# 2021 Product Catalog

Featuring 1,300+ new high performance end mills, an all new Stainless Steels & High Temp Alloys section, and expanded Titanium options.

# Let Us Impress You

## Exceptional, Fully Stocked Tooling

Helical has earned and maintained a reputation as an industry leading manufacturer of high performance carbide end mills. We consistently outperform other manufacturers by offering **extremely high quality, fully stocked cutting tools** at competitive prices, ensuring that you enjoy the best results while maximizing your shop's profitability.

## Unbeatable Custom Tool Experience

Helical's Custom-Engineered Solutions Program is designed to give you the best possible custom tool experience from end-to-end. We set ourselves apart with a team of engineers eager to understand every aspect of your project. Within 48 hours, we will return a quote with **expertly crafted geometries designed to produce extraordinary results** in your specific application. We'll then work with you to ensure proper tool setup and running parameters that deliver maximized performance.

## Outstanding Technical Expertise

Our team of experienced engineers live and breathe cutting tools and are enthusiastic about maximizing your shop floor productivity. Whether it be in your shop or over the phone, we have **knowledgeable technical field representatives and in-house tool experts** available to help you with tool selection, tool design, application support, and troubleshooting.

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Harvey Performance Company combines the leading Harvey Tool, Helical Solutions, Micro 100, and Titan USA brands to provide world class tooling, unmatched service, and innovative solutions that increase productivity for our customers.

HARVEY TOOL

**Think Harvey Tool First**

More than 24,000 miniature and specialty end mills. Ship today, in your machine tomorrow.

www.harveytool.com

Helical

**Let Helical Impress You**

Material-optimized high performance carbide end mills. Run faster, push harder, machine smarter.

www.helicaltool.com

MICRO 100

**Make More with Micro 100**

Exceptional quality turning tools designed for durability and performance in a range of difficult-to-machine materials.

www.micro100.com

TITAN USA
MADE IN THE U.S.A.

**Trust in Titan USA**

Broad assortment of premium quality, fully stocked, general purpose cutting tools of exceptional value.

www.titancuttingtools.com

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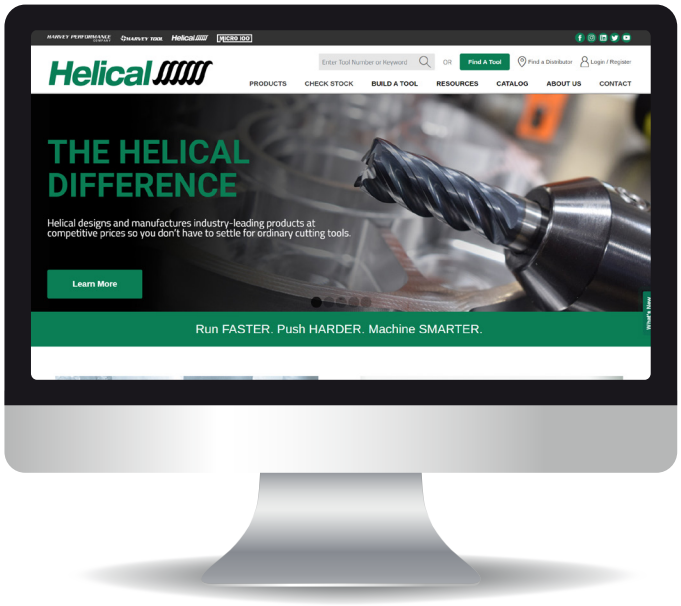
# Order Tools on Helicaltool.com

Did you know that you can place a Helical Solutions order directly to your distributor from our website? After creating your **Helicaltool.com** account, you're able to build and send "shopping carts" directly to your participating distributor to order. Learn more on **page 258**.




# The Helical Difference

At Helical, it is our goal to design and manufacture industry-leading products at competitive prices so you don't have to settle for ordinary cutting tools.

Helical end mills are built to last and **excel at aggressive running parameters,** meaning you will experience greatly reduced cycle times, heightened productivity, and superior part finish. This translates directly to savings and efficiencies in your shop, and positively affects your bottom line.

We offer **nearly 6,200 fully stocked tools** optimized for a variety of operations and designed for the unique challenges of non-ferrous and ferrous material groups. If you can't find what you're looking for, consider our custom-engineered solutions program (details on **page 234**).

## Our Tools Deliver

- ✓ Increased Metal Removal Rates
- ✓ Better Part Finish
- ✓ Extended Tool Life
- ✓ Improved Bottom Line

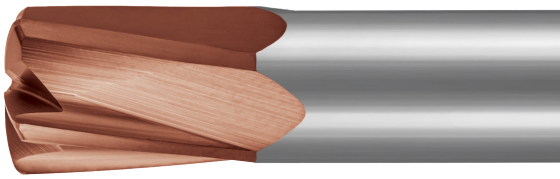
**11** End Mills for Aluminum Alloys & Non-Ferrous Materials

**67** End Mills for Steels, Tool Steels & Cast Iron

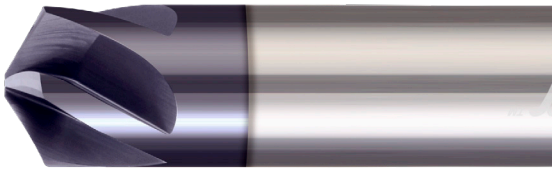
**161** End Mills for Stainless Steels & High Temp Alloys

**185** End Mills for Titanium & Titanium Alloys

**215** High Feed End Mills



**221** Specialty Profiles



# END MILLS FOR ALUMINUM Aluminum Alloys & Non-Ferrous Materials

## ROUGHERS


| | | | | PG |
|---|---|---|---|---|
| H35ALV-C-3 | 3 Flute | Corner Radius | 35° Helix - Chipbreaker Rougher - Variable Pitch | 12 |
| H35ALV-C-RN-3 | 3 Flute | Corner Radius | 35° Helix - Chipbreaker Rougherr - Variable Pitch - Reduced Neck | 14 |
| H45AL-C-3 | 3 Flute | Corner Radius | 45° Helix - Chipbreaker Rougher New Items! | 16 |
| H45AL-C-RN-3 | 3 Flute | Corner Radius | 45° Helix - Chipbreaker Rougher - Reduced Neck | 18 |


## 2 FLUTE


| | | | | PG |
|---|---|---|---|---|
| HMG-RN-2 | 2 Flute | Square | High Balance - Reduced Neck | 20 |
| HMG-RN-2 | 2 Flute | Corner Radius | High Balance - Reduced Neck | 21 |
| H45AL-2 | 2 Flute | Square | 45° Helix New Items! | 23 |
| H45AL-2 | 2 Flute | Ball | 45° Helix New Items! | 25 |
| H45AL-2 | 2 Flute | Corner Radius | 45° Helix | 26 |
| H45AL-RN-2 | 2 Flute | Square | 45° Helix - Reduced Neck New Items! | 27 |
| H45AL-RN-2 | 2 Flute | Ball | 45° Helix - Reduced Neck New Items! | 28 |


## 3 FLUTE


| | | | | PG |
|---|---|---|---|---|
| HMGC-RN-3 | 3 Flute | Square | Coolant Through - High Balance - Reduced Neck | 30 |
| HMGC-RN-3 | 3 Flute | Corner Radius | Coolant Through - High Balance - Reduced Neck | 31 |
| H35AL-3 | 3 Flute | Square | 35° Helix New Items! | 33 |
| MH35AL-3 | 3 Flute | Square | 35° Helix Metric | 35 |
| H35AL-3 | 3 Flute | Corner Radius | 35° Helix New Items! | 36 |
| MH35AL-3 | 3 Flute | Corner Radius | 35° Helix Metric | 39 |
| H35AL-RN-3 | 3 Flute | Square | 35° Helix - Reduced Neck New Items! | 41 |
| H40ALV-3 | 3 Flute | Square | 40° Helix - Variable Pitch New Items! | 43 |
| H40ALV-3 | 3 Flute | Ball | 40° Helix - Variable Pitch | 45 |
| H40ALV-3 | 3 Flute | Corner Radius | 40° Helix - Variable Pitch New Items! | 47 |
| H40ALV-RN-3 | 3 Flute | Square | 40° Helix - Variable Pitch - Reduced Neck New Items! | 51 |
| H40ALV-RN-3 | 3 Flute | Ball | 40° Helix - Variable Pitch - Reduced Neck New Items! | 53 |
| H40ALV-RN-3 | 3 Flute | Corner Radius | 40° Helix - Variable Pitch - Reduced Neck New Items! | 55 |
| H45AL-3 | 3 Flute | Square | 45° Helix New Items! | 59 |
| H45AL-3 | 3 Flute | Corner Radius | 45° Helix New Items! | 61 |
| H45AL-RN-3 | 3 Flute | Square | 45° Helix - Reduced Neck New Items! | 64 |

# Steels, Tool Steels, & Cast Iron **END MILLS FOR STEELS**

## ROUGHERS


| | | | | | PG |
|---|---|---|---|---|---|
| | HSVR-C-4 | 4 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch **New Items!** | 68 |
| | HSVR-C-RN-4 | 4 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch - Reduced Neck **New!** | 70 |
| | HEV-C-5 | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch **New Items!** | 72 |
| | HEV-C-RN-5 | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch - Reduced Neck **New!** | 74 |
| | HEV-C-6 | 6 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch **New Items!** | 76 |
| | HEV-C-7 | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch **New Items!** | 79 |
| | HEV-C-RN-7 | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch - Reduced Neck **New!** | 81 |
| | HXVR | Multi-Flute | Corner Radius | Knuckle Rougher - Variable Pitch **New Items!** | 83 |
| | HXVR-RN | Multi-Flute | Corner Radius | Knuckle Rougher - Variable Pitch - Reduced Neck **New Items!** | 84 |


## 3 FLUTE


| | | | | | PG |
|---|---|---|---|---|---|
| | HSV-3 | 3 Flute | Square | Variable Pitch | 87 |
| | HSV-3 | 3 Flute | Corner Radius | Variable Pitch | 88 |
| | HST-3 | 3 Flute | Ball | | 90 |
| | HST-3 | 3 Flute | Corner Radius | | 91 |
| | HST-RN-3 | 3 Flute | Ball | Reduced Neck | 92 |
| | HST-RN-3 | 3 Flute | Corner Radius | Reduced Neck | 93 |


## 4 FLUTE


| | | | | | PG |
|---|---|---|---|---|---|
| | HSV-4 | 4 Flute | Square | Variable Pitch **New Items!** | 95 |
| | MHSV-4 | 4 Flute | Square | Variable Pitch **Metric** | 97 |
| | HSV-4 | 4 Flute | Ball | Variable Pitch **New Items!** | 98 |
| | HSV-4 | 4 Flute | Corner Radius | Variable Pitch **New Items!** | 100 |
| | MHSV-4 | 4 Flute | Corner Radius | Variable Pitch **Metric** | 106 |
| | HSV-RN-4 | 4 Flute | Square | Variable Pitch - Reduced Neck **New Items!** | 108 |
| | HSV-RN-4 | 4 Flute | Ball | Variable Pitch - Reduced Neck **New Items!** | 110 |
| | HSV-RN-4 | 4 Flute | Corner Radius | Variable Pitch - Reduced Neck **New Items!** | 112 |


End Mills for Steels continues on next page

# END MILLS FOR STEELS Steels, Tool Steels, & Cast Iron (cont.)


## 5 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| HEV-5 | 5 Flute | Square | Variable Pitch | New Items! | | 116 |
| MHEV-5 | 5 Flute | Square | Variable Pitch | Metric | | 118 |
| HEV-5 | 5 Flute | Corner Radius | Variable Pitch | New Items! | | 119 |
| MHEV-5 | 5 Flute | Corner Radius | Variable Pitch | Metric | | 125 |
| HEV-RN-5 | 5 Flute | Square | Variable Pitch - Reduced Neck | | New Items! | 127 |
| HEV-RN-5 | 5 Flute | Corner Radius | Variable Pitch - Reduced Neck | | New Items! | 129 |
| HEF-5 | 5 Flute | Square | Finisher | | | 133 |

## 6 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| HEV-6 | 6 Flute | Square | Variable Pitch | | | 136 |
| MHEV-6 | 6 Flute | Square | Variable Pitch | Metric | | 137 |
| HEV-6 | 6 Flute | Ball | Variable Pitch | New Items! | | 138 |
| HEV-6 | 6 Flute | Corner Radius | Variable Pitch | New Items! | | 139 |
| MHEV-6 | 6 Flute | Corner Radius | Variable Pitch | Metric | | 142 |
| HEV-RN-6 | 6 Flute | Square | Variable Pitch - Reduced Neck | | | 144 |
| HEV-RN-6 | 6 Flute | Ball | Variable Pitch - Reduced Neck | | | 145 |
| HEV-RN-6 | 6 Flute | Corner Radius | Variable Pitch - Reduced Neck | | | 146 |

## 7 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| HEV-7 | 7 Flute | Square | Variable Pitch | New Items! | | 148 |
| MHEV-7 | 7 Flute | Square | Variable Pitch | Metric | | 149 |
| HEV-7 | 7 Flute | Corner Radius | Variable Pitch | New Items! | | 150 |
| MHEV-7 | 7 Flute | Corner Radius | Variable Pitch | Metric | | 152 |
| HEV-RN-7 | 7 Flute | Square | Variable Pitch - Reduced Neck | | New! | 154 |
| HEV-RN-7 | 7 Flute | Corner Radius | Variable Pitch - Reduced Neck | | New! | 155 |
| HSF-7 | 7 Flute | Square | Finisher | | | 157 |

## MULTI-FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| HXF | Multi-Flute | Corner Radius | Finisher | New Items! | | 159 |

# END MILLS FOR STAINLESS STEELS & HIGH TEMP ALLOYS


## ROUGHERS

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-C-5 | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | New! | 162 |
| | HEV-C-6 | 6 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | New! | 163 |
| | HEV-C-7 | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | New! | 164 |
| | HXVR | Multi-Flute | Corner Radius | Knuckle Rougher - Variable Pitch | New! | 165 |

## 4 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HSV-4 | 4 Flute | Square | Variable Pitch | New Items! | 166 |
| | HSV-4 | 4 Flute | Ball | Variable Pitch | New! | 168 |
| | HSV-4 | 4 Flute | Corner Radius | Variable Pitch | New Items! | 169 |

## 5 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-5 | 5 Flute | Square | Variable Pitch | New Items! | 171 |
| | HEV-5 | 5 Flute | Corner Radius | Variable Pitch | New Items! | 173 |

## 6 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-6 | 6 Flute | Square | Variable Pitch | New Items! | 177 |
| | HEV-6 | 6 Flute | Ball | Variable Pitch | New Items! | 178 |
| | HEV-6 | 6 Flute | Corner Radius | Variable Pitch | New Items! | 179 |

## 7 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-7 | 7 Flute | Square | Variable Pitch | New Items! | 182 |
| | HEV-7 | 7 Flute | Corner Radius | Variable Pitch | New Items! | 183 |

## MULTI-FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HXF | Multi-Flute | Corner Radius | Finisher | New Items! | 184 |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# END MILLS FOR TITANIUM Titanium & Titanium Alloys


## ROUGHERS

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-C-5 | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | New Items! | 186 |
| | HEV-C-6 | 6 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | New Items! | 188 |
| | HEV-C-7 | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | New Items! | 190 |

## 5 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-5 | 5 Flute | Corner Radius | Variable Pitch | New Items! | 192 |
| | MHEV-5 | 5 Flute | Corner Radius | Variable Pitch | Metric | 198 |

## 6 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HVTI | 6 Flute | Corner Radius | Variable Pitch - For High Efficiency Milling | New Items! | 200 |
| | HEV-6 | 6 Flute | Ball | Variable Pitch | New Items! | 203 |
| | HEV-6 | 6 Flute | Corner Radius | Variable Pitch | New Items! | 204 |
| | MHEV-6 | 6 Flute | Corner Radius | Variable Pitch | Metric | 207 |

## 7 FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HEV-7 | 7 Flute | Corner Radius | Variable Pitch | New Items! | 209 |
| | MHEV-7 | 7 Flute | Corner Radius | Variable Pitch | Metric | 211 |

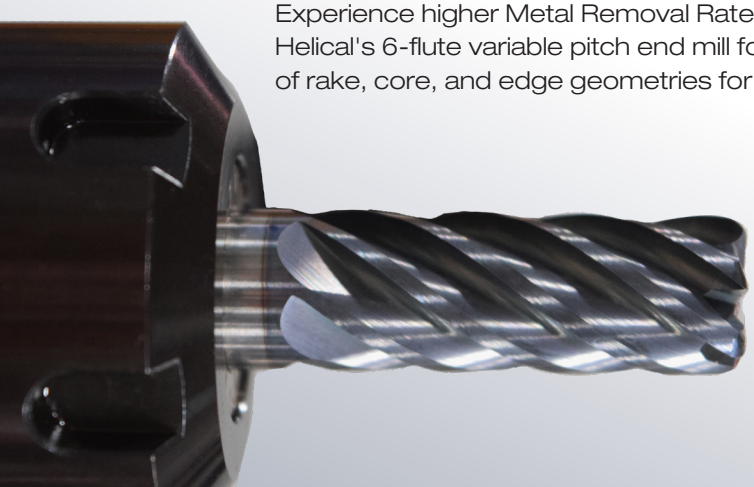
## MULTI-FLUTE

| | | | | | | PG |
|---|---|---|---|---|---|---|
| | HXF | Multi-Flute | Corner Radius | Finisher | New Items! | 213 |


## MADE FOR HIGH EFFICIENCY MILLING (HEM)

### HVTI-6 End Mill for Titanium pg 200

Experience higher Metal Removal Rates (MRR) and enjoy 20% more time in the cut with Helical's 6-flute variable pitch end mill for titanium, designed with a unique combination of rake, core, and edge geometries for exceptionally reliable and controlled wear.



Extensive testing in Ti 6-4 has proven its excellence in extending tool life and elevating part quality. This tool is a workhorse for HEM in Titanium.

# HIGH FEED END MILLS

## FOR STEELS UP TO 45 RC


| | | | PG |
|---|---|---|---|
| HFV | Steels Up to 45 Rc - Variable Pitch - Reduced Neck | New Items! | 216 |
| MHFV | Steels Up to 45 Rc - Variable Pitch - Reduced Neck | Metric | 217 |
| HFVC | Steels Up to 45 Rc - Variable Pitch - Coolant Through - Reduced Neck | New Items! | 218 |
| MHFVC | Steels Up to 45 Rc - Variable Pitch - Coolant Through - Reduced Neck | Metric | 219 |


# SPECIALTY PROFILES

## CHAMFER MILLS


| | | | | PG |
|---|---|---|---|---|
| HCM | 2 & 4 Flute Chamfer | Straight Flute | | 222 |
| HPCM | 2 & 4 Flute Chamfer | Helical Flute - High Performance - Pointed | New! | 224 |
| HPCM | 3 & 5 Flute Chamfer | Helical Flute - High Performance - Tipped Off | New Items! | 225 |


## COMBINATION CHAMFER / END MILLS


| | | | | PG |
|---|---|---|---|---|
| HCCM | 4 Flute - Combination Chamfer / End Mill - High Performance | | New! | 228 |


# TECHNICAL INFORMATION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## CAM Partners

AUTODESK® FUSION 360 · AUTODESK® HSM · CAMWorks · ESPRIT® CAM System · GibbsCAM® · Mastercam · SolidCAM iMachining – The Revolution in CAM!

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Look for additional industry-leading CAM partners in 2021.

# OUR COATINGS

## Standard Coatings

| Materials: | Wrought Aluminum, Cast Aluminum, Graphite, and Other Non-Ferrous Materials | Low Alloy Steels, Medium Alloy Steels, Tool Steels, Cast Iron, and Titanium | Stainless Steels, High Temp Alloys, Hardened Steels |
|---|---|---|---|
| Coating: | ***Zplus***<br>*Zplus* provides higher hardness, lubricity, and abrasion resistance. While it's specifically engineered for aluminum applications, it is also an optimal coating for other non-ferrous materials. Zplus holds up well in abrasive materials and reduces the chance of built-upedge in softer, gummy alloys.<br> | ***Aplus***<br>*Aplus* allows for high temperature resistance, decreased wear, and improved tool life. Proven to work in high speed machining and dry conditions, these benefits are seen in a wide range of ferrous materials and titanium alloys.<br> | ***Tplus***<br>*Tplus* is an ideal choice for increased wear resistance and edge strength in stainless steels, high temp alloys, and hardened steels up to 65Rc. Also an excellent choice for increased wear resistance in a wide variety of ferrous materials.<br> |
| Max. Usage Temp: | 1,110° F | 2,012° F | 2,192° F |
| Microhardness (HV 0.05): | 2243 (22 GPa) | 4079 (40 GPa) | 4487 (44 GPa) |
| Coeffecient of Friction: | 0.40 | 0.45 | 0.35 |
| Coating Color: | light gold / champagne | black / grey | copper |

## Experience the Benefits of T*plus* Coating in Stainless Steels & High Temp Alloys!!

T*plus* is the superior coating choice for difficult material families such as stainless steel, high temp alloys, and hardened steels up to 65Rc.

Unique features include:

- Higher hardness (44 GPa) for extended tool life
- Increased edge strength for use in difficult, abrasive materials and hardened steels (up to 65 Rc)
- Low coefficient of friction for superior chip flow

T*plus* can also be an excellent option for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron.

Machinists with high quality, vibration-free, rigid machine setups will experience even greater tool performance with our T*plus* coating offering.

**Our T*plus* coating produces excellent results in stainless steels, high-temp alloys, and high hardness materials up to 65Rc.**

# END MILLS FOR ALUMINUM

## Aluminum Alloys & Non-Ferrous Materials

With proven performance in industry-leading shops, our End Mills for Aluminum are deigned with geometries proven to accelerate metal removal rates and achieve a quality finish in aluminum and non-ferrous materials. The end mills in this section are stocked uncoated or with a *Zplus* coating and in 3 helix angles: 35°, 40°, and 45°.

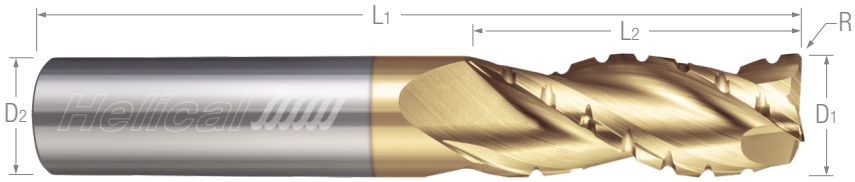
| | ROUGHERS | | | PG |
|---|---|---|---|---|
| | 3 Flute | Corner Radius | 35° Helix - Variable Pitch - Chipbreaker Rougher | 12 |
| | 3 Flute | Corner Radius | 35° Helix - Variable Pitch - Chipbreaker Rougher - Reduced Neck | 14 |
| new | 3 Flute | Corner Radius | 45° Helix - Chipbreaker Rougher | 16 |
| | 3 Flute | Corner Radius | 45° Helix - Chipbreaker Rougher - Reduced Neck | 18 |
| | **2 FLUTE** | | | **PG** |
| | 2 Flute | Square | High Balance - Reduced Neck | 20 |
| | 2 Flute | Corner Radius | High Balance - Reduced Neck | 21 |
| new | 2 Flute | Square | 45° Helix | 23 |
| new | 2 Flute | Ball | 45° Helix | 25 |
| | 2 Flute | Corner Radius | 45° Helix | 26 |
| new | 2 Flute | Square | 45° Helix - Reduced Neck | 27 |
| new | 2 Flute | Ball | 45° Helix - Reduced Neck | 28 |
| | **3 FLUTE** | | | **PG** |
| | 3 Flute | Square | Coolant Through - High Balance - Reduced Neck | 30 |
| | 3 Flute | Corner Radius | Coolant Through - High Balance - Reduced Neck | 31 |
| new | 3 Flute | Square | 35° Helix | 33 |
| | 3 Flute | Square | 35° Helix - Metric | 35 |
| new | 3 Flute | Corner Radius | 35° Helix | 36 |
| | 3 Flute | Corner Radius | 35° Helix - Metric | 39 |
| new | 3 Flute | Square | 35° Helix - Reduced Neck | 41 |
| new | 3 Flute | Square | 40° Helix - Variable Pitch | 43 |
| | 3 Flute | Ball | 40° Helix - Variable Pitch | 45 |
| new | 3 Flute | Corner Radius | 40° Helix - Variable Pitch | 47 |
| new | 3 Flute | Square | 40° Helix - Variable Pitch - Reduced Neck | 51 |
| new | 3 Flute | Ball | 40° Helix - Variable Pitch - Reduced Neck | 53 |
| new | 3 Flute | Corner Radius | 40° Helix - Variable Pitch - Reduced Neck | 55 |
| new | 3 Flute | Square | 45° Helix | 59 |
| new | 3 Flute | Corner Radius | 45° Helix | 61 |
| new | 3 Flute | Square | 45° Helix - Reduced Neck | 64 |

# 3 FLUTE - CORNER RADIUS

## H35ALV-C-3

### 35° Helix - Variable Pitch - Chipbreaker Rougher

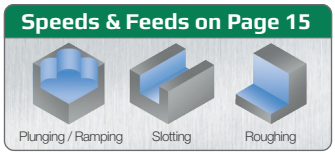
- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Engineered with optimized variable pitch and chipbreaker geometry for reduced harmonics and elevated material removal rates
- Unique tool design requires less torque and horsepower
- Unique "3 teeth-to-center" end geometry for ramping applications
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 3 | **82101** | **82102** | H35ALV-C-020-30125-R.010 |
| | 1/8 | **.010** | 3/8 | 2 | 3 | **82103** | **82104** | H35ALV-C-030-30125-R.010 |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 3 | **82105** | **82106** | H35ALV-C-040-30125-R.010 |
| 3/16 | 3/16 | **.010** | 5/16 | 2 | 3 | **82107** | **82108** | H35ALV-C-016-30187-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 3 | **82109** | **82110** | H35ALV-C-030-30187-R.010 |
| | 3/16 | **.010** | 3/4 | 2-1/2 | 3 | **82111** | **82112** | H35ALV-C-040-30187-R.010 |
| 1/4 | 1/4 | **.010** | 1/2 | 2-1/2 | 3 | **81991** | **81992** | H35ALV-C-020-30250-R.010 |
| | 1/4 | **.010** | 3/4 | 2-1/2 | 3 | **81993** | **81994** | H35ALV-C-030-30250-R.010 |
| | 1/4 | **.010** | 1 | 3 | 3 | **81995** | **81996** | H35ALV-C-040-30250-R.010 |
| | 1/4 | **.010** | 1-1/4 | 3 | 3 | **82113** | **82114** | H35ALV-C-050-30250-R.010 |
| | 1/4 | **.015** | 1/2 | 2-1/2 | 3 | **82115** | **82116** | H35ALV-C-020-30250-R.015 |
| | 1/4 | **.015** | 3/4 | 2-1/2 | 3 | **82117** | **82118** | H35ALV-C-030-30250-R.015 |
| | 1/4 | **.020** | 1/2 | 2-1/2 | 3 | **82119** | **82120** | H35ALV-C-020-30250-R.020 |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 3 | **82121** | **82122** | H35ALV-C-030-30250-R.020 |
| | 1/4 | **.030** | 1/2 | 2-1/2 | 3 | **81997** | **81998** | H35ALV-C-020-30250-R.030 |
| | 1/4 | **.030** | 3/4 | 2-1/2 | 3 | **81999** | **82000** | H35ALV-C-030-30250-R.030 |
| | 1/4 | **.030** | 1 | 3 | 3 | **82001** | **82002** | H35ALV-C-040-30250-R.030 |
| 3/8 | 3/8 | **.010** | 1/2 | 2 | 3 | **82123** | **82124** | H35ALV-C-013-30375-R.010 |
| | 3/8 | **.010** | 1 | 3 | 3 | **82125** | **82126** | H35ALV-C-026-30375-R.010 |
| | 3/8 | **.010** | 1-1/4 | 3-1/2 | 3 | **82127** | **82128** | H35ALV-C-033-30375-R.010 |
| | 3/8 | **.020** | 1/2 | 2 | 3 | **82129** | **82130** | H35ALV-C-013-30375-R.020 |
| | 3/8 | **.020** | 1 | 3 | 3 | **82131** | **82132** | H35ALV-C-026-30375-R.020 |
| | 3/8 | **.020** | 1-1/4 | 3-1/2 | 3 | **82133** | **82134** | H35ALV-C-033-30375-R.020 |
| | 3/8 | **.030** | 1/2 | 2 | 3 | **82003** | **82004** | H35ALV-C-013-30375-R.030 |
| | 3/8 | **.030** | 1 | 3 | 3 | **82005** | **82006** | H35ALV-C-026-30375-R.030 |
| | 3/8 | **.030** | 1-1/4 | 3-1/2 | 3 | **82007** | **82008** | H35ALV-C-033-30375-R.030 |
| | 3/8 | **.060** | 1/2 | 2 | 3 | **82009** | **82010** | H35ALV-C-013-30375-R.060 |
| | 3/8 | **.060** | 1 | 3 | 3 | **82011** | **82012** | H35ALV-C-026-30375-R.060 |
| | 3/8 | **.060** | 1-1/4 | 3-1/2 | 3 | **82013** | **82014** | H35ALV-C-033-30375-R.060 |

continued on next page

Speeds & Feeds on Page 15



# H35ALV-C-3

## 3 FLUTE - CORNER RADIUS

### 35° Helix - Variable Pitch - Chipbreaker Rougher (cont.)



continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | **.010** | 5/8 | 2-1/2 | 3 | **82135** | **82136** | H35ALV-C-012-30500-R.010 |
| | 1/2 | **.010** | 1 | 3 | 3 | **82137** | **82138** | H35ALV-C-020-30500-R.010 |
| | 1/2 | **.010** | 1-1/4 | 3 | 3 | **82139** | **82140** | H35ALV-C-025-30500-R.010 |
| | 1/2 | **.010** | 1-5/8 | 4 | 3 | **82141** | **82142** | H35ALV-C-032-30500-R.010 |
| | 1/2 | **.020** | 5/8 | 2-1/2 | 3 | **82143** | **82144** | H35ALV-C-012-30500-R.020 |
| | 1/2 | **.020** | 1 | 3 | 3 | **82145** | **82146** | H35ALV-C-020-30500-R.020 |
| | 1/2 | **.020** | 1-1/4 | 3 | 3 | **82147** | **82148** | H35ALV-C-025-30500-R.020 |
| | 1/2 | **.020** | 1-5/8 | 4 | 3 | **82149** | **82150** | H35ALV-C-032-30500-R.020 |
| | 1/2 | **.030** | 5/8 | 2-1/2 | 3 | **82015** | **82016** | H35ALV-C-012-30500-R.030 |
| | 1/2 | **.030** | 1 | 3 | 3 | **82017** | **82018** | H35ALV-C-020-30500-R.030 |
| | 1/2 | **.030** | 1-1/4 | 3 | 3 | **82019** | **82020** | H35ALV-C-025-30500-R.030 |
| | 1/2 | **.030** | 1-5/8 | 4 | 3 | **82021** | **82022** | H35ALV-C-032-30500-R.030 |
| | 1/2 | **.030** | 2 | 4 | 3 | **82023** | **82024** | H35ALV-C-040-30500-R.030 |
| | 1/2 | **.030** | 2-1/2 | 5 | 3 | **82151** | **82152** | H35ALV-C-050-30500-R.030 |
| | 1/2 | **.060** | 5/8 | 2-1/2 | 3 | **82025** | **82026** | H35ALV-C-012-30500-R.060 |
| | 1/2 | **.060** | 1 | 3 | 3 | **82027** | **82028** | H35ALV-C-020-30500-R.060 |
| | 1/2 | **.060** | 1-1/4 | 3 | 3 | **82029** | **82030** | H35ALV-C-025-30500-R.060 |
| | 1/2 | **.060** | 1-5/8 | 4 | 3 | **82031** | **82032** | H35ALV-C-032-30500-R.060 |
| | 1/2 | **.060** | 2 | 4 | 3 | **82033** | **82034** | H35ALV-C-040-30500-R.060 |
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 3 | **82035** | **82036** | H35ALV-C-012-30625-R.030 |
| | 5/8 | **.030** | 1-5/8 | 3-1/2 | 3 | **82037** | **82038** | H35ALV-C-026-30625-R.030 |
| | 5/8 | **.060** | 3/4 | 3 | 3 | **82039** | **82040** | H35ALV-C-012-30625-R.060 |
| | 5/8 | **.060** | 1-5/8 | 3-1/2 | 3 | **82041** | **82042** | H35ALV-C-026-30625-R.060 |
| 3/4 | 3/4 | **.010** | 1-5/8 | 4 | 3 | **82153** | **82154** | H35ALV-C-021-30750-R.010 |
| | 3/4 | **.010** | 2-1/4 | 5 | 3 | **82155** | **82156** | H35ALV-C-030-30750-R.010 |
| | 3/4 | **.030** | 1-5/8 | 4 | 3 | **82043** | **82044** | H35ALV-C-021-30750-R.030 |
| | 3/4 | **.030** | 2-1/4 | 5 | 3 | **82045** | **82046** | H35ALV-C-030-30750-R.030 |
| | 3/4 | **.030** | 3-1/4 | 6 | 3 | **82047** | **82048** | H35ALV-C-043-30750-R.030 |
| | 3/4 | **.060** | 1-5/8 | 4 | 3 | **82049** | **82050** | H35ALV-C-021-30750-R.060 |
| | 3/4 | **.060** | 2-1/4 | 5 | 3 | **82051** | **82052** | H35ALV-C-030-30750-R.060 |
| | 3/4 | **.060** | 3-1/4 | 6 | 3 | **82053** | **82054** | H35ALV-C-043-30750-R.060 |
| | 3/4 | **.125** | 1-5/8 | 4 | 3 | **82157** | **82158** | H35ALV-C-021-30750-R.125 |
| | 3/4 | **.125** | 2-1/4 | 5 | 3 | **82159** | **82160** | H35ALV-C-030-30750-R.125 |
| 1 | 1 | **.030** | 2 | 5 | 3 | **82055** | **82056** | H35ALV-C-020-31000-R.030 |
| | 1 | **.060** | 2 | 5 | 3 | **82057** | **82058** | H35ALV-C-020-31000-R.060 |

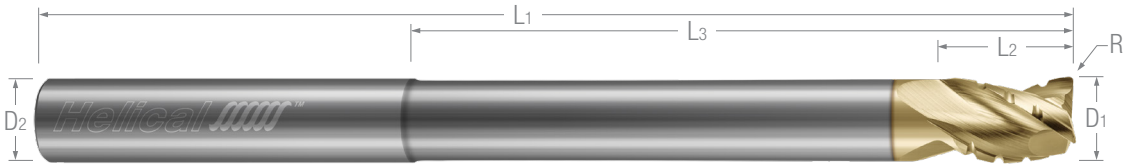
* .0003 max TIR

# 3 FLUTE - CORNER RADIUS

## H35ALV-C-RN-3

### 35° Helix - Variable Pitch - Chipbreaker Rougher - Reduced Neck

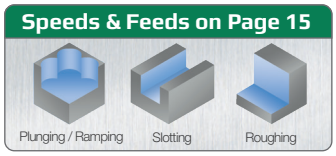
- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Engineered with optimized variable pitch and chipbreaker geometry for reduced harmonics and elevated material removal rates
- Unique tool design requires less torque and horsepower
- Excellent performance in High Efficiency Milling (HEM)
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.010** | 3/8 | 4 | 1-1/8 | .237 | 3 | **82161** | **82162** | H35ALV-C-RN-045-30250-R.010 |
| | 1/4 | **.010** | 3/8 | 4 | 1-5/8 | .237 | 3 | **82163** | **82164** | H35ALV-C-RN-065-30250-R.010 |
| | 1/4 | **.010** | 3/8 | 4 | 2-1/8 | .237 | 3 | **82165** | **82166** | H35ALV-C-RN-085-30250-R.010 |
| | 1/4 | **.010** | 3/8 | 4 | 2-1/2 | .237 | 3 | **82167** | **82168** | H35ALV-C-RN-100-30250-R.010 |
| 3/8 | 3/8 | **.030** | 1/2 | 4 | 1-1/8 | .356 | 3 | **82169** | **82170** | H35ALV-C-RN-030-30375-R.030 |
| | 3/8 | **.030** | 1/2 | 4 | 1-5/8 | .356 | 3 | **82171** | **82172** | H35ALV-C-RN-043-30375-R.030 |
| | 3/8 | **.030** | 1/2 | 4 | 2-1/8 | .356 | 3 | **82173** | **82174** | H35ALV-C-RN-056-30375-R.030 |
| | 3/8 | **.030** | 1/2 | 5 | 2-1/2 | .356 | 3 | **82175** | **82176** | H35ALV-C-RN-066-30375-R.030 |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-3/8 | .475 | 3 | **82177** | **82178** | H35ALV-C-RN-027-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 4 | 1-3/4 | .475 | 3 | **82179** | **82180** | H35ALV-C-RN-035-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 4 | 2-1/4 | .475 | 3 | **82181** | **82182** | H35ALV-C-RN-045-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 3 | **82183** | **82184** | H35ALV-C-RN-067-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/4 | .475 | 3 | **82185** | **82186** | H35ALV-C-RN-085-30500-R.030 |
| | 1/2 | **.060** | 5/8 | 4 | 1-3/8 | .475 | 3 | **82187** | **82188** | H35ALV-C-RN-027-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 4 | 1-3/4 | .475 | 3 | **82189** | **82190** | H35ALV-C-RN-035-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 4 | 2-1/4 | .475 | 3 | **82191** | **82192** | H35ALV-C-RN-045-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 6 | 3-3/8 | .475 | 3 | **82193** | **82194** | H35ALV-C-RN-067-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 6 | 4-1/4 | .475 | 3 | **82195** | **82196** | H35ALV-C-RN-085-30500-R.060 |
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 3 | **82197** | **82198** | H35ALV-C-RN-026-30750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 3 | **82199** | **82200** | H35ALV-C-RN-033-30750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 3 | .712 | 3 | **82201** | **82202** | H35ALV-C-RN-040-30750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 3 | **82203** | **82204** | H35ALV-C-RN-045-30750-R.030 |
| | 3/4 | **.060** | 1 | 4 | 2 | .712 | 3 | **82205** | **82206** | H35ALV-C-RN-026-30750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 2-1/2 | .712 | 3 | **82207** | **82208** | H35ALV-C-RN-033-30750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 3 | .712 | 3 | **82209** | **82210** | H35ALV-C-RN-040-30750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 3-3/8 | .712 | 3 | **82211** | **82212** | H35ALV-C-RN-045-30750-R.060 |

* .0003 max TIR

**Speeds & Feeds on Page 15**



# H35ALV-C-3

## SPEEDS & FEEDS

3 Flute - 35° Helix - Variable Pitch - Chipbreaker Rougher



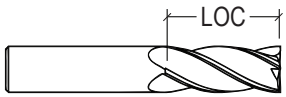
## H35ALV-C-3 / H35ALV-C-RN-3

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0007 | .0013 | .0011 | .0020 | .0014 | .0026 | .0021 | .0039 | .0027 | .0051 | .0039 | .0073 | .0050 | .0094 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0011 | .0021 | .0017 | .0031 | .0022 | .0041 | .0033 | .0061 | .0043 | .0080 | .0061 | .0114 | .0078 | .0145 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0008 | .0014 | .0011 | .0021 | .0015 | .0028 | .0022 | .0041 | .0029 | .0053 | .0041 | .0076 | .0052 | .0097 |

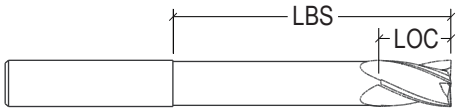
| Milling Process | Style | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | Non-Reached | 75%-125% Diameter | 100% Diameter |
| | Reached | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Non-Reached | 125%-200% Diameter | 30%-40% Diameter |
| | Reached | Up to Max LOC | 30%-40% Diameter |

NOTES:

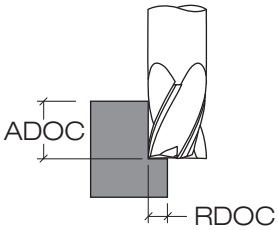
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.




Regular Style




Reduced Neck Style




**Key: LOC=Length of Cut** **ADOC=Axial Depth of Cut** **RDOC=Radial Depth of Cut**

Access customized running parameters for your specific setup and material at
www.machiningadvisorpro.com
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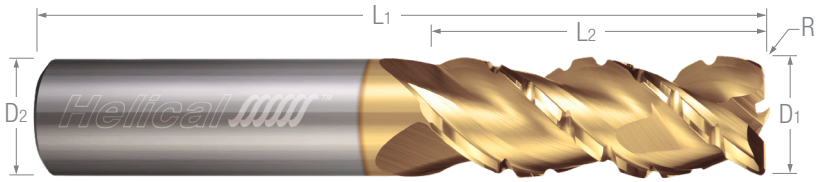
# 3 FLUTE - CORNER RADIUS New Items!

## H45AL-C-3

### 45° Helix - Chipbreaker Rougher

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Engineered with high helix and chipbreaker geometry for optimal chip evacuation and a semi-finished surface
- Unique tool design requires less torque and horsepower
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2{}^{+.032"}_{-.000"}$ | OAL $L_1{}^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 1/2 | 2-1/2 | 3 | 82717 | 82718 | H45AL-C-SR-30250-R.010 | new |
| | 1/4 | .010 | 3/4 | 2-1/2 | 3 | 82719 | 82720 | H45AL-C-R-30250-R.010 | new |
| | 1/4 | .010 | 1 | 3 | 3 | 82721 | 82722 | H45AL-C-M-30250-R.010 | new |
| | 1/4 | .020 | 3/8 | 2 | 3 | 29120 | 29122 | H45AL-C-S-30250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 3 | 29135 | 29137 | H45AL-C-SR-30250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 3 | 29150 | 29152 | H45AL-C-R-30250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 3 | 29165 | 29167 | H45AL-C-M-30250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 3 | 29180 | 29182 | H45AL-C-L-30250-R.020 | |
| 5/16 | 5/16 | .020 | 13/16 | 2-1/2 | 3 | 29225 | 29227 | H45AL-C-R-30312-R.020 | new |
| | 5/16 | .020 | 1 | 3 | 3 | 29240 | 29242 | H45AL-C-M-30312-R.020 | |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 3 | 29285 | 29287 | H45AL-C-S-30375-R.020 | |
| | 3/8 | .020 | 3/4 | 2-1/2 | 3 | 81305 | 81306 | H45AL-C-SR-30375-R.020 | |
| | 3/8 | .020 | 1 | 3 | 3 | 29300 | 29302 | H45AL-C-R-30375-R.020 | |
| | 3/8 | .020 | 1-1/4 | 3-1/2 | 3 | 29315 | 29317 | H45AL-C-M-30375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 4 | 3 | 29330 | 29332 | H45AL-C-L-30375-R.020 | |
| | 3/8 | .020 | 2 | 4 | 3 | 29345 | 29347 | H45AL-C-LX-30375-R.020 | |
| | 3/8 | .060 | 1/2 | 2 | 3 | 82723 | 82724 | H45AL-C-S-30375-R.060 | new |
| | 3/8 | .060 | 1 | 3 | 3 | 82725 | 82726 | H45AL-C-R-30375-R.060 | new |
| | 3/8 | .060 | 1-1/4 | 3-1/2 | 3 | 82727 | 82728 | H45AL-C-M-30375-R.060 | new |
| 1/2 | 1/2 | .010 | 1 | 3 | 3 | 82729 | 82730 | H45AL-C-SR-30500-R.010 | new |
| | 1/2 | .010 | 1-1/4 | 3 | 3 | 82731 | 82732 | H45AL-C-R-30500-R.010 | new |
| | 1/2 | .010 | 1-5/8 | 4 | 3 | 82733 | 82734 | H45AL-C-M-30500-R.010 | new |
| | 1/2 | .010 | 2 | 4 | 3 | 82735 | 82736 | H45AL-C-L-30500-R.010 | new |
| | 1/2 | .030 | 5/8 | 2-1/2 | 3 | 29375 | 29377 | H45AL-C-S-30500-R.030 | |
| | 1/2 | .030 | 1 | 3 | 3 | 29390 | 29392 | H45AL-C-SR-30500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 3 | 29405 | 29407 | H45AL-C-R-30500-R.030 | |
| | 1/2 | .030 | 1-5/8 | 4 | 3 | 29420 | 29422 | H45AL-C-M-30500-R.030 | |
| | 1/2 | .030 | 2 | 4 | 3 | 29435 | 29437 | H45AL-C-L-30500-R.030 | |
| | 1/2 | .030 | 2-1/2 | 5 | 3 | 29450 | 29452 | H45AL-C-LX-30500-R.030 | |
| | 1/2 | .030 | 3-1/8 | 6 | 3 | 29465 | 29467 | H45AL-C-X-30500-R.030 | |

* .0003 max TIR

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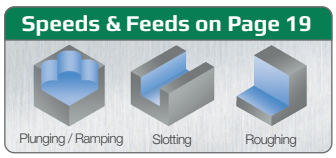
Speeds & Feeds on Page 19



# H45AL-C-3

New Items!

## 3 FLUTE - CORNER RADIUS

### 45° Helix - Chipbreaker Rougher (cont.)



continued from previous page

| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| new | 1/2 | 1/2 | **.060** | 1 | 3 | 3 | 82737 | 82738 | H45AL-C-SR-30500-R.060 |
| new | | 1/2 | **.060** | 1-1/4 | 3 | 3 | 82739 | 82740 | H45AL-C-R-30500-R.060 |
| new | | 1/2 | **.060** | 1-5/8 | 4 | 3 | 82741 | 82742 | H45AL-C-M-30500-R.060 |
| new | | 1/2 | **.060** | 2 | 4 | 3 | 82743 | 82744 | H45AL-C-L-30500-R.060 |
| | 5/8 | 5/8 | **.030** | 3/4 | 3 | 3 | 29480 | 29482 | H45AL-C-S-30625-R.030 |
| | | 5/8 | **.030** | 1-5/8 | 3-1/2 | 3 | 29495 | 29497 | H45AL-C-R-30625-R.030 |
| | | 5/8 | **.030** | 2-1/8 | 4 | 3 | 29510 | 29512 | H45AL-C-M-30625-R.030 |
| new | | 5/8 | **.030** | 2-1/2 | 5 | 3 | 29525 | 29527 | H45AL-C-L-30625-R.030 |
| | 3/4 | 3/4 | **.030** | 1 | 4 | 3 | 29570 | 29572 | H45AL-C-S-30750-R.030 |
| | | 3/4 | **.030** | 1-5/8 | 4 | 3 | 29585 | 29587 | H45AL-C-R-30750-R.030 |
| | | 3/4 | **.030** | 2 | 4 | 3 | 81307 | 81308 | H45AL-C-A-30750-R.030 |
| | | 3/4 | **.030** | 2-1/4 | 5 | 3 | 29600 | 29602 | H45AL-C-M-30750-R.030 |
| | | 3/4 | **.030** | 2-3/4 | 5 | 3 | 81309 | 81310 | H45AL-C-ML-30750-R.030 |
| | | 3/4 | **.030** | 3-1/4 | 6 | 3 | 29615 | 29617 | H45AL-C-L-30750-R.030 |
| new | | 3/4 | **.030** | 4 | 6-1/2 | 3 | 29630 | 29632 | H45AL-C-X-30750-R.030 |
| new | | 3/4 | **.060** | 1-5/8 | 4 | 3 | 82745 | 82746 | H45AL-C-R-30750-R.060 |
| new | | 3/4 | **.060** | 2-1/4 | 5 | 3 | 82747 | 82748 | H45AL-C-M-30750-R.060 |
| new | | 3/4 | **.060** | 3-1/4 | 6 | 3 | 82749 | 82750 | H45AL-C-L-30750-R.060 |
| | 1 | 1 | **.030** | 1-1/4 | 4 | 3 | 29645 | 29647 | H45AL-C-S-31000-R.030 |
| | | 1 | **.030** | 2 | 5 | 3 | 29660 | 29662 | H45AL-C-R-31000-R.030 |
| | | 1 | **.030** | 2-5/8 | 6 | 3 | 29675 | 29677 | H45AL-C-M-31000-R.030 |
| | | 1 | **.030** | 3-1/4 | 6 | 3 | 29690 | 29692 | H45AL-C-L-31000-R.030 |
| | | 1 | **.030** | 4-1/8 | 7 | 3 | 29705 | 29707 | H45AL-C-X-31000-R.030 |

* .0003 max TIR

# 3 FLUTE - CORNER RADIUS New Items!

## 45° Helix - Chipbreaker Rougher - Reduced Neck

HEM

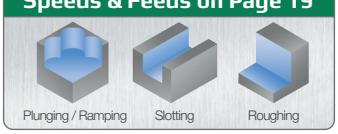
**H45AL-C-RN-3**

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Engineered with high helix and chipbreaker geometry for optimal chip evacuation and a semi-finished surface
- Unique tool design requires less torque and horsepower
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R$ +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 3/8 | 4 | 3/4 | .237 | 3 | **28105** | **28107** | H45AL-C-RN-S-30250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 1-1/8 | .237 | 3 | **28120** | **28122** | H45AL-C-RN-R-30250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 1-5/8 | .237 | 3 | **82751** | **82752** | H45AL-C-RN-A-30250-R.020 | new |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/8 | .237 | 3 | **28135** | **28137** | H45AL-C-RN-M-30250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/2 | .237 | 3 | **82753** | **82754** | H45AL-C-RN-ML-30250-R.020 | new |
| 5/16 | 5/16 | **.020** | 7/16 | 4 | 1-1/8 | .296 | 3 | **28165** | **28167** | H45AL-C-RN-R-30312-R.020 | |
| | 5/16 | **.020** | 7/16 | 4 | 2-1/8 | .296 | 3 | **28180** | **28182** | H45AL-C-RN-M-30312-R.020 | |
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 3 | **28210** | **28212** | H45AL-C-RN-R-30375-R.020 | |
| | 3/8 | **.020** | 1/2 | 4 | 1-5/8 | .356 | 3 | **82755** | **82756** | H45AL-C-RN-A-30375-R.020 | new |
| | 3/8 | **.020** | 1/2 | 4 | 2-1/8 | .356 | 3 | **28225** | **28227** | H45AL-C-RN-M-30375-R.020 | |
| | 3/8 | **.020** | 1/2 | 5 | 2-1/2 | .356 | 3 | **82757** | **82758** | H45AL-C-RN-ML-30375-R.020 | new |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-3/8 | .475 | 3 | **28285** | **28287** | H45AL-C-RN-R-30500-R.030 | |
| | 1/2 | **.030** | 5/8 | 4 | 1-3/4 | .475 | 3 | **81301** | **81302** | H45AL-C-RN-A-30500-R.030 | |
| | 1/2 | **.030** | 5/8 | 4 | 2-1/4 | .475 | 3 | **28300** | **28302** | H45AL-C-RN-M-30500-R.030 | |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 3 | **28315** | **28317** | H45AL-C-RN-L-30500-R.030 | |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/4 | .475 | 3 | **28325** | **28327** | H45AL-C-RN-X-30500-R.030 | |
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 3 | **28405** | **28407** | H45AL-C-RN-R-30750-R.030 | |
| | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 3 | **28420** | **28422** | H45AL-C-RN-M-30750-R.030 | |
| | 3/4 | **.030** | 1 | 6 | 3 | .712 | 3 | **81303** | **81304** | H45AL-C-RN-ML-30750-R.030 | |
| | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 3 | **28435** | **28437** | H45AL-C-RN-L-30750-R.030 | |
| | 3/4 | **.030** | 1 | 6 | 4-3/8 | .712 | 3 | **28445** | **28447** | H45AL-C-RN-X-30750-R.030 | |
| 1 | 1 | **.030** | 1-1/4 | 5 | 2-5/8 | .950 | 3 | **28465** | | H45AL-C-RN-R-31000-R.030 | |
| | 1 | **.030** | 1-1/4 | 6 | 3-3/8 | .950 | 3 | **28480** | | H45AL-C-RN-M-31000-R.030 | |
| | 1 | **.030** | 1-1/4 | 7 | 4-3/8 | .950 | 3 | **28495** | | H45AL-C-RN-L-31000-R.030 | |

* .0003 max TIR

Speeds & Feeds on Page 19



# H45AL-C-3

## SPEEDS & FEEDS

3 Flute - 45° Helix - Chipbreaker Rougher



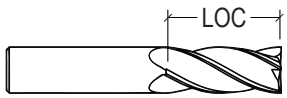
## H45AL-C-3 / H45AL-C-RN-3

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0007 | .0015 | .0011 | .0022 | .0014 | .0029 | .0021 | .0043 | .0028 | .0056 | .0040 | .0081 | .0051 | .0103 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0011 | .0023 | .0017 | .0034 | .0022 | .0045 | .0033 | .0067 | .0044 | .0088 | .0062 | .0125 | .0080 | .0160 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn-36Pb3, CuZn10, CuSn5 | 770 | .0008 | .0015 | .0011 | .0023 | .0015 | .0030 | .0022 | .0045 | .0029 | .0059 | .0042 | .0084 | .0053 | .0107 |

| Milling Process | ADOC | | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | Non-Reached | 100%-150% Diameter | 100% Diameter |
| | Reached | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Non-Reached | 100%-150% Diameter | 35%-50% Diameter |
| | Reached | Up to Max LOC | 30%-40% Diameter |

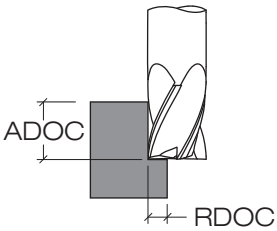
NOTES:

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.




Regular Style

Reduced Neck Style



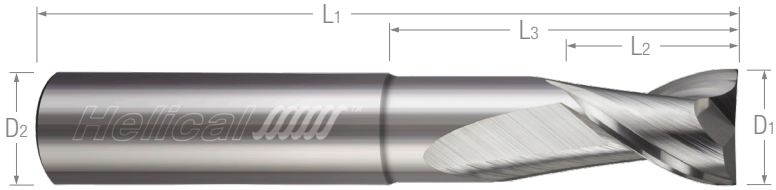

**Key: LOC=Length of Cut** **ADOC=Axial Depth of Cut** **RDOC=Radial Depth of Cut**

# 2 FLUTE - SQUARE

## High Balance - Reduced Neck

**HMG-RN-2**

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for high performance in Makino MAG machining centers capable of elevated RPMs and feed rates
- Precision balanced for high velocity machining in aluminum (up to 33,000 RPM)
- Shank length designed for optimal use in high performance tool holders, providing reduced excess stickout and increased rigidity
- Excellent performance in High Efficiency Milling (HEM)
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | 1/2 | 2-1/4 | 1-1/8 | .356 | 2 | **59968** | HMG-RN-030-20375 |
| | 3/8 | 1/2 | 2-3/4 | 1-1/2 | .356 | 2 | **59971** | HMG-RN-040-20375 |
| | 3/8 | 1/2 | 3-1/4 | 1-3/4 | .356 | 2 | **59974** | HMG-RN-046-20375 |
| | 3/8 | 1/2 | 3-1/4 | 2 | .356 | 2 | **59977** | HMG-RN-053-20375 |
| 1/2 | 1/2 | 5/8 | 2-3/4 | 1-3/8 | .475 | 2 | **59980** | HMG-RN-027-20500 |
| | 1/2 | 5/8 | 3-1/4 | 1-3/4 | .475 | 2 | **59983** | HMG-RN-035-20500 |
| | 1/2 | 5/8 | 3-3/4 | 2 | .475 | 2 | **59986** | HMG-RN-040-20500 |
| | 1/2 | 5/8 | 3-3/4 | 2-1/4 | .475 | 2 | **59989** | HMG-RN-045-20500 |
| | 1/2 | 5/8 | 4-1/4 | 2-1/2 | .475 | 2 | **59992** | HMG-RN-050-20500 |
| | 1/2 | 5/8 | 4-1/4 | 2-3/4 | .475 | 2 | **59995** | HMG-RN-055-20500 |
| | 1/2 | 5/8 | 4-3/4 | 3 | .475 | 2 | **59998** | HMG-RN-060-20500 |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 2 | **60001** | HMG-RN-026-20750 |
| | 3/4 | 1 | 4-1/2 | 2-1/2 | .712 | 2 | **60004** | HMG-RN-033-20750 |
| | 3/4 | 1 | 5 | 3 | .712 | 2 | **60007** | HMG-RN-040-20750 |
| | 3/4 | 1 | 5 | 3-3/8 | .712 | 2 | **60010** | HMG-RN-045-20750 |
| 1 | 1 | 1-1/4 | 4-1/4 | 2-3/8 | .950 | 2 | **60013** | HMG-RN-023-21000 |
| | 1 | 1-1/4 | 4-1/4 | 2-5/8 | .950 | 2 | **60016** | HMG-RN-026-21000 |
| | 1 | 1-1/4 | 4-3/4 | 3 | .950 | 2 | **60019** | HMG-RN-030-21000 |

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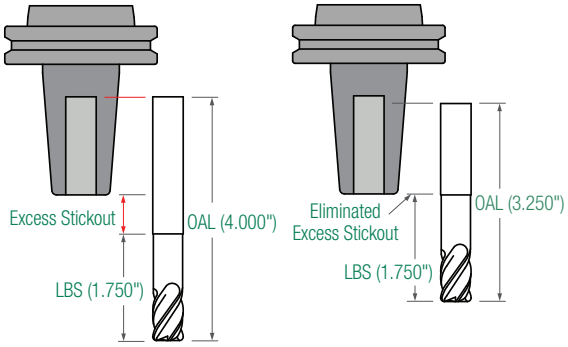
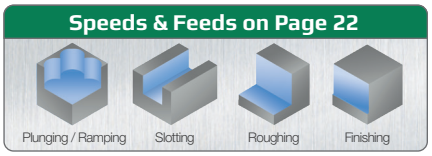



**Shank length designed for optimal use in high performance tool holders, providing reduced excess stickout and increased rigidity.**

**Speeds & Feeds on Page 22**



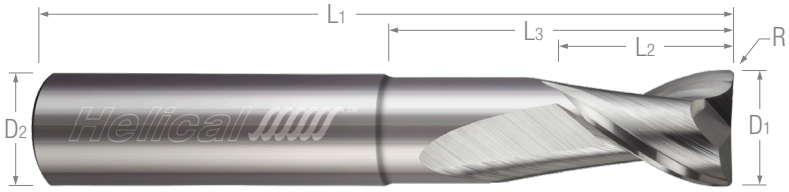
# HMG-RN-2

## 2 FLUTE - CORNER RADIUS

### High Balance - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for high performance in Makino MAG machining centers capable of elevated RPMs and feed rates
- Precision balanced for high velocity machining in aluminum (up to 33,000 RPM)
- Shank length designed for optimal use in high performance tool holders, providing reduced excess stickout and increased rigidity
- Excellent performance in High Efficiency Milling (HEM)
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

See page 20 for shank length benefits

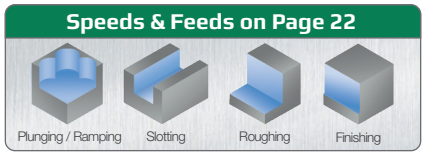



| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | LOC $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | .030 | 1/2 | 2-1/4 | 1-1/8 | .356 | 2 | 59969 | HMG-RN-030-20375-R.030 |
| | 3/8 | .030 | 1/2 | 2-3/4 | 1-1/2 | .356 | 2 | 59972 | HMG-RN-040-20375-R.030 |
| | 3/8 | .030 | 1/2 | 3-1/4 | 1-3/4 | .356 | 2 | 59975 | HMG-RN-046-20375-R.030 |
| | 3/8 | .030 | 1/2 | 3-1/4 | 2 | .356 | 2 | 59978 | HMG-RN-053-20375-R.030 |
| | 3/8 | .060 | 1/2 | 2-1/4 | 1-1/8 | .356 | 2 | 59970 | HMG-RN-030-20375-R.060 |
| | 3/8 | .060 | 1/2 | 2-3/4 | 1-1/2 | .356 | 2 | 59973 | HMG-RN-040-20375-R.060 |
| | 3/8 | .060 | 1/2 | 3-1/4 | 1-3/4 | .356 | 2 | 59976 | HMG-RN-046-20375-R.060 |
| | 3/8 | .060 | 1/2 | 3-1/4 | 2 | .356 | 2 | 59979 | HMG-RN-053-20375-R.060 |
| 1/2 | 1/2 | .030 | 5/8 | 2-3/4 | 1-3/8 | .475 | 2 | 59981 | HMG-RN-027-20500-R.030 |
| | 1/2 | .030 | 5/8 | 3-1/4 | 1-3/4 | .475 | 2 | 59984 | HMG-RN-035-20500-R.030 |
| | 1/2 | .030 | 5/8 | 3-3/4 | 2 | .475 | 2 | 59987 | HMG-RN-040-20500-R.030 |
| | 1/2 | .030 | 5/8 | 3-3/4 | 2-1/4 | .475 | 2 | 59990 | HMG-RN-045-20500-R.030 |
| | 1/2 | .030 | 5/8 | 4-1/4 | 2-1/2 | .475 | 2 | 59993 | HMG-RN-050-20500-R.030 |
| | 1/2 | .030 | 5/8 | 4-1/4 | 2-3/4 | .475 | 2 | 59996 | HMG-RN-055-20500-R.030 |
| | 1/2 | .030 | 5/8 | 4-3/4 | 3 | .475 | 2 | 59999 | HMG-RN-060-20500-R.030 |
| | 1/2 | .060 | 5/8 | 2-3/4 | 1-3/8 | .475 | 2 | 59982 | HMG-RN-027-20500-R.060 |
| | 1/2 | .060 | 5/8 | 3-1/4 | 1-3/4 | .475 | 2 | 59985 | HMG-RN-035-20500-R.060 |
| | 1/2 | .060 | 5/8 | 3-3/4 | 2 | .475 | 2 | 59988 | HMG-RN-040-20500-R.060 |
| | 1/2 | .060 | 5/8 | 3-3/4 | 2-1/4 | .475 | 2 | 59991 | HMG-RN-045-20500-R.060 |
| | 1/2 | .060 | 5/8 | 4-1/4 | 2-1/2 | .475 | 2 | 59994 | HMG-RN-050-20500-R.060 |
| | 1/2 | .060 | 5/8 | 4-1/4 | 2-3/4 | .475 | 2 | 59997 | HMG-RN-055-20500-R.060 |
| | 1/2 | .060 | 5/8 | 4-3/4 | 3 | .475 | 2 | 60000 | HMG-RN-060-20500-R.060 |
| 3/4 | 3/4 | .030 | 1 | 4 | 2 | .712 | 2 | 60002 | HMG-RN-026-20750-R.030 |
| | 3/4 | .030 | 1 | 4-1/2 | 2-1/2 | .712 | 2 | 60005 | HMG-RN-033-20750-R.030 |
| | 3/4 | .030 | 1 | 5 | 3 | .712 | 2 | 60008 | HMG-RN-040-20750-R.030 |
| | 3/4 | .030 | 1 | 5 | 3-3/8 | .712 | 2 | 60011 | HMG-RN-045-20750-R.030 |
| | 3/4 | .060 | 1 | 4 | 2 | .712 | 2 | 60003 | HMG-RN-026-20750-R.060 |
| | 3/4 | .060 | 1 | 4-1/2 | 2-1/2 | .712 | 2 | 60006 | HMG-RN-033-20750-R.060 |
| | 3/4 | .060 | 1 | 5 | 3 | .712 | 2 | 60009 | HMG-RN-040-20750-R.060 |
| | 3/4 | .060 | 1 | 5 | 3-3/8 | .712 | 2 | 60012 | HMG-RN-045-20750-R.060 |

*.0003 max TIR

continued on next page

Speeds & Feeds on Page 22



# 2 FLUTE - CORNER RADIUS

## 2 Flute - High Balance - Reduced Neck (cont.)

**HMG-RN-2**

continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | LOC $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | **.030** | 1-1/4 | 4-1/4 | 2-3/8 | .950 | 2 | **60014** | HMG-RN-023-21000-R.030 |
| | 1 | **.030** | 1-1/4 | 4-1/4 | 2-5/8 | .950 | 2 | **60017** | HMG-RN-026-21000-R.030 |
| | 1 | **.030** | 1-1/4 | 4-3/4 | 3 | .950 | 2 | **60020** | HMG-RN-030-21000-R.030 |
| | 1 | **.060** | 1-1/4 | 4-1/4 | 2-3/8 | .950 | 2 | **60015** | HMG-RN-023-21000-R.060 |
| | 1 | **.060** | 1-1/4 | 4-1/4 | 2-5/8 | .950 | 2 | **60018** | HMG-RN-026-21000-R.060 |
| | 1 | **.060** | 1-1/4 | 4-3/4 | 3 | .950 | 2 | **60021** | HMG-RN-030-21000-R.060 |

*.0003 max TIR

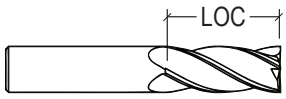
## HMG-RN-2

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0007 | .0015 | .0016 | .0011 | .0022 | .0018 | .0014 | .0029 | .0021 | .0021 | .0043 | .0024 | .0028 | .0056 | .0028 | .0040 | .0081 | .0033 | .0051 | .0103 | .0041 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0011 | .0023 | .0020 | .0017 | .0034 | .0023 | .0022 | .0045 | .0026 | .0033 | .0067 | .0030 | .0044 | .0087 | .0035 | .0062 | .0125 | .0042 | .0079 | .0160 | .0051 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0008 | .0015 | .0017 | .0011 | .0023 | .0019 | .0015 | .0030 | .0021 | .0022 | .0045 | .0024 | .0029 | .0059 | .0028 | .0042 | .0084 | .0034 | .0053 | .0107 | .0041 |

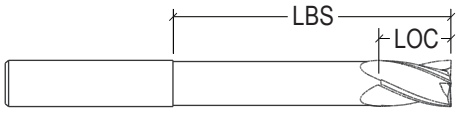
| Milling Process | ADOC | RDOC |
|---|---|---|
| Slot (Full Slotting) | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Up to Max LOC | 35%-50% Diameter |
| Fin (Finishing) | Up to Max LOC | 4%-6% Diameter |

NOTES:

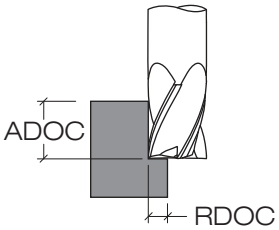
IPT values shown are for 4xD reach tools, and should be adjusted for longer or shorter reaches. For tools with reaches greater than 4xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.



Regular Style



Reduced Neck Style




**Key: LOC=Length of Cut ADOC=Axial Depth of Cut RDOC=Radial Depth of Cut**

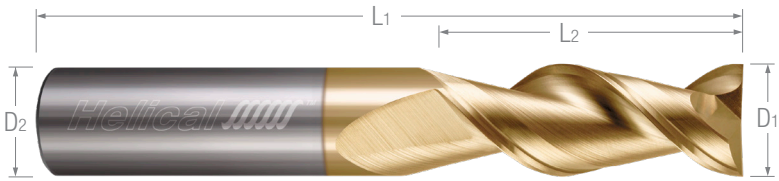
# H45AL-2

New Items!

## 2 FLUTE - SQUARE

45° Helix

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

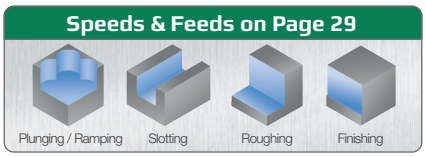



| | Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 1/4 | 1-1/2 | 2 | 00015 | 00017 | H45AL-S-20125 |
| | | 1/8 | 3/8 | 2 | 2 | 00030 | 00032 | H45AL-SR-20125 |
| | | 1/8 | 1/2 | 2-1/2 | 2 | 00045 | 00047 | H45AL-R-20125 |
| new | | 1/8 | 5/8 | 2-1/2 | 2 | 83405 | 83406 | H45AL-M-20125 |
| | | 1/8 | 3/4 | 2-1/2 | 2 | 00060 | 00062 | H45AL-L-20125 |
| new | | 1/8 | 7/8 | 2-1/2 | 2 | 83407 | 83408 | H45AL-LX-20125 |
| | 3/16 | 3/16 | 5/16 | 2 | 2 | 00090 | 00092 | H45AL-S-20187 |
| new | | 3/16 | 7/16 | 2 | 2 | 83409 | 83410 | H45AL-SR-20187 |
| | | 3/16 | 9/16 | 2-1/2 | 2 | 00105 | 00107 | H45AL-R-20187 |
| | | 3/16 | 3/4 | 2-1/2 | 2 | 00120 | 00122 | H45AL-M-20187 |
| | | 3/16 | 1 | 2-1/2 | 2 | 81311 | 81312 | H45AL-ML-20187 |
| | 1/4 | 1/4 | 3/8 | 2 | 2 | 00150 | 00152 | H45AL-S-20250 |
| | | 1/4 | 1/2 | 2-1/2 | 2 | 00155 | 00157 | H45AL-SR-20250 |
| | | 1/4 | 3/4 | 2-1/2 | 2 | 00165 | 00167 | H45AL-R-20250 |
| | | 1/4 | 1 | 3 | 2 | 00180 | 00182 | H45AL-M-20250 |
| | | 1/4 | 1-1/4 | 3 | 2 | 00195 | 00197 | H45AL-L-20250 |
| | | 1/4 | 1-3/4 | 4 | 2 | 00210 | 00212 | H45AL-X-20250 |
| | 5/16 | 5/16 | 7/16 | 2 | 2 | 00240 | 00242 | H45AL-S-20312 |
| | | 5/16 | 13/16 | 2-1/2 | 2 | 00255 | 00257 | H45AL-R-20312 |
| | | 5/16 | 1 | 3 | 2 | 00270 | 00272 | H45AL-M-20312 |
| | | 5/16 | 1-1/4 | 3 | 2 | 00285 | 00287 | H45AL-L-20312 |
| new | | 5/16 | 2-1/8 | 4 | 2 | 00300 | 00302 | H45AL-X-20312 |
| | 3/8 | 3/8 | 1/2 | 2 | 2 | 00330 | 00332 | H45AL-S-20375 |
| | | 3/8 | 3/4 | 2-1/2 | 2 | 81313 | 81314 | H45AL-SR-20375 |
| | | 3/8 | 1 | 3 | 2 | 00345 | 00347 | H45AL-R-20375 |
| | | 3/8 | 1-1/4 | 3-1/2 | 2 | 00360 | 00362 | H45AL-M-20375 |
| | | 3/8 | 1-1/2 | 4 | 2 | 00375 | 00377 | H45AL-L-20375 |
| | | 3/8 | 2 | 4 | 2 | 00390 | 00392 | H45AL-LX-20375 |
| | | 3/8 | 2-1/2 | 5 | 2 | 00405 | 00407 | H45AL-X-20375 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 29



# 2 FLUTE - SQUARE New Items!

## H45AL-2

45° Helix (cont.)

continued from previous page

| Cutter Diameter* D1 (h6) | Shank Diameter D2 (h6) | Length of Cut L2 +.032" −.000" | Overall Length L1 +.062" −.062" | Flutes | Uncoated | Zplus Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 2-1/2 | 2 | 00435 | 00437 | H45AL-S-20500 | |
| | 1/2 | 1 | 3 | 2 | 00450 | 00452 | H45AL-SR-20500 | |
| | 1/2 | 1-1/4 | 3 | 2 | 00465 | 00467 | H45AL-R-20500 | |
| | 1/2 | 1-5/8 | 4 | 2 | 00480 | 00482 | H45AL-M-20500 | |
| | 1/2 | 2 | 4 | 2 | 00495 | 00497 | H45AL-L-20500 | |
| | 1/2 | 2-1/2 | 5 | 2 | 00510 | 00512 | H45AL-LX-20500 | |
| | 1/2 | 3-1/8 | 6 | 2 | 00525 | 00527 | H45AL-X-20500 | |
| 5/8 | 5/8 | 3/4 | 3 | 2 | 00555 | 00557 | H45AL-S-20625 | new |
| | 5/8 | 1-5/8 | 3-1/2 | 2 | 00570 | 00572 | H45AL-R-20625 | |
| | 5/8 | 2-1/8 | 4 | 2 | 00585 | 00587 | H45AL-M-20625 | new |
| | 5/8 | 2-1/2 | 5 | 2 | 00600 | 00602 | H45AL-L-20625 | |
| | 5/8 | 3-3/4 | 6 | 2 | 00615 | 00617 | H45AL-X-20625 | new |
| 3/4 | 3/4 | 1 | 4 | 2 | 00645 | 00647 | H45AL-S-20750 | |
| | 3/4 | 1-5/8 | 4 | 2 | 00660 | 00662 | H45AL-R-20750 | |
| | 3/4 | 2 | 5 | 2 | 81315 | 81316 | H45AL-A-20750 | |
| | 3/4 | 2-1/4 | 5 | 2 | 00675 | 00677 | H45AL-M-20750 | |
| | 3/4 | 3-1/4 | 6 | 2 | 00690 | 00692 | H45AL-L-20750 | |
| | 3/4 | 4 | 7 | 2 | 00705 | 00707 | H45AL-X-20750 | |
| 1 | 1 | 2 | 5 | 2 | 00750 | 00752 | H45AL-R-21000 | new |
| | 1 | 2-5/8 | 6 | 2 | 00765 | 00767 | H45AL-M-21000 | new |
| | 1 | 3-1/4 | 6 | 2 | 00780 | 00782 | H45AL-L-21000 | new |
| | 1 | 4-1/8 | 7 | 2 | 00795 | 00797 | H45AL-X-21000 | new |

* .0003 max TIR



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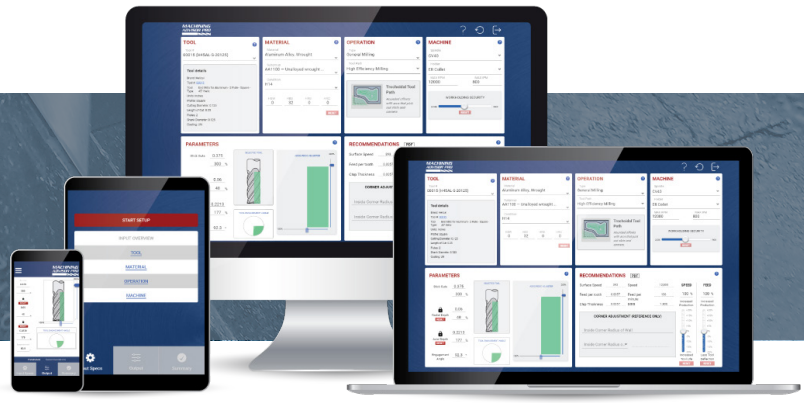


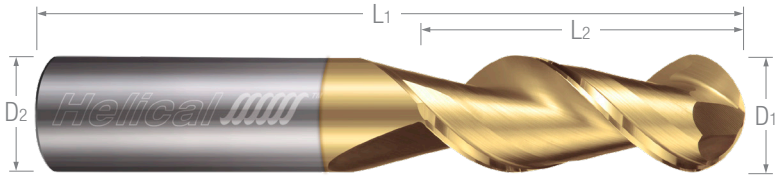
# H45AL-2

New Items!

## 2 FLUTE - BALL

45° Helix

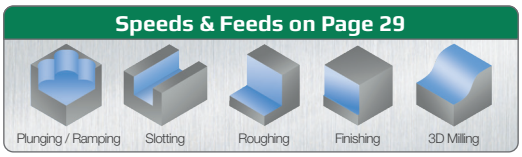
- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| | Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 1/4 | 1-1/2 | 2 | 17015 | 17017 | H45AL-S-20125-BN |
| | | 1/8 | 3/8 | 2 | 2 | 17030 | 17032 | H45AL-SR-20125-BN |
| | | 1/8 | 1/2 | 2-1/2 | 2 | 17045 | 17047 | H45AL-R-20125-BN |
| new | | 1/8 | 5/8 | 2-1/2 | 2 | 83411 | 83412 | H45AL-M-20125-BN |
| | | 1/8 | 3/4 | 2-1/2 | 2 | 81317 | 81318 | H45AL-L-20125-BN |
| | 3/16 | 3/16 | 5/16 | 2 | 2 | 17090 | 17092 | H45AL-S-20187-BN |
| new | | 3/16 | 7/16 | 2 | 2 | 83413 | 83414 | H45AL-SR-20187-BN |
| | | 3/16 | 9/16 | 2-1/2 | 2 | 17105 | 17107 | H45AL-R-20187-BN |
| | | 3/16 | 3/4 | 2-1/2 | 2 | 81319 | 81320 | H45AL-M-20187-BN |
| new | | 3/16 | 1 | 2-1/2 | 2 | 83415 | 83416 | H45AL-ML-20187-BN |
| | 1/4 | 1/4 | 3/8 | 2 | 2 | 17150 | 17152 | H45AL-S-20250-BN |
| | | 1/4 | 1/2 | 2-1/2 | 2 | 17155 | 17157 | H45AL-SR-20250-BN |
| | | 1/4 | 3/4 | 2-1/2 | 2 | 17165 | 17167 | H45AL-R-20250-BN |
| | | 1/4 | 1 | 3 | 2 | 81321 | 81322 | H45AL-M-20250-BN |
| new | | 1/4 | 1-1/4 | 3 | 2 | 83417 | 83418 | H45AL-L-20250-BN |
| | 5/16 | 5/16 | 7/16 | 2 | 2 | 17240 | 17242 | H45AL-S-20312-BN |
| | | 5/16 | 13/16 | 2-1/2 | 2 | 17255 | 17257 | H45AL-R-20312-BN |
| | 3/8 | 3/8 | 1/2 | 2 | 2 | 17330 | 17332 | H45AL-S-20375-BN |
| new | | 3/8 | 3/4 | 2-1/2 | 2 | 83419 | 83420 | H45AL-SR-20375-BN |
| | | 3/8 | 1 | 3 | 2 | 17345 | 17347 | H45AL-R-20375-BN |
| new | | 3/8 | 1-1/4 | 3-1/2 | 2 | 83421 | 83422 | H45AL-M-20375-BN |
| | | 3/8 | 1-1/2 | 3-1/2 | 2 | 81323 | 81324 | H45AL-L-20375-BN |
| | 1/2 | 1/2 | 5/8 | 2-1/2 | 2 | 17435 | 17437 | H45AL-S-20500-BN |
| | | 1/2 | 1 | 3 | 2 | 81325 | 81326 | H45AL-SR-20500-BN |
| | | 1/2 | 1-1/4 | 3 | 2 | 17465 | 17467 | H45AL-R-20500-BN |
| new | | 1/2 | 1-5/8 | 4 | 2 | 83423 | 83424 | H45AL-M-20500-BN |
| new | | 1/2 | 2 | 4 | 2 | 83425 | 83426 | H45AL-L-20500-BN |
| | 5/8 | 5/8 | 3/4 | 3 | 2 | 17555 | 17557 | H45AL-S-20625-BN |
| | 3/4 | 3/4 | 1 | 4 | 2 | 17645 | 17647 | H45AL-S-20750-BN |
| | | 3/4 | 1-5/8 | 4 | 2 | 17660 | 17662 | H45AL-R-20750-BN |
| new | | 3/4 | 2-1/4 | 5 | 2 | 83427 | 83428 | H45AL-M-20750-BN |
| | 1 | 1 | 2 | 5 | 2 | 17750 | 17752 | H45AL-R-21000-BN |

* .0003 max TIR

Speeds & Feeds on Page 29



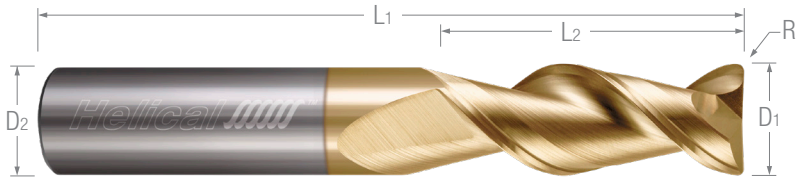
# 2 FLUTE - CORNER RADIUS

45° Helix

## H45AL-2

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

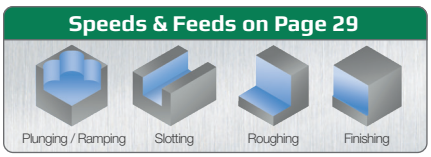





| Cutter Dia* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | Overall Length $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | .010 | 3/8 | 2 | 2 | 82329 | 82330 | H45AL-SR-20125-R.010 |
| | 1/8 | .010 | 1/2 | 2-1/2 | 2 | 82331 | 82332 | H45AL-R-20125-R.010 |
| | 1/8 | .010 | 3/4 | 2-1/2 | 2 | 82333 | 82334 | H45AL-L-20125-R.010 |
| 3/16 | 3/16 | .010 | 5/16 | 2 | 2 | 82335 | 82336 | H45AL-S-20187-R.010 |
| | 3/16 | .010 | 9/16 | 2-1/2 | 2 | 82337 | 82338 | H45AL-R-20187-R.010 |
| | 3/16 | .010 | 3/4 | 2-1/2 | 2 | 82339 | 82340 | H45AL-M-20187-R.010 |
| 1/4 | 1/4 | .010 | 1/2 | 2-1/2 | 2 | 82341 | 82342 | H45AL-SR-20250-R.010 |
| | 1/4 | .010 | 3/4 | 2-1/2 | 2 | 82343 | 82344 | H45AL-R-20250-R.010 |
| | 1/4 | .010 | 1 | 3 | 2 | 82345 | 82346 | H45AL-M-20250-R.010 |
| | 1/4 | .030 | 1/2 | 2-1/2 | 2 | 82347 | 82348 | H45AL-SR-20250-R.030 |
| | 1/4 | .030 | 3/4 | 2-1/2 | 2 | 82349 | 82350 | H45AL-R-20250-R.030 |
| | 1/4 | .030 | 1 | 3 | 2 | 82351 | 82352 | H45AL-M-20250-R.030 |
| 3/8 | 3/8 | .030 | 1/2 | 2 | 2 | 82353 | 82354 | H45AL-S-20375-R.030 |
| | 3/8 | .030 | 1 | 3 | 2 | 82355 | 82356 | H45AL-R-20375-R.030 |
| | 3/8 | .030 | 1-1/4 | 3-1/2 | 2 | 82357 | 82358 | H45AL-M-20375-R.030 |
| | 3/8 | .060 | 1/2 | 2 | 2 | 82359 | 82360 | H45AL-S-20375-R.060 |
| | 3/8 | .060 | 1 | 3 | 2 | 82361 | 82362 | H45AL-R-20375-R.060 |
| | 3/8 | .060 | 1-1/4 | 3-1/2 | 2 | 82363 | 82364 | H45AL-M-20375-R.060 |
| 1/2 | 1/2 | .030 | 1 | 3 | 2 | 82365 | 82366 | H45AL-SR-20500-R.030 |
| | 1/2 | .030 | 1-1/4 | 3 | 2 | 82367 | 82368 | H45AL-R-20500-R.030 |
| | 1/2 | .030 | 1-5/8 | 4 | 2 | 82369 | 82370 | H45AL-M-20500-R.030 |
| | 1/2 | .030 | 2 | 4 | 2 | 82371 | 82372 | H45AL-L-20500-R.030 |
| | 1/2 | .060 | 1 | 3 | 2 | 82373 | 82374 | H45AL-SR-20500-R.060 |
| | 1/2 | .060 | 1-1/4 | 3 | 2 | 82375 | 82376 | H45AL-R-20500-R.060 |
| | 1/2 | .060 | 1-5/8 | 4 | 2 | 82377 | 82378 | H45AL-M-20500-R.060 |
| | 1/2 | .060 | 2 | 4 | 2 | 82379 | 82380 | H45AL-L-20500-R.060 |
| 3/4 | 3/4 | .030 | 1-5/8 | 4 | 2 | 82381 | 82382 | H45AL-R-20750-R.030 |
| | 3/4 | .030 | 2-1/4 | 5 | 2 | 82383 | 82384 | H45AL-M-20750-R.030 |
| | 3/4 | .060 | 1-5/8 | 4 | 2 | 82385 | 82386 | H45AL-R-20750-R.060 |
| | 3/4 | .060 | 2-1/4 | 5 | 2 | 82387 | 82388 | H45AL-M-20750-R.060 |

* .0003 max TIR

Speeds & Feeds on Page 29



# H45AL-RN-2

New Items!

## 2 FLUTE - SQUARE

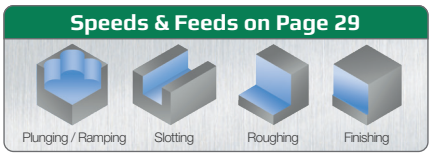
### 45° Helix - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 5/32 | 3 | 1/2 | .118 | 2 | 02015 | 02017 | H45AL-RN-R-20125 |
| | | 1/8 | 5/32 | 3 | 3/4 | .118 | 2 | 02030 | 02032 | H45AL-RN-M-20125 |
| | | 1/8 | 5/32 | 3 | 1 | .118 | 2 | 81327 | 81328 | H45AL-RN-L-20125 |
| | 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 2 | 02060 | 02062 | H45AL-RN-R-20187 |
| | | 3/16 | 7/32 | 3 | 3/4 | .178 | 2 | 02075 | 02077 | H45AL-RN-M-20187 |
| | | 3/16 | 7/32 | 3 | 1 | .178 | 2 | 81329 | 81330 | H45AL-RN-ML-20187 |
| | 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 2 | 02105 | 02107 | H45AL-RN-S-20250 |
| | | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 2 | 02120 | 02122 | H45AL-RN-R-20250 |
| | | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 2 | 81331 | 81332 | H45AL-RN-A-20250 |
| | | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 2 | 02135 | 02137 | H45AL-RN-M-20250 |
| | | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 2 | 81333 | 81334 | H45AL-RN-ML-20250 |
| new | 5/16 | 5/16 | 7/16 | 4 | 1-1/8 | .296 | 2 | 02165 | 02167 | H45AL-RN-R-20312 |
| new | | 5/16 | 7/16 | 4 | 2-1/8 | .296 | 2 | 02180 | 02182 | H45AL-RN-M-20312 |
| new | | 5/16 | 7/16 | 6 | 3-1/8 | .296 | 2 | 02190 | 02192 | H45AL-RN-L-20312 |
| | 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 2 | 02210 | 02212 | H45AL-RN-R-20375 |
| | | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 2 | 81335 | 81336 | H45AL-RN-A-20375 |
| | | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 2 | 02225 | 02227 | H45AL-RN-M-20375 |
| | | 3/8 | 1/2 | 5 | 2-1/2 | .356 | 2 | 81337 | 81338 | H45AL-RN-ML-20375 |
| | | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 2 | 02235 | 02237 | H45AL-RN-L-20375 |
| | | 3/8 | 1/2 | 6 | 4 | .356 | 2 | 02245 | 02247 | H45AL-RN-X-20375 |
| | 1/2 | 1/2 | 5/8 | 4 | 1-3/8 | .475 | 2 | 02285 | 02287 | H45AL-RN-R-20500 |
| | | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 2 | 81339 | 81340 | H45AL-RN-A-20500 |
| | | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 2 | 02300 | 02302 | H45AL-RN-M-20500 |
| | | 1/2 | 5/8 | 4-1/2 | 2-3/4 | .475 | 2 | 81341 | 81342 | H45AL-RN-ML-20500 |
| | | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 2 | 02315 | 02317 | H45AL-RN-L-20500 |
| | | 1/2 | 5/8 | 6 | 4-1/4 | .475 | 2 | 02325 | 02327 | H45AL-RN-X-20500 |
| new | 5/8 | 5/8 | 3/4 | 4 | 1-5/8 | .593 | 2 | 02345 | 02347 | H45AL-RN-R-20625 |
| new | 3/4 | 3/4 | 1 | 4 | 2 | .712 | 2 | 02405 | 02407 | H45AL-RN-R-20750 |
| | | 3/4 | 1 | 6 | 2-1/2 | .712 | 2 | 02420 | 02422 | H45AL-RN-M-20750 |
| | | 3/4 | 1 | 6 | 3-3/8 | .712 | 2 | 02435 | 02437 | H45AL-RN-L-20750 |
| new | | 3/4 | 1 | 6 | 4-3/8 | .712 | 2 | 02445 | 02447 | H45AL-RN-X-20750 |
| new | 1 | 1 | 1-1/4 | 5 | 2-5/8 | .950 | 2 | 02465 | 02467 | H45AL-RN-R-21000 |
| new | | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 2 | 02480 | 02482 | H45AL-RN-M-21000 |
| new | | 1 | 1-1/4 | 7 | 4-3/8 | .950 | 2 | 02495 | 02497 | H45AL-RN-L-21000 |

* .0003 max TIR

Speeds & Feeds on Page 29



# 2 FLUTE - BALL New Items!

## H45AL-RN-2

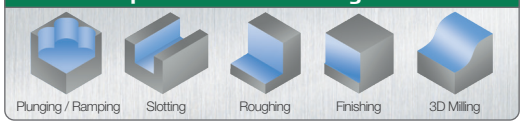
### 45° Helix - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 5/32 | 3 | 1/2 | .118 | 2 | 18015 | 18017 | H45AL-RN-R-20125-BN | |
| | 1/8 | 5/32 | 3 | 3/4 | .118 | 2 | 18030 | 18032 | H45AL-RN-M-20125-BN | |
| | 1/8 | 5/32 | 3 | 1 | .118 | 2 | 81343 | 81344 | H45AL-RN-L-20125-BN | |
| 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 2 | 18060 | 18062 | H45AL-RN-R-20187-BN | |
| | 3/16 | 7/32 | 3 | 3/4 | .178 | 2 | 18075 | 18077 | H45AL-RN-M-20187-BN | |
| | 3/16 | 7/32 | 3 | 1 | .178 | 2 | 81345 | 81346 | H45AL-RN-ML-20187-BN | |
| 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 2 | 18105 | 18107 | H45AL-RN-S-20250-BN | |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 2 | 18120 | 18122 | H45AL-RN-R-20250-BN | |
| | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 2 | 81347 | 81348 | H45AL-RN-A-20250-BN | |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 2 | 18135 | 18137 | H45AL-RN-M-20250-BN | |
| | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 2 | 81349 | 81350 | H45AL-RN-ML-20250-BN | |
| 5/16 | 5/16 | 7/16 | 4 | 1-1/8 | .296 | 2 | 18165 | 18167 | H45AL-RN-R-20312-BN | |
| | 5/16 | 7/16 | 4 | 2-1/8 | .296 | 2 | 18180 | 18182 | H45AL-RN-M-20312-BN | new |
| | 5/16 | 7/16 | 6 | 3-1/8 | .296 | 2 | 18190 | 18192 | H45AL-RN-L-20312-BN | new |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 2 | 18210 | 18212 | H45AL-RN-R-20375-BN | |
| | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 2 | 81351 | 81352 | H45AL-RN-A-20375-BN | |
| | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 2 | 18225 | 18227 | H45AL-RN-M-20375-BN | |
| | 3/8 | 1/2 | 5 | 2-1/2 | .356 | 2 | 81353 | 81354 | H45AL-RN-ML-20375-BN | |
| | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 2 | 18235 | 18237 | H45AL-RN-L-20375-BN | |
| | 3/8 | 1/2 | 6 | 4 | .356 | 2 | 18245 | 18247 | H45AL-RN-X-20375-BN | |
| 1/2 | 1/2 | 5/8 | 4 | 1-3/8 | .475 | 2 | 18285 | 18287 | H45AL-RN-R-20500-BN | |
| | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 2 | 81355 | 81356 | H45AL-RN-A-20500-BN | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 2 | 18300 | 18302 | H45AL-RN-M-20500-BN | |
| | 1/2 | 5/8 | 4-1/2 | 2-3/4 | .475 | 2 | 81357 | 81358 | H45AL-RN-ML-20500-BN | |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 2 | 18315 | 18317 | H45AL-RN-L-20500-BN | |
| | 1/2 | 5/8 | 6 | 4-1/4 | .475 | 2 | 18325 | 18327 | H45AL-RN-X-20500-BN | |

continued on next page

Speeds & Feeds on Page 29



# H45AL-RN-2

New Items!

## 2 FLUTE - BALL

### 45° Helix - Reduced Neck (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Zplus Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| new | 3/4 | 3/4 | 1 | 4 | 2 | .712 | 2 | 18405 | 18407 | H45AL-RN-R-20750-BN |
| | | 3/4 | 1 | 6 | 2-1/2 | .712 | 2 | 18420 | 18422 | H45AL-RN-M-20750-BN |
| | | 3/4 | 1 | 6 | 3-3/8 | .712 | 2 | 18435 | 18437 | H45AL-RN-L-20750-BN |
| new | | 3/4 | 1 | 6 | 4-3/8 | .712 | 2 | 18445 | 18447 | H45AL-RN-X-20750-BN |
| new | 1 | 1 | 1-1/4 | 5 | 2-5/8 | .950 | 2 | 18465 | 18467 | H45AL-RN-R-21000-BN |
| new | | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 2 | 18480 | 18482 | H45AL-RN-M-21000-BN |
| new | | 1 | 1-1/4 | 7 | 4-3/8 | .950 | 2 | 18495 | 18497 | H45AL-RN-L-21000-BN |

* .0003 max TIR

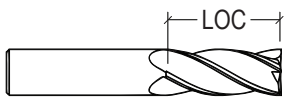
## H45AL-2 / H45AL-RN-2

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0007 | .0014 | .0018 | .0010 | .0021 | .0021 | .0014 | .0028 | .0023 | .0020 | .0042 | .0027 | .0027 | .0055 | .0032 | .0038 | .0078 | .0037 | .0048 | .0100 | .0045 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0011 | .0023 | .0023 | .0016 | .0033 | .0026 | .0022 | .0044 | .0029 | .0032 | .0066 | .0034 | .0042 | .0086 | .0039 | .0060 | .0124 | .0047 | .0077 | .0157 | .0057 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0007 | .0015 | .0019 | .0011 | .0022 | .0021 | .0014 | .0029 | .0024 | .0021 | .0044 | .0027 | .0028 | .0057 | .0032 | .0040 | .0082 | .0038 | .0051 | .0104 | .0047 |

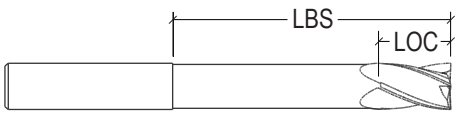
| Milling Process | Style | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | Non-Reached | Up to 200% Diameter | 100% Diameter |
| | Reached | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Non-Reached | 125%-200% Diameter | 30%-50% Diameter |
| | Reached | Up to Max LOC | 30%-50% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

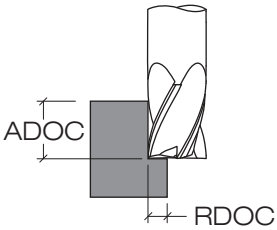
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.




Regular Style




Reduced Neck Style



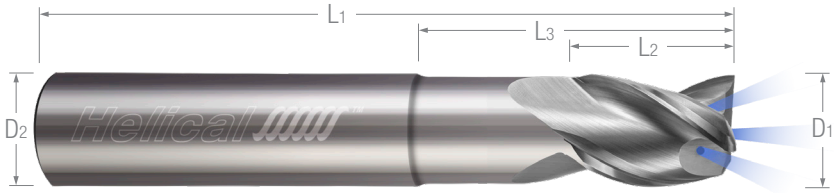

**Key: LOC=Length of Cut ADOC=Axial Depth of Cut RDOC=Radial Depth of Cut**

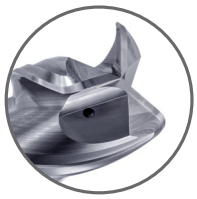
# 3 FLUTE - SQUARE

## Coolant Through - High Balance - Reduced Neck

**HMGC-RN-3**

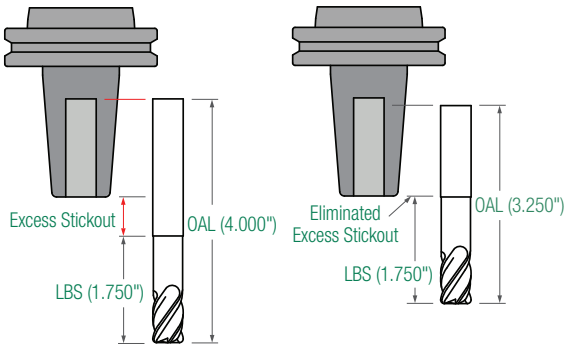
- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for high performance in Makino MAG machining centers capable of elevated RPMs and feed rates
- Precision balanced for high velocity machining in aluminum (up to 33,000 RPM)
- Shank length designed for optimal use in high performance tool holders, providing reduced excess stickout and increased rigidity
- Excellent performance in High Efficiency Milling (HEM)
- Radial coolant holes for reduced heat, enhanced chip evacuation, and increased MRR
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA



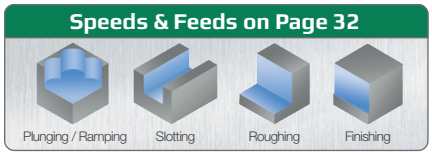
| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | 1/2 | 2-1/4 | 1-1/8 | .356 | 3 | **60022** | HMGC-RN-030-30375 |
| | 3/8 | 1/2 | 2-3/4 | 1-1/2 | .356 | 3 | **60025** | HMGC-RN-040-30375 |
| | 3/8 | 1/2 | 3-1/4 | 1-3/4 | .356 | 3 | **60028** | HMGC-RN-046-30375 |
| | 3/8 | 1/2 | 3-1/4 | 2 | .356 | 3 | **60031** | HMGC-RN-053-30375 |
| 1/2 | 1/2 | 5/8 | 2-3/4 | 1-3/8 | .475 | 3 | **60034** | HMGC-RN-027-30500 |
| | 1/2 | 5/8 | 3-1/4 | 1-3/4 | .475 | 3 | **60037** | HMGC-RN-035-30500 |
| | 1/2 | 5/8 | 3-3/4 | 2 | .475 | 3 | **60040** | HMGC-RN-040-30500 |
| | 1/2 | 5/8 | 3-3/4 | 2-1/4 | .475 | 3 | **60043** | HMGC-RN-045-30500 |
| | 1/2 | 5/8 | 4-1/4 | 2-1/2 | .475 | 3 | **60046** | HMGC-RN-050-30500 |
| | 1/2 | 5/8 | 4-1/4 | 2-3/4 | .475 | 3 | **60049** | HMGC-RN-055-30500 |
| | 1/2 | 5/8 | 4-3/4 | 3 | .475 | 3 | **60052** | HMGC-RN-060-30500 |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 3 | **60055** | HMGC-RN-026-30750 |
| | 3/4 | 1 | 4-1/2 | 2-1/2 | .712 | 3 | **60058** | HMGC-RN-033-30750 |
| | 3/4 | 1 | 5 | 3 | .712 | 3 | **60061** | HMGC-RN-040-30750 |
| | 3/4 | 1 | 5 | 3-3/8 | .712 | 3 | **60064** | HMGC-RN-045-30750 |
| 1 | 1 | 1-1/4 | 4-1/4 | 2-3/8 | .950 | 3 | **60067** | HMGC-RN-023-31000 |
| | 1 | 1-1/4 | 4-1/4 | 2-5/8 | .950 | 3 | **60070** | HMGC-RN-026-31000 |
| | 1 | 1-1/4 | 4-3/4 | 3 | .950 | 3 | **60073** | HMGC-RN-030-31000 |

* .0003 max TIR




**Shank length designed for optimal use in high performance tool holders, providing reduced excess stickout and increased rigidity.**

**Speeds & Feeds on Page 32**



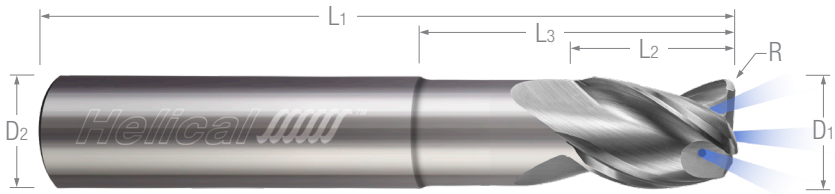
# HMGC-RN-3

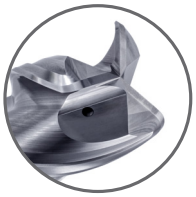
## 3 FLUTE - CORNER RADIUS

### Coolant Through - High Balance - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for high performance in Makino MAG machining centers capable of elevated RPMs and feed rates
- Precision balanced for high velocity machining in aluminum (up to 33,000 RPM)
- Shank length designed for optimal use in high performance tool holders, providing reduced excess stickout and increased rigidity
- Excellent performance in High Efficiency Milling (HEM)
- Radial coolant holes for reduced heat, enhanced chip evacuation, and increased MRR
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA

See page 30 for shank length benefits



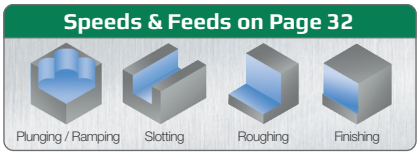



| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | LOC $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | **.030** | 1/2 | 2-1/4 | 1-1/8 | .356 | 3 | **60023** | HMGC-RN-030-30375-R.030 |
| | 3/8 | **.030** | 1/2 | 2-3/4 | 1-1/2 | .356 | 3 | **60026** | HMGC-RN-040-30375-R.030 |
| | 3/8 | **.030** | 1/2 | 3-1/4 | 1-3/4 | .356 | 3 | **60029** | HMGC-RN-046-30375-R.030 |
| | 3/8 | **.030** | 1/2 | 3-1/4 | 2 | .356 | 3 | **60032** | HMGC-RN-053-30375-R.030 |
| | 3/8 | **.060** | 1/2 | 2-1/4 | 1-1/8 | .356 | 3 | **60024** | HMGC-RN-030-30375-R.060 |
| | 3/8 | **.060** | 1/2 | 2-3/4 | 1-1/2 | .356 | 3 | **60027** | HMGC-RN-040-30375-R.060 |
| | 3/8 | **.060** | 1/2 | 3-1/4 | 1-3/4 | .356 | 3 | **60030** | HMGC-RN-046-30375-R.060 |
| | 3/8 | **.060** | 1/2 | 3-1/4 | 2 | .356 | 3 | **60033** | HMGC-RN-053-30375-R.060 |
| 1/2 | 1/2 | **.030** | 5/8 | 2-3/4 | 1-3/8 | .475 | 3 | **60035** | HMGC-RN-027-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 3-1/4 | 1-3/4 | .475 | 3 | **60038** | HMGC-RN-035-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 3-3/4 | 2 | .475 | 3 | **60041** | HMGC-RN-040-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 3-3/4 | 2-1/4 | .475 | 3 | **60044** | HMGC-RN-045-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 4-1/4 | 2-1/2 | .475 | 3 | **60047** | HMGC-RN-050-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 4-1/4 | 2-3/4 | .475 | 3 | **60050** | HMGC-RN-055-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 4-3/4 | 3 | .475 | 3 | **60053** | HMGC-RN-060-30500-R.030 |
| | 1/2 | **.060** | 5/8 | 2-3/4 | 1-3/8 | .475 | 3 | **60036** | HMGC-RN-027-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 3-1/4 | 1-3/4 | .475 | 3 | **60039** | HMGC-RN-035-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 3-3/4 | 2 | .475 | 3 | **60042** | HMGC-RN-040-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 3-3/4 | 2-1/4 | .475 | 3 | **60045** | HMGC-RN-045-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 4-1/4 | 2-1/2 | .475 | 3 | **60048** | HMGC-RN-050-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 4-1/4 | 2-3/4 | .475 | 3 | **60051** | HMGC-RN-055-30500-R.060 |
| | 1/2 | **.060** | 5/8 | 4-3/4 | 3 | .475 | 3 | **60054** | HMGC-RN-060-30500-R.060 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 32



# 3 FLUTE - CORNER RADIUS

## Coolant Through - High Balance - Reduced Neck (cont.)

HMGC-RN-3

continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | LOC $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 3 | **60056** | HMGC-RN-026-30750-R.030 |
| | 3/4 | **.030** | 1 | 4-1/2 | 2-1/2 | .712 | 3 | **60059** | HMGC-RN-033-30750-R.030 |
| | 3/4 | **.030** | 1 | 5 | 3 | .712 | 3 | **60062** | HMGC-RN-040-30750-R.030 |
| | 3/4 | **.030** | 1 | 5 | 3-3/8 | .712 | 3 | **60065** | HMGC-RN-045-30750-R.030 |
| | 3/4 | **.060** | 1 | 4 | 2 | .712 | 3 | **60057** | HMGC-RN-026-30750-R.060 |
| | 3/4 | **.060** | 1 | 4-1/2 | 2-1/2 | .712 | 3 | **60060** | HMGC-RN-033-30750-R.060 |
| | 3/4 | **.060** | 1 | 5 | 3 | .712 | 3 | **60063** | HMGC-RN-040-30750-R.060 |
| | 3/4 | **.060** | 1 | 5 | 3-3/8 | .712 | 3 | **60066** | HMGC-RN-045-30750-R.060 |
| 1 | 1 | **.030** | 1-1/4 | 4-1/4 | 2-3/8 | .950 | 3 | **60068** | HMGC-RN-023-31000-R.030 |
| | 1 | **.030** | 1-1/4 | 4-1/4 | 2-5/8 | .950 | 3 | **60071** | HMGC-RN-026-31000-R.030 |
| | 1 | **.030** | 1-1/4 | 4-3/4 | 3 | .950 | 3 | **60074** | HMGC-RN-030-31000-R.030 |
| | 1 | **.060** | 1-1/4 | 4-1/4 | 2-3/8 | .950 | 3 | **60069** | HMGC-RN-023-31000-R.060 |
| | 1 | **.060** | 1-1/4 | 4-1/4 | 2-5/8 | .950 | 3 | **60072** | HMGC-RN-026-31000-R.060 |
| | 1 | **.060** | 1-1/4 | 4-3/4 | 3 | .950 | 3 | **60075** | HMGC-RN-030-31000-R.060 |

* .0003 max TIR

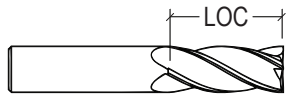
## HMGC-RN-3

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0007 | .0015 | .0016 | .0011 | .0022 | .0018 | .0014 | .0029 | .0021 | .0021 | .0043 | .0024 | .0028 | .0056 | .0028 | .0040 | .0080 | .0033 | .0051 | .0102 | .0040 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0011 | .0023 | .0020 | .0017 | .0034 | .0023 | .0022 | .0045 | .0026 | .0033 | .0066 | .0030 | .0043 | .0087 | .0035 | .0062 | .0124 | .0041 | .0079 | .0158 | .0050 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0008 | .0015 | .0017 | .0011 | .0023 | .0019 | .0015 | .0030 | .0021 | .0022 | .0044 | .0024 | .0029 | .0058 | .0028 | .0041 | .0083 | .0034 | .0053 | .0106 | .0041 |

| Milling Process | ADOC | RDOC |
|---|---|---|
| Slot (Full Slotting) | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Up to Max LOC | 35%-50% Diameter |
| Fin (Finishing) | Up to Max LOC | 4%-6% Diameter |

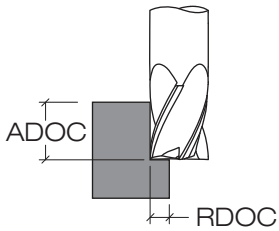
NOTES:

IPT values shown are for 4xD reach tools, and should be adjusted for longer or shorter reaches. For tools with reaches greater than 4xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.



Regular Style

Reduced Neck Style




**Key: LOC=Length of Cut ADOC=Axial Depth of Cut RDOC=Radial Depth of Cut**

# H35AL-3

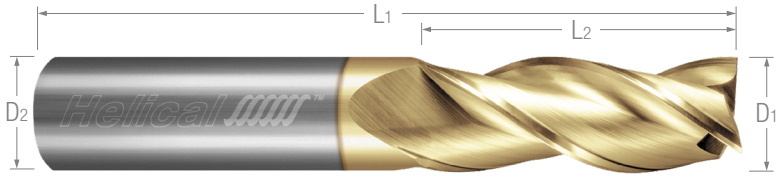
HEM

New Items!

## 3 FLUTE - SQUARE

35° Helix

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for tough roughing applications with 3 flutes and 35° helix
- Cylindrically ground to maintain edge strength
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

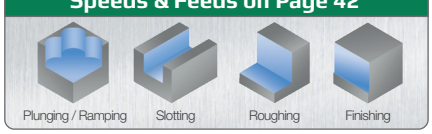



| | Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | 01015 | 01017 | H35AL-S-30125 |
| | | 1/8 | 3/8 | 2 | 3 | 01030 | 01032 | H35AL-SR-30125 |
| | | 1/8 | 1/2 | 2-1/2 | 3 | 01045 | 01047 | H35AL-R-30125 |
| | | 1/8 | 5/8 | 2-1/2 | 3 | 81359 | 81360 | H35AL-M-30125 |
| | | 1/8 | 3/4 | 2-1/2 | 3 | 81361 | 81362 | H35AL-L-30125 |
| new | | 1/8 | 7/8 | 2-1/2 | 3 | 83429 | 83430 | H35AL-LX-30125 |
| | 3/16 | 3/16 | 5/16 | 2 | 3 | 01090 | 01092 | H35AL-S-30187 |
| new | | 3/16 | 7/16 | 2 | 3 | 83431 | 83432 | H35AL-SR-30187 |
| | | 3/16 | 9/16 | 2-1/2 | 3 | 01105 | 01107 | H35AL-R-30187 |
| | | 3/16 | 3/4 | 2-1/2 | 3 | 81363 | 81364 | H35AL-M-30187 |
| | | 3/16 | 1 | 2-1/2 | 3 | 81365 | 81366 | H35AL-L-30187 |
| new | | 3/16 | 1-3/16 | 3 | 3 | 83433 | 83434 | H35AL-LX-30187 |
| | 1/4 | 1/4 | 3/8 | 2 | 3 | 01150 | 01152 | H35AL-S-30250 |
| | | 1/4 | 1/2 | 2-1/2 | 3 | 01155 | 01157 | H35AL-SR-30250 |
| | | 1/4 | 5/8 | 2-1/2 | 3 | 01165 | 01167 | H35AL-R-30250 |
| | | 1/4 | 1 | 3 | 3 | 01180 | 01182 | H35AL-M-30250 |
| | | 1/4 | 1-1/4 | 3 | 3 | 01195 | 01197 | H35AL-L-30250 |
| | | 1/4 | 1-1/2 | 3 | 3 | 81367 | 81368 | H35AL-LX-30250 |
| | | 1/4 | 1-3/4 | 4 | 3 | 81369 | 81370 | H35AL-X-30250 |
| | 5/16 | 5/16 | 7/16 | 2 | 3 | 01240 | 01242 | H35AL-S-30312 |
| | | 5/16 | 5/8 | 2-1/2 | 3 | 01255 | 01257 | H35AL-R-30312 |
| | | 5/16 | 1 | 3 | 3 | 01270 | 01272 | H35AL-M-30312 |
| | | 5/16 | 1-1/4 | 3 | 3 | 01285 | 01287 | H35AL-L-30312 |
| new | | 5/16 | 1-9/16 | 4 | 3 | 83435 | 83436 | H35AL-LX-30312 |
| | | 5/16 | 2-1/8 | 4 | 3 | 01300 | 01302 | H35AL-X-30312 |
| | 3/8 | 3/8 | 1/2 | 2 | 3 | 01330 | 01332 | H35AL-S-30375 |
| | | 3/8 | 3/4 | 2-1/2 | 3 | 81371 | 81372 | H35AL-SR-30375 |
| | | 3/8 | 1 | 3 | 3 | 01345 | 01347 | H35AL-R-30375 |
| | | 3/8 | 1-1/4 | 3-1/2 | 3 | 01360 | 01362 | H35AL-M-30375 |
| | | 3/8 | 1-1/2 | 4 | 3 | 01375 | 01377 | H35AL-L-30375 |
| | | 3/8 | 2 | 4 | 3 | 01390 | 01392 | H35AL-LX-30375 |
| | | 3/8 | 2-1/2 | 5 | 3 | 01405 | 01407 | H35AL-X-30375 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 42



# 3 FLUTE - SQUARE New Items!

## 35° Helix (cont.)

**H35AL-3**

continued from previous page

| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 2-1/2 | 3 | 01435 | 01437 | H35AL-S-30500 | |
| | 1/2 | 1 | 3 | 3 | 01450 | 01452 | H35AL-SR-30500 | |
| | 1/2 | 1-1/4 | 3 | 3 | 01465 | 01467 | H35AL-R-30500 | |
| | 1/2 | 1-5/8 | 4 | 3 | 01480 | 01482 | H35AL-M-30500 | |
| | 1/2 | 2 | 4 | 3 | 01495 | 01497 | H35AL-L-30500 | |
| | 1/2 | 2-1/2 | 5 | 3 | 01510 | 01512 | H35AL-LX-30500 | |
| | 1/2 | 3-1/8 | 6 | 3 | 01525 | 01527 | H35AL-X-30500 | |
| | 1/2 | 3-5/8 | 6 | 3 | 83437 | 83438 | H35AL-Y-30500 | new |
| 5/8 | 5/8 | 3/4 | 3 | 3 | 01555 | 01557 | H35AL-S-30625 | |
| | 5/8 | 1-1/4 | 3-1/2 | 3 | 83439 | 83440 | H35AL-SR-30625 | new |
| | 5/8 | 1-5/8 | 3-1/2 | 3 | 01570 | 01572 | H35AL-R-30625 | |
| | 5/8 | 2-1/8 | 4 | 3 | 01585 | 01587 | H35AL-M-30625 | |
| | 5/8 | 2-1/2 | 5 | 3 | 01600 | 01602 | H35AL-L-30625 | |
| | 5/8 | 3-1/4 | 6 | 3 | 01610 | 01612 | H35AL-LX-30625 | |
| | 5/8 | 3-3/4 | 6 | 3 | 01615 | 01617 | H35AL-X-30625 | |
| 3/4 | 3/4 | 1 | 4 | 3 | 01645 | 01647 | H35AL-S-30750 | |
| | 3/4 | 1-5/8 | 4 | 3 | 01660 | 01662 | H35AL-R-30750 | |
| | 3/4 | 2-1/4 | 5 | 3 | 01675 | 01677 | H35AL-M-30750 | |
| | 3/4 | 2-3/4 | 5 | 3 | 81373 | 81374 | H35AL-ML-30750 | |
| | 3/4 | 3-1/4 | 6 | 3 | 01690 | 01692 | H35AL-L-30750 | |
| | 3/4 | 4 | 6-1/2 | 3 | 01705 | 01707 | H35AL-X-30750 | |
| 1 | 1 | 1-1/4 | 4 | 3 | 01735 | 01737 | H35AL-S-31000 | |
| | 1 | 2 | 5 | 3 | 01750 | 01752 | H35AL-R-31000 | |
| | 1 | 2-5/8 | 6 | 3 | 01765 | 01767 | H35AL-M-31000 | |
| | 1 | 3-1/4 | 6 | 3 | 01780 | 01782 | H35AL-L-31000 | |
| | 1 | 4-1/4 | 7 | 3 | 01795 | 01797 | H35AL-X-31000 | |

* .0003 max TIR



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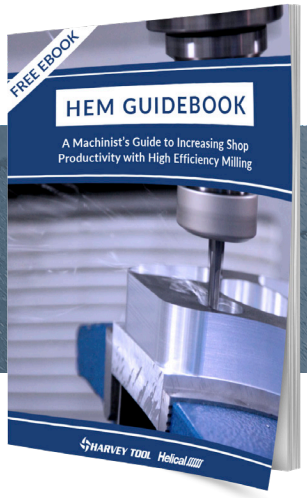
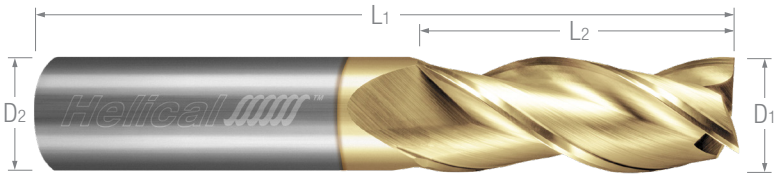


# MH35AL-3
METRIC

# 3 FLUTE - SQUARE - METRIC
35° Helix

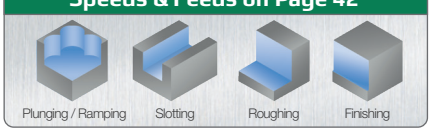
- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for tough roughing applications with 3 flutes and 35° helix
- Cylindrically ground to maintain edge strength
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | 9.00 mm | 63 mm | 3 | 59690 | 59691 | MH35AL-015-30600 |
| | 6.00 mm | 12.00 mm | 63 mm | 3 | 59726 | 59727 | MH35AL-020-30600 |
| | 6.00 mm | 18.00 mm | 63 mm | 3 | 59794 | 59795 | MH35AL-030-30600 |
| 8 mm | 8.00 mm | 12.00 mm | 63 mm | 3 | 59696 | 59697 | MH35AL-015-30800 |
| | 8.00 mm | 16.00 mm | 63 mm | 3 | 59732 | 59733 | MH35AL-020-30800 |
| | 8.00 mm | 24.00 mm | 75 mm | 3 | 59800 | 59801 | MH35AL-030-30800 |
| 10 mm | 10.00 mm | 15.00 mm | 63 mm | 3 | 59702 | 59703 | MH35AL-015-31000 |
| | 10.00 mm | 20.00 mm | 63 mm | 3 | 59738 | 59739 | MH35AL-020-31000 |
| | 10.00 mm | 25.00 mm | 75 mm | 3 | 59766 | 59767 | MH35AL-025-31000 |
| 12 mm | 12.00 mm | 18.00 mm | 75 mm | 3 | 59708 | 59709 | MH35AL-015-31200 |
| | 12.00 mm | 24.00 mm | 75 mm | 3 | 59744 | 59745 | MH35AL-020-31200 |
| | 12.00 mm | 30.00 mm | 75 mm | 3 | 59772 | 59773 | MH35AL-025-31200 |
| 16 mm | 16.00 mm | 24.00 mm | 89 mm | 3 | 59714 | 59715 | MH35AL-015-31600 |
| | 16.00 mm | 32.00 mm | 89 mm | 3 | 59750 | 59751 | MH35AL-020-31600 |
| | 16.00 mm | 40.00 mm | 89 mm | 3 | 59778 | 59779 | MH35AL-025-31600 |
| 20 mm | 20.00 mm | 30.00 mm | 89 mm | 3 | 59720 | 59721 | MH35AL-015-32000 |
| | 20.00 mm | 40.00 mm | 100 mm | 3 | 59756 | 59757 | MH35AL-020-32000 |
| | 20.00 mm | 50.00 mm | 125 mm | 3 | 59784 | 59785 | MH35AL-025-32000 |
| 25 mm | 25.00 mm | 50.00 mm | 125 mm | 3 | 59762 | 59763 | MH35AL-020-32500 |
| | 25.00 mm | 64.00 mm | 125 mm | 3 | 59790 | 59791 | MH35AL-025-32500 |

* .008 mm max TIR

Speeds & Feeds on Page 42

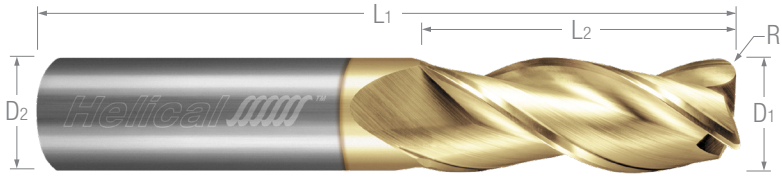


# 3 FLUTE - CORNER RADIUS New Items!

## 35° Helix

**H35AL-3**

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for tough roughing applications with 3 flutes and 35° helix
- Cylindrically ground to maintain edge strength
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA



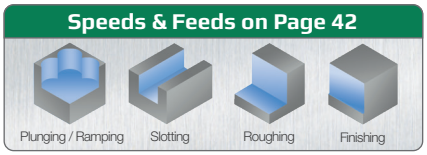



| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 3 | 59000 | 59001 | H35AL-S-30125-R.010 | |
| | 1/8 | .010 | 3/8 | 2 | 3 | 59008 | 59009 | H35AL-SR-30125-R.010 | |
| | 1/8 | .010 | 1/2 | 2-1/2 | 3 | 82759 | 82760 | H35AL-R-30125-R.010 | new |
| | 1/8 | .015 | 1/4 | 1-1/2 | 3 | 59002 | 59003 | H35AL-S-30125-R.015 | |
| | 1/8 | .015 | 3/8 | 2 | 3 | 59010 | 59011 | H35AL-SR-30125-R.015 | |
| | 1/8 | .015 | 1/2 | 2-1/2 | 3 | 82761 | 82762 | H35AL-R-30125-R.015 | new |
| | 1/8 | .020 | 1/4 | 1-1/2 | 3 | 59004 | 59005 | H35AL-S-30125-R.020 | |
| | 1/8 | .020 | 3/8 | 2 | 3 | 59012 | 59013 | H35AL-SR-30125-R.020 | |
| | 1/8 | .020 | 1/2 | 2-1/2 | 3 | 82763 | 82764 | H35AL-R-30125-R.020 | new |
| | 1/8 | .030 | 1/4 | 1-1/2 | 3 | 59006 | 59007 | H35AL-S-30125-R.030 | |
| | 1/8 | .030 | 3/8 | 2 | 3 | 59014 | 59015 | H35AL-SR-30125-R.030 | |
| | 1/8 | .030 | 1/2 | 2-1/2 | 3 | 82765 | 82766 | H35AL-R-30125-R.030 | new |
| 3/16 | 3/16 | .010 | 5/16 | 2 | 3 | 59016 | 59017 | H35AL-S-30187-R.010 | |
| | 3/16 | .010 | 9/16 | 2-1/2 | 3 | 59024 | 59025 | H35AL-R-30187-R.010 | |
| | 3/16 | .010 | 3/4 | 2-1/2 | 3 | 82767 | 82768 | H35AL-M-30187-R.010 | new |
| | 3/16 | .015 | 5/16 | 2 | 3 | 59018 | 59019 | H35AL-S-30187-R.015 | |
| | 3/16 | .015 | 9/16 | 2-1/2 | 3 | 59026 | 59027 | H35AL-R-30187-R.015 | |
| | 3/16 | .015 | 3/4 | 2-1/2 | 3 | 82769 | 82770 | H35AL-M-30187-R.015 | new |
| | 3/16 | .020 | 5/16 | 2 | 3 | 59020 | 59021 | H35AL-S-30187-R.020 | |
| | 3/16 | .020 | 9/16 | 2-1/2 | 3 | 59028 | 59029 | H35AL-R-30187-R.020 | |
| | 3/16 | .020 | 3/4 | 2-1/2 | 3 | 82771 | 82772 | H35AL-M-30187-R.020 | new |
| | 3/16 | .030 | 5/16 | 2 | 3 | 59022 | 59023 | H35AL-S-30187-R.030 | |
| | 3/16 | .030 | 9/16 | 2-1/2 | 3 | 59030 | 59031 | H35AL-R-30187-R.030 | |
| | 3/16 | .030 | 3/4 | 2-1/2 | 3 | 82773 | 82774 | H35AL-M-30187-R.030 | new |
| 1/4 | 1/4 | .010 | 3/8 | 2 | 3 | 59032 | 59033 | H35AL-S-30250-R.010 | |
| | 1/4 | .010 | 5/8 | 2-1/2 | 3 | 59042 | 59043 | H35AL-R-30250-R.010 | |
| | 1/4 | .010 | 1 | 3 | 3 | 59052 | 59053 | H35AL-M-30250-R.010 | |
| | 1/4 | .010 | 1-1/4 | 3 | 3 | 82775 | 82776 | H35AL-L-30250-R.010 | new |
| | 1/4 | .015 | 3/8 | 2 | 3 | 59034 | 59035 | H35AL-S-30250-R.015 | |
| | 1/4 | .015 | 5/8 | 2-1/2 | 3 | 59044 | 59045 | H35AL-R-30250-R.015 | |
| | 1/4 | .015 | 1 | 3 | 3 | 59054 | 59055 | H35AL-M-30250-R.015 | |
| | 1/4 | .015 | 1-1/4 | 3 | 3 | 82777 | 82778 | H35AL-L-30250-R.015 | new |
| | 1/4 | .020 | 3/8 | 2 | 3 | 59036 | 59037 | H35AL-S-30250-R.020 | |
| | 1/4 | .020 | 5/8 | 2-1/2 | 3 | 59046 | 59047 | H35AL-R-30250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 3 | 59056 | 59057 | H35AL-M-30250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 3 | 82779 | 82780 | H35AL-L-30250-R.020 | new |
| | 1/4 | .030 | 3/8 | 2 | 3 | 59038 | 59039 | H35AL-S-30250-R.030 | |
| | 1/4 | .030 | 5/8 | 2-1/2 | 3 | 59048 | 59049 | H35AL-R-30250-R.030 | |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 42



# H35AL-3

New Items!

## 3 FLUTE - CORNER RADIUS

35° Helix (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | Overall Length $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | .030 | 1 | 3 | 3 | 59058 | 59059 | H35AL-M-30250-R.030 |
| new | | 1/4 | .030 | 1-1/4 | 3 | 3 | 82781 | 82782 | H35AL-L-30250-R.030 |
| | | 1/4 | .060 | 3/8 | 2 | 3 | 59040 | 59041 | H35AL-S-30250-R.060 |
| | | 1/4 | .060 | 5/8 | 2-1/2 | 3 | 59050 | 59051 | H35AL-R-30250-R.060 |
| | | 1/4 | .060 | 1 | 3 | 3 | 59060 | 59061 | H35AL-M-30250-R.060 |
| new | | 1/4 | .060 | 1-1/4 | 3 | 3 | 82783 | 82784 | H35AL-L-30250-R.060 |
| | 5/16 | 5/16 | .020 | 7/16 | 2 | 3 | 59062 | 59063 | H35AL-S-30312-R.020 |
| | | 5/16 | .020 | 5/8 | 2-1/2 | 3 | 59068 | 59069 | H35AL-R-30312-R.020 |
| | | 5/16 | .020 | 1 | 3 | 3 | 59074 | 59075 | H35AL-M-30312-R.020 |
| | | 5/16 | .030 | 7/16 | 2 | 3 | 59064 | 59065 | H35AL-S-30312-R.030 |
| | | 5/16 | .030 | 5/8 | 2-1/2 | 3 | 59070 | 59071 | H35AL-R-30312-R.030 |
| | | 5/16 | .030 | 1 | 3 | 3 | 59076 | 59077 | H35AL-M-30312-R.030 |
| | | 5/16 | .060 | 7/16 | 2 | 3 | 59066 | 59067 | H35AL-S-30312-R.060 |
| | | 5/16 | .060 | 5/8 | 2-1/2 | 3 | 59072 | 59073 | H35AL-R-30312-R.060 |
| | | 5/16 | .060 | 1 | 3 | 3 | 59078 | 59079 | H35AL-M-30312-R.060 |
| | 3/8 | 3/8 | .010 | 1/2 | 2 | 3 | 59080 | 59081 | H35AL-S-30375-R.010 |
| | | 3/8 | .010 | 1 | 3 | 3 | 59090 | 59091 | H35AL-R-30375-R.010 |
| | | 3/8 | .010 | 1-1/4 | 3-1/2 | 3 | 59100 | 59101 | H35AL-M-30375-R.010 |
| new | | 3/8 | .010 | 1-1/2 | 4 | 3 | 82785 | 82786 | H35AL-L-30375-R.010 |
| | | 3/8 | .015 | 1/2 | 2 | 3 | 59082 | 59083 | H35AL-S-30375-R.015 |
| | | 3/8 | .015 | 1 | 3 | 3 | 59092 | 59093 | H35AL-R-30375-R.015 |
| | | 3/8 | .015 | 1-1/4 | 3-1/2 | 3 | 59102 | 59103 | H35AL-M-30375-R.015 |
| | | 3/8 | .020 | 1/2 | 2 | 3 | 59084 | 59085 | H35AL-S-30375-R.020 |
| | | 3/8 | .020 | 1 | 3 | 3 | 59094 | 59095 | H35AL-R-30375-R.020 |
| | | 3/8 | .020 | 1-1/4 | 3-1/2 | 3 | 59104 | 59105 | H35AL-M-30375-R.020 |
| | | 3/8 | .030 | 1/2 | 2 | 3 | 59086 | 59087 | H35AL-S-30375-R.030 |
| | | 3/8 | .030 | 1 | 3 | 3 | 59096 | 59097 | H35AL-R-30375-R.030 |
| | | 3/8 | .030 | 1-1/4 | 3-1/2 | 3 | 59106 | 59107 | H35AL-M-30375-R.030 |
| new | | 3/8 | .030 | 1-1/2 | 4 | 3 | 82787 | 82788 | H35AL-L-30375-R.030 |
| | | 3/8 | .060 | 1/2 | 2 | 3 | 59088 | 59089 | H35AL-S-30375-R.060 |
| | | 3/8 | .060 | 1 | 3 | 3 | 59098 | 59099 | H35AL-R-30375-R.060 |
| | | 3/8 | .060 | 1-1/4 | 3-1/2 | 3 | 59108 | 59109 | H35AL-M-30375-R.060 |
| new | | 3/8 | .060 | 1-1/2 | 4 | 3 | 82789 | 82790 | H35AL-L-30375-R.060 |
| | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 3 | 59110 | 59111 | H35AL-S-30500-R.010 |
| | | 1/2 | .010 | 1 | 3 | 3 | 59124 | 59125 | H35AL-SR-30500-R.010 |
| | | 1/2 | .010 | 1-1/4 | 3 | 3 | 59138 | 59139 | H35AL-R-30500-R.010 |
| | | 1/2 | .010 | 1-5/8 | 4 | 3 | 59152 | 59153 | H35AL-M-30500-R.010 |
| | | 1/2 | .015 | 5/8 | 2-1/2 | 3 | 59112 | 59113 | H35AL-S-30500-R.015 |
| | | 1/2 | .015 | 1 | 3 | 3 | 59126 | 59127 | H35AL-SR-30500-R.015 |
| | | 1/2 | .015 | 1-1/4 | 3 | 3 | 59140 | 59141 | H35AL-R-30500-R.015 |
| | | 1/2 | .015 | 1-5/8 | 4 | 3 | 59154 | 59155 | H35AL-M-30500-R.015 |
| | | 1/2 | .020 | 5/8 | 2-1/2 | 3 | 59114 | 59115 | H35AL-S-30500-R.020 |
| | | 1/2 | .020 | 1 | 3 | 3 | 59128 | 59129 | H35AL-SR-30500-R.020 |
| | | 1/2 | .020 | 1-1/4 | 3 | 3 | 59142 | 59143 | H35AL-R-30500-R.020 |
| | | 1/2 | .020 | 1-5/8 | 4 | 3 | 59156 | 59157 | H35AL-M-30500-R.020 |
| new | | 1/2 | .020 | 2 | 4 | 3 | 82791 | 82792 | H35AL-L-30500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 3 | 59116 | 59117 | H35AL-S-30500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 3 | 59130 | 59131 | H35AL-SR-30500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 3 | 59144 | 59145 | H35AL-R-30500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 3 | 59158 | 59159 | H35AL-M-30500-R.030 |
| new | | 1/2 | .030 | 2 | 4 | 3 | 82793 | 82794 | H35AL-L-30500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 3 | 59118 | 59119 | H35AL-S-30500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 3 | 59132 | 59133 | H35AL-SR-30500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 3 | 59146 | 59147 | H35AL-R-30500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 3 | 59160 | 59161 | H35AL-M-30500-R.060 |
| new | | 1/2 | .060 | 2 | 4 | 3 | 82795 | 82796 | H35AL-L-30500-R.060 |

* .0003 max TIR

continued on next page

# 3 FLUTE - CORNER RADIUS New Items!

## 35° Helix (cont.)

HEM

## H35AL-3

continued from previous page

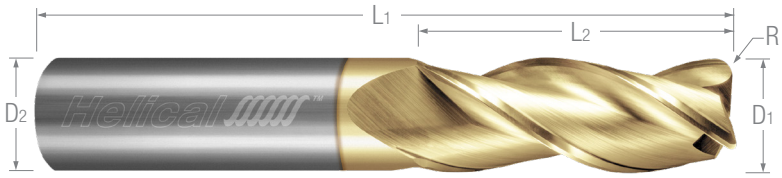
| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | Overall Length $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | **.090** | 5/8 | 2-1/2 | 3 | **59120** | **59121** | H35AL-S-30500-R.090 | |
| | 1/2 | **.090** | 1 | 3 | 3 | **59134** | **59135** | H35AL-SR-30500-R.090 | |
| | 1/2 | **.090** | 1-1/4 | 3 | 3 | **59148** | **59149** | H35AL-R-30500-R.090 | |
| | 1/2 | **.090** | 1-5/8 | 4 | 3 | **59162** | **59163** | H35AL-M-30500-R.090 | |
| | 1/2 | **.125** | 5/8 | 2-1/2 | 3 | **59122** | **59123** | H35AL-S-30500-R.125 | |
| | 1/2 | **.125** | 1 | 3 | 3 | **59136** | **59137** | H35AL-SR-30500-R.125 | |
| | 1/2 | **.125** | 1-1/4 | 3 | 3 | **59150** | **59151** | H35AL-R-30500-R.125 | |
| | 1/2 | **.125** | 1-5/8 | 4 | 3 | **59164** | **59165** | H35AL-M-30500-R.125 | |
| | 1/2 | **.125** | 2 | 4 | 3 | **82797** | **82798** | H35AL-L-30500-R.125 | new |
| 5/8 | 5/8 | **.020** | 3/4 | 3 | 3 | **59166** | **59167** | H35AL-S-30625-R.020 | |
| | 5/8 | **.020** | 1-5/8 | 3-1/2 | 3 | **59174** | **59175** | H35AL-R-30625-R.020 | |
| | 5/8 | **.020** | 2-1/8 | 4 | 3 | **59182** | **59183** | H35AL-M-30625-R.020 | |
| | 5/8 | **.020** | 2-1/2 | 5 | 3 | **59190** | **59191** | H35AL-L-30625-R.020 | |
| | 5/8 | **.030** | 3/4 | 3 | 3 | **59168** | **59169** | H35AL-S-30625-R.030 | |
| | 5/8 | **.030** | 1-5/8 | 3-1/2 | 3 | **59176** | **59177** | H35AL-R-30625-R.030 | |
| | 5/8 | **.030** | 2-1/8 | 4 | 3 | **59184** | **59185** | H35AL-M-30625-R.030 | |
| | 5/8 | **.030** | 2-1/2 | 5 | 3 | **59192** | **59193** | H35AL-L-30625-R.030 | |
| | 5/8 | **.060** | 3/4 | 3 | 3 | **59170** | **59171** | H35AL-S-30625-R.060 | |
| | 5/8 | **.060** | 1-5/8 | 3-1/2 | 3 | **59178** | **59179** | H35AL-R-30625-R.060 | |
| | 5/8 | **.060** | 2-1/8 | 4 | 3 | **59186** | **59187** | H35AL-M-30625-R.060 | |
| | 5/8 | **.060** | 2-1/2 | 5 | 3 | **59194** | **59195** | H35AL-L-30625-R.060 | |
| | 5/8 | **.125** | 3/4 | 3 | 3 | **59172** | **59173** | H35AL-S-30625-R.125 | |
| | 5/8 | **.125** | 1-5/8 | 3-1/2 | 3 | **59180** | **59181** | H35AL-R-30625-R.125 | |
| | 5/8 | **.125** | 2-1/8 | 4 | 3 | **59188** | **59189** | H35AL-M-30625-R.125 | |
| | 5/8 | **.125** | 2-1/2 | 5 | 3 | **59196** | **59197** | H35AL-L-30625-R.125 | |
| 3/4 | 3/4 | **.030** | 1-5/8 | 4 | 3 | **59198** | **59199** | H35AL-R-30750-R.030 | |
| | 3/4 | **.030** | 2-1/4 | 5 | 3 | **59210** | **59211** | H35AL-M-30750-R.030 | |
| | 3/4 | **.030** | 3-1/4 | 6 | 3 | **59222** | **59223** | H35AL-L-30750-R.030 | |
| | 3/4 | **.030** | 4 | 6-1/2 | 3 | **82799** | **82800** | H35AL-X-30750-R.030 | new |
| | 3/4 | **.060** | 1-5/8 | 4 | 3 | **59200** | **59201** | H35AL-R-30750-R.060 | |
| | 3/4 | **.060** | 2-1/4 | 5 | 3 | **59212** | **59213** | H35AL-M-30750-R.060 | |
| | 3/4 | **.060** | 3-1/4 | 6 | 3 | **59224** | **59225** | H35AL-L-30750-R.060 | |
| | 3/4 | **.060** | 4 | 6-1/2 | 3 | **82801** | **82802** | H35AL-X-30750-R.060 | new |
| | 3/4 | **.090** | 1-5/8 | 4 | 3 | **59202** | **59203** | H35AL-R-30750-R.090 | |
| | 3/4 | **.090** | 2-1/4 | 5 | 3 | **59214** | **59215** | H35AL-M-30750-R.090 | |
| | 3/4 | **.090** | 3-1/4 | 6 | 3 | **59226** | **59227** | H35AL-L-30750-R.090 | |
| | 3/4 | **.125** | 1-5/8 | 4 | 3 | **59204** | **59205** | H35AL-R-30750-R.125 | |
| | 3/4 | **.125** | 2-1/4 | 5 | 3 | **59216** | **59217** | H35AL-M-30750-R.125 | |
| | 3/4 | **.125** | 3-1/4 | 6 | 3 | **59228** | **59229** | H35AL-L-30750-R.125 | |
| | 3/4 | **.125** | 4 | 6-1/2 | 3 | **82803** | **82804** | H35AL-X-30750-R.125 | new |
| | 3/4 | **.190** | 1-5/8 | 4 | 3 | **59206** | **59207** | H35AL-R-30750-R.190 | |
| | 3/4 | **.190** | 2-1/4 | 5 | 3 | **59218** | **59219** | H35AL-M-30750-R.190 | |
| | 3/4 | **.190** | 3-1/4 | 6 | 3 | **59230** | **59231** | H35AL-L-30750-R.190 | |
| | 3/4 | **.250** | 1-5/8 | 4 | 3 | **59208** | **59209** | H35AL-R-30750-R.250 | |
| | 3/4 | **.250** | 2-1/4 | 5 | 3 | **59220** | **59221** | H35AL-M-30750-R.250 | |
| | 3/4 | **.250** | 3-1/4 | 6 | 3 | **59232** | **59233** | H35AL-L-30750-R.250 | |
| | 3/4 | **.250** | 4 | 6-1/2 | 3 | **82805** | **82806** | H35AL-X-30750-R.250 | new |
| 1 | 1 | **.030** | 2 | 5 | 3 | **59234** | **59235** | H35AL-R-31000-R.030 | |
| | 1 | **.030** | 3-1/4 | 6 | 3 | **59242** | **59243** | H35AL-L-31000-R.030 | |
| | 1 | **.060** | 2 | 5 | 3 | **59236** | **59237** | H35AL-R-31000-R.060 | |
| | 1 | **.060** | 3-1/4 | 6 | 3 | **59244** | **59245** | H35AL-L-31000-R.060 | |
| | 1 | **.125** | 2 | 5 | 3 | **59238** | **59239** | H35AL-R-31000-R.125 | |
| | 1 | **.125** | 3-1/4 | 6 | 3 | **59246** | **59247** | H35AL-L-31000-R.125 | |
| | 1 | **.250** | 2 | 5 | 3 | **59240** | **59241** | H35AL-R-31000-R.250 | |
| | 1 | **.250** | 3-1/4 | 6 | 3 | **59248** | **59249** | H35AL-L-31000-R.250 | |

* .0003 max TIR

# MH35AL-3
METRIC

# 3 FLUTE - CORNER RADIUS - METRIC
35° Helix

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for tough roughing applications with 3 flutes and 35° helix
- Cylindrically ground to maintain edge strength
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.05\ mm}_{-.05\ mm}$ | LOC $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.60\ mm}_{-1.60\ mm}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 3 | **59692** | **59693** | MH35AL-015-30600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 3 | **59728** | **59729** | MH35AL-020-30600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 3 | **59796** | **59797** | MH35AL-030-30600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 3 | **59694** | **59695** | MH35AL-015-30600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 3 | **59730** | **59731** | MH35AL-020-30600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 3 | **59798** | **59799** | MH35AL-030-30600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 3 | **59698** | **59699** | MH35AL-015-30800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 3 | **59734** | **59735** | MH35AL-020-30800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 3 | **59802** | **59803** | MH35AL-030-30800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 3 | **59700** | **59701** | MH35AL-015-30800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 3 | **59736** | **59737** | MH35AL-020-30800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 3 | **59804** | **59805** | MH35AL-030-30800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 3 | **59704** | **59705** | MH35AL-015-31000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 3 | **59740** | **59741** | MH35AL-020-31000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 3 | **59768** | **59769** | MH35AL-025-31000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 3 | **59706** | **59707** | MH35AL-015-31000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 3 | **59742** | **59743** | MH35AL-020-31000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 3 | **59770** | **59771** | MH35AL-025-31000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 3 | **59710** | **59711** | MH35AL-015-31200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 3 | **59746** | **59747** | MH35AL-020-31200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 3 | **59774** | **59775** | MH35AL-025-31200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 3 | **59712** | **59713** | MH35AL-015-31200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 3 | **59748** | **59749** | MH35AL-020-31200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 3 | **59776** | **59777** | MH35AL-025-31200-R1.00 |
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 3 | **59716** | **59717** | MH35AL-015-31600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 3 | **59752** | **59753** | MH35AL-020-31600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 3 | **59780** | **59781** | MH35AL-025-31600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 3 | **59718** | **59719** | MH35AL-015-31600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 3 | **59754** | **59755** | MH35AL-020-31600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 3 | **59782** | **59783** | MH35AL-025-31600-R1.00 |

* .008 mm max TIR

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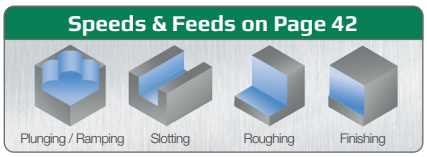


# 3 FLUTE - CORNER RADIUS - METRIC

35° Helix (cont.)

**MH35AL-3**
**METRIC**

continued from previous page

| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Corner Radius $R^{+.05\ mm}_{-.05\ mm}$ | LOC $L_2^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1^{+1.60\ mm}_{-1.60\ mm}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 3 | **59722** | **59723** | MH35AL-015-32000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 3 | **59758** | **59759** | MH35AL-020-32000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 3 | **59786** | **59787** | MH35AL-025-32000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 3 | **59724** | **59725** | MH35AL-015-32000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 3 | **59760** | **59761** | MH35AL-020-32000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 3 | **59788** | **59789** | MH35AL-025-32000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 3 | **59764** | **59765** | MH35AL-020-32500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 3 | **59792** | **59793** | MH35AL-025-32500-R1.00 |

* .008 mm max TIR

## The Anatomy of an End Mill

With how specific part blueprints are, understanding every geometry feature of your tool is pivotal to ensuring your final product is perfect. Get to know the fine details and geometry makeup of an end mill in our “In the Loupe” blog post **The Anatomy of an End Mill**.

**Read more on helical.blog/intheloupe**

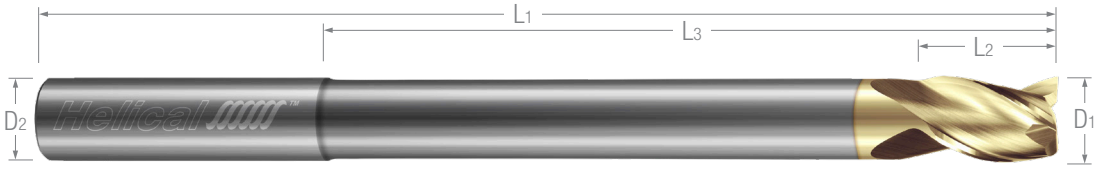
# H35AL-RN-3

New Items!

## 3 FLUTE - SQUARE

### 35° Helix - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed for tough roughing applications with 3 flutes and 35° helix
- Cylindrically ground to maintain edge strength
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

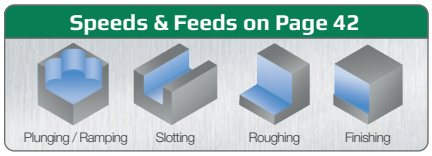



| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 5/32 | 3 | 1/2 | .118 | 3 | 04015 | 04017 | H35AL-RN-R-30125 |
| | | 1/8 | 5/32 | 3 | 5/8 | .118 | 3 | 81375 | 81376 | H35AL-RN-A-30125 |
| | | 1/8 | 5/32 | 3 | 3/4 | .118 | 3 | 04030 | 04032 | H35AL-RN-M-30125 |
| | | 1/8 | 5/32 | 3 | 1 | .118 | 3 | 81377 | 81378 | H35AL-RN-L-30125 |
| new | | 1/8 | 5/32 | 3 | 1-1/4 | .118 | 3 | 83441 | 83442 | H35AL-RN-LX-30125 |
| | 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 3 | 04060 | 04062 | H35AL-RN-R-30187 |
| | | 3/16 | 7/32 | 3 | 5/8 | .178 | 3 | 81379 | 81380 | H35AL-RN-A-30187 |
| | | 3/16 | 7/32 | 3 | 3/4 | .178 | 3 | 04075 | 04077 | H35AL-RN-M-30187 |
| | | 3/16 | 7/32 | 3 | 1 | .178 | 3 | 81381 | 81382 | H35AL-RN-ML-30187 |
| new | | 3/16 | 7/32 | 3 | 1-5/16 | .178 | 3 | 83443 | 83444 | H35AL-RN-LX-30187 |
| | 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 3 | 04105 | 04107 | H35AL-RN-S-30250 |
| | | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 3 | 04120 | 04122 | H35AL-RN-R-30250 |
| | | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 3 | 81383 | 81384 | H35AL-RN-A-30250 |
| | | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 3 | 04135 | 04137 | H35AL-RN-M-30250 |
| | | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 3 | 81385 | 81386 | H35AL-RN-ML-30250 |
| new | | 1/4 | 3/8 | 4-1/2 | 3 | .237 | 3 | 83445 | 83446 | H35AL-RN-L-30250 |
| | 5/16 | 5/16 | 7/16 | 4 | 1-1/8 | .296 | 3 | 04165 | 04167 | H35AL-RN-R-30312 |
| new | | 5/16 | 7/16 | 4 | 1-3/4 | .296 | 3 | 83447 | 83448 | H35AL-RN-A-30312 |
| | | 5/16 | 7/16 | 4 | 2-1/8 | .296 | 3 | 04180 | 04182 | H35AL-RN-M-30312 |
| | | 5/16 | 7/16 | 6 | 3-1/8 | .296 | 3 | 04190 | 04192 | H35AL-RN-L-30312 |
| | | 5/16 | 7/16 | 6 | 4 | .296 | 3 | 04200 | 04202 | H35AL-RN-X-30312 |
| | 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 3 | 04210 | 04212 | H35AL-RN-R-30375 |
| | | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 3 | 81387 | 81388 | H35AL-RN-A-30375 |
| | | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 3 | 04225 | 04227 | H35AL-RN-M-30375 |
| | | 3/8 | 1/2 | 5 | 2-1/2 | .356 | 3 | 81389 | 81390 | H35AL-RN-ML-30375 |
| | | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 3 | 04235 | 04237 | H35AL-RN-L-30375 |
| new | | 3/8 | 1/2 | 6 | 3-1/2 | .356 | 3 | 83449 | 83450 | H35AL-RN-LX-30375 |
| | | 3/8 | 1/2 | 6 | 4 | .356 | 3 | 04245 | 04247 | H35AL-RN-X-30375 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 42



# SPEEDS & FEEDS New Items!

## H35AL-3

### 3 Flute - 35° Helix (cont.)

continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 4 | 1-3/8 | .475 | 3 | **04285** | **04287** | H35AL-RN-R-30500 | |
| | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 3 | **81391** | **81392** | H35AL-RN-A-30500 | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 3 | **04300** | **04302** | H35AL-RN-M-30500 | |
| | 1/2 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | **81393** | **81394** | H35AL-RN-ML-30500 | |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 3 | **04315** | **04317** | H35AL-RN-L-30500 | |
| | 1/2 | 5/8 | 6 | 4-1/4 | .475 | 3 | **04325** | **04327** | H35AL-RN-X-30500 | |
| | 1/2 | 5/8 | 7 | 5 | .475 | 3 | **83451** | **83452** | H35AL-RN-Y-30500 | new |
| 5/8 | 5/8 | 3/4 | 4 | 1-5/8 | .593 | 3 | **04345** | **04347** | H35AL-RN-R-30625 | |
| | 5/8 | 3/4 | 6 | 2-3/8 | .593 | 3 | **04360** | **04362** | H35AL-RN-M-30625 | |
| | 5/8 | 3/4 | 6 | 3-3/8 | .593 | 3 | **04375** | **04377** | H35AL-RN-L-30625 | |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 3 | **04405** | **04407** | H35AL-RN-R-30750 | |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 3 | **04420** | **04422** | H35AL-RN-M-30750 | |
| | 3/4 | 1 | 6 | 2-7/8 | .712 | 3 | **81395** | **81396** | H35AL-RN-ML-30750 | |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 3 | **04435** | **04437** | H35AL-RN-L-30750 | |
| | 3/4 | 1 | 6 | 4-3/8 | .712 | 3 | **04445** | **04447** | H35AL-RN-X-30750 | |
| 1 | 1 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | **04465** | | H35AL-RN-R-31000 | |
| | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 3 | **04480** | | H35AL-RN-M-31000 | |
| | 1 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | **04495** | | H35AL-RN-L-31000 | |

* .0003 max TIR

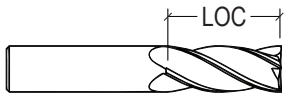
## H35AL-3 / H35AL-RN-3

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0007 | .0013 | .0016 | .0011 | .0019 | .0018 | .0014 | .0026 | .0020 | .0021 | .0038 | .0023 | .0027 | .0050 | .0027 | .0039 | .0072 | .0033 | .0050 | .0091 | .0039 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0011 | .0020 | .0020 | .0017 | .0030 | .0022 | .0022 | .0040 | .0025 | .0033 | .0059 | .0029 | .0043 | .0078 | .0034 | .0061 | .0111 | .0040 | .0078 | .0142 | .0049 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0008 | .0014 | .0016 | .0011 | .0020 | .0018 | .0015 | .0027 | .0021 | .0022 | .0040 | .0024 | .0029 | .0052 | .0028 | .0041 | .0074 | .0033 | .0052 | .0095 | .0040 |

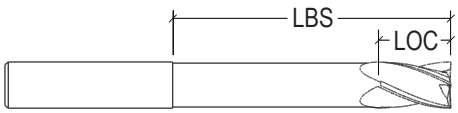
| Milling Process | Style | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | Non-Reached | 75%-125% Diameter | 100% Diameter |
| | Reached | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Non-Reached | 125%-200% Diameter | 30%-40% Diameter |
| | Reached | Up to Max LOC | 30%-40% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

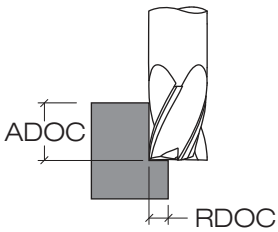
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.



Regular Style



Reduced Neck Style




**Key: LOC=Length of Cut ADOC=Axial Depth of Cut RDOC=Radial Depth of Cut**

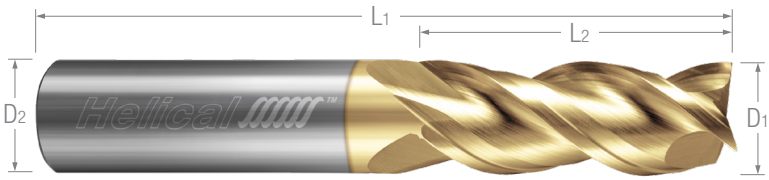
# H40ALV-3

New Items!

## 3 FLUTE - SQUARE

### 40° Helix - Variable Pitch

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a specialized combination of features for excellent performance in roughing and finishing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- Wiper flat design leaves superior floor finish
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- Uncoated tool offers an excellent option for aluminum finishing applications
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| | Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | 48000 | 48001 | H40ALV-S-30125 |
| | | 1/8 | 3/8 | 2 | 3 | 48010 | 48011 | H40ALV-SR-30125 |
| | | 1/8 | 1/2 | 2-1/2 | 3 | 48020 | 48021 | H40ALV-R-30125 |
| | | 1/8 | 5/8 | 2-1/2 | 3 | 82389 | 82390 | H40ALV-M-30125 |
| | | 1/8 | 3/4 | 2-1/2 | 3 | 81397 | 81398 | H40ALV-L-30125 |
| new | | 1/8 | 7/8 | 2-1/2 | 3 | 83521 | 83522 | H40ALV-LX-30125 |
| | 3/16 | 3/16 | 3/8 | 2 | 3 | 48030 | 48031 | H40ALV-S-30187 |
| | | 3/16 | 3/4 | 2-1/2 | 3 | 48045 | 48046 | H40ALV-R-30187 |
| | | 3/16 | 1 | 3 | 3 | 48060 | 48061 | H40ALV-M-30187 |
| | | 3/16 | 1-3/8 | 3 | 3 | 82391 | 82392 | H40ALV-L-30187 |
| | 1/4 | 1/4 | 3/8 | 2 | 3 | 48075 | 48076 | H40ALV-S-30250 |
| | | 1/4 | 1/2 | 2 | 3 | 81399 | 81400 | H40ALV-SR-30250 |
| | | 1/4 | 3/4 | 2-1/2 | 3 | 48115 | 48116 | H40ALV-R-30250 |
| | | 1/4 | 1 | 3 | 3 | 48135 | 48136 | H40ALV-M-30250 |
| | | 1/4 | 1-1/4 | 3 | 3 | 81401 | 81402 | H40ALV-L-30250 |
| | | 1/4 | 1-1/2 | 3 | 3 | 81403 | 81404 | H40ALV-LX-30250 |
| new | | 1/4 | 1-3/4 | 4 | 3 | 83523 | 83524 | H40ALV-X-30250 |
| | 5/16 | 5/16 | 7/16 | 2 | 3 | 81405 | 81406 | H40ALV-S-30312 |
| | | 5/16 | 3/4 | 2-1/2 | 3 | 81407 | 81408 | H40ALV-R-30312 |
| | | 5/16 | 1 | 3 | 3 | 81409 | 81410 | H40ALV-M-30312 |
| | | 5/16 | 1-1/4 | 3 | 3 | 82393 | 82394 | H40ALV-L-30312 |
| | 3/8 | 3/8 | 1/2 | 2 | 3 | 48235 | 48236 | H40ALV-S-30375 |
| | | 3/8 | 3/4 | 2-1/2 | 3 | 81411 | 81412 | H40ALV-SR-30375 |
| | | 3/8 | 1 | 2-1/2 | 3 | 48260 | 48261 | H40ALV-R-30375 |
| | | 3/8 | 1-1/4 | 3 | 3 | 81413 | 81414 | H40ALV-M-30375 |
| | | 3/8 | 1-1/2 | 3-1/2 | 3 | 48310 | 48311 | H40ALV-L-30375 |
| | | 3/8 | 2 | 4 | 3 | 82395 | 82396 | H40ALV-LX-30375 |

* .0003 max TIR

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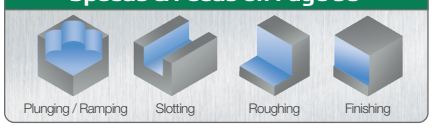
Speeds & Feeds on Page 58



# 3 FLUTE - SQUARE New Items!

## 40° Helix - Variable Pitch (cont.)

HEM

**H40ALV-3**

continued from previous page

| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 2-1/2 | 3 | 48335 | 48336 | H40ALV-S-30500 | |
| | 1/2 | 1 | 3 | 3 | 48365 | 48366 | H40ALV-SR-30500 | |
| | 1/2 | 1-1/4 | 3 | 3 | 48395 | 48396 | H40ALV-R-30500 | |
| | 1/2 | 1-5/8 | 4 | 3 | 48425 | 48426 | H40ALV-M-30500 | |
| | 1/2 | 2 | 4 | 3 | 48455 | 48456 | H40ALV-L-30500 | |
| | 1/2 | 2-1/2 | 5 | 3 | 81415 | 81416 | H40ALV-LX-30500 | |
| | 1/2 | 3-1/8 | 6 | 3 | 82397 | 82398 | H40ALV-X-30500 | |
| 5/8 | 5/8 | 3/4 | 3 | 3 | 48485 | 48486 | H40ALV-S-30625 | |
| | 5/8 | 1-1/4 | 3-1/2 | 3 | 48510 | 48511 | H40ALV-SR-30625 | |
| | 5/8 | 1-5/8 | 4 | 3 | 48535 | 48536 | H40ALV-R-30625 | |
| | 5/8 | 2 | 4 | 3 | 82399 | 82400 | H40ALV-M-30625 | |
| 3/4 | 3/4 | 1 | 3 | 3 | 48585 | 48586 | H40ALV-S-30750 | |
| | 3/4 | 1-5/8 | 4 | 3 | 48620 | 48621 | H40ALV-R-30750 | |
| | 3/4 | 2-1/4 | 5 | 3 | 48655 | 48656 | H40ALV-M-30750 | |
| | 3/4 | 2-3/4 | 5 | 3 | 81417 | 81418 | H40ALV-ML-30750 | |
| | 3/4 | 3-1/4 | 6 | 3 | 83525 | 83526 | H40ALV-L-30750 | new |
| 1 | 1 | 1-1/4 | 4 | 3 | 48690 | 48691 | H40ALV-S-31000 | |
| | 1 | 2 | 5 | 3 | 48725 | 48726 | H40ALV-R-31000 | |
| | 1 | 3-1/4 | 6 | 3 | 48760 | 48761 | H40ALV-M-31000 | |

* .0003 max TIR

## Attacking Aluminum: A Machining Guide

Are you attacking aluminum the right way? Aluminum is one of the most commonly machined materials, and is used in many different industries. But with so much popularity, competition for aluminum machining can be intense. Our "In the Loupe," blog post **Attacking Aluminum: A Machining Guide** teaches you how to gain a competitive advantage.

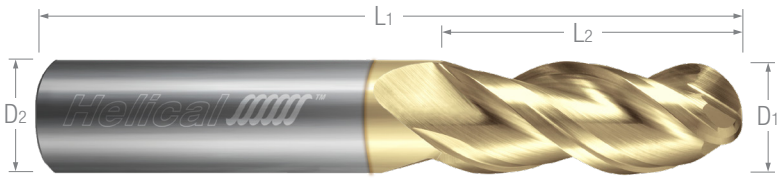
**Read more on helical.blog/intheloupe**

# H40ALV-3

# 3 FLUTE - BALL

## 40° Helix - Variable Pitch

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a specialized combination of features for excellent performance in roughing and finishing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- Uncoated tool offers an excellent option for aluminum finishing applications
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA




| Cutter Diameter** $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | 49030* | 49031* | H40ALV-S-30125-BN |
| | 1/8 | 3/8 | 2 | 3 | 49035* | 49036* | H40ALV-SR-30125-BN |
| | 1/8 | 1/2 | 2-1/2 | 3 | 49040* | 49041* | H40ALV-R-30125-BN |
| | 1/8 | 5/8 | 2-1/2 | 3 | 82453* | 82454* | H40ALV-M-30125-BN |
| | 1/8 | 3/4 | 2-1/2 | 3 | 81455* | 81456* | H40ALV-L-30125-BN |
| 3/16 | 3/16 | 3/8 | 2 | 3 | 49050* | 49051* | H40ALV-S-30187-BN |
| | 3/16 | 3/4 | 2-1/2 | 3 | 49060* | 49061* | H40ALV-R-30187-BN |
| | 3/16 | 1 | 3 | 3 | 49065* | 49066* | H40ALV-M-30187-BN |
| | 3/16 | 1-3/8 | 3 | 3 | 82455* | 82456* | H40ALV-L-30187-BN |
| 1/4 | 1/4 | 3/8 | 2 | 3 | 49075 | 49076 | H40ALV-S-30250-BN |
| | 1/4 | 1/2 | 2 | 3 | 81457 | 81458 | H40ALV-SR-30250-BN |
| | 1/4 | 3/4 | 2-1/2 | 3 | 49105 | 49106 | H40ALV-R-30250-BN |
| | 1/4 | 1 | 3 | 3 | 49120 | 49121 | H40ALV-M-30250-BN |
| | 1/4 | 1-1/4 | 3 | 3 | 81459 | 81460 | H40ALV-L-30250-BN |
| | 1/4 | 1-1/2 | 3 | 3 | 82457 | 82458 | H40ALV-LX-30250-BN |
| 5/16 | 5/16 | 7/16 | 2 | 3 | 81461 | 81462 | H40ALV-S-30312-BN |
| | 5/16 | 3/4 | 2-1/2 | 3 | 81463 | 81464 | H40ALV-R-30312-BN |
| | 5/16 | 1 | 3 | 3 | 82459 | 82460 | H40ALV-M-30312-BN |
| 3/8 | 3/8 | 1/2 | 2 | 3 | 49195 | 49196 | H40ALV-S-30375-BN |
| | 3/8 | 3/4 | 2-1/2 | 3 | 82461 | 82462 | H40ALV-SR-30375-BN |
| | 3/8 | 1 | 2-1/2 | 3 | 49210 | 49211 | H40ALV-R-30375-BN |
| | 3/8 | 1-1/4 | 3 | 3 | 81465 | 81466 | H40ALV-M-30375-BN |
| | 3/8 | 1-1/2 | 3-1/2 | 3 | 49240 | 49241 | H40ALV-L-30375-BN |
| | 3/8 | 2 | 4 | 3 | 82463 | 82464 | H40ALV-LX-30375-BN |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 3 | 49255 | 49256 | H40ALV-S-30500-BN |
| | 1/2 | 1 | 3 | 3 | 49270 | 49271 | H40ALV-SR-30500-BN |
| | 1/2 | 1-1/4 | 3 | 3 | 49285 | 49286 | H40ALV-R-30500-BN |
| | 1/2 | 1-5/8 | 4 | 3 | 49300 | 49301 | H40ALV-M-30500-BN |
| | 1/2 | 2 | 4 | 3 | 49315 | 49316 | H40ALV-L-30500-BN |
| | 1/2 | 2-1/2 | 5 | 3 | 82465 | 82466 | H40ALV-LX-30500-BN |

* 1/8 and 3/16 have 1 tooth to center
** .0003 max TIR

continued on next page

Speeds & Feeds on Page 58

# 3 FLUTE - BALL

## 40° Helix - Variable Pitch (cont.)

**H40ALV-3**

continued from previous page

| Cutter Diameter** $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | 3/4 | 3 | 3 | **49330** | **49331** | H40ALV-S-30625-BN |
| | 5/8 | 1-1/4 | 3-1/2 | 3 | **49345** | **49346** | H40ALV-SR-30625-BN |
| | 5/8 | 1-5/8 | 4 | 3 | **49360** | **49361** | H40ALV-R-30625-BN |
| 3/4 | 3/4 | 1 | 3 | 3 | **49390** | **49391** | H40ALV-S-30750-BN |
| | 3/4 | 1-5/8 | 4 | 3 | **49405** | **49406** | H40ALV-R-30750-BN |
| | 3/4 | 2-1/4 | 5 | 3 | **49420** | **49421** | H40ALV-M-30750-BN |
| | 3/4 | 2-3/4 | 5 | 3 | **82467** | **82468** | H40ALV-ML-30750-BN |
| 1 | 1 | 1-1/4 | 4 | 3 | **49435** | **49436** | H40ALV-S-31000-BN |
| | 1 | 2 | 5 | 3 | **49450** | **49451** | H40ALV-R-31000-BN |
| | 1 | 3-1/4 | 6 | 3 | **49465** | **49466** | H40ALV-M-31000-BN |

* 1/8 and 3/16 have 1 tooth to center
** .0003 max TIR

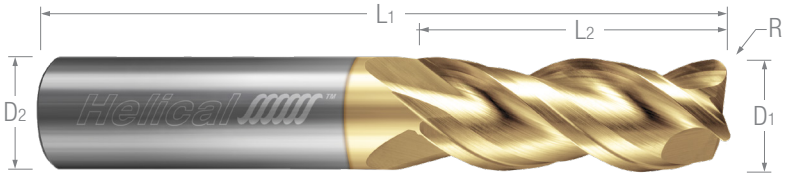
# H40ALV-3

New Items!

## 3 FLUTE - CORNER RADIUS

### 40° Helix - Variable Pitch

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a specialized combination of features for excellent performance in roughing and finishing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- Wiper flat design leaves superior floor finish*
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- Uncoated tool offers an excellent option for aluminum finishing applications
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

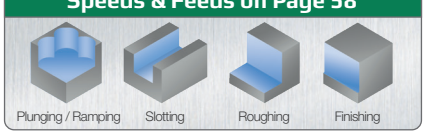



| Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 3 | 82401 | 82402 | H40ALV-S-30125-R.010 |
| | 1/8 | .010 | 3/8 | 2 | 3 | 82403 | 82404 | H40ALV-SR-30125-R.010 |
| | 1/8 | .010 | 1/2 | 2-1/2 | 3 | 82405 | 82406 | H40ALV-R-30125-R.010 |
| | 1/8 | .015 | 1/4 | 1-1/2 | 3 | 48005 | 48006 | H40ALV-S-30125-R.015 |
| | 1/8 | .015 | 3/8 | 2 | 3 | 48015 | 48016 | H40ALV-SR-30125-R.015 |
| | 1/8 | .015 | 1/2 | 2-1/2 | 3 | 48025 | 48026 | H40ALV-R-30125-R.015 |
| | 1/8 | .015 | 5/8 | 2-1/2 | 3 | 82407 | 82408 | H40ALV-M-30125-R.015 |
| | 1/8 | .030 | 1/4 | 1-1/2 | 3 | 81419* | 81420* | H40ALV-S-30125-R.030 |
| | 1/8 | .030 | 3/8 | 2 | 3 | 81421* | 81422* | H40ALV-SR-30125-R.030 |
| | 1/8 | .030 | 1/2 | 2-1/2 | 3 | 81423* | 81424* | H40ALV-R-30125-R.030 |
| | 1/8 | .030 | 5/8 | 2-1/2 | 3 | 82409* | 82410* | H40ALV-M-30125-R.030 |
| 3/16 | 3/16 | .015 | 3/8 | 2 | 3 | 48035 | 48036 | H40ALV-S-30187-R.015 |
| | 3/16 | .015 | 3/4 | 2-1/2 | 3 | 48050 | 48051 | H40ALV-R-30187-R.015 |
| | 3/16 | .015 | 1 | 3 | 3 | 48065 | 48066 | H40ALV-M-30187-R.015 |
| | 3/16 | .015 | 1-3/8 | 3 | 3 | 82411 | 82412 | H40ALV-L-30187-R.015 |
| | 3/16 | .030 | 3/8 | 2 | 3 | 48040 | 48041 | H40ALV-S-30187-R.030 |
| | 3/16 | .030 | 3/4 | 2-1/2 | 3 | 48055 | 48056 | H40ALV-R-30187-R.030 |
| | 3/16 | .030 | 1 | 3 | 3 | 48070 | 48071 | H40ALV-M-30187-R.030 |
| | 3/16 | .030 | 1-3/8 | 3 | 3 | 82413 | 82414 | H40ALV-L-30187-R.030 |
| 1/4 | 1/4 | .010 | 3/8 | 2 | 3 | 82415 | 82416 | H40ALV-S-30250-R.010 |
| | 1/4 | .010 | 3/4 | 2-1/2 | 3 | 82417 | 82418 | H40ALV-R-30250-R.010 |
| | 1/4 | .010 | 1 | 3 | 3 | 82419 | 82420 | H40ALV-M-30250-R.010 |
| | 1/4 | .015 | 3/8 | 2 | 3 | 48080 | 48081 | H40ALV-S-30250-R.015 |
| | 1/4 | .015 | 1/2 | 2 | 3 | 81425 | 81426 | H40ALV-SR-30250-R.015 |
| | 1/4 | .015 | 3/4 | 2-1/2 | 3 | 48120 | 48121 | H40ALV-R-30250-R.015 |
| | 1/4 | .015 | 1 | 3 | 3 | 48140 | 48141 | H40ALV-M-30250-R.015 |
| | 1/4 | .015 | 1-1/4 | 3 | 3 | 82421 | 82422 | H40ALV-L-30250-R.015 |
| | 1/4 | .030 | 3/8 | 2 | 3 | 48085 | 48086 | H40ALV-S-30250-R.030 |
| | 1/4 | .030 | 1/2 | 2 | 3 | 81427 | 81428 | H40ALV-SR-30250-R.030 |
| | 1/4 | .030 | 3/4 | 2-1/2 | 3 | 48125 | 48126 | H40ALV-R-30250-R.030 |
| | 1/4 | .030 | 1 | 3 | 3 | 48145 | 48146 | H40ALV-M-30250-R.030 |
| | 1/4 | .030 | 1-1/4 | 3 | 3 | 82423 | 82424 | H40ALV-L-30250-R.030 |

* Wiper flats not included if corner radius exceeds 20% of tool diameter.
** .0003 max TIR

continued on next page

Speeds & Feeds on Page 58



# 3 FLUTE - CORNER RADIUS New Items!

## 40° Helix - Variable Pitch (cont.)

**H40ALV-3**

continued from previous page

| Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .060 | 3/8 | 2 | 3 | 48090* | 48091* | H40ALV-S-30250-R.060 | |
| | 1/4 | .060 | 1/2 | 2 | 3 | 81429* | 81430* | H40ALV-SR-30250-R.060 | |
| | 1/4 | .060 | 3/4 | 2-1/2 | 3 | 48130* | 48131* | H40ALV-R-30250-R.060 | |
| | 1/4 | .060 | 1 | 3 | 3 | 48150* | 48151* | H40ALV-M-30250-R.060 | |
| | 1/4 | .060 | 1-1/4 | 3 | 3 | 82425* | 82426* | H40ALV-L-30250-R.060 | |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 3 | 81431 | 81432 | H40ALV-S-30375-R.010 | |
| | 3/8 | .010 | 3/4 | 2-1/2 | 3 | 83527 | 83528 | H40ALV-SR-30375-R.010 | new |
| | 3/8 | .010 | 1 | 2-1/2 | 3 | 81433 | 81434 | H40ALV-R-30375-R.010 | |
| | 3/8 | .010 | 1-1/2 | 3-1/2 | 3 | 81435 | 81436 | H40ALV-L-30375-R.010 | |
| | 3/8 | .015 | 1/2 | 2 | 3 | 48240 | 48241 | H40ALV-S-30375-R.015 | |
| | 3/8 | .015 | 3/4 | 2-1/2 | 3 | 81437 | 81438 | H40ALV-SR-30375-R.015 | |
| | 3/8 | .015 | 1 | 2-1/2 | 3 | 48265 | 48266 | H40ALV-R-30375-R.015 | |
| | 3/8 | .015 | 1-1/2 | 3-1/2 | 3 | 48315 | 48316 | H40ALV-L-30375-R.015 | |
| | 3/8 | .015 | 2 | 4 | 3 | 82427 | 82428 | H40ALV-LX-30375-R.015 | |
| | 3/8 | .030 | 1/2 | 2 | 3 | 48245 | 48246 | H40ALV-S-30375-R.030 | |
| | 3/8 | .030 | 3/4 | 2-1/2 | 3 | 81439 | 81440 | H40ALV-SR-30375-R.030 | |
| | 3/8 | .030 | 1 | 2-1/2 | 3 | 48270 | 48271 | H40ALV-R-30375-R.030 | |
| | 3/8 | .030 | 1-1/2 | 3-1/2 | 3 | 48320 | 48321 | H40ALV-L-30375-R.030 | |
| | 3/8 | .030 | 2 | 4 | 3 | 82429 | 82430 | H40ALV-LX-30375-R.030 | |
| | 3/8 | .060 | 1/2 | 2 | 3 | 48250 | 48251 | H40ALV-S-30375-R.060 | |
| | 3/8 | .060 | 3/4 | 2-1/2 | 3 | 81441 | 81442 | H40ALV-SR-30375-R.060 | |
| | 3/8 | .060 | 1 | 2-1/2 | 3 | 48275 | 48276 | H40ALV-R-30375-R.060 | |
| | 3/8 | .060 | 1-1/2 | 3-1/2 | 3 | 48325 | 48326 | H40ALV-L-30375-R.060 | |
| | 3/8 | .060 | 2 | 4 | 3 | 82431 | 82432 | H40ALV-LX-30375-R.060 | |
| | 3/8 | .090 | 1/2 | 2 | 3 | 48255* | 48256* | H40ALV-S-30375-R.090 | |
| | 3/8 | .090 | 3/4 | 2-1/2 | 3 | 81443* | 81444* | H40ALV-SR-30375-R.090 | |
| | 3/8 | .090 | 1 | 2-1/2 | 3 | 48280* | 48281* | H40ALV-R-30375-R.090 | |
| | 3/8 | .090 | 1-1/2 | 3-1/2 | 3 | 48330* | 48331* | H40ALV-L-30375-R.090 | |
| | 3/8 | .090 | 2 | 4 | 3 | 82433* | 82434* | H40ALV-LX-30375-R.090 | |
| | 3/8 | .125 | 1/2 | 2 | 3 | 83529* | 83530* | H40ALV-S-30375-R.125 | new |
| | 3/8 | .125 | 3/4 | 2-1/2 | 3 | 83531* | 83532* | H40ALV-SR-30375-R.125 | new |
| | 3/8 | .125 | 1 | 2-1/2 | 3 | 83533* | 83534* | H40ALV-R-30375-R.125 | new |
| | 3/8 | .125 | 1-1/2 | 3-1/2 | 3 | 83535* | 83536* | H40ALV-L-30375-R.125 | new |
| | 3/8 | .125 | 2 | 4 | 3 | 83537* | 83538* | H40ALV-LX-30375-R.125 | new |
| 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 3 | 81445 | 81446 | H40ALV-S-30500-R.010 | |
| | 1/2 | .010 | 1 | 3 | 3 | 81447 | 81448 | H40ALV-SR-30500-R.010 | |
| | 1/2 | .010 | 1-1/4 | 3 | 3 | 81449 | 81450 | H40ALV-R-30500-R.010 | |
| | 1/2 | .010 | 1-5/8 | 4 | 3 | 81451 | 81452 | H40ALV-M-30500-R.010 | |
| | 1/2 | .010 | 2 | 4 | 3 | 81453 | 81454 | H40ALV-L-30500-R.010 | |
| | 1/2 | .015 | 5/8 | 2-1/2 | 3 | 48340 | 48341 | H40ALV-S-30500-R.015 | |
| | 1/2 | .015 | 1 | 3 | 3 | 48370 | 48371 | H40ALV-SR-30500-R.015 | |
| | 1/2 | .015 | 1-1/4 | 3 | 3 | 48400 | 48401 | H40ALV-R-30500-R.015 | |
| | 1/2 | .015 | 1-5/8 | 4 | 3 | 48430 | 48431 | H40ALV-M-30500-R.015 | |
| | 1/2 | .015 | 2 | 4 | 3 | 48460 | 48461 | H40ALV-L-30500-R.015 | |
| | 1/2 | .015 | 2-1/2 | 5 | 3 | 82435 | 82436 | H40ALV-LX-30500-R.015 | |

* Wiper flats not included if corner radius exceeds 20% of tool diameter.
** .0003 max TIR

continued on next page

# H40ALV-3

New Items!

## 3 FLUTE - CORNER RADIUS

### 40° Helix - Variable Pitch (cont.)

continued from previous page

| | Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| new | 1/2 | 1/2 | **.020** | 5/8 | 2-1/2 | 3 | 83539 | 83540 | H40ALV-S-30500-R.020 |
| new | | 1/2 | **.020** | 1 | 3 | 3 | 83541 | 83542 | H40ALV-SR-30500-R.020 |
| new | | 1/2 | **.020** | 1-1/4 | 3 | 3 | 83543 | 83544 | H40ALV-R-30500-R.020 |
| new | | 1/2 | **.020** | 1-5/8 | 4 | 3 | 83545 | 83546 | H40ALV-M-30500-R.020 |
| new | | 1/2 | **.020** | 2 | 4 | 3 | 83547 | 83548 | H40ALV-L-30500-R.020 |
| | | 1/2 | **.030** | 5/8 | 2-1/2 | 3 | 48345 | 48346 | H40ALV-S-30500-R.030 |
| | | 1/2 | **.030** | 1 | 3 | 3 | 48375 | 48376 | H40ALV-SR-30500-R.030 |
| | | 1/2 | **.030** | 1-1/4 | 3 | 3 | 48405 | 48406 | H40ALV-R-30500-R.030 |
| | | 1/2 | **.030** | 1-5/8 | 4 | 3 | 48435 | 48436 | H40ALV-M-30500-R.030 |
| | | 1/2 | **.030** | 2 | 4 | 3 | 48465 | 48466 | H40ALV-L-30500-R.030 |
| | | 1/2 | **.030** | 2-1/2 | 5 | 3 | 82437 | 82438 | H40ALV-LX-30500-R.030 |
| | | 1/2 | **.060** | 5/8 | 2-1/2 | 3 | 48350 | 48351 | H40ALV-S-30500-R.060 |
| | | 1/2 | **.060** | 1 | 3 | 3 | 48380 | 48381 | H40ALV-SR-30500-R.060 |
| | | 1/2 | **.060** | 1-1/4 | 3 | 3 | 48410 | 48411 | H40ALV-R-30500-R.060 |
| | 1/2 | 1/2 | **.060** | 1-5/8 | 4 | 3 | 48440 | 48441 | H40ALV-M-30500-R.060 |
| | | 1/2 | **.060** | 2 | 4 | 3 | 48470 | 48471 | H40ALV-L-30500-R.060 |
| | | 1/2 | **.060** | 2-1/2 | 5 | 3 | 82439 | 82440 | H40ALV-LX-30500-R.060 |
| | | 1/2 | **.090** | 5/8 | 2-1/2 | 3 | 48355 | 48356 | H40ALV-S-30500-R.090 |
| | | 1/2 | **.090** | 1 | 3 | 3 | 48385 | 48386 | H40ALV-SR-30500-R.090 |
| | | 1/2 | **.090** | 1-1/4 | 3 | 3 | 48415 | 48416 | H40ALV-R-30500-R.090 |
| | | 1/2 | **.090** | 1-5/8 | 4 | 3 | 48445 | 48446 | H40ALV-M-30500-R.090 |
| | | 1/2 | **.090** | 2 | 4 | 3 | 48475 | 48476 | H40ALV-L-30500-R.090 |
| | | 1/2 | **.090** | 2-1/2 | 5 | 3 | 82441 | 82442 | H40ALV-LX-30500-R.090 |
| | | 1/2 | **.125** | 5/8 | 2-1/2 | 3 | 48360* | 48361* | H40ALV-S-30500-R.125 |
| | | 1/2 | **.125** | 1 | 3 | 3 | 48390* | 48391* | H40ALV-SR-30500-R.125 |
| | | 1/2 | **.125** | 1-1/4 | 3 | 3 | 48420* | 48421* | H40ALV-R-30500-R.125 |
| | | 1/2 | **.125** | 1-5/8 | 4 | 3 | 48450* | 48451* | H40ALV-M-30500-R.125 |
| | | 1/2 | **.125** | 2 | 4 | 3 | 48480* | 48481* | H40ALV-L-30500-R.125 |
| | | 1/2 | **.125** | 2-1/2 | 5 | 3 | 82443* | 82444* | H40ALV-LX-30500-R.125 |
| | | 5/8 | **.030** | 3/4 | 3 | 3 | 48490 | 48491 | H40ALV-S-30625-R.030 |
| | | 5/8 | **.030** | 1-1/4 | 3-1/2 | 3 | 48515 | 48516 | H40ALV-SR-30625-R.030 |
| | | 5/8 | **.030** | 1-5/8 | 4 | 3 | 48540 | 48541 | H40ALV-R-30625-R.030 |
| | | 5/8 | **.030** | 2 | 4 | 3 | 82445 | 82446 | H40ALV-M-30625-R.030 |
| | | 5/8 | **.060** | 3/4 | 3 | 3 | 48495 | 48496 | H40ALV-S-30625-R.060 |
| | | 5/8 | **.060** | 1-1/4 | 3-1/2 | 3 | 48520 | 48521 | H40ALV-SR-30625-R.060 |
| | 5/8 | 5/8 | **.060** | 1-5/8 | 4 | 3 | 48545 | 48546 | H40ALV-R-30625-R.060 |
| | | 5/8 | **.090** | 3/4 | 3 | 3 | 48500 | 48501 | H40ALV-S-30625-R.090 |
| | | 5/8 | **.090** | 1-1/4 | 3-1/2 | 3 | 48525 | 48526 | H40ALV-SR-30625-R.090 |
| | | 5/8 | **.090** | 1-5/8 | 4 | 3 | 48550 | 48551 | H40ALV-R-30625-R.090 |
| | | 5/8 | **.125** | 3/4 | 3 | 3 | 48505 | 48506 | H40ALV-S-30625-R.125 |
| | | 5/8 | **.125** | 1-1/4 | 3-1/2 | 3 | 48530 | 48531 | H40ALV-SR-30625-R.125 |
| | | 5/8 | **.125** | 1-5/8 | 4 | 3 | 48555 | 48556 | H40ALV-R-30625-R.125 |
| | | 5/8 | **.125** | 2 | 4 | 3 | 82447 | 82448 | H40ALV-M-30625-R.125 |

* Wiper flats not included if corner radius exceeds 20% of tool diameter.
** .0003 max TIR

continued on next page

# 3 FLUTE - CORNER RADIUS New Items!

## 40° Helix - Variable Pitch (cont.)

H40ALV-3

continued from previous page

| Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | .015 | 1 | 3 | 3 | 83549 | 83550 | H40ALV-S-30750-R.015 | new |
| | 3/4 | .015 | 1-5/8 | 4 | 3 | 83551 | 83552 | H40ALV-R-30750-R.015 | new |
| | 3/4 | .015 | 2-1/4 | 5 | 3 | 83553 | 83554 | H40ALV-M-30750-R.015 | new |
| | 3/4 | .030 | 1 | 3 | 3 | 48590 | 48591 | H40ALV-S-30750-R.030 | |
| | 3/4 | .030 | 1-5/8 | 4 | 3 | 48625 | 48626 | H40ALV-R-30750-R.030 | |
| | 3/4 | .030 | 2-1/4 | 5 | 3 | 48660 | 48661 | H40ALV-M-30750-R.030 | |
| | 3/4 | .030 | 2-3/4 | 5 | 3 | 82449 | 82450 | H40ALV-ML-30750-R.030 | |
| | 3/4 | .060 | 1 | 3 | 3 | 48595 | 48596 | H40ALV-S-30750-R.060 | |
| | 3/4 | .060 | 1-5/8 | 4 | 3 | 48630 | 48631 | H40ALV-R-30750-R.060 | |
| | 3/4 | .060 | 2-1/4 | 5 | 3 | 48665 | 48666 | H40ALV-M-30750-R.060 | |
| | 3/4 | .090 | 1 | 3 | 3 | 48600 | 48601 | H40ALV-S-30750-R.090 | |
| | 3/4 | .090 | 1-5/8 | 4 | 3 | 48635 | 48636 | H40ALV-R-30750-R.090 | |
| | 3/4 | .090 | 2-1/4 | 5 | 3 | 48670 | 48671 | H40ALV-M-30750-R.090 | |
| | 3/4 | .125 | 1 | 3 | 3 | 48605 | 48606 | H40ALV-S-30750-R.125 | |
| | 3/4 | .125 | 1-5/8 | 4 | 3 | 48640 | 48641 | H40ALV-R-30750-R.125 | |
| | 3/4 | .125 | 2-1/4 | 5 | 3 | 48675 | 48676 | H40ALV-M-30750-R.125 | |
| | 3/4 | .125 | 2-3/4 | 5 | 3 | 82451 | 82452 | H40ALV-ML-30750-R.125 | |
| | 3/4 | .190 | 1 | 3 | 3 | 48610* | 48611* | H40ALV-S-30750-R.190 | |
| | 3/4 | .190 | 1-5/8 | 4 | 3 | 48645* | 48646* | H40ALV-R-30750-R.190 | |
| | 3/4 | .190 | 2-1/4 | 5 | 3 | 48680* | 48681* | H40ALV-M-30750-R.190 | |
| | 3/4 | .250 | 1 | 3 | 3 | 48615* | 48616* | H40ALV-S-30750-R.250 | |
| | 3/4 | .250 | 1-5/8 | 4 | 3 | 48650* | 48651* | H40ALV-R-30750-R.250 | |
| | 3/4 | .250 | 2-1/4 | 5 | 3 | 48685* | 48686* | H40ALV-M-30750-R.250 | |
| 1 | 1 | .030 | 1-1/4 | 4 | 3 | 48695 | 48696 | H40ALV-S-31000-R.030 | |
| | 1 | .030 | 2 | 5 | 3 | 48730 | 48731 | H40ALV-R-31000-R.030 | |
| | 1 | .030 | 3-1/4 | 6 | 3 | 48765 | 48766 | H40ALV-M-31000-R.030 | |
| | 1 | .060 | 1-1/4 | 4 | 3 | 48700 | 48701 | H40ALV-S-31000-R.060 | |
| | 1 | .060 | 2 | 5 | 3 | 48735 | 48736 | H40ALV-R-31000-R.060 | |
| | 1 | .060 | 3-1/4 | 6 | 3 | 48770 | 48771 | H40ALV-M-31000-R.060 | |
| | 1 | .125 | 1-1/4 | 4 | 3 | 48710 | 48711 | H40ALV-S-31000-R.125 | |
| | 1 | .125 | 2 | 5 | 3 | 48745 | 48746 | H40ALV-R-31000-R.125 | |
| | 1 | .125 | 3-1/4 | 6 | 3 | 48780 | 48781 | H40ALV-M-31000-R.125 | |
| | 1 | .250 | 1-1/4 | 4 | 3 | 48720* | 48721* | H40ALV-S-31000-R.250 | |
| | 1 | .250 | 2 | 5 | 3 | 48755* | 48756* | H40ALV-R-31000-R.250 | |
| | 1 | .250 | 3-1/4 | 6 | 3 | 48790* | 48791* | H40ALV-M-31000-R.250 | |

* Wiper flats not included if corner radius exceeds 20% of tool diameter.
** .0003 max TIR

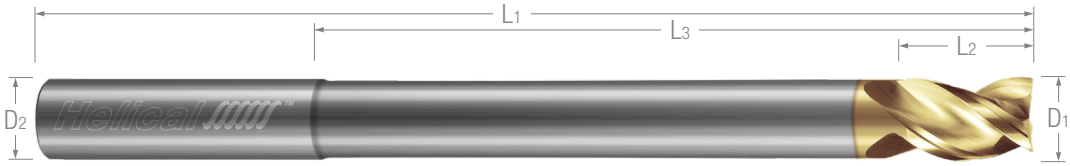
# H40ALV-RN-3

New Items!

## 3 FLUTE - SQUARE

### 40° Helix - Variable Pitch - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a specialized combination of features for excellent performance in roughing and finishing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Wiper flat design leaves superior floor finish
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- Uncoated tool offers an excellent option for aluminum finishing applications
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

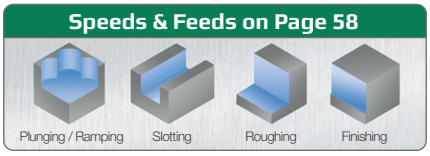



| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | LOC $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 5/32 | 2-1/2 | 1/2 | .118 | 3 | 46010 | 46011 | H40ALV-RN-R-30125 |
| | | 1/8 | 5/32 | 3 | 3/4 | .118 | 3 | 46020 | 46021 | H40ALV-RN-M-30125 |
| | | 1/8 | 5/32 | 3 | 1 | .118 | 3 | 81467 | 81468 | H40ALV-RN-L-30125 |
| | | 1/8 | 5/32 | 3 | 1-1/4 | .118 | 3 | 82469 | 82470 | H40ALV-RN-LX-30125 |
| new | | 1/8 | 5/32 | 3 | 1-1/2 | .118 | 3 | 83555 | 83556 | H40ALV-RN-X-30125 |
| | 3/16 | 3/16 | 7/32 | 2-1/2 | 1/2 | .178 | 3 | 46045 | 46046 | H40ALV-RN-R-30187 |
| | | 3/16 | 7/32 | 3 | 3/4 | .178 | 3 | 46060 | 46061 | H40ALV-RN-M-30187 |
| | | 3/16 | 7/32 | 3 | 1 | .178 | 3 | 81469 | 81470 | H40ALV-RN-ML-30187 |
| | | 3/16 | 7/32 | 3 | 1-5/16 | .178 | 3 | 82471 | 82472 | H40ALV-RN-LX-30187 |
| new | | 3/16 | 7/32 | 3 | 1-1/2 | .178 | 3 | 83557 | 83558 | H40ALV-RN-X-30187 |
| | 1/4 | 1/4 | 3/8 | 2-1/2 | 3/4 | .237 | 3 | 46075 | 46076 | H40ALV-RN-S-30250 |
| | | 1/4 | 3/8 | 3 | 1-1/8 | .237 | 3 | 46095 | 46096 | H40ALV-RN-R-30250 |
| | | 1/4 | 3/8 | 3 | 1-3/8 | .237 | 3 | 82473 | 82474 | H40ALV-RN-RA-30250 |
| | | 1/4 | 3/8 | 3 | 1-5/8 | .237 | 3 | 81471 | 81472 | H40ALV-RN-A-30250 |
| | | 1/4 | 3/8 | 4 | 1-7/8 | .237 | 3 | 82475 | 82476 | H40ALV-RN-AM-30250 |
| | | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 3 | 81473 | 81474 | H40ALV-RN-M-30250 |
| | | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 3 | 82477 | 82478 | H40ALV-RN-ML-30250 |
| new | | 1/4 | 3/8 | 4-1/2 | 3 | .237 | 3 | 83559 | 83560 | H40ALV-RN-L-30250 |
| | 3/8 | 3/8 | 1/2 | 3 | 1-1/8 | .356 | 3 | 46220 | 46221 | H40ALV-RN-R-30375 |
| | | 3/8 | 1/2 | 3 | 1-5/8 | .356 | 3 | 81475 | 81476 | H40ALV-RN-A-30375 |
| | | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 3 | 46245 | 46246 | H40ALV-RN-M-30375 |
| | | 3/8 | 1/2 | 5 | 2-1/2 | .356 | 3 | 81477 | 81478 | H40ALV-RN-ML-30375 |
| | | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 3 | 82479 | 82480 | H40ALV-RN-LX-30375 |
| new | | 3/8 | 1/2 | 6 | 4 | .356 | 3 | 83561 | 83562 | H40ALV-RN-X-30375 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 58



# 3 FLUTE - SQUARE New Items!

## 40° Helix - Variable Pitch - Reduced Neck (cont.)

HEM

**H40ALV-RN-3**

continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | LOC $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 3 | 1-3/8 | .475 | 3 | 46300 | 46301 | H40ALV-RN-R-30500 | |
| | 1/2 | 5/8 | 3-1/2 | 1-3/4 | .475 | 3 | 81479 | 81480 | H40ALV-RN-A-30500 | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 3 | 46330 | 46331 | H40ALV-RN-M-30500 | |
| | 1/2 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | 81481 | 81482 | H40ALV-RN-ML-30500 | |
| | 1/2 | 5/8 | 5 | 3-3/8 | .475 | 3 | 46360 | 46361 | H40ALV-RN-L-30500 | |
| | 1/2 | 5/8 | 6 | 3-3/4 | .475 | 3 | 81483 | 81484 | H40ALV-RN-LX-30500 | |
| | 1/2 | 5/8 | 6 | 4-1/4 | .475 | 3 | 46390 | 46391 | H40ALV-RN-X-30500 | |
| | 1/2 | 5/8 | 7 | 5 | .475 | 3 | 82481 | 82482 | H40ALV-RN-Y-30500 | |
| 5/8 | 5/8 | 3/4 | 4 | 2-3/8 | .593 | 3 | 46470 | 46471 | H40ALV-RN-M-30625 | |
| | 5/8 | 3/4 | 6 | 3-3/8 | .593 | 3 | 46495 | 46496 | H40ALV-RN-L-30625 | |
| | 5/8 | 3/4 | 6 | 4-1/8 | .593 | 3 | 83563 | 83564 | H40ALV-RN-X-30625 | new |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 3 | 46555 | 46556 | H40ALV-RN-R-30750 | |
| | 3/4 | 1 | 5 | 2-1/2 | .712 | 3 | 81485 | 81486 | H40ALV-RN-A-30750 | |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 3 | 46590 | 46591 | H40ALV-RN-M-30750 | |
| | 3/4 | 1 | 7 | 4-1/8 | .712 | 3 | 81487 | 81488 | H40ALV-RN-ML-30750 | |
| | 3/4 | 1 | 7 | 5 | .712 | 3 | 46625 | 46626 | H40ALV-RN-L-30750 | |
| | 3/4 | 1 | 10 | 6 | .712 | 3 | 82483 | 82484 | H40ALV-RN-LX-30750 | |
| 1 | 1 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | 46695 | 46696 | H40ALV-RN-R-31000 | |
| | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 3 | 46730 | 46731 | H40ALV-RN-M-31000 | |
| | 1 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | 46765 | 46766 | H40ALV-RN-L-31000 | |
| | 1 | 1-1/4 | 9 | 6 | .950 | 3 | 46800 | 46801 | H40ALV-RN-LX-31000 | |

* .0003 max TIR



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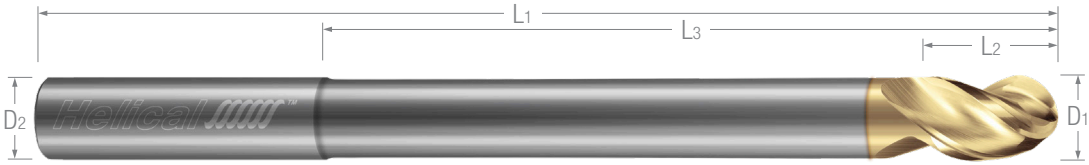
# H40ALV-RN-3

New Items!

## 3 FLUTE - BALL

### 40° Helix - Variable Pitch - Reduced Neck

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a specialized combination of features for excellent performance in roughing and finishing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- Uncoated tool offers an excellent option for aluminum finishing applications
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

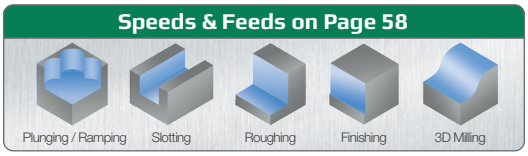



| | Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 5/32 | 2-1/2 | 1/2 | .118 | 3 | 47040* | 47041* | H40ALV-RN-R-30125-BN |
| | | 1/8 | 5/32 | 3 | 3/4 | .118 | 3 | 47045* | 47046* | H40ALV-RN-M-30125-BN |
| | | 1/8 | 5/32 | 3 | 1 | .118 | 3 | 81533* | 81534* | H40ALV-RN-L-30125-BN |
| | | 1/8 | 5/32 | 3 | 1-1/4 | .118 | 3 | 82485* | 82486* | H40ALV-RN-LX-30125-BN |
| new | | 1/8 | 5/32 | 3 | 1-1/2 | .118 | 3 | 83565* | 83566* | H40ALV-RN-X-30125-BN |
| | 3/16 | 3/16 | 7/32 | 2-1/2 | 1/2 | .178 | 3 | 47060* | 47061* | H40ALV-RN-R-30187-BN |
| | | 3/16 | 7/32 | 3 | 3/4 | .178 | 3 | 47065* | 47066* | H40ALV-RN-M-30187-BN |
| | | 3/16 | 7/32 | 3 | 1 | .178 | 3 | 81535* | 81536* | H40ALV-RN-ML-30187-BN |
| | | 3/16 | 7/32 | 3 | 1-5/16 | .178 | 3 | 82487* | 82488* | H40ALV-RN-LX-30187-BN |
| new | | 3/16 | 7/32 | 3 | 1-1/2 | .178 | 3 | 83567* | 83568* | H40ALV-RN-X-30187-BN |
| | 1/4 | 1/4 | 3/8 | 2-1/2 | 3/4 | .237 | 3 | 47075 | 47076 | H40ALV-RN-S-30250-BN |
| | | 1/4 | 3/8 | 3 | 1-1/8 | .237 | 3 | 47090 | 47091 | H40ALV-RN-R-30250-BN |
| | | 1/4 | 3/8 | 3 | 1-3/8 | .237 | 3 | 82489 | 82490 | H40ALV-RN-RA-30250-BN |
| | | 1/4 | 3/8 | 3 | 1-5/8 | .237 | 3 | 81537 | 81538 | H40ALV-RN-A-30250-BN |
| | | 1/4 | 3/8 | 4 | 1-7/8 | .237 | 3 | 82491 | 82492 | H40ALV-RN-AM-30250-BN |
| | | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 3 | 81539 | 81540 | H40ALV-RN-M-30250-BN |
| | | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 3 | 82493 | 82494 | H40ALV-RN-ML-30250-BN |
| new | | 1/4 | 3/8 | 4-1/2 | 3 | .237 | 3 | 83569 | 83570 | H40ALV-RN-L-30250-BN |
| | 3/8 | 3/8 | 1/2 | 3 | 1-1/8 | .356 | 3 | 47180 | 47181 | H40ALV-RN-R-30375-BN |
| | | 3/8 | 1/2 | 3 | 1-5/8 | .356 | 3 | 81541 | 81542 | H40ALV-RN-A-30375-BN |
| | | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 3 | 47195 | 47196 | H40ALV-RN-M-30375-BN |
| | | 3/8 | 1/2 | 5 | 2-1/2 | .356 | 3 | 81543 | 81544 | H40ALV-RN-ML-30375-BN |
| | | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 3 | 82495 | 82496 | H40ALV-RN-LX-30375-BN |
| | 1/2 | 1/2 | 5/8 | 3 | 1-3/8 | .475 | 3 | 47225 | 47226 | H40ALV-RN-R-30500-BN |
| | | 1/2 | 5/8 | 3-1/2 | 1-3/4 | .475 | 3 | 81545 | 81546 | H40ALV-RN-A-30500-BN |
| | | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 3 | 47240 | 47241 | H40ALV-RN-M-30500-BN |
| | | 1/2 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | 81547 | 81548 | H40ALV-RN-ML-30500-BN |
| | | 1/2 | 5/8 | 5 | 3-3/8 | .475 | 3 | 47255 | 47256 | H40ALV-RN-L-30500-BN |
| | | 1/2 | 5/8 | 6 | 3-3/4 | .475 | 3 | 81549 | 81550 | H40ALV-RN-LX-30500-BN |
| | | 1/2 | 5/8 | 6 | 4-1/4 | .475 | 3 | 47270 | 47271 | H40ALV-RN-X-30500-BN |
| | | 1/2 | 5/8 | 7 | 5 | .475 | 3 | 82497 | 82498 | H40ALV-RN-Y-30500-BN |

* 1/8 & 3/16 have one tooth to center
** .0003 max TIR

continued on next page

Speeds & Feeds on Page 58



# 3 FLUTE - BALL New Items!

## 40° Helix - Variable Pitch - Reduced Neck (cont.)

HEM

**H40ALV-RN-3**

continued from previous page

| Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | 3/4 | 4 | 1-5/8 | .593 | 3 | **47300** | **47301** | H40ALV-RN-R-30625-BN | |
| | 5/8 | 3/4 | 4 | 2-3/8 | .593 | 3 | **47315** | **47316** | H40ALV-RN-M-30625-BN | |
| | 5/8 | 3/4 | 6 | 3-3/8 | .593 | 3 | **47330** | **47331** | H40ALV-RN-L-30625-BN | |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 3 | **47360** | **47361** | H40ALV-RN-R-30750-BN | |
| | 3/4 | 1 | 5 | 2-1/2 | .712 | 3 | **83571** | **83572** | H40ALV-RN-A-30750-BN | new |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 3 | **47375** | **47376** | H40ALV-RN-M-30750-BN | |
| | 3/4 | 1 | 7 | 4-1/8 | .712 | 3 | **83573** | **83574** | H40ALV-RN-ML-30750-BN | new |
| | 3/4 | 1 | 7 | 5 | .712 | 3 | **47390** | **47391** | H40ALV-RN-L-30750-BN | |
| 1 | 1 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | **47420** | **47421** | H40ALV-RN-R-31000-BN | |
| | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 3 | **47435** | **47436** | H40ALV-RN-M-31000-BN | |
| | 1 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | **47450** | **47451** | H40ALV-RN-L-31000-BN | |
| | 1 | 1-1/4 | 9 | 6 | .950 | 3 | **47465** | **47466** | H40ALV-RN-LX-31000-BN | |
| | 1 | 1-1/4 | 12-1/2 | 9-1/2 | .950 | 3 | **47480** | **47481** | H40ALV-RN-X-31000-BN | |

* 1/8 & 3/16 have one tooth to center
** .0003 max TIR

# H40ALV-RN-3

New Items!

## 3 FLUTE - CORNER RADIUS

### 40° Helix - Variable Pitch - Reduced Neck

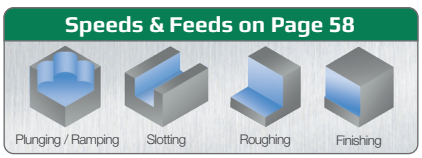
- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a specialized combination of features for excellent performance in roughing and finishing applications
- Unique "3 teeth-to-center" end geometry for ramping applications
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Wiper flat design leaves superior floor finish*
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- Uncoated tool offers an excellent option for aluminum finishing applications
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

| | Cutter Dia.** $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | LOC $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | .015 | 5/32 | 2-1/2 | 1/2 | .118 | 3 | 46015 | 46016 | H40ALV-RN-R-30125-R.015 |
| | | 1/8 | .015 | 5/32 | 3 | 3/4 | .118 | 3 | 46025 | 46026 | H40ALV-RN-M-30125-R.015 |
| new | | 1/8 | .015 | 5/32 | 3 | 1 | .118 | 3 | 82807 | 82808 | H40ALV-RN-L-30125-R.015 |
| | 3/16 | 3/16 | .015 | 7/32 | 2-1/2 | 1/2 | .178 | 3 | 46050 | 46051 | H40ALV-RN-R-30187-R.015 |
| | | 3/16 | .015 | 7/32 | 3 | 3/4 | .178 | 3 | 46065 | 46066 | H40ALV-RN-M-30187-R.015 |
| new | | 3/16 | .015 | 7/32 | 3 | 1 | .178 | 3 | 82809 | 82810 | H40ALV-RN-ML-30187-R.015 |
| | | 3/16 | .030 | 7/32 | 2-1/2 | 1/2 | .178 | 3 | 46055 | 46056 | H40ALV-RN-R-30187-R.030 |
| | | 3/16 | .030 | 7/32 | 3 | 3/4 | .178 | 3 | 46070 | 46071 | H40ALV-RN-M-30187-R.030 |
| new | | 3/16 | .030 | 7/32 | 3 | 1 | .178 | 3 | 82811 | 82812 | H40ALV-RN-ML-30187-R.030 |
| | 1/4 | 1/4 | .015 | 3/8 | 2-1/2 | 3/4 | .237 | 3 | 46080 | 46081 | H40ALV-RN-S-30250-R.015 |
| | | 1/4 | .015 | 3/8 | 3 | 1-1/8 | .237 | 3 | 46100 | 46101 | H40ALV-RN-R-30250-R.015 |
| new | | 1/4 | .015 | 3/8 | 3 | 1-3/8 | .237 | 3 | 82813 | 82814 | H40ALV-RN-RA-30250-R.015 |
| | | 1/4 | .015 | 3/8 | 3 | 1-5/8 | .237 | 3 | 81489 | 81490 | H40ALV-RN-A-30250-R.015 |
| new | | 1/4 | .015 | 3/8 | 4 | 1-7/8 | .237 | 3 | 82815 | 82816 | H40ALV-RN-AM-30250-R.015 |
| | | 1/4 | .015 | 3/8 | 4 | 2-1/8 | .237 | 3 | 81491 | 81492 | H40ALV-RN-M-30250-R.015 |
| new | | 1/4 | .015 | 3/8 | 4 | 2-1/2 | .237 | 3 | 82817 | 82818 | H40ALV-RN-ML-30250-R.015 |
| | | 1/4 | .030 | 3/8 | 2-1/2 | 3/4 | .237 | 3 | 46085 | 46086 | H40ALV-RN-S-30250-R.030 |
| | | 1/4 | .030 | 3/8 | 3 | 1-1/8 | .237 | 3 | 46105 | 46106 | H40ALV-RN-R-30250-R.030 |
| new | | 1/4 | .030 | 3/8 | 3 | 1-3/8 | .237 | 3 | 82819 | 82820 | H40ALV-RN-RA-30250-R.030 |
| | | 1/4 | .030 | 3/8 | 3 | 1-5/8 | .237 | 3 | 81493 | 81494 | H40ALV-RN-A-30250-R.030 |
| new | | 1/4 | .030 | 3/8 | 4 | 1-7/8 | .237 | 3 | 82821 | 82822 | H40ALV-RN-AM-30250-R.030 |
| | | 1/4 | .030 | 3/8 | 4 | 2-1/8 | .237 | 3 | 81495 | 81496 | H40ALV-RN-M-30250-R.030 |
| new | | 1/4 | .030 | 3/8 | 4 | 2-1/2 | .237 | 3 | 82823 | 82824 | H40ALV-RN-ML-30250-R.030 |
| | | 1/4 | .060 | 3/8 | 2-1/2 | 3/4 | .237 | 3 | 46090* | 46091* | H40ALV-RN-S-30250-R.060 |
| | | 1/4 | .060 | 3/8 | 3 | 1-1/8 | .237 | 3 | 46110* | 46111* | H40ALV-RN-R-30250-R.060 |
| new | | 1/4 | .060 | 3/8 | 3 | 1-3/8 | .237 | 3 | 82825* | 82826* | H40ALV-RN-RA-30250-R.060 |
| | | 1/4 | .060 | 3/8 | 3 | 1-5/8 | .237 | 3 | 81497* | 81498* | H40ALV-RN-A-30250-R.060 |
| new | | 1/4 | .060 | 3/8 | 4 | 1-7/8 | .237 | 3 | 82827* | 82828* | H40ALV-RN-AM-30250-R.060 |
| | | 1/4 | .060 | 3/8 | 4 | 2-1/8 | .237 | 3 | 81499* | 81500* | H40ALV-RN-M-30250-R.060 |
| new | | 1/4 | .060 | 3/8 | 4 | 2-1/2 | .237 | 3 | 82829* | 82830* | H40ALV-RN-ML-30250-R.060 |

* Wiper flats not included if corner radius exceeds 20% of tool diameter. ** .0003 max TIR

continued on next page

Speeds & Feeds on Page 58



# 3 FLUTE - CORNER RADIUS New Items!

## 40° Helix - Variable Pitch - Reduced Neck (cont.)

**H40ALV-RN-3**

continued from previous page

| Cutter Dia.** D1 (h6) | Shank Dia. D2 (h6) | Corner Radius R +.002" −.002" | LOC L2 +.032" −.000" | OAL L1 +.062" −.062" | Reach (LBS) L3 | Neck Dia. | Flutes | Uncoated | Zplus Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | .015 | 1/2 | 3 | 1-1/8 | .356 | 3 | 46225 | 46226 | H40ALV-RN-R-30375-R.015 | |
| | 3/8 | .015 | 1/2 | 3 | 1-5/8 | .356 | 3 | 81501 | 81502 | H40ALV-RN-A-30375-R.015 | |
| | 3/8 | .015 | 1/2 | 4 | 2-1/8 | .356 | 3 | 46250 | 46251 | H40ALV-RN-M-30375-R.015 | |
| | 3/8 | .015 | 1/2 | 5 | 2-1/2 | .356 | 3 | 82831 | 82832 | H40ALV-RN-ML-30375-R.015 | new |
| | 3/8 | .030 | 1/2 | 3 | 1-1/8 | .356 | 3 | 46230 | 46231 | H40ALV-RN-R-30375-R.030 | |
| | 3/8 | .030 | 1/2 | 3 | 1-5/8 | .356 | 3 | 81503 | 81504 | H40ALV-RN-A-30375-R.030 | |
| | 3/8 | .030 | 1/2 | 4 | 2-1/8 | .356 | 3 | 46255 | 46256 | H40ALV-RN-M-30375-R.030 | |
| | 3/8 | .030 | 1/2 | 5 | 2-1/2 | .356 | 3 | 81505 | 81506 | H40ALV-RN-ML-30375-R.030 | |
| | 3/8 | .060 | 1/2 | 3 | 1-1/8 | .356 | 3 | 46235 | 46236 | H40ALV-RN-R-30375-R.060 | |
| | 3/8 | .060 | 1/2 | 3 | 1-5/8 | .356 | 3 | 81507 | 81508 | H40ALV-RN-A-30375-R.060 | |
| | 3/8 | .060 | 1/2 | 4 | 2-1/8 | .356 | 3 | 46260 | 46261 | H40ALV-RN-M-30375-R.060 | |
| | 3/8 | .060 | 1/2 | 5 | 2-1/2 | .356 | 3 | 81509 | 81510 | H40ALV-RN-ML-30375-R.060 | |
| | 3/8 | .090 | 1/2 | 3 | 1-1/8 | .356 | 3 | 46240* | 46241* | H40ALV-RN-R-30375-R.090 | |
| | 3/8 | .090 | 1/2 | 3 | 1-5/8 | .356 | 3 | 82833* | 82834* | H40ALV-RN-A-30375-R.090 | new |
| | 3/8 | .090 | 1/2 | 4 | 2-1/8 | .356 | 3 | 46265* | 46266* | H40ALV-RN-M-30375-R.090 | |
| | 3/8 | .090 | 1/2 | 5 | 2-1/2 | .356 | 3 | 82835* | 82836* | H40ALV-RN-ML-30375-R.090 | new |
| 1/2 | 1/2 | .015 | 5/8 | 3 | 1-3/8 | .475 | 3 | 46305 | 46306 | H40ALV-RN-R-30500-R.015 | |
| | 1/2 | .015 | 5/8 | 4 | 2-1/4 | .475 | 3 | 46335 | 46336 | H40ALV-RN-M-30500-R.015 | |
| | 1/2 | .015 | 5/8 | 5 | 3-3/8 | .475 | 3 | 46365 | 46366 | H40ALV-RN-L-30500-R.015 | |
| | 1/2 | .015 | 5/8 | 6 | 4-1/4 | .475 | 3 | 46395 | 46396 | H40ALV-RN-X-30500-R.015 | |
| | 1/2 | .030 | 5/8 | 3 | 1-3/8 | .475 | 3 | 46310 | 46311 | H40ALV-RN-R-30500-R.030 | |
| | 1/2 | .030 | 5/8 | 3-1/2 | 1-3/4 | .475 | 3 | 81511 | 81512 | H40ALV-RN-A-30500-R.030 | |
| | 1/2 | .030 | 5/8 | 4 | 2-1/4 | .475 | 3 | 46340 | 46341 | H40ALV-RN-M-30500-R.030 | |
| | 1/2 | .030 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | 81513 | 81514 | H40ALV-RN-ML-30500-R.030 | |
| | 1/2 | .030 | 5/8 | 5 | 3-3/8 | .475 | 3 | 46370 | 46371 | H40ALV-RN-L-30500-R.030 | |
| | 1/2 | .030 | 5/8 | 6 | 3-3/4 | .475 | 3 | 82837 | 82838 | H40ALV-RN-L-30500-R.030 | new |
| | 1/2 | .030 | 5/8 | 6 | 4-1/4 | .475 | 3 | 46400 | 46401 | H40ALV-RN-X-30500-R.030 | |
| | 1/2 | .030 | 5/8 | 7 | 5 | .475 | 3 | 82839 | 82840 | H40ALV-RN-Y-30500-R.030 | new |
| | 1/2 | .060 | 5/8 | 3 | 1-3/8 | .475 | 3 | 46315 | 46316 | H40ALV-RN-R-30500-R.060 | |
| | 1/2 | .060 | 5/8 | 3-1/2 | 1-3/4 | .475 | 3 | 81515 | 81516 | H40ALV-RN-A-30500-R.060 | |
| | 1/2 | .060 | 5/8 | 4 | 2-1/4 | .475 | 3 | 46345 | 46346 | H40ALV-RN-M-30500-R.060 | |
| | 1/2 | .060 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | 81517 | 81518 | H40ALV-RN-ML-30500-R.060 | |
| | 1/2 | .060 | 5/8 | 5 | 3-3/8 | .475 | 3 | 46375 | 46376 | H40ALV-RN-L-30500-R.060 | |
| | 1/2 | .060 | 5/8 | 6 | 3-3/4 | .475 | 3 | 82841 | 82842 | H40ALV-RN-L-30500-R.060 | new |
| | 1/2 | .060 | 5/8 | 6 | 4-1/4 | .475 | 3 | 46405 | 46406 | H40ALV-RN-X-30500-R.060 | |
| | 1/2 | .060 | 5/8 | 7 | 5 | .475 | 3 | 82843 | 82844 | H40ALV-RN-Y-30500-R.060 | new |
| | 1/2 | .090 | 5/8 | 3 | 1-3/8 | .475 | 3 | 46320 | 46321 | H40ALV-RN-R-30500-R.090 | |
| | 1/2 | .090 | 5/8 | 4 | 2-1/4 | .475 | 3 | 46350 | 46351 | H40ALV-RN-M-30500-R.090 | |
| | 1/2 | .090 | 5/8 | 5 | 3-3/8 | .475 | 3 | 46380 | 46381 | H40ALV-RN-L-30500-R.090 | |
| | 1/2 | .090 | 5/8 | 6 | 4-1/4 | .475 | 3 | 46410 | 46411 | H40ALV-RN-X-30500-R.090 | |
| | 1/2 | .125 | 5/8 | 3 | 1-3/8 | .475 | 3 | 46325* | 46326* | H40ALV-RN-R-30500-R.125 | |
| | 1/2 | .125 | 5/8 | 3-1/2 | 1-3/4 | .475 | 3 | 81519* | 81520* | H40ALV-RN-A-30500-R.125 | |
| | 1/2 | .125 | 5/8 | 4 | 2-1/4 | .475 | 3 | 46355* | 46356* | H40ALV-RN-M-30500-R.125 | |
| | 1/2 | .125 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | 81521* | 81522* | H40ALV-RN-ML-30500-R.125 | |
| | 1/2 | .125 | 5/8 | 5 | 3-3/8 | .475 | 3 | 46385* | 46386* | H40ALV-RN-L-30500-R.125 | |
| | 1/2 | .125 | 5/8 | 6 | 3-3/4 | .475 | 3 | 82845* | 82846* | H40ALV-RN-L-30500-R.125 | new |
| | 1/2 | .125 | 5/8 | 6 | 4-1/4 | .475 | 3 | 46415* | 46416* | H40ALV-RN-X-30500-R.125 | |
| | 1/2 | .125 | 5/8 | 7 | 5 | .475 | 3 | 82847* | 82848* | H40ALV-RN-Y-30500-R.125 | new |

* Wiper flats not included if corner radius exceeds 20% of tool diameter. ** .0003 max TIR

continued on next page

# H40ALV-RN-3

New Items!

## 3 FLUTE - CORNER RADIUS

### 40° Helix - Variable Pitch - Reduced Neck (cont.)

continued from previous page

| Cutter Dia.** D1 (h6) | Shank Dia. D2 (h6) | Corner Radius R +.002" −.002" | LOC L2 +.032" −.000" | OAL L1 +.062" −.062" | Reach (LBS) L3 | Neck Dia. | Flutes | Uncoated | Zplus Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | .030 | 3/4 | 4 | 2-3/8 | .593 | 3 | 46475 | 46476 | H40ALV-RN-M-30625-R.030 |
| | 5/8 | .030 | 3/4 | 6 | 3-3/8 | .593 | 3 | 46500 | 46501 | H40ALV-RN-L-30625-R.030 |
| | 5/8 | .060 | 3/4 | 4 | 2-3/8 | .593 | 3 | 46480 | 46481 | H40ALV-RN-M-30625-R.060 |
| | 5/8 | .090 | 3/4 | 4 | 2-3/8 | .593 | 3 | 46485 | 46486 | H40ALV-RN-M-30625-R.090 |
| | 5/8 | .125 | 3/4 | 4 | 2-3/8 | .593 | 3 | 46490 | 46491 | H40ALV-RN-M-30625-R.125 |
| 3/4 | 3/4 | .030 | 1 | 4 | 2 | .712 | 3 | 46560 | 46561 | H40ALV-RN-R-30750-R.030 |
| | 3/4 | .030 | 1 | 5 | 2-1/2 | .712 | 3 | 81523 | 81524 | H40ALV-RN-A-30750-R.030 |
| | 3/4 | .030 | 1 | 6 | 3-3/8 | .712 | 3 | 46595 | 46596 | H40ALV-RN-M-30750-R.030 |
| | 3/4 | .030 | 1 | 7 | 4-1/8 | .712 | 3 | 81525 | 81526 | H40ALV-RN-ML-30750-R.030 |
| | 3/4 | .030 | 1 | 7 | 5 | .712 | 3 | 46630 | 46631 | H40ALV-RN-L-30750-R.030 |
| | 3/4 | .060 | 1 | 4 | 2 | .712 | 3 | 46565 | 46566 | H40ALV-RN-R-30750-R.060 |
| | 3/4 | .060 | 1 | 5 | 2-1/2 | .712 | 3 | 81527 | 81528 | H40ALV-RN-A-30750-R.060 |
| | 3/4 | .060 | 1 | 6 | 3-3/8 | .712 | 3 | 46600 | 46601 | H40ALV-RN-M-30750-R.060 |
| | 3/4 | .060 | 1 | 7 | 4-1/8 | .712 | 3 | 81529 | 81530 | H40ALV-RN-ML-30750-R.060 |
| | 3/4 | .060 | 1 | 7 | 5 | .712 | 3 | 46635 | 46636 | H40ALV-RN-L-30750-R.060 |
| | 3/4 | .090 | 1 | 4 | 2 | .712 | 3 | 46570 | 46571 | H40ALV-RN-R-30750-R.090 |
| | 3/4 | .090 | 1 | 6 | 3-3/8 | .712 | 3 | 46605 | 46606 | H40ALV-RN-M-30750-R.090 |
| | 3/4 | .125 | 1 | 4 | 2 | .712 | 3 | 46575 | 46576 | H40ALV-RN-R-30750-R.125 |
| | 3/4 | .125 | 1 | 5 | 2-1/2 | .712 | 3 | 81531 | 81532 | H40ALV-RN-A-30750-R.125 |
| | 3/4 | .125 | 1 | 6 | 3-3/8 | .712 | 3 | 46610 | 46611 | H40ALV-RN-M-30750-R.125 |
| | 3/4 | .125 | 1 | 7 | 5 | .712 | 3 | 46645 | 46646 | H40ALV-RN-L-30750-R.125 |
| | 3/4 | .190 | 1 | 4 | 2 | .712 | 3 | 46580* | 46581* | H40ALV-RN-R-30750-R.190 |
| | 3/4 | .190 | 1 | 6 | 3-3/8 | .712 | 3 | 46615* | 46616* | H40ALV-RN-M-30750-R.190 |
| | 3/4 | .250 | 1 | 4 | 2 | .712 | 3 | 46585* | 46586* | H40ALV-RN-R-30750-R.250 |
| | 3/4 | .250 | 1 | 6 | 3-3/8 | .712 | 3 | 46620* | 46621* | H40ALV-RN-M-30750-R.250 |
| | 3/4 | .250 | 1 | 7 | 5 | .712 | 3 | 46655* | 46656* | H40ALV-RN-L-30750-R.250 |
| 1 | 1 | .030 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | 46700 | 46701 | H40ALV-RN-R-31000-R.030 |
| | 1 | .030 | 1-1/4 | 6 | 3-3/8 | .950 | 3 | 46735 | 46736 | H40ALV-RN-M-31000-R.030 |
| | 1 | .030 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | 46770 | 46771 | H40ALV-RN-L-31000-R.030 |
| | 1 | .030 | 1-1/4 | 9 | 6 | .950 | 3 | 46805 | 46806 | H40ALV-RN-LX-31000-R.030 |
| | 1 | .060 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | 46705 | 46706 | H40ALV-RN-R-31000-R.060 |
| | 1 | .060 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | 46775 | 46776 | H40ALV-RN-L-31000-R.060 |
| | 1 | .125 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | 46715 | 46716 | H40ALV-RN-R-31000-R.125 |
| | 1 | .125 | 1-1/4 | 6 | 3-3/8 | .950 | 3 | 46750 | 46751 | H40ALV-RN-M-31000-R.125 |
| | 1 | .125 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | 46785 | 46786 | H40ALV-RN-L-31000-R.125 |
| | 1 | .125 | 1-1/4 | 9 | 6 | .950 | 3 | 46820 | 46821 | H40ALV-RN-LX-31000-R.125 |
| | 1 | .250 | 1-1/4 | 5 | 2-5/8 | .950 | 3 | 46725* | 46726* | H40ALV-RN-R-31000-R.250 |
| | 1 | .250 | 1-1/4 | 6 | 3-3/8 | .950 | 3 | 46760* | 46761* | H40ALV-RN-M-31000-R.250 |
| | 1 | .250 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | 46795* | 46796* | H40ALV-RN-L-31000-R.250 |
| | 1 | .250 | 1-1/4 | 9 | 6 | .950 | 3 | 46830* | 46831* | H40ALV-RN-LX-31000-R.250 |

* Wiper flats not included if corner radius exceeds 20% of tool diameter. ** .0003 max TIR

# SPEEDS & FEEDS

## 40° Helix - Variable Pitch - Reduced Neck (cont.)

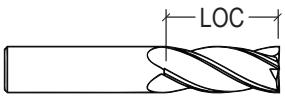
**H40ALV-RN-3**

| H40ALV-3 / H40ALV-RN-3 | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | | |
| | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0008 | .0014 | .0017 | .0011 | .0021 | .0019 | .0015 | .0028 | .0022 | .0022 | .0041 | .0025 | .0029 | .0054 | .0029 | .0041 | .0077 | .0035 | .0053 | .0098 | .0042 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0012 | .0022 | .0021 | .0017 | .0033 | .0024 | .0023 | .0043 | .0027 | .0034 | .0064 | .0031 | .0045 | .0084 | .0036 | .0064 | .0120 | .0043 | .0082 | .0153 | .0052 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0008 | .0015 | .0017 | .0012 | .0022 | .0020 | .0016 | .0029 | .0022 | .0023 | .0043 | .0025 | .0030 | .0056 | .0030 | .0043 | .0081 | .0035 | .0055 | .0103 | .0043 |

| Milling Process | Style | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | Non-Reached | 75%-125% Diameter | 100% Diameter |
| | Reached | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Non-Reached | 125%-200% Diameter | 30%-40% Diameter |
| | Reached | Up to Max LOC | 30%-40% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

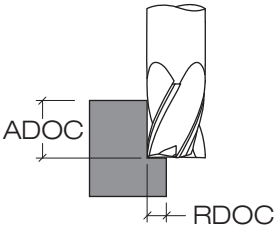
NOTES:

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.



Regular Style

Reduced Neck Style




**Key: LOC=Length of Cut ADOC=Axial Depth of Cut RDOC=Radial Depth of Cut**

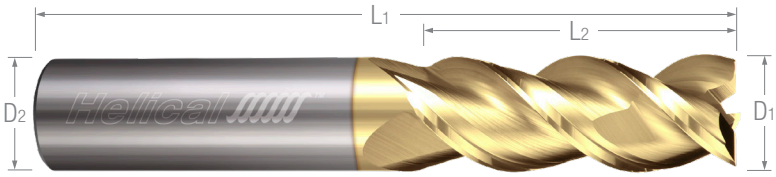
# H45AL-3

New Items!

## 3 FLUTE - SQUARE

45° Helix

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Center cutting
- Excellent performance in High Efficiency Milling (HEM)
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

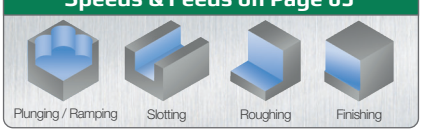



| | Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | 03015 | 03017 | H45AL-S-30125 |
| | | 1/8 | 3/8 | 2 | 3 | 03030 | 03032 | H45AL-SR-30125 |
| | | 1/8 | 1/2 | 2-1/2 | 3 | 03045 | 03047 | H45AL-R-30125 |
| | | 1/8 | 5/8 | 2-1/2 | 3 | 81551 | 81552 | H45AL-M-30125 |
| | | 1/8 | 3/4 | 2-1/2 | 3 | 03060 | 03062 | H45AL-L-30125 |
| new | | 1/8 | 7/8 | 2-1/2 | 3 | 82849 | 82850 | H45AL-LX-30125 |
| | 3/16 | 3/16 | 5/16 | 2 | 3 | 03090 | 03092 | H45AL-S-30187 |
| | | 3/16 | 9/16 | 2-1/2 | 3 | 03105 | 03107 | H45AL-R-30187 |
| | | 3/16 | 3/4 | 2-1/2 | 3 | 03120 | 03122 | H45AL-M-30187 |
| | | 3/16 | 1 | 2-1/2 | 3 | 81553 | 81554 | H45AL-ML-30187 |
| new | | 3/16 | 1-3/16 | 3 | 3 | 82851 | 82852 | H45AL-L-30187 |
| | 1/4 | 1/4 | 3/8 | 2 | 3 | 03150 | 03152 | H45AL-S-30250 |
| | | 1/4 | 1/2 | 2-1/2 | 3 | 03155 | 03157 | H45AL-SR-30250 |
| | | 1/4 | 3/4 | 2-1/2 | 3 | 03165 | 03167 | H45AL-R-30250 |
| | | 1/4 | 1 | 3 | 3 | 03180 | 03182 | H45AL-M-30250 |
| | | 1/4 | 1-1/4 | 3 | 3 | 03195 | 03197 | H45AL-L-30250 |
| | | 1/4 | 1-1/2 | 3 | 3 | 81555 | 81556 | H45AL-LX-30250 |
| | | 1/4 | 1-3/4 | 4 | 3 | 03210 | 03212 | H45AL-X-30250 |
| new | | 1/4 | 2 | 4 | 3 | 82853 | 82854 | H45AL-Y-30250 |
| | 5/16 | 5/16 | 7/16 | 2 | 3 | 03240 | 03242 | H45AL-S-30312 |
| | | 5/16 | 13/16 | 2-1/2 | 3 | 03255 | 03257 | H45AL-R-30312 |
| | | 5/16 | 1 | 3 | 3 | 03270 | 03272 | H45AL-M-30312 |
| | | 5/16 | 1-1/4 | 3 | 3 | 03285 | 03287 | H45AL-L-30312 |
| | | 5/16 | 1-9/16 | 3 | 3 | 81557 | 81558 | H45AL-LX-30312 |
| | | 5/16 | 2-1/8 | 4 | 3 | 03300 | 03302 | H45AL-X-30312 |
| | 3/8 | 3/8 | 1/2 | 2 | 3 | 03330 | 03332 | H45AL-S-30375 |
| | | 3/8 | 3/4 | 2-1/2 | 3 | 81559 | 81560 | H45AL-SR-30375 |
| | | 3/8 | 1 | 3 | 3 | 03345 | 03347 | H45AL-R-30375 |
| | | 3/8 | 1-1/4 | 3-1/2 | 3 | 03360 | 03362 | H45AL-M-30375 |
| | | 3/8 | 1-1/2 | 4 | 3 | 03375 | 03377 | H45AL-L-30375 |
| | | 3/8 | 2 | 4 | 3 | 03390 | 03392 | H45AL-LX-30375 |
| | | 3/8 | 2-1/2 | 5 | 3 | 03405 | 03407 | H45AL-X-30375 |
| new | | 3/8 | 3 | 5 | 3 | 82855 | 82856 | H45AL-Y-30375 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 65



# 3 FLUTE - SQUARE New Items!

## 45° Helix (cont.)

HEM

**H45AL-3**

continued from previous page

| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 2-1/2 | 3 | 03435 | 03437 | H45AL-S-30500 | |
| | 1/2 | 1 | 3 | 3 | 03450 | 03452 | H45AL-SR-30500 | |
| | 1/2 | 1-1/4 | 3 | 3 | 03465 | 03467 | H45AL-R-30500 | |
| | 1/2 | 1-5/8 | 4 | 3 | 03480 | 03482 | H45AL-M-30500 | |
| | 1/2 | 2 | 4 | 3 | 03495 | 03497 | H45AL-L-30500 | |
| | 1/2 | 2-1/2 | 5 | 3 | 03510 | 03512 | H45AL-LX-30500 | |
| | 1/2 | 3-1/8 | 6 | 3 | 03525 | 03527 | H45AL-X-30500 | |
| | 1/2 | 3-5/8 | 6 | 3 | 82857 | 82858 | H45AL-Y-30500 | new |
| 5/8 | 5/8 | 3/4 | 3 | 3 | 03555 | 03557 | H45AL-S-30625 | |
| | 5/8 | 1-5/8 | 3-1/2 | 3 | 03570 | 03572 | H45AL-R-30625 | |
| | 5/8 | 2-1/8 | 4 | 3 | 03585 | 03587 | H45AL-M-30625 | |
| | 5/8 | 2-1/2 | 5 | 3 | 03600 | 03602 | H45AL-L-30625 | |
| | 5/8 | 3-1/4 | 6 | 3 | 03610 | 03612 | H45AL-LX-30625 | |
| 3/4 | 3/4 | 1 | 4 | 3 | 03645 | 03647 | H45AL-S-30750 | |
| | 3/4 | 1-5/8 | 4 | 3 | 03660 | 03662 | H45AL-R-30750 | |
| | 3/4 | 2 | 4 | 3 | 81561 | 81562 | H45AL-A-30750 | |
| | 3/4 | 2-1/4 | 5 | 3 | 03675 | 03677 | H45AL-M-30750 | |
| | 3/4 | 2-3/4 | 5 | 3 | 81563 | 81564 | H45AL-ML-30750 | |
| | 3/4 | 3-1/4 | 6 | 3 | 03690 | 03692 | H45AL-L-30750 | |
| | 3/4 | 4 | 6-1/2 | 3 | 03705 | 03707 | H45AL-X-30750 | |
| 1 | 1 | 2 | 5 | 3 | 03750 | 03752 | H45AL-R-31000 | |
| | 1 | 2-5/8 | 6 | 3 | 03765 | 03767 | H45AL-M-31000 | |
| | 1 | 3-1/4 | 6 | 3 | 03780 | 03782 | H45AL-L-31000 | |
| | 1 | 4-1/8 | 7 | 3 | 03795 | 03797 | H45AL-X-31000 | |

* .0003 max TIR

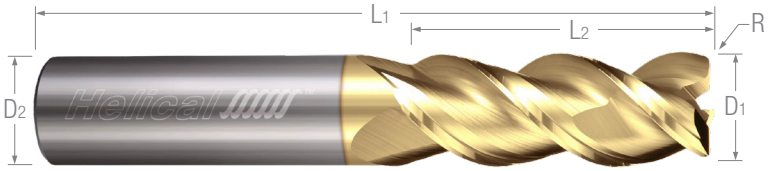
# H45AL-3

New Items!

## 3 FLUTE - CORNER RADIUS

45° Helix

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- Cylindrically ground to maintain edge strength
- Center cutting
- Excellent performance in High Efficiency Milling (HEM)
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

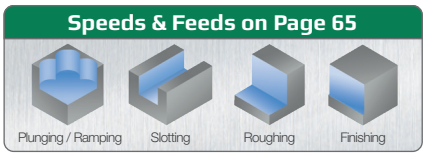



| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2^{+.032"}_{-.000"}$ | OAL $L_1^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 3 | 81581 | 81582 | H45AL-S-30125-R.010 |
| | | 1/8 | .010 | 3/8 | 2 | 3 | 81583 | 81584 | H45AL-SR-30125-R.010 |
| | | 1/8 | .010 | 1/2 | 2-1/2 | 3 | 81585 | 81586 | H45AL-R-30125-R.010 |
| new | | 1/8 | .010 | 5/8 | 2-1/2 | 3 | 83575 | 83576 | H45AL-M-30125-R.010 |
| new | | 1/8 | .010 | 3/4 | 2-1/2 | 3 | 83577 | 83578 | H45AL-L-30125-R.010 |
| new | | 1/8 | .020 | 1/4 | 1-1/2 | 3 | 83579 | 83580 | H45AL-S-30125-R.020 |
| new | | 1/8 | .020 | 3/8 | 2 | 3 | 83581 | 83582 | H45AL-SR-30125-R.020 |
| new | | 1/8 | .020 | 1/2 | 2-1/2 | 3 | 83583 | 83584 | H45AL-R-30125-R.020 |
| new | | 1/8 | .030 | 1/4 | 1-1/2 | 3 | 83585 | 83586 | H45AL-S-30125-R.030 |
| new | | 1/8 | .030 | 3/8 | 2 | 3 | 83587 | 83588 | H45AL-SR-30125-R.030 |
| new | | 1/8 | .030 | 1/2 | 2-1/2 | 3 | 83589 | 83590 | H45AL-R-30125-R.030 |
| new | 3/16 | 3/16 | .010 | 5/16 | 2 | 3 | 83591 | 83592 | H45AL-S-30187-R.010 |
| new | | 3/16 | .010 | 9/16 | 2-1/2 | 3 | 83593 | 83594 | H45AL-R-30187-R.010 |
| new | | 3/16 | .010 | 3/4 | 2-1/2 | 3 | 83595 | 83596 | H45AL-M-30187-R.010 |
| new | | 3/16 | .020 | 5/16 | 2 | 3 | 83597 | 83598 | H45AL-S-30187-R.020 |
| new | | 3/16 | .020 | 9/16 | 2-1/2 | 3 | 83599 | 83600 | H45AL-R-30187-R.020 |
| new | | 3/16 | .020 | 3/4 | 2-1/2 | 3 | 83601 | 83602 | H45AL-M-30187-R.020 |
| new | | 3/16 | .030 | 5/16 | 2 | 3 | 83603 | 83604 | H45AL-S-30187-R.030 |
| new | | 3/16 | .030 | 9/16 | 2-1/2 | 3 | 83605 | 83606 | H45AL-R-30187-R.030 |
| new | | 3/16 | .030 | 3/4 | 2-1/2 | 3 | 83607 | 83608 | H45AL-M-30187-R.030 |
| | 1/4 | 1/4 | .010 | 1/2 | 2-1/2 | 3 | 81587 | 81588 | H45AL-SR-30250-R.010 |
| | | 1/4 | .010 | 3/4 | 2-1/2 | 3 | 81589 | 81590 | H45AL-R-30250-R.010 |
| | | 1/4 | .010 | 1 | 3 | 3 | 81591 | 81592 | H45AL-M-30250-R.010 |
| new | | 1/4 | .010 | 1-1/4 | 3 | 3 | 83609 | 83610 | H45AL-L-30250-R.010 |
| new | | 1/4 | .020 | 1/2 | 2-1/2 | 3 | 83611 | 83612 | H45AL-SR-30250-R.020 |
| new | | 1/4 | .020 | 3/4 | 2-1/2 | 3 | 83613 | 83614 | H45AL-R-30250-R.020 |
| new | | 1/4 | .020 | 1 | 3 | 3 | 83615 | 83616 | H45AL-M-30250-R.020 |
| | | 1/4 | .030 | 1/2 | 2-1/2 | 3 | 81593 | 81594 | H45AL-SR-30250-R.030 |
| | | 1/4 | .030 | 3/4 | 2-1/2 | 3 | 81595 | 81596 | H45AL-R-30250-R.030 |
| | | 1/4 | .030 | 1 | 3 | 3 | 81597 | 81598 | H45AL-M-30250-R.030 |
| new | | 1/4 | .030 | 1-1/4 | 3 | 3 | 83617 | 83618 | H45AL-L-30250-R.030 |
| new | | 1/4 | .060 | 1/2 | 2-1/2 | 3 | 83619 | 83620 | H45AL-SR-30250-R.060 |
| new | | 1/4 | .060 | 3/4 | 2-1/2 | 3 | 83621 | 83622 | H45AL-R-30250-R.060 |
| new | | 1/4 | .060 | 1 | 3 | 3 | 83623 | 83624 | H45AL-M-30250-R.060 |

* .0003 max TIR

continued on next page

Speeds & Feeds on Page 65



# 3 FLUTE - CORNER RADIUS New Items!

45° Helix (cont.)

HEM

## H45AL-3

continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2{}^{+.032"}_{-.000"}$ | OAL $L_1{}^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 5/16 | 5/16 | .010 | 7/16 | 2 | 3 | 83625 | 83626 | H45AL-S-30312-R.010 | new |
| | 5/16 | .010 | 13/16 | 2-1/2 | 3 | 83627 | 83628 | H45AL-R-30312-R.010 | new |
| | 5/16 | .010 | 1 | 3 | 3 | 83629 | 83630 | H45AL-M-30312-R.010 | new |
| | 5/16 | .030 | 7/16 | 2 | 3 | 83631 | 83632 | H45AL-S-30312-R.030 | new |
| | 5/16 | .030 | 13/16 | 2-1/2 | 3 | 83633 | 83634 | H45AL-R-30312-R.030 | new |
| | 5/16 | .030 | 1 | 3 | 3 | 83635 | 83636 | H45AL-M-30312-R.030 | new |
| | 5/16 | .060 | 7/16 | 2 | 3 | 83637 | 83638 | H45AL-S-30312-R.060 | new |
| | 5/16 | .060 | 13/16 | 2-1/2 | 3 | 83639 | 83640 | H45AL-R-30312-R.060 | new |
| | 5/16 | .060 | 1 | 3 | 3 | 83641 | 83642 | H45AL-M-30312-R.060 | new |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 3 | 83643 | 83644 | H45AL-S-30375-R.010 | new |
| | 3/8 | .010 | 1 | 3 | 3 | 83645 | 83646 | H45AL-R-30375-R.010 | new |
| | 3/8 | .010 | 1-1/4 | 3-1/2 | 3 | 83647 | 83648 | H45AL-M-30375-R.010 | new |
| | 3/8 | .030 | 1/2 | 2 | 3 | 81599 | 81600 | H45AL-S-30375-R.030 | |
| | 3/8 | .030 | 1 | 3 | 3 | 81601 | 81602 | H45AL-R-30375-R.030 | |
| | 3/8 | .030 | 1-1/4 | 3-1/2 | 3 | 81603 | 81604 | H45AL-M-30375-R.030 | |
| | 3/8 | .030 | 1-1/2 | 4 | 3 | 83649 | 83650 | H45AL-L-30375 -R.030 | new |
| | 3/8 | .060 | 1/2 | 2 | 3 | 81605 | 81606 | H45AL-S-30375-R.060 | |
| | 3/8 | .060 | 1 | 3 | 3 | 81607 | 81608 | H45AL-R-30375-R.060 | |
| | 3/8 | .060 | 1-1/4 | 3-1/2 | 3 | 81609 | 81610 | H45AL-M-30375-R.060 | |
| | 3/8 | .060 | 1-1/2 | 4 | 3 | 83651 | 83652 | H45AL-L-30375 -R.060 | new |
| 1/2 | 1/2 | .010 | 1 | 3 | 3 | 83653 | 83654 | H45AL-SR-30500-R.010 | new |
| | 1/2 | .010 | 1-1/4 | 3 | 3 | 83655 | 83656 | H45AL-R-30500-R.010 | new |
| | 1/2 | .010 | 1-5/8 | 4 | 3 | 83657 | 83658 | H45AL-M-30500-R.010 | new |
| | 1/2 | .010 | 2 | 4 | 3 | 83659 | 83660 | H45AL-L-30500-R.010 | new |
| | 1/2 | .020 | 1 | 3 | 3 | 83661 | 83662 | H45AL-SR-30500-R.020 | new |
| | 1/2 | .020 | 1-1/4 | 3 | 3 | 83663 | 83664 | H45AL-R-30500-R.020 | new |
| | 1/2 | .020 | 1-5/8 | 4 | 3 | 83665 | 83666 | H45AL-M-30500-R.020 | new |
| | 1/2 | .020 | 2 | 4 | 3 | 83667 | 83668 | H45AL-L-30500-R.020 | new |
| | 1/2 | .030 | 5/8 | 2-1/2 | 3 | 83669 | 83670 | H45AL-S-30500-R.030 | new |
| | 1/2 | .030 | 1 | 3 | 3 | 81611 | 81612 | H45AL-SR-30500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 3 | 81613 | 81614 | H45AL-R-30500-R.030 | |
| | 1/2 | .030 | 1-5/8 | 4 | 3 | 81615 | 81616 | H45AL-M-30500-R.030 | |
| | 1/2 | .030 | 2 | 4 | 3 | 81617 | 81618 | H45AL-L-30500-R.030 | |
| | 1/2 | .030 | 2-1/2 | 5 | 3 | 83671 | 83672 | H45AL-LX-30500-R.030 | new |
| | 1/2 | .060 | 5/8 | 2-1/2 | 3 | 83673 | 83674 | H45AL-S-30500-R.060 | new |
| | 1/2 | .060 | 1 | 3 | 3 | 81619 | 81620 | H45AL-SR-30500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 3 | 3 | 81621 | 81622 | H45AL-R-30500-R.060 | |
| | 1/2 | .060 | 1-5/8 | 4 | 3 | 81623 | 81624 | H45AL-M-30500-R.060 | |
| | 1/2 | .060 | 2 | 4 | 3 | 81625 | 81626 | H45AL-L-30500-R.060 | |
| | 1/2 | .060 | 2-1/2 | 5 | 3 | 83675 | 83676 | H45AL-LX-30500-R.060 | new |
| | 1/2 | .125 | 1 | 3 | 3 | 83677 | 83678 | H45AL-SR-30500-R.125 | new |
| | 1/2 | .125 | 1-1/4 | 3 | 3 | 83679 | 83680 | H45AL-R-30500-R.125 | new |
| | 1/2 | .125 | 1-5/8 | 4 | 3 | 83681 | 83682 | H45AL-M-30500-R.125 | new |
| | 1/2 | .125 | 2 | 4 | 3 | 83683 | 83684 | H45AL-L-30500-R.125 | new |

* .0003 max TIR

continued on next page

# H45AL-3

New Items!

## 3 FLUTE - CORNER RADIUS

45° Helix (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Corner Radius $R^{+.002"}_{-.002"}$ | Length of Cut $L_2{}^{+.032"}_{-.000"}$ | OAL $L_1{}^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| new | 5/8 | 5/8 | **.030** | 1-5/8 | 3-1/2 | 3 | 83685 | 83686 | H45AL-R-30625-R.030 |
| new | | 5/8 | **.030** | 2-1/8 | 4 | 3 | 83687 | 83688 | H45AL-M-30625-R.030 |
| new | | 5/8 | **.030** | 2-1/2 | 5 | 3 | 83689 | 83690 | H45AL-L-30625-R.030 |
| new | | 5/8 | **.060** | 1-5/8 | 3-1/2 | 3 | 83691 | 83692 | H45AL-R-30625-R.060 |
| new | | 5/8 | **.060** | 2-1/8 | 4 | 3 | 83693 | 83694 | H45AL-M-30625-R.060 |
| new | | 5/8 | **.060** | 2-1/2 | 5 | 3 | 83695 | 83696 | H45AL-L-30625-R.060 |
| new | | 5/8 | **.125** | 1-5/8 | 3-1/2 | 3 | 83697 | 83698 | H45AL-R-30625-R.125 |
| new | | 5/8 | **.125** | 2-1/8 | 4 | 3 | 83699 | 83700 | H45AL-M-30625-R.125 |
| new | | 5/8 | **.125** | 2-1/2 | 5 | 3 | 83701 | 83702 | H45AL-L-30625-R.125 |
| | 3/4 | 3/4 | **.030** | 1-5/8 | 4 | 3 | 81627 | 81628 | H45AL-R-30750-R.030 |
| | | 3/4 | **.030** | 2-1/4 | 5 | 3 | 81629 | 81630 | H45AL-M-30750-R.030 |
| | | 3/4 | **.060** | 1-5/8 | 4 | 3 | 81631 | 81632 | H45AL-R-30750-R.060 |
| | | 3/4 | **.060** | 2-1/4 | 5 | 3 | 81633 | 81634 | H45AL-M-30750-R.060 |
| new | | 3/4 | **.125** | 1-5/8 | 4 | 3 | 83703 | 83704 | H45AL-R-30750-R.125 |
| new | | 3/4 | **.125** | 2-1/4 | 5 | 3 | 83705 | 83706 | H45AL-M-30750-R.125 |

* .0003 max TIR



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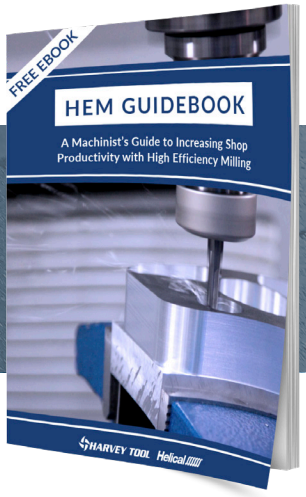

# 3 FLUTE - SQUARE New Items!

## 45° Helix - Reduced Neck

**H45AL-RN-3**

- Designed for outstanding performance and accelerated metal removal rates in aluminum and non-ferrous materials
- Designed with a high helix for improved part finish and shearing action
- High helix for increased part finish and shearing action
- Cylindrically ground to maintain edge strength
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Excellent performance in High Efficiency Milling (HEM)
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 5/32 | 3 | 1/2 | .118 | 3 | 19015 | 19017 | H45AL-RN-R-30125 | |
| | 1/8 | 5/32 | 3 | 3/4 | .118 | 3 | 19030 | 19032 | H45AL-RN-M-30125 | |
| | 1/8 | 5/32 | 3 | 1 | .118 | 3 | 81565 | 81566 | H45AL-RN-L-30125 | |
| | 1/8 | 5/32 | 3 | 1-1/4 | .118 | 3 | 83707 | 83708 | H45AL-RN-LX-30125 | new |
| 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 3 | 19060 | 19062 | H45AL-RN-R-30187 | |
| | 3/16 | 7/32 | 3 | 3/4 | .178 | 3 | 19075 | 19077 | H45AL-RN-M-30187 | |
| | 3/16 | 7/32 | 3 | 1 | .178 | 3 | 81567 | 81568 | H45AL-RN-ML-30187 | |
| | 3/16 | 7/32 | 3 | 1-5/16 | .178 | 3 | 83709 | 83710 | H45AL-RN-LX-30187 | new |
| 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 3 | 19105 | 19107 | H45AL-RN-S-30250 | |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 3 | 19120 | 19122 | H45AL-RN-R-30250 | |
| | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 3 | 81569 | 81570 | H45AL-RN-A-30250 | |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 3 | 19135 | 19137 | H45AL-RN-M-30250 | |
| | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 3 | 81571 | 81572 | H45AL-RN-ML-30250 | |
| | 1/4 | 3/8 | 4-1/2 | 3 | .237 | 3 | 83711 | 83712 | H45AL-RN-L-30250 | new |
| 5/16 | 5/16 | 7/16 | 4 | 1-1/8 | .296 | 3 | 19165 | 19167 | H45AL-RN-R-30312 | |
| | 5/16 | 7/16 | 4 | 1-3/4 | .296 | 3 | 83713 | 83714 | H45AL-RN-A-30312 | new |
| | 5/16 | 7/16 | 4 | 2-1/8 | .296 | 3 | 19180 | 19182 | H45AL-RN-M-30312 | |
| | 5/16 | 7/16 | 6 | 3-1/8 | .296 | 3 | 19190 | 19192 | H45AL-RN-L-30312 | new |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 3 | 19210 | 19212 | H45AL-RN-R-30375 | |
| | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 3 | 81573 | 81574 | H45AL-RN-A-30375 | |
| | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 3 | 19225 | 19227 | H45AL-RN-M-30375 | |
| | 3/8 | 1/2 | 5 | 2-1/2 | .356 | 3 | 83715 | 83716 | H45AL-RN-ML-30375 | new |
| | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 3 | 19235 | 19237 | H45AL-RN-L-30375 | |
| | 3/8 | 1/2 | 6 | 4 | .356 | 3 | 19245 | 19247 | H45AL-RN-X-30375 | |
| 1/2 | 1/2 | 5/8 | 4 | 1-3/8 | .475 | 3 | 19285 | 19287 | H45AL-RN-R-30500 | |
| | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 3 | 81575 | 81576 | H45AL-RN-A-30500 | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 3 | 19300 | 19302 | H45AL-RN-M-30500 | |
| | 1/2 | 5/8 | 4-1/2 | 2-3/4 | .475 | 3 | 81577 | 81578 | H45AL-RN-ML-30500 | |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 3 | 19315 | 19317 | H45AL-RN-L-30500 | |
| | 1/2 | 5/8 | 6 | 3-3/4 | .475 | 3 | 83717 | 83718 | H45AL-RN-LX-30500 | new |
| | 1/2 | 5/8 | 6 | 4-1/4 | .475 | 3 | 19325 | 19327 | H45AL-RN-X-30500 | |

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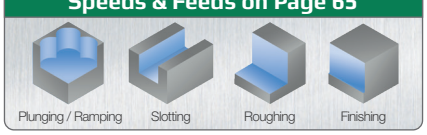
Speeds & Feeds on Page 65



# H45AL-3

New Items!

## 3 FLUTE - SQUARE

45° Helix - Reduced Neck (cont.)

continued from previous page

| Cutter Dia.* $D_1$ (h6) | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Uncoated | *Zplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 3 | **19405** | **19407** | H45AL-RN-R-30750 |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 3 | **19420** | **19422** | H45AL-RN-M-30750 |
| | 3/4 | 1 | 6 | 2-7/8 | .712 | 3 | **81579** | **81580** | H45AL-RN-ML-30750 |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 3 | **19435** | **19437** | H45AL-RN-L-30750 |
| | 3/4 | 1 | 6 | 4-3/8 | .712 | 3 | **19445** | **19447** | H45AL-RN-X-30750 |
| 1 | 1 | 1-1/4 | 7 | 4-3/8 | .950 | 3 | **19495** | **19497** | H45AL-RN-L-31000 |

* .0003 max TIR



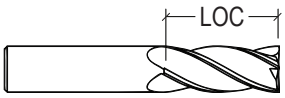
## H45AL-3 / H45AL-RN-3

| Material Guide | | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| WROUGHT ALUMINUM ALLOY | 2014, 5062, 6061, 7050, 7075, 7475 | 2100 | .0008 | .0016 | .0018 | .0012 | .0023 | .0021 | .0016 | .0031 | .0023 | .0024 | .0045 | .0027 | .0032 | .0059 | .0032 | .0046 | .0085 | .0037 | .0058 | .0108 | .0045 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0, 360.0, 380.0, 383.0, 390.0, 520.0, 535.0 | 1400 | .0013 | .0024 | .0023 | .0019 | .0036 | .0026 | .0025 | .0048 | .0029 | .0038 | .0071 | .0034 | .0049 | .0092 | .0039 | .0071 | .0132 | .0047 | .0090 | .0169 | .0057 |
| COPPER ALLOY | Cu-ETP, CuBe2, CuZn30, CuZn36Pb3, CuZn10, CuSn5 | 770 | .0009 | .0016 | .0019 | .0013 | .0024 | .0021 | .0017 | .0032 | .0024 | .0025 | .0047 | .0027 | .0033 | .0062 | .0032 | .0047 | .0089 | .0038 | .0060 | .0113 | .0047 |

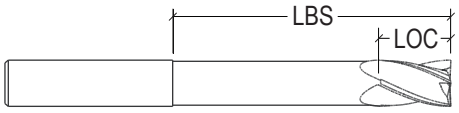
| Milling Process | Style | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | Non-Reached | 75%-125% Diameter | 100% Diameter |
| | Reached | Up to Max LOC | 100% Diameter |
| Rgh (Traditional Roughing) | Non-Reached | 125%-200% Diameter | 30%-40% Diameter |
| | Reached | Up to Max LOC | 30%-40% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

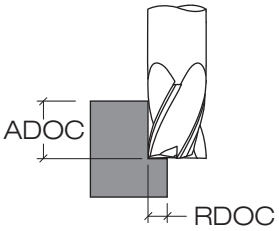
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.




Regular Style



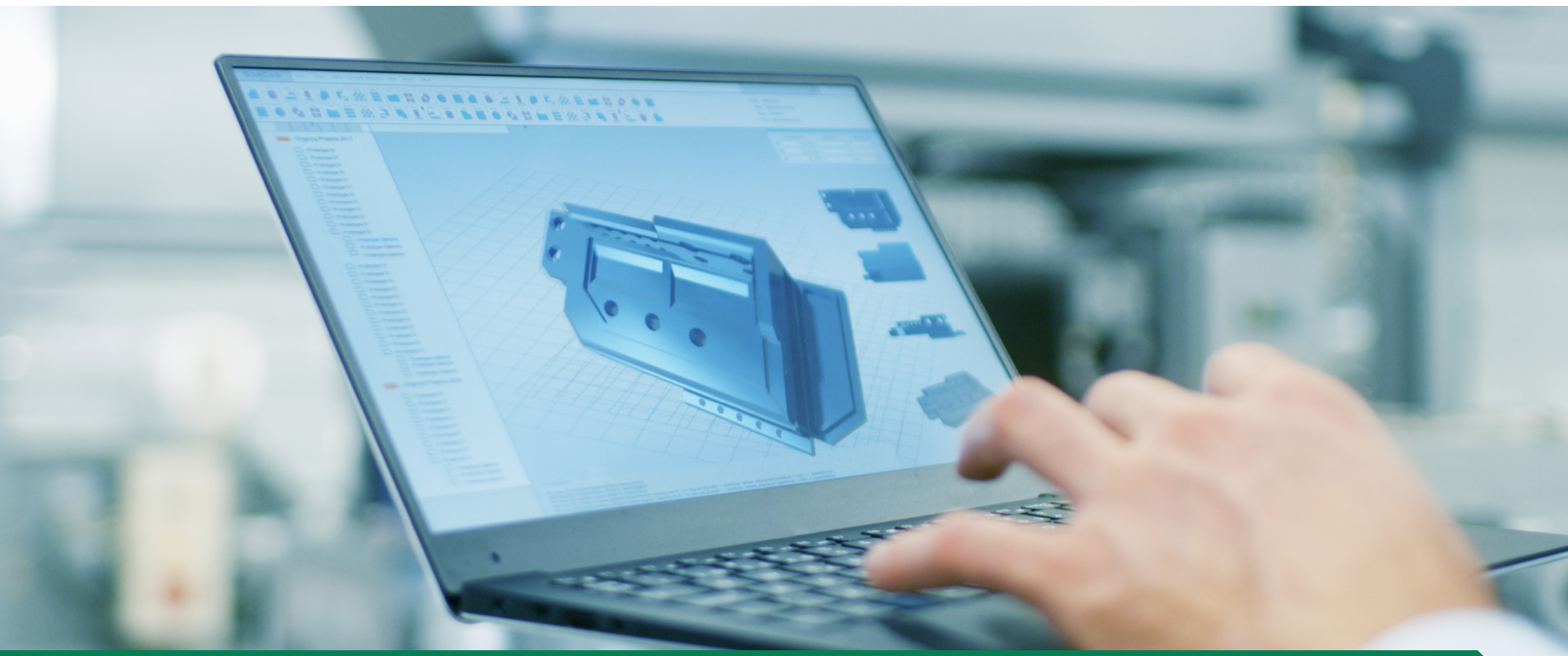

Reduced Neck Style




Key: LOC=Length of Cut ADOC=Axial Depth of Cut RDOC=Radial Depth of Cut

# New CAM Tool Libraries

Harvey Performance Company works closely with industry-leading CAM software companies to optimize Helical Solutions and Harvey Tool product libraries for their platforms.



### Valuable Time Savings

Import tool libraries directly into CAM software and allow more time to be spent at the machine.

### Confident Machining

Program confidently with accurate tool dimensions and CAM-specific tool data.

### Growing Libraries & Partnerships

Count on up-to-date product libraries across a roster of leading CAM partners.

AUTODESK® FUSION 360

AUTODESK® HSM

CAMWorks

ESPRIT® CAM System

GibbsCAM®

Mastercam®

SolidCAM iMachining – The Revolution in CAM!

Download Tool Libraries Now

**www.harveyperformance.com/tool-libraries**

Look for additional industry-leading CAM partners in 2021.

# END MILLS FOR STEELS

## Steels, Tool Steels, & Cast Iron


| ROUGHERS | | | | PG |
|---|---|---|---|---|
| new | 4 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 68 |
| new | 4 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch - Reduced Neck | 70 |
| new | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 72 |
| new | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch - Reduced Neck | 74 |
| new | 6 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 76 |
| new | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 79 |
| new | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch - Reduced Neck | 81 |
| new | Multi-Flute | Corner Radius | Knuckle Rougher - Variable Pitch | 83 |
| new | Multi-Flute | Corner Radius | Knuckle Rougher - Variable Pitch - Reduced Neck | 84 |

| 3 FLUTE | | | | PG |
|---|---|---|---|---|
| | 3 Flute | Square | Variable Pitch | 87 |
| | 3 Flute | Corner Radius | Variable Pitch | 88 |
| | 3 Flute | Ball | | 90 |
| | 3 Flute | Corner Radius | | 91 |
| | 3 Flute | Ball | Reduced Neck | 92 |
| | 3 Flute | Corner Radius | Reduced Neck | 93 |

| 4 FLUTE | | | | PG |
|---|---|---|---|---|
| new | 4 Flute | Square | Variable Pitch | 95 |
| | 4 Flute | Square | Variable Pitch - Metric | 97 |
| new | 4 Flute | Ball | Variable Pitch | 98 |
| new | 4 Flute | Corner Radius | Variable Pitch | 100 |
| | 4 Flute | Corner Radius | Variable Pitch - Metric | 106 |
| new | 4 Flute | Square | Variable Pitch - Reduced Neck | 108 |
| new | 4 Flute | Ball | Variable Pitch - Reduced Neck | 110 |
| new | 4 Flute | Corner Radius | Variable Pitch - Reduced Neck | 112 |

| 5 FLUTE | | | | PG |
|---|---|---|---|---|
| new | 5 Flute | Square | Variable Pitch | 116 |
| | 5 Flute | Square | Variable Pitch - Metric | 118 |
| new | 5 Flute | Corner Radius | Variable Pitch | 119 |
| | 5 Flute | Corner Radius | Variable Pitch - Metric | 125 |
| new | 5 Flute | Square | Variable Pitch - Reduced Neck | 127 |
| new | 5 Flute | Corner Radius | Variable Pitch - Reduced Neck | 129 |
| | 5 Flute | Square | Finisher | 133 |

| 6 FLUTE | | | | PG |
|---|---|---|---|---|
| | 6 Flute | Square | Variable Pitch | 136 |
| | 6 Flute | Square | Variable Pitch - Metric | 137 |
| new | 6 Flute | Ball | Variable Pitch | 138 |
| new | 6 Flute | Corner Radius | Variable Pitch | 139 |
| | 6 Flute | Corner Radius | Variable Pitch - Metric | 142 |
| | 6 Flute | Square | Variable Pitch - Reduced Neck | 144 |
| | 6 Flute | Ball | Variable Pitch - Reduced Neck | 145 |
| | 6 Flute | Corner Radius | Variable Pitch - Reduced Neck | 146 |

| 7 FLUTE | | | | PG |
|---|---|---|---|---|
| new | 7 Flute | Square | Variable Pitch | 148 |
| | 7 Flute | Square | Variable Pitch - Metric | 149 |
| new | 7 Flute | Corner Radius | Variable Pitch | 150 |
| | 7 Flute | Corner Radius | Variable Pitch - Metric | 152 |
| new | 7 Flute | Square | Variable Pitch - Reduced Neck | 154 |
| new | 7 Flute | Corner Radius | Variable Pitch - Reduced Neck | 155 |
| | 7 Flute | Square | Finisher | 157 |

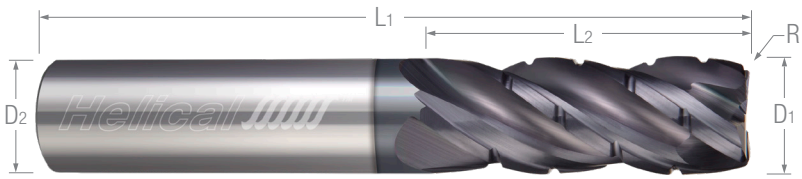
| MULTI-FLUTE | | | | PG |
|---|---|---|---|---|
| new | Multi-Flute | Corner Radius | Finisher | 159 |

# 4 FLUTE - CORNER RADIUS New Items!

## HSVR-C-4

### Chipbreaker Rougher - Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Eccentric relief for maximum edge strength
- Redesigned end geometry for optimal ramping, slotting, and plunging
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

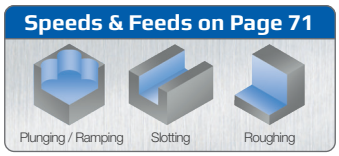



| Cutter Diameter* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 4 | **33017** | | HSVR-C-S-40125-R.010 | |
| | 1/8 | **.010** | 3/8 | 2 | 4 | **82499** | | HSVR-C-SR-40125-R.010 | |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 4 | **33032** | | HSVR-C-R-40125-R.010 | |
| | 1/8 | **.010** | 5/8 | 2-1/2 | 4 | **82500** | | HSVR-C-A-40125-R.010 | |
| | 1/8 | **.030** | 1/4 | 1-1/2 | 4 | **83453** | | HSVR-C-S-40125-R.030 | new |
| | 1/8 | **.030** | 1/2 | 2-1/2 | 4 | **83454** | | HSVR-C-R-40125-R.030 | new |
| 3/16 | 3/16 | **.010** | 5/16 | 2 | 4 | **33077** | | HSVR-C-S-40187-R.010 | |
| | 3/16 | **.010** | 7/16 | 2 | 4 | **82501** | | HSVR-C-SR-40187-R010 | |
| | 3/16 | **.010** | 5/8 | 2-1/2 | 4 | **33092** | | HSVR-C-R-40187-R.010 | |
| | 3/16 | **.010** | 1 | 2-1/2 | 4 | **82502** | | HSVR-C-M-40187-R.010 | |
| | 3/16 | **.030** | 5/16 | 2 | 4 | **83455** | | HSVR-C-S-40187-R.030 | new |
| | 3/16 | **.030** | 5/8 | 2-1/2 | 4 | **83456** | | HSVR-C-R-40187-R.030 | new |
| 1/4 | 1/4 | **.010** | 3/8 | 2 | 4 | **83457** | | HSVR-C-S-40250-R.010 | new |
| | 1/4 | **.010** | 1/2 | 2-1/2 | 4 | **83458** | | HSVR-C-SR-40250-R.010 | new |
| | 1/4 | **.010** | 3/4 | 2-1/2 | 4 | **83459** | | HSVR-C-R-40250-R.010 | new |
| | 1/4 | **.020** | 3/8 | 2 | 4 | **33137** | **33137W** | HSVR-C-S-40250-R.020 | |
| | 1/4 | **.020** | 1/2 | 2-1/2 | 4 | **33142** | **33142W** | HSVR-C-SR-40250-R.020 | |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 4 | **33152** | **33152W** | HSVR-C-R-40250-R.020 | |
| | 1/4 | **.020** | 1 | 3 | 4 | **33167** | | HSVR-C-M-40250-R.020 | |
| | 1/4 | **.020** | 1-1/4 | 3 | 4 | **82503** | | HSVR-C-L-40250-R.020 | |
| | 1/4 | **.030** | 3/8 | 2 | 4 | **83460** | | HSVR-C-S-40250-R.030 | new |
| | 1/4 | **.030** | 1/2 | 2-1/2 | 4 | **83461** | | HSVR-C-SR-40250-R.030 | new |
| | 1/4 | **.030** | 3/4 | 2-1/2 | 4 | **83462** | | HSVR-C-R-40250-R.030 | new |
| 5/16 | 5/16 | **.020** | 1/2 | 2 | 4 | **33227** | | HSVR-C-S-40312-R.020 | |
| | 5/16 | **.020** | 3/4 | 2-1/2 | 4 | **33242** | | HSVR-C-R-40312-R.020 | |
| | 5/16 | **.020** | 1 | 2-1/2 | 4 | **82504** | | HSVR-C-A-40312-R.020 | |
| | 5/16 | **.020** | 1-1/4 | 3 | 4 | **33257** | | HSVR-C-M-40312-R.020 | |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 71



# HSVR-C-4

New Items!

## 4 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch (cont.)



continued from previous page

| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| new | 3/8 | 3/8 | .010 | 1/2 | 2 | 4 | 83463 | | HSVR-C-S-40375-R.010 |
| new | | 3/8 | .010 | 7/8 | 3 | 4 | 83464 | | HSVR-C-SR-40375-R.010 |
| new | | 3/8 | .010 | 1 | 3 | 4 | 83465 | | HSVR-C-R-40375-R.010 |
| | | 3/8 | .020 | 1/2 | 2 | 4 | 33317 | 33317W | HSVR-C-S-40375-R.020 |
| | | 3/8 | .020 | 7/8 | 3 | 4 | 33332 | 33332W | HSVR-C-SR-40375-R.020 |
| | | 3/8 | .020 | 1 | 3 | 4 | 33337 | 33337W | HSVR-C-R-40375-R.020 |
| | | 3/8 | .020 | 1-1/4 | 3 | 4 | 33347 | 33347W | HSVR-C-M-40375-R.020 |
| | | 3/8 | .020 | 1-1/2 | 3 | 4 | 82505 | | HSVR-C-L-40375-R.020 |
| new | | 3/8 | .030 | 1/2 | 2 | 4 | 83466 | | HSVR-C-S-40375-R.030 |
| new | | 3/8 | .030 | 7/8 | 3 | 4 | 83467 | | HSVR-C-SR-40375-R.030 |
| new | | 3/8 | .030 | 1 | 3 | 4 | 83468 | | HSVR-C-R-40375-R.030 |
| | 7/16 | 7/16 | .020 | 5/8 | 2-3/4 | 4 | 33407 | | HSVR-C-S-40437-R.020 |
| | | 7/16 | .020 | 7/8 | 2-3/4 | 4 | 33422 | | HSVR-C-R-40437-R.020 |
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 4 | 83469 | | HSVR-C-S-40500-R.010 |
| new | | 1/2 | .010 | 1 | 3 | 4 | 83470 | | HSVR-C-SR-40500-R.010 |
| new | | 1/2 | .010 | 1-1/4 | 3 | 4 | 83471 | | HSVR-C-R-40500-R.010 |
| new | | 1/2 | .010 | 1-5/8 | 4 | 4 | 83472 | | HSVR-C-M-40500-R.010 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 4 | 33497 | 33497W | HSVR-C-S-40500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 4 | 33512 | 33512W | HSVR-C-SR-40500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 4 | 33527 | 33527W | HSVR-C-R-40500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 4 | 33542 | 33542W | HSVR-C-M-40500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 4 | 82506 | | HSVR-C-L-40500-R.030 |
| | | 1/2 | .030 | 2-1/2 | 4 | 4 | 82507 | | HSVR-C-LX-40500-R.030 |
| new | | 1/2 | .060 | 5/8 | 2-1/2 | 4 | 83473 | | HSVR-C-S-40500-R.060 |
| new | | 1/2 | .060 | 1 | 3 | 4 | 83474 | | HSVR-C-SR-40500-R.060 |
| new | | 1/2 | .060 | 1-1/4 | 3 | 4 | 83475 | | HSVR-C-R-40500-R.060 |
| new | | 1/2 | .060 | 1-5/8 | 4 | 4 | 83476 | | HSVR-C-M-40500-R.060 |
| | 5/8 | 5/8 | .030 | 3/4 | 3 | 4 | 33557 | 33557W | HSVR-C-S-40625-R.030 |
| | | 5/8 | .030 | 1-1/4 | 3-1/2 | 4 | 33572 | 33572W | HSVR-C-SR-40625-R.030 |
| | | 5/8 | .030 | 1-5/8 | 3-1/2 | 4 | 33587 | 33587W | HSVR-C-R-40625-R.030 |
| | | 5/8 | .030 | 2 | 4 | 4 | 33602 | 33602W | HSVR-C-M-40625-R.030 |
| | | 5/8 | .030 | 2-1/2 | 5 | 4 | 82508 | | HSVR-C-ML-40625-R.030 |
| | | 5/8 | .030 | 3-1/4 | 6 | 4 | 33617 | | HSVR-C-L-40625-R.030 |
| new | | 5/8 | .060 | 1-1/4 | 3-1/2 | 4 | 83477 | | HSVR-C-SR-40625-R.060 |
| new | | 5/8 | .060 | 1-5/8 | 3-1/2 | 4 | 83478 | | HSVR-C-R-40625-R.060 |
| new | | 5/8 | .060 | 2 | 4 | 4 | 83479 | | HSVR-C-M-40625-R.060 |
| | 3/4 | 3/4 | .030 | 7/8 | 3 | 4 | 33632 | 33632W | HSVR-C-S-40750-R.030 |
| | | 3/4 | .030 | 1-1/4 | 4 | 4 | 33647 | 33647W | HSVR-C-SR-40750-R.030 |
| | | 3/4 | .030 | 1-5/8 | 4 | 4 | 33662 | 33662W | HSVR-C-R-40750-R.030 |
| | | 3/4 | .030 | 2-1/4 | 5 | 4 | 33677 | 33677W | HSVR-C-M-40750-R.030 |
| | | 3/4 | .030 | 2-3/4 | 5 | 4 | 82509 | | HSVR-C-ML-40750-R.030 |
| | | 3/4 | .030 | 3-1/4 | 6 | 4 | 33692 | 33692W | HSVR-C-L-40750-R.030 |
| new | | 3/4 | .060 | 1-5/8 | 4 | 4 | 83480 | | HSVR-C-R-40750-R.060 |
| new | | 3/4 | .060 | 2-1/4 | 5 | 4 | 83481 | | HSVR-C-M-40750-R.060 |
| | 1 | 1 | .030 | 1-1/2 | 4 | 4 | 33707 | | HSVR-C-S-41000-R.030 |
| | | 1 | .030 | 2 | 4-1/2 | 4 | 33722 | | HSVR-C-R-41000-R.030 |
| | | 1 | .030 | 2-5/8 | 5 | 4 | 33737 | 33737W | HSVR-C-M-41000-R.030 |
| | | 1 | .030 | 3 | 6 | 4 | 33742 | 33742W | HSVR-C-ML-41000-R.030 |
| | | 1 | .030 | 4-1/4 | 7 | 4 | 33752 | | HSVR-C-L-41000-R.030 |

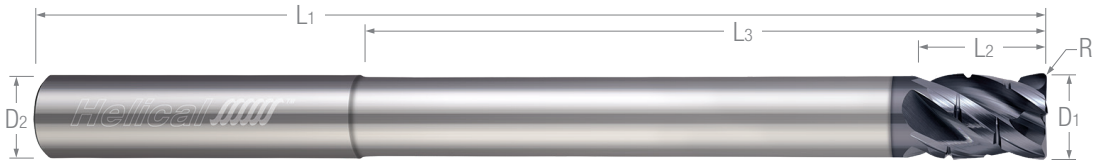
* .0005 max TIR

# 4 FLUTE - CORNER RADIUS New!

**HSVR-C-RN-4**

## Chipbreaker Rougher - Variable Pitch - Reduced Neck

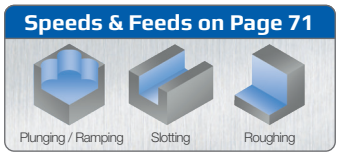
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Eccentric relief for maximum edge strength
- Redesigned end geometry for optimal ramping, slotting, and plunging
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 3/8 | 4 | 3/4 | .237 | 4 | **82876** | HSVR-C-RN-S-40250-R.020 | new |
| | 1/4 | **.020** | 3/8 | 4 | 1-1/8 | .237 | 4 | **82877** | HSVR-C-RN-R-40250-R.020 | new |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/8 | .237 | 4 | **82878** | HSVR-C-RN-M-40250-R.020 | new |
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 4 | **82879** | HSVR-C-RN-S-40375-R.020 | new |
| | 3/8 | **.020** | 1/2 | 4 | 2-1/8 | .356 | 4 | **82880** | HSVR-C-RN-R-40375-R.020 | new |
| | 3/8 | **.020** | 1/2 | 6 | 3-1/8 | .356 | 4 | **82881** | HSVR-C-RN-M-40375-R.020 | new |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-1/2 | .475 | 4 | **82882** | HSVR-C-RN-S-40500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 4 | 2-1/4 | .475 | 4 | **82883** | HSVR-C-RN-R-40500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 4 | **82884** | HSVR-C-RN-M-40500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/8 | .475 | 4 | **82885** | HSVR-C-RN-L-40500-R.030 | new |
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 4 | **82886** | HSVR-C-RN-S-40750-R.030 | new |
| | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 4 | **82887** | HSVR-C-RN-R-40750-R.030 | new |
| | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 4 | **82888** | HSVR-C-RN-M-40750-R.030 | new |

* .0005 max TIR

Speeds & Feeds on Page 71



# SPEEDS & FEEDS

## HSVR-C-4

4 Flute - Chipbreaker Rougher - Variable Pitch



### HSVR-C-4 / HSVR-C-RN-4

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0008 | .0013 | .0012 | .0019 | .0015 | .0025 | .0023 | .0037 | .0030 | .0048 | .0042 | .0069 | .0054 | .0088 |
| | | 75 - 98 HRB | 445 | .0006 | .0009 | .0008 | .0014 | .0011 | .0018 | .0017 | .0027 | .0022 | .0035 | .0031 | .0051 | .0040 | .0065 |
| | | 21 - 36 HRC | 400 | .0004 | .0006 | .0005 | .0009 | .0007 | .0012 | .0011 | .0017 | .0014 | .0023 | .0020 | .0033 | .0026 | .0042 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0005 | .0008 | .0007 | .0012 | .0010 | .0016 | .0014 | .0023 | .0019 | .0031 | .0027 | .0044 | .0034 | .0056 |
| | | 21 - 36 HRC | 340 | .0004 | .0006 | .0005 | .0009 | .0007 | .0012 | .0011 | .0017 | .0014 | .0023 | .0020 | .0033 | .0025 | .0042 |
| | | 36 - 50 HRC | 260 | .0003 | .0005 | .0005 | .0008 | .0006 | .0010 | .0009 | .0015 | .0012 | .0020 | .0018 | .0029 | .0022 | .0036 |
| | | > 50 HRC | 155 | .0003 | .0004 | .0004 | .0006 | .0005 | .0008 | .0007 | .0012 | .0010 | .0016 | .0014 | .0023 | .0017 | .0029 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0005 | .0008 | .0007 | .0012 | .0010 | .0016 | .0014 | .0023 | .0019 | .0031 | .0027 | .0044 | .0034 | .0056 |
| | | 21 - 36 HRC | 250 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0011 | .0019 | .0015 | .0024 | .0021 | .0035 | .0027 | .0045 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0005 | .0007 | .0006 | .0010 | .0009 | .0015 | .0012 | .0019 | .0017 | .0027 | .0021 | .0035 |
| | | > 50 HRC | 85 | .0003 | .0004 | .0004 | .0006 | .0005 | .0008 | .0007 | .0012 | .0010 | .0016 | .0014 | .0022 | .0017 | .0028 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0006 | .0011 | .0010 | .0015 | .0013 | .0021 | .0019 | .0031 | .0025 | .0040 | .0035 | .0058 | .0045 | .0073 |
| | | 75 - 98 HRB | 255 | .0005 | .0007 | .0007 | .0011 | .0009 | .0014 | .0013 | .0021 | .0017 | .0028 | .0024 | .0040 | .0031 | .0050 |
| | | 21 - 36 HRC | 175 | .0004 | .0007 | .0006 | .0010 | .0008 | .0013 | .0012 | .0019 | .0015 | .0025 | .0022 | .0035 | .0028 | .0045 |
| | | 36 - 50 HRC | 150 | .0004 | .0006 | .0005 | .0009 | .0007 | .0011 | .0010 | .0017 | .0014 | .0022 | .0019 | .0032 | .0025 | .0040 |
| | | > 50 HRC | 55 | .0002 | .0004 | .0003 | .0005 | .0004 | .0007 | .0006 | .0010 | .0008 | .0014 | .0012 | .0019 | .0015 | .0025 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0005 | .0008 | .0007 | .0011 | .0009 | .0015 | .0014 | .0023 | .0018 | .0030 | .0026 | .0043 | .0033 | .0054 |
| | | 21 - 36 HRC | 225 | .0004 | .0007 | .0006 | .0010 | .0008 | .0014 | .0013 | .0021 | .0016 | .0027 | .0024 | .0039 | .0030 | .0049 |
| | | 36 - 50 HRC | 180 | .0003 | .0006 | .0005 | .0008 | .0007 | .0011 | .0010 | .0016 | .0013 | .0022 | .0019 | .0031 | .0024 | .0039 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0005 | .0008 | .0007 | .0012 | .0010 | .0016 | .0014 | .0024 | .0019 | .0031 | .0027 | .0044 | .0034 | .0056 |
| | | 21 - 36 HRC | 280 | .0004 | .0007 | .0006 | .0010 | .0008 | .0014 | .0012 | .0020 | .0016 | .0027 | .0023 | .0038 | .0030 | .0049 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0004 | .0006 | .0005 | .0009 | .0007 | .0012 | .0011 | .0017 | .0014 | .0023 | .0020 | .0032 | .0025 | .0041 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0005 | .0008 | .0006 | .0010 | .0009 | .0015 | .0012 | .0020 | .0017 | .0028 | .0022 | .0036 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0008 | .0013 | .0012 | .0019 | .0016 | .0026 | .0023 | .0038 | .0030 | .0050 | .0044 | .0071 | .0055 | .0091 |
| | | 21 - 36 HRC | 370 | .0004 | .0007 | .0006 | .0010 | .0009 | .0014 | .0013 | .0021 | .0017 | .0027 | .0024 | .0039 | .0030 | .0049 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0024 | .0019 | .0032 | .0028 | .0045 | .0035 | .0058 |
| | | 21 - 36 HRC | 335 | .0004 | .0007 | .0007 | .0010 | .0009 | .0014 | .0013 | .0021 | .0017 | .0027 | .0024 | .0039 | .0030 | .0049 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0005 | .0009 | .0008 | .0013 | .0010 | .0017 | .0015 | .0025 | .0020 | .0033 | .0029 | .0047 | .0037 | .0060 |
| | | 21 - 36 HRC | 260 | .0004 | .0006 | .0005 | .0008 | .0007 | .0011 | .0010 | .0017 | .0013 | .0022 | .0019 | .0031 | .0024 | .0040 |
| | | 36 - 50 HRC | 135 | .0002 | .0004 | .0003 | .0005 | .0004 | .0007 | .0007 | .0011 | .0009 | .0014 | .0012 | .0020 | .0015 | .0025 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0007 | .0011 | .0010 | .0016 | .0013 | .0022 | .0020 | .0032 | .0026 | .0042 | .0037 | .0060 | .0047 | .0077 |
| | | 75 - 98 HRB | 250 | .0006 | .0009 | .0008 | .0014 | .0011 | .0018 | .0017 | .0027 | .0022 | .0035 | .0031 | .0051 | .0039 | .0064 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0003 | .0006 | .0005 | .0008 | .0007 | .0011 | .0010 | .0016 | .0013 | .0022 | .0019 | .0031 | .0024 | .0039 |
| | | 21 - 36 HRC | 75 | .0003 | .0005 | .0005 | .0008 | .0006 | .0011 | .0010 | .0016 | .0013 | .0021 | .0018 | .0030 | .0023 | .0037 |
| | | 36 - 50 HRC | 70 | .0003 | .0005 | .0004 | .0007 | .0006 | .0009 | .0008 | .0014 | .0011 | .0018 | .0015 | .0025 | .0020 | .0032 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0009 | .0015 | .0014 | .0022 | .0018 | .0030 | .0027 | .0044 | .0036 | .0058 | .0051 | .0083 | .0065 | .0106 |
| | | 75 - 98 HRB | 275 | .0008 | .0013 | .0012 | .0019 | .0015 | .0025 | .0023 | .0037 | .0030 | .0049 | .0043 | .0070 | .0054 | .0089 |
| | | 21 - 36 HRC | 250 | .0006 | .0010 | .0009 | .0014 | .0012 | .0019 | .0017 | .0028 | .0022 | .0037 | .0032 | .0052 | .0041 | .0067 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0005 | .0008 | .0007 | .0011 | .0009 | .0015 | .0014 | .0022 | .0018 | .0029 | .0025 | .0041 | .0032 | .0053 |
| | | 36 - 50 HRC | 160 | .0004 | .0007 | .0006 | .0010 | .0008 | .0014 | .0012 | .0020 | .0016 | .0026 | .0023 | .0038 | .0029 | .0048 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0011 | .0019 | .0015 | .0024 | .0021 | .0035 | .0027 | .0045 |
| | | 21 - 36 HRC | 170 | .0004 | .0006 | .0006 | .0009 | .0008 | .0012 | .0011 | .0018 | .0014 | .0024 | .0021 | .0034 | .0026 | .0043 |
| | | 36 - 50 HRC | 65 | .0003 | .0004 | .0004 | .0006 | .0005 | .0008 | .0007 | .0012 | .0010 | .0016 | .0014 | .0023 | .0018 | .0029 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 75%-125% Diameter | 100% Diameter |
| | ≥ 35 HRC | 60%-75% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 30%-40% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 20%-40% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

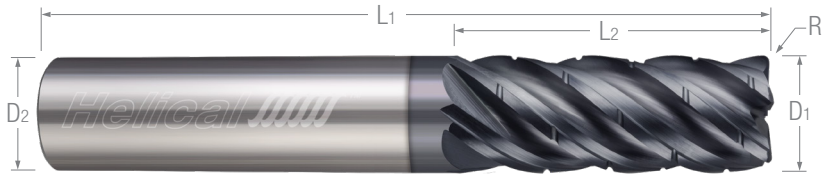
# 5 FLUTE - CORNER RADIUS New Items!

## HEV-C-5

### Chipbreaker Rougher - Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 5 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

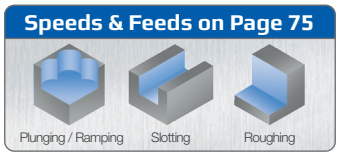
For increased wear resistance, see page 162 for T*plus* coating




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 5 | 59391 | HEV-C-S-50125-R.010 | |
| | 1/8 | .010 | 3/8 | 2 | 5 | 82213 | HEV-C-SR-50125-R.010 | |
| | 1/8 | .010 | 1/2 | 2-1/2 | 5 | 59392 | HEV-C-R-50125-R.010 | |
| | 1/8 | .010 | 5/8 | 2-1/2 | 5 | 82214 | HEV-C-A-50125-R.010 | |
| | 1/8 | .010 | 3/4 | 2-1/2 | 5 | 83068 | HEV-C-M-50125-R.010 | new |
| 3/16 | 3/16 | .010 | 5/16 | 2 | 5 | 59393 | HEV-C-S-50187-R.010 | |
| | 3/16 | .010 | 7/16 | 2 | 5 | 81956 | HEV-C-SR-50187-R.010 | |
| | 3/16 | .010 | 9/16 | 2-1/2 | 5 | 59394 | HEV-C-R-50187-R.010 | |
| | 3/16 | .010 | 3/4 | 2-1/2 | 5 | 81957 | HEV-C-M-50187-R.010 | |
| | 3/16 | .010 | 1 | 2-1/2 | 5 | 83069 | HEV-C-ML-50187-R.010 | new |
| | 3/16 | .030 | 5/16 | 2 | 5 | 83070 | HEV-C-S-50187-R.030 | new |
| | 3/16 | .030 | 7/16 | 2 | 5 | 83071 | HEV-C-SR-50187-R.030 | new |
| | 3/16 | .030 | 9/16 | 2-1/2 | 5 | 83072 | HEV-C-R-50187-R.030 | new |
| | 3/16 | .030 | 3/4 | 2-1/2 | 5 | 83073 | HEV-C-M-50187-R.030 | new |
| 1/4 | 1/4 | .020 | 3/8 | 2 | 5 | 59395 | HEV-C-S-50250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 5 | 59396 | HEV-C-SR-50250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 5 | 59397 | HEV-C-R-50250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 5 | 59398 | HEV-C-M-50250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 5 | 82215 | HEV-C-L-50250-R.020 | |
| | 1/4 | .020 | 1-1/2 | 3 | 5 | 83074 | HEV-C-LX-50250-R.020 | new |
| | 1/4 | .030 | 3/8 | 2 | 5 | 83075 | HEV-C-S-50250-R.030 | new |
| | 1/4 | .030 | 1/2 | 2-1/2 | 5 | 83076 | HEV-C-SR-50250-R.030 | new |
| | 1/4 | .030 | 3/4 | 2-1/2 | 5 | 83077 | HEV-C-R-50250-R.030 | new |
| | 1/4 | .030 | 1 | 3 | 5 | 83078 | HEV-C-M-50250-R.030 | new |
| 5/16 | 5/16 | .020 | 7/16 | 2 | 5 | 59399 | HEV-C-S-50312-R.020 | |
| | 5/16 | .020 | 13/16 | 2-1/2 | 5 | 59400 | HEV-C-R-50312-R.020 | |
| | 5/16 | .020 | 1-1/4 | 3 | 5 | 82216 | HEV-C-L-50312-R.020 | |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 5 | 59401 | HEV-C-S-50375-R.020 | |
| | 3/8 | .020 | 3/4 | 2-1/2 | 5 | 81958 | HEV-C-SR-50375-R.020 | |
| | 3/8 | .020 | 1 | 3 | 5 | 59402 | HEV-C-R-50375-R.020 | |
| | 3/8 | .020 | 1-1/4 | 3 | 5 | 59403 | HEV-C-M-50375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 5 | 82217 | HEV-C-L-50375-R.020 | |
| | 3/8 | .020 | 2 | 4 | 5 | 83079 | HEV-C-LX-50375-R.020 | new |

* .0005 max TIR

Speeds & Feeds on Page 75

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# HEV-C-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch (cont.)



continued from previous page

| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 3/8 | 3/8 | .030 | 1/2 | 2 | 5 | 83080 | HEV-C-S-50375-R.030 |
| new | | 3/8 | .030 | 3/4 | 2-1/2 | 5 | 83081 | HEV-C-SR-50375-R.030 |
| new | | 3/8 | .030 | 1 | 3 | 5 | 83082 | HEV-C-R-50375-R.030 |
| new | | 3/8 | .030 | 1-1/4 | 3 | 5 | 83083 | HEV-C-M-50375-R.030 |
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 5 | 83084 | HEV-C-S-50500-R.010 |
| new | | 1/2 | .010 | 1 | 3 | 5 | 83085 | HEV-C-SR-50500-R.010 |
| new | | 1/2 | .010 | 1-1/4 | 3 | 5 | 83086 | HEV-C-R-50500-R.010 |
| new | | 1/2 | .010 | 1-5/8 | 4 | 5 | 83087 | HEV-C-M-50500-R.010 |
| new | | 1/2 | .010 | 2 | 4 | 5 | 83088 | HEV-C-L-50500-R.010 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 5 | 59404 | HEV-C-S-50500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 5 | 59405 | HEV-C-SR-50500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 5 | 59406 | HEV-C-R-50500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 5 | 59407 | HEV-C-M-50500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 5 | 59408 | HEV-C-L-50500-R.030 |
| | | 1/2 | .030 | 2-1/2 | 5 | 5 | 81959 | HEV-C-LX-50500-R.030 |
| | | 1/2 | .030 | 3-1/8 | 6 | 5 | 82218 | HEV-C-X-50500-R.030 |
| | | 1/2 | .030 | 3-5/8 | 6 | 5 | 82219 | HEV-C-Y-50500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 5 | 81960 | HEV-C-S-50500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 5 | 81961 | HEV-C-SR-50500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 5 | 81962 | HEV-C-R-50500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 5 | 81963 | HEV-C-M-50500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 5 | 81964 | HEV-C-L-50500-R.060 |
| | | 1/2 | .060 | 2-1/2 | 5 | 5 | 81965 | HEV-C-LX-50500-R.060 |
| new | | 1/2 | .060 | 3-1/8 | 6 | 5 | 83089 | HEV-C-X-50500-R.060 |
| | 5/8 | 5/8 | .030 | 3/4 | 3 | 5 | 59409 | HEV-C-S-50625-R.030 |
| | | 5/8 | .030 | 1-1/4 | 3-1/2 | 5 | 59410 | HEV-C-SR-50625-R.030 |
| | | 5/8 | .030 | 1-5/8 | 3-1/2 | 5 | 59411 | HEV-C-R-50625-R.030 |
| | | 5/8 | .030 | 2-1/8 | 4 | 5 | 59412 | HEV-C-M-50625-R.030 |
| | | 5/8 | .030 | 2-1/2 | 5 | 5 | 82220 | HEV-C-L-50625-R.030 |
| | | 5/8 | .030 | 3-1/4 | 6 | 5 | 82221 | HEV-C-LX-50625-R.030 |
| | | 5/8 | .060 | 3/4 | 3 | 5 | 81966 | HEV-C-S-50625-R.060 |
| | | 5/8 | .060 | 1-1/4 | 3-1/2 | 5 | 81967 | HEV-C-SR-50625-R.060 |
| | | 5/8 | .060 | 1-5/8 | 3-1/2 | 5 | 81968 | HEV-C-R-50625-R.060 |
| | | 5/8 | .060 | 2-1/8 | 4 | 5 | 81969 | HEV-C-M-50625-R.060 |
| | 3/4 | 3/4 | .030 | 1 | 3 | 5 | 59413 | HEV-C-S-50750-R.030 |
| | | 3/4 | .030 | 1-5/8 | 4 | 5 | 59414 | HEV-C-R-50750-R.030 |
| | | 3/4 | .030 | 2-1/4 | 5 | 5 | 59415 | HEV-C-M-50750-R.030 |
| | | 3/4 | .030 | 2-3/4 | 5 | 5 | 59416 | HEV-C-L-50750-R.030 |
| | | 3/4 | .030 | 3-1/4 | 6 | 5 | 59417 | HEV-C-LX-50750-R.030 |
| | | 3/4 | .030 | 4 | 6-1/2 | 5 | 82222 | HEV-C-X-50750-R.030 |
| | | 3/4 | .060 | 1 | 3 | 5 | 81970 | HEV-C-S-50750-R.060 |
| | | 3/4 | .060 | 1-5/8 | 4 | 5 | 81971 | HEV-C-R-50750-R.060 |
| | | 3/4 | .060 | 2-1/4 | 5 | 5 | 81972 | HEV-C-M-50750-R.060 |
| | | 3/4 | .060 | 2-3/4 | 5 | 5 | 81973 | HEV-C-L-50750-R.060 |
| | | 3/4 | .060 | 3-1/4 | 6 | 5 | 81974 | HEV-C-LX-50750-R.060 |
| | 1 | 1 | .030 | 1-1/4 | 4 | 5 | 59418 | HEV-C-S-51000-R.030 |
| | | 1 | .030 | 2 | 4-1/2 | 5 | 59419 | HEV-C-R-51000-R.030 |

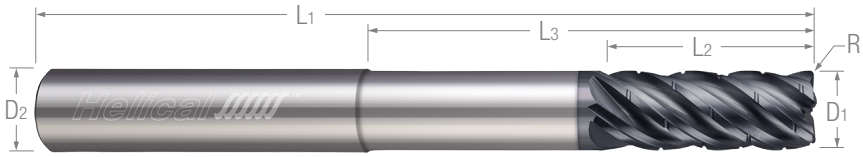
* .0005 max TIR

# 5 FLUTE - CORNER RADIUS New!

## HEV-C-RN-5

### Chipbreaker Rougher - Variable Pitch- Reduced Neck

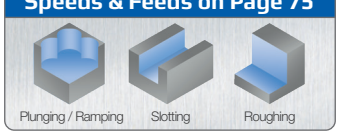
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in deep pocket High Efficiency Milling (HEM) applications
- 5 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 3/8 | 4 | 3/4 | .237 | 5 | 82889 | HEV-C-RN-S-50250-R.020 | new |
| | 1/4 | **.020** | 3/8 | 4 | 1-1/8 | .237 | 5 | 82890 | HEV-C-RN-R-50250-R.020 | new |
| | 1/4 | **.020** | 3/4 | 4 | 1-1/8 | .237 | 5 | 82891 | HEV-C-RNR-R-50250-R.020 | new |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/8 | .237 | 5 | 82892 | HEV-C-RN-M-50250-R.020 | new |
| | 1/4 | **.020** | 3/4 | 4 | 2-1/8 | .237 | 5 | 82893 | HEV-C-RNR-M-50250-R.020 | new |
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 5 | 82894 | HEV-C-RN-S-50375-R.020 | new |
| | 3/8 | **.020** | 1/2 | 4 | 2-1/8 | .356 | 5 | 82895 | HEV-C-RN-R-50375-R.020 | new |
| | 3/8 | **.020** | 1 | 4 | 2-1/8 | .356 | 5 | 82896 | HEV-C-RNR-R-50375-R.020 | new |
| | 3/8 | **.020** | 1/2 | 6 | 3-1/8 | .356 | 5 | 82897 | HEV-C-RN-M-50375-R.020 | new |
| | 3/8 | **.020** | 1 | 6 | 3-1/8 | .356 | 5 | 82898 | HEV-C-RNR-M-50375-R.020 | new |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-1/2 | .475 | 5 | 82899 | HEV-C-RN-S-50500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 4 | 2-1/4 | .475 | 5 | 82900 | HEV-C-RN-R-50500-R.030 | new |
| | 1/2 | **.030** | 1-1/4 | 4 | 2-1/4 | .475 | 5 | 82901 | HEV-C-RNR-R-50500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 5 | 82902 | HEV-C-RN-M-50500-R.030 | new |
| | 1/2 | **.030** | 1-1/4 | 6 | 3-3/8 | .475 | 5 | 82903 | HEV-C-RNR-M-50500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/8 | .475 | 5 | 82904 | HEV-C-RN-L-50500-R.030 | new |
| | 1/2 | **.030** | 1-1/4 | 6 | 4-1/8 | .475 | 5 | 82905 | HEV-C-RNR-L-50500-R.030 | new |
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 5 | 82906 | HEV-C-RN-S-50750-R.030 | new |
| | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 5 | 82907 | HEV-C-RN-R-50750-R.030 | new |
| | 3/4 | **.030** | 1-5/8 | 6 | 2-1/2 | .712 | 5 | 82908 | HEV-C-RNR-R-50750-R.030 | new |
| | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 5 | 82909 | HEV-C-RN-M-50750-R.030 | new |
| | 3/4 | **.030** | 1-5/8 | 6 | 3-3/8 | .712 | 5 | 82910 | HEV-C-RNR-M-50750-R.030 | new |

* .0005 max TIR

Speeds & Feeds on Page 75



# HEV-C-5

## SPEEDS & FEEDS

5 Flute - Chipbreaker Rougher - Variable Pitch



## HEV-C-5 / HEV-C-RN-5

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0009 | .0015 | .0014 | .0021 | .0018 | .0029 | .0027 | .0043 | .0035 | .0056 | .0051 | .0080 | .0065 | .0102 |
| | | 75 - 98 HRB | 445 | .0007 | .0011 | .0010 | .0015 | .0013 | .0021 | .0020 | .0031 | .0026 | .0041 | .0037 | .0059 | .0047 | .0075 |
| | | 21 - 36 HRC | 400 | .0004 | .0007 | .0007 | .0010 | .0009 | .0014 | .0013 | .0020 | .0017 | .0026 | .0024 | .0038 | .0031 | .0048 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0006 | .0009 | .0009 | .0013 | .0012 | .0018 | .0017 | .0027 | .0022 | .0035 | .0032 | .0051 | .0041 | .0065 |
| | | 21 - 36 HRC | 340 | .0004 | .0007 | .0007 | .0010 | .0009 | .0013 | .0013 | .0020 | .0017 | .0026 | .0024 | .0038 | .0030 | .0048 |
| | | 36 - 50 HRC | 260 | .0004 | .0006 | .0006 | .0009 | .0008 | .0012 | .0011 | .0017 | .0015 | .0023 | .0021 | .0033 | .0027 | .0042 |
| | | > 50 HRC | 155 | .0003 | .0005 | .0005 | .0007 | .0006 | .0009 | .0009 | .0014 | .0011 | .0018 | .0017 | .0026 | .0021 | .0033 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0006 | .0009 | .0009 | .0013 | .0012 | .0018 | .0017 | .0027 | .0022 | .0035 | .0032 | .0051 | .0041 | .0065 |
| | | 21 - 36 HRC | 250 | .0005 | .0007 | .0007 | .0011 | .0009 | .0015 | .0014 | .0022 | .0018 | .0028 | .0026 | .0040 | .0033 | .0051 |
| | | 36 - 50 HRC | 145 | .0004 | .0006 | .0005 | .0008 | .0007 | .0011 | .0011 | .0017 | .0014 | .0022 | .0020 | .0031 | .0026 | .0040 |
| | | > 50 HRC | 85 | .0003 | .0005 | .0005 | .0007 | .0006 | .0009 | .0009 | .0014 | .0011 | .0018 | .0016 | .0026 | .0021 | .0033 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0008 | .0012 | .0011 | .0018 | .0015 | .0024 | .0023 | .0035 | .0029 | .0046 | .0042 | .0066 | .0054 | .0085 |
| | | 75 - 98 HRB | 255 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0024 | .0020 | .0032 | .0029 | .0045 | .0037 | .0058 |
| | | 21 - 36 HRC | 175 | .0005 | .0008 | .0007 | .0011 | .0009 | .0015 | .0014 | .0022 | .0018 | .0029 | .0026 | .0041 | .0033 | .0052 |
| | | 36 - 50 HRC | 150 | .0004 | .0007 | .0006 | .0010 | .0008 | .0013 | .0012 | .0019 | .0016 | .0026 | .0023 | .0037 | .0030 | .0046 |
| | | > 50 HRC | 55 | .0003 | .0004 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0014 | .0022 | .0018 | .0029 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0006 | .0009 | .0009 | .0013 | .0011 | .0018 | .0017 | .0026 | .0022 | .0034 | .0031 | .0049 | .0040 | .0063 |
| | | 21 - 36 HRC | 225 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0024 | .0020 | .0031 | .0028 | .0044 | .0036 | .0057 |
| | | 36 - 50 HRC | 180 | .0004 | .0007 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0029 | .0045 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0006 | .0009 | .0009 | .0013 | .0012 | .0018 | .0017 | .0027 | .0023 | .0035 | .0032 | .0051 | .0041 | .0065 |
| | | 21 - 36 HRC | 280 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0024 | .0020 | .0031 | .0028 | .0044 | .0036 | .0056 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0004 | .0007 | .0006 | .0010 | .0009 | .0013 | .0013 | .0020 | .0017 | .0026 | .0024 | .0037 | .0030 | .0048 |
| | | 36 - 50 HRC | 145 | .0004 | .0006 | .0006 | .0009 | .0007 | .0012 | .0011 | .0017 | .0014 | .0023 | .0021 | .0032 | .0026 | .0041 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0010 | .0015 | .0014 | .0022 | .0019 | .0029 | .0028 | .0044 | .0036 | .0057 | .0052 | .0082 | .0066 | .0104 |
| | | 21 - 36 HRC | 370 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0024 | .0020 | .0031 | .0028 | .0045 | .0036 | .0057 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0006 | .0010 | .0009 | .0014 | .0012 | .0019 | .0018 | .0028 | .0023 | .0036 | .0033 | .0052 | .0042 | .0066 |
| | | 21 - 36 HRC | 335 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0024 | .0020 | .0031 | .0029 | .0045 | .0036 | .0057 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0006 | .0010 | .0009 | .0014 | .0012 | .0020 | .0018 | .0029 | .0024 | .0038 | .0034 | .0054 | .0044 | .0069 |
| | | 21 - 36 HRC | 260 | .0004 | .0007 | .0006 | .0010 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0029 | .0046 |
| | | 36 - 50 HRC | 135 | .0003 | .0004 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0014 | .0023 | .0018 | .0029 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0008 | .0013 | .0012 | .0018 | .0016 | .0025 | .0024 | .0037 | .0031 | .0049 | .0044 | .0070 | .0056 | .0089 |
| | | 75 - 98 HRB | 250 | .0007 | .0011 | .0010 | .0015 | .0013 | .0021 | .0020 | .0031 | .0026 | .0041 | .0037 | .0058 | .0047 | .0074 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0035 | .0029 | .0045 |
| | | 21 - 36 HRC | 75 | .0004 | .0006 | .0006 | .0009 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0034 | .0028 | .0043 |
| | | 36 - 50 HRC | 70 | .0003 | .0005 | .0005 | .0008 | .0007 | .0010 | .0010 | .0015 | .0013 | .0020 | .0019 | .0029 | .0023 | .0037 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0011 | .0017 | .0017 | .0025 | .0022 | .0035 | .0033 | .0051 | .0043 | .0067 | .0061 | .0096 | .0078 | .0122 |
| | | 75 - 98 HRB | 275 | .0009 | .0015 | .0014 | .0021 | .0018 | .0029 | .0027 | .0043 | .0036 | .0056 | .0051 | .0081 | .0065 | .0103 |
| | | 21 - 36 HRC | 250 | .0007 | .0011 | .0010 | .0016 | .0014 | .0022 | .0021 | .0032 | .0027 | .0042 | .0038 | .0060 | .0049 | .0077 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0006 | .0009 | .0008 | .0013 | .0011 | .0017 | .0016 | .0025 | .0021 | .0033 | .0030 | .0048 | .0039 | .0061 |
| | | 36 - 50 HRC | 160 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0023 | .0019 | .0030 | .0028 | .0043 | .0035 | .0055 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0005 | .0007 | .0007 | .0011 | .0009 | .0015 | .0014 | .0021 | .0018 | .0028 | .0026 | .0040 | .0032 | .0051 |
| | | 21 - 36 HRC | 170 | .0005 | .0007 | .0007 | .0010 | .0009 | .0014 | .0013 | .0021 | .0017 | .0027 | .0025 | .0039 | .0031 | .0050 |
| | | 36 - 50 HRC | 65 | .0003 | .0005 | .0005 | .0007 | .0006 | .0010 | .0009 | .0014 | .0012 | .0018 | .0017 | .0026 | .0021 | .0034 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 30%-75% Diameter | 100% Diameter |
| | ≥ 35 HRC | 25%-50% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 10%-30% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-30% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

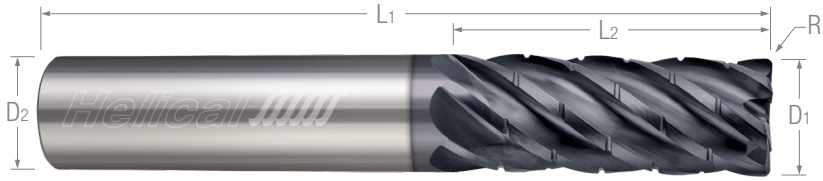
# 6 FLUTE - CORNER RADIUS New Items!

## HEV-C-6

### Chipbreaker Rougher - Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 6 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

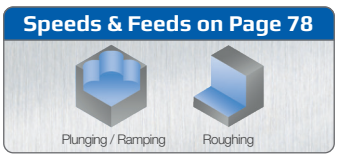
For increased wear resistance, see page 163 for T*plus* coating




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | A*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 3/8 | 2 | 6 | 83125 | HEV-C-S-60250-R.010 | new |
| | 1/4 | .010 | 1/2 | 2-1/2 | 6 | 83126 | HEV-C-SR-60250-R.010 | new |
| | 1/4 | .010 | 3/4 | 2-1/2 | 6 | 83127 | HEV-C-R-60250-R.010 | new |
| | 1/4 | .010 | 1 | 3 | 6 | 83128 | HEV-C-M-60250-R.010 | new |
| | 1/4 | .020 | 3/8 | 2 | 6 | 82223 | HEV-C-S-60250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 6 | 82224 | HEV-C-SR-60250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 6 | 82225 | HEV-C-R-60250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 6 | 82226 | HEV-C-M-60250-R.020 | |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 6 | 83129 | HEV-C-S-60375-R.010 | new |
| | 3/8 | .010 | 3/4 | 2-1/2 | 6 | 83130 | HEV-C-SR-60375-R.010 | new |
| | 3/8 | .010 | 1 | 3 | 6 | 83131 | HEV-C-R-60375-R.010 | new |
| | 3/8 | .010 | 1-1/4 | 3 | 6 | 83132 | HEV-C-M-60375-R.010 | new |
| | 3/8 | .030 | 1/2 | 2 | 6 | 82227 | HEV-C-S-60375-R.030 | |
| | 3/8 | .030 | 3/4 | 2-1/2 | 6 | 82228 | HEV-C-SR-60375-R.030 | |
| | 3/8 | .030 | 1 | 3 | 6 | 82229 | HEV-C-R-60375-R.030 | |
| | 3/8 | .030 | 1-1/4 | 3 | 6 | 82230 | HEV-C-M-60375-R.030 | |
| 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 6 | 83133 | HEV-C-S-60500-R.010 | new |
| | 1/2 | .010 | 1 | 3 | 6 | 83134 | HEV-C-SR-60500-R.010 | new |
| | 1/2 | .010 | 1-1/4 | 3 | 6 | 83135 | HEV-C-R-60500-R.010 | new |
| | 1/2 | .010 | 1-5/8 | 4 | 6 | 83136 | HEV-C-M-60500-R.010 | new |
| | 1/2 | .010 | 2 | 4 | 6 | 83137 | HEV-C-L-60500-R.010 | new |
| | 1/2 | .010 | 2-1/2 | 5 | 6 | 83138 | HEV-C-LX-60500-R.010 | new |
| | 1/2 | .030 | 5/8 | 2-1/2 | 6 | 82231 | HEV-C-S-60500-R.030 | |
| | 1/2 | .030 | 1 | 3 | 6 | 82232 | HEV-C-SR-60500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 6 | 82233 | HEV-C-R-60500-R.030 | |
| | 1/2 | .030 | 1-5/8 | 4 | 6 | 82234 | HEV-C-M-60500-R.030 | |
| | 1/2 | .030 | 2 | 4 | 6 | 82235 | HEV-C-L-60500-R.030 | |
| | 1/2 | .030 | 2-1/2 | 5 | 6 | 82236 | HEV-C-LX-60500-R.030 | |
| | 1/2 | .060 | 5/8 | 2-1/2 | 6 | 82237 | HEV-C-S-60500-R.060 | |
| | 1/2 | .060 | 1 | 3 | 6 | 82238 | HEV-C-SR-60500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 3 | 6 | 82239 | HEV-C-R-60500-R.060 | |
| | 1/2 | .060 | 1-5/8 | 4 | 6 | 82240 | HEV-C-M-60500-R.060 | |
| | 1/2 | .060 | 2 | 4 | 6 | 82241 | HEV-C-L-60500-R.060 | |
| | 1/2 | .060 | 2-1/2 | 5 | 6 | 82242 | HEV-C-LX-60500-R.060 | |

* .0005 max TIR

Speeds & Feeds on Page 78

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# HEV-C-6

New Items!

## 6 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch (cont.)



continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 5/8 | 5/8 | **.030** | 1-1/4 | 3-1/2 | 6 | **83139** | HEV-C-SR-60625-R.030 |
| new | | 5/8 | **.030** | 1-5/8 | 3-1/2 | 6 | **83140** | HEV-C-R-60625-R.030 |
| new | | 5/8 | **.030** | 2 | 4 | 6 | **83141** | HEV-C-M-60625-R.030 |
| | | 5/8 | **.060** | 1-1/4 | 3-1/2 | 6 | **82243** | HEV-C-SR-60625-R.060 |
| | | 5/8 | **.060** | 1-5/8 | 3-1/2 | 6 | **82244** | HEV-C-R-60625-R.060 |
| | | 5/8 | **.060** | 2 | 4 | 6 | **82245** | HEV-C-M-60625-R.060 |
| new | 3/4 | 3/4 | **.030** | 1-5/8 | 4 | 6 | **83142** | HEV-C-R-60750-R.030 |
| new | | 3/4 | **.030** | 2-1/4 | 5 | 6 | **83143** | HEV-C-M-60750-R.030 |
| new | | 3/4 | **.030** | 2-3/4 | 5 | 6 | **83144** | HEV-C-L-60750-R.030 |
| | | 3/4 | **.060** | 1-5/8 | 4 | 6 | **82246** | HEV-C-R-60750-R.060 |
| | | 3/4 | **.060** | 2-1/4 | 5 | 6 | **82247** | HEV-C-M-60750-R.060 |
| | | 3/4 | **.060** | 2-3/4 | 5 | 6 | **82248** | HEV-C-L-60750-R.060 |

* .0005 max TIR

# SPEEDS & FEEDS

## 6 Flute - Chipbreaker Rougher - Variable Pitch

**HEV-C-6**

| HEV-C-6 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Material Guide | | Hardness | SFM | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 |
| | | | | Rgh | Rgh | Rgh | Rgh | Rgh | Rgh | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0014 | .0020 | .0028 | .0041 | .0054 | .0077 | .0099 |
| | | 75 - 98 HRB | 445 | .0010 | .0015 | .0020 | .0030 | .0040 | .0057 | .0073 |
| | | 21 - 36 HRC | 400 | .0007 | .0010 | .0013 | .0020 | .0026 | .0037 | .0047 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0009 | .0013 | .0018 | .0026 | .0034 | .0049 | .0063 |
| | | 21 - 36 HRC | 340 | .0007 | .0010 | .0013 | .0020 | .0026 | .0037 | .0047 |
| | | 36 - 50 HRC | 260 | .0006 | .0008 | .0011 | .0017 | .0022 | .0032 | .0041 |
| | | > 50 HRC | 155 | .0005 | .0007 | .0009 | .0014 | .0018 | .0025 | .0033 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0009 | .0013 | .0018 | .0026 | .0034 | .0049 | .0063 |
| | | 21 - 36 HRC | 250 | .0007 | .0010 | .0014 | .0021 | .0027 | .0039 | .0050 |
| | | 36 - 50 HRC | 145 | .0006 | .0008 | .0011 | .0016 | .0021 | .0031 | .0040 |
| | | > 50 HRC | 85 | .0005 | .0007 | .0009 | .0013 | .0017 | .0025 | .0032 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0012 | .0017 | .0023 | .0034 | .0045 | .0064 | .0082 |
| | | 75 - 98 HRB | 255 | .0008 | .0012 | .0016 | .0023 | .0031 | .0044 | .0056 |
| | | 21 - 36 HRC | 175 | .0007 | .0010 | .0014 | .0021 | .0027 | .0039 | .0051 |
| | | 36 - 50 HRC | 150 | .0006 | .0009 | .0013 | .0019 | .0025 | .0035 | .0046 |
| | | > 50 HRC | 55 | .0004 | .0006 | .0008 | .0012 | .0015 | .0022 | .0028 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0009 | .0013 | .0017 | .0025 | .0033 | .0048 | .0061 |
| | | 21 - 36 HRC | 225 | .0008 | .0011 | .0015 | .0023 | .0030 | .0043 | .0055 |
| | | 36 - 50 HRC | 180 | .0006 | .0009 | .0012 | .0018 | .0024 | .0034 | .0044 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0009 | .0013 | .0018 | .0026 | .0034 | .0049 | .0064 |
| | | 21 - 36 HRC | 280 | .0008 | .0011 | .0015 | .0023 | .0030 | .0043 | .0055 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0007 | .0010 | .0013 | .0019 | .0025 | .0036 | .0047 |
| | | 36 - 50 HRC | 145 | .0006 | .0008 | .0011 | .0017 | .0022 | .0031 | .0040 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0014 | .0021 | .0029 | .0042 | .0056 | .0080 | .0103 |
| | | 21 - 36 HRC | 370 | .0008 | .0011 | .0016 | .0023 | .0030 | .0043 | .0056 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0009 | .0013 | .0018 | .0027 | .0035 | .0051 | .0065 |
| | | 21 - 36 HRC | 335 | .0008 | .0012 | .0016 | .0023 | .0030 | .0043 | .0056 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0010 | .0014 | .0019 | .0028 | .0037 | .0052 | .0068 |
| | | 21 - 36 HRC | 260 | .0006 | .0009 | .0012 | .0019 | .0024 | .0035 | .0045 |
| | | 36 - 50 HRC | 135 | .0004 | .0006 | .0008 | .0012 | .0015 | .0022 | .0029 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0012 | .0018 | .0024 | .0036 | .0047 | .0067 | .0087 |
| | | 75 - 98 HRB | 250 | .0010 | .0015 | .0020 | .0030 | .0039 | .0057 | .0073 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0006 | .0009 | .0012 | .0018 | .0024 | .0034 | .0044 |
| | | 21 - 36 HRC | 75 | .0006 | .0009 | .0012 | .0017 | .0023 | .0033 | .0042 |
| | | 36 - 50 HRC | 70 | .0005 | .0007 | .0010 | .0015 | .0020 | .0028 | .0036 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0017 | .0025 | .0033 | .0050 | .0065 | .0093 | .0120 |
| | | 75 - 98 HRB | 275 | .0014 | .0021 | .0028 | .0042 | .0055 | .0078 | .0101 |
| | | 21 - 36 HRC | 250 | .0011 | .0015 | .0021 | .0031 | .0041 | .0059 | .0076 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0009 | .0012 | .0017 | .0025 | .0032 | .0046 | .0060 |
| | | 36 - 50 HRC | 160 | .0008 | .0011 | .0015 | .0022 | .0029 | .0042 | .0054 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0007 | .0010 | .0014 | .0021 | .0027 | .0039 | .0051 |
| | | 21 - 36 HRC | 170 | .0007 | .0010 | .0014 | .0020 | .0026 | .0038 | .0049 |
| | | 36 - 50 HRC | 65 | .0005 | .0007 | .0009 | .0014 | .0018 | .0026 | .0033 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 15%-25% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-20% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. For more accurate running parameters, please refer to Machining Advisor Pro.

# HEV-C-7

New Items!

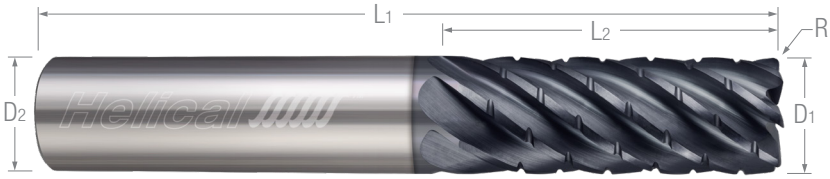
## 7 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch



- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

**For increased wear resistance, see page 164 for T*plus* coating**




| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | .020 | 3/8 | 2 | 7 | 59420 | HEV-C-S-70250-R.020 |
| | | 1/4 | .020 | 1/2 | 2 | 7 | 59421 | HEV-C-SR-70250-R.020 |
| | | 1/4 | .020 | 3/4 | 2-1/2 | 7 | 59422 | HEV-C-R-70250-R.020 |
| | | 1/4 | .020 | 1 | 3 | 7 | 82249 | HEV-C-M-70250-R.020 |
| new | | 1/4 | .020 | 1-1/4 | 3 | 7 | 83163 | HEV-C-L-70250-R.020 |
| | 3/8 | 3/8 | .020 | 1/2 | 2 | 7 | 59423 | HEV-C-S-70375-R.020 |
| | | 3/8 | .020 | 3/4 | 2-1/2 | 7 | 59424 | HEV-C-SR-70375-R.020 |
| | | 3/8 | .020 | 1 | 2-1/2 | 7 | 59425 | HEV-C-R-70375-R.020 |
| | | 3/8 | .020 | 1-1/2 | 3-1/2 | 7 | 82250 | HEV-C-L-70375-R.020 |
| new | | 3/8 | .060 | 1/2 | 2 | 7 | 83164 | HEV-C-S-70375-R.060 |
| new | | 3/8 | .060 | 3/4 | 2-1/2 | 7 | 83165 | HEV-C-SR-70375-R.060 |
| new | | 3/8 | .060 | 1 | 2-1/2 | 7 | 83166 | HEV-C-R-70375-R.060 |
| new | 1/2 | 1/2 | .020 | 5/8 | 2-1/2 | 7 | 83167 | HEV-C-S-70500-R.020 |
| new | | 1/2 | .020 | 1 | 3 | 7 | 83168 | HEV-C-SR-70500-R.020 |
| new | | 1/2 | .020 | 1-1/4 | 3 | 7 | 83169 | HEV-C-R-70500-R.020 |
| new | | 1/2 | .020 | 1-5/8 | 4 | 7 | 83170 | HEV-C-M-70500-R.020 |
| new | | 1/2 | .020 | 2 | 4 | 7 | 83171 | HEV-C-L-70500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 7 | 59426 | HEV-C-S-70500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 7 | 59427 | HEV-C-SR-70500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 7 | 59428 | HEV-C-R-70500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 7 | 59429 | HEV-C-M-70500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 7 | 81975 | HEV-C-L-70500-R.030 |
| | | 1/2 | .030 | 2-1/2 | 5 | 7 | 82251 | HEV-C-LX-70500-R.030 |
| | | 1/2 | .030 | 3-1/8 | 6 | 7 | 82252 | HEV-C-X-70500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 7 | 81978 | HEV-C-S-70500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 7 | 81979 | HEV-C-SR-70500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 7 | 81980 | HEV-C-R-70500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 7 | 81981 | HEV-C-M-70500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 7 | 81982 | HEV-C-L-70500-R.060 |
| new | | 1/2 | .060 | 2-1/2 | 5 | 7 | 83172 | HEV-C-LX-70500-R.060 |

continued on next page

**Speeds & Feeds on Page 82**

# 7 FLUTE - CORNER RADIUS New Items!

## Chipbreaker Rougher - Variable Pitch (cont.)

HEV-C-7

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 7 | **83173** | HEV-C-S-70625-R.030 | new |
| | 5/8 | **.030** | 1-1/4 | 3-1/2 | 7 | **59430** | HEV-C-SR-70625-R.030 | |
| | 5/8 | **.030** | 1-5/8 | 4 | 7 | **59431** | HEV-C-R-70625-R.030 | |
| | 5/8 | **.030** | 2-1/8 | 4 | 7 | **81976** | HEV-C-M-70625-R.030 | |
| | 5/8 | **.060** | 1-1/4 | 3-1/2 | 7 | **81983** | HEV-C-SR-70625-R.060 | |
| | 5/8 | **.060** | 1-5/8 | 4 | 7 | **81984** | HEV-C-R-70625-R.060 | |
| | 5/8 | **.060** | 2-1/8 | 4 | 7 | **81985** | HEV-C-M-70625-R.060 | |
| 3/4 | 3/4 | **.030** | 1-1/4 | 3-1/2 | 7 | **83174** | HEV-C-SR-70750-R.030 | new |
| | 3/4 | **.030** | 1-5/8 | 4 | 7 | **59432** | HEV-C-R-70750-R.030 | |
| | 3/4 | **.030** | 2-1/4 | 5 | 7 | **59433** | HEV-C-M-70750-R.030 | |
| | 3/4 | **.030** | 2-3/4 | 5 | 7 | **81977** | HEV-C-L-70750-R.030 | |
| | 3/4 | **.030** | 3-1/4 | 6 | 7 | **83175** | HEV-C-LX-70750-R.030 | new |
| | 3/4 | **.060** | 1-1/4 | 3-1/2 | 7 | **83176** | HEV-C-SR-70750-R.060 | new |
| | 3/4 | **.060** | 1-5/8 | 4 | 7 | **81986** | HEV-C-R-70750-R.060 | |
| | 3/4 | **.060** | 2-1/4 | 5 | 7 | **81987** | HEV-C-M-70750-R.060 | |
| | 3/4 | **.060** | 2-3/4 | 5 | 7 | **81988** | HEV-C-L-70750-R.060 | |

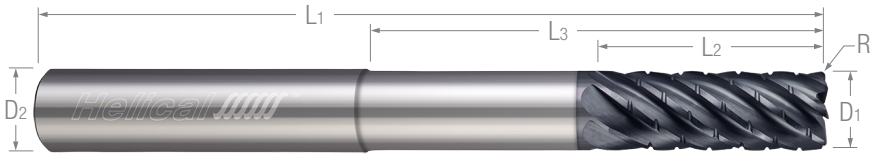
* .0005 max TIR

# HEV-C-RN-7

New! **7 FLUTE - CORNER RADIUS**

## Chipbreaker Rougher - Variable Pitch- Reduced Neck

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in deep pocket High Efficiency Milling (HEM) applications
- 7 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- End cutting geometry (non-center cutting)
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| | Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| new | 1/4 | 1/4 | **.020** | 3/4 | 4 | 1-1/8 | .237 | 7 | 82927 | HEV-C-RNR-R-70250-R.020 |
| new | | 1/4 | **.020** | 3/4 | 4 | 2-1/8 | .237 | 7 | 82928 | HEV-C-RNR-M-70250-R.020 |
| new | 3/8 | 3/8 | **.020** | 1 | 4 | 2-1/8 | .356 | 7 | 82929 | HEV-C-RNR-R-70375-R.020 |
| new | | 3/8 | **.020** | 1 | 6 | 3-1/8 | .356 | 7 | 82930 | HEV-C-RNR-M-70375-R.020 |
| new | 1/2 | 1/2 | **.030** | 1-1/4 | 4 | 2-1/4 | .475 | 7 | 82931 | HEV-C-RNR-R-70500-R.030 |
| new | | 1/2 | **.030** | 1-1/4 | 6 | 3-3/8 | .475 | 7 | 82932 | HEV-C-RNR-M-70500-R.030 |
| new | | 1/2 | **.030** | 1-1/4 | 6 | 4-1/8 | .475 | 7 | 82933 | HEV-C-RNR-L-70500-R.030 |
| new | | 1/2 | **.060** | 1-1/4 | 4 | 2-1/4 | .475 | 7 | 82934 | HEV-C-RNR-R-70500-R.060 |
| new | | 1/2 | **.060** | 1-1/4 | 6 | 3-3/8 | .475 | 7 | 82935 | HEV-C-RNR-M-70500-R.060 |
| new | | 1/2 | **.060** | 1-1/4 | 6 | 4-1/8 | .475 | 7 | 82936 | HEV-C-RNR-L-70500-R.060 |
| new | 3/4 | 3/4 | **.030** | 1-5/8 | 6 | 2-1/2 | .712 | 7 | 82937 | HEV-C-RNR-R-70750-R.030 |
| new | | 3/4 | **.030** | 1-5/8 | 6 | 3-3/8 | .712 | 7 | 82938 | HEV-C-RNR-M-70750-R.030 |
| new | | 3/4 | **.060** | 1-5/8 | 6 | 2-1/2 | .712 | 7 | 82939 | HEV-C-RNR-R-70750-R.060 |
| new | | 3/4 | **.060** | 1-5/8 | 6 | 3-3/8 | .712 | 7 | 82940 | HEV-C-RNR-M-70750-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 82
Roughing

# SPEEDS & FEEDS

## 7 Flute - Chipbreaker Rougher - Variable Pitch

**HEV-C-7**

| HEV-C-7 / HEV-C-RN-7 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Material Guide | | Hardness | SFM | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 |
| | | | | Rgh | Rgh | Rgh | Rgh | Rgh | Rgh | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0015 | .0023 | .0030 | .0045 | .0058 | .0085 | .0108 |
| | | 75 - 98 HRB | 445 | .0011 | .0017 | .0022 | .0033 | .0042 | .0062 | .0079 |
| | | 21 - 36 HRC | 400 | .0007 | .0011 | .0014 | .0021 | .0028 | .0040 | .0051 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0010 | .0014 | .0019 | .0029 | .0037 | .0054 | .0068 |
| | | 21 - 36 HRC | 340 | .0007 | .0011 | .0014 | .0021 | .0027 | .0040 | .0051 |
| | | 36 - 50 HRC | 260 | .0006 | .0009 | .0012 | .0019 | .0024 | .0035 | .0044 |
| | | > 50 HRC | 155 | .0005 | .0007 | .0010 | .0015 | .0019 | .0028 | .0035 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0010 | .0014 | .0019 | .0029 | .0037 | .0054 | .0068 |
| | | 21 - 36 HRC | 250 | .0008 | .0011 | .0015 | .0023 | .0029 | .0043 | .0054 |
| | | 36 - 50 HRC | 145 | .0006 | .0009 | .0012 | .0018 | .0023 | .0033 | .0042 |
| | | > 50 HRC | 85 | .0005 | .0007 | .0010 | .0014 | .0019 | .0027 | .0034 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0013 | .0019 | .0025 | .0037 | .0048 | .0070 | .0089 |
| | | 75 - 98 HRB | 255 | .0009 | .0013 | .0017 | .0026 | .0033 | .0048 | .0061 |
| | | 21 - 36 HRC | 175 | .0008 | .0012 | .0015 | .0023 | .0030 | .0043 | .0055 |
| | | 36 - 50 HRC | 150 | .0007 | .0011 | .0014 | .0021 | .0027 | .0039 | .0049 |
| | | > 50 HRC | 55 | .0004 | .0006 | .0008 | .0013 | .0016 | .0024 | .0030 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0009 | .0014 | .0019 | .0028 | .0036 | .0052 | .0066 |
| | | 21 - 36 HRC | 225 | .0008 | .0013 | .0017 | .0025 | .0032 | .0047 | .0060 |
| | | 36 - 50 HRC | 180 | .0007 | .0010 | .0013 | .0020 | .0026 | .0038 | .0048 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0010 | .0015 | .0019 | .0029 | .0037 | .0054 | .0068 |
| | | 21 - 36 HRC | 280 | .0008 | .0013 | .0017 | .0025 | .0032 | .0047 | .0059 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0007 | .0011 | .0014 | .0021 | .0027 | .0039 | .0050 |
| | | 36 - 50 HRC | 145 | .0006 | .0009 | .0012 | .0018 | .0024 | .0034 | .0044 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0016 | .0024 | .0031 | .0046 | .0060 | .0087 | .0111 |
| | | 21 - 36 HRC | 370 | .0009 | .0013 | .0017 | .0025 | .0032 | .0047 | .0060 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0010 | .0015 | .0019 | .0029 | .0038 | .0055 | .0070 |
| | | 21 - 36 HRC | 335 | .0009 | .0013 | .0017 | .0025 | .0033 | .0047 | .0060 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0010 | .0016 | .0020 | .0031 | .0039 | .0057 | .0073 |
| | | 21 - 36 HRC | 260 | .0007 | .0010 | .0013 | .0020 | .0026 | .0038 | .0048 |
| | | 36 - 50 HRC | 135 | .0004 | .0007 | .0009 | .0013 | .0017 | .0024 | .0031 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0013 | .0020 | .0026 | .0039 | .0051 | .0074 | .0094 |
| | | 75 - 98 HRB | 250 | .0011 | .0017 | .0022 | .0033 | .0042 | .0062 | .0079 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0007 | .0010 | .0013 | .0020 | .0026 | .0037 | .0048 |
| | | 21 - 36 HRC | 75 | .0007 | .0010 | .0013 | .0019 | .0025 | .0036 | .0046 |
| | | 36 - 50 HRC | 70 | .0006 | .0008 | .0011 | .0016 | .0021 | .0031 | .0039 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0018 | .0028 | .0036 | .0054 | .0070 | .0102 | .0129 |
| | | 75 - 98 HRB | 275 | .0015 | .0023 | .0030 | .0045 | .0059 | .0085 | .0108 |
| | | 21 - 36 HRC | 250 | .0011 | .0017 | .0023 | .0034 | .0044 | .0064 | .0081 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0009 | .0014 | .0018 | .0027 | .0035 | .0050 | .0064 |
| | | 36 - 50 HRC | 160 | .0008 | .0012 | .0016 | .0025 | .0032 | .0046 | .0058 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0008 | .0012 | .0015 | .0023 | .0029 | .0043 | .0054 |
| | | 21 - 36 HRC | 170 | .0007 | .0011 | .0015 | .0022 | .0028 | .0041 | .0052 |
| | | 36 - 50 HRC | 65 | .0005 | .0008 | .0010 | .0015 | .0019 | .0028 | .0036 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 10%-20% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-20% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# HXVR

New Items!

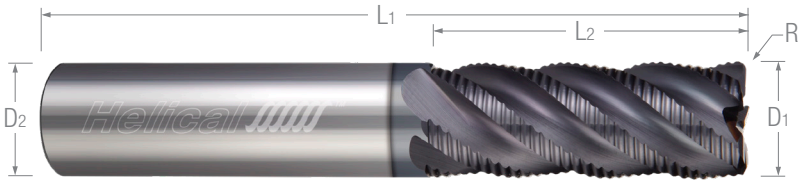
## MULTI-FLUTE - CORNER RADIUS

### Knuckle Rougher - Variable Pitch



- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with staggered "low profile" edge geometry for chip control and minimized cutting forces
- Available in 4 flute and 5 flute options
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 165 for T*plus* coating




| | Cutter Diameter $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | A*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | .030 | 3/8 | 2 | 4 | 54017 | HXVR-S-40250-R.030 |
| new | | 1/4 | .030 | 1/2 | 2-1/2 | 4 | 82859 | HXVR-SR-40250-R.030 |
| | | 1/4 | .030 | 3/4 | 2-1/2 | 4 | 54047 | HXVR-R-40250-R.030 |
| new | | 1/4 | .030 | 1 | 3 | 4 | 82860 | HXVR-M-40250-R.030 |
| | 3/8 | 3/8 | .040 | 1/2 | 2 | 4 | 54092 | HXVR-S-40375-R.040 |
| | | 3/8 | .040 | 1/2 | 2 | 5 | 55092 | HXVR-S-50375-R.040 |
| new | | 3/8 | .040 | 3/4 | 2-1/2 | 4 | 82861 | HXVR-SR-40375-R.040 |
| new | | 3/8 | .040 | 3/4 | 2-1/2 | 5 | 82862 | HXVR-SR-50375-R.040 |
| | | 3/8 | .040 | 1 | 3 | 4 | 54107 | HXVR-R-40375-R.040 |
| | | 3/8 | .040 | 1 | 3 | 5 | 55107 | HXVR-R-50375-R.040 |
| new | | 3/8 | .040 | 1-1/4 | 3 | 4 | 82863 | HXVR-M-40375-R.040 |
| new | | 3/8 | .040 | 1-1/4 | 3 | 5 | 82864 | HXVR-M-50375-R.040 |
| | 1/2 | 1/2 | .040 | 5/8 | 2-1/2 | 4 | 54152 | HXVR-S-40500-R.040 |
| | | 1/2 | .040 | 5/8 | 2-1/2 | 5 | 55152 | HXVR-S-50500-R.040 |
| new | | 1/2 | .040 | 1 | 3 | 4 | 82865 | HXVR-SR-40500-R.040 |
| new | | 1/2 | .040 | 1 | 3 | 5 | 82866 | HXVR-SR-50500-R.040 |
| | | 1/2 | .040 | 1-1/4 | 3 | 4 | 54182 | HXVR-R-40500-R.040 |
| | | 1/2 | .040 | 1-1/4 | 3 | 5 | 55182 | HXVR-R-50500-R.040 |
| new | | 1/2 | .040 | 1-5/8 | 4 | 4 | 82867 | HXVR-M-40500-R.040 |
| new | | 1/2 | .040 | 1-5/8 | 4 | 5 | 82868 | HXVR-M-50500-R.040 |
| | 5/8 | 5/8 | .060 | 3/4 | 3 | 4 | 54227 | HXVR-S-40625-R.060 |
| | | 5/8 | .060 | 3/4 | 3 | 5 | 55227 | HXVR-S-50625-R.060 |
| | | 5/8 | .060 | 1-5/8 | 3-1/2 | 4 | 54257 | HXVR-R-40625-R.060 |
| | | 5/8 | .060 | 1-5/8 | 3-1/2 | 5 | 55257 | HXVR-R-50625-R.060 |
| new | | 5/8 | .060 | 2 | 4 | 5 | 82869 | HXVR-M-50625-R.060 |
| | 3/4 | 3/4 | .060 | 1 | 3 | 4 | 54302 | HXVR-S-40750-R.060 |
| | | 3/4 | .060 | 1 | 3 | 5 | 55302 | HXVR-S-50750-R.060 |
| | | 3/4 | .060 | 1-5/8 | 4 | 4 | 54317 | HXVR-R-40750-R.060 |
| | | 3/4 | .060 | 1-5/8 | 4 | 5 | 55317 | HXVR-R-50750-R.060 |
| new | | 3/4 | .060 | 2-1/4 | 5 | 5 | 82870 | HXVR-M-50750-R.060 |
| | 1 | 1 | .060 | 1-1/4 | 4 | 4 | 54377 | HXVR-S-41000-R.060 |
| | | 1 | .060 | 1-1/4 | 4 | 5 | 55377 | HXVR-S-51000-R.060 |
| | | 1 | .060 | 2 | 4-1/2 | 4 | 54392 | HXVR-R-41000-R.060 |
| | | 1 | .060 | 2 | 4-1/2 | 5 | 55392 | HXVR-R-51000-R.060 |

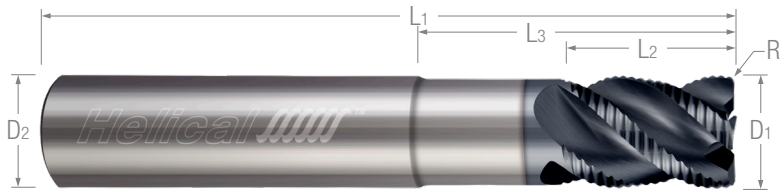
* .0005 max TIR

# MULTI-FLUTE - CORNER RADIUS New Items!

# HXVR-RN

## Knuckle Rougher - Variable Pitch - Reduced Neck

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with staggered "low profile" edge geometry for chip control and minimized cutting forces
- Available in 4 flute and 5 flute options
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.030** | 3/8 | 2-1/2 | 1-1/8 | .237 | 4 | **64032** | HXVR-RN-R-40250-R.030 | |
| | 1/4 | **.030** | 3/8 | 3 | 1-3/8 | .237 | 4 | **82871** | HXVR-RN-A-40250-R.030 | new |
| 3/8 | 3/8 | **.040** | 1/2 | 2-1/2 | 1-1/8 | .356 | 4 | **64077** | HXVR-RN-R-40375-R.040 | |
| | 3/8 | **.040** | 1/2 | 2-1/2 | 1-1/8 | .356 | 5 | **65077** | HXVR-RN-R-50375-R.040 | |
| | 3/8 | **.040** | 1/2 | 4 | 1-5/8 | .356 | 5 | **82872** | HXVR-RN-A-50375-R.040 | new |
| 1/2 | 1/2 | **.040** | 5/8 | 3 | 1-3/8 | .475 | 4 | **64152** | HXVR-RN-R-40500-R.040 | |
| | 1/2 | **.040** | 5/8 | 3 | 1-3/8 | .475 | 5 | **65152** | HXVR-RN-R-50500-R.040 | |
| | 1/2 | **.040** | 5/8 | 4 | 2-1/4 | .475 | 4 | **82873** | HXVR-RN-M-40500-R.040 | new |
| | 1/2 | **.040** | 5/8 | 4 | 2-1/4 | .475 | 5 | **82874** | HXVR-RN-M-50500-R.040 | new |
| 5/8 | 5/8 | **.060** | 3/4 | 3-1/2 | 1-5/8 | .593 | 5 | **65227** | HXVR-RN-R-50625-R.060 | |
| 3/4 | 3/4 | **.060** | 1 | 4 | 2 | .712 | 5 | **65302** | HXVR-RN-R-50750-R.060 | |
| | 3/4 | **.060** | 1 | 6 | 2-1/2 | .712 | 5 | **82875** | HXVR-RN-A-50750-R.060 | new |
| 1 | 1 | **.060** | 1-1/4 | 5 | 2-5/8 | .950 | 5 | **65377** | HXVR-RN-R-51000-R.060 | |

* .0005 max TIR

## Shank Tolerances, Collet Fits, & h6 Benefits

A cutting tool's shank is one of the most vital parts of a tool, as it's critical to the collet-tool connection. There are several types of shanks, each with their own tolerances and suitable tool holder methods. One common tool holding style is a shrink fit tool holder. Learn about this method, and others, in our "In the Loupe" post **Shank Tolerances, Collet Fits, & h6 Benefits.**

**Read more on helical.blog/intheloupe**

**Speeds & Feeds on Pages 85-86**

# HXVR-4

## SPEEDS & FEEDS

4 Flute - Knuckle Rougher - Variable Pitch



## HXVR / HXVR-RN (4 Flute)

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0007 | .0010 | .0010 | .0015 | .0015 | .0023 | .0022 | .0034 | .0028 | .0044 | .0040 | .0063 | .0051 | .0081 |
| | | 75 - 98 HRB | 445 | .0005 | .0009 | .0008 | .0013 | .0012 | .0019 | .0018 | .0028 | .0024 | .0037 | .0034 | .0053 | .0043 | .0067 |
| | | 21 - 36 HRC | 400 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0034 | .0028 | .0043 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0005 | .0007 | .0007 | .0011 | .0011 | .0016 | .0016 | .0024 | .0020 | .0032 | .0029 | .0045 | .0037 | .0058 |
| | | 21 - 36 HRC | 340 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0034 | .0028 | .0043 |
| | | 36 - 50 HRC | 260 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0010 | .0016 | .0013 | .0021 | .0019 | .0030 | .0024 | .0038 |
| | | > 50 HRC | 155 | .0003 | .0004 | .0004 | .0006 | .0005 | .0008 | .0008 | .0013 | .0010 | .0016 | .0015 | .0023 | .0019 | .0030 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0005 | .0007 | .0007 | .0011 | .0011 | .0016 | .0016 | .0024 | .0020 | .0032 | .0029 | .0045 | .0037 | .0058 |
| | | 21 - 36 HRC | 250 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0029 | .0046 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0007 | .0010 | .0010 | .0015 | .0013 | .0020 | .0018 | .0028 | .0023 | .0036 |
| | | > 50 HRC | 85 | .0002 | .0004 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0010 | .0016 | .0015 | .0023 | .0019 | .0029 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0003 | .0005 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0015 | .0023 | .0021 | .0034 | .0027 | .0043 |
| | | 75 - 98 HRB | 255 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0017 | .0026 | .0022 | .0035 | .0032 | .0050 | .0040 | .0063 |
| | | 21 - 36 HRC | 175 | .0003 | .0004 | .0004 | .0006 | .0006 | .0009 | .0009 | .0014 | .0011 | .0018 | .0016 | .0025 | .0021 | .0032 |
| | | 36 - 50 HRC | 150 | .0003 | .0005 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0015 | .0023 | .0021 | .0033 | .0027 | .0042 |
| | | > 50 HRC | 55 | .0002 | .0003 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0009 | .0014 | .0013 | .0020 | .0016 | .0026 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0005 | .0008 | .0008 | .0012 | .0012 | .0019 | .0018 | .0027 | .0023 | .0036 | .0033 | .0051 | .0042 | .0065 |
| | | 21 - 36 HRC | 225 | .0004 | .0006 | .0006 | .0009 | .0009 | .0014 | .0013 | .0020 | .0017 | .0026 | .0024 | .0038 | .0031 | .0048 |
| | | 36 - 50 HRC | 180 | .0003 | .0005 | .0005 | .0007 | .0007 | .0010 | .0010 | .0016 | .0013 | .0020 | .0019 | .0029 | .0024 | .0037 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0005 | .0007 | .0007 | .0011 | .0011 | .0016 | .0016 | .0024 | .0020 | .0032 | .0029 | .0046 | .0037 | .0058 |
| | | 21 - 36 HRC | 280 | .0004 | .0006 | .0006 | .0009 | .0009 | .0014 | .0014 | .0021 | .0018 | .0028 | .0025 | .0040 | .0032 | .0051 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0003 | .0005 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0015 | .0023 | .0021 | .0034 | .0027 | .0043 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0006 | .0010 | .0010 | .0015 | .0012 | .0019 | .0018 | .0028 | .0023 | .0036 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0008 | .0012 | .0011 | .0018 | .0017 | .0026 | .0025 | .0039 | .0033 | .0052 | .0047 | .0074 | .0060 | .0094 |
| | | 21 - 36 HRC | 370 | .0004 | .0007 | .0006 | .0010 | .0009 | .0014 | .0014 | .0021 | .0018 | .0028 | .0026 | .0040 | .0033 | .0051 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0005 | .0008 | .0007 | .0011 | .0011 | .0017 | .0016 | .0025 | .0021 | .0033 | .0030 | .0047 | .0038 | .0060 |
| | | 21 - 36 HRC | 335 | .0004 | .0007 | .0006 | .0010 | .0009 | .0015 | .0014 | .0022 | .0018 | .0028 | .0026 | .0040 | .0033 | .0051 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0005 | .0008 | .0008 | .0012 | .0011 | .0017 | .0017 | .0026 | .0022 | .0034 | .0031 | .0049 | .0040 | .0062 |
| | | 21 - 36 HRC | 260 | .0003 | .0005 | .0005 | .0008 | .0007 | .0012 | .0011 | .0017 | .0014 | .0023 | .0021 | .0032 | .0026 | .0041 |
| | | 36 - 50 HRC | 135 | .0002 | .0003 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0009 | .0014 | .0013 | .0020 | .0017 | .0026 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0007 | .0010 | .0010 | .0015 | .0014 | .0022 | .0021 | .0033 | .0028 | .0044 | .0040 | .0063 | .0051 | .0080 |
| | | 75 - 98 HRB | 250 | .0005 | .0009 | .0008 | .0013 | .0012 | .0019 | .0018 | .0028 | .0023 | .0037 | .0033 | .0052 | .0043 | .0067 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0004 | .0006 | .0005 | .0008 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0022 | .0035 | .0028 | .0045 |
| | | 21 - 36 HRC | 75 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0029 | .0046 |
| | | 36 - 50 HRC | 70 | .0003 | .0005 | .0004 | .0007 | .0007 | .0010 | .0010 | .0015 | .0013 | .0020 | .0018 | .0029 | .0023 | .0036 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0009 | .0014 | .0013 | .0021 | .0020 | .0031 | .0029 | .0046 | .0039 | .0060 | .0055 | .0086 | .0070 | .0110 |
| | | 75 - 98 HRB | 275 | .0008 | .0012 | .0011 | .0017 | .0017 | .0026 | .0025 | .0039 | .0032 | .0051 | .0046 | .0072 | .0059 | .0092 |
| | | 21 - 36 HRC | 250 | .0006 | .0009 | .0008 | .0013 | .0012 | .0020 | .0019 | .0029 | .0024 | .0038 | .0035 | .0054 | .0044 | .0069 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0004 | .0007 | .0007 | .0010 | .0010 | .0015 | .0015 | .0023 | .0019 | .0030 | .0027 | .0043 | .0035 | .0054 |
| | | 36 - 50 HRC | 160 | .0004 | .0006 | .0006 | .0009 | .0009 | .0014 | .0013 | .0021 | .0017 | .0027 | .0025 | .0039 | .0032 | .0050 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0030 | .0046 |
| | | 21 - 36 HRC | 170 | .0004 | .0006 | .0005 | .0008 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0022 | .0035 | .0028 | .0045 |
| | | 36 - 50 HRC | 65 | .0003 | .0004 | .0004 | .0006 | .0005 | .0009 | .0008 | .0013 | .0011 | .0017 | .0015 | .0024 | .0019 | .0030 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 75%-125% Diameter | 100% Diameter |
| | ≥ 35 HRC | 60%-75% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 20%-40% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 20%-40% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# SPEEDS & FEEDS

## HXVR-5

5 Flute - Knuckle Rougher - Variable Pitch

### HXVR / HXVR-RN (5 Flute)

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0007 | .0010 | .0010 | .0015 | .0015 | .0023 | .0022 | .0034 | .0029 | .0045 | .0041 | .0064 | .0052 | .0082 |
| | | 75 - 98 HRB | 445 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0018 | .0028 | .0024 | .0037 | .0034 | .0053 | .0043 | .0068 |
| | | 21 - 36 HRC | 400 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0035 | .0028 | .0044 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0005 | .0008 | .0007 | .0011 | .0011 | .0017 | .0016 | .0025 | .0021 | .0032 | .0029 | .0046 | .0038 | .0059 |
| | | 21 - 36 HRC | 340 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0034 | .0028 | .0044 |
| | | 36 - 50 HRC | 260 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0010 | .0016 | .0013 | .0021 | .0019 | .0030 | .0024 | .0038 |
| | | > 50 HRC | 155 | .0003 | .0004 | .0004 | .0006 | .0005 | .0009 | .0008 | .0013 | .0011 | .0017 | .0015 | .0024 | .0019 | .0030 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0005 | .0008 | .0007 | .0011 | .0011 | .0017 | .0016 | .0025 | .0021 | .0032 | .0029 | .0046 | .0038 | .0059 |
| | | 21 - 36 HRC | 250 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0013 | .0020 | .0016 | .0026 | .0023 | .0037 | .0030 | .0047 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0007 | .0010 | .0010 | .0015 | .0013 | .0020 | .0018 | .0029 | .0023 | .0036 |
| | | > 50 HRC | 85 | .0002 | .0004 | .0004 | .0006 | .0005 | .0008 | .0008 | .0013 | .0010 | .0016 | .0015 | .0023 | .0019 | .0030 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0034 | .0028 | .0043 |
| | | 75 - 98 HRB | 255 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0017 | .0027 | .0022 | .0035 | .0032 | .0050 | .0041 | .0064 |
| | | 21 - 36 HRC | 175 | .0003 | .0004 | .0004 | .0006 | .0006 | .0009 | .0009 | .0014 | .0012 | .0018 | .0017 | .0026 | .0021 | .0033 |
| | | 36 - 50 HRC | 150 | .0004 | .0005 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0015 | .0023 | .0021 | .0033 | .0027 | .0042 |
| | | > 50 HRC | 55 | .0002 | .0003 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0009 | .0014 | .0013 | .0020 | .0017 | .0026 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0005 | .0008 | .0008 | .0012 | .0012 | .0019 | .0018 | .0028 | .0023 | .0036 | .0033 | .0052 | .0042 | .0066 |
| | | 21 - 36 HRC | 225 | .0004 | .0006 | .0006 | .0009 | .0009 | .0014 | .0013 | .0021 | .0017 | .0027 | .0025 | .0038 | .0031 | .0049 |
| | | 36 - 50 HRC | 180 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0010 | .0016 | .0013 | .0021 | .0019 | .0030 | .0024 | .0038 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0005 | .0008 | .0007 | .0011 | .0011 | .0017 | .0016 | .0025 | .0021 | .0032 | .0030 | .0046 | .0038 | .0059 |
| | | 21 - 36 HRC | 280 | .0004 | .0007 | .0006 | .0010 | .0009 | .0014 | .0014 | .0021 | .0018 | .0028 | .0026 | .0040 | .0033 | .0051 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0004 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0018 | .0015 | .0024 | .0022 | .0034 | .0028 | .0043 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0007 | .0010 | .0010 | .0015 | .0013 | .0020 | .0018 | .0028 | .0023 | .0036 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0008 | .0012 | .0012 | .0018 | .0017 | .0027 | .0025 | .0040 | .0033 | .0052 | .0048 | .0075 | .0061 | .0095 |
| | | 21 - 36 HRC | 370 | .0004 | .0007 | .0006 | .0010 | .0009 | .0015 | .0014 | .0022 | .0018 | .0028 | .0026 | .0041 | .0033 | .0052 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0005 | .0008 | .0007 | .0011 | .0011 | .0017 | .0016 | .0025 | .0021 | .0033 | .0030 | .0047 | .0039 | .0061 |
| | | 21 - 36 HRC | 335 | .0004 | .0007 | .0006 | .0010 | .0009 | .0015 | .0014 | .0022 | .0018 | .0029 | .0026 | .0041 | .0033 | .0052 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0005 | .0008 | .0008 | .0012 | .0011 | .0018 | .0017 | .0026 | .0022 | .0034 | .0032 | .0049 | .0040 | .0063 |
| | | 21 - 36 HRC | 260 | .0003 | .0005 | .0005 | .0008 | .0008 | .0012 | .0011 | .0017 | .0015 | .0023 | .0021 | .0033 | .0027 | .0042 |
| | | 36 - 50 HRC | 135 | .0002 | .0003 | .0003 | .0005 | .0005 | .0007 | .0007 | .0011 | .0009 | .0015 | .0013 | .0021 | .0017 | .0026 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0007 | .0010 | .0010 | .0015 | .0015 | .0023 | .0022 | .0034 | .0028 | .0044 | .0041 | .0063 | .0052 | .0081 |
| | | 75 - 98 HRB | 250 | .0005 | .0009 | .0008 | .0013 | .0012 | .0019 | .0018 | .0028 | .0024 | .0037 | .0034 | .0053 | .0043 | .0068 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0029 | .0045 |
| | | 21 - 36 HRC | 75 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0036 | .0030 | .0046 |
| | | 36 - 50 HRC | 70 | .0003 | .0005 | .0005 | .0007 | .0007 | .0010 | .0010 | .0016 | .0013 | .0020 | .0019 | .0029 | .0024 | .0037 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0009 | .0014 | .0014 | .0021 | .0020 | .0032 | .0030 | .0047 | .0039 | .0061 | .0056 | .0088 | .0071 | .0112 |
| | | 75 - 98 HRB | 275 | .0008 | .0012 | .0011 | .0018 | .0017 | .0026 | .0025 | .0039 | .0033 | .0051 | .0047 | .0073 | .0060 | .0094 |
| | | 21 - 36 HRC | 250 | .0006 | .0009 | .0009 | .0013 | .0013 | .0020 | .0019 | .0029 | .0025 | .0038 | .0035 | .0055 | .0045 | .0070 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0005 | .0007 | .0007 | .0010 | .0010 | .0016 | .0015 | .0023 | .0019 | .0030 | .0028 | .0043 | .0035 | .0055 |
| | | 36 - 50 HRC | 160 | .0004 | .0007 | .0006 | .0009 | .0009 | .0014 | .0013 | .0021 | .0018 | .0028 | .0025 | .0039 | .0032 | .0050 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0020 | .0016 | .0026 | .0023 | .0037 | .0030 | .0047 |
| | | 21 - 36 HRC | 170 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0012 | .0019 | .0016 | .0025 | .0023 | .0035 | .0029 | .0045 |
| | | 36 - 50 HRC | 65 | .0003 | .0004 | .0004 | .0006 | .0006 | .0009 | .0008 | .0013 | .0011 | .0017 | .0015 | .0024 | .0020 | .0031 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 30%-60% Diameter | 100% Diameter |
| | ≥ 35 HRC | 30%-60% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 10%-30% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-30% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

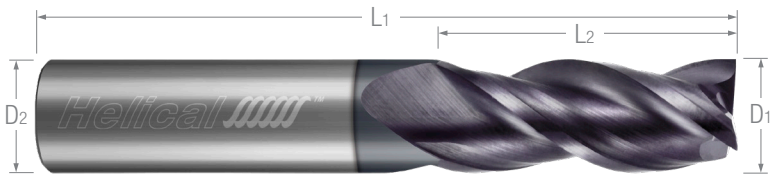
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# HSV-3

## 3 FLUTE - SQUARE

### Variable Pitch

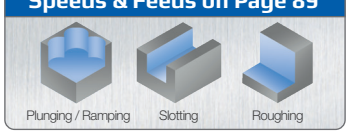
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed with variable pitch and 3 flutes for reduced harmonics, increased chip clearance, and higher quality parts in full slotting and heavy roughing applications
- Eccentric relief for maximum edge strength
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | **23010** | HSV-S-30125 |
| | 1/8 | 1/2 | 2-1/2 | 3 | **23020** | HSV-R-30125 |
| 3/16 | 3/16 | 5/16 | 2 | 3 | **23040** | HSV-S-30187 |
| | 3/16 | 9/16 | 2-1/2 | 3 | **23050** | HSV-R-30187 |
| 1/4 | 1/4 | 3/8 | 2 | 3 | **23070** | HSV-S-30250 |
| | 1/4 | 1/2 | 2-1/2 | 3 | **23080** | HSV-SR-30250 |
| | 1/4 | 3/4 | 2-1/2 | 3 | **23090** | HSV-R-30250 |
| | 1/4 | 1 | 3 | 3 | **23100** | HSV-M-30250 |
| 5/16 | 5/16 | 7/16 | 2 | 3 | **23120** | HSV-S-30312 |
| | 5/16 | 13/16 | 2-1/2 | 3 | **23130** | HSV-R-30312 |
| | 5/16 | 1-1/4 | 3 | 3 | **23140** | HSV-M-30312 |
| 3/8 | 3/8 | 1/2 | 2 | 3 | **23150** | HSV-S-30375 |
| | 3/8 | 1 | 3 | 3 | **23160** | HSV-R-30375 |
| | 3/8 | 1-1/4 | 3 | 3 | **23170** | HSV-M-30375 |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 3 | **23190** | HSV-S-30500 |
| | 1/2 | 1 | 3 | 3 | **23200** | HSV-SR-30500 |
| | 1/2 | 1-1/4 | 3 | 3 | **23210** | HSV-R-30500 |
| | 1/2 | 1-5/8 | 4 | 3 | **23220** | HSV-M-30500 |
| 5/8 | 5/8 | 3/4 | 3 | 3 | **23240** | HSV-S-30625 |
| | 5/8 | 1-1/8 | 3-1/2 | 3 | **23250** | HSV-SR-30625 |
| | 5/8 | 1-5/8 | 4 | 3 | **23260** | HSV-R-30625 |
| | 5/8 | 2-1/8 | 4 | 3 | **23270** | HSV-M-30625 |
| 3/4 | 3/4 | 1 | 3 | 3 | **23290** | HSV-S-30750 |
| | 3/4 | 1-5/8 | 4 | 3 | **23300** | HSV-R-30750 |
| | 3/4 | 2-1/4 | 5 | 3 | **23310** | HSV-M-30750 |
| 1 | 1 | 1-1/4 | 4 | 3 | **23330** | HSV-S-31000 |
| | 1 | 2 | 4-1/2 | 3 | **23340** | HSV-R-31000 |
| | 1 | 2-5/8 | 6 | 3 | **23350** | HSV-M-31000 |

* .0005 max TIR

**Speeds & Feeds on Page 89**



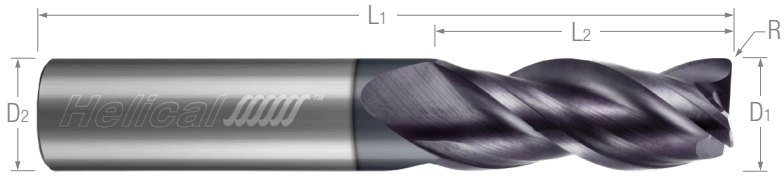
# 3 FLUTE - CORNER RADIUS

## HSV-3

### Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed with variable pitch and 3 flutes for reduced harmonics, increased chip clearance, and higher quality parts in full slotting and heavy roughing applications
- Eccentric relief for maximum edge strength
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

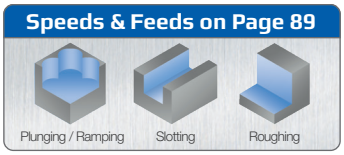





| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 3 | **23011** | HSV-S-30125-R.010 |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 3 | **23021** | HSV-R-30125-R.010 |
| 3/16 | 3/16 | **.010** | 5/16 | 2 | 3 | **23041** | HSV-S-30187-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 3 | **23051** | HSV-R-30187-R.010 |
| 1/4 | 1/4 | **.020** | 3/8 | 2 | 3 | **23072** | HSV-S-30250-R.020 |
| | 1/4 | **.020** | 1/2 | 2-1/2 | 3 | **23082** | HSV-SR-30250-R.020 |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 3 | **23092** | HSV-R-30250-R.020 |
| | 1/4 | **.020** | 1 | 3 | 3 | **23102** | HSV-M-30250-R.020 |
| 5/16 | 5/16 | **.020** | 7/16 | 2 | 3 | **23122** | HSV-S-30312-R.020 |
| | 5/16 | **.020** | 13/16 | 2-1/2 | 3 | **23132** | HSV-R-30312-R.020 |
| | 5/16 | **.020** | 1-1/4 | 3 | 3 | **23142** | HSV-M-30312-R.020 |
| 3/8 | 3/8 | **.020** | 1/2 | 2 | 3 | **23152** | HSV-S-30375-R.020 |
| | 3/8 | **.020** | 1 | 3 | 3 | **23162** | HSV-R-30375-R.020 |
| | 3/8 | **.020** | 1-1/4 | 3 | 3 | **23172** | HSV-M-30375-R.020 |
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 3 | **23193** | HSV-S-30500-R.030 |
| | 1/2 | **.030** | 1 | 3 | 3 | **23203** | HSV-SR-30500-R.030 |
| | 1/2 | **.030** | 1-1/4 | 3 | 3 | **23213** | HSV-R-30500-R.030 |
| | 1/2 | **.030** | 1-5/8 | 4 | 3 | **23223** | HSV-M-30500-R.030 |
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 3 | **23243** | HSV-S-30625-R.030 |
| | 5/8 | **.030** | 1-1/8 | 3-1/2 | 3 | **23253** | HSV-SR-30625-R.030 |
| | 5/8 | **.030** | 1-5/8 | 4 | 3 | **23263** | HSV-R-30625-R.030 |
| | 5/8 | **.030** | 2-1/8 | 4 | 3 | **23273** | HSV-M-30625-R.030 |
| 3/4 | 3/4 | **.030** | 1 | 3 | 3 | **23293** | HSV-S-30750-R.030 |
| | 3/4 | **.030** | 1-5/8 | 4 | 3 | **23303** | HSV-R-30750-R.030 |
| | 3/4 | **.030** | 2-1/4 | 5 | 3 | **23313** | HSV-M-30750-R.030 |
| 1 | 1 | **.030** | 1-1/4 | 4 | 3 | **23333** | HSV-S-31000-R.030 |
| | 1 | **.030** | 2 | 4-1/2 | 3 | **23343** | HSV-R-31000-R.030 |
| | 1 | **.030** | 2-5/8 | 6 | 3 | **23353** | HSV-M-31000-R.030 |

* .0005 max TIR

**Speeds & Feeds on Page 89**



# HSV-3

## SPEEDS & FEEDS

3 Flute - Variable Pitch



### HSV-3

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 | .0020 | .0035 | .0026 | .0045 | .0037 | .0066 | .0047 | .0084 |
| | | 75 - 98 HRB | 445 | .0005 | .0009 | .0007 | .0013 | .0010 | .0017 | .0014 | .0026 | .0019 | .0033 | .0027 | .0048 | .0034 | .0062 |
| | | 21 - 36 HRC | 400 | .0003 | .0006 | .0005 | .0008 | .0006 | .0011 | .0009 | .0017 | .0012 | .0021 | .0017 | .0031 | .0022 | .0040 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0012 | .0022 | .0016 | .0029 | .0023 | .0042 | .0030 | .0053 |
| | | 21 - 36 HRC | 340 | .0003 | .0006 | .0005 | .0009 | .0006 | .0011 | .0009 | .0017 | .0012 | .0021 | .0017 | .0031 | .0022 | .0040 |
| | | 36 - 50 HRC | 260 | .0003 | .0005 | .0004 | .0007 | .0005 | .0010 | .0008 | .0014 | .0011 | .0019 | .0015 | .0027 | .0019 | .0035 |
| | | > 50 HRC | 155 | .0002 | .0004 | .0003 | .0006 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0012 | .0021 | .0015 | .0027 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0012 | .0022 | .0016 | .0029 | .0023 | .0042 | .0030 | .0053 |
| | | 21 - 36 HRC | 250 | .0003 | .0006 | .0005 | .0009 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 | .0019 | .0033 | .0023 | .0042 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0005 | .0009 | .0008 | .0014 | .0010 | .0018 | .0014 | .0026 | .0018 | .0033 |
| | | > 50 HRC | 85 | .0002 | .0004 | .0003 | .0006 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0012 | .0021 | .0015 | .0027 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0006 | .0010 | .0008 | .0015 | .0011 | .0019 | .0016 | .0029 | .0021 | .0038 | .0031 | .0055 | .0039 | .0070 |
| | | 75 - 98 HRB | 255 | .0004 | .0007 | .0006 | .0010 | .0008 | .0013 | .0011 | .0020 | .0015 | .0026 | .0021 | .0038 | .0027 | .0048 |
| | | 21 - 36 HRC | 175 | .0003 | .0006 | .0005 | .0009 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 | .0019 | .0034 | .0024 | .0043 |
| | | 36 - 50 HRC | 150 | .0003 | .0005 | .0005 | .0008 | .0006 | .0011 | .0009 | .0016 | .0012 | .0021 | .0017 | .0030 | .0021 | .0039 |
| | | > 50 HRC | 55 | .0002 | .0003 | .0003 | .0005 | .0004 | .0007 | .0005 | .0010 | .0007 | .0013 | .0010 | .0019 | .0013 | .0024 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0004 | .0007 | .0006 | .0011 | .0008 | .0014 | .0012 | .0022 | .0016 | .0028 | .0023 | .0041 | .0029 | .0052 |
| | | 21 - 36 HRC | 225 | .0004 | .0007 | .0006 | .0010 | .0007 | .0013 | .0011 | .0020 | .0014 | .0025 | .0020 | .0037 | .0026 | .0047 |
| | | 36 - 50 HRC | 180 | .0003 | .0005 | .0004 | .0008 | .0006 | .0011 | .0009 | .0016 | .0011 | .0020 | .0016 | .0030 | .0021 | .0038 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0013 | .0022 | .0016 | .0029 | .0023 | .0042 | .0030 | .0054 |
| | | 21 - 36 HRC | 280 | .0004 | .0007 | .0006 | .0010 | .0007 | .0013 | .0011 | .0020 | .0014 | .0025 | .0020 | .0036 | .0026 | .0047 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0003 | .0006 | .0005 | .0008 | .0006 | .0011 | .0009 | .0016 | .0012 | .0021 | .0017 | .0031 | .0022 | .0039 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0005 | .0010 | .0008 | .0014 | .0010 | .0018 | .0015 | .0027 | .0019 | .0034 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0007 | .0012 | .0010 | .0018 | .0013 | .0024 | .0020 | .0036 | .0026 | .0047 | .0038 | .0068 | .0048 | .0087 |
| | | 21 - 36 HRC | 370 | .0004 | .0007 | .0006 | .0010 | .0007 | .0013 | .0011 | .0020 | .0014 | .0025 | .0021 | .0037 | .0026 | .0047 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0004 | .0008 | .0007 | .0012 | .0009 | .0015 | .0013 | .0023 | .0017 | .0030 | .0024 | .0043 | .0030 | .0055 |
| | | 21 - 36 HRC | 335 | .0004 | .0007 | .0006 | .0010 | .0007 | .0013 | .0011 | .0020 | .0014 | .0025 | .0021 | .0037 | .0026 | .0047 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0005 | .0008 | .0007 | .0012 | .0009 | .0016 | .0013 | .0024 | .0017 | .0031 | .0025 | .0045 | .0032 | .0057 |
| | | 21 - 36 HRC | 260 | .0003 | .0005 | .0005 | .0008 | .0006 | .0011 | .0009 | .0016 | .0012 | .0020 | .0016 | .0030 | .0021 | .0038 |
| | | 36 - 50 HRC | 135 | .0002 | .0003 | .0003 | .0005 | .0004 | .0007 | .0006 | .0010 | .0007 | .0013 | .0010 | .0019 | .0013 | .0024 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0006 | .0010 | .0009 | .0016 | .0012 | .0020 | .0017 | .0031 | .0022 | .0039 | .0032 | .0057 | .0041 | .0073 |
| | | 75 - 98 HRB | 250 | .0005 | .0009 | .0007 | .0013 | .0010 | .0017 | .0014 | .0026 | .0019 | .0033 | .0027 | .0048 | .0034 | .0061 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0003 | .0005 | .0004 | .0008 | .0006 | .0010 | .0009 | .0016 | .0011 | .0020 | .0016 | .0029 | .0021 | .0037 |
| | | 21 - 36 HRC | 75 | .0003 | .0005 | .0004 | .0008 | .0006 | .0010 | .0008 | .0015 | .0011 | .0019 | .0016 | .0028 | .0020 | .0036 |
| | | 36 - 50 HRC | 70 | .0003 | .0004 | .0004 | .0007 | .0005 | .0008 | .0007 | .0013 | .0009 | .0016 | .0013 | .0024 | .0017 | .0031 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0008 | .0014 | .0012 | .0022 | .0016 | .0028 | .0024 | .0042 | .0031 | .0055 | .0044 | .0079 | .0056 | .0101 |
| | | 75 - 98 HRB | 275 | .0007 | .0012 | .0010 | .0018 | .0013 | .0024 | .0020 | .0035 | .0026 | .0046 | .0037 | .0066 | .0047 | .0085 |
| | | 21 - 36 HRC | 250 | .0005 | .0009 | .0008 | .0014 | .0010 | .0018 | .0015 | .0027 | .0019 | .0034 | .0028 | .0050 | .0035 | .0064 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0004 | .0007 | .0006 | .0011 | .0008 | .0014 | .0012 | .0021 | .0015 | .0027 | .0022 | .0039 | .0028 | .0050 |
| | | 36 - 50 HRC | 160 | .0004 | .0006 | .0005 | .0010 | .0007 | .0013 | .0011 | .0019 | .0014 | .0025 | .0020 | .0036 | .0025 | .0046 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0003 | .0006 | .0005 | .0009 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 | .0019 | .0033 | .0024 | .0042 |
| | | 21 - 36 HRC | 170 | .0003 | .0006 | .0005 | .0009 | .0006 | .0011 | .0010 | .0017 | .0012 | .0022 | .0018 | .0032 | .0023 | .0041 |
| | | 36 - 50 HRC | 65 | .0002 | .0004 | .0003 | .0006 | .0004 | .0008 | .0007 | .0012 | .0008 | .0015 | .0012 | .0022 | .0015 | .0028 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 100%-150% Diameter | 100% Diameter |
| | ≥ 35 HRC | 100%-125% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | Up to 50% Diameter |
| | ≥ 35 HRC | Up to Max LOC | Up to 50% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

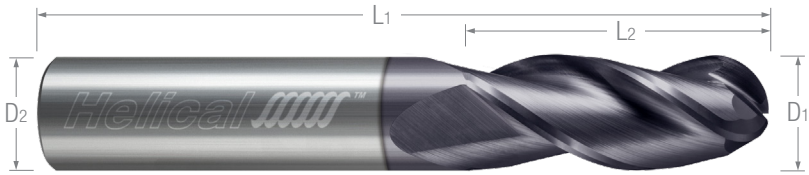
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. For more accurate running parameters, please refer to Machining Advisor Pro.

# 3 FLUTE - BALL

## HST-3

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed for excellent chip evacuation in slotting, pocketing, and roughing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA






| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | **12017** | HST-S-30125-BN |
| | 1/8 | 1/2 | 2-1/2 | 3 | **12032** | HST-R-30125-BN |
| 3/16 | 3/16 | 5/16 | 2 | 3 | **12062** | HST-S-30187-BN |
| | 3/16 | 9/16 | 2-1/2 | 3 | **12077** | HST-R-30187-BN |
| 1/4 | 1/4 | 3/8 | 2 | 3 | **12107** | HST-S-30250-BN |
| | 1/4 | 1/2 | 2-1/2 | 3 | **12112** | HST-SR-30250-BN |
| | 1/4 | 3/4 | 2-1/2 | 3 | **12122** | HST-R-30250-BN |
| 5/16 | 5/16 | 7/16 | 2 | 3 | **12167** | HST-S-30312-BN |
| | 5/16 | 13/16 | 2-1/2 | 3 | **12182** | HST-R-30312-BN |
| 3/8 | 3/8 | 1/2 | 2 | 3 | **12212** | HST-S-30375-BN |
| | 3/8 | 1 | 3 | 3 | **12227** | HST-R-30375-BN |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 3 | **12317** | HST-S-30500-BN |
| | 1/2 | 1 | 3 | 3 | **12332** | HST-SR-30500-BN |
| | 1/2 | 1-1/4 | 3 | 3 | **12347** | HST-R-30500-BN |
| 5/8 | 5/8 | 1-1/8 | 3-1/2 | 3 | **12407** | HST-SR-30625-BN |
| 3/4 | 3/4 | 1 | 3 | 3 | **12467** | HST-S-30750-BN |
| | 3/4 | 1-5/8 | 4 | 3 | **12482** | HST-R-30750-BN |
| 1 | 1 | 1-1/4 | 4 | 3 | **12527** | HST-S-31000-BN |
| | 1 | 2 | 4-1/2 | 3 | **12542** | HST-R-31000-BN |

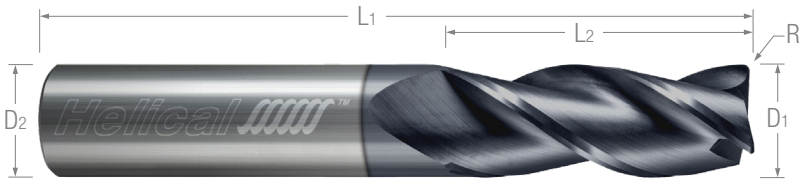
* .0005 max TIR

Speeds & Feeds on Page 94

# HST-3

## 3 FLUTE - CORNER RADIUS

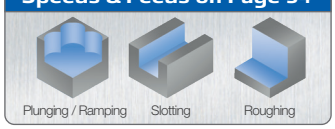
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed for excellent chip evacuation in slotting, pocketing, and roughing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- Aplus coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 3 | **08017** | HST-S-30125-R.010 |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 3 | **08032** | HST-R-30125-R.010 |
| 3/16 | 3/16 | **.010** | 5/16 | 2 | 3 | **08062** | HST-S-30187-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 3 | **08077** | HST-R-30187-R.010 |
| 1/4 | 1/4 | **.020** | 3/8 | 2 | 3 | **08107** | HST-S-30250-R.020 |
| | 1/4 | **.020** | 1/2 | 2-1/2 | 3 | **08112** | HST-SR-30250-R.020 |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 3 | **08122** | HST-R-30250-R.020 |
| | 1/4 | **.020** | 1 | 3 | 3 | **08137** | HST-M-30250-R.020 |
| 5/16 | 5/16 | **.020** | 7/16 | 2 | 3 | **08167** | HST-S-30312-R.020 |
| | 5/16 | **.020** | 13/16 | 2-1/2 | 3 | **08182** | HST-R-30312-R.020 |
| | 5/16 | **.020** | 1-1/4 | 3 | 3 | **08192** | HST-M-30312-R.020 |
| 3/8 | 3/8 | **.020** | 1/2 | 2 | 3 | **08212** | HST-S-30375-R.020 |
| | 3/8 | **.020** | 1 | 3 | 3 | **08227** | HST-R-30375-R.020 |
| | 3/8 | **.020** | 1-1/4 | 3 | 3 | **08242** | HST-M-30375-R.020 |
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 3 | **08317** | HST-S-30500-R.030 |
| | 1/2 | **.030** | 1 | 3 | 3 | **08332** | HST-SR-30500-R.030 |
| | 1/2 | **.030** | 1-1/4 | 3 | 3 | **08347** | HST-R-30500-R.030 |
| | 1/2 | **.030** | 1-5/8 | 4 | 3 | **08362** | HST-M-30500-R.030 |
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 3 | **08392** | HST-S-30625-R.030 |
| | 5/8 | **.030** | 1-1/8 | 3-1/2 | 3 | **08407** | HST-SR-30625-R.030 |
| | 5/8 | **.030** | 1-5/8 | 4 | 3 | **08422** | HST-R-30625-R.030 |
| | 5/8 | **.030** | 2-1/8 | 4 | 3 | **08437** | HST-M-30625-R.030 |
| 3/4 | 3/4 | **.030** | 1 | 3 | 3 | **08467** | HST-S-30750-R.030 |
| | 3/4 | **.030** | 1-5/8 | 4 | 3 | **08482** | HST-R-30750-R.030 |
| | 3/4 | **.030** | 2-1/4 | 5 | 3 | **08497** | HST-M-30750-R.030 |
| 1 | 1 | **.030** | 1-1/4 | 4 | 3 | **08527** | HST-S-31000-R.030 |
| | 1 | **.030** | 2 | 4-1/2 | 3 | **08542** | HST-R-31000-R.030 |
| | 1 | **.030** | 2-5/8 | 6 | 3 | **08557** | HST-M-31000-R.030 |

* .0005 max TIR

Speeds & Feeds on Page 94

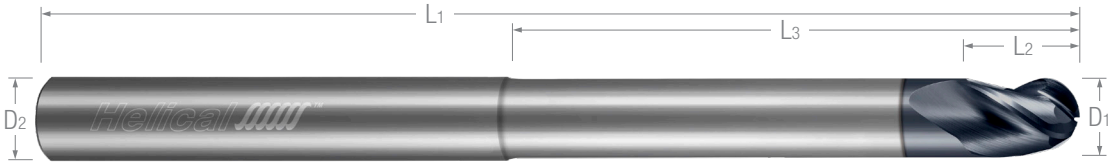


# 3 FLUTE - BALL

## Reduced Neck

**HST-RN-3**

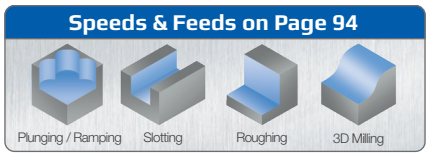
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed for excellent chip evacuation in slotting, pocketing, and roughing applications
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 5/32 | 3 | 3/8 | .118 | 3 | **13017** | HST-RN-S-30125-BN |
| | 1/8 | 5/32 | 3 | 1/2 | .118 | 3 | **13032** | HST-RN-R-30125-BN |
| | 1/8 | 5/32 | 3 | 5/8 | .118 | 3 | **13047** | HST-RN-M-30125-BN |
| 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 3 | **13077** | HST-RN-R-30187-BN |
| | 3/16 | 7/32 | 3 | 3/4 | .178 | 3 | **13092** | HST-RN-M-30187-BN |
| 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 3 | **13112** | HST-RN-S-30250-BN |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 3 | **13122** | HST-RN-R-30250-BN |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 3 | **13137** | HST-RN-M-30250-BN |
| 5/16 | 5/16 | 7/16 | 4 | 1-1/8 | .296 | 3 | **13157** | HST-RN-R-30312-BN |
| | 5/16 | 7/16 | 4 | 2-1/8 | .296 | 3 | **13167** | HST-RN-M-30312-BN |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 3 | **13197** | HST-RN-R-30375-BN |
| | 3/8 | 1/2 | 6 | 2-3/8 | .356 | 3 | **13212** | HST-RN-M-30375-BN |
| | 3/8 | 1/2 | 6 | 3-3/8 | .356 | 3 | **13227** | HST-RN-L-30375-BN |
| | 3/8 | 1/2 | 6 | 4 | .356 | 3 | **13232** | HST-RN-X-30375-BN |
| 1/2 | 1/2 | 5/8 | 4 | 1-3/8 | .475 | 3 | **13302** | HST-RN-R-30500-BN |
| | 1/2 | 5/8 | 6 | 2-3/8 | .475 | 3 | **13317** | HST-RN-M-30500-BN |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 3 | **13332** | HST-RN-L-30500-BN |
| | 1/2 | 5/8 | 6 | 4-1/8 | .475 | 3 | **13347** | HST-RN-X-30500-BN |

* .0005 max TIR

**Speeds & Feeds on Page 94**

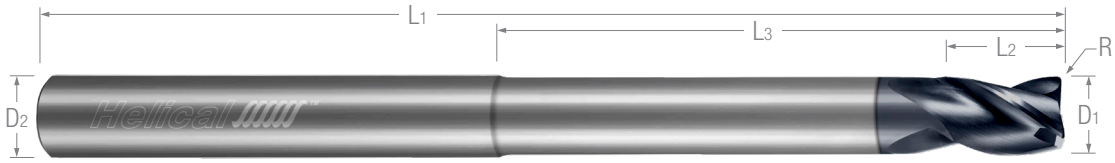


# HST-RN-3

## 3 FLUTE - CORNER RADIUS

### Reduced Neck

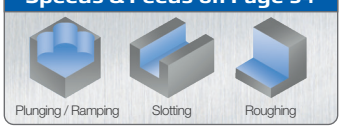
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed for excellent chip evacuation in slotting, pocketing, and roughing applications
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 5/32 | 3 | 3/8 | .118 | 3 | **10017** | HST-RN-S-30125-R.010 |
| | 1/8 | **.010** | 5/32 | 3 | 5/8 | .118 | 3 | **10047** | HST-RN-M-30125-R.010 |
| 3/16 | 3/16 | **.010** | 7/32 | 3 | 3/4 | .178 | 3 | **10092** | HST-RN-M-30187-R.010 |
| 1/4 | 1/4 | **.020** | 3/8 | 4 | 3/4 | .237 | 3 | **10112** | HST-RN-S-30250-R.020 |
| | 1/4 | **.020** | 3/8 | 4 | 1-1/8 | .237 | 3 | **10122** | HST-RN-R-30250-R.020 |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/8 | .237 | 3 | **10137** | HST-RN-M-30250-R.020 |
| 5/16 | 5/16 | **.020** | 7/16 | 4 | 1-1/8 | .296 | 3 | **10157** | HST-RN-R-30312-R.020 |
| | 5/16 | **.020** | 7/16 | 4 | 2-1/8 | .296 | 3 | **10167** | HST-RN-M-30312-R.020 |
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 3 | **10197** | HST-RN-R-30375-R.020 |
| | 3/8 | **.020** | 1/2 | 6 | 2-3/8 | .356 | 3 | **10212** | HST-RN-M-30375-R.020 |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-3/8 | .475 | 3 | **10302** | HST-RN-R-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 2-3/8 | .475 | 3 | **10317** | HST-RN-M-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 3 | **10332** | HST-RN-L-30500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/8 | .475 | 3 | **10347** | HST-RN-X-30500-R.030 |

* .0005 max TIR

Speeds & Feeds on Page 94



# SPEEDS & FEEDS

## 3 Flute

**HST-3**



## HST-3 / HST-RN-3

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh | Slot | Rgh |
| Carbon Steel | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0007 | .0011 | .0010 | .0017 | .0013 | .0023 | .0019 | .0034 | .0025 | .0044 | .0036 | .0064 | .0045 | .0082 |
| | | 75 - 98 HRB | 445 | .0005 | .0009 | .0007 | .0013 | .0009 | .0017 | .0014 | .0025 | .0018 | .0032 | .0026 | .0047 | .0033 | .0060 |
| | | 21 - 36 HRC | 400 | .0003 | .0006 | .0005 | .0008 | .0006 | .0011 | .0009 | .0016 | .0012 | .0021 | .0017 | .0030 | .0021 | .0039 |
| Low Alloy Steel | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0004 | .0007 | .0006 | .0011 | .0008 | .0015 | .0012 | .0022 | .0016 | .0028 | .0023 | .0041 | .0029 | .0052 |
| | | 21 - 36 HRC | 340 | .0003 | .0005 | .0005 | .0008 | .0006 | .0011 | .0009 | .0016 | .0012 | .0021 | .0017 | .0030 | .0021 | .0039 |
| | | 36 - 50 HRC | 260 | .0003 | .0005 | .0004 | .0007 | .0005 | .0009 | .0008 | .0014 | .0010 | .0018 | .0015 | .0026 | .0019 | .0034 |
| | | > 50 HRC | 155 | .0002 | .0004 | .0003 | .0006 | .0004 | .0007 | .0006 | .0011 | .0008 | .0014 | .0012 | .0021 | .0015 | .0027 |
| Tool Steel | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0004 | .0007 | .0006 | .0011 | .0008 | .0015 | .0012 | .0022 | .0016 | .0028 | .0023 | .0041 | .0029 | .0052 |
| | | 21 - 36 HRC | 250 | .0003 | .0006 | .0005 | .0009 | .0007 | .0011 | .0010 | .0017 | .0013 | .0022 | .0018 | .0032 | .0023 | .0041 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0005 | .0009 | .0008 | .0014 | .0010 | .0017 | .0014 | .0025 | .0018 | .0032 |
| | | > 50 HRC | 85 | .0002 | .0004 | .0003 | .0006 | .0004 | .0007 | .0006 | .0011 | .0008 | .0014 | .0012 | .0021 | .0015 | .0026 |
| Specialty Steel | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0006 | .0010 | .0008 | .0015 | .0011 | .0019 | .0016 | .0029 | .0021 | .0037 | .0030 | .0053 | .0038 | .0068 |
| | | 75 - 98 HRB | 255 | .0004 | .0007 | .0006 | .0010 | .0007 | .0013 | .0011 | .0020 | .0014 | .0025 | .0020 | .0037 | .0026 | .0047 |
| | | 21 - 36 HRC | 175 | .0003 | .0006 | .0005 | .0009 | .0007 | .0012 | .0010 | .0017 | .0013 | .0023 | .0018 | .0033 | .0023 | .0042 |
| | | 36 - 50 HRC | 150 | .0003 | .0005 | .0004 | .0008 | .0006 | .0011 | .0009 | .0016 | .0011 | .0020 | .0016 | .0029 | .0021 | .0038 |
| | | > 50 HRC | 55 | .0002 | .0003 | .0003 | .0005 | .0004 | .0007 | .0005 | .0010 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 |
| Austenitic Stainless Steel | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0004 | .0007 | .0006 | .0011 | .0008 | .0014 | .0012 | .0021 | .0015 | .0027 | .0022 | .0040 | .0028 | .0051 |
| | | 21 - 36 HRC | 225 | .0004 | .0006 | .0006 | .0010 | .0007 | .0013 | .0011 | .0019 | .0014 | .0025 | .0020 | .0036 | .0025 | .0046 |
| | | 36 - 50 HRC | 180 | .0003 | .0005 | .0004 | .0008 | .0006 | .0010 | .0009 | .0015 | .0011 | .0020 | .0016 | .0029 | .0020 | .0037 |
| Martensitic & Ferritic Stainless Steel | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0004 | .0007 | .0006 | .0011 | .0008 | .0015 | .0012 | .0022 | .0016 | .0028 | .0023 | .0041 | .0029 | .0052 |
| | | 21 - 36 HRC | 280 | .0004 | .0006 | .0005 | .0010 | .0007 | .0013 | .0011 | .0019 | .0014 | .0024 | .0020 | .0035 | .0025 | .0045 |
| PH Stainless Steel | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0003 | .0005 | .0005 | .0008 | .0006 | .0011 | .0009 | .0016 | .0012 | .0021 | .0017 | .0030 | .0021 | .0038 |
| | | 36 - 50 HRC | 145 | .0003 | .0005 | .0004 | .0007 | .0005 | .0009 | .0008 | .0014 | .0010 | .0018 | .0014 | .0026 | .0018 | .0033 |
| Gray Cast Iron | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 | .0020 | .0035 | .0026 | .0045 | .0037 | .0066 | .0047 | .0084 |
| | | 21 - 36 HRC | 370 | .0004 | .0006 | .0005 | .0010 | .0007 | .0013 | .0011 | .0019 | .0014 | .0025 | .0020 | .0036 | .0025 | .0046 |
| Malleable Cast Iron | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0012 | .0022 | .0016 | .0029 | .0023 | .0042 | .0030 | .0054 |
| | | 21 - 36 HRC | 335 | .0004 | .0007 | .0005 | .0010 | .0007 | .0013 | .0011 | .0019 | .0014 | .0025 | .0020 | .0036 | .0026 | .0046 |
| Nodular (Ductile) Cast Iron | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0005 | .0008 | .0007 | .0012 | .0009 | .0015 | .0013 | .0023 | .0017 | .0030 | .0024 | .0043 | .0031 | .0056 |
| | | 21 - 36 HRC | 260 | .0003 | .0005 | .0004 | .0008 | .0006 | .0010 | .0009 | .0015 | .0011 | .0020 | .0016 | .0029 | .0020 | .0037 |
| | | 36 - 50 HRC | 135 | .0002 | .0003 | .0003 | .0005 | .0004 | .0007 | .0005 | .0010 | .0007 | .0013 | .0010 | .0018 | .0013 | .0023 |
| Pure Nickel | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0006 | .0010 | .0008 | .0015 | .0011 | .0020 | .0017 | .0030 | .0022 | .0038 | .0031 | .0056 | .0040 | .0072 |
| | | 75 - 98 HRB | 250 | .0005 | .0008 | .0007 | .0013 | .0009 | .0017 | .0014 | .0025 | .0018 | .0032 | .0026 | .0047 | .0033 | .0060 |
| Nickel Alloy | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0003 | .0005 | .0004 | .0008 | .0006 | .0010 | .0008 | .0015 | .0011 | .0020 | .0016 | .0029 | .0020 | .0036 |
| | | 21 - 36 HRC | 75 | .0003 | .0005 | .0004 | .0007 | .0006 | .0010 | .0008 | .0015 | .0011 | .0019 | .0015 | .0027 | .0019 | .0035 |
| | | 36 - 50 HRC | 70 | .0002 | .0004 | .0004 | .0006 | .0005 | .0008 | .0007 | .0013 | .0009 | .0016 | .0013 | .0023 | .0017 | .0030 |
| Pure Titanium | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0008 | .0014 | .0012 | .0021 | .0015 | .0027 | .0023 | .0041 | .0030 | .0053 | .0043 | .0077 | .0055 | .0099 |
| | | 75 - 98 HRB | 275 | .0007 | .0012 | .0010 | .0018 | .0013 | .0023 | .0019 | .0034 | .0025 | .0045 | .0036 | .0065 | .0046 | .0083 |
| | | 21 - 36 HRC | 250 | .0005 | .0009 | .0007 | .0013 | .0010 | .0017 | .0014 | .0026 | .0019 | .0033 | .0027 | .0049 | .0034 | .0062 |
| Titanium Alloy | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0004 | .0007 | .0006 | .0010 | .0008 | .0014 | .0011 | .0020 | .0015 | .0026 | .0021 | .0038 | .0027 | .0049 |
| | | 36 - 50 HRC | 160 | .0004 | .0006 | .0005 | .0009 | .0007 | .0012 | .0010 | .0019 | .0014 | .0024 | .0019 | .0035 | .0025 | .0045 |
| Cobalt Alloy | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0003 | .0006 | .0005 | .0009 | .0007 | .0012 | .0010 | .0017 | .0013 | .0022 | .0018 | .0032 | .0023 | .0041 |
| | | 21 - 36 HRC | 170 | .0003 | .0006 | .0005 | .0009 | .0006 | .0011 | .0009 | .0017 | .0012 | .0022 | .0017 | .0031 | .0022 | .0040 |
| | | 36 - 50 HRC | 65 | .0002 | .0004 | .0003 | .0006 | .0004 | .0008 | .0006 | .0011 | .0008 | .0015 | .0012 | .0021 | .0015 | .0027 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 100%-150% Diameter | 100% Diameter |
| | ≥ 35 HRC | 100%-125% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | Up to 50% Diameter |
| | ≥ 35 HRC | Up to Max LOC | Up to 50% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# HSV-4

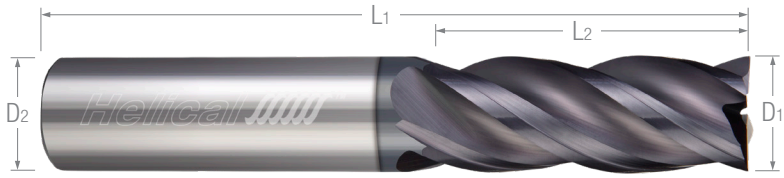
New Item!

## 4 FLUTE - SQUARE

### Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 166 for T*plus* coating

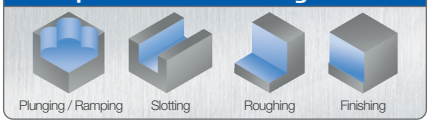



| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | A*plus* Coated | A*plus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 4 | 30017 | | HSV-S-40125 |
| | 1/8 | 3/8 | 2 | 4 | 81635 | | HSV-SR-40125 |
| | 1/8 | 1/2 | 2-1/2 | 4 | 30032 | | HSV-R-40125 |
| | 1/8 | 5/8 | 2-1/2 | 4 | 81636 | | HSV-A-40125 |
| | 1/8 | 3/4 | 2-1/2 | 4 | 81637 | | HSV-M-40125 |
| | 1/8 | 7/8 | 2-1/2 | 4 | 82253 | | HSV-L-40125 |
| 5/32 | 3/16 | 3/16 | 2 | 4 | 30047 | | HSV-S-40156 |
| | 3/16 | 7/16 | 2-1/2 | 4 | 30062 | | HSV-R-40156 |
| | 3/16 | 9/16 | 2-1/2 | 4 | 81638 | | HSV-M-40156 |
| | 3/16 | 3/4 | 2-1/2 | 4 | 82254 | | HSV-ML-40156 |
| 3/16 | 3/16 | 5/16 | 2 | 4 | 30077 | | HSV-S-40187 |
| | 3/16 | 7/16 | 2 | 4 | 81639 | | HSV-SR-40187 |
| | 3/16 | 5/8 | 2-1/2 | 4 | 30092 | | HSV-R-40187 |
| | 3/16 | 1 | 2-1/2 | 4 | 81640 | | HSV-M-40187 |
| | 3/16 | 1-3/16 | 3 | 4 | 82255 | | HSV-L-40187 |
| 7/32 | 1/4 | 1/4 | 2 | 4 | 30107 | | HSV-S-40218 |
| | 1/4 | 7/16 | 2-1/2 | 4 | 30122 | | HSV-R-40218 |
| | 1/4 | 5/8 | 2-1/2 | 4 | 82256 | | HSV-A-40218 |
| 1/4 | 1/4 | 3/8 | 2 | 4 | 30137 | 30137W | HSV-S-40250 |
| | 1/4 | 1/2 | 2-1/2 | 4 | 30142 | 30142W | HSV-SR-40250 |
| | 1/4 | 3/4 | 2-1/2 | 4 | 30152 | 30152W | HSV-R-40250 |
| | 1/4 | 1 | 3 | 4 | 30167 | 30167W | HSV-M-40250 |
| | 1/4 | 1-1/4 | 3 | 4 | 81641 | | HSV-L-40250 |
| | 1/4 | 1-1/2 | 3 | 4 | 81642 | | HSV-LX-40250 |
| new | 1/4 | 1-3/4 | 4 | 4 | 83182 | | HSV-X-40250 |
| 9/32 | 5/16 | 7/16 | 2 | 4 | 30182 | | HSV-S-40281 |
| | 5/16 | 5/8 | 2-1/2 | 4 | 30197 | | HSV-R-40281 |
| | 5/16 | 1 | 3 | 4 | 30212 | | HSV-M-40281 |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115



# 4 FLUTE - SQUARE New Item!

## HSV-4

### Variable Pitch (cont.)

continued from previous page

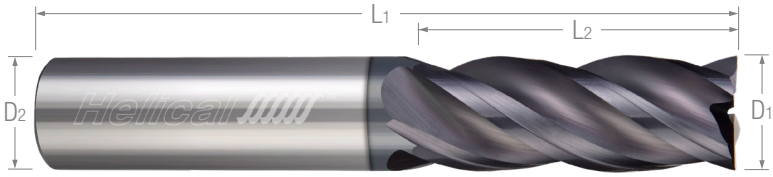
| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|
| 5/16 | 5/16 | 1/2 | 2 | 4 | **30227** | **30227W** | HSV-S-40312 |
| | 5/16 | 3/4 | 2-1/2 | 4 | **30242** | **30242W** | HSV-R-40312 |
| | 5/16 | 1 | 2-1/2 | 4 | **81643** | | HSV-A-40312 |
| | 5/16 | 1-1/4 | 3 | 4 | **30257** | | HSV-M-40312 |
| | 5/16 | 1-9/16 | 4 | 4 | **82257** | | HSV-ML-40312 |
| 3/8 | 3/8 | 1/2 | 2 | 4 | **30317** | **30317W** | HSV-S-40375 |
| | 3/8 | 7/8 | 3 | 4 | **30332** | **30332W** | HSV-SR-40375 |
| | 3/8 | 1 | 3 | 4 | **30337** | **30337W** | HSV-R-40375 |
| | 3/8 | 1-1/4 | 3 | 4 | **30347** | **30347W** | HSV-M-40375 |
| | 3/8 | 1-1/2 | 3 | 4 | **81644** | | HSV-L-40375 |
| | 3/8 | 2 | 4 | 4 | **82258** | | HSV-LX-40375 |
| 13/32 | 7/16 | 1/2 | 2-3/4 | 4 | **30362** | | HSV-S-40406 |
| 7/16 | 7/16 | 5/8 | 2-3/4 | 4 | **30407** | | HSV-S-40437 |
| | 7/16 | 7/8 | 2-3/4 | 4 | **30422** | | HSV-R-40437 |
| | 7/16 | 1-1/8 | 3-1/2 | 4 | **30437** | | HSV-M-40437 |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 4 | **30497** | **30497W** | HSV-S-40500 |
| | 1/2 | 1 | 3 | 4 | **30512** | **30512W** | HSV-SR-40500 |
| | 1/2 | 1-1/4 | 3 | 4 | **30527** | **30527W** | HSV-R-40500 |
| | 1/2 | 1-5/8 | 4 | 4 | **30542** | **30542W** | HSV-M-40500 |
| | 1/2 | 2 | 4 | 4 | **81645** | | HSV-L-40500 |
| | 1/2 | 2-1/2 | 5 | 4 | **81646** | | HSV-LX-40500 |
| | 1/2 | 3-1/8 | 6 | 4 | **82259** | | HSV-X-40500 |
| 5/8 | 5/8 | 3/4 | 3 | 4 | **30557** | | HSV-S-40625 |
| | 5/8 | 1-1/4 | 3-1/2 | 4 | **30572** | **30572W** | HSV-SR-40625 |
| | 5/8 | 1-5/8 | 3-1/2 | 4 | **30587** | **30587W** | HSV-R-40625 |
| | 5/8 | 2 | 4 | 4 | **30602** | | HSV-M-40625 |
| | 5/8 | 2-1/2 | 5 | 4 | **82260** | | HSV-ML-40625 |
| | 5/8 | 3-1/4 | 6 | 4 | **30617** | | HSV-L-40625 |
| 3/4 | 3/4 | 7/8 | 3 | 4 | **30632** | | HSV-S-40750 |
| | 3/4 | 1-1/4 | 4 | 4 | **30647** | | HSV-SR-40750 |
| | 3/4 | 1-5/8 | 4 | 4 | **30662** | **30662W** | HSV-R-40750 |
| | 3/4 | 2-1/4 | 5 | 4 | **30677** | **30677W** | HSV-M-40750 |
| | 3/4 | 2-3/4 | 5 | 4 | **81647** | | HSV-ML-40750 |
| | 3/4 | 3-1/4 | 6 | 4 | **30692** | **30692W** | HSV-L-40750 |
| | 3/4 | 4 | 6-1/2 | 4 | **82261** | | HSV-LX-40750 |
| 1 | 1 | 1-1/2 | 4 | 4 | **30707** | | HSV-S-41000 |
| | 1 | 2 | 4-1/2 | 4 | **30722** | | HSV-R-41000 |
| | 1 | 2-5/8 | 5 | 4 | **30737** | | HSV-M-41000 |
| | 1 | 3 | 6 | 4 | **30742** | | HSV-ML-41000 |
| | 1 | 4-1/4 | 7 | 4 | **30752** | | HSV-L-41000 |

* .0005 max TIR

# MHSV-4
## METRIC

# 4 FLUTE - SQUARE - METRIC
## Variable Pitch

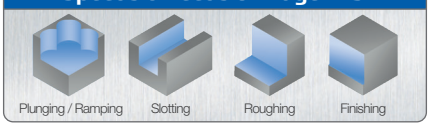
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ $^{+.00\ mm}_{-.05\ mm}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.60\ mm}_{-1.60\ mm}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | 9.00 mm | 63 mm | 4 | **59458** | MHSV-015-40600 |
| | 6.00 mm | 12.00 mm | 63 mm | 4 | **59476** | MHSV-020-40600 |
| | 6.00 mm | 18.00 mm | 63 mm | 4 | **59510** | MHSV-030-40600 |
| 8 mm | 8.00 mm | 12.00 mm | 63 mm | 4 | **59461** | MHSV-015-40800 |
| | 8.00 mm | 16.00 mm | 63 mm | 4 | **59479** | MHSV-020-40800 |
| | 8.00 mm | 24.00 mm | 75 mm | 4 | **59513** | MHSV-030-40800 |
| 10 mm | 10.00 mm | 15.00 mm | 63 mm | 4 | **59464** | MHSV-015-41000 |
| | 10.00 mm | 20.00 mm | 63 mm | 4 | **59482** | MHSV-020-41000 |
| | 10.00 mm | 25.00 mm | 75 mm | 4 | **59496** | MHSV-025-41000 |
| 12 mm | 12.00 mm | 18.00 mm | 75 mm | 4 | **59467** | MHSV-015-41200 |
| | 12.00 mm | 24.00 mm | 75 mm | 4 | **59485** | MHSV-020-41200 |
| | 12.00 mm | 30.00 mm | 75 mm | 4 | **59499** | MHSV-025-41200 |
| 16 mm | 16.00 mm | 24.00 mm | 89 mm | 4 | **59470** | MHSV-015-41600 |
| | 16.00 mm | 32.00 mm | 89 mm | 4 | **59488** | MHSV-020-41600 |
| | 16.00 mm | 40.00 mm | 89 mm | 4 | **59502** | MHSV-025-41600 |
| 20 mm | 20.00 mm | 30.00 mm | 89 mm | 4 | **59473** | MHSV-015-42000 |
| | 20.00 mm | 40.00 mm | 100 mm | 4 | **59491** | MHSV-020-42000 |
| | 20.00 mm | 50.00 mm | 125 mm | 4 | **59505** | MHSV-025-42000 |
| 25 mm | 25.00 mm | 50.00 mm | 125 mm | 4 | **59494** | MHSV-020-42500 |
| | 25.00 mm | 64.00 mm | 125 mm | 4 | **59508** | MHSV-025-42500 |

* .013 mm max TIR

Speeds & Feeds on Page 115



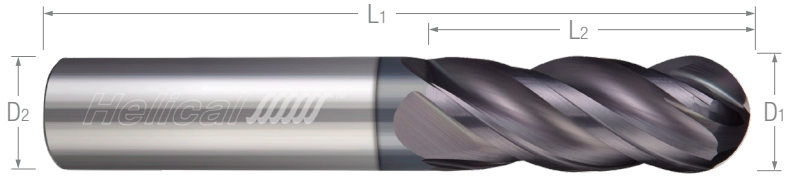
# 4 FLUTE - BALL New Items!

## HSV-4

### Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 168 for *Tplus* coating



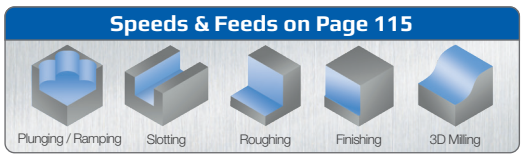



| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 4 | 56017 | HSV-S-40125-BN | |
| | 1/8 | 3/8 | 2 | 4 | 81674 | HSV-SR-40125-BN | |
| | 1/8 | 1/2 | 2-1/2 | 4 | 56032 | HSV-R-40125-BN | |
| | 1/8 | 5/8 | 2-1/2 | 4 | 81675 | HSV-A-40125-BN | |
| | 1/8 | 3/4 | 2-1/2 | 4 | 82510 | HSV-M-40125-BN | |
| 5/32 | 3/16 | 3/16 | 2 | 4 | 83941 | HSV-S-40156-BN | new |
| | 3/16 | 7/16 | 2-1/2 | 4 | 83942 | HSV-R-40156-BN | new |
| | 3/16 | 9/16 | 2-1/2 | 4 | 83943 | HSV-M-40156-BN | new |
| 3/16 | 3/16 | 5/16 | 2 | 4 | 56077 | HSV-S-40187-BN | |
| | 3/16 | 7/16 | 2 | 4 | 82511 | HSV-SR-40187-BN | |
| | 3/16 | 5/8 | 2-1/2 | 4 | 56092 | HSV-R-40187-BN | |
| | 3/16 | 1 | 2-1/2 | 4 | 81676 | HSV-M-40187-BN | |
| | 3/16 | 1-3/16 | 3 | 4 | 83273 | HSV-L-40187-BN | new |
| 7/32 | 1/4 | 1/4 | 2 | 4 | 83944 | HSV-S-40218-BN | new |
| | 1/4 | 7/16 | 2-1/2 | 4 | 83945 | HSV-R-40218-BN | new |
| 1/4 | 1/4 | 3/8 | 2 | 4 | 56137 | HSV-S-40250-BN | |
| | 1/4 | 1/2 | 2-1/2 | 4 | 56142 | HSV-SR-40250-BN | |
| | 1/4 | 3/4 | 2-1/2 | 4 | 56152 | HSV-R-40250-BN | |
| | 1/4 | 1 | 3 | 4 | 56167 | HSV-M-40250-BN | |
| | 1/4 | 1-1/4 | 3 | 4 | 81677 | HSV-L-40250-BN | |
| | 1/4 | 1-1/2 | 3 | 4 | 82512 | HSV-LX-40250-BN | |
| 9/32 | 5/16 | 7/16 | 2 | 4 | 83946 | HSV-S-40281-BN | new |
| | 5/16 | 5/8 | 2-1/2 | 4 | 83947 | HSV-R-40281-BN | new |
| 5/16 | 5/16 | 1/2 | 2 | 4 | 56227 | HSV-S-40312-BN | |
| | 5/16 | 3/4 | 2-1/2 | 4 | 56242 | HSV-R-40312-BN | |
| | 5/16 | 1 | 2-1/2 | 4 | 81678 | HSV-A-40312-BN | |
| | 5/16 | 1-1/4 | 3 | 4 | 56257 | HSV-M-40312-BN | |
| | 5/16 | 1-9/16 | 4 | 4 | 82513 | HSV-L-40312-BN | |
| 3/8 | 3/8 | 1/2 | 2 | 4 | 56317 | HSV-S-40375-BN | |
| | 3/8 | 7/8 | 3 | 4 | 56332 | HSV-SR-40375-BN | |
| | 3/8 | 1 | 3 | 4 | 56337 | HSV-R-40375-BN | |
| | 3/8 | 1-1/4 | 3 | 4 | 56347 | HSV-M-40375-BN | |
| | 3/8 | 1-1/2 | 3 | 4 | 82514 | HSV-L-40375-BN | |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115



# HSV-4

New Items!

## 4 FLUTE - BALL

Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 7/16 | 7/16 | 5/8 | 2-3/4 | 4 | 56407 | HSV-S-40437-BN |
| | 7/16 | 7/8 | 2-3/4 | 4 | 56422 | HSV-R-40437-BN |
| | 7/16 | 1-1/8 | 3-1/2 | 4 | 56437 | HSV-M-40437-BN |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 4 | 56497 | HSV-S-40500-BN |
| | 1/2 | 1 | 3 | 4 | 56512 | HSV-SR-40500-BN |
| | 1/2 | 1-1/4 | 3 | 4 | 56527 | HSV-R-40500-BN |
| | 1/2 | 1-5/8 | 4 | 4 | 56542 | HSV-M-40500-BN |
| | 1/2 | 2 | 4 | 4 | 81679 | HSV-L-40500-BN |
| new | 1/2 | 2-1/2 | 5 | 4 | 83274 | HSV-LX-40500-BN |
| 5/8 | 5/8 | 3/4 | 3 | 4 | 56557 | HSV-S-40625-BN |
| | 5/8 | 1-1/4 | 3-1/2 | 4 | 56572 | HSV-SR-40625-BN |
| | 5/8 | 1-5/8 | 3-1/2 | 4 | 56587 | HSV-R-40625-BN |
| | 5/8 | 2 | 4 | 4 | 56602 | HSV-M-40625-BN |
| | 5/8 | 3-1/4 | 6 | 4 | 56617 | HSV-L-40625-BN |
| 3/4 | 3/4 | 7/8 | 3 | 4 | 56632 | HSV-S-40750-BN |
| | 3/4 | 1-1/4 | 4 | 4 | 56647 | HSV-SR-40750-BN |
| | 3/4 | 1-5/8 | 4 | 4 | 56662 | HSV-R-40750-BN |
| | 3/4 | 2-1/4 | 5 | 4 | 56677 | HSV-M-40750-BN |
| | 3/4 | 3-1/4 | 6 | 4 | 56692 | HSV-L-40750-BN |
| 1 | 1 | 1-1/2 | 4 | 4 | 56707 | HSV-S-41000-BN |
| | 1 | 2 | 4- 1/2 | 4 | 56722 | HSV-R-41000-BN |
| | 1 | 2-5/8 | 5 | 4 | 56737 | HSV-M-41000-BN |
| | 1 | 3 | 6 | 4 | 56742 | HSV-ML-41000-BN |
| | 1 | 4-1/4 | 7 | 4 | 56752 | HSV-L-41000-BN |

* .0005 max TIR

## Ball Nose Milling Strategy Guide

Ball nose end mills are ideal for machining 3-dimensional contour shapes typically found in the mold and die industry, the manufacturing of turbine blades, and fulfilling general part radius requirements. Learn the two-step process for properly employing a ball nose end mill (with no tilt angle) and gain the optimal tool life and part finish by reading our “In the Loupe” blog post **Ball Nose Milling Strategy Guide.**

**Read more on helical.blog/intheloupe**

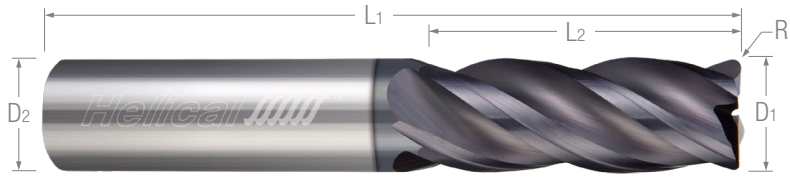
# 4 FLUTE - CORNER RADIUS New Items!

## HSV-4

### Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 169 for T*plus* coating



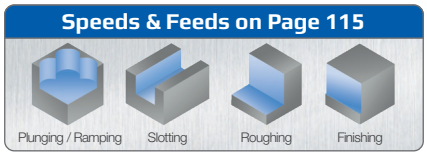



| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 4 | **31017** | | HSV-S-40125-R.010 | |
| | 1/8 | **.010** | 3/8 | 2 | 4 | **81648** | | HSV-SR-40125-R.010 | |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 4 | **31032** | | HSV-R-40125-R.010 | |
| | 1/8 | **.010** | 5/8 | 2-1/2 | 4 | **81649** | | HSV-A-40125-R.010 | |
| | 1/8 | **.010** | 3/4 | 2-1/2 | 4 | **81650** | | HSV-M-40125-R.010 | |
| | 1/8 | **.010** | 7/8 | 2-1/2 | 4 | **83212** | | HSV-L-40125-R.010 | new |
| | 1/8 | **.015** | 1/4 | 1-1/2 | 4 | **81651** | | HSV-S-40125-R.015 | |
| | 1/8 | **.015** | 3/8 | 2 | 4 | **82276** | | HSV-SR-40125-R.015 | |
| | 1/8 | **.015** | 1/2 | 2-1/2 | 4 | **81652** | | HSV-R-40125-R.015 | |
| | 1/8 | **.015** | 5/8 | 2-1/2 | 4 | **83213** | | HSV-A-40125-R.015 | new |
| | 1/8 | **.020** | 1/4 | 1-1/2 | 4 | **83214** | | HSV-S-40125-R.020 | new |
| | 1/8 | **.020** | 3/8 | 2 | 4 | **83215** | | HSV-SR-40125-R.020 | new |
| | 1/8 | **.020** | 1/2 | 2-1/2 | 4 | **83216** | | HSV-R-40125-R.020 | new |
| | 1/8 | **.030** | 1/4 | 1-1/2 | 4 | **43017** | | HSV-S-40125-R.030 | |
| | 1/8 | **.030** | 3/8 | 2 | 4 | **82277** | | HSV-SR-40125-R.030 | |
| | 1/8 | **.030** | 1/2 | 2-1/2 | 4 | **43032** | | HSV-R-40125-R.030 | |
| | 1/8 | **.030** | 5/8 | 2-1/2 | 4 | **82278** | | HSV-A-40125-R.030 | |
| 5/32 | 3/16 | **.010** | 3/16 | 2 | 4 | **31047** | | HSV-S-40156-R.010 | |
| | 3/16 | **.010** | 7/16 | 2-1/2 | 4 | **31062** | | HSV-R-40156-R.010 | |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 4 | **81653** | | HSV-M-40156-R.010 | |
| | 3/16 | **.030** | 3/16 | 2 | 4 | **82279** | | HSV-S-40156-R.030 | |
| | 3/16 | **.030** | 7/16 | 2-1/2 | 4 | **82280** | | HSV-R-40156-R.030 | |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115



# HSV-4

New Items!

## 4 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 3/16 | 3/16 | .010 | 5/16 | 2 | 4 | 31077 | | HSV-S-40187-R.010 |
| | | 3/16 | .010 | 7/16 | 2 | 4 | 81654 | | HSV-SR-40187-R.010 |
| | | 3/16 | .010 | 5/8 | 2-1/2 | 4 | 31092 | | HSV-R-40187-R.010 |
| | | 3/16 | .010 | 1 | 2-1/2 | 4 | 81655 | | HSV-M-40187-R.010 |
| new | | 3/16 | .010 | 1-3/16 | 3 | 4 | 83217 | | HSV-L-40187-R.010 |
| new | | 3/16 | .015 | 5/16 | 2 | 4 | 83218 | | HSV-S-40187-R.015 |
| new | | 3/16 | .015 | 7/16 | 2 | 4 | 83219 | | HSV-SR-40187-R.015 |
| new | | 3/16 | .015 | 5/8 | 2-1/2 | 4 | 83220 | | HSV-R-40187-R.015 |
| new | | 3/16 | .020 | 5/16 | 2 | 4 | 83221 | | HSV-S-40187-R.020 |
| new | | 3/16 | .020 | 7/16 | 2 | 4 | 83222 | | HSV-SR-40187-R.020 |
| new | | 3/16 | .020 | 5/8 | 2-1/2 | 4 | 83223 | | HSV-R-40187-R.020 |
| | | 3/16 | .030 | 5/16 | 2 | 4 | 43077 | | HSV-S-40187-R.030 |
| | | 3/16 | .030 | 7/16 | 2 | 4 | 82281 | | HSV-SR-40187-R.030 |
| | | 3/16 | .030 | 5/8 | 2-1/2 | 4 | 43092 | | HSV-R-40187-R.030 |
| | | 3/16 | .030 | 1 | 2-1/2 | 4 | 82282 | | HSV-M-40187-R.030 |
| | 7/32 | 1/4 | .010 | 1/4 | 2 | 4 | 31107 | | HSV-S-40218-R.010 |
| | | 1/4 | .010 | 7/16 | 2-1/2 | 4 | 31122 | | HSV-R-40218-R.010 |
| | | 1/4 | .010 | 5/8 | 2-1/2 | 4 | 82283 | | HSV-A-40218-R.010 |
| | 1/4 | 1/4 | .010 | 3/8 | 2 | 4 | 81656 | | HSV-S-40250-R.010 |
| | | 1/4 | .010 | 1/2 | 2-1/2 | 4 | 81657 | | HSV-SR-40250-R.010 |
| | | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 81658 | | HSV-R-40250-R.010 |
| | | 1/4 | .010 | 1 | 3 | 4 | 82284 | | HSV-M-40250-R.010 |
| | | 1/4 | .010 | 1-1/4 | 3 | 4 | 82285 | | HSV-L-40250-R.010 |
| | | 1/4 | .015 | 3/8 | 2 | 4 | 82286 | | HSV-S-40250-R.015 |
| | | 1/4 | .015 | 1/2 | 2-1/2 | 4 | 82287 | | HSV-SR-40250-R.015 |
| | | 1/4 | .015 | 3/4 | 2-1/2 | 4 | 82288 | | HSV-R-40250-R.015 |
| | | 1/4 | .015 | 1 | 3 | 4 | 82289 | | HSV-M-40250-R.015 |
| | | 1/4 | .015 | 1-1/4 | 3 | 4 | 82290 | | HSV-L-40250-R.015 |
| | | 1/4 | .020 | 3/8 | 2 | 4 | 31137 | 31137W | HSV-S-40250-R.020 |
| | | 1/4 | .020 | 1/2 | 2-1/2 | 4 | 31142 | 31142W | HSV-SR-40250-R.020 |
| | | 1/4 | .020 | 3/4 | 2-1/2 | 4 | 31152 | 31152W | HSV-R-40250-R.020 |
| | | 1/4 | .020 | 1 | 3 | 4 | 31167 | 31167W | HSV-M-40250-R.020 |
| | | 1/4 | .020 | 1-1/4 | 3 | 4 | 81659 | | HSV-L-40250-R.020 |
| new | | 1/4 | .020 | 1-1/2 | 3 | 4 | 83224 | | HSV-LX-40250-R.020 |
| | | 1/4 | .030 | 3/8 | 2 | 4 | 43137 | | HSV-S-40250-R.030 |
| | | 1/4 | .030 | 1/2 | 2-1/2 | 4 | 43142 | | HSV-SR-40250-R.030 |
| | | 1/4 | .030 | 3/4 | 2-1/2 | 4 | 43152 | | HSV-R-40250-R.030 |
| | | 1/4 | .030 | 1 | 3 | 4 | 43167 | | HSV-M-40250-R.030 |
| | | 1/4 | .030 | 1-1/4 | 3 | 4 | 82291 | | HSV-L-40250-R.030 |
| | | 1/4 | .060 | 3/8 | 2 | 4 | 43138 | | HSV-S-40250-R.060 |
| | | 1/4 | .060 | 1/2 | 2-1/2 | 4 | 43143 | | HSV-SR-40250-R.060 |
| | | 1/4 | .060 | 3/4 | 2-1/2 | 4 | 43153 | | HSV-R-40250-R.060 |
| | | 1/4 | .060 | 1 | 3 | 4 | 43168 | | HSV-M-40250-R.060 |
| | | 1/4 | .060 | 1-1/4 | 3 | 4 | 82292 | | HSV-L-40250-R.060 |
| | 9/32 | 5/16 | .020 | 7/16 | 2 | 4 | 31182 | | HSV-S-40281-R.020 |
| | | 5/16 | .020 | 5/8 | 2-1/2 | 4 | 31197 | | HSV-R-40281-R.020 |
| | | 5/16 | .020 | 1 | 3 | 4 | 31212 | | HSV-M-40281-R.020 |

* .0005 max TIR

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# 4 FLUTE - CORNER RADIUS New Items!

## HSV-4

### Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 5/16 | 5/16 | .010 | 1/2 | 2 | 4 | 82293 | | HSV-S-40312-R.010 | |
| | 5/16 | .010 | 3/4 | 2-1/2 | 4 | 82294 | | HSV-R-40312-R.010 | |
| | 5/16 | .010 | 1-1/4 | 3 | 4 | 82295 | | HSV-M-40312-R.010 | |
| | 5/16 | .020 | 1/2 | 2 | 4 | 31227 | 31227W | HSV-S-40312-R.020 | |
| | 5/16 | .020 | 3/4 | 2-1/2 | 4 | 31242 | | HSV-R-40312-R.020 | |
| | 5/16 | .020 | 1 | 2-1/2 | 4 | 81660 | | HSV-A-40312-R.020 | |
| | 5/16 | .020 | 1-1/4 | 3 | 4 | 31257 | | HSV-M-40312-R.020 | |
| | 5/16 | .020 | 1-9/16 | 4 | 4 | 82296 | | HSV-ML-40312-R.020 | |
| | 5/16 | .030 | 1/2 | 2 | 4 | 43227 | 43227W | HSV-S-40312-R.030 | |
| | 5/16 | .030 | 3/4 | 2-1/2 | 4 | 43242 | | HSV-R-40312-R.030 | |
| | 5/16 | .030 | 1-1/4 | 3 | 4 | 43257 | | HSV-M-40312-R.030 | |
| | 5/16 | .060 | 1/2 | 2 | 4 | 43228 | | HSV-S-40312-R.060 | |
| | 5/16 | .060 | 3/4 | 2-1/2 | 4 | 43243 | | HSV-R-40312-R.060 | |
| | 5/16 | .060 | 1-1/4 | 3 | 4 | 43258 | | HSV-M-40312-R.060 | |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 4 | 81661 | | HSV-S-40375-R.010 | |
| | 3/8 | .010 | 7/8 | 3 | 4 | 81662 | | HSV-SR-40375-R.010 | |
| | 3/8 | .010 | 1-1/4 | 3 | 4 | 81663 | | HSV-M-40375-R.010 | |
| | 3/8 | .010 | 1-1/2 | 3 | 4 | 83225 | | HSV-L-40375-R.010 | new |
| | 3/8 | .015 | 1/2 | 2 | 4 | 83226 | | HSV-S-40375-R.015 | new |
| | 3/8 | .015 | 7/8 | 3 | 4 | 83227 | | HSV-SR-40375-R.015 | new |
| | 3/8 | .015 | 1-1/4 | 3 | 4 | 83228 | | HSV-M-40375-R.015 | new |
| | 3/8 | .020 | 1/2 | 2 | 4 | 31317 | 31317W | HSV-S-40375-R.020 | |
| | 3/8 | .020 | 7/8 | 3 | 4 | 31332 | 31332W | HSV-SR-40375-R.020 | |
| | 3/8 | .020 | 1 | 3 | 4 | 31337 | 31337W | HSV-R-40375-R.020 | |
| | 3/8 | .020 | 1-1/4 | 3 | 4 | 31347 | 31347W | HSV-M-40375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 3 | 4 | 81664 | | HSV-L-40375-R.020 | |
| | 3/8 | .030 | 1/2 | 2 | 4 | 43317 | 43317W | HSV-S-40375-R.030 | |
| | 3/8 | .030 | 7/8 | 3 | 4 | 43332 | | HSV-SR-40375-R.030 | |
| | 3/8 | .030 | 1 | 3 | 4 | 43337 | 43337W | HSV-R-40375-R.030 | |
| | 3/8 | .030 | 1-1/4 | 3 | 4 | 43347 | | HSV-M-40375-R.030 | |
| | 3/8 | .030 | 1-1/2 | 3 | 4 | 83229 | | HSV-L-40375-R.030 | new |
| | 3/8 | .060 | 1/2 | 2 | 4 | 43318 | 43318W | HSV-S-40375-R.060 | |
| | 3/8 | .060 | 7/8 | 3 | 4 | 43333 | | HSV-SR-40375-R.060 | |
| | 3/8 | .060 | 1 | 3 | 4 | 43338 | 43338W | HSV-R-40375-R.060 | |
| | 3/8 | .060 | 1-1/4 | 3 | 4 | 43348 | | HSV-M-40375-R.060 | |
| | 3/8 | .060 | 1-1/2 | 3 | 4 | 83230 | | HSV-L-40375-R.060 | new |
| | 3/8 | .090 | 1/2 | 2 | 4 | 43319 | | HSV-S-40375-R.090 | |
| | 3/8 | .090 | 7/8 | 3 | 4 | 43334 | | HSV-SR-40375-R.090 | |
| | 3/8 | .090 | 1 | 3 | 4 | 43339 | | HSV-R-40375-R.090 | |
| | 3/8 | .090 | 1-1/4 | 3 | 4 | 43349 | | HSV-M-40375-R.090 | |
| 13/32 | 7/16 | .020 | 15/16 | 2-3/4 | 4 | 31377 | | HSV-R-40406-R.020 | |

* .0005 max TIR

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New Items!

## 4 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 7/16 | 7/16 | .020 | 5/8 | 2-3/4 | 4 | 31407 | | HSV-S-40437-R.020 |
| | | 7/16 | .020 | 7/8 | 2-3/4 | 4 | 31422 | | HSV-R-40437-R.020 |
| | | 7/16 | .020 | 1-1/8 | 3-1/2 | 4 | 31437 | | HSV-M-40437-R.020 |
| | | 7/16 | .030 | 5/8 | 2-3/4 | 4 | 43407 | | HSV-S-40437-R.030 |
| | | 7/16 | .030 | 7/8 | 2-3/4 | 4 | 43422 | | HSV-R-40437-R.030 |
| | | 7/16 | .030 | 1-1/8 | 3-1/2 | 4 | 43437 | | HSV-M-40437-R.030 |
| | | 7/16 | .060 | 5/8 | 2-3/4 | 4 | 43408 | | HSV-S-40437-R.060 |
| | | 7/16 | .060 | 7/8 | 2-3/4 | 4 | 43423 | | HSV-R-40437-R.060 |
| | | 7/16 | .060 | 1-1/8 | 3-1/2 | 4 | 43438 | | HSV-M-40437-R.060 |
| | | 7/16 | .090 | 5/8 | 2-3/4 | 4 | 43409 | | HSV-S-40437-R.090 |
| | | 7/16 | .090 | 7/8 | 2-3/4 | 4 | 43424 | | HSV-R-40437-R.090 |
| | | 7/16 | .090 | 1-1/8 | 3-1/2 | 4 | 43439 | | HSV-M-40437-R.090 |
| | 15/32 | 1/2 | .030 | 5/8 | 2-1/2 | 4 | 31452 | | HSV-S-40468-R.030 |
| | | 1/2 | .030 | 1 | 3 | 4 | 31467 | | HSV-R-40468-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 4 | 31482 | | HSV-M-40468-R.030 |
| | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 4 | 82297 | | HSV-S-40500-R.010 |
| | | 1/2 | .010 | 1 | 3 | 4 | 82298 | | HSV-SR-40500-R.010 |
| | | 1/2 | .010 | 1-1/4 | 3 | 4 | 82299 | | HSV-R-40500-R.010 |
| new | | 1/2 | .010 | 1-5/8 | 4 | 4 | 83231 | | HSV-M-40500-R.010 |
| | | 1/2 | .015 | 5/8 | 2-1/2 | 4 | 81665 | | HSV-S-40500-R.015 |
| | | 1/2 | .015 | 1 | 3 | 4 | 81666 | | HSV-SR-40500-R.015 |
| | | 1/2 | .015 | 1-1/4 | 3 | 4 | 81667 | | HSV-R-40500-R.015 |
| new | | 1/2 | .015 | 1-5/8 | 4 | 4 | 83232 | | HSV-M-40500-R.015 |
| new | | 1/2 | .015 | 2 | 4 | 4 | 83233 | | HSV-L-40500-R.015 |
| | | 1/2 | .020 | 5/8 | 2-1/2 | 4 | 43496 | | HSV-S-40500-R.020 |
| | | 1/2 | .020 | 1 | 3 | 4 | 43511 | 43511W | HSV-SR-40500-R.020 |
| | | 1/2 | .020 | 1-1/4 | 3 | 4 | 43526 | 43526W | HSV-R-40500-R.020 |
| | | 1/2 | .020 | 1-5/8 | 4 | 4 | 43541 | | HSV-M-40500-R.020 |
| new | | 1/2 | .020 | 2 | 4 | 4 | 83234 | | HSV-L-40500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 4 | 31497 | 31497W | HSV-S-40500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 4 | 31512 | 31512W | HSV-SR-40500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 4 | 31527 | 31527W | HSV-R-40500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 4 | 31542 | 31542W | HSV-M-40500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 4 | 81668 | | HSV-L-40500-R.030 |
| new | | 1/2 | .030 | 2-1/2 | 5 | 4 | 83235 | | HSV-LX-40500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 4 | 43497 | | HSV-S-40500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 4 | 43512 | | HSV-SR-40500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 4 | 43527 | 43527W | HSV-R-40500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 4 | 43542 | 43542W | HSV-M-40500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 4 | 81669 | | HSV-L-40500-R.060 |
| new | | 1/2 | .060 | 2-1/2 | 5 | 4 | 83236 | | HSV-LX-40500-R.060 |
| | | 1/2 | .090 | 5/8 | 2-1/2 | 4 | 43498 | | HSV-S-40500-R.090 |
| | | 1/2 | .090 | 1 | 3 | 4 | 43513 | | HSV-SR-40500-R.090 |
| | | 1/2 | .090 | 1-1/4 | 3 | 4 | 43528 | | HSV-R-40500-R.090 |
| | | 1/2 | .090 | 1-5/8 | 4 | 4 | 43543 | | HSV-M-40500-R.090 |
| | | 1/2 | .125 | 5/8 | 2-1/2 | 4 | 43499 | | HSV-S-40500-R.125 |
| | | 1/2 | .125 | 1 | 3 | 4 | 43514 | | HSV-SR-40500-R.125 |
| | | 1/2 | .125 | 1-1/4 | 3 | 4 | 43529 | 43529W | HSV-R-40500-R.125 |
| | | 1/2 | .125 | 1-5/8 | 4 | 4 | 43544 | | HSV-M-40500-R.125 |
| new | | 1/2 | .125 | 2 | 4 | 4 | 83237 | | HSV-L-40500-R.125 |

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# 4 FLUTE - CORNER RADIUS New Items!

## HSV-4

### Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 4 | **31557** | | HSV-S-40625-R.030 |
| | 5/8 | **.030** | 1-1/4 | 3-1/2 | 4 | **31572** | **31572W** | HSV-SR-40625-R.030 |
| | 5/8 | **.030** | 1-5/8 | 3-1/2 | 4 | **31587** | **31587W** | HSV-R-40625-R.030 |
| | 5/8 | **.030** | 2 | 4 | 4 | **31602** | **31602W** | HSV-M-40625-R.030 |
| | 5/8 | **.030** | 2-1/2 | 5 | 4 | **81670** | | HSV-ML-40625-R.030 |
| | 5/8 | **.030** | 3-1/4 | 6 | 4 | **31617** | | HSV-L-40625-R.030 |
| | 5/8 | **.030** | 3-3/4 | 6 | 4 | **82300** | | HSV-LX-40625-R.030 |
| | 5/8 | **.060** | 3/4 | 3 | 4 | **43557** | | HSV-S-40625-R.060 |
| | 5/8 | **.060** | 1-1/4 | 3-1/2 | 4 | **43572** | | HSV-SR-40625-R.060 |
| | 5/8 | **.060** | 1-5/8 | 3-1/2 | 4 | **43587** | | HSV-R-40625-R.060 |
| | 5/8 | **.060** | 2 | 4 | 4 | **43602** | | HSV-M-40625-R.060 |
| | 5/8 | **.060** | 3-1/4 | 6 | 4 | **43617** | | HSV-L-40625-R.060 |
| | 5/8 | **.090** | 3/4 | 3 | 4 | **43558** | | HSV-S-40625-R.090 |
| | 5/8 | **.090** | 1-1/4 | 3-1/2 | 4 | **43573** | | HSV-SR-40625-R.090 |
| | 5/8 | **.090** | 1-5/8 | 3-1/2 | 4 | **43588** | | HSV-R-40625-R.090 |
| | 5/8 | **.090** | 2 | 4 | 4 | **43603** | | HSV-M-40625-R.090 |
| | 5/8 | **.090** | 3-1/4 | 6 | 4 | **43618** | | HSV-L-40625-R.090 |
| | 5/8 | **.125** | 3/4 | 3 | 4 | **43559** | | HSV-S-40625-R.125 |
| | 5/8 | **.125** | 1-1/4 | 3-1/2 | 4 | **43574** | | HSV-SR-40625-R.125 |
| | 5/8 | **.125** | 1-5/8 | 3-1/2 | 4 | **43589** | | HSV-R-40625-R.125 |
| | 5/8 | **.125** | 2 | 4 | 4 | **43604** | | HSV-M-40625-R.125 |
| | 5/8 | **.125** | 3-1/4 | 6 | 4 | **43619** | | HSV-L-40625-R.125 |
| 3/4 | 3/4 | **.015** | 1-1/4 | 4 | 4 | **81671** | | HSV-SR-40750-R.015 |
| | 3/4 | **.015** | 1-5/8 | 4 | 4 | **81672** | | HSV-R-40750-R.015 |
| | 3/4 | **.030** | 7/8 | 3 | 4 | **31632** | **31632W** | HSV-S-40750-R.030 |
| | 3/4 | **.030** | 1-1/4 | 4 | 4 | **31647** | **31647W** | HSV-SR-40750-R.030 |
| | 3/4 | **.030** | 1-5/8 | 4 | 4 | **31662** | **31662W** | HSV-R-40750-R.030 |
| | 3/4 | **.030** | 2-1/4 | 5 | 4 | **31677** | **31677W** | HSV-M-40750-R.030 |
| | 3/4 | **.030** | 2-3/4 | 5 | 4 | **81673** | | HSV-ML-40750-R.030 |
| | 3/4 | **.030** | 3-1/4 | 6 | 4 | **31692** | **31692W** | HSV-L-40750-R.030 |
| | 3/4 | **.030** | 4 | 6-1/2 | 4 | **82301** | | HSV-LX-40750-R.030 |
| | 3/4 | **.060** | 7/8 | 3 | 4 | **43632** | | HSV-S-40750-R.060 |
| | 3/4 | **.060** | 1-1/4 | 4 | 4 | **43647** | | HSV-SR-40750-R.060 |
| | 3/4 | **.060** | 1-5/8 | 4 | 4 | **43662** | | HSV-R-40750-R.060 |
| | 3/4 | **.060** | 2-1/4 | 5 | 4 | **43677** | | HSV-M-40750-R.060 |
| | 3/4 | **.060** | 3-1/4 | 6 | 4 | **43692** | | HSV-L-40750-R.060 |
| | 3/4 | **.090** | 7/8 | 3 | 4 | **43633** | | HSV-S-40750-R.090 |
| | 3/4 | **.090** | 1-1/4 | 4 | 4 | **43648** | | HSV-SR-40750-R.090 |
| | 3/4 | **.090** | 1-5/8 | 4 | 4 | **43663** | | HSV-R-40750-R.090 |
| | 3/4 | **.090** | 2-1/4 | 5 | 4 | **43678** | | HSV-M-40750-R.090 |
| | 3/4 | **.090** | 3-1/4 | 6 | 4 | **43693** | | HSV-L-40750-R.090 |
| | 3/4 | **.125** | 7/8 | 3 | 4 | **43634** | | HSV-S-40750-R.125 |
| | 3/4 | **.125** | 1-1/4 | 4 | 4 | **43649** | | HSV-SR-40750-R.125 |
| | 3/4 | **.125** | 1-5/8 | 4 | 4 | **43664** | | HSV-R-40750-R.125 |
| | 3/4 | **.125** | 2-1/4 | 5 | 4 | **43679** | | HSV-M-40750-R.125 |
| | 3/4 | **.125** | 3-1/4 | 6 | 4 | **43694** | | HSV-L-40750-R.125 |

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New Items!

## 4 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | **.190** | 7/8 | 3 | 4 | **43635** | | HSV-S-40750-R.190 |
| | 3/4 | **.190** | 1-1/4 | 4 | 4 | **43650** | | HSV-SR-40750-R.190 |
| | 3/4 | **.190** | 1-5/8 | 4 | 4 | **43665** | | HSV-R-40750-R.190 |
| | 3/4 | **.190** | 2-1/4 | 5 | 4 | **43680** | | HSV-M-40750-R.190 |
| | 3/4 | **.190** | 3-1/4 | 6 | 4 | **43695** | | HSV-L-40750-R.190 |
| | 3/4 | **.250** | 7/8 | 3 | 4 | **43636** | | HSV-S-40750-R.250 |
| | 3/4 | **.250** | 1-1/4 | 4 | 4 | **43651** | | HSV-SR-40750-R.250 |
| | 3/4 | **.250** | 1-5/8 | 4 | 4 | **43666** | | HSV-R-40750-R.250 |
| | 3/4 | **.250** | 2-1/4 | 5 | 4 | **43681** | | HSV-M-40750-R.250 |
| | 3/4 | **.250** | 3-1/4 | 6 | 4 | **43696** | | HSV-L-40750-R.250 |
| 1 | 1 | **.030** | 1-1/2 | 4 | 4 | **31707** | | HSV-S-41000-R.030 |
| | 1 | **.030** | 2 | 4-1/2 | 4 | **31722** | | HSV-R-41000-R.030 |
| | 1 | **.030** | 2-5/8 | 5 | 4 | **31737** | | HSV-M-41000-R.030 |
| | 1 | **.030** | 3 | 6 | 4 | **31742** | | HSV-ML-41000-R.030 |
| | 1 | **.030** | 4-1/4 | 7 | 4 | **31752** | | HSV-L-41000-R.030 |
| | 1 | **.030** | 5-1/4 | 9 | 4 | **82302** | | HSV-LX-41000-R.030 |
| | 1 | **.060** | 1-1/2 | 4 | 4 | **43707** | | HSV-S-41000-R.060 |
| | 1 | **.060** | 2 | 4-1/2 | 4 | **43722** | | HSV-R-41000-R.060 |
| | 1 | **.060** | 2-5/8 | 5 | 4 | **43737** | | HSV-M-41000-R.060 |
| | 1 | **.060** | 3 | 6 | 4 | **43742** | | HSV-ML-41000-R.060 |
| | 1 | **.060** | 4-1/4 | 7 | 4 | **43752** | | HSV-L-41000-R.060 |
| | 1 | **.090** | 1-1/2 | 4 | 4 | **43708** | | HSV-S-41000-R.090 |
| | 1 | **.090** | 2 | 4-1/2 | 4 | **43723** | | HSV-R-41000-R.090 |
| | 1 | **.090** | 2-5/8 | 5 | 4 | **43738** | | HSV-M-41000-R.090 |
| | 1 | **.090** | 3 | 6 | 4 | **43743** | | HSV-ML-41000-R.090 |
| | 1 | **.090** | 4-1/4 | 7 | 4 | **43753** | | HSV-L-41000-R.090 |
| | 1 | **.125** | 1-1/2 | 4 | 4 | **43709** | | HSV-S-41000-R.125 |
| | 1 | **.125** | 2 | 4-1/2 | 4 | **43724** | | HSV-R-41000-R.125 |
| | 1 | **.125** | 2-5/8 | 5 | 4 | **43739** | | HSV-M-41000-R.125 |
| | 1 | **.125** | 3 | 6 | 4 | **43744** | | HSV-ML-41000-R.125 |
| | 1 | **.125** | 4-1/4 | 7 | 4 | **43754** | | HSV-L-41000-R.125 |
| | 1 | **.190** | 1-1/2 | 4 | 4 | **43710** | | HSV-S-41000-R.190 |
| | 1 | **.190** | 2 | 4-1/2 | 4 | **43725** | | HSV-R-41000-R.190 |
| | 1 | **.190** | 2-5/8 | 5 | 4 | **43740** | | HSV-M-41000-R.190 |
| | 1 | **.190** | 3 | 6 | 4 | **43745** | | HSV-ML-41000-R.190 |
| | 1 | **.190** | 4-1/4 | 7 | 4 | **43755** | | HSV-L-41000-R.190 |
| | 1 | **.250** | 1-1/2 | 4 | 4 | **43711** | | HSV-S-41000-R.250 |
| | 1 | **.250** | 2 | 4-1/2 | 4 | **43726** | | HSV-R-41000-R.250 |
| | 1 | **.250** | 2-5/8 | 5 | 4 | **43741** | | HSV-M-41000-R.250 |
| | 1 | **.250** | 3 | 6 | 4 | **43746** | | HSV-ML-41000-R.250 |
| | 1 | **.250** | 4-1/4 | 7 | 4 | **43756** | | HSV-L-41000-R.250 |

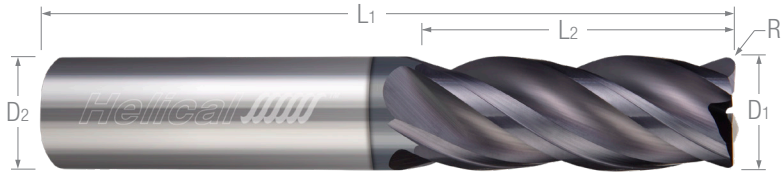
* .0005 max TIR

# 4 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch

**MHSV-4**
**METRIC**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

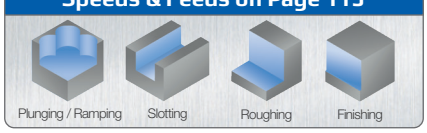



| Cutter Dia.* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 4 | **59459** | MHSV-015-40600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 4 | **59477** | MHSV-020-40600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 4 | **59511** | MHSV-030-40600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 4 | **59460** | MHSV-015-40600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 4 | **59478** | MHSV-020-40600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 4 | **59512** | MHSV-030-40600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 4 | **59462** | MHSV-015-40800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 4 | **59480** | MHSV-020-40800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 4 | **59514** | MHSV-030-40800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 4 | **59463** | MHSV-015-40800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 4 | **59481** | MHSV-020-40800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 4 | **59515** | MHSV-030-40800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 4 | **59465** | MHSV-015-41000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 4 | **59483** | MHSV-020-41000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 4 | **59497** | MHSV-025-41000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 4 | **59466** | MHSV-015-41000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 4 | **59484** | MHSV-020-41000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 4 | **59498** | MHSV-025-41000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 4 | **59468** | MHSV-015-41200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 4 | **59486** | MHSV-020-41200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 4 | **59500** | MHSV-025-41200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 4 | **59469** | MHSV-015-41200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 4 | **59487** | MHSV-020-41200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 4 | **59501** | MHSV-025-41200-R1.00 |
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 4 | **59471** | MHSV-015-41600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 4 | **59489** | MHSV-020-41600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 4 | **59503** | MHSV-025-41600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 4 | **59472** | MHSV-015-41600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 4 | **59490** | MHSV-020-41600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 4 | **59504** | MHSV-025-41600-R1.00 |

* .013 mm max TIR

continued on next page

**Speeds & Feeds on Page 115**



# MHSV-4
## METRIC

# 4 FLUTE - CORNER RADIUS - METRIC
## Variable Pitch (cont.)

continued from previous page

| Cutter Dia.* $D_1$ $^{+.00\ mm}_{-.05\ mm}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.05\ mm}_{-.05\ mm}$ | Length of Cut $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.60\ mm}_{-1.60\ mm}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 4 | **59474** | MHSV-015-42000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 4 | **59492** | MHSV-020-42000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 4 | **59506** | MHSV-025-42000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 4 | **59475** | MHSV-015-42000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 4 | **59493** | MHSV-020-42000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 4 | **59507** | MHSV-025-42000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 4 | **59495** | MHSV-020-42500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 4 | **59509** | MHSV-025-42500-R1.00 |

* .013 mm max TIR

## 8 Ways You're Killing Your End Mill

Are you making these end mill killing mistakes? You could be getting much more use from your tooling! Learn these 8 common ways machinists break their end mills prematurely in our "In the Loupe" blog post **8 Ways You're Killing Your End Mill.**

**Read more on helical.blog/intheloupe**

# 4 FLUTE - SQUARE New Items!

**HSV-RN-4**

## Variable Pitch - Reduced Neck

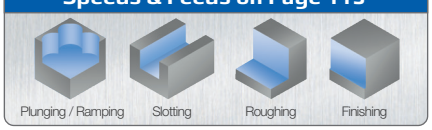
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 5/32 | 3 | 3/8 | .118 | 4 | 52017 | HSV-RN-S-40125 | |
| | 1/8 | 5/32 | 3 | 1/2 | .118 | 4 | 52032 | HSV-RN-R-40125 | |
| | 1/8 | 5/32 | 3 | 5/8 | .118 | 4 | 52047 | HSV-RN-M-40125 | |
| | 1/8 | 5/32 | 3 | 3/4 | .118 | 4 | 83496 | HSV-RN-ML-40125 | new |
| | 1/8 | 5/32 | 3 | 1 | .118 | 4 | 83497 | HSV-RN-LX-40125 | new |
| 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 4 | 52062 | HSV-RN-R-40187 | |
| | 3/16 | 7/32 | 3 | 3/4 | .178 | 4 | 52077 | HSV-RN-M-40187 | |
| | 3/16 | 7/32 | 3 | 1 | .178 | 4 | 52092 | HSV-RN-L-40187 | |
| | 3/16 | 7/32 | 3 | 1-5/16 | .178 | 4 | 83498 | HSV-RN-X-40187 | new |
| 1/4 | 1/4 | 3/8 | 3 | 3/4 | .237 | 4 | 52107 | HSV-RN-S-40250 | |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 4 | 52122 | HSV-RN-R-40250 | |
| | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 4 | 81680 | HSV-RN-A-40250 | |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 4 | 52137 | HSV-RN-M-40250 | |
| | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 4 | 83499 | HSV-RN-ML-40250 | new |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 4 | 52152 | HSV-RN-S-40375 | |
| | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 4 | 81681 | HSV-RN-SR-40375 | |
| | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 4 | 52167 | HSV-RN-R-40375 | |
| | 3/8 | 1/2 | 6 | 2-1/2 | .356 | 4 | 81682 | HSV-RN-A-40375 | |
| | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 4 | 52182 | HSV-RN-M-40375 | |
| | 3/8 | 1/2 | 6 | 4-1/8 | .356 | 4 | 52197 | HSV-RN-L-40375 | |
| 1/2 | 1/2 | 5/8 | 4 | 1-1/2 | .475 | 4 | 52212 | HSV-RN-S-40500 | |
| | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 4 | 81683 | HSV-RN-SR-40500 | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 4 | 52227 | HSV-RN-R-40500 | |
| | 1/2 | 5/8 | 5 | 2-3/4 | .475 | 4 | 81684 | HSV-RN-A-40500 | |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 4 | 52242 | HSV-RN-M-40500 | |
| | 1/2 | 5/8 | 6 | 3-3/4 | .475 | 4 | 83500 | HSV-RN-ML-40500 | new |
| | 1/2 | 5/8 | 6 | 4-1/8 | .475 | 4 | 52257 | HSV-RN-L-40500 | |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115



# HSV-RN-4

New Items!

## 4 FLUTE - SQUARE

### Variable Pitch - Reduced Neck (cont.)

continued from previous page

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | 3/4 | 4 | 1-5/8 | .593 | 4 | **52272** | HSV-RN-S-40625 |
| | 5/8 | 3/4 | 6 | 2-3/8 | .593 | 4 | **52287** | HSV-RN-R-40625 |
| | 5/8 | 3/4 | 6 | 3-3/8 | .593 | 4 | **52302** | HSV-RN-M-40625 |
| | 5/8 | 3/4 | 6 | 4-1/8 | .593 | 4 | **52317** | HSV-RN-L-40625 |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 4 | **52332** | HSV-RN-S-40750 |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 4 | **52347** | HSV-RN-R-40750 |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 4 | **52362** | HSV-RN-M-40750 |
| | 3/4 | 1 | 6 | 4-1/8 | .712 | 4 | **52377** | HSV-RN-L-40750 |
| 1 | 1 | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **52392** | HSV-RN-S-41000 |
| | 1 | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **52407** | HSV-RN-R-41000 |
| | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **52422** | HSV-RN-M-41000 |
| | 1 | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **52437** | HSV-RN-L-41000 |

* .0005 max TIR

# 4 FLUTE - BALL New Items!

## HSV-RN-4

### Variable Pitch - Reduced Neck

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 5/32 | 3 | 3/8 | .118 | 4 | 57017 | HSV-RN-S-40125-BN | |
| | 1/8 | 5/32 | 3 | 1/2 | .118 | 4 | 57032 | HSV-RN-R-40125-BN | |
| | 1/8 | 5/32 | 3 | 5/8 | .118 | 4 | 57047 | HSV-RN-M-40125-BN | |
| | 1/8 | 5/32 | 3 | 3/4 | .118 | 4 | 82515 | HSV-RN-ML-40125-BN | |
| | 1/8 | 5/32 | 3 | 1 | .118 | 4 | 83512 | HSV-RN-LX-40125-BN | new |
| 3/16 | 3/16 | 7/32 | 3 | 1/2 | .178 | 4 | 57062 | HSV-RN-S-40187-BN | |
| | 3/16 | 7/32 | 3 | 3/4 | .178 | 4 | 57077 | HSV-RN-R-40187-BN | |
| | 3/16 | 7/32 | 3 | 1 | .178 | 4 | 57092 | HSV-RN-M-40187-BN | |
| | 3/16 | 7/32 | 3 | 1-5/16 | .178 | 4 | 82516 | HSV-RN-L-40187-BN | |
| | 3/16 | 7/32 | 3 | 1-1/2 | .178 | 4 | 83513 | HSV-RN-LX-40187-BN | new |
| 1/4 | 1/4 | 3/8 | 3 | 3/4 | .237 | 4 | 57107 | HSV-RN-S-40250-BN | |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 4 | 57122 | HSV-RN-R-40250-BN | |
| | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 4 | 81694 | HSV-RN-A-40250-BN | |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 4 | 57137 | HSV-RN-M-40250-BN | |
| | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 4 | 81695 | HSV-RN-ML-40250-BN | |
| | 1/4 | 3/8 | 4-1/2 | 3 | .237 | 4 | 82517 | HSV-RN-L-40250-BN | |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 4 | 57152 | HSV-RN-S-40375-BN | |
| | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 4 | 81696 | HSV-RN-SR-40375-BN | |
| | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 4 | 57167 | HSV-RN-R-40375-BN | |
| | 3/8 | 1/2 | 6 | 2-1/2 | .356 | 4 | 81697 | HSV-RN-A-40375-BN | |
| | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 4 | 57182 | HSV-RN-M-40375-BN | |
| | 3/8 | 1/2 | 6 | 3-5/8 | .356 | 4 | 83514 | HSV-RN-ML-40375-BN | new |
| | 3/8 | 1/2 | 6 | 4-1/8 | .356 | 4 | 57197 | HSV-RN-L-40375-BN | |
| 1/2 | 1/2 | 5/8 | 4 | 1-1/2 | .475 | 4 | 57212 | HSV-RN-S-40500-BN | |
| | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 4 | 81698 | HSV-RN-SR-40500-BN | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 4 | 57227 | HSV-RN-R-40500-BN | |
| | 1/2 | 5/8 | 5 | 2-3/4 | .475 | 4 | 81699 | HSV-RN-A-40500-BN | |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 4 | 57242 | HSV-RN-M-40500-BN | |
| | 1/2 | 5/8 | 6 | 3-3/4 | .475 | 4 | 81700 | HSV-RN-ML-40500-BN | |
| | 1/2 | 5/8 | 6 | 4-1/8 | .475 | 4 | 57257 | HSV-RN-L-40500-BN | |
| | 1/2 | 5/8 | 7 | 5 | .475 | 4 | 83515 | HSV-RN-X-40500-BN | new |

* .0005 max TIR

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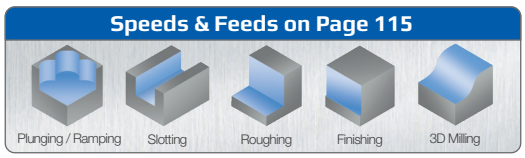
Speeds & Feeds on Page 115



# HSV-RN-4

New Items!

## 4 FLUTE - BALL

### Variable Pitch - Reduced Neck (cont.)

continued from previous page

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | 3/4 | 4 | 1-5/8 | .593 | 4 | **57272** | HSV-RN-S-40625-BN |
| | 5/8 | 3/4 | 6 | 2-3/8 | .593 | 4 | **57287** | HSV-RN-R-40625-BN |
| | 5/8 | 3/4 | 6 | 3-3/8 | .593 | 4 | **57302** | HSV-RN-M-40625-BN |
| | 5/8 | 3/4 | 6 | 4-1/8 | .593 | 4 | **57317** | HSV-RN-L-40625-BN |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 4 | **57332** | HSV-RN-S-40750-BN |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 4 | **57347** | HSV-RN-R-40750-BN |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 4 | **57362** | HSV-RN-M-40750-BN |
| new | 3/4 | 1 | 6 | 3-3/4 | .712 | 4 | **83516** | HSV-RN-ML-40750-BN |
| | 3/4 | 1 | 6 | 4-1/8 | .712 | 4 | **57377** | HSV-RN-L-40750-BN |
| 1 | 1 | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **57392** | HSV-RN-S-41000-BN |
| | 1 | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **57407** | HSV-RN-R-41000-BN |
| | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **57422** | HSV-RN-M-41000-BN |
| | 1 | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **57437** | HSV-RN-L-41000-BN |

* .0005 max TIR

# 4 FLUTE - CORNER RADIUS New Items!

## HSV-RN-4

### Variable Pitch - Reduced Neck

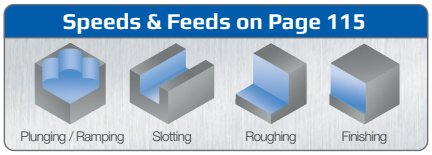
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 5/32 | 3 | 3/8 | .118 | 4 | **32017** | HSV-RN-S-40125-R.010 | |
| | 1/8 | **.010** | 5/32 | 3 | 1/2 | .118 | 4 | **32032** | HSV-RN-R-40125-R.010 | |
| | 1/8 | **.010** | 5/32 | 3 | 5/8 | .118 | 4 | **32047** | HSV-RN-M-40125-R.010 | |
| | 1/8 | **.010** | 5/32 | 3 | 3/4 | .118 | 4 | **81685** | HSV-RN-ML-40125-R.010 | |
| | 1/8 | **.010** | 5/32 | 3 | 1 | .118 | 4 | **83501** | HSV-RN-LX-40125-R.010 | new |
| | 1/8 | **.030** | 5/32 | 3 | 3/8 | .118 | 4 | **53017** | HSV-RN-S-40125-R.030 | |
| | 1/8 | **.030** | 5/32 | 3 | 1/2 | .118 | 4 | **53032** | HSV-RN-R-40125-R.030 | |
| | 1/8 | **.030** | 5/32 | 3 | 5/8 | .118 | 4 | **53047** | HSV-RN-M-40125-R.030 | |
| | 1/8 | **.030** | 5/32 | 3 | 3/4 | .118 | 4 | **83502** | HSV-RN-ML-40125-R.030 | new |
| 3/16 | 3/16 | **.010** | 7/32 | 3 | 1/2 | .178 | 4 | **32062** | HSV-RN-S-40187-R.010 | |
| | 3/16 | **.010** | 7/32 | 3 | 3/4 | .178 | 4 | **32077** | HSV-RN-R-40187-R.010 | |
| | 3/16 | **.010** | 7/32 | 3 | 1 | .178 | 4 | **32092** | HSV-RN-M-40187-R.010 | |
| | 3/16 | **.010** | 7/32 | 3 | 1-5/16 | .178 | 4 | **81686** | HSV-RN-L-40187-R.010 | |
| | 3/16 | **.010** | 7/32 | 3 | 1-1/2 | .178 | 4 | **83503** | HSV-RN-LX-40187-R.010 | new |
| | 3/16 | **.030** | 7/32 | 3 | 1/2 | .178 | 4 | **53062** | HSV-RN-S-40187-R.030 | |
| | 3/16 | **.030** | 7/32 | 3 | 3/4 | .178 | 4 | **53077** | HSV-RN-R-40187-R.030 | |
| | 3/16 | **.030** | 7/32 | 3 | 1 | .178 | 4 | **53092** | HSV-RN-M-40187-R.030 | |
| | 3/16 | **.030** | 7/32 | 3 | 1-5/16 | .178 | 4 | **83504** | HSV-RN-L-40187-R.030 | new |
| 1/4 | 1/4 | **.020** | 3/8 | 3 | 3/4 | .237 | 4 | **32107** | HSV-RN-S-40250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 1-1/8 | .237 | 4 | **32122** | HSV-RN-R-40250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 1-5/8 | .237 | 4 | **81687** | HSV-RN-A-40250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/8 | .237 | 4 | **32137** | HSV-RN-M-40250-R.020 | |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/2 | .237 | 4 | **83505** | HSV-RN-ML-40250-R.020 | new |
| | 1/4 | **.030** | 3/8 | 3 | 3/4 | .237 | 4 | **53107** | HSV-RN-S-40250-R.030 | |
| | 1/4 | **.030** | 3/8 | 4 | 1-1/8 | .237 | 4 | **53122** | HSV-RN-R-40250-R.030 | |
| | 1/4 | **.030** | 3/8 | 4 | 1-5/8 | .237 | 4 | **83506** | HSV-RN-A-40250-R.030 | new |
| | 1/4 | **.030** | 3/8 | 4 | 2-1/8 | .237 | 4 | **53137** | HSV-RN-M-40250-R.030 | |
| | 1/4 | **.030** | 3/8 | 4 | 2-1/2 | .237 | 4 | **83507** | HSV-RN-ML-40250-R.030 | new |
| | 1/4 | **.060** | 3/8 | 3 | 3/4 | .237 | 4 | **53108** | HSV-RN-S-40250-R.060 | |
| | 1/4 | **.060** | 3/8 | 4 | 1-1/8 | .237 | 4 | **53123** | HSV-RN-R-40250-R.060 | |
| | 1/4 | **.060** | 3/8 | 4 | 2-1/8 | .237 | 4 | **53138** | HSV-RN-M-40250-R.060 | |
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 4 | **32152** | HSV-RN-S-40375-R.020 | |
| | 3/8 | **.020** | 1/2 | 4 | 1-5/8 | .356 | 4 | **81688** | HSV-RN-SR-40375-R.020 | |
| | 3/8 | **.020** | 1/2 | 4 | 2-1/8 | .356 | 4 | **32167** | HSV-RN-R-40375-R.020 | |
| | 3/8 | **.020** | 1/2 | 6 | 2-1/2 | .356 | 4 | **81689** | HSV-RN-A-40375-R.020 | |
| | 3/8 | **.020** | 1/2 | 6 | 3-1/8 | .356 | 4 | **32182** | HSV-RN-M-40375-R.020 | |
| | 3/8 | **.020** | 1/2 | 6 | 4-1/8 | .356 | 4 | **32197** | HSV-RN-L-40375-R.020 | |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115



# HSV-RN-4

New Items!

## 4 FLUTE - CORNER RADIUS

### Variable Pitch - Reduced Neck (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3/8 | 3/8 | .030 | 1/2 | 4 | 1-1/8 | .356 | 4 | 53152 | HSV-RN-S-40375-R.030 |
| | | 3/8 | .030 | 1/2 | 4 | 2-1/8 | .356 | 4 | 53167 | HSV-RN-R-40375-R.030 |
| | | 3/8 | .030 | 1/2 | 6 | 3-1/8 | .356 | 4 | 53182 | HSV-RN-M-40375-R.030 |
| | | 3/8 | .030 | 1/2 | 6 | 4-1/8 | .356 | 4 | 53197 | HSV-RN-L-40375-R.030 |
| | | 3/8 | .060 | 1/2 | 4 | 1-1/8 | .356 | 4 | 53153 | HSV-RN-S-40375-R.060 |
| | | 3/8 | .060 | 1/2 | 4 | 2-1/8 | .356 | 4 | 53168 | HSV-RN-R-40375-R.060 |
| | | 3/8 | .060 | 1/2 | 6 | 3-1/8 | .356 | 4 | 53183 | HSV-RN-M-40375-R.060 |
| | | 3/8 | .060 | 1/2 | 6 | 4-1/8 | .356 | 4 | 53198 | HSV-RN-L-40375-R.060 |
| | | 3/8 | .090 | 1/2 | 4 | 1-1/8 | .356 | 4 | 53154 | HSV-RN-S-40375-R.090 |
| | | 3/8 | .090 | 1/2 | 4 | 2-1/8 | .356 | 4 | 53169 | HSV-RN-R-40375-R.090 |
| | | 3/8 | .090 | 1/2 | 6 | 3-1/8 | .356 | 4 | 53184 | HSV-RN-M-40375-R.090 |
| | | 3/8 | .090 | 1/2 | 6 | 4-1/8 | .356 | 4 | 53199 | HSV-RN-L-40375-R.090 |
| new | 1/2 | 1/2 | .010 | 5/8 | 4 | 1-1/2 | .475 | 4 | 83508 | HSV-RN-S-40500-R.010 |
| new | | 1/2 | .010 | 5/8 | 4 | 2-1/4 | .475 | 4 | 83509 | HSV-RN-R-40500-R.010 |
| new | | 1/2 | .010 | 5/8 | 6 | 3-3/8 | .475 | 4 | 83510 | HSV-RN-M-40500-R.010 |
| new | | 1/2 | .010 | 5/8 | 6 | 4-1/8 | .475 | 4 | 83511 | HSV-RN-L-40500-R.010 |
| | | 1/2 | .020 | 5/8 | 4 | 1-1/2 | .475 | 4 | 53211 | HSV-RN-S-40500-R.020 |
| | | 1/2 | .020 | 5/8 | 4 | 2-1/4 | .475 | 4 | 53226 | HSV-RN-R-40500-R.020 |
| | | 1/2 | .020 | 5/8 | 6 | 3-3/8 | .475 | 4 | 53241 | HSV-RN-M-40500-R.020 |
| | | 1/2 | .020 | 5/8 | 6 | 4-1/8 | .475 | 4 | 53256 | HSV-RN-L-40500-R.020 |
| | | 1/2 | .030 | 5/8 | 4 | 1-1/2 | .475 | 4 | 32212 | HSV-RN-S-40500-R.030 |
| | | 1/2 | .030 | 5/8 | 4 | 1-3/4 | .475 | 4 | 81690 | HSV-RN-SR-40500-R.030 |
| | | 1/2 | .030 | 5/8 | 4 | 2-1/4 | .475 | 4 | 32227 | HSV-RN-R-40500-R.030 |
| | | 1/2 | .030 | 5/8 | 5 | 2-3/4 | .475 | 4 | 81691 | HSV-RN-A-40500-R.030 |
| | | 1/2 | .030 | 5/8 | 6 | 3-3/8 | .475 | 4 | 32242 | HSV-RN-M-40500-R.030 |
| | | 1/2 | .030 | 5/8 | 6 | 3-3/4 | .475 | 4 | 81692 | HSV-RN-ML-40500-R.030 |
| | | 1/2 | .030 | 5/8 | 6 | 4-1/8 | .475 | 4 | 32257 | HSV-RN-L-40500-R.030 |
| | | 1/2 | .060 | 5/8 | 4 | 1-1/2 | .475 | 4 | 53212 | HSV-RN-S-40500-R.060 |
| | | 1/2 | .060 | 5/8 | 4 | 2-1/4 | .475 | 4 | 53227 | HSV-RN-R-40500-R.060 |
| | | 1/2 | .060 | 5/8 | 6 | 3-3/8 | .475 | 4 | 53242 | HSV-RN-M-40500-R.060 |
| | | 1/2 | .060 | 5/8 | 6 | 4-1/8 | .475 | 4 | 53257 | HSV-RN-L-40500-R.060 |
| | | 1/2 | .090 | 5/8 | 4 | 1-1/2 | .475 | 4 | 53213 | HSV-RN-S-40500-R.090 |
| | | 1/2 | .090 | 5/8 | 4 | 2-1/4 | .475 | 4 | 53228 | HSV-RN-R-40500-R.090 |
| | | 1/2 | .090 | 5/8 | 6 | 3-3/8 | .475 | 4 | 53243 | HSV-RN-M-40500-R.090 |
| | | 1/2 | .090 | 5/8 | 6 | 4-1/8 | .475 | 4 | 53258 | HSV-RN-L-40500-R.090 |
| | | 1/2 | .125 | 5/8 | 4 | 1-1/2 | .475 | 4 | 53214 | HSV-RN-S-40500-R.125 |
| | | 1/2 | .125 | 5/8 | 4 | 2-1/4 | .475 | 4 | 53229 | HSV-RN-R-40500-R.125 |
| | | 1/2 | .125 | 5/8 | 6 | 3-3/8 | .475 | 4 | 53244 | HSV-RN-M-40500-R.125 |
| | | 1/2 | .125 | 5/8 | 6 | 4-1/8 | .475 | 4 | 53259 | HSV-RN-L-40500-R.125 |
| | 5/8 | 5/8 | .030 | 3/4 | 4 | 1-5/8 | .593 | 4 | 32272 | HSV-RN-S-40625-R.030 |
| | | 5/8 | .030 | 3/4 | 6 | 2-3/8 | .593 | 4 | 32287 | HSV-RN-R-40625-R.030 |
| | | 5/8 | .030 | 3/4 | 6 | 3-3/8 | .593 | 4 | 32302 | HSV-RN-M-40625-R.030 |
| | | 5/8 | .030 | 3/4 | 6 | 4-1/8 | .593 | 4 | 32317 | HSV-RN-L-40625-R.030 |
| | | 5/8 | .060 | 3/4 | 4 | 1-5/8 | .593 | 4 | 53272 | HSV-RN-S-40625-R.060 |
| | | 5/8 | .060 | 3/4 | 6 | 2-3/8 | .593 | 4 | 53287 | HSV-RN-R-40625-R.060 |
| | | 5/8 | .060 | 3/4 | 6 | 3-3/8 | .593 | 4 | 53302 | HSV-RN-M-40625-R.060 |
| | | 5/8 | .060 | 3/4 | 6 | 4-1/8 | .593 | 4 | 53317 | HSV-RN-L-40625-R.060 |
| | | 5/8 | .090 | 3/4 | 4 | 1-5/8 | .593 | 4 | 53273 | HSV-RN-S-40625-R.090 |
| | | 5/8 | .090 | 3/4 | 6 | 2-3/8 | .593 | 4 | 53288 | HSV-RN-R-40625-R.090 |
| | | 5/8 | .090 | 3/4 | 6 | 3-3/8 | .593 | 4 | 53303 | HSV-RN-M-40625-R.090 |
| | | 5/8 | .090 | 3/4 | 6 | 4-1/8 | .593 | 4 | 53318 | HSV-RN-L-40625-R.090 |
| | | 5/8 | .125 | 3/4 | 4 | 1-5/8 | .593 | 4 | 53274 | HSV-RN-S-40625-R.125 |
| | | 5/8 | .125 | 3/4 | 6 | 2-3/8 | .593 | 4 | 53289 | HSV-RN-R-40625-R.125 |
| | | 5/8 | .125 | 3/4 | 6 | 3-3/8 | .593 | 4 | 53304 | HSV-RN-M-40625-R.125 |
| | | 5/8 | .125 | 3/4 | 6 | 4-1/8 | .593 | 4 | 53319 | HSV-RN-L-40625-R.125 |

* .0005 max TIR

continued on next page

# 4 FLUTE - CORNER RADIUS New Items!

## HSV-RN-4

### Variable Pitch - Reduced Neck (cont.)

continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 4 | **32332** | HSV-RN-S-40750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 4 | **32347** | HSV-RN-R-40750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 2-7/8 | .712 | 4 | **81693** | HSV-RN-A-40750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 4 | **32362** | HSV-RN-M-40750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 4-1/8 | .712 | 4 | **32377** | HSV-RN-L-40750-R.030 |
| | 3/4 | **.060** | 1 | 4 | 2 | .712 | 4 | **53332** | HSV-RN-S-40750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 2-1/2 | .712 | 4 | **53347** | HSV-RN-R-40750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 3-3/8 | .712 | 4 | **53362** | HSV-RN-M-40750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 4-1/8 | .712 | 4 | **53377** | HSV-RN-L-40750-R.060 |
| | 3/4 | **.090** | 1 | 4 | 2 | .712 | 4 | **53333** | HSV-RN-S-40750-R.090 |
| | 3/4 | **.090** | 1 | 6 | 2-1/2 | .712 | 4 | **53348** | HSV-RN-R-40750-R.090 |
| | 3/4 | **.090** | 1 | 6 | 3-3/8 | .712 | 4 | **53363** | HSV-RN-M-40750-R.090 |
| | 3/4 | **.090** | 1 | 6 | 4-1/8 | .712 | 4 | **53378** | HSV-RN-L-40750-R.090 |
| | 3/4 | **.125** | 1 | 4 | 2 | .712 | 4 | **53334** | HSV-RN-S-40750-R.125 |
| | 3/4 | **.125** | 1 | 6 | 2-1/2 | .712 | 4 | **53349** | HSV-RN-R-40750-R.125 |
| | 3/4 | **.125** | 1 | 6 | 3-3/8 | .712 | 4 | **53364** | HSV-RN-M-40750-R.125 |
| | 3/4 | **.125** | 1 | 6 | 4-1/8 | .712 | 4 | **53379** | HSV-RN-L-40750-R.125 |
| | 3/4 | **.190** | 1 | 4 | 2 | .712 | 4 | **53335** | HSV-RN-S-40750-R.190 |
| | 3/4 | **.190** | 1 | 6 | 2-1/2 | .712 | 4 | **53350** | HSV-RN-R-40750-R.190 |
| | 3/4 | **.190** | 1 | 6 | 3-3/8 | .712 | 4 | **53365** | HSV-RN-M-40750-R.190 |
| | 3/4 | **.190** | 1 | 6 | 4-1/8 | .712 | 4 | **53380** | HSV-RN-L-40750-R.190 |
| | 3/4 | **.250** | 1 | 4 | 2 | .712 | 4 | **53336** | HSV-RN-S-40750-R.250 |
| | 3/4 | **.250** | 1 | 6 | 2-1/2 | .712 | 4 | **53351** | HSV-RN-R-40750-R.250 |
| | 3/4 | **.250** | 1 | 6 | 3-3/8 | .712 | 4 | **53366** | HSV-RN-M-40750-R.250 |
| | 3/4 | **.250** | 1 | 6 | 4-1/8 | .712 | 4 | **53381** | HSV-RN-L-40750-R.250 |
| 1 | 1 | **.030** | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **32392** | HSV-RN-S-41000-R.030 |
| | 1 | **.030** | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **32407** | HSV-RN-R-41000-R.030 |
| | 1 | **.030** | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **32422** | HSV-RN-M-41000-R.030 |
| | 1 | **.030** | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **32437** | HSV-RN-L-41000-R.030 |
| | 1 | **.060** | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **53392** | HSV-RN-S-41000-R.060 |
| | 1 | **.060** | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **53407** | HSV-RN-R-41000-R.060 |
| | 1 | **.060** | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **53422** | HSV-RN-M-41000-R.060 |
| | 1 | **.060** | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **53437** | HSV-RN-L-41000-R.060 |
| | 1 | **.090** | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **53393** | HSV-RN-S-41000-R.090 |
| | 1 | **.090** | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **53408** | HSV-RN-R-41000-R.090 |
| | 1 | **.090** | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **53423** | HSV-RN-M-41000-R.090 |
| | 1 | **.090** | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **53438** | HSV-RN-L-41000-R.090 |
| | 1 | **.125** | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **53394** | HSV-RN-S-41000-R.125 |
| | 1 | **.125** | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **53409** | HSV-RN-R-41000-R.125 |
| | 1 | **.125** | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **53424** | HSV-RN-M-41000-R.125 |
| | 1 | **.125** | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **53439** | HSV-RN-L-41000-R.125 |
| | 1 | **.190** | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **53395** | HSV-RN-S-41000-R.190 |
| | 1 | **.190** | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **53410** | HSV-RN-R-41000-R.190 |
| | 1 | **.190** | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **53425** | HSV-RN-M-41000-R.190 |
| | 1 | **.190** | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **53440** | HSV-RN-L-41000-R.190 |
| | 1 | **.250** | 1-1/4 | 4 | 2-1/4 | .950 | 4 | **53396** | HSV-RN-S-41000-R.250 |
| | 1 | **.250** | 1-1/4 | 6 | 2-5/8 | .950 | 4 | **53411** | HSV-RN-R-41000-R.250 |
| | 1 | **.250** | 1-1/4 | 6 | 3-3/8 | .950 | 4 | **53426** | HSV-RN-M-41000-R.250 |
| | 1 | **.250** | 1-1/4 | 6 | 4-1/8 | .950 | 4 | **53441** | HSV-RN-L-41000-R.250 |

* .0005 max TIR

# HSV-4

## SPEEDS & FEEDS

4 Flute - Variable Pitch

### HSV-4 / HSV-RN-4

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/16 | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0004 | .0006 | .0008 | .0007 | .0012 | .0016 | .0010 | .0018 | .0019 | .0014 | .0024 | .0021 | .0020 | .0036 | .0024 | .0027 | .0047 | .0028 | .0038 | .0067 | .0034 | .0049 | .0086 | .0041 |
| | | 75 - 98 HRB | 445 | .0003 | .0005 | .0007 | .0005 | .0009 | .0014 | .0008 | .0013 | .0016 | .0010 | .0018 | .0018 | .0015 | .0026 | .0021 | .0020 | .0034 | .0024 | .0028 | .0049 | .0029 | .0036 | .0063 | .0035 |
| | | 21 - 36 HRC | 400 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0009 | .0013 | .0007 | .0011 | .0014 | .0010 | .0017 | .0017 | .0013 | .0022 | .0019 | .0018 | .0032 | .0023 | .0023 | .0041 | .0028 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0007 | .0011 | .0015 | .0009 | .0015 | .0017 | .0013 | .0023 | .0019 | .0017 | .0030 | .0023 | .0024 | .0043 | .0027 | .0031 | .0054 | .0033 |
| | | 21 - 36 HRC | 340 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0009 | .0013 | .0007 | .0012 | .0014 | .0010 | .0017 | .0017 | .0013 | .0022 | .0019 | .0018 | .0032 | .0023 | .0023 | .0040 | .0028 |
| | | 36 - 50 HRC | 260 | .0002 | .0003 | .0006 | .0003 | .0005 | .0011 | .0004 | .0007 | .0012 | .0006 | .0010 | .0013 | .0008 | .0015 | .0016 | .0011 | .0019 | .0018 | .0016 | .0028 | .0022 | .0020 | .0035 | .0026 |
| | | > 50 HRC | 155 | .0001 | .0002 | .0005 | .0002 | .0004 | .0009 | .0003 | .0006 | .0010 | .0005 | .0008 | .0012 | .0007 | .0012 | .0014 | .0009 | .0015 | .0016 | .0012 | .0022 | .0019 | .0016 | .0028 | .0023 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0007 | .0011 | .0015 | .0009 | .0015 | .0017 | .0013 | .0023 | .0019 | .0017 | .0030 | .0023 | .0024 | .0043 | .0027 | .0031 | .0054 | .0033 |
| | | 21 - 36 HRC | 250 | .0002 | .0003 | .0006 | .0004 | .0006 | .0012 | .0005 | .0009 | .0013 | .0007 | .0012 | .0015 | .0010 | .0018 | .0017 | .0013 | .0024 | .0020 | .0019 | .0034 | .0024 | .0025 | .0043 | .0029 |
| | | 36 - 50 HRC | 145 | .0002 | .0003 | .0005 | .0003 | .0005 | .0010 | .0004 | .0007 | .0012 | .0005 | .0010 | .0013 | .0008 | .0014 | .0015 | .0010 | .0019 | .0018 | .0015 | .0027 | .0021 | .0019 | .0034 | .0026 |
| | | > 50 HRC | 85 | .0001 | .0002 | .0005 | .0002 | .0004 | .0009 | .0003 | .0006 | .0010 | .0005 | .0008 | .0012 | .0007 | .0012 | .0014 | .0009 | .0015 | .0016 | .0012 | .0022 | .0019 | .0016 | .0028 | .0023 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0003 | .0005 | .0008 | .0006 | .0010 | .0015 | .0009 | .0015 | .0017 | .0011 | .0020 | .0019 | .0017 | .0030 | .0022 | .0022 | .0039 | .0026 | .0032 | .0056 | .0031 | .0040 | .0071 | .0037 |
| | | 75 - 98 HRB | 255 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0008 | .0014 | .0016 | .0012 | .0021 | .0018 | .0015 | .0027 | .0021 | .0022 | .0038 | .0025 | .0028 | .0049 | .0031 |
| | | 21 - 36 HRC | 175 | .0002 | .0003 | .0006 | .0004 | .0006 | .0012 | .0005 | .0009 | .0013 | .0007 | .0012 | .0015 | .0010 | .0018 | .0017 | .0014 | .0024 | .0020 | .0020 | .0034 | .0024 | .0025 | .0044 | .0029 |
| | | 36 - 50 HRC | 150 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0008 | .0012 | .0006 | .0011 | .0014 | .0009 | .0016 | .0016 | .0012 | .0021 | .0019 | .0017 | .0031 | .0023 | .0022 | .0039 | .0028 |
| | | > 50 HRC | 55 | .0001 | .0002 | .0005 | .0002 | .0004 | .0009 | .0003 | .0005 | .0010 | .0004 | .0007 | .0011 | .0006 | .0010 | .0013 | .0008 | .0013 | .0015 | .0011 | .0019 | .0018 | .0014 | .0024 | .0022 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0002 | .0004 | .0007 | .0004 | .0008 | .0013 | .0006 | .0011 | .0015 | .0009 | .0015 | .0017 | .0013 | .0022 | .0019 | .0017 | .0029 | .0022 | .0024 | .0042 | .0026 | .0030 | .0053 | .0032 |
| | | 21 - 36 HRC | 225 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0008 | .0014 | .0016 | .0011 | .0020 | .0018 | .0015 | .0026 | .0021 | .0021 | .0038 | .0025 | .0027 | .0048 | .0030 |
| | | 36 - 50 HRC | 180 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0008 | .0012 | .0006 | .0011 | .0014 | .0009 | .0016 | .0016 | .0012 | .0021 | .0019 | .0017 | .0030 | .0023 | .0022 | .0038 | .0027 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0007 | .0011 | .0015 | .0009 | .0016 | .0017 | .0013 | .0023 | .0019 | .0017 | .0030 | .0023 | .0024 | .0043 | .0027 | .0031 | .0055 | .0033 |
| | | 21 - 36 HRC | 280 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0008 | .0013 | .0016 | .0011 | .0020 | .0018 | .0015 | .0026 | .0021 | .0021 | .0037 | .0025 | .0027 | .0047 | .0030 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0008 | .0012 | .0006 | .0011 | .0014 | .0010 | .0017 | .0016 | .0012 | .0022 | .0019 | .0018 | .0031 | .0023 | .0023 | .0040 | .0028 |
| | | 36 - 50 HRC | 145 | .0002 | .0003 | .0006 | .0003 | .0005 | .0011 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0008 | .0014 | .0015 | .0011 | .0019 | .0018 | .0016 | .0027 | .0021 | .0020 | .0035 | .0026 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0004 | .0007 | .0009 | .0007 | .0013 | .0017 | .0011 | .0019 | .0019 | .0014 | .0025 | .0021 | .0021 | .0037 | .0025 | .0027 | .0048 | .0029 | .0039 | .0069 | .0034 | .0050 | .0088 | .0042 |
| | | 21 - 36 HRC | 370 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0008 | .0013 | .0016 | .0011 | .0020 | .0018 | .0015 | .0026 | .0021 | .0021 | .0038 | .0025 | .0027 | .0048 | .0031 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0007 | .0012 | .0015 | .0009 | .0016 | .0017 | .0013 | .0023 | .0019 | .0017 | .0031 | .0023 | .0025 | .0044 | .0027 | .0032 | .0056 | .0033 |
| | | 21 - 36 HRC | 335 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0008 | .0014 | .0016 | .0011 | .0020 | .0018 | .0015 | .0026 | .0021 | .0021 | .0038 | .0025 | .0027 | .0048 | .0031 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0003 | .0004 | .0007 | .0005 | .0008 | .0014 | .0007 | .0012 | .0015 | .0009 | .0016 | .0017 | .0014 | .0024 | .0020 | .0018 | .0032 | .0023 | .0026 | .0046 | .0028 | .0033 | .0058 | .0034 |
| | | 21 - 36 HRC | 260 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0008 | .0012 | .0006 | .0011 | .0014 | .0009 | .0016 | .0016 | .0012 | .0021 | .0019 | .0017 | .0030 | .0023 | .0022 | .0039 | .0027 |
| | | 36 - 50 HRC | 135 | .0001 | .0002 | .0005 | .0002 | .0004 | .0009 | .0003 | .0005 | .0010 | .0004 | .0007 | .0011 | .0006 | .0010 | .0013 | .0008 | .0013 | .0015 | .0011 | .0019 | .0018 | .0014 | .0024 | .0022 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0003 | .0006 | .0008 | .0006 | .0011 | .0015 | .0009 | .0016 | .0017 | .0012 | .0021 | .0020 | .0018 | .0031 | .0023 | .0023 | .0041 | .0026 | .0033 | .0059 | .0031 | .0042 | .0075 | .0038 |
| | | 75 - 98 HRB | 250 | .0003 | .0005 | .0007 | .0005 | .0009 | .0014 | .0008 | .0013 | .0016 | .0010 | .0018 | .0018 | .0015 | .0026 | .0021 | .0019 | .0034 | .0024 | .0028 | .0049 | .0029 | .0035 | .0063 | .0035 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0002 | .0003 | .0006 | .0003 | .0005 | .0011 | .0005 | .0008 | .0012 | .0006 | .0011 | .0014 | .0009 | .0016 | .0016 | .0012 | .0021 | .0019 | .0017 | .0030 | .0023 | .0022 | .0038 | .0027 |
| | | 21 - 36 HRC | 75 | .0002 | .0003 | .0006 | .0003 | .0005 | .0011 | .0004 | .0008 | .0012 | .0006 | .0010 | .0014 | .0009 | .0015 | .0016 | .0011 | .0020 | .0018 | .0016 | .0029 | .0022 | .0021 | .0036 | .0027 |
| | | 36 - 50 HRC | 70 | .0002 | .0003 | .0005 | .0003 | .0005 | .0010 | .0004 | .0007 | .0011 | .0005 | .0009 | .0013 | .0007 | .0013 | .0015 | .0010 | .0017 | .0017 | .0014 | .0025 | .0020 | .0018 | .0031 | .0025 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0004 | .0008 | .0009 | .0008 | .0015 | .0018 | .0013 | .0022 | .0020 | .0017 | .0029 | .0023 | .0025 | .0043 | .0027 | .0032 | .0057 | .0031 | .0046 | .0081 | .0037 | .0059 | .0103 | .0045 |
| | | 75 - 98 HRB | 275 | .0004 | .0006 | .0009 | .0007 | .0012 | .0017 | .0010 | .0018 | .0019 | .0014 | .0024 | .0021 | .0021 | .0036 | .0024 | .0027 | .0047 | .0028 | .0039 | .0068 | .0034 | .0049 | .0087 | .0041 |
| | | 21 - 36 HRC | 250 | .0003 | .0005 | .0007 | .0005 | .0009 | .0014 | .0008 | .0014 | .0016 | .0010 | .0018 | .0018 | .0015 | .0027 | .0021 | .0020 | .0036 | .0025 | .0029 | .0051 | .0029 | .0037 | .0065 | .0036 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0002 | .0004 | .0007 | .0004 | .0007 | .0013 | .0006 | .0011 | .0014 | .0008 | .0014 | .0016 | .0012 | .0021 | .0019 | .0016 | .0028 | .0022 | .0023 | .0040 | .0026 | .0029 | .0051 | .0031 |
| | | 36 - 50 HRC | 160 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0014 | .0007 | .0013 | .0016 | .0011 | .0020 | .0018 | .0015 | .0026 | .0021 | .0021 | .0037 | .0025 | .0026 | .0047 | .0030 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0002 | .0003 | .0006 | .0004 | .0006 | .0012 | .0005 | .0009 | .0013 | .0007 | .0012 | .0015 | .0010 | .0018 | .0017 | .0013 | .0024 | .0020 | .0019 | .0034 | .0024 | .0025 | .0043 | .0029 |
| | | 21 - 36 HRC | 170 | .0002 | .0003 | .0006 | .0003 | .0006 | .0011 | .0005 | .0009 | .0013 | .0007 | .0012 | .0015 | .0010 | .0017 | .0017 | .0013 | .0023 | .0020 | .0019 | .0033 | .0023 | .0024 | .0042 | .0028 |
| | | 36 - 50 HRC | 65 | .0001 | .0002 | .0005 | .0002 | .0004 | .0009 | .0003 | .0006 | .0011 | .0005 | .0008 | .0012 | .0007 | .0012 | .0014 | .0009 | .0016 | .0016 | .0013 | .0022 | .0019 | .0016 | .0028 | .0023 |

**For all diameters, please go to HelicalTool.com**

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 75%-125% Diameter | 100% Diameter |
| | ≥ 35 HRC | 60%-100% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 30%-40% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 25%-35% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# 5 FLUTE - SQUARE New Items!

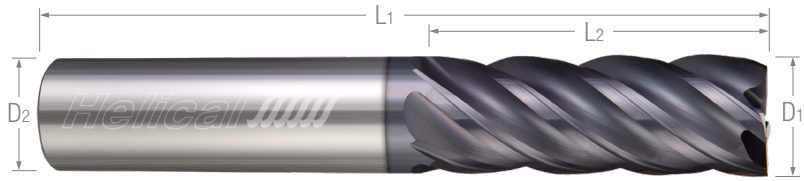
## Variable Pitch

HEM

**HEV-5**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

**For increased wear resistance, see page 171 for T*plus* coating**

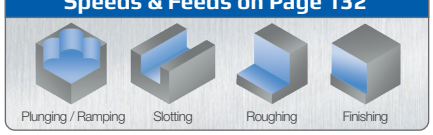



| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 5 | 44017 | | HEV-S-50125 | |
| | 1/8 | 3/8 | 2 | 5 | 81701 | | HEV-SR-50125 | |
| | 1/8 | 1/2 | 2-1/2 | 5 | 44032 | | HEV-R-50125 | |
| | 1/8 | 5/8 | 2-1/2 | 5 | 81702 | | HEV-A-50125 | |
| | 1/8 | 3/4 | 2-1/2 | 5 | 44047 | | HEV-M-50125 | |
| | 1/8 | 7/8 | 2-1/2 | 5 | 82518 | | HEV-L-50125 | |
| 5/32 | 3/16 | 3/16 | 2 | 5 | 81703 | | HEV-S-50156 | |
| | 3/16 | 7/16 | 2-1/2 | 5 | 81704 | | HEV-R-50156 | |
| | 3/16 | 9/16 | 2-1/2 | 5 | 81705 | | HEV-M-50156 | |
| 3/16 | 3/16 | 5/16 | 2 | 5 | 44062 | | HEV-S-50187 | |
| | 3/16 | 7/16 | 2 | 5 | 81706 | | HEV-SR-50187 | |
| | 3/16 | 9/16 | 2-1/2 | 5 | 44077 | | HEV-R-50187 | |
| | 3/16 | 3/4 | 2-1/2 | 5 | 44092 | | HEV-M-50187 | |
| | 3/16 | 1 | 2-1/2 | 5 | 81707 | | HEV-ML-50187 | |
| | 3/16 | 1-3/16 | 3 | 5 | 82519 | | HEV-L-50187 | |
| 7/32 | 1/4 | 5/16 | 2 | 5 | 81708 | | HEV-S-50218 | |
| | 1/4 | 7/16 | 2-1/2 | 5 | 81709 | | HEV-R-50218 | |
| 1/4 | 1/4 | 3/8 | 2 | 5 | 44107 | 44107W | HEV-S-50250 | |
| | 1/4 | 3/8 | 4 | 5 | 82941 | | HEV-S-50250 | new |
| | 1/4 | 1/2 | 2-1/2 | 5 | 44122 | 44122W | HEV-SR-50250 | |
| | 1/4 | 3/4 | 2-1/2 | 5 | 44137 | 44137W | HEV-R-50250 | |
| | 1/4 | 3/4 | 4 | 5 | 82942 | | HEV-R-50250 | new |
| | 1/4 | 1 | 3 | 5 | 44152 | 44152W | HEV-M-50250 | |
| | 1/4 | 1-1/4 | 3 | 5 | 44157 | 44157W | HEV-L-50250 | new |
| | 1/4 | 1-1/2 | 3 | 5 | 81710 | | HEV-LX-50250 | |
| 9/32 | 5/16 | 3/4 | 2-1/2 | 5 | 81711 | | HEV-R-50281 | |
| | 5/16 | 1 | 3 | 5 | 81712 | | HEV-M-50281 | |

* .0005 max TIR

continued on next page

**Speeds & Feeds on Page 132**



# HEV-5

New Items!

## 5 FLUTE - SQUARE

### Variable Pitch (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 5/16 | 5/16 | 7/16 | 2 | 5 | 44167 | 44167W | HEV-S-50312 |
| | | 5/16 | 13/16 | 2-1/2 | 5 | 44182 | 44182W | HEV-R-50312 |
| new | | 5/16 | 1 | 3 | 5 | 44197 | 44197W | HEV-M-50312 |
| | | 5/16 | 1-1/4 | 3 | 5 | 81713 | | HEV-L-50312 |
| | | 5/16 | 1-9/16 | 4 | 5 | 82520 | | HEV-LX-50312 |
| | 3/8 | 3/8 | 1/2 | 2 | 5 | 44212 | 44212W | HEV-S-50375 |
| new | | 3/8 | 1/2 | 4 | 5 | 82943 | | HEV-S-50375 |
| | | 3/8 | 3/4 | 2-1/2 | 5 | 81714 | 81714W | HEV-SR-50375 |
| | | 3/8 | 1 | 3 | 5 | 44227 | 44227W | HEV-R-50375 |
| new | | 3/8 | 1 | 6 | 5 | 82944 | | HEV-R-50375 |
| | | 3/8 | 1-1/4 | 3 | 5 | 44242 | 44242W | HEV-M-50375 |
| | | 3/8 | 1-1/2 | 3-1/2 | 5 | 44247 | 44247W | HEV-L-50375 |
| | | 3/8 | 2 | 4 | 5 | 82521 | | HEV-LX-50375 |
| | 1/2 | 1/2 | 5/8 | 2-1/2 | 5 | 44257 | 44257W | HEV-S-50500 |
| new | | 1/2 | 5/8 | 4 | 5 | 82945 | | HEV-S-50500 |
| | | 1/2 | 1 | 3 | 5 | 44272 | 44272W | HEV-SR-50500 |
| | | 1/2 | 1-1/4 | 3 | 5 | 44287 | 44287W | HEV-R-50500 |
| new | | 1/2 | 1-1/4 | 6 | 5 | 82946 | | HEV-R-50500 |
| | | 1/2 | 1-5/8 | 4 | 5 | 44302 | 44302W | HEV-M-50500 |
| | | 1/2 | 2 | 4 | 5 | 44307 | 44307W | HEV-L-50500 |
| new | | 1/2 | 2-1/2 | 5 | 5 | 81715 | 81715W | HEV-LX-50500 |
| | | 1/2 | 3-1/8 | 6 | 5 | 82522 | | HEV-X-50500 |
| | | 1/2 | 3-5/8 | 6 | 5 | 82523 | | HEV-Y-50500 |
| | 5/8 | 5/8 | 3/4 | 3 | 5 | 44317 | 44317W | HEV-S-50625 |
| new | | 5/8 | 1-1/4 | 3-1/2 | 5 | 44322 | 44322W | HEV-SR-50625 |
| | | 5/8 | 1-5/8 | 3-1/2 | 5 | 44332 | 44332W | HEV-R-50625 |
| new | | 5/8 | 2-1/8 | 4 | 5 | 44347 | 44347W | HEV-M-50625 |
| new | | 5/8 | 2-1/2 | 5 | 5 | 44352 | 44352W | HEV-L-50625 |
| | | 5/8 | 3-1/4 | 6 | 5 | 82524 | | HEV-LX-50625 |
| | 3/4 | 3/4 | 1 | 3 | 5 | 44362 | 44362W | HEV-S-50750 |
| new | | 3/4 | 1 | 6 | 5 | 82947 | | HEV-S-50750 |
| | | 3/4 | 1-1/4 | 4 | 5 | 81716 | | HEV-SR-50750 |
| | | 3/4 | 1-5/8 | 4 | 5 | 44377 | 44377W | HEV-R-50750 |
| new | | 3/4 | 1-5/8 | 6 | 5 | 82948 | | HEV-R-50750 |
| | | 3/4 | 2-1/4 | 5 | 5 | 44392 | 44392W | HEV-M-50750 |
| | | 3/4 | 2-3/4 | 5 | 5 | 44397 | 44397W | HEV-L-50750 |
| | | 3/4 | 3-1/4 | 6 | 5 | 44402 | 44402W | HEV-LX-50750 |
| | | 3/4 | 4 | 6-1/2 | 5 | 81717 | | HEV-X-50750 |
| new | 1 | 1 | 1-1/4 | 4 | 5 | 44407 | | HEV-S-51000 |
| | | 1 | 2 | 4-1/2 | 5 | 44422 | | HEV-R-51000 |
| | | 1 | 2-5/8 | 5 | 5 | 44437 | | HEV-M-51000 |
| | | 1 | 3-1/4 | 6 | 5 | 44442 | | HEV-L-51000 |
| | | 1 | 4-1/4 | 7 | 5 | 44447 | | HEV-X-51000 |

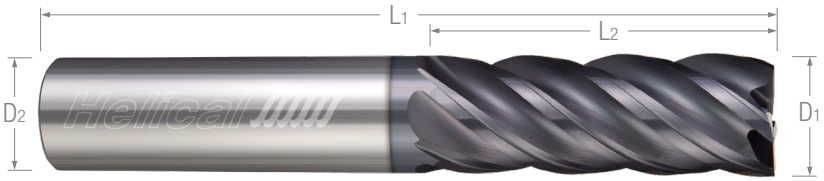
* .0005 max TIR

# 5 FLUTE - SQUARE - METRIC

## Variable Pitch

**MHEV-5**
**METRIC**

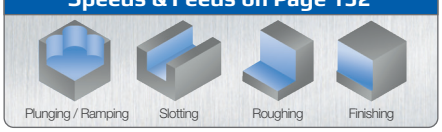
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ $^{+.00\ mm}_{-.05\ mm}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.6\ mm}_{-1.6\ mm}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | 9.00 mm | 63 mm | 5 | **59516** | MHEV-015-50600 |
| | 6.00 mm | 12.00 mm | 63 mm | 5 | **59534** | MHEV-020-50600 |
| | 6.00 mm | 18.00 mm | 63 mm | 5 | **59568** | MHEV-030-50600 |
| 8 mm | 8.00 mm | 12.00 mm | 63 mm | 5 | **59519** | MHEV-015-50800 |
| | 8.00 mm | 16.00 mm | 63 mm | 5 | **59537** | MHEV-020-50800 |
| | 8.00 mm | 24.00 mm | 75 mm | 5 | **59571** | MHEV-030-50800 |
| 10 mm | 10.00 mm | 15.00 mm | 63 mm | 5 | **59522** | MHEV-015-51000 |
| | 10.00 mm | 20.00 mm | 63 mm | 5 | **59540** | MHEV-020-51000 |
| | 10.00 mm | 25.00 mm | 75 mm | 5 | **59554** | MHEV-025-51000 |
| 12 mm | 12.00 mm | 18.00 mm | 75 mm | 5 | **59525** | MHEV-015-51200 |
| | 12.00 mm | 24.00 mm | 75 mm | 5 | **59543** | MHEV-020-51200 |
| | 12.00 mm | 30.00 mm | 75 mm | 5 | **59557** | MHEV-025-51200 |
| 16 mm | 16.00 mm | 24.00 mm | 89 mm | 5 | **59528** | MHEV-015-51600 |
| | 16.00 mm | 32.00 mm | 89 mm | 5 | **59546** | MHEV-020-51600 |
| | 16.00 mm | 40.00 mm | 89 mm | 5 | **59560** | MHEV-025-51600 |
| 20 mm | 20.00 mm | 30.00 mm | 89 mm | 5 | **59531** | MHEV-015-52000 |
| | 20.00 mm | 40.00 mm | 100 mm | 5 | **59549** | MHEV-020-52000 |
| | 20.00 mm | 50.00 mm | 125 mm | 5 | **59563** | MHEV-025-52000 |
| 25 mm | 25.00 mm | 50.00 mm | 125 mm | 5 | **59552** | MHEV-020-52500 |
| | 25.00 mm | 64.00 mm | 125 mm | 5 | **59566** | MHEV-025-52500 |

* .013 mm max TIR

Speeds & Feeds on Page 132



# HEV-5

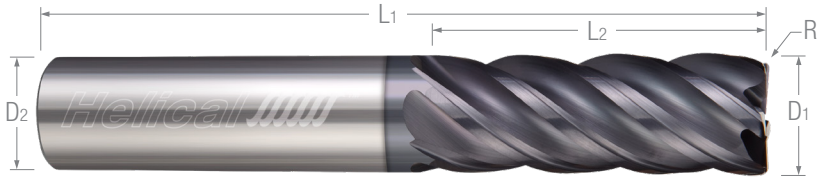
New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

**For increased wear resistance, see page 173 for T*plus* coating**




| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 5 | **34017** | | HEV-S-50125-R.010 |
| | 1/8 | **.010** | 3/8 | 2 | 5 | **81718** | | HEV-SR-50125-R.010 |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 5 | **34032** | | HEV-R-50125-R.010 |
| | 1/8 | **.010** | 5/8 | 2-1/2 | 5 | **81719** | | HEV-A-50125-R.010 |
| | 1/8 | **.010** | 3/4 | 2-1/2 | 5 | **34047** | | HEV-M-50125-R.010 |
| | 1/8 | **.015** | 1/4 | 1-1/2 | 5 | **81720** | | HEV-S-50125-R.015 |
| | 1/8 | **.015** | 3/8 | 2 | 5 | **82530** | | HEV-SR-50125-R.015 |
| | 1/8 | **.015** | 1/2 | 2-1/2 | 5 | **81721** | | HEV-R-50125-R.015 |
| | 1/8 | **.030** | 1/4 | 1-1/2 | 5 | **45017** | | HEV-S-50125-R.030 |
| | 1/8 | **.030** | 3/8 | 2 | 5 | **82531** | | HEV-SR-50125-R.030 |
| | 1/8 | **.030** | 1/2 | 2-1/2 | 5 | **45032** | | HEV-R-50125-R.030 |
| | 1/8 | **.030** | 5/8 | 2-1/2 | 5 | **82532** | | HEV-A-50125-R.030 |
| | 1/8 | **.030** | 3/4 | 2-1/2 | 5 | **45047** | | HEV-M-50125-R.030 |
| 5/32 | 3/16 | **.010** | 3/16 | 2 | 5 | **81722** | | HEV-S-50156-R.010 |
| | 3/16 | **.010** | 7/16 | 2-1/2 | 5 | **81723** | | HEV-R-50156-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 5 | **81724** | | HEV-M-50156-R.010 |
| 3/16 | 3/16 | **.010** | 5/16 | 2 | 5 | **34062** | | HEV-S-50187-R.010 |
| | 3/16 | **.010** | 7/16 | 2 | 5 | **81725** | | HEV-SR-50187-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 5 | **34077** | | HEV-R-50187-R.010 |
| | 3/16 | **.010** | 3/4 | 2-1/2 | 5 | **34092** | | HEV-M-50187-R.010 |
| | 3/16 | **.010** | 1 | 2-1/2 | 5 | **81726** | | HEV-ML-50187-R.010 |
| | 3/16 | **.015** | 5/16 | 2 | 5 | **81727** | | HEV-S-50187-R.015 |
| | 3/16 | **.015** | 7/16 | 2 | 5 | **82533** | | HEV-SR-50187-R.015 |
| | 3/16 | **.015** | 9/16 | 2-1/2 | 5 | **81728** | | HEV-R-50187-R.015 |
| | 3/16 | **.015** | 3/4 | 2-1/2 | 5 | **82534** | | HEV-M-50187-R.015 |
| | 3/16 | **.015** | 1 | 2-1/2 | 5 | **82535** | | HEV-ML-50187-R.015 |
| | 3/16 | **.030** | 5/16 | 2 | 5 | **45062** | | HEV-S-50187-R.030 |
| | 3/16 | **.030** | 7/16 | 2 | 5 | **81729** | | HEV-SR-50187-R.030 |
| | 3/16 | **.030** | 9/16 | 2-1/2 | 5 | **45077** | | HEV-R-50187-R.030 |
| | 3/16 | **.030** | 3/4 | 2-1/2 | 5 | **45092** | | HEV-M-50187-R.030 |
| | 3/16 | **.030** | 1 | 2-1/2 | 5 | **82536** | | HEV-ML-50187-R.030 |
| 7/32 | 1/4 | **.010** | 5/16 | 2 | 5 | **81730** | | HEV-S-50218-R.010 |
| | 1/4 | **.010** | 7/16 | 2-1/2 | 5 | **81731** | | HEV-R-50218-R.010 |

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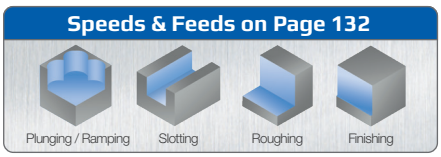
**Speeds & Feeds on Page 132**



# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

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continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 3/8 | 2 | 5 | 81732 | | HEV-S-50250-R.010 | |
| | 1/4 | .010 | 1/2 | 2-1/2 | 5 | 81733 | | HEV-SR-50250-R.010 | |
| | 1/4 | .010 | 3/4 | 2-1/2 | 5 | 81734 | | HEV-R-50250-R.010 | |
| | 1/4 | .010 | 1 | 3 | 5 | 82537 | | HEV-M-50250-R.010 | |
| | 1/4 | .010 | 1-1/4 | 3 | 5 | 82538 | | HEV-L-50250-R.010 | |
| | 1/4 | .015 | 3/8 | 2 | 5 | 81735 | | HEV-S-50250-R.015 | |
| | 1/4 | .015 | 1/2 | 2-1/2 | 5 | 81736 | | HEV-SR-50250-R.015 | |
| | 1/4 | .015 | 3/4 | 2-1/2 | 5 | 81737 | | HEV-R-50250-R.015 | |
| | 1/4 | .015 | 1 | 3 | 5 | 82539 | | HEV-M-50250-R.015 | |
| | 1/4 | .015 | 1-1/4 | 3 | 5 | 82540 | | HEV-L-50250-R.015 | |
| | 1/4 | .020 | 3/8 | 2 | 5 | 34107 | 34107W | HEV-S-50250-R.020 | |
| | 1/4 | .020 | 3/8 | 4 | 5 | 82958 | | HEV-S-50250-R.020 | new |
| | 1/4 | .020 | 1/2 | 2-1/2 | 5 | 34122 | 34122W | HEV-SR-50250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 5 | 34137 | 34137W | HEV-R-50250-R.020 | |
| | 1/4 | .020 | 3/4 | 4 | 5 | 82959 | | HEV-R-50250-R.020 | new |
| | 1/4 | .020 | 1 | 3 | 5 | 34152 | 34152W | HEV-M-50250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 5 | 34157 | | HEV-L-50250-R.020 | |
| | 1/4 | .020 | 1-1/2 | 3 | 5 | 82541 | | HEV-LX-50250-R.020 | |
| | 1/4 | .030 | 3/8 | 2 | 5 | 45107 | 45107W | HEV-S-50250-R.030 | new |
| | 1/4 | .030 | 1/2 | 2-1/2 | 5 | 45122 | 45122W | HEV-SR-50250-R.030 | new |
| | 1/4 | .030 | 3/4 | 2-1/2 | 5 | 45137 | 45137W | HEV-R-50250-R.030 | new |
| | 1/4 | .030 | 1 | 3 | 5 | 45152 | 45152W | HEV-M-50250-R.030 | new |
| | 1/4 | .030 | 1-1/4 | 3 | 5 | 45157 | | HEV-L-50250-R.030 | |
| | 1/4 | .030 | 1-1/2 | 3 | 5 | 82542 | | HEV-LX-50250-R.030 | |
| | 1/4 | .060 | 3/8 | 2 | 5 | 45108 | 45108W | HEV-S-50250-R.060 | new |
| | 1/4 | .060 | 1/2 | 2-1/2 | 5 | 45123 | 45123W | HEV-SR-50250-R.060 | new |
| | 1/4 | .060 | 3/4 | 2-1/2 | 5 | 45138 | 45138W | HEV-R-50250-R.060 | new |
| | 1/4 | .060 | 1 | 3 | 5 | 45153 | 45153W | HEV-M-50250-R.060 | new |
| | 1/4 | .060 | 1-1/4 | 3 | 5 | 45158 | | HEV-L-50250-R.060 | |
| | 1/4 | .060 | 1-1/2 | 3 | 5 | 82543 | | HEV-LX-50250-R.060 | |
| 9/32 | 5/16 | .020 | 7/16 | 2 | 5 | 81738 | | HEV-S-50281-R.020 | |
| | 5/16 | .020 | 3/4 | 2-1/2 | 5 | 81739 | | HEV-R-50281-R.020 | |
| | 5/16 | .020 | 1 | 3 | 5 | 81740 | | HEV-M-50281-R.020 | |
| 5/16 | 5/16 | .010 | 7/16 | 2 | 5 | 81741 | | HEV-S-50312-R.010 | |
| | 5/16 | .010 | 13/16 | 2-1/2 | 5 | 81742 | | HEV-R-50312-R.010 | |
| | 5/16 | .020 | 7/16 | 2 | 5 | 34167 | 34167W | HEV-S-50312-R.020 | new |
| | 5/16 | .020 | 13/16 | 2-1/2 | 5 | 34182 | 34182W | HEV-R-50312-R.020 | new |
| | 5/16 | .020 | 1 | 3 | 5 | 34197 | 34197W | HEV-M-50312-R.020 | new |
| | 5/16 | .020 | 1-1/4 | 3 | 5 | 81743 | | HEV-L-50312-R.020 | |
| | 5/16 | .020 | 1-9/16 | 4 | 5 | 82544 | | HEV-LX-50312-R.020 | |
| | 5/16 | .030 | 7/16 | 2 | 5 | 45167 | 45167W | HEV-S-50312-R.030 | new |
| | 5/16 | .030 | 13/16 | 2-1/2 | 5 | 45182 | 45182W | HEV-R-50312-R.030 | new |
| | 5/16 | .030 | 1 | 3 | 5 | 45197 | 45197W | HEV-M-50312-R.030 | new |
| | 5/16 | .030 | 1-1/4 | 3 | 5 | 82545 | | HEV-L-50312-R.030 | |
| | 5/16 | .060 | 7/16 | 2 | 5 | 45168 | | HEV-S-50312-R.060 | |
| | 5/16 | .060 | 13/16 | 2-1/2 | 5 | 45183 | | HEV-R-50312-R.060 | |
| | 5/16 | .060 | 1 | 3 | 5 | 45198 | | HEV-M-50312-R.060 | |

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# HEV-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 3/8 | 3/8 | **.010** | 1/2 | 2 | 5 | **81744** | | HEV-S-50375-R.010 |
| | | 3/8 | **.010** | 3/4 | 2-1/2 | 5 | **82546** | | HEV-SR-50375-R.010 |
| | | 3/8 | **.010** | 1 | 3 | 5 | **81745** | | HEV-R-50375-R.010 |
| | | 3/8 | **.010** | 1-1/4 | 3 | 5 | **81746** | | HEV-M-50375-R.010 |
| | | 3/8 | **.010** | 1-1/2 | 3-1/2 | 5 | **81747** | | HEV-L-50375-R.010 |
| | | 3/8 | **.015** | 1/2 | 2 | 5 | **81748** | | HEV-S-50375-R.015 |
| | | 3/8 | **.015** | 3/4 | 2-1/2 | 5 | **82547** | | HEV-SR-50375-R.015 |
| | | 3/8 | **.015** | 1 | 3 | 5 | **81749** | | HEV-R-50375-R.015 |
| | | 3/8 | **.015** | 1-1/4 | 3 | 5 | **82548** | | HEV-M-50375-R.015 |
| | | 3/8 | **.020** | 1/2 | 2 | 5 | **34212** | **34212W** | HEV-S-50375-R.020 |
| new | | 3/8 | **.020** | 1/2 | 4 | 5 | **82960** | | HEV-S-50375-R.020 |
| | | 3/8 | **.020** | 3/4 | 2-1/2 | 5 | **81750** | | HEV-SR-50375-R.020 |
| | | 3/8 | **.020** | 1 | 3 | 5 | **34227** | **34227W** | HEV-R-50375-R.020 |
| new | | 3/8 | **.020** | 1 | 6 | 5 | **82961** | | HEV-R-50375-R.020 |
| | | 3/8 | **.020** | 1-1/4 | 3 | 5 | **34242** | **34242W** | HEV-M-50375-R.020 |
| | | 3/8 | **.020** | 1-1/2 | 3-1/2 | 5 | **34247** | | HEV-L-50375-R.020 |
| | **3/8** | 3/8 | **.030** | 1/2 | 2 | 5 | **45212** | **45212W** | HEV-S-50375-R.030 |
| | | 3/8 | **.030** | 3/4 | 2-1/2 | 5 | **81751** | | HEV-SR-50375-R.030 |
| | | 3/8 | **.030** | 1 | 3 | 5 | **45227** | **45227W** | HEV-R-50375-R.030 |
| | | 3/8 | **.030** | 1-1/4 | 3 | 5 | **45242** | **45242W** | HEV-M-50375-R.030 |
| | | 3/8 | **.030** | 1-1/2 | 3-1/2 | 5 | **45247** | **45247W** | HEV-L-50375-R.030 |
| | | 3/8 | **.060** | 1/2 | 2 | 5 | **45213** | **45213W** | HEV-S-50375-R.060 |
| | | 3/8 | **.060** | 3/4 | 2-1/2 | 5 | **81752** | | HEV-SR-50375-R.060 |
| | | 3/8 | **.060** | 1 | 3 | 5 | **45228** | **45228W** | HEV-R-50375-R.060 |
| | | 3/8 | **.060** | 1-1/4 | 3 | 5 | **45243** | **45243W** | HEV-M-50375-R.060 |
| | | 3/8 | **.060** | 1-1/2 | 3-1/2 | 5 | **45248** | | HEV-L-50375-R.060 |
| | | 3/8 | **.090** | 1/2 | 2 | 5 | **45214** | | HEV-S-50375-R.090 |
| | | 3/8 | **.090** | 1 | 3 | 5 | **45229** | | HEV-R-50375-R.090 |
| | | 3/8 | **.090** | 1-1/4 | 3 | 5 | **45244** | | HEV-M-50375-R.090 |
| | | 3/8 | **.090** | 1-1/2 | 3-1/2 | 5 | **45249** | | HEV-L-50375-R.090 |
| | | 3/8 | **.125** | 1/2 | 2 | 5 | **82549** | | HEV-S-50375-R.125 |
| | | 3/8 | **.125** | 1 | 3 | 5 | **82550** | | HEV-R-50375-R.125 |
| | | 3/8 | **.125** | 1-1/4 | 3 | 5 | **82551** | | HEV-M-50375-R.125 |

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# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

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continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 5 | 81753 | 81753W | HEV-S-50500-R.010 | new |
| | 1/2 | .010 | 1 | 3 | 5 | 81754 | 81754W | HEV-SR-50500-R.010 | new |
| | 1/2 | .010 | 1-1/4 | 3 | 5 | 81755 | 81755W | HEV-R-50500-R.010 | new |
| | 1/2 | .010 | 1-5/8 | 4 | 5 | 81756 | | HEV-M-50500-R.010 | |
| | 1/2 | .010 | 2 | 4 | 5 | 81757 | | HEV-L-50500-R.010 | |
| | 1/2 | .015 | 5/8 | 2-1/2 | 5 | 81758 | 81758W | HEV-S-50500-R.015 | new |
| | 1/2 | .015 | 1 | 3 | 5 | 81759 | 81759W | HEV-SR-50500-R.015 | new |
| | 1/2 | .015 | 1-1/4 | 3 | 5 | 81760 | 81760W | HEV-R-50500-R.015 | new |
| | 1/2 | .015 | 1-5/8 | 4 | 5 | 82552 | | HEV-M-50500-R.015 | |
| | 1/2 | .015 | 2 | 4 | 5 | 82553 | | HEV-L-50500-R.015 | |
| | 1/2 | .020 | 5/8 | 2-1/2 | 5 | 81761 | 81761W | HEV-S-50500-R.020 | new |
| | 1/2 | .020 | 1 | 3 | 5 | 81762 | 81762W | HEV-SR-50500-R.020 | new |
| | 1/2 | .020 | 1-1/4 | 3 | 5 | 81763 | 81763W | HEV-R-50500-R.020 | new |
| | 1/2 | .020 | 1-5/8 | 4 | 5 | 82554 | | HEV-M-50500-R.020 | |
| | 1/2 | .020 | 2 | 4 | 5 | 82555 | | HEV-L-50500-R.020 | |
| | 1/2 | .030 | 5/8 | 2-1/2 | 5 | 34257 | 34257W | HEV-S-50500-R.030 | |
| | 1/2 | .030 | 5/8 | 4 | 5 | 82962 | | HEV-S-50500-R.030 | new |
| | 1/2 | .030 | 1 | 3 | 5 | 34272 | 34272W | HEV-SR-50500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 5 | 34287 | 34287W | HEV-R-50500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 6 | 5 | 82963 | | HEV-R-50500-R.030 | new |
| | 1/2 | .030 | 1-5/8 | 4 | 5 | 34302 | 34302W | HEV-M-50500-R.030 | |
| | 1/2 | .030 | 2 | 4 | 5 | 34307 | 34307W | HEV-L-50500-R.030 | |
| | 1/2 | .030 | 2-1/2 | 5 | 5 | 81764 | | HEV-LX-50500-R.030 | |
| | 1/2 | .030 | 3-1/8 | 6 | 5 | 82556 | | HEV-X-50500-R.030 | |
| | 1/2 | .030 | 3-5/8 | 6 | 5 | 82557 | | HEV-Y-50500-R.030 | |
| | 1/2 | .060 | 5/8 | 2-1/2 | 5 | 45257 | 45257W | HEV-S-50500-R.060 | |
| | 1/2 | .060 | 5/8 | 4 | 5 | 82964 | | HEV-S-50500-R.060 | new |
| | 1/2 | .060 | 1 | 3 | 5 | 45272 | 45272W | HEV-SR-50500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 3 | 5 | 45287 | 45287W | HEV-R-50500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 6 | 5 | 82965 | | HEV-R-50500-R.060 | new |
| | 1/2 | .060 | 1-5/8 | 4 | 5 | 45302 | 45302W | HEV-M-50500-R.060 | |
| | 1/2 | .060 | 2 | 4 | 5 | 45307 | 45307W | HEV-L-50500-R.060 | |
| | 1/2 | .060 | 2-1/2 | 5 | 5 | 81765 | | HEV-LX-50500-R.060 | |
| | 1/2 | .090 | 5/8 | 2-1/2 | 5 | 45258 | 45258W | HEV-S-50500-R.090 | new |
| | 1/2 | .090 | 1 | 3 | 5 | 45273 | 45273W | HEV-SR-50500-R.090 | new |
| | 1/2 | .090 | 1-1/4 | 3 | 5 | 45288 | 45288W | HEV-R-50500-R.090 | |
| | 1/2 | .090 | 1-5/8 | 4 | 5 | 45303 | | HEV-M-50500-R.090 | |
| | 1/2 | .090 | 2 | 4 | 5 | 45308 | | HEV-L-50500-R.090 | |
| | 1/2 | .090 | 2-1/2 | 5 | 5 | 82558 | | HEV-LX-50500-R.090 | |
| | 1/2 | .120 | 5/8 | 2-1/2 | 5 | 45259 | 45259W | HEV-S-50500-R.120 | new |
| | 1/2 | .120 | 1 | 3 | 5 | 45274 | 45274W | HEV-SR-50500-R.120 | new |
| | 1/2 | .120 | 1-1/4 | 3 | 5 | 45289 | 45289W | HEV-R-50500-R.120 | |
| | 1/2 | .120 | 1-5/8 | 4 | 5 | 45304 | 45304W | HEV-M-50500-R.120 | |
| | 1/2 | .120 | 2 | 4 | 5 | 45309 | 45309W | HEV-L-50500-R.120 | new |
| | 1/2 | .120 | 2-1/2 | 5 | 5 | 82559 | | HEV-LX-50500-R.120 | |
| | 1/2 | .125 | 5/8 | 2-1/2 | 5 | 81766 | | HEV-S-50500-R.125 | |
| | 1/2 | .125 | 1 | 3 | 5 | 81767 | | HEV-SR-50500-R.125 | |
| | 1/2 | .125 | 1-1/4 | 3 | 5 | 81768 | | HEV-R-50500-R.125 | |
| | 1/2 | .125 | 1-5/8 | 4 | 5 | 82560 | | HEV-M-50500-R.125 | |

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# HEV-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 5/8 | 5/8 | .030 | 3/4 | 3 | 5 | 34317 | | HEV-S-50625-R.030 |
| | | 5/8 | .030 | 1-1/4 | 3-1/2 | 5 | 34322 | 34322W | HEV-SR-50625-R.030 |
| | | 5/8 | .030 | 1-5/8 | 3-1/2 | 5 | 34332 | 34332W | HEV-R-50625-R.030 |
| | | 5/8 | .030 | 2-1/8 | 4 | 5 | 34347 | 34347W | HEV-M-50625-R.030 |
| | | 5/8 | .030 | 2-1/2 | 5 | 5 | 34352 | | HEV-L-50625-R.030 |
| | | 5/8 | .030 | 3-1/4 | 6 | 5 | 82561 | | HEV-LX-50625-R.030 |
| | | 5/8 | .060 | 3/4 | 3 | 5 | 45317 | | HEV-S-50625-R.060 |
| | | 5/8 | .060 | 1-1/4 | 3-1/2 | 5 | 45322 | | HEV-SR-50625-R.060 |
| | | 5/8 | .060 | 1-5/8 | 3-1/2 | 5 | 45332 | | HEV-R-50625-R.060 |
| | | 5/8 | .060 | 2-1/8 | 4 | 5 | 45347 | | HEV-M-50625-R.060 |
| | | 5/8 | .060 | 2-1/2 | 5 | 5 | 45352 | | HEV-L-50625-R.060 |
| | | 5/8 | .090 | 3/4 | 3 | 5 | 45318 | | HEV-S-50625-R.090 |
| | | 5/8 | .090 | 1-1/4 | 3-1/2 | 5 | 45323 | | HEV-SR-50625-R.090 |
| | | 5/8 | .090 | 1-5/8 | 3-1/2 | 5 | 45333 | | HEV-R-50625-R.090 |
| | | 5/8 | .090 | 2-1/8 | 4 | 5 | 45348 | | HEV-M-50625-R.090 |
| | | 5/8 | .090 | 2-1/2 | 5 | 5 | 45353 | | HEV-L-50625-R.090 |
| | | 5/8 | .120 | 3/4 | 3 | 5 | 45319 | | HEV-S-50625-R.120 |
| | | 5/8 | .120 | 1-1/4 | 3-1/2 | 5 | 45324 | | HEV-SR-50625-R.120 |
| | | 5/8 | .120 | 1-5/8 | 3-1/2 | 5 | 45334 | | HEV-R-50625-R.120 |
| | | 5/8 | .120 | 2-1/8 | 4 | 5 | 45349 | | HEV-M-50625-R.120 |
| | | 5/8 | .120 | 2-1/2 | 5 | 5 | 45354 | | HEV-L-50625-R.120 |
| | | 5/8 | .120 | 3-1/4 | 6 | 5 | 82562 | | HEV-LX-50625-R.120 |
| | 3/4 | 3/4 | .010 | 1 | 3 | 5 | 81769 | | HEV-S-50750-R.010 |
| | | 3/4 | .010 | 1-5/8 | 4 | 5 | 81770 | | HEV-R-50750-R.010 |
| | | 3/4 | .010 | 2-1/4 | 5 | 5 | 81771 | | HEV-M-50750-R.010 |
| | | 3/4 | .015 | 1 | 3 | 5 | 81772 | | HEV-S-50750-R.015 |
| | | 3/4 | .015 | 1-5/8 | 4 | 5 | 81773 | | HEV-R-50750-R.015 |
| | | 3/4 | .015 | 2-1/4 | 5 | 5 | 81774 | | HEV-M-50750-R.015 |
| | | 3/4 | .020 | 1 | 3 | 5 | 81775 | | HEV-S-50750-R.020 |
| | | 3/4 | .020 | 1-5/8 | 4 | 5 | 81776 | | HEV-R-50750-R.020 |
| | | 3/4 | .020 | 2-1/4 | 5 | 5 | 81777 | | HEV-M-50750-R.020 |
| | | 3/4 | .030 | 1 | 3 | 5 | 34362 | 34362W | HEV-S-50750-R.030 |
| new | | 3/4 | .030 | 1 | 6 | 5 | 82966 | | HEV-S-50750-R.030 |
| | | 3/4 | .030 | 1-1/4 | 4 | 5 | 81778 | | HEV-SR-50750-R.030 |
| | | 3/4 | .030 | 1-5/8 | 4 | 5 | 34377 | 34377W | HEV-R-50750-R.030 |
| new | | 3/4 | .030 | 1-5/8 | 6 | 5 | 82967 | | HEV-R-50750-R.030 |
| | | 3/4 | .030 | 2-1/4 | 5 | 5 | 34392 | 34392W | HEV-M-50750-R.030 |
| | | 3/4 | .030 | 2-3/4 | 5 | 5 | 34397 | | HEV-L-50750-R.030 |
| | | 3/4 | .030 | 3-1/4 | 6 | 5 | 34402 | | HEV-LX-50750-R.030 |
| | | 3/4 | .030 | 4 | 6-1/2 | 5 | 82563 | | HEV-X-50750-R.030 |
| new | | 3/4 | .060 | 1 | 3 | 5 | 45362 | 45362W | HEV-S-50750-R.060 |
| new | | 3/4 | .060 | 1 | 6 | 5 | 82968 | | HEV-S-50750-R.060 |
| | | 3/4 | .060 | 1-1/4 | 4 | 5 | 81779 | | HEV-SR-50750-R.060 |
| | | 3/4 | .060 | 1-5/8 | 4 | 5 | 45377 | 45377W | HEV-R-50750-R.060 |
| new | | 3/4 | .060 | 1-5/8 | 6 | 5 | 82969 | | HEV-R-50750-R.060 |
| | | 3/4 | .060 | 2-1/4 | 5 | 5 | 45392 | 45392W | HEV-M-50750-R.060 |
| | | 3/4 | .060 | 2-3/4 | 5 | 5 | 45397 | | HEV-L-50750-R.060 |
| | | 3/4 | .060 | 3-1/4 | 6 | 5 | 45402 | | HEV-LX-50750-R.060 |
| | | 3/4 | .060 | 4 | 6-1/2 | 5 | 82564 | | HEV-X-50750-R.060 |
| | | 3/4 | .090 | 1 | 3 | 5 | 45363 | | HEV-S-50750-R.090 |
| | | 3/4 | .090 | 1-5/8 | 4 | 5 | 45378 | 45378W | HEV-R-50750-R.090 |
| | | 3/4 | .090 | 2-1/4 | 5 | 5 | 45393 | | HEV-M-50750-R.090 |

*.0005 max TIR

continued on next page

# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-5

continued from previous page

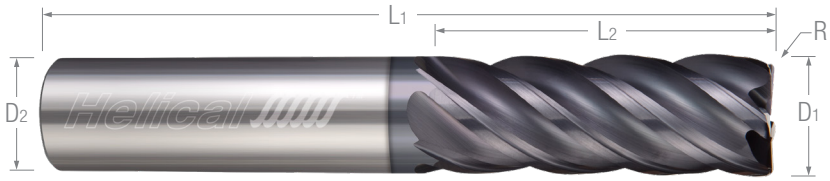
| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | .090 | 2-3/4 | 5 | 5 | 45398 | | HEV-L-50750-R.090 | |
| | 3/4 | .090 | 3-1/4 | 6 | 5 | 45403 | | HEV-LX-50750-R.090 | |
| | 3/4 | .120 | 1 | 3 | 5 | 45364 | | HEV-S-50750-R.120 | |
| | 3/4 | .120 | 1-1/4 | 4 | 5 | 81780 | | HEV-SR-50750-R.120 | |
| | 3/4 | .120 | 1-5/8 | 4 | 5 | 45379 | 45379W | HEV-R-50750-R.120 | |
| | 3/4 | .120 | 2-1/4 | 5 | 5 | 45394 | 45394W | HEV-M-50750-R.120 | |
| | 3/4 | .120 | 2-3/4 | 5 | 5 | 45399 | | HEV-L-50750-R.120 | |
| | 3/4 | .120 | 3-1/4 | 6 | 5 | 45404 | | HEV-LX-50750-R.120 | |
| | 3/4 | .190 | 1 | 3 | 5 | 45365 | | HEV-S-50750-R.190 | |
| | 3/4 | .190 | 1-5/8 | 4 | 5 | 45380 | 45380W | HEV-R-50750-R.190 | |
| | 3/4 | .190 | 2-1/4 | 5 | 5 | 45395 | | HEV-M-50750-R.190 | |
| | 3/4 | .190 | 2-3/4 | 5 | 5 | 45400 | | HEV-L-50750-R.190 | |
| | 3/4 | .190 | 3-1/4 | 6 | 5 | 45405 | | HEV-LX-50750-R.190 | |
| | 3/4 | .250 | 1 | 3 | 5 | 45366 | | HEV-S-50750-R.250 | |
| | 3/4 | .250 | 1-5/8 | 4 | 5 | 45381 | 45381W | HEV-R-50750-R.250 | |
| | 3/4 | .250 | 2-1/4 | 5 | 5 | 45396 | | HEV-M-50750-R.250 | |
| | 3/4 | .250 | 2-3/4 | 5 | 5 | 45401 | | HEV-L-50750-R.250 | |
| | 3/4 | .250 | 3-1/4 | 6 | 5 | 45406 | | HEV-LX-50750-R.250 | |
| 1 | 1 | .030 | 1-1/4 | 4 | 5 | 34407 | | HEV-S-51000-R.030 | |
| | 1 | .030 | 2 | 4-1/2 | 5 | 34422 | | HEV-R-51000-R.030 | |
| | 1 | .030 | 2-5/8 | 5 | 5 | 34437 | | HEV-M-51000-R.030 | |
| | 1 | .030 | 3-1/4 | 6 | 5 | 34442 | | HEV-L-51000-R.030 | |
| | 1 | .030 | 4-1/4 | 7 | 5 | 34447 | | HEV-X-51000-R.030 | |
| | 1 | .060 | 1-1/4 | 4 | 5 | 45407 | | HEV-S-51000-R.060 | |
| | 1 | .060 | 2 | 4-1/2 | 5 | 45422 | | HEV-R-51000-R.060 | |
| | 1 | .060 | 2-5/8 | 5 | 5 | 45437 | | HEV-M-51000-R.060 | |
| | 1 | .060 | 3-1/4 | 6 | 5 | 45442 | | HEV-L-51000-R.060 | |
| | 1 | .060 | 4-1/4 | 7 | 5 | 45447 | | HEV-X-51000-R.060 | |
| | 1 | .090 | 1-1/4 | 4 | 5 | 45408 | | HEV-S-51000-R.090 | new |
| | 1 | .090 | 2 | 4-1/2 | 5 | 45423 | | HEV-R-51000-R.090 | new |
| | 1 | .090 | 2-5/8 | 5 | 5 | 45438 | | HEV-M-51000-R.090 | new |
| | 1 | .120 | 1-1/4 | 4 | 5 | 45409 | | HEV-S-51000-R.120 | |
| | 1 | .120 | 2 | 4-1/2 | 5 | 45424 | | HEV-R-51000-R.120 | |
| | 1 | .120 | 2-5/8 | 5 | 5 | 45439 | | HEV-M-51000-R.120 | |
| | 1 | .120 | 3-1/4 | 6 | 5 | 45444 | | HEV-L-51000-R.120 | |
| | 1 | .120 | 4-1/4 | 7 | 5 | 45449 | | HEV-X-51000-R.120 | |
| | 1 | .190 | 2 | 4-1/2 | 5 | 45425 | | HEV-R-51000-R.190 | |
| | 1 | .190 | 3-1/4 | 6 | 5 | 45445 | | HEV-L-51000-R.190 | |
| | 1 | .190 | 4-1/4 | 7 | 5 | 45450 | | HEV-X-51000-R.190 | |
| | 1 | .250 | 1-1/4 | 4 | 5 | 45411 | | HEV-S-51000-R.250 | |
| | 1 | .250 | 2 | 4-1/2 | 5 | 45426 | | HEV-R-51000-R.250 | |
| | 1 | .250 | 2-5/8 | 5 | 5 | 45441 | | HEV-M-51000-R.250 | |
| | 1 | .250 | 3-1/4 | 6 | 5 | 45446 | | HEV-L-51000-R.250 | |
| | 1 | .250 | 4-1/4 | 7 | 5 | 45451 | | HEV-X-51000-R.250 | |

*.0005 max TIR

# MHEV-5
## METRIC

# 5 FLUTE - CORNER RADIUS - METRIC
## Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

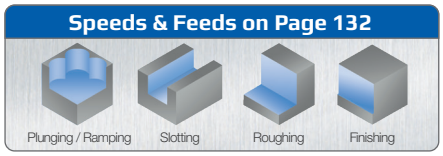



| Cutter Dia.* $D_1$ +.00 mm −.05 mm | Shank Dia. $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 5 | **59517** | MHEV-015-50600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 5 | **59535** | MHEV-020-50600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 5 | **59569** | MHEV-030-50600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 5 | **59518** | MHEV-015-50600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 5 | **59536** | MHEV-020-50600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 5 | **59570** | MHEV-030-50600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 5 | **59520** | MHEV-015-50800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 5 | **59538** | MHEV-020-50800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 5 | **59572** | MHEV-030-50800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 5 | **59521** | MHEV-015-50800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 5 | **59539** | MHEV-020-50800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 5 | **59573** | MHEV-030-50800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 5 | **59523** | MHEV-015-51000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 5 | **59541** | MHEV-020-51000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 5 | **59555** | MHEV-025-51000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 5 | **59524** | MHEV-015-51000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 5 | **59542** | MHEV-020-51000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 5 | **59556** | MHEV-025-51000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 5 | **59526** | MHEV-015-51200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 5 | **59544** | MHEV-020-51200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 5 | **59558** | MHEV-025-51200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 5 | **59527** | MHEV-015-51200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 5 | **59545** | MHEV-020-51200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 5 | **59559** | MHEV-025-51200-R1.00 |
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 5 | **59529** | MHEV-015-51600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 5 | **59547** | MHEV-020-51600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 5 | **59561** | MHEV-025-51600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 5 | **59530** | MHEV-015-51600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 5 | **59548** | MHEV-020-51600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 5 | **59562** | MHEV-025-51600-R1.00 |

* .013 mm max TIR

continued on next page

Speeds & Feeds on Page 132



# 5 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch (cont.)

**MHEV-5**
**METRIC**

continued from previous page

| Cutter Dia.* $D_1$ +.00 mm −.05 mm | Shank Dia. $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 5 | **59532** | MHEV-015-52000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 5 | **59550** | MHEV-020-52000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 5 | **59564** | MHEV-025-52000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 5 | **59533** | MHEV-015-52000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 5 | **59551** | MHEV-020-52000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 5 | **59565** | MHEV-025-52000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 5 | **59553** | MHEV-020-52500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 5 | **59567** | MHEV-025-52500-R1.00 |

* .013 mm max TIR



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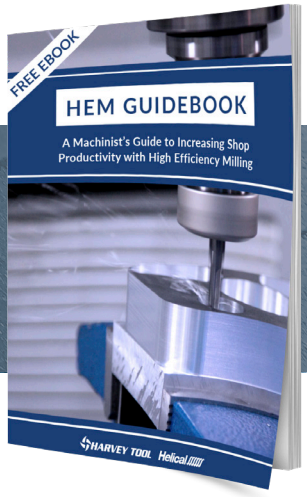


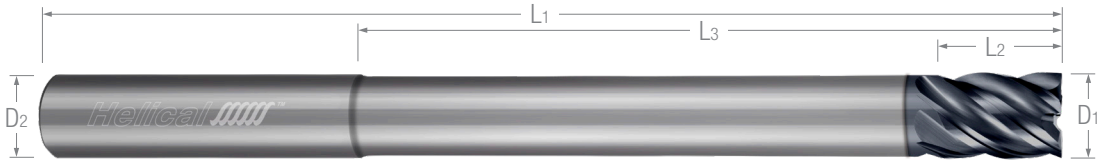
# HEV-RN-5

New Items!

## 5 FLUTE - SQUARE

### Variable Pitch - Reduced Neck

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Longer lengths of cut available for excellent performance in deep pocket High Efficiency Milling (HEM) applications
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

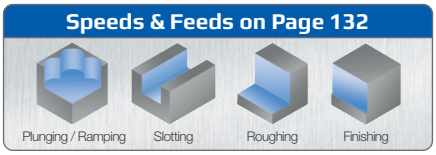



| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 5/32 | 2 | 3/8 | .118 | 5 | 50017 | HEV-RN-S-50125 |
| | | 1/8 | 5/32 | 2 | 1/2 | .118 | 5 | 50032 | HEV-RN-R-50125 |
| | | 1/8 | 5/32 | 2-1/2 | 3/4 | .118 | 5 | 50047 | HEV-RN-M-50125 |
| | | 1/8 | 5/32 | 2-1/2 | 1 | .118 | 5 | 81781 | HEV-RN-L-50125 |
| new | | 1/8 | 5/32 | 2-1/2 | 1-1/4 | .118 | 5 | 83014 | HEV-RN-LX-50125 |
| | 3/16 | 3/16 | 7/32 | 2 | 1/2 | .178 | 5 | 50062 | HEV-RN-R-50187 |
| | | 3/16 | 7/32 | 2-1/2 | 3/4 | .178 | 5 | 50077 | HEV-RN-M-50187 |
| | | 3/16 | 7/32 | 2-1/2 | 1-1/8 | .178 | 5 | 50092 | HEV-RN-L-50187 |
| new | | 3/16 | 7/32 | 2-1/2 | 1-5/16 | .178 | 5 | 83015 | HEV-RN-LX-50187 |
| | 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 5 | 50107 | HEV-RN-S-50250 |
| | | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 5 | 50122 | HEV-RN-R-50250 |
| new | | 1/4 | 3/4 | 4 | 1-1/8 | .237 | 5 | 83016 | HEV-RNR-R-50250 |
| | | 1/4 | 3/8 | 4 | 1-5/8 | .237 | 5 | 81782 | HEV-RN-A-50250 |
| | | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 5 | 50137 | HEV-RN-M-50250 |
| new | | 1/4 | 3/4 | 4 | 2-1/8 | .237 | 5 | 83017 | HEV-RNR-M-50250 |
| | | 1/4 | 3/8 | 4 | 2-1/2 | .237 | 5 | 81783 | HEV-RN-ML-50250 |
| new | | 1/4 | 3/8 | 4-1/2 | 3 | .237 | 5 | 83018 | HEV-RN-L-50250 |
| | 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 5 | 50152 | HEV-RN-S-50375 |
| | | 3/8 | 1/2 | 4 | 1-5/8 | .356 | 5 | 81784 | HEV-RN-SR-50375 |
| | | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 5 | 50167 | HEV-RN-R-50375 |
| new | | 3/8 | 1 | 4 | 2-1/8 | .356 | 5 | 83019 | HEV-RNR-R-50375 |
| | | 3/8 | 1/2 | 6 | 2-1/2 | .356 | 5 | 81785 | HEV-RN-A-50375 |
| | | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 5 | 50197 | HEV-RN-M-50375 |
| new | | 3/8 | 1 | 6 | 3-1/8 | .356 | 5 | 83020 | HEV-RNR-M-50375 |
| | | 3/8 | 1/2 | 6 | 4-1/8 | .356 | 5 | 50212 | HEV-RN-L-50375 |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 132



# 5 FLUTE - SQUARE New Items!

## Variable Pitch - Reduced Neck (cont.)

HEM

**HEV-RN-5**

continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 4 | 1-1/2 | .475 | 5 | 50227 | HEV-RN-S-50500 | |
| | 1/2 | 5/8 | 4 | 1-3/4 | .475 | 5 | 81786 | HEV-RN-SR-50500 | |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 5 | 50242 | HEV-RN-R-50500 | |
| | 1/2 | 1-1/4 | 4 | 2-1/4 | .475 | 5 | 83021 | HEV-RNR-R-50500 | new |
| | 1/2 | 5/8 | 5 | 2-3/4 | .475 | 5 | 81787 | HEV-RN-A-50500 | |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 5 | 50272 | HEV-RN-M-50500 | |
| | 1/2 | 1-1/4 | 6 | 3-3/8 | .475 | 5 | 83022 | HEV-RNR-M-50500 | new |
| | 1/2 | 5/8 | 6 | 4-1/8 | .475 | 5 | 50287 | HEV-RN-L-50500 | |
| | 1/2 | 1-1/4 | 6 | 4-1/8 | .475 | 5 | 83023 | HEV-RNR-L-50500 | new |
| | 1/2 | 5/8 | 7 | 5 | .475 | 5 | 83024 | HEV-RN-X-50500 | new |
| 5/8 | 5/8 | 3/4 | 4 | 1-5/8 | .593 | 5 | 50302 | HEV-RN-S-50625 | |
| | 5/8 | 3/4 | 6 | 2-3/8 | .593 | 5 | 50317 | HEV-RN-R-50625 | |
| | 5/8 | 3/4 | 6 | 3-3/8 | .593 | 5 | 50332 | HEV-RN-M-50625 | |
| | 5/8 | 3/4 | 6 | 4-1/8 | .593 | 5 | 50347 | HEV-RN-L-50625 | |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 5 | 50362 | HEV-RN-S-50750 | |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 5 | 50377 | HEV-RN-R-50750 | |
| | 3/4 | 1-5/8 | 6 | 2-1/2 | .712 | 5 | 83025 | HEV-RNR-R-50750 | new |
| | 3/4 | 1 | 6 | 2-7/8 | .712 | 5 | 81788 | HEV-RN-A-50750 | |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 5 | 50392 | HEV-RN-M-50750 | |
| | 3/4 | 1-5/8 | 6 | 3-3/8 | .712 | 5 | 83026 | HEV-RNR-M-50750 | new |
| | 3/4 | 1 | 6 | 4-1/8 | .712 | 5 | 50407 | HEV-RN-L-50750 | |
| 1 | 1 | 1-1/4 | 6 | 2-5/8 | .950 | 5 | 50437 | HEV-RN-R-51000 | |
| | 1 | 1-1/4 | 6 | 3-3/8 | .950 | 5 | 50452 | HEV-RN-M-51000 | |
| | 1 | 1-1/4 | 6 | 4-1/8 | .950 | 5 | 50467 | HEV-RN-L-51000 | |

* .0005 max TIR



Access customized running parameters for your specific setup and material at
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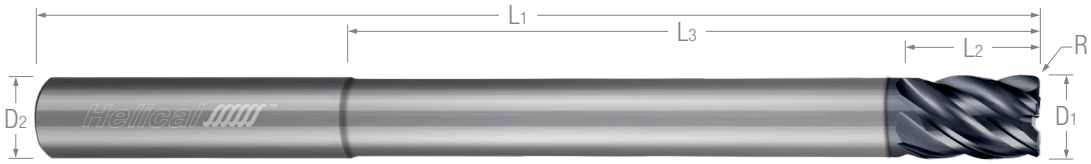
# HEV-RN-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch - Reduced Neck

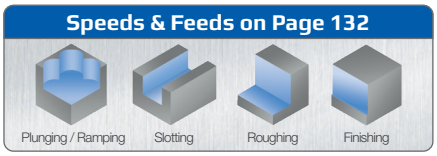
- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Longer lengths of cut available for excellent performance in deep pocket High Efficiency Milling (HEM) applications
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | .010 | 5/32 | 2 | 3/8 | .118 | 5 | 35017 | HEV-RN-S-50125-R.010 |
| | | 1/8 | .010 | 5/32 | 2 | 1/2 | .118 | 5 | 35032 | HEV-RN-R-50125-R.010 |
| | | 1/8 | .010 | 5/32 | 2-1/2 | 3/4 | .118 | 5 | 35047 | HEV-RN-M-50125-R.010 |
| | | 1/8 | .010 | 5/32 | 2-1/2 | 1 | .118 | 5 | 81789 | HEV-RN-L-50125-R.010 |
| new | | 1/8 | .010 | 5/32 | 2-1/2 | 1-1/4 | .118 | 5 | 83027 | HEV-RN-LX-50125-R.010 |
| | | 1/8 | .030 | 5/32 | 2 | 3/8 | .118 | 5 | 51017 | HEV-RN-S-50125-R.030 |
| | | 1/8 | .030 | 5/32 | 2 | 1/2 | .118 | 5 | 51032 | HEV-RN-R-50125-R.030 |
| | | 1/8 | .030 | 5/32 | 2-1/2 | 3/4 | .118 | 5 | 51047 | HEV-RN-M-50125-R.030 |
| new | | 1/8 | .030 | 5/32 | 2-1/2 | 1 | .118 | 5 | 83028 | HEV-RN-L-50125-R.030 |
| | 3/16 | 3/16 | .010 | 7/32 | 2 | 1/2 | .178 | 5 | 35062 | HEV-RN-R-50187-R.010 |
| | | 3/16 | .010 | 7/32 | 2-1/2 | 3/4 | .178 | 5 | 35077 | HEV-RN-M-50187-R.010 |
| | | 3/16 | .010 | 7/32 | 2-1/2 | 1-1/8 | .178 | 5 | 35092 | HEV-RN-L-50187-R.010 |
| | | 3/16 | .010 | 7/32 | 2-1/2 | 1-5/16 | .178 | 5 | 81790 | HEV-RN-LX-50187-R.010 |
| new | | 3/16 | .010 | 7/32 | 3 | 1-1/2 | .178 | 5 | 83029 | HEV-RN-X-50187-R.010 |
| | | 3/16 | .030 | 7/32 | 2 | 1/2 | .178 | 5 | 51062 | HEV-RN-R-50187-R.030 |
| | | 3/16 | .030 | 7/32 | 2-1/2 | 3/4 | .178 | 5 | 51077 | HEV-RN-M-50187-R.030 |
| | | 3/16 | .030 | 7/32 | 2-1/2 | 1-1/8 | .178 | 5 | 51092 | HEV-RN-L-50187-R.030 |
| | | 3/16 | .030 | 7/32 | 2-1/2 | 1-5/16 | .178 | 5 | 81791 | HEV-RN-LX-50187-R.030 |
| new | | 3/16 | .030 | 7/32 | 3 | 1-1/2 | .178 | 5 | 83030 | HEV-RN-X-50187-R.030 |
| | 1/4 | 1/4 | .020 | 3/8 | 4 | 3/4 | .237 | 5 | 35107 | HEV-RN-S-50250-R.020 |
| | | 1/4 | .020 | 3/8 | 4 | 1-1/8 | .237 | 5 | 35122 | HEV-RN-R-50250-R.020 |
| new | | 1/4 | .020 | 3/4 | 4 | 1-1/8 | .237 | 5 | 83031 | HEV-RNR-R-50250-R.020 |
| | | 1/4 | .020 | 3/8 | 4 | 1-5/8 | .237 | 5 | 81792 | HEV-RN-A-50250-R.020 |
| | | 1/4 | .020 | 3/8 | 4 | 2-1/8 | .237 | 5 | 35137 | HEV-RN-M-50250-R.020 |
| new | | 1/4 | .020 | 3/4 | 4 | 2-1/8 | .237 | 5 | 83032 | HEV-RNR-M-50250-R.020 |
| | | 1/4 | .020 | 3/8 | 4 | 2-1/2 | .237 | 5 | 81793 | HEV-RN-ML-50250-R.020 |
| new | | 1/4 | .020 | 3/8 | 4-1/2 | 3 | .237 | 5 | 83033 | HEV-RN-L-50250-R.020 |
| | | 1/4 | .030 | 3/8 | 4 | 3/4 | .237 | 5 | 51107 | HEV-RN-S-50250-R.030 |
| | | 1/4 | .030 | 3/8 | 4 | 1-1/8 | .237 | 5 | 51122 | HEV-RN-R-50250-R.030 |
| | | 1/4 | .030 | 3/8 | 4 | 2-1/8 | .237 | 5 | 51137 | HEV-RN-M-50250-R.030 |
| new | | 1/4 | .030 | 3/8 | 4 | 2-1/2 | .237 | 5 | 83034 | HEV-RN-ML-50250-R.030 |
| | | 1/4 | .060 | 3/8 | 4 | 3/4 | .237 | 5 | 51108 | HEV-RN-S-50250-R.060 |
| | | 1/4 | .060 | 3/8 | 4 | 1-1/8 | .237 | 5 | 51123 | HEV-RN-R-50250-R.060 |
| | | 1/4 | .060 | 3/8 | 4 | 2-1/8 | .237 | 5 | 51138 | HEV-RN-M-50250-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 132

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# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch - Reduced Neck (cont.)

HEV-RN-5

continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 5 | **35152** | HEV-RN-S-50375-R.020 | |
| | 3/8 | **.020** | 1/2 | 4 | 1-5/8 | .356 | 5 | **81794** | HEV-RN-SR-50375-R.020 | |
| | 3/8 | **.020** | 1/2 | 4 | 2-1/8 | .356 | 5 | **35167** | HEV-RN-R-50375-R.020 | |
| | 3/8 | **.020** | 1 | 4 | 2-1/8 | .356 | 5 | **83035** | HEV-RNR-R-50375-R.020 | new |
| | 3/8 | **.020** | 1/2 | 6 | 2-1/2 | .356 | 5 | **81795** | HEV-RN-A-50375-R.020 | |
| | 3/8 | **.020** | 1/2 | 6 | 3-1/8 | .356 | 5 | **35197** | HEV-RN-M-50375-R.020 | |
| | 3/8 | **.020** | 1 | 6 | 3-1/8 | .356 | 5 | **83036** | HEV-RNR-M-50375-R.020 | new |
| | 3/8 | **.030** | 1/2 | 4 | 1-1/8 | .356 | 5 | **51152** | HEV-RN-S-50375-R.030 | |
| | 3/8 | **.030** | 1/2 | 4 | 1-5/8 | .356 | 5 | **81796** | HEV-RN-SR-50375-R.030 | |
| | 3/8 | **.030** | 1/2 | 4 | 2-1/8 | .356 | 5 | **51167** | HEV-RN-R-50375-R.030 | |
| | 3/8 | **.030** | 1/2 | 6 | 2-1/2 | .356 | 5 | **81797** | HEV-RN-A-50375-R.030 | |
| | 3/8 | **.030** | 1/2 | 6 | 3-1/8 | .356 | 5 | **51197** | HEV-RN-M-50375-R.030 | |
| | 3/8 | **.030** | 1/2 | 6 | 4-1/8 | .356 | 5 | **51212** | HEV-RN-L-50375-R.030 | |
| | 3/8 | **.060** | 1/2 | 4 | 1-1/8 | .356 | 5 | **51153** | HEV-RN-S-50375-R.060 | |
| | 3/8 | **.060** | 1/2 | 4 | 2-1/8 | .356 | 5 | **51168** | HEV-RN-R-50375-R.060 | |
| | 3/8 | **.060** | 1/2 | 6 | 3-1/8 | .356 | 5 | **51198** | HEV-RN-M-50375-R.060 | |
| | 3/8 | **.090** | 1/2 | 4 | 1-1/8 | .356 | 5 | **51154** | HEV-RN-S-50375-R.090 | |
| | 3/8 | **.090** | 1/2 | 4 | 2-1/8 | .356 | 5 | **51169** | HEV-RN-R-50375-R.090 | |
| | 3/8 | **.090** | 1/2 | 6 | 3-1/8 | .356 | 5 | **51199** | HEV-RN-M-50375-R.090 | |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-1/2 | .475 | 5 | **35227** | HEV-RN-S-50500-R.030 | |
| | 1/2 | **.030** | 5/8 | 4 | 1-3/4 | .475 | 5 | **81798** | HEV-RN-SR-50500-R.030 | |
| | 1/2 | **.030** | 5/8 | 4 | 2-1/4 | .475 | 5 | **35242** | HEV-RN-R-50500-R.030 | |
| | 1/2 | **.030** | 1-1/4 | 4 | 2-1/4 | .475 | 5 | **83037** | HEV-RNR-R-50500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 5 | 2-3/4 | .475 | 5 | **81799** | HEV-RN-A-50500-R.030 | |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 5 | **35272** | HEV-RN-M-50500-R.030 | |
| | 1/2 | **.030** | 1-1/4 | 6 | 3-3/8 | .475 | 5 | **83038** | HEV-RNR-M-50500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/8 | .475 | 5 | **35287** | HEV-RN-L-50500-R.030 | |
| | 1/2 | **.030** | 1-1/4 | 6 | 4-1/8 | .475 | 5 | **83039** | HEV-RNR-L-50500-R.030 | new |
| | 1/2 | **.030** | 5/8 | 7 | 5 | .475 | 5 | **83040** | HEV-RN-X-50500-R.030 | new |
| | 1/2 | **.060** | 5/8 | 4 | 1-1/2 | .475 | 5 | **51227** | HEV-RN-S-50500-R.060 | |
| | 1/2 | **.060** | 5/8 | 4 | 2-1/4 | .475 | 5 | **51242** | HEV-RN-R-50500-R.060 | |
| | 1/2 | **.060** | 5/8 | 6 | 3-3/8 | .475 | 5 | **51272** | HEV-RN-M-50500-R.060 | |
| | 1/2 | **.060** | 5/8 | 6 | 4-1/8 | .475 | 5 | **51287** | HEV-RN-L-50500-R.060 | new |
| | 1/2 | **.090** | 5/8 | 4 | 1-1/2 | .475 | 5 | **51228** | HEV-RN-S-50500-R.090 | |
| | 1/2 | **.090** | 5/8 | 4 | 2-1/4 | .475 | 5 | **51243** | HEV-RN-R-50500-R.090 | |
| | 1/2 | **.090** | 5/8 | 6 | 3-3/8 | .475 | 5 | **51273** | HEV-RN-M-50500-R.090 | new |
| | 1/2 | **.120** | 5/8 | 4 | 1-1/2 | .475 | 5 | **51229** | HEV-RN-S-50500-R.120 | |
| | 1/2 | **.120** | 5/8 | 4 | 2-1/4 | .475 | 5 | **51244** | HEV-RN-R-50500-R.120 | |
| | 1/2 | **.120** | 5/8 | 6 | 3-3/8 | .475 | 5 | **51274** | HEV-RN-M-50500-R.120 | |
| | 1/2 | **.120** | 5/8 | 6 | 4-1/8 | .475 | 5 | **51289** | HEV-RN-L-50500-R.120 | |
| 5/8 | 5/8 | **.030** | 3/4 | 4 | 1-5/8 | .593 | 5 | **35302** | HEV-RN-S-50625-R.030 | |
| | 5/8 | **.030** | 3/4 | 6 | 2-3/8 | .593 | 5 | **35317** | HEV-RN-R-50625-R.030 | |
| | 5/8 | **.030** | 3/4 | 6 | 3-3/8 | .593 | 5 | **35332** | HEV-RN-M-50625-R.030 | |
| | 5/8 | **.030** | 3/4 | 6 | 4-1/8 | .593 | 5 | **35347** | HEV-RN-L-50625-R.030 | |
| | 5/8 | **.120** | 3/4 | 4 | 1-5/8 | .593 | 5 | **51304** | HEV-RN-S-50625-R.120 | |
| | 5/8 | **.120** | 3/4 | 6 | 2-3/8 | .593 | 5 | **51319** | HEV-RN-R-50625-R.120 | |

* .0005 max TIR

continued on next page

# HEV-RN-5

New Items!

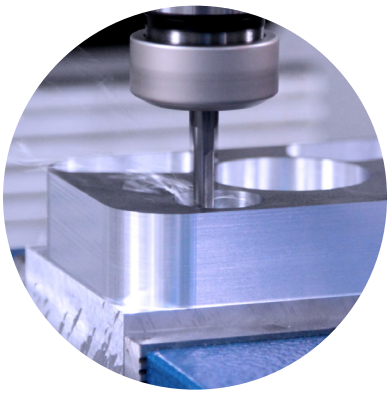
## 5 FLUTE - CORNER RADIUS

### Variable Pitch - Reduced Neck (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 5 | **35362** | HEV-RN-S-50750-R.030 |
| | | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 5 | **35377** | HEV-RN-R-50750-R.030 |
| new | | 3/4 | **.030** | 1-5/8 | 6 | 2-1/2 | .712 | 5 | **83043** | HEV-RNR-R-50750-R.030 |
| | | 3/4 | **.030** | 1 | 6 | 2-7/8 | .712 | 5 | **81800** | HEV-RN-A-50750-R.030 |
| | | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 5 | **35392** | HEV-RN-M-50750-R.030 |
| new | | 3/4 | **.030** | 1-5/8 | 6 | 3-3/8 | .712 | 5 | **83044** | HEV-RNR-M-50750-R.030 |
| | | 3/4 | **.030** | 1 | 6 | 4-1/8 | .712 | 5 | **35407** | HEV-RN-L-50750-R.030 |
| | | 3/4 | **.060** | 1 | 4 | 2 | .712 | 5 | **51362** | HEV-RN-S-50750-R.060 |
| | | 3/4 | **.060** | 1 | 6 | 2-1/2 | .712 | 5 | **51377** | HEV-RN-R-50750-R.060 |
| | | 3/4 | **.060** | 1 | 6 | 3-3/8 | .712 | 5 | **51392** | HEV-RN-M-50750-R.060 |
| | | 3/4 | **.060** | 1 | 6 | 4-1/8 | .712 | 5 | **51407** | HEV-RN-L-50750-R.060 |
| | | 3/4 | **.090** | 1 | 4 | 2 | .712 | 5 | **51363** | HEV-RN-S-50750-R.090 |
| | | 3/4 | **.090** | 1 | 6 | 4-1/8 | .712 | 5 | **51408** | HEV-RN-L-50750-R.090 |
| | | 3/4 | **.120** | 1 | 4 | 2 | .712 | 5 | **51364** | HEV-RN-S-50750-R.120 |
| | | 3/4 | **.120** | 1 | 6 | 2-1/2 | .712 | 5 | **51379** | HEV-RN-R-50750-R.120 |
| | | 3/4 | **.120** | 1 | 6 | 3-3/8 | .712 | 5 | **51394** | HEV-RN-M-50750-R.120 |
| | | 3/4 | **.120** | 1 | 6 | 4-1/8 | .712 | 5 | **51409** | HEV-RN-L-50750-R.120 |
| | | 3/4 | **.190** | 1 | 4 | 2 | .712 | 5 | **51365** | HEV-RN-S-50750-R.190 |
| | | 3/4 | **.190** | 1 | 6 | 4-1/8 | .712 | 5 | **51410** | HEV-RN-L-50750-R.190 |
| | | 3/4 | **.250** | 1 | 4 | 2 | .712 | 5 | **51366** | HEV-RN-S-50750-R.250 |
| | | 3/4 | **.250** | 1 | 6 | 2-1/2 | .712 | 5 | **51381** | HEV-RN-R-50750-R.250 |
| | | 3/4 | **.250** | 1 | 6 | 2-7/8 | .712 | 5 | **81801** | HEV-RN-A-50750-R.250 |
| | | 3/4 | **.250** | 1 | 6 | 3-3/8 | .712 | 5 | **51396** | HEV-RN-M-50750-R.250 |
| | | 3/4 | **.250** | 1 | 6 | 4-1/8 | .712 | 5 | **51411** | HEV-RN-L-50750-R.250 |
| | 1 | 1 | **.030** | 1-1/4 | 4 | 2-1/4 | .950 | 5 | **35422** | HEV-RN-S-51000-R.030 |
| | | 1 | **.030** | 1-1/4 | 6 | 2-5/8 | .950 | 5 | **35437** | HEV-RN-R-51000-R.030 |
| | | 1 | **.030** | 1-1/4 | 6 | 3-3/8 | .950 | 5 | **35452** | HEV-RN-M-51000-R.030 |
| | | 1 | **.030** | 1-1/4 | 6 | 4-1/8 | .950 | 5 | **35467** | HEV-RN-L-51000-R.030 |

* .0005 max TIR



## Avoiding 4 Major Types of Tool Wear

Excessive tool wear will show inconsistencies and have unwanted effects on your workpiece. Learn how to steer clear of tool wear in our "In the Loupe" blog post **How to Avoid 4 Major Types of Tool Wear**.

**Read more on helical.blog/intheloupe**

# SPEEDS & FEEDS

## 5 Flute - Variable Pitch

**HEV-5 / HSM-5**

## HEV-5 / HEV-RN-5 / HSM-5

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/16 | | | 1/8 | | | 3/16 | | | 1/4 | | | 3/8 | | | 1/2 | | | 3/4 | | | 1 | | |
| | | | | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin | Slot | Rgh | Fin |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0005 | .0008 | .0009 | .0009 | .0015 | .0018 | .0014 | .0021 | .0020 | .0018 | .0029 | .0022 | .0027 | .0043 | .0026 | .0035 | .0056 | .0030 | .0051 | .0080 | .0036 | .0065 | .0102 | .0044 |
| | | 75 - 98 HRB | 445 | .0004 | .0006 | .0008 | .0007 | .0011 | .0015 | .0010 | .0015 | .0017 | .0013 | .0021 | .0019 | .0020 | .0031 | .0022 | .0026 | .0041 | .0026 | .0037 | .0059 | .0031 | .0047 | .0075 | .0037 |
| | | 21 - 36 HRC | 400 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0007 | .0010 | .0014 | .0009 | .0014 | .0015 | .0013 | .0020 | .0018 | .0017 | .0026 | .0021 | .0024 | .0038 | .0025 | .0031 | .0048 | .0030 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0003 | .0005 | .0007 | .0006 | .0009 | .0014 | .0009 | .0013 | .0016 | .0012 | .0018 | .0018 | .0017 | .0027 | .0021 | .0022 | .0035 | .0024 | .0032 | .0051 | .0029 | .0041 | .0065 | .0035 |
| | | 21 - 36 HRC | 340 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0007 | .0010 | .0013 | .0009 | .0013 | .0015 | .0013 | .0020 | .0018 | .0017 | .0026 | .0021 | .0024 | .0038 | .0025 | .0030 | .0048 | .0030 |
| | | 36 - 50 HRC | 260 | .0002 | .0003 | .0006 | .0004 | .0006 | .0011 | .0006 | .0009 | .0013 | .0008 | .0012 | .0014 | .0011 | .0017 | .0017 | .0015 | .0023 | .0019 | .0021 | .0033 | .0023 | .0027 | .0042 | .0028 |
| | | > 50 HRC | 155 | .0002 | .0003 | .0005 | .0003 | .0005 | .0010 | .0005 | .0007 | .0011 | .0006 | .0009 | .0013 | .0009 | .0014 | .0015 | .0011 | .0018 | .0017 | .0017 | .0026 | .0020 | .0021 | .0033 | .0025 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0003 | .0005 | .0007 | .0006 | .0009 | .0014 | .0009 | .0013 | .0016 | .0012 | .0018 | .0018 | .0017 | .0027 | .0021 | .0022 | .0035 | .0024 | .0032 | .0051 | .0029 | .0041 | .0065 | .0035 |
| | | 21 - 36 HRC | 250 | .0003 | .0004 | .0006 | .0005 | .0007 | .0012 | .0007 | .0011 | .0014 | .0009 | .0015 | .0016 | .0014 | .0022 | .0018 | .0018 | .0028 | .0021 | .0026 | .0040 | .0025 | .0033 | .0051 | .0031 |
| | | 36 - 50 HRC | 145 | .0002 | .0003 | .0006 | .0004 | .0006 | .0011 | .0005 | .0008 | .0012 | .0007 | .0011 | .0014 | .0011 | .0017 | .0016 | .0014 | .0022 | .0019 | .0020 | .0031 | .0023 | .0026 | .0040 | .0027 |
| | | > 50 HRC | 85 | .0002 | .0003 | .0005 | .0003 | .0005 | .0010 | .0005 | .0007 | .0011 | .0006 | .0009 | .0013 | .0009 | .0014 | .0015 | .0011 | .0018 | .0017 | .0016 | .0026 | .0020 | .0021 | .0033 | .0025 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0004 | .0006 | .0008 | .0008 | .0012 | .0016 | .0011 | .0018 | .0018 | .0015 | .0024 | .0020 | .0023 | .0035 | .0024 | .0029 | .0046 | .0028 | .0042 | .0066 | .0033 | .0054 | .0085 | .0040 |
| | | 75 - 98 HRB | 255 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0008 | .0012 | .0015 | .0010 | .0016 | .0017 | .0015 | .0024 | .0019 | .0020 | .0032 | .0023 | .0029 | .0045 | .0027 | .0037 | .0058 | .0033 |
| | | 21 - 36 HRC | 175 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0007 | .0011 | .0014 | .0009 | .0015 | .0016 | .0014 | .0022 | .0019 | .0018 | .0029 | .0021 | .0026 | .0041 | .0026 | .0033 | .0052 | .0031 |
| | | 36 - 50 HRC | 150 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0013 | .0008 | .0013 | .0015 | .0012 | .0019 | .0017 | .0016 | .0026 | .0020 | .0023 | .0037 | .0024 | .0030 | .0046 | .0030 |
| | | > 50 HRC | 55 | .0002 | .0002 | .0005 | .0003 | .0004 | .0009 | .0004 | .0006 | .0010 | .0005 | .0008 | .0012 | .0008 | .0012 | .0014 | .0010 | .0016 | .0016 | .0014 | .0022 | .0019 | .0018 | .0029 | .0023 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0003 | .0005 | .0007 | .0006 | .0009 | .0014 | .0009 | .0013 | .0016 | .0011 | .0018 | .0018 | .0017 | .0026 | .0020 | .0022 | .0034 | .0024 | .0031 | .0049 | .0028 | .0040 | .0063 | .0034 |
| | | 21 - 36 HRC | 225 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0008 | .0012 | .0015 | .0010 | .0016 | .0017 | .0015 | .0024 | .0019 | .0020 | .0031 | .0023 | .0028 | .0044 | .0027 | .0036 | .0057 | .0033 |
| | | 36 - 50 HRC | 180 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0009 | .0013 | .0008 | .0013 | .0015 | .0012 | .0019 | .0017 | .0016 | .0025 | .0020 | .0023 | .0036 | .0024 | .0029 | .0045 | .0029 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0003 | .0005 | .0007 | .0006 | .0009 | .0014 | .0009 | .0013 | .0016 | .0012 | .0018 | .0018 | .0017 | .0027 | .0021 | .0023 | .0035 | .0024 | .0032 | .0051 | .0029 | .0041 | .0065 | .0035 |
| | | 21 - 36 HRC | 280 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0008 | .0012 | .0015 | .0010 | .0016 | .0017 | .0015 | .0024 | .0019 | .0020 | .0031 | .0022 | .0028 | .0044 | .0027 | .0036 | .0056 | .0033 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0013 | .0009 | .0013 | .0015 | .0013 | .0020 | .0018 | .0017 | .0026 | .0021 | .0024 | .0037 | .0025 | .0030 | .0048 | .0030 |
| | | 36 - 50 HRC | 145 | .0002 | .0003 | .0006 | .0004 | .0006 | .0011 | .0006 | .0009 | .0013 | .0007 | .0012 | .0014 | .0011 | .0017 | .0016 | .0014 | .0023 | .0019 | .0021 | .0032 | .0023 | .0026 | .0041 | .0028 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0005 | .0008 | .0009 | .0010 | .0015 | .0018 | .0014 | .0022 | .0020 | .0019 | .0029 | .0023 | .0028 | .0044 | .0026 | .0036 | .0057 | .0030 | .0052 | .0082 | .0037 | .0066 | .0104 | .0044 |
| | | 21 - 36 HRC | 370 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0008 | .0012 | .0015 | .0010 | .0016 | .0017 | .0015 | .0024 | .0019 | .0020 | .0031 | .0022 | .0028 | .0045 | .0027 | .0036 | .0057 | .0033 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0003 | .0005 | .0007 | .0006 | .0010 | .0014 | .0009 | .0014 | .0016 | .0012 | .0019 | .0018 | .0018 | .0028 | .0021 | .0023 | .0036 | .0024 | .0033 | .0052 | .0029 | .0042 | .0066 | .0035 |
| | | 21 - 36 HRC | 335 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0008 | .0012 | .0015 | .0010 | .0016 | .0017 | .0015 | .0024 | .0019 | .0020 | .0031 | .0022 | .0029 | .0045 | .0027 | .0036 | .0057 | .0033 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0003 | .0005 | .0008 | .0006 | .0010 | .0015 | .0009 | .0014 | .0016 | .0012 | .0020 | .0018 | .0018 | .0029 | .0021 | .0024 | .0038 | .0025 | .0034 | .0054 | .0029 | .0044 | .0069 | .0036 |
| | | 21 - 36 HRC | 260 | .0002 | .0004 | .0006 | .0004 | .0007 | .0012 | .0006 | .0010 | .0013 | .0008 | .0013 | .0015 | .0012 | .0019 | .0017 | .0016 | .0025 | .0020 | .0023 | .0036 | .0024 | .0029 | .0046 | .0029 |
| | | 36 - 50 HRC | 135 | .0002 | .0002 | .0005 | .0003 | .0004 | .0009 | .0004 | .0006 | .0010 | .0005 | .0008 | .0012 | .0008 | .0012 | .0014 | .0010 | .0016 | .0016 | .0014 | .0023 | .0019 | .0018 | .0029 | .0023 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0004 | .0007 | .0009 | .0008 | .0013 | .0017 | .0012 | .0018 | .0019 | .0016 | .0025 | .0021 | .0024 | .0037 | .0024 | .0031 | .0049 | .0028 | .0044 | .0070 | .0034 | .0056 | .0089 | .0041 |
| | | 75 - 98 HRB | 250 | .0004 | .0006 | .0008 | .0007 | .0011 | .0015 | .0010 | .0015 | .0017 | .0013 | .0021 | .0019 | .0020 | .0031 | .0022 | .0026 | .0041 | .0026 | .0037 | .0058 | .0031 | .0047 | .0074 | .0037 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0002 | .0003 | .0006 | .0004 | .0006 | .0012 | .0006 | .0009 | .0013 | .0008 | .0013 | .0015 | .0012 | .0019 | .0017 | .0016 | .0025 | .0020 | .0023 | .0035 | .0024 | .0029 | .0045 | .0029 |
| | | 21 - 36 HRC | 75 | .0002 | .0003 | .0006 | .0004 | .0006 | .0012 | .0006 | .0009 | .0013 | .0008 | .0012 | .0015 | .0012 | .0018 | .0017 | .0015 | .0024 | .0020 | .0022 | .0034 | .0023 | .0028 | .0043 | .0028 |
| | | 36 - 50 HRC | 70 | .0002 | .0003 | .0005 | .0003 | .0005 | .0010 | .0005 | .0008 | .0012 | .0007 | .0010 | .0014 | .0010 | .0015 | .0015 | .0013 | .0020 | .0018 | .0019 | .0029 | .0022 | .0023 | .0037 | .0026 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0006 | .0009 | .0010 | .0011 | .0017 | .0019 | .0017 | .0025 | .0022 | .0022 | .0035 | .0025 | .0033 | .0051 | .0028 | .0043 | .0067 | .0033 | .0061 | .0096 | .0039 | .0078 | .0122 | .0048 |
| | | 75 - 98 HRB | 275 | .0005 | .0008 | .0009 | .0009 | .0015 | .0018 | .0014 | .0021 | .0020 | .0018 | .0029 | .0023 | .0027 | .0043 | .0026 | .0036 | .0056 | .0030 | .0051 | .0081 | .0036 | .0065 | .0103 | .0044 |
| | | 21 - 36 HRC | 250 | .0004 | .0006 | .0008 | .0007 | .0011 | .0015 | .0010 | .0016 | .0017 | .0014 | .0022 | .0020 | .0021 | .0032 | .0022 | .0027 | .0042 | .0026 | .0038 | .0060 | .0031 | .0049 | .0077 | .0038 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0003 | .0005 | .0007 | .0006 | .0009 | .0014 | .0008 | .0013 | .0015 | .0011 | .0017 | .0017 | .0016 | .0025 | .0020 | .0021 | .0033 | .0023 | .0030 | .0048 | .0028 | .0039 | .0061 | .0034 |
| | | 36 - 50 HRC | 160 | .0003 | .0004 | .0007 | .0005 | .0008 | .0013 | .0008 | .0012 | .0015 | .0010 | .0016 | .0017 | .0015 | .0023 | .0019 | .0019 | .0030 | .0022 | .0028 | .0043 | .0027 | .0035 | .0055 | .0032 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0003 | .0004 | .0006 | .0005 | .0007 | .0012 | .0007 | .0011 | .0014 | .0009 | .0015 | .0016 | .0014 | .0021 | .0018 | .0018 | .0028 | .0022 | .0026 | .0040 | .0026 | .0032 | .0051 | .0031 |
| | | 21 - 36 HRC | 170 | .0003 | .0004 | .0006 | .0005 | .0007 | .0012 | .0007 | .0010 | .0014 | .0009 | .0014 | .0016 | .0013 | .0021 | .0018 | .0017 | .0027 | .0021 | .0025 | .0039 | .0025 | .0031 | .0050 | .0030 |
| | | | 65 | .0002 | .0003 | .0005 | .0003 | .0005 | .0010 | .0005 | .0007 | .0011 | .0006 | .0010 | .0013 | .0009 | .0014 | .0015 | .0012 | .0018 | .0017 | .0017 | .0026 | .0021 | .0021 | .0034 | .0025 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 30%-75% Diameter | 100% Diameter |
| | ≥ 35 HRC | 25%-50% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 15%-30% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-20% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

**For diameters under 1/8', please refer to the complete S&F chart on our website.**

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

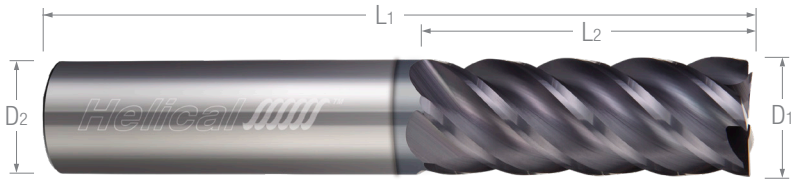
IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# HEF-5

## 5 FLUTE - SQUARE

Finisher

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed with 5 flutes for excellent performance in roughing, High Efficiency Milling (HEM), and finishing (including thin wall applications)
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 5 | **05007** | HEF-S-50125 |
| | 1/8 | 3/8 | 2 | 5 | **81802** | HEF-SR-50125 |
| | 1/8 | 1/2 | 2-1/2 | 5 | **05022** | HEF-R-50125 |
| | 1/8 | 5/8 | 2-1/2 | 5 | **81803** | HEF-M-50125 |
| | 1/8 | 3/4 | 2-1/2 | 5 | **05037** | HEF-L-50125 |
| 3/16 | 3/16 | 5/16 | 2 | 5 | **05067** | HEF-S-50187 |
| | 3/16 | 7/16 | 2 | 5 | **81804** | HEF-SR-50187 |
| | 3/16 | 9/16 | 2-1/2 | 5 | **05082** | HEF-R-50187 |
| | 3/16 | 3/4 | 2-1/2 | 5 | **05097** | HEF-M-50187 |
| | 3/16 | 1 | 2-1/2 | 5 | **81805** | HEF-ML-50187 |
| 1/4 | 1/4 | 3/8 | 2 | 5 | **05127** | HEF-S-50250 |
| | 1/4 | 1/2 | 2-1/2 | 5 | **05132** | HEF-SR-50250 |
| | 1/4 | 3/4 | 2-1/2 | 5 | **05142** | HEF-R-50250 |
| | 1/4 | 1 | 3 | 5 | **05157** | HEF-M-50250 |
| | 1/4 | 1-1/4 | 3 | 5 | **05172** | HEF-L-50250 |
| | 1/4 | 1-3/4 | 4 | 5 | **05182** | HEF-X-50250 |
| 5/16 | 5/16 | 7/16 | 2 | 5 | **05202** | HEF-S-50312 |
| | 5/16 | 13/16 | 2-1/2 | 5 | **05217** | HEF-R-50312 |
| | 5/16 | 1 | 3 | 5 | **05232** | HEF-M-50312 |
| | 5/16 | 1-1/4 | 3 | 5 | **05247** | HEF-L-50312 |
| | 5/16 | 2-1/8 | 4 | 5 | **05262** | HEF-X-50312 |
| 3/8 | 3/8 | 1/2 | 2 | 5 | **05292** | HEF-S-50375 |
| | 3/8 | 3/4 | 2-1/2 | 5 | **81806** | HEF-SR-50375 |
| | 3/8 | 1 | 3 | 5 | **05307** | HEF-R-50375 |
| | 3/8 | 1-1/4 | 3 | 5 | **05322** | HEF-M-50375 |
| | 3/8 | 1-1/2 | 3-1/2 | 5 | **05337** | HEF-L-50375 |
| | 3/8 | 2 | 4 | 5 | **05352** | HEF-LX-50375 |
| | 3/8 | 2-1/2 | 5 | 5 | **05367** | HEF-X-50375 |
| 7/16 | 7/16 | 9/16 | 2-3/4 | 5 | **05397** | HEF-S-50437 |
| | 7/16 | 1 | 2-3/4 | 5 | **05412** | HEF-R-50437 |
| | 7/16 | 2 | 4 | 5 | **05427** | HEF-L-50437 |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 135

# 5 FLUTE - SQUARE

## Finisher (cont.)

HEF-5

continued from previous page

| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 1/2 | 1/2 | 5/8 | 2-1/2 | 5 | **05457** | HEF-S-50500 |
| | 1/2 | 1 | 3 | 5 | **05472** | HEF-SR-50500 |
| | 1/2 | 1-1/4 | 3 | 5 | **05487** | HEF-R-50500 |
| | 1/2 | 1-5/8 | 4 | 5 | **05502** | HEF-M-50500 |
| | 1/2 | 2 | 4 | 5 | **05517** | HEF-L-50500 |
| | 1/2 | 2-1/2 | 5 | 5 | **05532** | HEF-LX-50500 |
| | 1/2 | 3-1/8 | 6 | 5 | **05547** | HEF-X-50500 |
| 5/8 | 5/8 | 3/4 | 3 | 5 | **05607** | HEF-S-50625 |
| | 5/8 | 1-5/8 | 3-1/2 | 5 | **05622** | HEF-R-50625 |
| | 5/8 | 2-1/8 | 4 | 5 | **05637** | HEF-M-50625 |
| | 5/8 | 2-1/2 | 5 | 5 | **05652** | HEF-L-50625 |
| | 5/8 | 3-1/4 | 6 | 5 | **05662** | HEF-LX-50625 |
| | 5/8 | 4 | 6 | 5 | **05667** | HEF-X-50625 |
| 3/4 | 3/4 | 1 | 3 | 5 | **05697** | HEF-S-50750 |
| | 3/4 | 1-5/8 | 4 | 5 | **05712** | HEF-R-50750 |
| | 3/4 | 2-1/4 | 5 | 5 | **05727** | HEF-M-50750 |
| | 3/4 | 2-3/4 | 5 | 5 | **05742** | HEF-ML-50750 |
| | 3/4 | 3-1/2 | 6 | 5 | **05757** | HEF-L-50750 |
| | 3/4 | 4 | 6 | 5 | **05772** | HEF-X-50750 |
| 1 | 1 | 1-1/4 | 4 | 5 | **05862** | HEF-S-51000 |
| | 1 | 2 | 4-1/2 | 5 | **05877** | HEF-R-51000 |
| | 1 | 2-5/8 | 5 | 5 | **05892** | HEF-M-51000 |
| | 1 | 3-1/4 | 6 | 5 | **05907** | HEF-L-51000 |
| | 1 | 4-1/8 | 7 | 5 | **05922** | HEF-X-51000 |

* .0005 max TIR



Access customized running parameters for your specific setup and material at
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# HEF-5

# SPEEDS & FEEDS

## 5 Flute - Finisher

## HEF-5

| Material Guide | | Hardness | SFM | Inches Per Tooth (IPT) 1/8 Rgh | 1/8 Fin | 3/16 Rgh | 3/16 Fin | 1/4 Rgh | 1/4 Fin | 3/8 Rgh | 3/8 Fin | 1/2 Rgh | 1/2 Fin | 3/4 Rgh | 3/4 Fin | 1 Rgh | 1 Fin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0016 | .0019 | .0023 | .0022 | .0031 | .0024 | .0046 | .0028 | .0061 | .0033 | .0087 | .0039 | .0111 | .0047 |
| | | 75 - 98 HRB | 445 | .0012 | .0016 | .0017 | .0018 | .0023 | .0021 | .0034 | .0024 | .0044 | .0028 | .0064 | .0033 | .0081 | .0040 |
| | | 21 - 36 HRC | 400 | .0008 | .0013 | .0011 | .0015 | .0015 | .0017 | .0022 | .0019 | .0029 | .0022 | .0041 | .0027 | .0053 | .0033 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0010 | .0015 | .0015 | .0017 | .0020 | .0019 | .0029 | .0022 | .0038 | .0026 | .0055 | .0031 | .0070 | .0038 |
| | | 21 - 36 HRC | 340 | .0008 | .0013 | .0011 | .0014 | .0015 | .0017 | .0022 | .0019 | .0029 | .0023 | .0041 | .0027 | .0052 | .0033 |
| | | 36 - 50 HRC | 260 | .0007 | .0012 | .0009 | .0014 | .0013 | .0016 | .0019 | .0018 | .0025 | .0021 | .0036 | .0025 | .0046 | .0030 |
| | | > 50 HRC | 155 | .0005 | .0011 | .0007 | .0012 | .0010 | .0014 | .0015 | .0016 | .0020 | .0019 | .0028 | .0022 | .0036 | .0027 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0010 | .0015 | .0015 | .0017 | .0020 | .0019 | .0029 | .0022 | .0038 | .0026 | .0055 | .0031 | .0070 | .0038 |
| | | 21 - 36 HRC | 250 | .0008 | .0014 | .0012 | .0015 | .0016 | .0017 | .0023 | .0020 | .0031 | .0023 | .0044 | .0028 | .0056 | .0034 |
| | | 36 - 50 HRC | 145 | .0006 | .0012 | .0009 | .0013 | .0012 | .0015 | .0018 | .0017 | .0024 | .0020 | .0034 | .0024 | .0044 | .0029 |
| | | > 50 HRC | 85 | .0005 | .0011 | .0008 | .0012 | .0010 | .0014 | .0015 | .0016 | .0020 | .0019 | .0028 | .0022 | .0036 | .0027 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0013 | .0017 | .0019 | .0020 | .0026 | .0022 | .0038 | .0026 | .0050 | .0030 | .0072 | .0035 | .0092 | .0043 |
| | | 75 - 98 HRB | 255 | .0009 | .0014 | .0013 | .0016 | .0018 | .0018 | .0026 | .0021 | .0035 | .0025 | .0050 | .0029 | .0063 | .0036 |
| | | 21 - 36 HRC | 175 | .0008 | .0014 | .0012 | .0015 | .0016 | .0018 | .0024 | .0020 | .0031 | .0023 | .0044 | .0028 | .0057 | .0034 |
| | | 36 - 50 HRC | 150 | .0007 | .0013 | .0011 | .0014 | .0014 | .0017 | .0021 | .0019 | .0028 | .0022 | .0040 | .0026 | .0051 | .0032 |
| | | > 50 HRC | 55 | .0004 | .0010 | .0006 | .0011 | .0009 | .0013 | .0013 | .0015 | .0017 | .0017 | .0024 | .0021 | .0031 | .0025 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0010 | .0015 | .0014 | .0017 | .0019 | .0019 | .0029 | .0022 | .0037 | .0026 | .0054 | .0031 | .0069 | .0037 |
| | | 21 - 36 HRC | 225 | .0009 | .0014 | .0013 | .0016 | .0017 | .0018 | .0026 | .0021 | .0034 | .0024 | .0048 | .0029 | .0062 | .0035 |
| | | 36 - 50 HRC | 180 | .0007 | .0013 | .0010 | .0014 | .0014 | .0016 | .0021 | .0019 | .0027 | .0022 | .0039 | .0026 | .0050 | .0032 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0010 | .0015 | .0015 | .0017 | .0020 | .0019 | .0030 | .0022 | .0039 | .0026 | .0055 | .0031 | .0071 | .0038 |
| | | 21 - 36 HRC | 280 | .0009 | .0014 | .0013 | .0016 | .0017 | .0018 | .0026 | .0021 | .0034 | .0024 | .0048 | .0029 | .0062 | .0035 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0007 | .0013 | .0011 | .0014 | .0015 | .0017 | .0022 | .0019 | .0028 | .0022 | .0041 | .0026 | .0052 | .0032 |
| | | 36 - 50 HRC | 145 | .0006 | .0012 | .0009 | .0014 | .0013 | .0016 | .0019 | .0018 | .0024 | .0021 | .0035 | .0025 | .0045 | .0030 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0016 | .0019 | .0024 | .0022 | .0032 | .0024 | .0048 | .0028 | .0062 | .0033 | .0089 | .0039 | .0114 | .0048 |
| | | 21 - 36 HRC | 370 | .0009 | .0014 | .0013 | .0016 | .0017 | .0018 | .0026 | .0021 | .0034 | .0025 | .0048 | .0029 | .0062 | .0035 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0010 | .0015 | .0015 | .0017 | .0020 | .0020 | .0030 | .0023 | .0040 | .0026 | .0057 | .0031 | .0073 | .0038 |
| | | 21 - 36 HRC | 335 | .0009 | .0014 | .0013 | .0016 | .0017 | .0018 | .0026 | .0021 | .0034 | .0025 | .0049 | .0029 | .0062 | .0035 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0011 | .0016 | .0016 | .0017 | .0021 | .0020 | .0031 | .0023 | .0041 | .0027 | .0059 | .0032 | .0075 | .0039 |
| | | 21 - 36 HRC | 260 | .0007 | .0013 | .0010 | .0014 | .0014 | .0016 | .0021 | .0019 | .0027 | .0022 | .0039 | .0026 | .0050 | .0032 |
| | | 36 - 50 HRC | 135 | .0005 | .0010 | .0007 | .0011 | .0009 | .0013 | .0013 | .0015 | .0017 | .0017 | .0025 | .0021 | .0032 | .0025 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0014 | .0018 | .0020 | .0020 | .0027 | .0023 | .0040 | .0026 | .0053 | .0030 | .0076 | .0036 | .0097 | .0044 |
| | | 75 - 98 HRB | 250 | .0012 | .0016 | .0017 | .0018 | .0023 | .0021 | .0034 | .0024 | .0044 | .0028 | .0063 | .0033 | .0081 | .0040 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0007 | .0013 | .0010 | .0014 | .0014 | .0016 | .0021 | .0019 | .0027 | .0022 | .0039 | .0026 | .0049 | .0031 |
| | | 21 - 36 HRC | 75 | .0007 | .0012 | .0010 | .0014 | .0013 | .0016 | .0020 | .0018 | .0026 | .0021 | .0037 | .0025 | .0047 | .0031 |
| | | 36 - 50 HRC | 70 | .0006 | .0011 | .0008 | .0013 | .0011 | .0015 | .0017 | .0017 | .0022 | .0020 | .0032 | .0023 | .0041 | .0028 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0019 | .0021 | .0028 | .0024 | .0037 | .0027 | .0056 | .0031 | .0073 | .0036 | .0104 | .0043 | .0134 | .0052 |
| | | 75 - 98 HRB | 275 | .0016 | .0019 | .0023 | .0022 | .0032 | .0024 | .0047 | .0028 | .0061 | .0033 | .0087 | .0039 | .0112 | .0048 |
| | | 21 - 36 HRC | 250 | .0012 | .0017 | .0017 | .0019 | .0024 | .0021 | .0035 | .0024 | .0046 | .0028 | .0066 | .0034 | .0084 | .0041 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0009 | .0015 | .0014 | .0017 | .0019 | .0019 | .0028 | .0022 | .0036 | .0025 | .0052 | .0030 | .0066 | .0037 |
| | | 36 - 50 HRC | 160 | .0009 | .0014 | .0012 | .0016 | .0017 | .0018 | .0025 | .0021 | .0033 | .0024 | .0047 | .0029 | .0060 | .0035 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0008 | .0013 | .0012 | .0015 | .0016 | .0017 | .0023 | .0020 | .0031 | .0023 | .0044 | .0028 | .0056 | .0034 |
| | | 21 - 36 HRC | 170 | .0008 | .0013 | .0011 | .0015 | .0015 | .0017 | .0023 | .0019 | .0029 | .0023 | .0042 | .0027 | .0054 | .0033 |
| | | 36 - 50 HRC | 65 | .0005 | .0011 | .0008 | .0012 | .0010 | .0014 | .0015 | .0016 | .0020 | .0019 | .0029 | .0023 | .0037 | .0027 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 15%-25% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-20% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. For more accurate running parameters, please refer to Machining Advisor Pro.

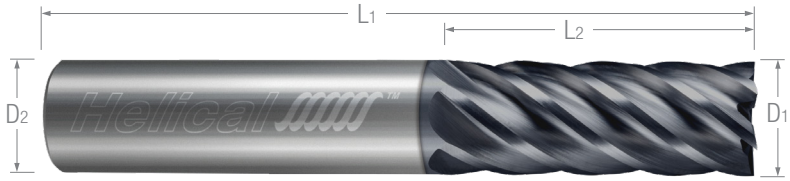
# 6 FLUTE - SQUARE

## Variable Pitch

**HEV-6**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 177 for T*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | A*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 2 | 6 | 59250 | HEV-S-60250 |
| | 1/4 | 1/2 | 2-1/2 | 6 | 59251 | HEV-SR-60250 |
| | 1/4 | 3/4 | 2-1/2 | 6 | 59252 | HEV-R-60250 |
| | 1/4 | 1 | 3 | 6 | 59253 | HEV-M-60250 |
| | 1/4 | 1-1/4 | 3 | 6 | 59254 | HEV-L-60250 |
| | 1/4 | 1-1/2 | 3 | 6 | 82565 | HEV-LX-60250 |
| 5/16 | 5/16 | 7/16 | 2 | 6 | 59255 | HEV-S-60312 |
| | 5/16 | 3/4 | 2-1/2 | 6 | 59256 | HEV-R-60312 |
| | 5/16 | 1 | 3 | 6 | 59257 | HEV-M-60312 |
| 3/8 | 3/8 | 1/2 | 2 | 6 | 59258 | HEV-S-60375 |
| | 3/8 | 3/4 | 2-1/2 | 6 | 82566 | HEV-SR-60375 |
| | 3/8 | 1 | 3 | 6 | 59259 | HEV-R-60375 |
| | 3/8 | 1-1/4 | 3 | 6 | 59260 | HEV-M-60375 |
| | 3/8 | 1-1/2 | 3-1/2 | 6 | 59261 | HEV-L-60375 |
| | 3/8 | 2 | 4 | 6 | 82567 | HEV-LX-60375 |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 6 | 59262 | HEV-S-60500 |
| | 1/2 | 1 | 3 | 6 | 59263 | HEV-SR-60500 |
| | 1/2 | 1-1/4 | 3 | 6 | 59264 | HEV-R-60500 |
| | 1/2 | 1-5/8 | 4 | 6 | 59265 | HEV-M-60500 |
| | 1/2 | 2 | 4 | 6 | 59266 | HEV-L-60500 |
| | 1/2 | 2-1/2 | 5 | 6 | 82568 | HEV-LX-60500 |
| 5/8 | 5/8 | 3/4 | 3 | 6 | 59267 | HEV-S-60625 |
| | 5/8 | 1-1/4 | 3-1/2 | 6 | 59268 | HEV-SR-60625 |
| | 5/8 | 1-5/8 | 3-1/2 | 6 | 59269 | HEV-R-60625 |
| | 5/8 | 2 | 4 | 6 | 59270 | HEV-M-60625 |
| | 5/8 | 2-1/2 | 5 | 6 | 59271 | HEV-L-60625 |
| 3/4 | 3/4 | 1 | 3 | 6 | 59272 | HEV-S-60750 |
| | 3/4 | 1-5/8 | 4 | 6 | 59273 | HEV-R-60750 |
| | 3/4 | 2-1/4 | 5 | 6 | 59274 | HEV-M-60750 |
| | 3/4 | 2-3/4 | 5 | 6 | 59275 | HEV-L-60750 |
| | 3/4 | 3-1/4 | 6 | 6 | 59276 | HEV-LX-60750 |
| 1 | 1 | 2 | 4-1/2 | 6 | 59277 | HEV-R-61000 |
| | 1 | 2-5/8 | 5 | 6 | 59278 | HEV-M-61000 |
| | 1 | 3-1/4 | 6 | 6 | 59279 | HEV-L-61000 |

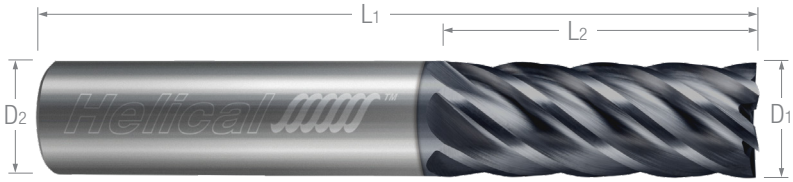
* .0005 max TIR

**Speeds & Feeds on Page 147**

# MHEV-6
## METRIC

# 6 FLUTE - SQUARE - METRIC
## Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | 9.00 mm | 63 mm | 6 | 59574 | MHEV-015-60600 |
| | 6.00 mm | 12.00 mm | 63 mm | 6 | 59592 | MHEV-020-60600 |
| | 6.00 mm | 18.00 mm | 63 mm | 6 | 59626 | MHEV-030-60600 |
| 8 mm | 8.00 mm | 12.00 mm | 63 mm | 6 | 59577 | MHEV-015-60800 |
| | 8.00 mm | 16.00 mm | 63 mm | 6 | 59595 | MHEV-020-60800 |
| | 8.00 mm | 24.00 mm | 75 mm | 6 | 59629 | MHEV-030-60800 |
| 10 mm | 10.00 mm | 15.00 mm | 63 mm | 6 | 59580 | MHEV-015-61000 |
| | 10.00 mm | 20.00 mm | 63 mm | 6 | 59598 | MHEV-020-61000 |
| | 10.00 mm | 25.00 mm | 75 mm | 6 | 59612 | MHEV-025-61000 |
| 12 mm | 12.00 mm | 18.00 mm | 75 mm | 6 | 59583 | MHEV-015-61200 |
| | 12.00 mm | 24.00 mm | 75 mm | 6 | 59601 | MHEV-020-61200 |
| | 12.00 mm | 30.00 mm | 75 mm | 6 | 59615 | MHEV-025-61200 |
| 16 mm | 16.00 mm | 24.00 mm | 89 mm | 6 | 59586 | MHEV-015-61600 |
| | 16.00 mm | 32.00 mm | 89 mm | 6 | 59604 | MHEV-020-61600 |
| | 16.00 mm | 40.00 mm | 89 mm | 6 | 59618 | MHEV-025-61600 |
| 20 mm | 20.00 mm | 30.00 mm | 89 mm | 6 | 59589 | MHEV-015-62000 |
| | 20.00 mm | 40.00 mm | 100 mm | 6 | 59607 | MHEV-020-62000 |
| | 20.00 mm | 50.00 mm | 125 mm | 6 | 59621 | MHEV-025-62000 |
| 25 mm | 25.00 mm | 50.00 mm | 125 mm | 6 | 59610 | MHEV-020-62500 |
| | 25.00 mm | 64.00 mm | 125 mm | 6 | 59624 | MHEV-025-62500 |

* .013 mm max TIR

Speeds & Feeds on Page 147

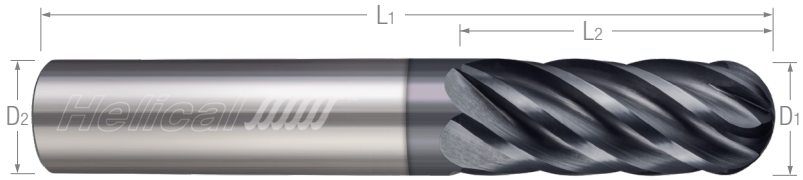
# 6 FLUTE - BALL New Items!

## Variable Pitch

HEV-6

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 178 for T*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | A*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 2 | 6 | 59434 | HEV-S-60250-BN | |
| | 1/4 | 1/2 | 2-1/2 | 6 | 59435 | HEV-SR-60250-BN | |
| | 1/4 | 3/4 | 2-1/2 | 6 | 59436 | HEV-R-60250-BN | |
| | 1/4 | 1 | 3 | 6 | 59437 | HEV-M-60250-BN | |
| | 1/4 | 1-1/4 | 3 | 6 | 59438 | HEV-L-60250-BN | |
| | 1/4 | 1-1/2 | 3 | 6 | 83361 | HEV-LX-60250-BN | new |
| 5/16 | 5/16 | 7/16 | 2 | 6 | 59439 | HEV-S-60312-BN | |
| | 5/16 | 3/4 | 2-1/2 | 6 | 59440 | HEV-R-60312-BN | |
| | 5/16 | 1 | 3 | 6 | 59441 | HEV-M-60312-BN | |
| 3/8 | 3/8 | 1/2 | 2 | 6 | 59442 | HEV-S-60375-BN | |
| | 3/8 | 3/4 | 2-1/2 | 6 | 82592 | HEV-SR-60375-BN | |
| | 3/8 | 1 | 3 | 6 | 59443 | HEV-R-60375-BN | |
| | 3/8 | 1-1/4 | 3 | 6 | 59444 | HEV-M-60375-BN | |
| | 3/8 | 1-1/2 | 3-1/2 | 6 | 59445 | HEV-L-60375-BN | |
| | 3/8 | 2 | 4 | 6 | 83362 | HEV-LX-60375-BN | new |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 6 | 59446 | HEV-S-60500-BN | |
| | 1/2 | 1 | 3 | 6 | 59447 | HEV-SR-60500-BN | |
| | 1/2 | 1-1/4 | 3 | 6 | 59448 | HEV-R-60500-BN | |
| | 1/2 | 1-5/8 | 4 | 6 | 59449 | HEV-M-60500-BN | |
| | 1/2 | 2 | 4 | 6 | 59450 | HEV-L-60500-BN | |
| | 1/2 | 2-1/2 | 5 | 6 | 82593 | HEV-LX-60500-BN | |
| 5/8 | 5/8 | 3/4 | 3 | 6 | 59451 | HEV-S-60625-BN | |
| | 5/8 | 1-1/4 | 3-1/2 | 6 | 59452 | HEV-SR-60625-BN | |
| | 5/8 | 1-5/8 | 3-1/2 | 6 | 59453 | HEV-R-60625-BN | |
| 3/4 | 3/4 | 1 | 3 | 6 | 59454 | HEV-S-60750-BN | |
| | 3/4 | 1-5/8 | 4 | 6 | 59455 | HEV-R-60750-BN | |
| | 3/4 | 2-1/4 | 5 | 6 | 59456 | HEV-M-60750-BN | |
| | 3/4 | 2-3/4 | 5 | 6 | 83363 | HEV-L-60750-BN | new |
| 1 | 1 | 2 | 4-1/2 | 6 | 59457 | HEV-R-61000-BN | |
| | 1 | 2-5/8 | 5 | 6 | 82594 | HEV-M-61000-BN | |

* .0005 max TIR

Speeds & Feeds on Page 147

# HEV-6

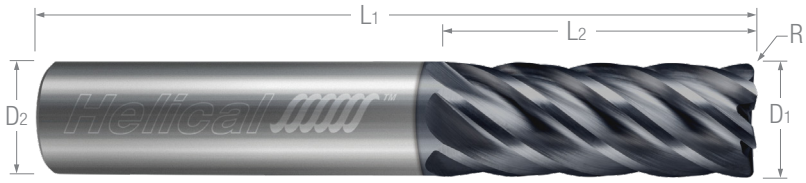
New Items!

## 6 FLUTE - CORNER RADIUS

### Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

**For increased wear resistance, see page 179 for T*plus* coating**




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 3/8 | 2 | 6 | **59280** | HEV-S-60250-R.020 |
| | 1/4 | **.020** | 1/2 | 2-1/2 | 6 | **59283** | HEV-SR-60250-R.020 |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 6 | **59286** | HEV-R-60250-R.020 |
| | 1/4 | **.020** | 1 | 3 | 6 | **59289** | HEV-M-60250-R.020 |
| | 1/4 | **.020** | 1-1/4 | 3 | 6 | **59292** | HEV-L-60250-R.020 |
| | 1/4 | **.020** | 1-1/2 | 3 | 6 | **82569** | HEV-LX-60250-R.020 |
| | 1/4 | **.030** | 3/8 | 2 | 6 | **59281** | HEV-S-60250-R.030 |
| | 1/4 | **.030** | 1/2 | 2-1/2 | 6 | **59284** | HEV-SR-60250-R.030 |
| | 1/4 | **.030** | 3/4 | 2-1/2 | 6 | **59287** | HEV-R-60250-R.030 |
| | 1/4 | **.030** | 1 | 3 | 6 | **59290** | HEV-M-60250-R.030 |
| | 1/4 | **.030** | 1-1/4 | 3 | 6 | **59293** | HEV-L-60250-R.030 |
| | 1/4 | **.060** | 3/8 | 2 | 6 | **59282** | HEV-S-60250-R.060 |
| | 1/4 | **.060** | 1/2 | 2-1/2 | 6 | **59285** | HEV-SR-60250-R.060 |
| | 1/4 | **.060** | 3/4 | 2-1/2 | 6 | **59288** | HEV-R-60250-R.060 |
| | 1/4 | **.060** | 1 | 3 | 6 | **59291** | HEV-M-60250-R.060 |
| | 1/4 | **.060** | 1-1/4 | 3 | 6 | **59294** | HEV-L-60250-R.060 |
| | 1/4 | **.060** | 1-1/2 | 3 | 6 | **82570** | HEV-LX-60250-R.060 |
| 5/16 | 5/16 | **.020** | 7/16 | 2 | 6 | **59295** | HEV-S-60312-R.020 |
| | 5/16 | **.020** | 3/4 | 2-1/2 | 6 | **59298** | HEV-R-60312-R.020 |
| | 5/16 | **.020** | 1 | 3 | 6 | **59301** | HEV-M-60312-R.020 |
| | 5/16 | **.030** | 7/16 | 2 | 6 | **59296** | HEV-S-60312-R.030 |
| | 5/16 | **.030** | 3/4 | 2-1/2 | 6 | **59299** | HEV-R-60312-R.030 |
| | 5/16 | **.030** | 1 | 3 | 6 | **59302** | HEV-M-60312-R.030 |
| | 5/16 | **.060** | 7/16 | 2 | 6 | **59297** | HEV-S-60312-R.060 |
| | 5/16 | **.060** | 3/4 | 2-1/2 | 6 | **59300** | HEV-R-60312-R.060 |
| | 5/16 | **.060** | 1 | 3 | 6 | **59303** | HEV-M-60312-R.060 |
| 3/8 | 3/8 | **.020** | 1/2 | 2 | 6 | **59304** | HEV-S-60375-R.020 |
| | 3/8 | **.020** | 3/4 | 2-1/2 | 6 | **82571** | HEV-SR-60375-R.020 |
| | 3/8 | **.020** | 1 | 3 | 6 | **59308** | HEV-R-60375-R.020 |
| | 3/8 | **.020** | 1-1/4 | 3 | 6 | **59312** | HEV-M-60375-R.020 |
| | 3/8 | **.020** | 1-1/2 | 3-1/2 | 6 | **59316** | HEV-L-60375-R.020 |
| new | 3/8 | **.020** | 2 | 4 | 6 | **83318** | HEV-LX-60375-R.020 |

* .0005 max TIR

continued on next page

**Speeds & Feeds on Page 147**

# 6 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-6

continued from previous page

| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | **.030** | 1/2 | 2 | 6 | **59305** | HEV-S-60375-R.030 | |
| | 3/8 | **.030** | 3/4 | 2-1/2 | 6 | **82572** | HEV-SR-60375-R.030 | |
| | 3/8 | **.030** | 1 | 3 | 6 | **59309** | HEV-R-60375-R.030 | |
| | 3/8 | **.030** | 1-1/4 | 3 | 6 | **59313** | HEV-M-60375-R.030 | |
| | 3/8 | **.030** | 1-1/2 | 3-1/2 | 6 | **59317** | HEV-L-60375-R.030 | |
| | 3/8 | **.030** | 2 | 4 | 6 | **82573** | HEV-LX-60375-R.030 | |
| | 3/8 | **.060** | 1/2 | 2 | 6 | **59306** | HEV-S-60375-R.060 | |
| | 3/8 | **.060** | 3/4 | 2-1/2 | 6 | **82574** | HEV-SR-60375-R.060 | |
| | 3/8 | **.060** | 1 | 3 | 6 | **59310** | HEV-R-60375-R.060 | |
| | 3/8 | **.060** | 1-1/4 | 3 | 6 | **59314** | HEV-M-60375-R.060 | |
| | 3/8 | **.060** | 1-1/2 | 3-1/2 | 6 | **59318** | HEV-L-60375-R.060 | |
| | 3/8 | **.060** | 2 | 4 | 6 | **82575** | HEV-LX-60375-R.060 | |
| | 3/8 | **.090** | 1/2 | 2 | 6 | **59307** | HEV-S-60375-R.090 | |
| | 3/8 | **.090** | 3/4 | 2-1/2 | 6 | **82576** | HEV-SR-60375-R.090 | |
| | 3/8 | **.090** | 1 | 3 | 6 | **59311** | HEV-R-60375-R.090 | |
| | 3/8 | **.090** | 1-1/4 | 3 | 6 | **59315** | HEV-M-60375-R.090 | |
| | 3/8 | **.090** | 1-1/2 | 3-1/2 | 6 | **59319** | HEV-L-60375-R.090 | |
| | 3/8 | **.090** | 2 | 4 | 6 | **82577** | HEV-LX-60375-R.090 | |
| 1/2 | 1/2 | **.010** | 5/8 | 2-1/2 | 6 | **83319** | HEV-S-60500-R.010 | new |
| | 1/2 | **.010** | 1 | 3 | 6 | **82578** | HEV-SR-60500-R.010 | |
| | 1/2 | **.010** | 1-1/4 | 3 | 6 | **82579** | HEV-R-60500-R.010 | |
| | 1/2 | **.015** | 5/8 | 2-1/2 | 6 | **83320** | HEV-S-60500-R.015 | new |
| | 1/2 | **.015** | 1 | 3 | 6 | **82580** | HEV-SR-60500-R.015 | |
| | 1/2 | **.015** | 1-1/4 | 3 | 6 | **82581** | HEV-R-60500-R.015 | |
| | 1/2 | **.020** | 1 | 3 | 6 | **82582** | HEV-SR-60500-R.020 | |
| | 1/2 | **.020** | 1-1/4 | 3 | 6 | **82583** | HEV-R-60500-R.020 | |
| | 1/2 | **.030** | 5/8 | 2-1/2 | 6 | **59320** | HEV-S-60500-R.030 | |
| | 1/2 | **.030** | 1 | 3 | 6 | **59324** | HEV-SR-60500-R.030 | |
| | 1/2 | **.030** | 1-1/4 | 3 | 6 | **59328** | HEV-R-60500-R.030 | |
| | 1/2 | **.030** | 1-5/8 | 4 | 6 | **59332** | HEV-M-60500-R.030 | |
| | 1/2 | **.030** | 2 | 4 | 6 | **59336** | HEV-L-60500-R.030 | |
| | 1/2 | **.030** | 2-1/2 | 5 | 6 | **82584** | HEV-LX-60500-R.030 | |
| | 1/2 | **.060** | 5/8 | 2-1/2 | 6 | **59321** | HEV-S-60500-R.060 | |
| | 1/2 | **.060** | 1 | 3 | 6 | **59325** | HEV-SR-60500-R.060 | |
| | 1/2 | **.060** | 1-1/4 | 3 | 6 | **59329** | HEV-R-60500-R.060 | |
| | 1/2 | **.060** | 1-5/8 | 4 | 6 | **59333** | HEV-M-60500-R.060 | |
| | 1/2 | **.060** | 2 | 4 | 6 | **59337** | HEV-L-60500-R.060 | |
| | 1/2 | **.060** | 2-1/2 | 5 | 6 | **82585** | HEV-LX-60500-R.060 | |
| | 1/2 | **.090** | 5/8 | 2-1/2 | 6 | **59322** | HEV-S-60500-R.090 | |
| | 1/2 | **.090** | 1 | 3 | 6 | **59326** | HEV-SR-60500-R.090 | |
| | 1/2 | **.090** | 1-1/4 | 3 | 6 | **59330** | HEV-R-60500-R.090 | |
| | 1/2 | **.090** | 1-5/8 | 4 | 6 | **59334** | HEV-M-60500-R.090 | |
| | 1/2 | **.090** | 2 | 4 | 6 | **59338** | HEV-L-60500-R.090 | |
| | 1/2 | **.090** | 2-1/2 | 5 | 6 | **82586** | HEV-LX-60500-R.090 | |
| | 1/2 | **.125** | 5/8 | 2-1/2 | 6 | **59323** | HEV-S-60500-R.125 | |
| | 1/2 | **.125** | 1 | 3 | 6 | **59327** | HEV-SR-60500-R.125 | |
| | 1/2 | **.125** | 1-1/4 | 3 | 6 | **59331** | HEV-R-60500-R.125 | |
| | 1/2 | **.125** | 1-5/8 | 4 | 6 | **59335** | HEV-M-60500-R.125 | |
| | 1/2 | **.125** | 2 | 4 | 6 | **59339** | HEV-L-60500-R.125 | |
| | 1/2 | **.125** | 2-1/2 | 5 | 6 | **83321** | HEV-LX-60500-R.125 | new |

* .0005 max TIR

continued on next page

# HEV-6

New Items!

## 6 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | Aplus Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | .030 | 3/4 | 3 | 6 | 59340 | HEV-S-60625-R.030 |
| | 5/8 | .030 | 1-1/4 | 3-1/2 | 6 | 59341 | HEV-SR-60625-R.030 |
| | 5/8 | .030 | 1-5/8 | 3-1/2 | 6 | 59345 | HEV-R-60625-R.030 |
| | 5/8 | .030 | 2 | 4 | 6 | 59349 | HEV-M-60625-R.030 |
| | 5/8 | .030 | 2-1/2 | 5 | 6 | 59353 | HEV-L-60625-R.030 |
| | 5/8 | .060 | 1-1/4 | 3-1/2 | 6 | 59342 | HEV-SR-60625-R.060 |
| | 5/8 | .060 | 1-5/8 | 3-1/2 | 6 | 59346 | HEV-R-60625-R.060 |
| | 5/8 | .060 | 2 | 4 | 6 | 59350 | HEV-M-60625-R.060 |
| | 5/8 | .090 | 1-1/4 | 3-1/2 | 6 | 59343 | HEV-SR-60625-R.090 |
| | 5/8 | .090 | 1-5/8 | 3-1/2 | 6 | 59347 | HEV-R-60625-R.090 |
| | 5/8 | .090 | 2 | 4 | 6 | 59351 | HEV-M-60625-R.090 |
| | 5/8 | .125 | 1-1/4 | 3-1/2 | 6 | 59344 | HEV-SR-60625-R.125 |
| | 5/8 | .125 | 1-5/8 | 3-1/2 | 6 | 59348 | HEV-R-60625-R.125 |
| | 5/8 | .125 | 2 | 4 | 6 | 59352 | HEV-M-60625-R.125 |
| 3/4 | 3/4 | .030 | 1 | 3 | 6 | 59354 | HEV-S-60750-R.030 |
| | 3/4 | .030 | 1-5/8 | 4 | 6 | 59360 | HEV-R-60750-R.030 |
| | 3/4 | .030 | 2-1/4 | 5 | 6 | 59366 | HEV-M-60750-R.030 |
| | 3/4 | .030 | 2-3/4 | 5 | 6 | 59372 | HEV-L-60750-R.030 |
| | 3/4 | .030 | 3-1/4 | 6 | 6 | 59378 | HEV-LX-60750-R.030 |
| | 3/4 | .060 | 1 | 3 | 6 | 59355 | HEV-S-60750-R.060 |
| | 3/4 | .060 | 1-5/8 | 4 | 6 | 59361 | HEV-R-60750-R.060 |
| | 3/4 | .060 | 2-1/4 | 5 | 6 | 59367 | HEV-M-60750-R.060 |
| | 3/4 | .060 | 2-3/4 | 5 | 6 | 59373 | HEV-L-60750-R.060 |
| new | 3/4 | .060 | 3-1/4 | 6 | 6 | 83322 | HEV-LX-60750-R.060 |
| | 3/4 | .090 | 1 | 3 | 6 | 59356 | HEV-S-60750-R.090 |
| | 3/4 | .090 | 1-5/8 | 4 | 6 | 59362 | HEV-R-60750-R.090 |
| | 3/4 | .090 | 2-1/4 | 5 | 6 | 59368 | HEV-M-60750-R.090 |
| | 3/4 | .090 | 2-3/4 | 5 | 6 | 59374 | HEV-L-60750-R.090 |
| | 3/4 | .125 | 1 | 3 | 6 | 59357 | HEV-S-60750-R.125 |
| | 3/4 | .125 | 1-5/8 | 4 | 6 | 59363 | HEV-R-60750-R.125 |
| | 3/4 | .125 | 2-1/4 | 5 | 6 | 59369 | HEV-M-60750-R.125 |
| | 3/4 | .125 | 2-3/4 | 5 | 6 | 59375 | HEV-L-60750-R.125 |
| | 3/4 | .190 | 1 | 3 | 6 | 59358 | HEV-S-60750-R.190 |
| | 3/4 | .190 | 1-5/8 | 4 | 6 | 59364 | HEV-R-60750-R.190 |
| | 3/4 | .190 | 2-1/4 | 5 | 6 | 59370 | HEV-M-60750-R.190 |
| | 3/4 | .190 | 2-3/4 | 5 | 6 | 59376 | HEV-L-60750-R.190 |
| | 3/4 | .250 | 1 | 3 | 6 | 59359 | HEV-S-60750-R.250 |
| | 3/4 | .250 | 1-5/8 | 4 | 6 | 59365 | HEV-R-60750-R.250 |
| | 3/4 | .250 | 2-1/4 | 5 | 6 | 59371 | HEV-M-60750-R.250 |
| | 3/4 | .250 | 2-3/4 | 5 | 6 | 59377 | HEV-L-60750-R.250 |
| new | 3/4 | .250 | 3-1/4 | 6 | 6 | 83323 | HEV-LX-60750-R.250 |
| 1 | 1 | .030 | 2 | 4-1/2 | 6 | 59379 | HEV-R-61000-R.030 |
| | 1 | .030 | 2-5/8 | 5 | 6 | 59383 | HEV-M-61000-R.030 |
| | 1 | .030 | 3-1/4 | 6 | 6 | 59387 | HEV-L-61000-R.030 |
| | 1 | .060 | 2 | 4-1/2 | 6 | 59380 | HEV-R-61000-R.060 |
| | 1 | .060 | 2-5/8 | 5 | 6 | 59384 | HEV-M-61000-R.060 |
| | 1 | .060 | 3-1/4 | 6 | 6 | 59388 | HEV-L-61000-R.060 |
| | 1 | .125 | 2 | 4-1/2 | 6 | 59381 | HEV-R-61000-R.125 |
| | 1 | .125 | 2-5/8 | 5 | 6 | 59385 | HEV-M-61000-R.125 |
| | 1 | .125 | 3-1/4 | 6 | 6 | 59389 | HEV-L-61000-R.125 |
| | 1 | .250 | 2 | 4-1/2 | 6 | 59382 | HEV-R-61000-R.250 |
| | 1 | .250 | 2-5/8 | 5 | 6 | 59386 | HEV-M-61000-R.250 |
| | 1 | .250 | 3-1/4 | 6 | 6 | 59390 | HEV-L-61000-R.250 |

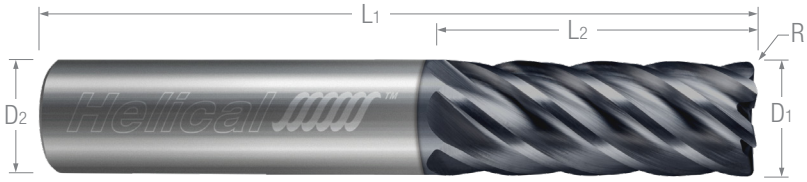
* .0005 max TIR

# 6 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch

**MHEV-6**
**METRIC**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.6 mm −1.6 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 6 | **59575** | MHEV-015-60600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 6 | **59593** | MHEV-020-60600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 6 | **59627** | MHEV-030-60600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 6 | **59576** | MHEV-015-60600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 6 | **59594** | MHEV-020-60600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 6 | **59628** | MHEV-030-60600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 6 | **59578** | MHEV-015-60800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 6 | **59596** | MHEV-020-60800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 6 | **59630** | MHEV-030-60800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 6 | **59579** | MHEV-015-60800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 6 | **59597** | MHEV-020-60800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 6 | **59631** | MHEV-030-60800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 6 | **59581** | MHEV-015-61000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 6 | **59599** | MHEV-020-61000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 6 | **59613** | MHEV-025-61000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 6 | **59582** | MHEV-015-61000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 6 | **59600** | MHEV-020-61000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 6 | **59614** | MHEV-025-61000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 6 | **59584** | MHEV-015-61200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 6 | **59602** | MHEV-020-61200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 6 | **59616** | MHEV-025-61200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 6 | **59585** | MHEV-015-61200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 6 | **59603** | MHEV-020-61200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 6 | **59617** | MHEV-025-61200-R1.00 |
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 6 | **59587** | MHEV-015-61600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 6 | **59605** | MHEV-020-61600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 6 | **59619** | MHEV-025-61600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 6 | **59588** | MHEV-015-61600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 6 | **59606** | MHEV-020-61600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 6 | **59620** | MHEV-025-61600-R1.00 |

* .013 mm max TIR

continued on next page

**Speeds & Feeds on Page 147**

**MHEV-6**
**METRIC**

# 6 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ $^{+.00\ mm}_{-.05\ mm}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.05\ mm}_{-.05\ mm}$ | Length of Cut $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.6\ mm}_{-1.6\ mm}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 6 | **59590** | MHEV-015-62000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 6 | **59608** | MHEV-020-62000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 6 | **59622** | MHEV-025-62000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 6 | **59591** | MHEV-015-62000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 6 | **59609** | MHEV-020-62000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 6 | **59623** | MHEV-025-62000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 6 | **59611** | MHEV-020-62500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 6 | **59625** | MHEV-025-62500-R1.00 |

* .013 mm max TIR

## 5 Questions to Ask Before Selecting an End Mill

Few steps in the machining process are as important as selecting the best tooling option for your job. Before making a decision on an end mill, read our "In the Loupe" blog post and learn **5 Questions to Ask Before Selecting an End Mill** to feel confident that you're choosing right.

**Read more on helical.blog/intheloupe**

# 6 FLUTE - SQUARE

## Variable Pitch - Reduced Neck

**HEV-RN-6**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed with 6 flutes for excellent results in light profiling, High Efficiency Milling (HEM), and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 6 | **82597** | HEV-RN-S-60250 |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 6 | **82598** | HEV-RN-R-60250 |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 6 | **82599** | HEV-RN-M-60250 |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 6 | **82600** | HEV-RN-S-60375 |
| | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 6 | **82601** | HEV-RN-R-60375 |
| | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 6 | **82602** | HEV-RN-M-60375 |
| 1/2 | 1/2 | 5/8 | 4 | 1-1/2 | .475 | 6 | **82603** | HEV-RN-S-60500 |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 6 | **82604** | HEV-RN-R-60500 |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 6 | **82605** | HEV-RN-M-60500 |
| | 1/2 | 5/8 | 6 | 4-1/8 | .475 | 6 | **82606** | HEV-RN-L-60500 |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 6 | **82607** | HEV-RN-S-60750 |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 6 | **82608** | HEV-RN-R-60750 |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 6 | **82609** | HEV-RN-M-60750 |

* .0005 max TIR



Speeds & Feeds on Page 147

# HEV-RN-6

## 6 FLUTE - BALL

### Variable Pitch - Reduced Neck

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 4 | 3/4 | .237 | 6 | **82634** | HEV-RN-S-60250-BN |
| | 1/4 | 3/8 | 4 | 1-1/8 | .237 | 6 | **82635** | HEV-RN-R-60250-BN |
| | 1/4 | 3/8 | 4 | 2-1/8 | .237 | 6 | **82636** | HEV-RN-M-60250-BN |
| 3/8 | 3/8 | 1/2 | 4 | 1-1/8 | .356 | 6 | **82637** | HEV-RN-S-60375-BN |
| | 3/8 | 1/2 | 4 | 2-1/8 | .356 | 6 | **82638** | HEV-RN-R-60375-BN |
| | 3/8 | 1/2 | 6 | 3-1/8 | .356 | 6 | **82639** | HEV-RN-M-60375-BN |
| 1/2 | 1/2 | 5/8 | 4 | 1-1/2 | .475 | 6 | **82640** | HEV-RN-S-60500-BN |
| | 1/2 | 5/8 | 4 | 2-1/4 | .475 | 6 | **82641** | HEV-RN-R-60500-BN |
| | 1/2 | 5/8 | 6 | 3-3/8 | .475 | 6 | **82642** | HEV-RN-M-60500-BN |
| | 1/2 | 5/8 | 6 | 4-1/8 | .475 | 6 | **82643** | HEV-RN-L-60500-BN |
| 3/4 | 3/4 | 1 | 4 | 2 | .712 | 6 | **82644** | HEV-RN-S-60750-BN |
| | 3/4 | 1 | 6 | 2-1/2 | .712 | 6 | **82645** | HEV-RN-R-60750-BN |
| | 3/4 | 1 | 6 | 3-3/8 | .712 | 6 | **82646** | HEV-RN-M-60750-BN |

* .0005 max TIR



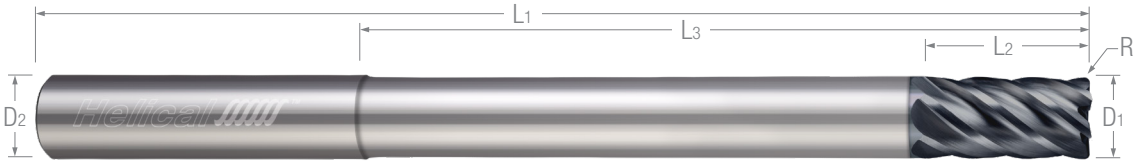
Speeds & Feeds on Page 147

# 6 FLUTE - CORNER RADIUS

## Variable Pitch - Reduced Neck

**HEV-RN-6**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/4 | **.020** | 3/8 | 4 | 3/4 | .237 | 6 | **82610** | HEV-RN-S-60250-R.020 |
| | 1/4 | **.020** | 3/8 | 4 | 1-1/8 | .237 | 6 | **82611** | HEV-RN-R-60250-R.020 |
| | 1/4 | **.020** | 3/8 | 4 | 2-1/8 | .237 | 6 | **82612** | HEV-RN-M-60250-R.020 |
| 3/8 | 3/8 | **.020** | 1/2 | 4 | 1-1/8 | .356 | 6 | **82613** | HEV-RN-S-60375-R.020 |
| | 3/8 | **.020** | 1/2 | 4 | 2-1/8 | .356 | 6 | **82614** | HEV-RN-R-60375-R.020 |
| | 3/8 | **.020** | 1/2 | 6 | 3-1/8 | .356 | 6 | **82615** | HEV-RN-M-60375-R.020 |
| 1/2 | 1/2 | **.030** | 5/8 | 4 | 1-1/2 | .475 | 6 | **82616** | HEV-RN-S-60500-R.030 |
| | 1/2 | **.030** | 5/8 | 4 | 2-1/4 | .475 | 6 | **82617** | HEV-RN-R-60500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 3-3/8 | .475 | 6 | **82618** | HEV-RN-M-60500-R.030 |
| | 1/2 | **.030** | 5/8 | 6 | 4-1/8 | .475 | 6 | **82619** | HEV-RN-L-60500-R.030 |
| | 1/2 | **.060** | 5/8 | 4 | 1-1/2 | .475 | 6 | **82620** | HEV-RN-S-60500-R.060 |
| | 1/2 | **.060** | 5/8 | 4 | 2-1/4 | .475 | 6 | **82621** | HEV-RN-R-60500-R.060 |
| | 1/2 | **.060** | 5/8 | 6 | 3-3/8 | .475 | 6 | **82622** | HEV-RN-M-60500-R.060 |
| | 1/2 | **.060** | 5/8 | 6 | 4-1/8 | .475 | 6 | **82623** | HEV-RN-L-60500-R.060 |
| | 1/2 | **.125** | 5/8 | 4 | 1-1/2 | .475 | 6 | **82624** | HEV-RN-S-60500-R.125 |
| | 1/2 | **.125** | 5/8 | 4 | 2-1/4 | .475 | 6 | **82625** | HEV-RN-R-60500-R.125 |
| | 1/2 | **.125** | 5/8 | 6 | 3-3/8 | .475 | 6 | **82626** | HEV-RN-M-60500-R.125 |
| | 1/2 | **.125** | 5/8 | 6 | 4-1/8 | .475 | 6 | **82627** | HEV-RN-L-60500-R.125 |
| 3/4 | 3/4 | **.030** | 1 | 4 | 2 | .712 | 6 | **82628** | HEV-RN-S-60750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 2-1/2 | .712 | 6 | **82629** | HEV-RN-R-60750-R.030 |
| | 3/4 | **.030** | 1 | 6 | 3-3/8 | .712 | 6 | **82630** | HEV-RN-M-60750-R.030 |
| | 3/4 | **.060** | 1 | 4 | 2 | .712 | 6 | **82631** | HEV-RN-S-60750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 2-1/2 | .712 | 6 | **82632** | HEV-RN-R-60750-R.060 |
| | 3/4 | **.060** | 1 | 6 | 3-3/8 | .712 | 6 | **82633** | HEV-RN-M-60750-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 147

# HEV-6

## SPEEDS & FEEDS

6 Flute - Variable Pitch

### HEV-6 / HEV-RN-6

| Material Guide | | Hardness | SFM | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0014 | .0017 | .0020 | .0019 | .0028 | .0022 | .0041 | .0025 | .0054 | .0029 | .0077 | .0034 | .0099 | .0042 |
| | | 75 - 98 HRB | 445 | .0010 | .0014 | .0015 | .0016 | .0020 | .0018 | .0030 | .0021 | .0039 | .0025 | .0056 | .0029 | .0072 | .0036 |
| | | 21 - 36 HRC | 400 | .0007 | .0012 | .0010 | .0013 | .0013 | .0015 | .0020 | .0017 | .0025 | .0020 | .0036 | .0024 | .0047 | .0029 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0009 | .0013 | .0013 | .0015 | .0018 | .0017 | .0026 | .0020 | .0034 | .0023 | .0049 | .0027 | .0063 | .0033 |
| | | 21 - 36 HRC | 340 | .0007 | .0011 | .0010 | .0013 | .0013 | .0015 | .0019 | .0017 | .0025 | .0020 | .0036 | .0023 | .0047 | .0028 |
| | | 36 - 50 HRC | 260 | .0006 | .0011 | .0008 | .0012 | .0011 | .0014 | .0017 | .0016 | .0022 | .0018 | .0032 | .0022 | .0041 | .0027 |
| | | > 50 HRC | 155 | .0005 | .0010 | .0007 | .0011 | .0009 | .0012 | .0013 | .0014 | .0017 | .0016 | .0025 | .0019 | .0032 | .0024 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0009 | .0013 | .0013 | .0015 | .0018 | .0017 | .0026 | .0020 | .0034 | .0023 | .0049 | .0027 | .0063 | .0033 |
| | | 21 - 36 HRC | 250 | .0007 | .0012 | .0010 | .0013 | .0014 | .0015 | .0021 | .0017 | .0027 | .0020 | .0039 | .0024 | .0050 | .0029 |
| | | 36 - 50 HRC | 145 | .0006 | .0011 | .0008 | .0012 | .0011 | .0014 | .0016 | .0015 | .0021 | .0018 | .0030 | .0022 | .0039 | .0026 |
| | | > 50 HRC | 85 | .0005 | .0010 | .0007 | .0011 | .0009 | .0012 | .0013 | .0014 | .0017 | .0016 | .0025 | .0019 | .0032 | .0023 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0012 | .0015 | .0017 | .0017 | .0023 | .0020 | .0034 | .0022 | .0045 | .0026 | .0064 | .0031 | .0082 | .0038 |
| | | 75 - 98 HRB | 255 | .0008 | .0013 | .0012 | .0014 | .0016 | .0016 | .0023 | .0019 | .0031 | .0022 | .0044 | .0026 | .0056 | .0031 |
| | | 21 - 36 HRC | 175 | .0007 | .0012 | .0010 | .0013 | .0014 | .0015 | .0021 | .0018 | .0027 | .0020 | .0039 | .0025 | .0051 | .0030 |
| | | 36 - 50 HRC | 150 | .0006 | .0011 | .0009 | .0013 | .0013 | .0014 | .0019 | .0017 | .0025 | .0019 | .0035 | .0023 | .0045 | .0028 |
| | | > 50 HRC | 55 | .0004 | .0009 | .0006 | .0010 | .0008 | .0011 | .0012 | .0013 | .0015 | .0015 | .0022 | .0018 | .0028 | .0022 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0009 | .0013 | .0013 | .0015 | .0017 | .0017 | .0025 | .0019 | .0033 | .0023 | .0048 | .0027 | .0061 | .0033 |
| | | 21 - 36 HRC | 225 | .0008 | .0013 | .0011 | .0014 | .0015 | .0016 | .0023 | .0018 | .0030 | .0021 | .0043 | .0026 | .0055 | .0031 |
| | | 36 - 50 HRC | 180 | .0006 | .0011 | .0009 | .0012 | .0012 | .0014 | .0018 | .0016 | .0024 | .0019 | .0034 | .0023 | .0044 | .0028 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0009 | .0013 | .0013 | .0015 | .0018 | .0017 | .0026 | .0020 | .0034 | .0023 | .0049 | .0027 | .0063 | .0033 |
| | | 21 - 36 HRC | 280 | .0008 | .0013 | .0011 | .0014 | .0015 | .0016 | .0023 | .0018 | .0030 | .0021 | .0043 | .0025 | .0055 | .0031 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0007 | .0011 | .0010 | .0013 | .0013 | .0015 | .0019 | .0017 | .0025 | .0020 | .0036 | .0023 | .0046 | .0028 |
| | | 36 - 50 HRC | 145 | .0006 | .0011 | .0008 | .0012 | .0011 | .0014 | .0017 | .0016 | .0022 | .0018 | .0031 | .0022 | .0040 | .0027 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0014 | .0017 | .0021 | .0019 | .0029 | .0022 | .0042 | .0025 | .0055 | .0029 | .0079 | .0035 | .0102 | .0042 |
| | | 21 - 36 HRC | 370 | .0008 | .0013 | .0011 | .0014 | .0015 | .0016 | .0023 | .0018 | .0030 | .0021 | .0043 | .0025 | .0055 | .0031 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0009 | .0014 | .0013 | .0015 | .0018 | .0017 | .0027 | .0020 | .0035 | .0023 | .0050 | .0028 | .0065 | .0034 |
| | | 21 - 36 HRC | 335 | .0008 | .0013 | .0011 | .0014 | .0016 | .0016 | .0023 | .0018 | .0030 | .0021 | .0043 | .0026 | .0056 | .0031 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0009 | .0014 | .0014 | .0015 | .0019 | .0018 | .0028 | .0020 | .0036 | .0024 | .0052 | .0028 | .0067 | .0034 |
| | | 21 - 36 HRC | 260 | .0006 | .0011 | .0009 | .0013 | .0012 | .0014 | .0019 | .0017 | .0024 | .0019 | .0035 | .0023 | .0044 | .0028 |
| | | 36 - 50 HRC | 135 | .0004 | .0009 | .0006 | .0010 | .0008 | .0011 | .0012 | .0013 | .0015 | .0015 | .0022 | .0018 | .0028 | .0022 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0012 | .0016 | .0018 | .0018 | .0024 | .0020 | .0036 | .0023 | .0047 | .0027 | .0067 | .0032 | .0086 | .0039 |
| | | 75 - 98 HRB | 250 | .0010 | .0014 | .0015 | .0016 | .0020 | .0018 | .0030 | .0021 | .0039 | .0025 | .0056 | .0029 | .0072 | .0036 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0006 | .0011 | .0009 | .0013 | .0012 | .0014 | .0018 | .0016 | .0024 | .0019 | .0034 | .0023 | .0044 | .0028 |
| | | 21 - 36 HRC | 75 | .0006 | .0011 | .0009 | .0012 | .0012 | .0014 | .0017 | .0016 | .0023 | .0019 | .0033 | .0023 | .0042 | .0027 |
| | | 36 - 50 HRC | 70 | .0005 | .0010 | .0007 | .0011 | .0010 | .0013 | .0015 | .0015 | .0020 | .0017 | .0028 | .0021 | .0036 | .0025 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0017 | .0019 | .0024 | .0021 | .0033 | .0024 | .0049 | .0027 | .0065 | .0032 | .0093 | .0038 | .0119 | .0046 |
| | | 75 - 98 HRB | 275 | .0014 | .0017 | .0021 | .0019 | .0028 | .0022 | .0041 | .0025 | .0054 | .0029 | .0078 | .0035 | .0100 | .0042 |
| | | 21 - 36 HRC | 250 | .0011 | .0015 | .0015 | .0017 | .0021 | .0019 | .0031 | .0022 | .0041 | .0025 | .0058 | .0030 | .0075 | .0036 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0009 | .0013 | .0012 | .0015 | .0017 | .0017 | .0024 | .0019 | .0032 | .0022 | .0046 | .0027 | .0059 | .0032 |
| | | 36 - 50 HRC | 160 | .0008 | .0012 | .0011 | .0014 | .0015 | .0016 | .0022 | .0018 | .0029 | .0021 | .0042 | .0025 | .0054 | .0031 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0007 | .0012 | .0010 | .0013 | .0014 | .0015 | .0021 | .0018 | .0027 | .0021 | .0039 | .0024 | .0050 | .0030 |
| | | 21 - 36 HRC | 170 | .0007 | .0012 | .0010 | .0013 | .0014 | .0015 | .0020 | .0017 | .0026 | .0020 | .0038 | .0024 | .0048 | .0029 |
| | | 36 - 50 HRC | 65 | .0005 | .0010 | .0007 | .0011 | .0009 | .0012 | .0014 | .0014 | .0018 | .0017 | .0025 | .0020 | .0033 | .0024 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 15%-25% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-20% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

# 7 FLUTE - SQUARE New Items!

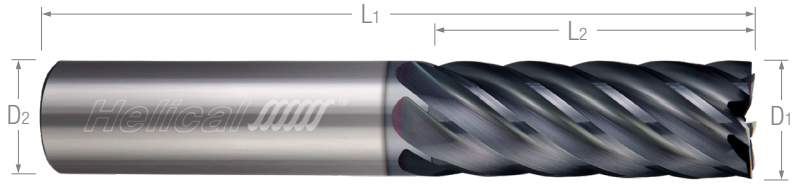
## Variable Pitch

HEM

**HEV-7**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

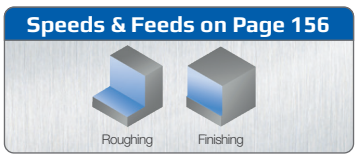
For increased wear resistance, see page 182 for *Tplus* coating




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Decription | |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 2 | 7 | 26107 | HEV-S-70250 | |
| | 1/4 | 1/2 | 2 | 7 | 26122 | HEV-SR-70250 | |
| | 1/4 | 3/4 | 2-1/2 | 7 | 26137 | HEV-R-70250 | |
| | 1/4 | 1 | 3 | 7 | 26152 | HEV-M-70250 | |
| | 1/4 | 1-1/4 | 3 | 7 | 82647 | HEV-L-70250 | |
| 5/16 | 5/16 | 7/16 | 2 | 7 | 82648 | HEV-S-70312 | |
| | 5/16 | 3/4 | 2-1/2 | 7 | 82649 | HEV-R-70312 | |
| | 5/16 | 1 | 3 | 7 | 82650 | HEV-M-70312 | |
| 3/8 | 3/8 | 1/2 | 2 | 7 | 26212 | HEV-S-70375 | |
| | 3/8 | 3/4 | 2-1/2 | 7 | 26227 | HEV-SR-70375 | |
| | 3/8 | 1 | 2-1/2 | 7 | 26242 | HEV-R-70375 | |
| | 3/8 | 1-1/2 | 3-1/2 | 7 | 26247 | HEV-L-70375 | |
| | 3/8 | 2 | 4 | 7 | 82651 | HEV-LX-70375 | |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 7 | 26257 | HEV-S-70500 | |
| | 1/2 | 1 | 3 | 7 | 26272 | HEV-SR-70500 | |
| | 1/2 | 1-1/4 | 3 | 7 | 26287 | HEV-R-70500 | |
| | 1/2 | 1-5/8 | 4 | 7 | 26302 | HEV-M-70500 | |
| | 1/2 | 2 | 4 | 7 | 26307 | HEV-L-70500 | |
| | 1/2 | 2-1/2 | 5 | 7 | 82652 | HEV-LX-70500 | |
| | 1/2 | 3-1/8 | 6 | 7 | 82653 | HEV-X-70500 | |
| 5/8 | 5/8 | 3/4 | 3 | 7 | 26317 | HEV-S-70625 | |
| | 5/8 | 1-1/4 | 3-1/2 | 7 | 26322 | HEV-SR-70625 | |
| | 5/8 | 1-5/8 | 4 | 7 | 26332 | HEV-R-70625 | |
| | 5/8 | 2-1/8 | 4 | 7 | 26347 | HEV-M-70625 | |
| | 5/8 | 2-1/2 | 5 | 7 | 83373 | HEV-L-70625 | new |
| 3/4 | 3/4 | 1 | 3 | 7 | 26362 | HEV-S-70750 | |
| | 3/4 | 1-1/4 | 3-1/2 | 7 | 26367 | HEV-SR-70750 | |
| | 3/4 | 1-5/8 | 4 | 7 | 26377 | HEV-R-70750 | |
| | 3/4 | 2-1/4 | 5 | 7 | 26392 | HEV-M-70750 | |
| | 3/4 | 2-3/4 | 5 | 7 | 83374 | HEV-L-70750 | new |
| | 3/4 | 3-1/4 | 6 | 7 | 82654 | HEV-LX-70750 | |
| 1 | 1 | 1-1/4 | 4 | 7 | 26407 | HEV-S-71000 | |
| | 1 | 2 | 5 | 7 | 26422 | HEV-R-71000 | |
| | 1 | 3-1/4 | 6 | 7 | 26442 | HEV-L-71000 | |

* .0005 max TIR

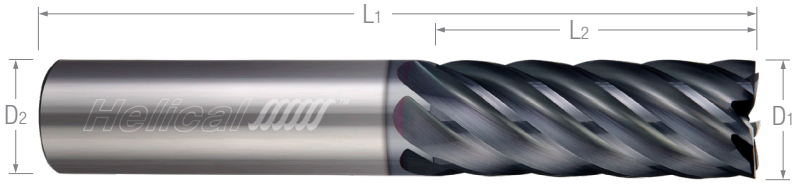
Speeds & Feeds on Page 156



# MHEV-7
## METRIC

# 7 FLUTE - SQUARE - METRIC
## Variable Pitch

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

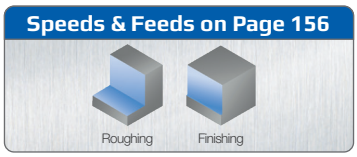



| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | 9.00 mm | 63 mm | 7 | **59632** | MHEV-015-70600 |
| | 6.00 mm | 12.00 mm | 63 mm | 7 | **59650** | MHEV-020-70600 |
| | 6.00 mm | 18.00 mm | 63 mm | 7 | **59684** | MHEV-030-70600 |
| 8 mm | 8.00 mm | 12.00 mm | 63 mm | 7 | **59635** | MHEV-015-70800 |
| | 8.00 mm | 16.00 mm | 63 mm | 7 | **59653** | MHEV-020-70800 |
| | 8.00 mm | 24.00 mm | 75 mm | 7 | **59687** | MHEV-030-70800 |
| 10 mm | 10.00 mm | 15.00 mm | 63 mm | 7 | **59638** | MHEV-015-71000 |
| | 10.00 mm | 20.00 mm | 63 mm | 7 | **59656** | MHEV-020-71000 |
| | 10.00 mm | 25.00 mm | 75 mm | 7 | **59670** | MHEV-025-71000 |
| 12 mm | 12.00 mm | 18.00 mm | 75 mm | 7 | **59641** | MHEV-015-71200 |
| | 12.00 mm | 24.00 mm | 75 mm | 7 | **59659** | MHEV-020-71200 |
| | 12.00 mm | 30.00 mm | 75 mm | 7 | **59673** | MHEV-025-71200 |
| 16 mm | 16.00 mm | 24.00 mm | 89 mm | 7 | **59644** | MHEV-015-71600 |
| | 16.00 mm | 32.00 mm | 89 mm | 7 | **59662** | MHEV-020-71600 |
| | 16.00 mm | 40.00 mm | 89 mm | 7 | **59676** | MHEV-025-71600 |
| 20 mm | 20.00 mm | 30.00 mm | 89 mm | 7 | **59647** | MHEV-015-72000 |
| | 20.00 mm | 40.00 mm | 100 mm | 7 | **59665** | MHEV-020-72000 |
| | 20.00 mm | 50.00 mm | 125 mm | 7 | **59679** | MHEV-025-72000 |
| 25 mm | 25.00 mm | 50.00 mm | 125 mm | 7 | **59668** | MHEV-020-72500 |
| | 25.00 mm | 64.00 mm | 125 mm | 7 | **59682** | MHEV-025-72500 |

* .013 mm max TIR



Speeds & Feeds on Page 156



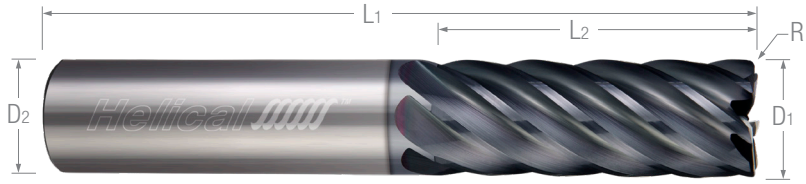
# 7 FLUTE - CORNER RADIUS New Items!

## Variable Pitch

**HEV-7**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 183 for T*plus* coating

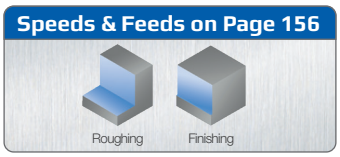



| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | A*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 3/8 | 2 | 7 | 83376 | HEV-S-70250-R.010 | new |
| | 1/4 | .010 | 1/2 | 2 | 7 | 83377 | HEV-SR-70250-R.010 | new |
| | 1/4 | .010 | 3/4 | 2-1/2 | 7 | 83378 | HEV-R-70250-R.010 | new |
| | 1/4 | .010 | 1 | 3 | 7 | 83379 | HEV-M-70250-R.010 | new |
| | 1/4 | .020 | 3/8 | 2 | 7 | 27107 | HEV-S-70250-R.020 | |
| | 1/4 | .020 | 1/2 | 2 | 7 | 27122 | HEV-SR-70250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 7 | 27137 | HEV-R-70250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 7 | 27152 | HEV-M-70250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 7 | 82655 | HEV-L-70250-R.020 | |
| | 1/4 | .060 | 3/8 | 2 | 7 | 81807 | HEV-S-70250-R.060 | |
| | 1/4 | .060 | 1/2 | 2 | 7 | 81808 | HEV-SR-70250-R.060 | |
| | 1/4 | .060 | 3/4 | 2-1/2 | 7 | 81809 | HEV-R-70250-R.060 | |
| | 1/4 | .060 | 1 | 3 | 7 | 81810 | HEV-M-70250-R.060 | |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 7 | 83380 | HEV-S-70375-R.010 | new |
| | 3/8 | .010 | 3/4 | 2-1/2 | 7 | 83381 | HEV-SR-70375-R.010 | new |
| | 3/8 | .010 | 1 | 2-1/2 | 7 | 83382 | HEV-R-70375-R.010 | new |
| | 3/8 | .010 | 1-1/2 | 3-1/2 | 7 | 83383 | HEV-L-70375-R.010 | new |
| | 3/8 | .020 | 1/2 | 2 | 7 | 27212 | HEV-S-70375-R.020 | |
| | 3/8 | .020 | 3/4 | 2-1/2 | 7 | 27227 | HEV-SR-70375-R.020 | |
| | 3/8 | .020 | 1 | 2-1/2 | 7 | 27242 | HEV-R-70375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 7 | 27247 | HEV-L-70375-R.020 | |
| | 3/8 | .020 | 2 | 4 | 7 | 82656 | HEV-LX-70375-R.020 | |
| | 3/8 | .060 | 1/2 | 2 | 7 | 81811 | HEV-S-70375-R.060 | |
| | 3/8 | .060 | 3/4 | 2-1/2 | 7 | 81812 | HEV-SR-70375-R.060 | |
| | 3/8 | .060 | 1 | 2-1/2 | 7 | 81813 | HEV-R-70375-R.060 | |
| 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 7 | 83384 | HEV-S-70500-R.010 | new |
| | 1/2 | .010 | 1 | 3 | 7 | 83385 | HEV-SR-70500-R.010 | new |
| | 1/2 | .010 | 1-1/4 | 3 | 7 | 83386 | HEV-R-70500-R.010 | new |
| | 1/2 | .010 | 1-5/8 | 4 | 7 | 83387 | HEV-M-70500-R.010 | new |
| | 1/2 | .010 | 2 | 4 | 7 | 83388 | HEV-L-70500-R.010 | new |
| | 1/2 | .020 | 5/8 | 2-1/2 | 7 | 81814 | HEV-S-70500-R.020 | |
| | 1/2 | .020 | 1 | 3 | 7 | 81815 | HEV-SR-70500-R.020 | |
| | 1/2 | .020 | 1-1/4 | 3 | 7 | 81816 | HEV-R-70500-R.020 | |
| | 1/2 | .020 | 1-5/8 | 4 | 7 | 81817 | HEV-M-70500-R.020 | |
| | 1/2 | .020 | 2 | 4 | 7 | 81818 | HEV-L-70500-R.020 | |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 156



# HEV-7

New Items!

## 7 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 7 | **27257** | HEV-S-70500-R.030 |
| | 1/2 | **.030** | 1 | 3 | 7 | **27272** | HEV-SR-70500-R.030 |
| | 1/2 | **.030** | 1-1/4 | 3 | 7 | **27287** | HEV-R-70500-R.030 |
| | 1/2 | **.030** | 1-5/8 | 4 | 7 | **27302** | HEV-M-70500-R.030 |
| | 1/2 | **.030** | 2 | 4 | 7 | **27307** | HEV-L-70500-R.030 |
| | 1/2 | **.030** | 2-1/2 | 5 | 7 | **82657** | HEV-LX-70500-R.030 |
| | 1/2 | **.030** | 3-1/8 | 6 | 7 | **82658** | HEV-X-70500-R.030 |
| | 1/2 | **.060** | 5/8 | 2-1/2 | 7 | **81819** | HEV-S-70500-R.060 |
| | 1/2 | **.060** | 1 | 3 | 7 | **81820** | HEV-SR-70500-R.060 |
| | 1/2 | **.060** | 1-1/4 | 3 | 7 | **81821** | HEV-R-70500-R.060 |
| | 1/2 | **.060** | 1-5/8 | 4 | 7 | **81822** | HEV-M-70500-R.060 |
| | 1/2 | **.060** | 2 | 4 | 7 | **81823** | HEV-L-70500-R.060 |
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 7 | **27317** | HEV-S-70625-R.030 |
| | 5/8 | **.030** | 1-1/4 | 3-1/2 | 7 | **27322** | HEV-SR-70625-R.030 |
| | 5/8 | **.030** | 1-5/8 | 4 | 7 | **27332** | HEV-R-70625-R.030 |
| | 5/8 | **.030** | 2-1/8 | 4 | 7 | **27347** | HEV-M-70625-R.030 |
| | 5/8 | **.030** | 2-1/2 | 5 | 7 | **82659** | HEV-L-70625-R.030 |
| | 5/8 | **.060** | 1-1/4 | 3-1/2 | 7 | **81824** | HEV-SR-70625-R.060 |
| | 5/8 | **.060** | 1-5/8 | 4 | 7 | **81825** | HEV-R-70625-R.060 |
| 3/4 | 3/4 | **.030** | 1 | 3 | 7 | **27362** | HEV-S-70750-R.030 |
| | 3/4 | **.030** | 1-1/4 | 3-1/2 | 7 | **27367** | HEV-SR-70750-R.030 |
| | 3/4 | **.030** | 1-5/8 | 4 | 7 | **27377** | HEV-R-70750-R.030 |
| | 3/4 | **.030** | 2-1/4 | 5 | 7 | **27392** | HEV-M-70750-R.030 |
| | 3/4 | **.030** | 2-3/4 | 5 | 7 | **82660** | HEV-L-70750-R.030 |
| | 3/4 | **.030** | 3-1/4 | 6 | 7 | **82661** | HEV-LX-70750-R.030 |
| | 3/4 | **.060** | 1 | 3 | 7 | **81826** | HEV-S-70750-R.060 |
| | 3/4 | **.060** | 1-5/8 | 4 | 7 | **81827** | HEV-R-70750-R.060 |
| | 3/4 | **.060** | 2-1/4 | 5 | 7 | **81828** | HEV-M-70750-R.060 |
| 1 | 1 | **.030** | 1-1/4 | 4 | 7 | **27407** | HEV-S-71000-R.030 |
| | 1 | **.030** | 2 | 5 | 7 | **27422** | HEV-R-71000-R.030 |
| | 1 | **.030** | 3-1/4 | 6 | 7 | **27442** | HEV-L-71000-R.030 |

* .0005 max TIR

## Why Flute Count Matters

7 Flutes? Is that really necessary? Yes! Our "In the Loupe" blog post **Why Flute Count Matters** walks readers through the importance of the tool's core diameter size, and why flute count plays a pivotal role in speeds and feeds calculations.

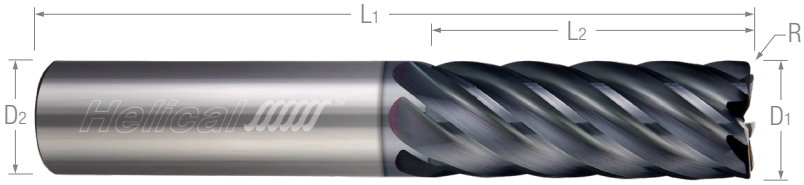
**Read more on helical.blog/intheloupe**

# 7 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch

**MHEV-7**
**METRIC**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 7 | **59633** | MHEV-015-70600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 7 | **59651** | MHEV-020-70600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 7 | **59685** | MHEV-030-70600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 7 | **59634** | MHEV-015-70600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 7 | **59652** | MHEV-020-70600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 7 | **59686** | MHEV-030-70600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 7 | **59636** | MHEV-015-70800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 7 | **59654** | MHEV-020-70800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 7 | **59688** | MHEV-030-70800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 7 | **59637** | MHEV-015-70800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 7 | **59655** | MHEV-020-70800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 7 | **59689** | MHEV-030-70800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 7 | **59639** | MHEV-015-71000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 7 | **59657** | MHEV-020-71000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 7 | **59671** | MHEV-025-71000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 7 | **59640** | MHEV-015-71000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 7 | **59658** | MHEV-020-71000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 7 | **59672** | MHEV-025-71000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 7 | **59642** | MHEV-015-71200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 7 | **59660** | MHEV-020-71200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 7 | **59674** | MHEV-025-71200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 7 | **59643** | MHEV-015-71200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 7 | **59661** | MHEV-020-71200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 7 | **59675** | MHEV-025-71200-R1.00 |

* .013 mm max TIR

continued on next page

Speeds & Feeds on Page 156

**MHEV-7**
**METRIC**

# 7 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 7 | **59645** | MHEV-015-71600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 7 | **59663** | MHEV-020-71600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 7 | **59677** | MHEV-025-71600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 7 | **59646** | MHEV-015-71600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 7 | **59664** | MHEV-020-71600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 7 | **59678** | MHEV-025-71600-R1.00 |
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 7 | **59648** | MHEV-015-72000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 7 | **59666** | MHEV-020-72000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 7 | **59680** | MHEV-025-72000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 7 | **59649** | MHEV-015-72000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 7 | **59667** | MHEV-020-72000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 7 | **59681** | MHEV-025-72000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 7 | **59669** | MHEV-020-72500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 7 | **59683** | MHEV-025-72500-R1.00 |

* .013 mm max TIR



Access customized running parameters for your specific setup and material at
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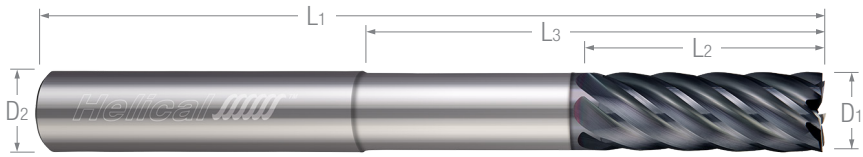
# 7 FLUTE - SQUARE New!

## Variable Pitch – Reduced Neck

**HEV-RN-7**

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in deep pocket High Efficiency Milling (HEM) applications
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/4 | 4 | 1-1/8 | .237 | 7 | 83045 | HEV-RNR-R-70250 | new |
| | 1/4 | 3/4 | 4 | 2-1/8 | .237 | 7 | 83046 | HEV-RNR-M-70250 | new |
| 3/8 | 3/8 | 1 | 4 | 2-1/8 | .356 | 7 | 83047 | HEV-RNR-R-70375 | new |
| | 3/8 | 1 | 6 | 3-1/8 | .356 | 7 | 83048 | HEV-RNR-M-70375 | new |
| 1/2 | 1/2 | 1-1/4 | 4 | 2-1/4 | .475 | 7 | 83049 | HEV-RNR-R-70500 | new |
| | 1/2 | 1-1/4 | 6 | 3-3/8 | .475 | 7 | 83050 | HEV-RNR-M-70500 | new |
| | 1/2 | 1-1/4 | 6 | 4-1/8 | .475 | 7 | 83051 | HEV-RNR-L-70500 | new |
| 3/4 | 3/4 | 1-5/8 | 6 | 2-1/2 | .712 | 7 | 83052 | HEV-RNR-R-70750 | new |
| | 3/4 | 1-5/8 | 6 | 3-3/8 | .712 | 7 | 83053 | HEV-RNR-M-70750 | new |

* .0005 max TIR

Speeds & Feeds on Page 156
Roughing Finishing

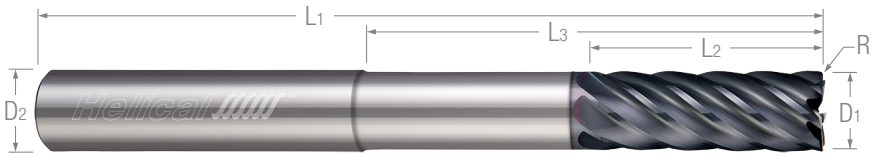
# HEV-RN-7

New!

## 7 FLUTE - CORNER RADIUS

### Variable Pitch - Reduced Neck

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in deep pocket High Efficiency Milling (HEM) applications
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Reach (LBS) $L_3$ | Neck Dia. | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| new | 1/4 | 1/4 | **.020** | 3/4 | 4 | 1-1/8 | .237 | 7 | 83054 | HEV-RNR-R-70250-R.020 |
| new | | 1/4 | **.020** | 3/4 | 4 | 2-1/8 | .237 | 7 | 83055 | HEV-RNR-M-70250-R.020 |
| new | 3/8 | 3/8 | **.020** | 1 | 4 | 2-1/8 | .356 | 7 | 83056 | HEV-RNR-R-70375-R.020 |
| new | | 3/8 | **.020** | 1 | 6 | 3-1/8 | .356 | 7 | 83057 | HEV-RNR-M-70375-R.020 |
| new | 1/2 | 1/2 | **.030** | 1-1/4 | 4 | 2-1/4 | .475 | 7 | 83058 | HEV-RNR-R-70500-R.030 |
| new | | 1/2 | **.030** | 1-1/4 | 6 | 3-3/8 | .475 | 7 | 83059 | HEV-RNR-M-70500-R.030 |
| new | | 1/2 | **.030** | 1-1/4 | 6 | 4-1/8 | .475 | 7 | 83060 | HEV-RNR-L-70500-R.030 |
| new | | 1/2 | **.060** | 1-1/4 | 4 | 2-1/4 | .475 | 7 | 83061 | HEV-RNR-R-70500-R.060 |
| new | | 1/2 | **.060** | 1-1/4 | 6 | 3-3/8 | .475 | 7 | 83062 | HEV-RNR-M-70500-R.060 |
| new | | 1/2 | **.060** | 1-1/4 | 6 | 4-1/8 | .475 | 7 | 83063 | HEV-RNR-L-70500-R.060 |
| new | 3/4 | 3/4 | **.030** | 1-5/8 | 6 | 2-1/2 | .712 | 7 | 83064 | HEV-RNR-R-70750-R.030 |
| new | | 3/4 | **.030** | 1-5/8 | 6 | 3-3/8 | .712 | 7 | 83065 | HEV-RNR-M-70750-R.030 |
| new | | 3/4 | **.060** | 1-5/8 | 6 | 2-1/2 | .712 | 7 | 83066 | HEV-RNR-R-70750-R.060 |
| new | | 3/4 | **.060** | 1-5/8 | 6 | 3-3/8 | .712 | 7 | 83067 | HEV-RNR-M-70750-R.060 |

* .0005 max TIR



Speeds & Feeds on Page 156
Roughing
Finishing

# SPEEDS & FEEDS

## 7 Flute - Variable Pitch

**HEV-7**

## HEV-7 / HEV-RN-7

| Material Guide | | Hardness | SFM | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0016 | .0017 | .0024 | .0019 | .0031 | .0022 | .0047 | .0025 | .0060 | .0029 | .0087 | .0035 | .0111 | .0043 |
| | | 75 - 98 HRB | 445 | .0011 | .0015 | .0017 | .0016 | .0023 | .0019 | .0034 | .0022 | .0044 | .0025 | .0064 | .0030 | .0081 | .0036 |
| | | 21 - 36 HRC | 400 | .0007 | .0012 | .0011 | .0013 | .0015 | .0015 | .0022 | .0017 | .0028 | .0020 | .0041 | .0024 | .0053 | .0029 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0010 | .0014 | .0015 | .0015 | .0020 | .0018 | .0030 | .0020 | .0038 | .0023 | .0055 | .0028 | .0070 | .0034 |
| | | 21 - 36 HRC | 340 | .0007 | .0012 | .0011 | .0013 | .0015 | .0015 | .0022 | .0017 | .0028 | .0020 | .0041 | .0024 | .0052 | .0029 |
| | | 36 - 50 HRC | 260 | .0006 | .0011 | .0010 | .0012 | .0013 | .0014 | .0019 | .0016 | .0025 | .0019 | .0036 | .0023 | .0046 | .0027 |
| | | > 50 HRC | 155 | .0005 | .0010 | .0008 | .0011 | .0010 | .0013 | .0015 | .0014 | .0020 | .0017 | .0028 | .0020 | .0036 | .0024 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0010 | .0014 | .0015 | .0015 | .0020 | .0018 | .0030 | .0020 | .0038 | .0023 | .0055 | .0028 | .0070 | .0034 |
| | | 21 - 36 HRC | 250 | .0008 | .0012 | .0012 | .0013 | .0016 | .0016 | .0023 | .0018 | .0030 | .0021 | .0044 | .0025 | .0056 | .0030 |
| | | 36 - 50 HRC | 145 | .0006 | .0011 | .0009 | .0012 | .0012 | .0014 | .0018 | .0016 | .0024 | .0019 | .0034 | .0022 | .0044 | .0027 |
| | | > 50 HRC | 85 | .0005 | .0010 | .0008 | .0011 | .0010 | .0012 | .0015 | .0014 | .0019 | .0016 | .0028 | .0020 | .0036 | .0024 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0013 | .0016 | .0020 | .0018 | .0026 | .0020 | .0039 | .0023 | .0050 | .0027 | .0072 | .0032 | .0092 | .0039 |
| | | 75 - 98 HRB | 255 | .0009 | .0013 | .0014 | .0014 | .0018 | .0017 | .0027 | .0019 | .0034 | .0022 | .0050 | .0027 | .0063 | .0032 |
| | | 21 - 36 HRC | 175 | .0008 | .0012 | .0012 | .0014 | .0016 | .0016 | .0024 | .0018 | .0031 | .0021 | .0045 | .0025 | .0057 | .0030 |
| | | 36 - 50 HRC | 150 | .0007 | .0011 | .0011 | .0013 | .0014 | .0015 | .0021 | .0017 | .0027 | .0020 | .0040 | .0024 | .0051 | .0029 |
| | | > 50 HRC | 55 | .0004 | .0009 | .0007 | .0010 | .0009 | .0012 | .0013 | .0013 | .0017 | .0016 | .0025 | .0018 | .0031 | .0022 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0010 | .0013 | .0015 | .0015 | .0019 | .0017 | .0029 | .0020 | .0037 | .0023 | .0054 | .0028 | .0069 | .0034 |
| | | 21 - 36 HRC | 225 | .0009 | .0013 | .0013 | .0015 | .0017 | .0016 | .0026 | .0019 | .0033 | .0022 | .0048 | .0026 | .0062 | .0032 |
| | | 36 - 50 HRC | 180 | .0007 | .0012 | .0011 | .0013 | .0014 | .0015 | .0021 | .0017 | .0027 | .0020 | .0039 | .0023 | .0049 | .0028 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0010 | .0014 | .0015 | .0015 | .0020 | .0018 | .0030 | .0020 | .0038 | .0023 | .0055 | .0028 | .0071 | .0034 |
| | | 21 - 36 HRC | 280 | .0009 | .0013 | .0013 | .0014 | .0017 | .0016 | .0026 | .0019 | .0033 | .0022 | .0048 | .0026 | .0061 | .0032 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0007 | .0012 | .0011 | .0013 | .0015 | .0015 | .0022 | .0017 | .0028 | .0020 | .0041 | .0024 | .0052 | .0029 |
| | | 36 - 50 HRC | 145 | .0006 | .0011 | .0010 | .0012 | .0013 | .0014 | .0019 | .0016 | .0024 | .0019 | .0035 | .0022 | .0045 | .0027 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0016 | .0017 | .0024 | .0020 | .0032 | .0022 | .0048 | .0026 | .0062 | .0030 | .0090 | .0036 | .0114 | .0043 |
| | | 21 - 36 HRC | 370 | .0009 | .0013 | .0013 | .0014 | .0017 | .0016 | .0026 | .0019 | .0033 | .0022 | .0049 | .0026 | .0062 | .0032 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0010 | .0014 | .0015 | .0015 | .0020 | .0018 | .0030 | .0020 | .0039 | .0024 | .0057 | .0028 | .0072 | .0034 |
| | | 21 - 36 HRC | 335 | .0009 | .0013 | .0013 | .0014 | .0017 | .0016 | .0026 | .0019 | .0034 | .0022 | .0049 | .0026 | .0062 | .0032 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0011 | .0014 | .0016 | .0016 | .0021 | .0018 | .0032 | .0021 | .0041 | .0024 | .0059 | .0029 | .0075 | .0035 |
| | | 21 - 36 HRC | 260 | .0007 | .0011 | .0011 | .0013 | .0014 | .0015 | .0021 | .0017 | .0027 | .0020 | .0039 | .0023 | .0050 | .0028 |
| | | 36 - 50 HRC | 135 | .0005 | .0009 | .0007 | .0010 | .0009 | .0012 | .0013 | .0014 | .0017 | .0016 | .0025 | .0019 | .0032 | .0023 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0014 | .0016 | .0021 | .0018 | .0027 | .0020 | .0041 | .0023 | .0052 | .0027 | .0076 | .0033 | .0097 | .0040 |
| | | 75 - 98 HRB | 250 | .0011 | .0015 | .0017 | .0016 | .0023 | .0019 | .0034 | .0021 | .0044 | .0025 | .0064 | .0030 | .0081 | .0036 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0007 | .0011 | .0011 | .0013 | .0014 | .0015 | .0021 | .0017 | .0027 | .0020 | .0039 | .0023 | .0049 | .0028 |
| | | 21 - 36 HRC | 75 | .0007 | .0011 | .0010 | .0012 | .0013 | .0014 | .0020 | .0016 | .0025 | .0019 | .0037 | .0023 | .0047 | .0028 |
| | | 36 - 50 HRC | 70 | .0006 | .0010 | .0008 | .0011 | .0011 | .0013 | .0017 | .0015 | .0022 | .0018 | .0032 | .0021 | .0040 | .0026 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0019 | .0019 | .0028 | .0021 | .0037 | .0024 | .0056 | .0028 | .0072 | .0032 | .0105 | .0039 | .0134 | .0047 |
| | | 75 - 98 HRB | 275 | .0016 | .0017 | .0024 | .0019 | .0031 | .0022 | .0047 | .0025 | .0060 | .0030 | .0088 | .0035 | .0112 | .0043 |
| | | 21 - 36 HRC | 250 | .0012 | .0015 | .0018 | .0017 | .0023 | .0019 | .0035 | .0022 | .0045 | .0026 | .0066 | .0031 | .0084 | .0037 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0009 | .0013 | .0014 | .0015 | .0018 | .0017 | .0028 | .0020 | .0036 | .0023 | .0052 | .0027 | .0066 | .0033 |
| | | 36 - 50 HRC | 160 | .0009 | .0013 | .0013 | .0014 | .0017 | .0016 | .0025 | .0019 | .0033 | .0022 | .0047 | .0026 | .0060 | .0031 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0008 | .0012 | .0012 | .0014 | .0016 | .0016 | .0023 | .0018 | .0030 | .0021 | .0044 | .0025 | .0056 | .0030 |
| | | 21 - 36 HRC | 170 | .0008 | .0012 | .0012 | .0013 | .0015 | .0015 | .0023 | .0017 | .0029 | .0020 | .0042 | .0024 | .0054 | .0030 |
| | | 36 - 50 HRC | 65 | .0005 | .0010 | .0008 | .0011 | .0010 | .0013 | .0015 | .0014 | .0020 | .0017 | .0029 | .0020 | .0037 | .0024 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 10%-15% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-15% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. Values shown are for non-reached tools. For tools with reaches greater than 3xD, IPT should be reduced. For more accurate running parameters, please refer to Machining Advisor Pro.

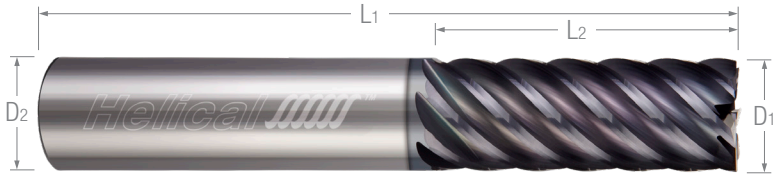
# HSF-7

HEM

## 7 FLUTE - SQUARE

### Finisher

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 2 | 7 | **24017** | HSF-S-70250 |
| | 1/4 | 1/2 | 2-1/2 | 7 | **24022** | HSF-SR-70250 |
| | 1/4 | 3/4 | 2-1/2 | 7 | **24032** | HSF-R-70250 |
| | 1/4 | 1-1/4 | 3 | 7 | **24047** | HSF-L-70250 |
| | 1/4 | 1-3/4 | 4 | 7 | **24062** | HSF-X-70250 |
| 5/16 | 5/16 | 7/16 | 2 | 7 | **24092** | HSF-S-70312 |
| | 5/16 | 13/16 | 2-1/2 | 7 | **24107** | HSF-R-70312 |
| | 5/16 | 1-3/8 | 3-1/2 | 7 | **24122** | HSF-L-70312 |
| | 5/16 | 2 | 4 | 7 | **24137** | HSF-X-70312 |
| 3/8 | 3/8 | 1/2 | 2 | 7 | **24167** | HSF-S-70375 |
| | 3/8 | 7/8 | 2-1/2 | 7 | **24182** | HSF-SR-70375 |
| | 3/8 | 1 | 3 | 7 | **24187** | HSF-R-70375 |
| | 3/8 | 1-1/2 | 3-1/2 | 7 | **24197** | HSF-L-70375 |
| | 3/8 | 2-1/2 | 5 | 7 | **24212** | HSF-X-70375 |
| 7/16 | 7/16 | 9/16 | 2-3/4 | 7 | **24242** | HSF-S-70437 |
| | 7/16 | 1 | 2-3/4 | 7 | **24257** | HSF-R-70437 |
| | 7/16 | 1-1/2 | 3-1/2 | 7 | **24272** | HSF-M-70437 |
| 1/2 | 1/2 | 3/4 | 2-1/2 | 7 | **24317** | HSF-S-70500 |
| | 1/2 | 1 | 2-1/2 | 7 | **81829** | HSF-SR-70500 |
| | 1/2 | 1-1/4 | 3 | 7 | **24332** | HSF-R-70500 |
| | 1/2 | 1-5/8 | 3-1/2 | 7 | **81830** | HSF-M-70500 |
| | 1/2 | 2 | 4 | 7 | **24347** | HSF-L-70500 |
| | 1/2 | 2-1/2 | 5 | 7 | **81831** | HSF-LX-70500 |
| | 1/2 | 3-1/4 | 6 | 7 | **24362** | HSF-X-70500 |
| 5/8 | 5/8 | 3/4 | 3 | 7 | **24392** | HSF-S-70625 |
| | 5/8 | 1-5/8 | 4 | 7 | **24407** | HSF-R-70625 |
| | 5/8 | 2 | 4 | 7 | **24422** | HSF-M-70625 |
| 3/4 | 3/4 | 1 | 3 | 7 | **24467** | HSF-S-70750 |
| | 3/4 | 1-5/8 | 4 | 7 | **24482** | HSF-R-70750 |
| | 3/4 | 2-1/4 | 5 | 7 | **24497** | HSF-M-70750 |
| | 3/4 | 3-1/4 | 6 | 7 | **24512** | HSF-L-70750 |
| 1 | 1 | 1-1/4 | 4 | 7 | **24542** | HSF-S-71000 |
| | 1 | 2 | 4-1/2 | 7 | **24557** | HSF-R-71000 |
| | 1 | 3-1/4 | 6 | 7 | **24572** | HSF-ML-71000 |
| | 1 | 4-1/8 | 7 | 7 | **24587** | HSF-X-71000 |
| 1-1/4 | 1-1/4 | 2 | 4-1/2 | 7 | **24617** | HSF-R-71250 |
| | 1-1/4 | 2-5/8 | 5-1/2 | 7 | **24632** | HSF-M-71250 |
| | 1-1/4 | 3-1/4 | 6 | 7 | **24647** | HSF-L-71250 |
| | 1-1/4 | 5 | 7-1/2 | 7 | **24662** | HSF-X-71250 |

* .0005 max TIR

Speeds & Feeds on Page 158

# SPEEDS & FEEDS

## 7 Flute - Finisher

HSF-7

| Material Guide | | Hardness | SFM | Inches Per Tooth (IPT) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0017 | .0019 | .0026 | .0022 | .0034 | .0024 | .0052 | .0028 | .0067 | .0033 | .0097 | .0039 | .0123 | .0047 |
| | | 75 - 98 HRB | 445 | .0013 | .0016 | .0019 | .0018 | .0025 | .0021 | .0038 | .0024 | .0049 | .0028 | .0071 | .0033 | .0090 | .0040 |
| | | 21 - 36 HRC | 400 | .0008 | .0013 | .0013 | .0015 | .0016 | .0017 | .0024 | .0019 | .0031 | .0022 | .0046 | .0027 | .0058 | .0033 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0011 | .0015 | .0017 | .0017 | .0022 | .0019 | .0033 | .0022 | .0042 | .0026 | .0061 | .0031 | .0078 | .0038 |
| | | 21 - 36 HRC | 340 | .0008 | .0013 | .0012 | .0014 | .0016 | .0017 | .0024 | .0019 | .0031 | .0023 | .0046 | .0027 | .0058 | .0033 |
| | | 36 - 50 HRC | 260 | .0007 | .0012 | .0011 | .0014 | .0014 | .0016 | .0021 | .0018 | .0027 | .0021 | .0040 | .0025 | .0051 | .0030 |
| | | > 50 HRC | 155 | .0006 | .0011 | .0009 | .0012 | .0011 | .0014 | .0017 | .0016 | .0022 | .0019 | .0032 | .0022 | .0040 | .0027 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0011 | .0015 | .0017 | .0017 | .0022 | .0019 | .0033 | .0022 | .0042 | .0026 | .0061 | .0031 | .0078 | .0038 |
| | | 21 - 36 HRC | 250 | .0009 | .0014 | .0013 | .0015 | .0017 | .0017 | .0026 | .0020 | .0033 | .0023 | .0049 | .0028 | .0062 | .0034 |
| | | 36 - 50 HRC | 145 | .0007 | .0012 | .0010 | .0013 | .0014 | .0015 | .0020 | .0017 | .0026 | .0020 | .0038 | .0024 | .0049 | .0029 |
| | | > 50 HRC | 85 | .0006 | .0011 | .0008 | .0012 | .0011 | .0014 | .0017 | .0016 | .0022 | .0019 | .0031 | .0022 | .0040 | .0027 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0014 | .0017 | .0022 | .0020 | .0028 | .0022 | .0043 | .0026 | .0055 | .0030 | .0080 | .0035 | .0102 | .0043 |
| | | 75 - 98 HRB | 255 | .0010 | .0014 | .0015 | .0016 | .0019 | .0018 | .0029 | .0021 | .0038 | .0025 | .0055 | .0029 | .0070 | .0036 |
| | | 21 - 36 HRC | 175 | .0009 | .0014 | .0013 | .0015 | .0018 | .0018 | .0026 | .0020 | .0034 | .0023 | .0049 | .0028 | .0063 | .0034 |
| | | 36 - 50 HRC | 150 | .0008 | .0013 | .0012 | .0014 | .0016 | .0017 | .0024 | .0019 | .0031 | .0022 | .0044 | .0026 | .0056 | .0032 |
| | | > 50 HRC | 55 | .0005 | .0010 | .0007 | .0011 | .0010 | .0013 | .0015 | .0015 | .0019 | .0017 | .0027 | .0021 | .0035 | .0025 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0011 | .0015 | .0016 | .0017 | .0021 | .0019 | .0032 | .0022 | .0041 | .0026 | .0060 | .0031 | .0076 | .0037 |
| | | 21 - 36 HRC | 225 | .0010 | .0014 | .0015 | .0016 | .0019 | .0018 | .0029 | .0021 | .0037 | .0024 | .0054 | .0029 | .0069 | .0035 |
| | | 36 - 50 HRC | 180 | .0008 | .0013 | .0012 | .0014 | .0015 | .0016 | .0023 | .0019 | .0030 | .0022 | .0043 | .0026 | .0055 | .0032 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0011 | .0015 | .0017 | .0017 | .0022 | .0019 | .0033 | .0022 | .0042 | .0026 | .0061 | .0031 | .0078 | .0038 |
| | | 21 - 36 HRC | 280 | .0010 | .0014 | .0015 | .0016 | .0019 | .0018 | .0029 | .0021 | .0037 | .0024 | .0053 | .0029 | .0068 | .0035 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0008 | .0013 | .0012 | .0014 | .0016 | .0017 | .0024 | .0019 | .0031 | .0022 | .0045 | .0026 | .0057 | .0032 |
| | | 36 - 50 HRC | 145 | .0007 | .0012 | .0011 | .0014 | .0014 | .0016 | .0021 | .0018 | .0027 | .0021 | .0039 | .0025 | .0050 | .0030 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0018 | .0019 | .0027 | .0022 | .0035 | .0024 | .0053 | .0028 | .0068 | .0033 | .0099 | .0039 | .0127 | .0048 |
| | | 21 - 36 HRC | 370 | .0010 | .0014 | .0015 | .0016 | .0019 | .0018 | .0029 | .0021 | .0037 | .0025 | .0054 | .0029 | .0069 | .0035 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0011 | .0015 | .0017 | .0017 | .0022 | .0020 | .0034 | .0023 | .0043 | .0026 | .0063 | .0031 | .0080 | .0038 |
| | | 21 - 36 HRC | 335 | .0010 | .0014 | .0015 | .0016 | .0019 | .0018 | .0029 | .0021 | .0037 | .0025 | .0054 | .0029 | .0069 | .0035 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0012 | .0016 | .0018 | .0017 | .0023 | .0020 | .0035 | .0023 | .0045 | .0027 | .0065 | .0032 | .0083 | .0039 |
| | | 21 - 36 HRC | 260 | .0008 | .0013 | .0012 | .0014 | .0015 | .0016 | .0023 | .0019 | .0030 | .0022 | .0043 | .0026 | .0055 | .0032 |
| | | 36 - 50 HRC | 135 | .0005 | .0010 | .0008 | .0011 | .0010 | .0013 | .0015 | .0015 | .0019 | .0017 | .0028 | .0021 | .0035 | .0025 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0015 | .0018 | .0023 | .0020 | .0030 | .0023 | .0045 | .0026 | .0058 | .0030 | .0084 | .0036 | .0107 | .0044 |
| | | 75 - 98 HRB | 250 | .0013 | .0016 | .0019 | .0018 | .0025 | .0021 | .0038 | .0024 | .0048 | .0028 | .0071 | .0033 | .0090 | .0040 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0008 | .0013 | .0012 | .0014 | .0015 | .0016 | .0023 | .0019 | .0029 | .0022 | .0043 | .0026 | .0055 | .0031 |
| | | 21 - 36 HRC | 75 | .0007 | .0012 | .0011 | .0014 | .0015 | .0016 | .0022 | .0018 | .0028 | .0021 | .0041 | .0025 | .0052 | .0031 |
| | | 36 - 50 HRC | 70 | .0006 | .0011 | .0009 | .0013 | .0013 | .0015 | .0019 | .0017 | .0024 | .0020 | .0035 | .0023 | .0045 | .0028 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0021 | .0021 | .0032 | .0024 | .0041 | .0027 | .0062 | .0031 | .0080 | .0036 | .0116 | .0043 | .0148 | .0052 |
| | | 75 - 98 HRB | 275 | .0018 | .0019 | .0027 | .0022 | .0035 | .0024 | .0052 | .0028 | .0067 | .0033 | .0097 | .0039 | .0124 | .0048 |
| | | 21 - 36 HRC | 250 | .0013 | .0017 | .0020 | .0019 | .0026 | .0021 | .0039 | .0024 | .0050 | .0028 | .0073 | .0034 | .0093 | .0041 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0010 | .0015 | .0016 | .0017 | .0020 | .0019 | .0031 | .0022 | .0040 | .0025 | .0058 | .0030 | .0073 | .0037 |
| | | 36 - 50 HRC | 160 | .0010 | .0014 | .0014 | .0016 | .0019 | .0018 | .0028 | .0021 | .0036 | .0024 | .0053 | .0029 | .0067 | .0035 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0009 | .0013 | .0013 | .0015 | .0017 | .0017 | .0026 | .0020 | .0033 | .0023 | .0049 | .0028 | .0062 | .0034 |
| | | 21 - 36 HRC | 170 | .0009 | .0013 | .0013 | .0015 | .0017 | .0017 | .0025 | .0019 | .0033 | .0023 | .0047 | .0027 | .0060 | .0033 |
| | | 36 - 50 HRC | 65 | .0006 | .0011 | .0009 | .0012 | .0011 | .0014 | .0017 | .0016 | .0022 | .0019 | .0032 | .0023 | .0041 | .0027 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 10%-15% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 10%-15% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. For more accurate running parameters, please refer to Machining Advisor Pro.

# HXF

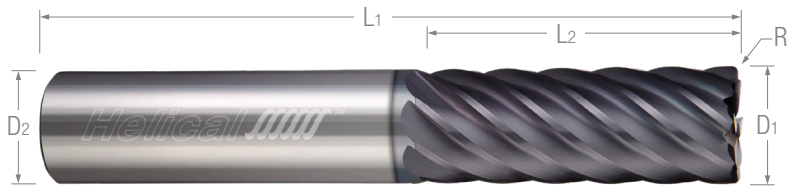
New Item!

# MULTI-FLUTE - CORNER RADIUS

## Finisher

- Offers outstanding performance and high temperature resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed with high flute count for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

For increased wear resistance, see page 184 for T*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .020 | 3/8 | 2 | 7 | 36016 | HXF-S-070250-R.020 |
| | 1/4 | .020 | 1/2 | 2 | 7 | 81832 | HXF-SR-070250-R.020 |
| | 1/4 | .020 | 3/4 | 2-1/2 | 7 | 36031 | HXF-R-070250-R.020 |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 7 | 36046 | HXF-S-070375-R.020 |
| | 3/8 | .020 | 3/4 | 2-1/2 | 7 | 81833 | HXF-SR-070375-R.020 |
| | 3/8 | .020 | 1 | 3 | 7 | 36061 | HXF-R-070375-R.020 |
| | 3/8 | .020 | 1-1/4 | 3 | 7 | 81834 | HXF-M-070375-R.020 |
| 1/2 | 1/2 | .030 | 5/8 | 2-1/2 | 8 | 36076 | HXF-S-080500-R.030 |
| | 1/2 | .030 | 1 | 3 | 8 | 36091 | HXF-SR-080500-R.030 |
| | 1/2 | .030 | 1-1/4 | 3 | 8 | 36106 | HXF-R-080500-R.030 |
| | 1/2 | .030 | 1-5/8 | 3-1/2 | 8 | 81835 | HXF-M-080500-R.030 |
| | 1/2 | .030 | 2 | 3-1/2 | 8 | 81836 | HXF-L-080500-R.030 |
| 5/8 | 5/8 | .060 | 3/4 | 3 | 10 | 36121 | HXF-S-100625-R.060 |
| | 5/8 | .060 | 1-5/8 | 3-1/2 | 10 | 36136 | HXF-R-100625-R.060 |
| 3/4 | 3/4 | .060 | 1 | 3 | 12 | 36151 | HXF-S-120750-R.060 |
| | 3/4 | .060 | 1-5/8 | 4 | 12 | 36166 | HXF-R-120750-R.060 |
| | 3/4 | .060 | 2 | 4 | 12 | 81837 | HXF-M-120750-R.060 |
| 1 | 1 | .060 | 1-1/4 | 4 | 14 | 36181 | HXF-S-141000-R.060 |
| new | 1 | .060 | 2 | 4-1/2 | 14 | 36196 | HXF-R-141000-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 160
Roughing Finishing

# SPEEDS & FEEDS

## Multi-Flute - Finisher

HXF

| HXF | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material Guide | | Hardness | SFM | Inches Per Tooth (IPT) | | | | | | | | | | | | | |
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin | Rgh | Fin |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0017 | .0018 | .0026 | .0020 | .0034 | .0022 | .0051 | .0026 | .0066 | .0030 | .0097 | .0036 | .0123 | .0044 |
| | | 75 - 98 HRB | 445 | .0012 | .0015 | .0019 | .0017 | .0025 | .0019 | .0038 | .0022 | .0048 | .0026 | .0071 | .0031 | .0090 | .0037 |
| | | 21 - 36 HRC | 400 | .0008 | .0012 | .0012 | .0014 | .0016 | .0015 | .0024 | .0018 | .0031 | .0021 | .0046 | .0025 | .0058 | .0030 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0011 | .0014 | .0017 | .0016 | .0021 | .0018 | .0033 | .0021 | .0041 | .0024 | .0061 | .0029 | .0078 | .0035 |
| | | 21 - 36 HRC | 340 | .0008 | .0012 | .0012 | .0013 | .0016 | .0015 | .0024 | .0018 | .0031 | .0021 | .0045 | .0025 | .0058 | .0030 |
| | | 36 - 50 HRC | 260 | .0007 | .0011 | .0011 | .0013 | .0014 | .0014 | .0021 | .0017 | .0027 | .0019 | .0040 | .0023 | .0050 | .0028 |
| | | > 50 HRC | 155 | .0006 | .0010 | .0009 | .0011 | .0011 | .0013 | .0017 | .0015 | .0021 | .0017 | .0031 | .0020 | .0040 | .0025 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0011 | .0014 | .0017 | .0016 | .0021 | .0018 | .0033 | .0021 | .0041 | .0024 | .0061 | .0029 | .0078 | .0035 |
| | | 21 - 36 HRC | 250 | .0009 | .0012 | .0013 | .0014 | .0017 | .0016 | .0026 | .0018 | .0033 | .0021 | .0049 | .0025 | .0062 | .0031 |
| | | 36 - 50 HRC | 145 | .0007 | .0011 | .0010 | .0012 | .0013 | .0014 | .0020 | .0016 | .0026 | .0019 | .0038 | .0023 | .0048 | .0027 |
| | | > 50 HRC | 85 | .0006 | .0010 | .0008 | .0011 | .0011 | .0013 | .0017 | .0015 | .0021 | .0017 | .0031 | .0020 | .0039 | .0025 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0014 | .0016 | .0022 | .0018 | .0028 | .0020 | .0043 | .0024 | .0054 | .0028 | .0080 | .0033 | .0102 | .0040 |
| | | 75 - 98 HRB | 255 | .0010 | .0013 | .0015 | .0015 | .0019 | .0017 | .0029 | .0019 | .0037 | .0023 | .0055 | .0027 | .0070 | .0033 |
| | | 21 - 36 HRC | 175 | .0009 | .0013 | .0013 | .0014 | .0017 | .0016 | .0026 | .0019 | .0034 | .0021 | .0049 | .0026 | .0063 | .0031 |
| | | 36 - 50 HRC | 150 | .0008 | .0012 | .0012 | .0013 | .0015 | .0015 | .0023 | .0017 | .0030 | .0020 | .0044 | .0024 | .0056 | .0030 |
| | | > 50 HRC | 55 | .0005 | .0009 | .0007 | .0010 | .0009 | .0012 | .0014 | .0014 | .0018 | .0016 | .0027 | .0019 | .0034 | .0023 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0011 | .0014 | .0016 | .0016 | .0021 | .0018 | .0032 | .0020 | .0040 | .0024 | .0060 | .0028 | .0076 | .0034 |
| | | 21 - 36 HRC | 225 | .0010 | .0013 | .0015 | .0015 | .0019 | .0017 | .0029 | .0019 | .0036 | .0023 | .0054 | .0027 | .0068 | .0033 |
| | | 36 - 50 HRC | 180 | .0008 | .0012 | .0012 | .0013 | .0015 | .0015 | .0023 | .0017 | .0029 | .0020 | .0043 | .0024 | .0055 | .0029 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0011 | .0014 | .0017 | .0016 | .0021 | .0018 | .0033 | .0021 | .0042 | .0024 | .0061 | .0029 | .0078 | .0035 |
| | | 21 - 36 HRC | 280 | .0010 | .0013 | .0014 | .0015 | .0019 | .0017 | .0029 | .0019 | .0036 | .0022 | .0053 | .0027 | .0068 | .0033 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0008 | .0012 | .0012 | .0013 | .0016 | .0015 | .0024 | .0018 | .0031 | .0021 | .0045 | .0025 | .0057 | .0030 |
| | | 36 - 50 HRC | 145 | .0007 | .0011 | .0011 | .0013 | .0014 | .0014 | .0021 | .0016 | .0027 | .0019 | .0039 | .0023 | .0049 | .0028 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0018 | .0018 | .0027 | .0020 | .0035 | .0023 | .0053 | .0026 | .0067 | .0030 | .0099 | .0037 | .0126 | .0044 |
| | | 21 - 36 HRC | 370 | .0009 | .0013 | .0015 | .0015 | .0019 | .0017 | .0029 | .0019 | .0037 | .0022 | .0054 | .0027 | .0068 | .0033 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0011 | .0014 | .0017 | .0016 | .0022 | .0018 | .0034 | .0021 | .0043 | .0024 | .0063 | .0029 | .0080 | .0035 |
| | | 21 - 36 HRC | 335 | .0010 | .0013 | .0015 | .0015 | .0019 | .0017 | .0029 | .0019 | .0037 | .0022 | .0054 | .0027 | .0069 | .0033 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0012 | .0015 | .0018 | .0016 | .0023 | .0018 | .0035 | .0021 | .0044 | .0025 | .0065 | .0029 | .0083 | .0036 |
| | | 21 - 36 HRC | 260 | .0008 | .0012 | .0012 | .0013 | .0015 | .0015 | .0023 | .0017 | .0029 | .0020 | .0043 | .0024 | .0055 | .0029 |
| | | 36 - 50 HRC | 135 | .0005 | .0009 | .0008 | .0010 | .0010 | .0012 | .0015 | .0014 | .0019 | .0016 | .0027 | .0019 | .0035 | .0023 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0015 | .0017 | .0023 | .0019 | .0029 | .0021 | .0045 | .0024 | .0057 | .0028 | .0084 | .0034 | .0107 | .0041 |
| | | 75 - 98 HRB | 250 | .0013 | .0015 | .0019 | .0017 | .0025 | .0019 | .0037 | .0022 | .0048 | .0026 | .0070 | .0031 | .0089 | .0037 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0008 | .0012 | .0012 | .0013 | .0015 | .0015 | .0023 | .0017 | .0029 | .0020 | .0043 | .0024 | .0054 | .0029 |
| | | 21 - 36 HRC | 75 | .0007 | .0012 | .0011 | .0013 | .0014 | .0015 | .0022 | .0017 | .0028 | .0020 | .0041 | .0023 | .0052 | .0028 |
| | | 36 - 50 HRC | 70 | .0006 | .0010 | .0010 | .0012 | .0012 | .0014 | .0019 | .0015 | .0024 | .0018 | .0035 | .0022 | .0044 | .0026 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0020 | .0019 | .0031 | .0022 | .0041 | .0025 | .0062 | .0028 | .0079 | .0033 | .0116 | .0039 | .0147 | .0048 |
| | | 75 - 98 HRB | 275 | .0017 | .0018 | .0026 | .0020 | .0034 | .0023 | .0052 | .0026 | .0066 | .0030 | .0097 | .0036 | .0123 | .0044 |
| | | 21 - 36 HRC | 250 | .0013 | .0015 | .0020 | .0017 | .0025 | .0020 | .0039 | .0022 | .0050 | .0026 | .0073 | .0031 | .0093 | .0038 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0010 | .0014 | .0016 | .0015 | .0020 | .0017 | .0031 | .0020 | .0039 | .0023 | .0057 | .0028 | .0073 | .0034 |
| | | 36 - 50 HRC | 160 | .0009 | .0013 | .0014 | .0015 | .0018 | .0017 | .0028 | .0019 | .0036 | .0022 | .0052 | .0027 | .0067 | .0032 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0009 | .0012 | .0013 | .0014 | .0017 | .0016 | .0026 | .0018 | .0033 | .0022 | .0049 | .0026 | .0062 | .0031 |
| | | 21 - 36 HRC | 170 | .0008 | .0012 | .0013 | .0014 | .0017 | .0016 | .0025 | .0018 | .0032 | .0021 | .0047 | .0025 | .0060 | .0030 |
| | | 36 - 50 HRC | 65 | .0006 | .0010 | .0009 | .0011 | .0011 | .0013 | .0017 | .0015 | .0022 | .0017 | .0032 | .0021 | .0040 | .0025 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 8%-10% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 8%-10% Diameter |
| Fin (Finishing) | N/A | Up to Max LOC | 4%-6% Diameter |

NOTES:

Hardness Scales: HRB = Rockwell B
HRC = Rockwell C

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. For more accurate running parameters, please refer to Machining Advisor Pro.

# END MILLS FOR STAINLESS STEELS & HIGH TEMP ALLOYS

Our End Mills for Stainless Steels and High Temp Alloys focuses on our extensive offering of T*plus* coated end mills. T*plus* offers excellent heat resistance and high hardness for reduced abrasion and extended tool life in these notorious alloys. Take on your next project knowing that you'll get the most out of your tooling with the tools in this section.


| | ROUGHERS | | | PG |
|---|---|---|---|---|
| new | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 162 |
| new | 6 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 163 |
| new | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 164 |
| new | Multi-Flute | Corner Radius | Knuckle Rougher - Variable Pitch | 165 |
| | **4 FLUTE** | | | **PG** |
| new | 4 Flute | Square | Variable Pitch | 166 |
| new | 4 Flute | Ball | Variable Pitch | 168 |
| new | 4 Flute | Corner Radius | Variable Pitch | 169 |
| | **5 FLUTE** | | | **PG** |
| new | 5 Flute | Square | Variable Pitch | 171 |
| new | 5 Flute | Corner Radius | Variable Pitch | 173 |
| | **6 FLUTE** | | | **PG** |
| new | 6 Flute | Square | Variable Pitch | 177 |
| new | 6 Flute | Ball | Variable Pitch | 178 |
| new | 6 Flute | Corner Radius | Variable Pitch | 179 |
| | **7 FLUTE** | | | **PG** |
| new | 7 Flute | Square | Variable Pitch | 182 |
| new | 7 Flute | Corner Radius | Variable Pitch | 183 |
| | **MULTI-FLUTE** | | | **PG** |
| new | Multi-Flute | Corner Radius | Finisher | 184 |

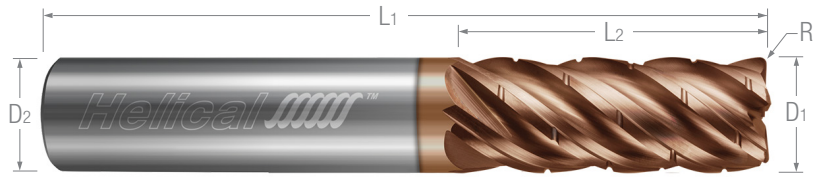
# 5 FLUTE - CORNER RADIUS New!

## Chipbreaker Rougher - Variable Pitch

HEV-C-5

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 5 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

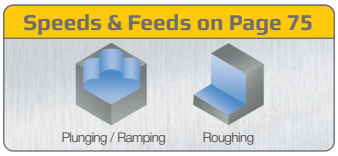
For steel applications, see page 72 for A*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 5 | 83090 | HEV-C-S-50125-R.010 | new |
| | 1/8 | .010 | 1/2 | 2-1/2 | 5 | 83091 | HEV-C-R-50125-R.010 | new |
| 3/16 | 3/16 | .010 | 5/16 | 2 | 5 | 83092 | HEV-C-S-50187-R.010 | new |
| | 3/16 | .010 | 7/16 | 2 | 5 | 83093 | HEV-C-SR-50187-R.010 | new |
| | 3/16 | .010 | 9/16 | 2-1/2 | 5 | 83094 | HEV-C-R-50187-R.010 | new |
| | 3/16 | .010 | 3/4 | 2-1/2 | 5 | 83095 | HEV-C-M-50187-R.010 | new |
| 1/4 | 1/4 | .020 | 3/8 | 2 | 5 | 83096 | HEV-C-S-50250-R.020 | new |
| | 1/4 | .020 | 1/2 | 2-1/2 | 5 | 83097 | HEV-C-SR-50250-R.020 | new |
| | 1/4 | .020 | 3/4 | 2-1/2 | 5 | 83098 | HEV-C-R-50250-R.020 | new |
| | 1/4 | .020 | 1 | 3 | 5 | 83099 | HEV-C-M-50250-R.020 | new |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 5 | 83100 | HEV-C-S-50375-R.020 | new |
| | 3/8 | .020 | 3/4 | 2-1/2 | 5 | 83101 | HEV-C-SR-50375-R.020 | new |
| | 3/8 | .020 | 1 | 3 | 5 | 83102 | HEV-C-R-50375-R.020 | new |
| | 3/8 | .020 | 1-1/4 | 3 | 5 | 83103 | HEV-C-M-50375-R.020 | new |
| 1/2 | 1/2 | .030 | 5/8 | 2-1/2 | 5 | 83104 | HEV-C-S-50500-R.030 | new |
| | 1/2 | .030 | 1 | 3 | 5 | 83105 | HEV-C-SR-50500-R.030 | new |
| | 1/2 | .030 | 1-1/4 | 3 | 5 | 83106 | HEV-C-R-50500-R.030 | new |
| | 1/2 | .030 | 1-5/8 | 4 | 5 | 83107 | HEV-C-M-50500-R.030 | new |
| | 1/2 | .030 | 2 | 4 | 5 | 83108 | HEV-C-L-50500-R.030 | new |
| | 1/2 | .030 | 2-1/2 | 5 | 5 | 83109 | HEV-C-LX-50500-R.030 | new |
| | 1/2 | .060 | 5/8 | 2-1/2 | 5 | 83110 | HEV-C-S-50500-R.060 | new |
| | 1/2 | .060 | 1 | 3 | 5 | 83111 | HEV-C-SR-50500-R.060 | new |
| | 1/2 | .060 | 1-1/4 | 3 | 5 | 83112 | HEV-C-R-50500-R.060 | new |
| | 1/2 | .060 | 1-5/8 | 4 | 5 | 83113 | HEV-C-M-50500-R.060 | new |
| | 1/2 | .060 | 2 | 4 | 5 | 83114 | HEV-C-L-50500-R.060 | new |
| | 1/2 | .060 | 2-1/2 | 5 | 5 | 83115 | HEV-C-LX-50500-R.060 | new |
| 5/8 | 5/8 | .030 | 3/4 | 3 | 5 | 83116 | HEV-C-S-50625-R.030 | new |
| | 5/8 | .030 | 1-1/4 | 3-1/2 | 5 | 83117 | HEV-C-SR-50625-R.030 | new |
| | 5/8 | .030 | 1-5/8 | 3-1/2 | 5 | 83118 | HEV-C-R-50625-R.030 | new |
| | 5/8 | .030 | 2-1/8 | 4 | 5 | 83119 | HEV-C-M-50625-R.030 | new |
| 3/4 | 3/4 | .030 | 1 | 3 | 5 | 83120 | HEV-C-S-50750-R.030 | new |
| | 3/4 | .030 | 1-5/8 | 4 | 5 | 83121 | HEV-C-R-50750-R.030 | new |
| | 3/4 | .030 | 2-1/4 | 5 | 5 | 83122 | HEV-C-M-50750-R.030 | new |
| | 3/4 | .030 | 2-3/4 | 5 | 5 | 83123 | HEV-C-L-50750-R.030 | new |
| | 3/4 | .030 | 3-1/4 | 6 | 5 | 83124 | HEV-C-LX-50750-R.030 | new |

* .0005 max TIR

Speeds & Feeds on Page 75



# HEV-C-6

HEM

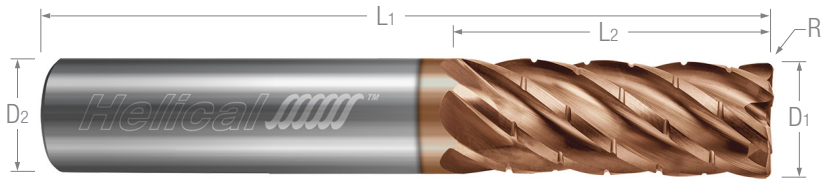
New! **6 FLUTE - CORNER RADIUS**

## Chipbreaker Rougher - Variable Pitch



- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 6 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

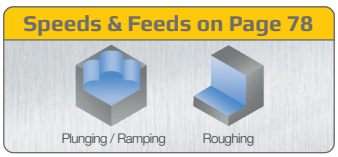
For steel applications, see page 76 for A*plus* coating




| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 1/4 | 1/4 | **.020** | 3/8 | 2 | 6 | **83145** | HEV-C-S-60250-R.020 |
| new | | 1/4 | **.020** | 1/2 | 2-1/2 | 6 | **83146** | HEV-C-SR-60250-R.020 |
| new | | 1/4 | **.020** | 3/4 | 2-1/2 | 6 | **83147** | HEV-C-R-60250-R.020 |
| new | | 1/4 | **.020** | 1 | 3 | 6 | **83148** | HEV-C-M-60250-R.020 |
| new | 3/8 | 3/8 | **.030** | 1/2 | 2 | 6 | **83149** | HEV-C-S-60375-R.030 |
| new | | 3/8 | **.030** | 3/4 | 2-1/2 | 6 | **83150** | HEV-C-SR-60375-R.030 |
| new | | 3/8 | **.030** | 1 | 3 | 6 | **83151** | HEV-C-R-60375-R.030 |
| new | | 3/8 | **.030** | 1-1/4 | 3 | 6 | **83152** | HEV-C-M-60375-R.030 |
| new | 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 6 | **83153** | HEV-C-S-60500-R.030 |
| new | | 1/2 | **.030** | 1 | 3 | 6 | **83154** | HEV-C-SR-60500-R.030 |
| new | | 1/2 | **.030** | 1-1/4 | 3 | 6 | **83155** | HEV-C-R-60500-R.030 |
| new | | 1/2 | **.030** | 1-5/8 | 4 | 6 | **83156** | HEV-C-M-60500-R.030 |
| new | | 1/2 | **.030** | 2 | 4 | 6 | **83157** | HEV-C-L-60500-R.030 |
| new | | 1/2 | **.060** | 5/8 | 2-1/2 | 6 | **83158** | HEV-C-S-60500-R.060 |
| new | | 1/2 | **.060** | 1 | 3 | 6 | **83159** | HEV-C-SR-60500-R.060 |
| new | | 1/2 | **.060** | 1-1/4 | 3 | 6 | **83160** | HEV-C-R-60500-R.060 |
| new | | 1/2 | **.060** | 1-5/8 | 4 | 6 | **83161** | HEV-C-M-60500-R.060 |
| new | | 1/2 | **.060** | 2 | 4 | 6 | **83162** | HEV-C-L-60500-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 78



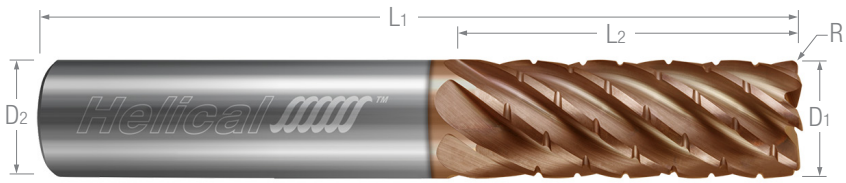
# 7 FLUTE - CORNER RADIUS New!

## HEV-C-7

### Chipbreaker Rougher - Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 79 for A*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 1/2 | 2 | 7 | **82911** | HEV-C-SR-70250-R.020 | new |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 7 | **82912** | HEV-C-R-70250-R.020 | new |
| 3/8 | 3/8 | **.020** | 1/2 | 2 | 7 | **82913** | HEV-C-S-70375-R.020 | new |
| | 3/8 | **.020** | 3/4 | 2-1/2 | 7 | **82914** | HEV-C-SR-70375-R.020 | new |
| | 3/8 | **.020** | 1 | 2-1/2 | 7 | **82915** | HEV-C-R-70375-R.020 | new |
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 7 | **82916** | HEV-C-S-70500-R.030 | new |
| | 1/2 | **.030** | 1 | 3 | 7 | **82917** | HEV-C-SR-70500-R.030 | new |
| | 1/2 | **.030** | 1-1/4 | 3 | 7 | **82918** | HEV-C-R-70500-R.030 | new |
| | 1/2 | **.030** | 1-5/8 | 4 | 7 | **82919** | HEV-C-M-70500-R.030 | new |
| | 1/2 | **.030** | 2 | 4 | 7 | **82920** | HEV-C-L-70500-R.030 | new |
| | 1/2 | **.060** | 5/8 | 2-1/2 | 7 | **83177** | HEV-C-S-70500-R.060 | new |
| | 1/2 | **.060** | 1 | 3 | 7 | **83178** | HEV-C-SR-70500-R.060 | new |
| | 1/2 | **.060** | 1-1/4 | 3 | 7 | **83179** | HEV-C-R-70500-R.060 | new |
| | 1/2 | **.060** | 1-5/8 | 4 | 7 | **83180** | HEV-C-M-70500-R.060 | new |
| | 1/2 | **.060** | 2 | 4 | 7 | **83181** | HEV-C-L-70500-R.060 | new |
| 5/8 | 5/8 | **.030** | 1-1/4 | 3-1/2 | 7 | **82921** | HEV-C-SR-70625-R.030 | new |
| | 5/8 | **.030** | 1-5/8 | 4 | 7 | **82922** | HEV-C-R-70625-R.030 | new |
| 3/4 | 3/4 | **.030** | 1-5/8 | 4 | 7 | **82923** | HEV-C-R-70750-R.030 | new |
| | 3/4 | **.030** | 2-1/4 | 5 | 7 | **82924** | HEV-C-M-70750-R.030 | new |
| | 3/4 | **.060** | 1-5/8 | 4 | 7 | **82925** | HEV-C-R-70750-R.060 | new |
| | 3/4 | **.060** | 2-1/4 | 5 | 7 | **82926** | HEV-C-M-70750-R.060 | new |

* .0005 max TIR

Speeds & Feeds on Page 82
Roughing

# HXVR

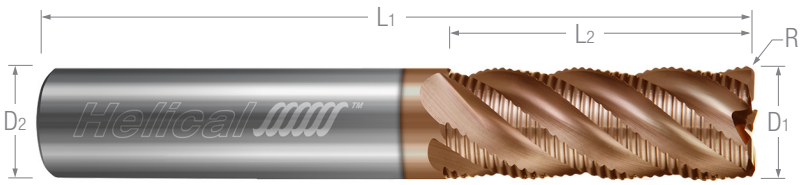
New! **MULTI-FLUTE - CORNER RADIUS**

## Knuckle Rougher - Variable Pitch



- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with staggered "low profile" edge geometry for chip control and minimized cutting forces
- Available in 4 flute and 5 flute options
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

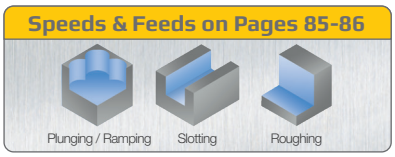
For steel applications, see page 83 for A*plus* coating




| | Cutter Diameter $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 1/4 | 1/4 | **.030** | 3/8 | 2 | 4 | 83482 | HXVR-S-40250-R.030 |
| new | | 1/4 | **.030** | 3/4 | 2-1/2 | 4 | 83483 | HXVR-R-40250-R.030 |
| new | 3/8 | 3/8 | **.040** | 1/2 | 2 | 4 | 83484 | HXVR-S-40375-R.040 |
| new | | 3/8 | **.040** | 1/2 | 2 | 5 | 83485 | HXVR-S-50375-R.040 |
| new | | 3/8 | **.040** | 1 | 3 | 4 | 83486 | HXVR-R-40375-R.040 |
| new | | 3/8 | **.040** | 1 | 3 | 5 | 83487 | HXVR-R-50375-R.040 |
| new | 1/2 | 1/2 | **.040** | 5/8 | 2-1/2 | 4 | 83488 | HXVR-S-40500-R.040 |
| new | | 1/2 | **.040** | 5/8 | 2-1/2 | 5 | 83489 | HXVR-S-50500-R.040 |
| new | | 1/2 | **.040** | 1-1/4 | 3 | 4 | 83490 | HXVR-R-40500-R.040 |
| new | | 1/2 | **.040** | 1-1/4 | 3 | 5 | 83491 | HXVR-R-50500-R.040 |
| new | 3/4 | 3/4 | **.060** | 1 | 3 | 4 | 83492 | HXVR-S-40750-R.060 |
| new | | 3/4 | **.060** | 1 | 3 | 5 | 83493 | HXVR-S-50750-R.060 |
| new | | 3/4 | **.060** | 1-5/8 | 4 | 4 | 83494 | HXVR-R-40750-R.060 |
| new | | 3/4 | **.060** | 1-5/8 | 4 | 5 | 83495 | HXVR-R-50750-R.060 |

* .0005 max TIR

Speeds & Feeds on Pages 85-86



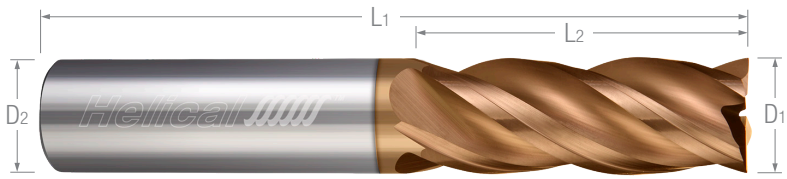
# 4 FLUTE - SQUARE New Items!

## HSV-4 / HSM-4

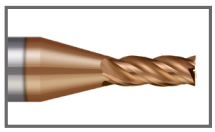
### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- CNC ground in the USA

For steel applications, see page 95 for A*plus* coating




HSM series feature enlarged shanks for added strength



| Cutter Diameter* $D_1$ $^{+.0005"}_{-.0005"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.010"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 1/32 | 1/4 | 3/32 | 2-1/2 | 4 | 84040 | HSM-030-40031 | new |
| | 1/4 | 5/32 | 2-1/2 | 4 | 84041 | HSM-050-40031 | new |
| 3/64 | 1/4 | 5/32 | 2-1/2 | 4 | 84042 | HSM-033-40047 | new |
| | 1/4 | 1/4 | 2-1/2 | 4 | 84043 | HSM-053-40047 | new |
| 1/16 | 1/4 | 3/16 | 2-1/2 | 4 | 84044 | HSM-030-40062 | new |
| | 1/4 | 5/16 | 2-1/2 | 4 | 84045 | HSM-050-40062 | new |
| 5/64 | 1/4 | 1/4 | 2-1/2 | 4 | 84046 | HSM-032-40078 | new |
| | 1/4 | 3/8 | 2-1/2 | 4 | 84047 | HSM-048-40078 | new |
| 3/32 | 1/4 | 9/32 | 2-1/2 | 4 | 84048 | HSM-030-40093 | new |
| | 1/4 | 1/2 | 2-1/2 | 4 | 84049 | HSM-053-40093 | new |

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 4 | 83183 | HSV-S-40125 | new |
| | 1/4 | 1/4 | 2-1/2 | 4 | 84050 | HSM-020-40125 | new |
| | 1/8 | 3/8 | 2 | 4 | 83184 | HSV-SR-40125 | new |
| | 1/4 | 3/8 | 2-1/2 | 4 | 84051 | HSM-030-40125 | new |
| | 1/8 | 1/2 | 2-1/2 | 4 | 83185 | HSV-R-40125 | new |
| | 1/4 | 1/2 | 2-1/2 | 4 | 84052 | HSM-040-40125 | new |
| | 1/8 | 5/8 | 2-1/2 | 4 | 83186 | HSV-A-40125 | new |
| | 1/8 | 3/4 | 2-1/2 | 4 | 83187 | HSV-M-40125 | new |
| 5/32 | 3/16 | 3/16 | 2 | 4 | 83188 | HSV-S-40156 | new |
| | 3/16 | 7/16 | 2-1/2 | 4 | 83189 | HSV-R-40156 | new |
| | 3/16 | 9/16 | 2-1/2 | 4 | 83190 | HSV-M-40156 | new |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115

# HSV-4 / HSM-4

New Items!

## 4 FLUTE - SQUARE

### Variable Pitch (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Tplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| new | 3/16 | 3/16 | 5/16 | 2 | 4 | 83191 | HSV-S-40187 |
| new | | 1/4 | 5/16 | 2-1/2 | 4 | 84053 | HSM-016-40187 |
| new | | 3/16 | 7/16 | 2 | 4 | 83192 | HSV-SR-40187 |
| new | | 1/4 | 7/16 | 2-1/2 | 4 | 84054 | HSM-023-40187 |
| new | | 1/4 | 9/16 | 2-1/2 | 4 | 84055 | HSM-029-40187 |
| new | | 3/16 | 5/8 | 2-1/2 | 4 | 83193 | HSV-R-40187 |
| new | | 1/4 | 3/4 | 2-1/2 | 4 | 84056 | HSM-040-40187 |
| new | | 3/16 | 1 | 2-1/2 | 4 | 83194 | HSV-M-40187 |
| | 1/4 | 1/4 | 3/8 | 2 | 4 | 82262 | HSV-S-40250 |
| | | 1/4 | 1/2 | 2-1/2 | 4 | 82263 | HSV-SR-40250 |
| | | 1/4 | 3/4 | 2-1/2 | 4 | 82264 | HSV-R-40250 |
| | | 1/4 | 1 | 3 | 4 | 82265 | HSV-M-40250 |
| new | | 1/4 | 1-1/4 | 3 | 4 | 83195 | HSV-L-40250 |
| new | | 1/4 | 1-1/2 | 3 | 4 | 83196 | HSV-LX-40250 |
| new | 5/16 | 5/16 | 1/2 | 2 | 4 | 83197 | HSV-S-40312 |
| new | | 5/16 | 3/4 | 2-1/2 | 4 | 83198 | HSV-R-40312 |
| new | | 5/16 | 1 | 2-1/2 | 4 | 83199 | HSV-A-40312 |
| new | | 5/16 | 1-1/4 | 3 | 4 | 83200 | HSV-M-40312 |
| | 3/8 | 3/8 | 1/2 | 2 | 4 | 82266 | HSV-S-40375 |
| | | 3/8 | 7/8 | 3 | 4 | 82267 | HSV-SR-40375 |
| | | 3/8 | 1 | 3 | 4 | 82268 | HSV-R-40375 |
| | | 3/8 | 1-1/4 | 3 | 4 | 82269 | HSV-M-40375 |
| new | | 3/8 | 1-1/2 | 3 | 4 | 83201 | HSV-L-40375 |
| | 1/2 | 1/2 | 5/8 | 2-1/2 | 4 | 82270 | HSV-S-40500 |
| | | 1/2 | 1 | 3 | 4 | 82271 | HSV-SR-40500 |
| | | 1/2 | 1-1/4 | 3 | 4 | 82272 | HSV-R-40500 |
| | | 1/2 | 1-5/8 | 4 | 4 | 82273 | HSV-M-40500 |
| new | | 1/2 | 2 | 4 | 4 | 83202 | HSV-L-40500 |
| new | | 1/2 | 2-1/2 | 5 | 4 | 83203 | HSV-LX-40500 |
| new | 5/8 | 5/8 | 3/4 | 3 | 4 | 83204 | HSV-S-40625 |
| new | | 5/8 | 1-1/4 | 3-1/2 | 4 | 83205 | HSV-SR-40625 |
| new | | 5/8 | 1-5/8 | 3-1/2 | 4 | 83206 | HSV-R-40625 |
| new | | 5/8 | 2 | 4 | 4 | 83207 | HSV-M-40625 |
| new | 3/4 | 3/4 | 7/8 | 3 | 4 | 83208 | HSV-S-40750 |
| new | | 3/4 | 1-1/4 | 4 | 4 | 83209 | HSV-SR-40750 |
| | | 3/4 | 1-5/8 | 4 | 4 | 82274 | HSV-R-40750 |
| | | 3/4 | 2-1/4 | 5 | 4 | 82275 | HSV-M-40750 |
| new | | 3/4 | 2-3/4 | 5 | 4 | 83210 | HSV-ML-40750 |
| new | | 3/4 | 3-1/4 | 6 | 4 | 83211 | HSV-L-40750 |

* .0005 max TIR

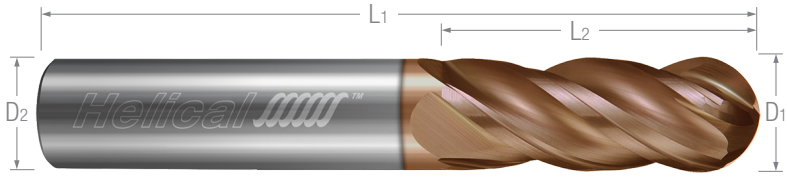
# 4 FLUTE - BALL New!

## HSV-4

### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

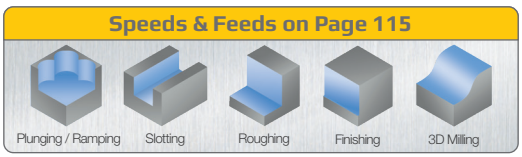
For steel applications, see page 98 for A*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 4 | 83275 | HSV-S-40125-BN | new |
| | 1/8 | 3/8 | 2 | 4 | 83276 | HSV-SR-40125-BN | new |
| | 1/8 | 1/2 | 2-1/2 | 4 | 83277 | HSV-R-40125-BN | new |
| | 1/8 | 5/8 | 2-1/2 | 4 | 83278 | HSV-A-40125-BN | new |
| 3/16 | 3/16 | 5/16 | 2 | 4 | 83279 | HSV-S-40187-BN | new |
| | 3/16 | 5/8 | 2-1/2 | 4 | 83280 | HSV-R-40187-BN | new |
| | 3/16 | 1 | 2-1/2 | 4 | 83281 | HSV-M-40187-BN | new |
| 1/4 | 1/4 | 3/8 | 2 | 4 | 83282 | HSV-S-40250-BN | new |
| | 1/4 | 1/2 | 2-1/2 | 4 | 83283 | HSV-SR-40250-BN | new |
| | 1/4 | 3/4 | 2-1/2 | 4 | 83284 | HSV-R-40250-BN | new |
| | 1/4 | 1 | 3 | 4 | 83285 | HSV-M-40250-BN | new |
| | 1/4 | 1-1/4 | 3 | 4 | 83286 | HSV-L-40250-BN | new |
| 5/16 | 5/16 | 1/2 | 2 | 4 | 83287 | HSV-S-40312-BN | new |
| | 5/16 | 3/4 | 2-1/2 | 4 | 83288 | HSV-R-40312-BN | new |
| | 5/16 | 1 | 2-1/2 | 4 | 83289 | HSV-A-40312-BN | new |
| | 5/16 | 1-1/4 | 3 | 4 | 83290 | HSV-M-40312-BN | new |
| 3/8 | 3/8 | 1/2 | 2 | 4 | 83291 | HSV-S-40375-BN | new |
| | 3/8 | 7/8 | 3 | 4 | 83292 | HSV-SR-40375-BN | new |
| | 3/8 | 1 | 3 | 4 | 83293 | HSV-R-40375-BN | new |
| | 3/8 | 1-1/4 | 3 | 4 | 83294 | HSV-M-40375-BN | new |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 4 | 83295 | HSV-S-40500-BN | new |
| | 1/2 | 1 | 3 | 4 | 83296 | HSV-SR-40500-BN | new |
| | 1/2 | 1-1/4 | 3 | 4 | 83297 | HSV-R-40500-BN | new |
| | 1/2 | 1-5/8 | 4 | 4 | 83298 | HSV-M-40500-BN | new |
| | 1/2 | 2 | 4 | 4 | 83299 | HSV-L-40500-BN | new |
| 3/4 | 3/4 | 7/8 | 3 | 4 | 83300 | HSV-S-40750-BN | new |
| | 3/4 | 1-1/4 | 4 | 4 | 83301 | HSV-SR-40750-BN | new |
| | 3/4 | 1-5/8 | 4 | 4 | 83302 | HSV-R-40750-BN | new |

* .0005 max TIR

Speeds & Feeds on Page 115



# HSV-4 / HSM-4

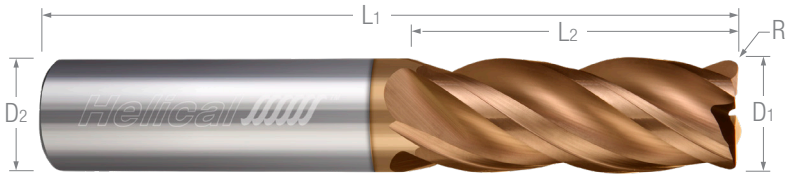
New Items!

## 4 FLUTE - CORNER RADIUS

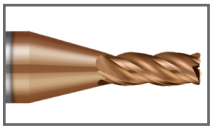
### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered with eccentric relief for maximum edge strength in both roughing and finishing applications
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 100 for A*plus* coating




HSM series feature enlarged shanks for added strength



| | Cutter Diameter* $D_1$ $^{+.0005"}_{-.0005"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.001"}_{-.001"}$ | Length of Cut $L_2$ $^{+.010"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 1/32 | 1/4 | .005 | 3/32 | 2-1/2 | 4 | 84016 | HSM-030-40031-R.005 |
| new | | 1/4 | .005 | 5/32 | 2-1/2 | 4 | 84017 | HSM-050-40031-R.005 |
| new | 3/64 | 1/4 | .010 | 5/32 | 2-1/2 | 4 | 84018 | HSM-033-40047-R.010 |
| new | | 1/4 | .010 | 1/4 | 2-1/2 | 4 | 84019 | HSM-053-40047-R.010 |
| new | 1/16 | 1/4 | .010 | 3/16 | 2-1/2 | 4 | 84020 | HSM-030-40062-R.010 |
| new | | 1/4 | .010 | 5/16 | 2-1/2 | 4 | 84021 | HSM-050-40062-R.010 |
| new | 5/64 | 1/4 | .010 | 1/4 | 2-1/2 | 4 | 84022 | HSM-032-40078-R.010 |
| new | | 1/4 | .010 | 3/8 | 2-1/2 | 4 | 84023 | HSM-048-40078-R.010 |
| new | 3/32 | 1/4 | .010 | 9/32 | 2-1/2 | 4 | 84024 | HSM-030-40093-R.010 |
| new | | 1/4 | .010 | 1/2 | 2-1/2 | 4 | 84025 | HSM-053-40093-R.010 |

| | $D_1$ $^{+.000"}_{-.002"}$ | $D_2$ (h6) | R $^{+.002"}_{-.002"}$ | $L_2$ $^{+.032"}_{-.000"}$ | $L_1$ $^{+.062"}_{-.062"}$ | | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 4 | 83238 | HSV-S-40125-R.010 |
| new | | 1/4 | .010 | 1/4 | 2-1/2 | 4 | 84026 | HSM-020-40125-R.010 |
| new | | 1/4 | .010 | 3/8 | 2-1/2 | 4 | 84027 | HSM-030-40125-R.010 |
| new | | 1/8 | .010 | 1/2 | 2-1/2 | 4 | 83239 | HSV-R-40125-R.010 |
| new | | 1/4 | .010 | 1/2 | 2-1/2 | 4 | 84028 | HSM-040-40125-R.010 |
| new | | 1/8 | .030 | 1/4 | 1-1/2 | 4 | 83240 | HSV-S-40125-R.030 |
| new | | 1/4 | .030 | 1/4 | 2-1/2 | 4 | 84033 | HSM-020-40125-R.030 |
| new | | 1/4 | .030 | 3/8 | 2-1/2 | 4 | 84034 | HSM-030-40125-R.030 |
| new | | 1/8 | .030 | 1/2 | 2-1/2 | 4 | 83241 | HSV-R-40125-R.030 |
| new | | 1/4 | .030 | 1/2 | 2-1/2 | 4 | 84035 | HSM-040-40125-R.030 |
| new | 3/16 | 3/16 | .010 | 5/16 | 2 | 4 | 83242 | HSV-S-40187-R.010 |
| new | | 1/4 | .010 | 5/16 | 2-1/2 | 4 | 84029 | HSM-016-40187-R.010 |
| new | | 1/4 | .010 | 7/16 | 2-1/2 | 4 | 84030 | HSM-023-40187-R.010 |
| new | | 1/4 | .010 | 9/16 | 2-1/2 | 4 | 84031 | HSM-029-40187-R.010 |
| new | | 3/16 | .010 | 5/8 | 2-1/2 | 4 | 83243 | HSV-R-40187-R.010 |
| new | | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 84032 | HSM-040-40187-R.010 |
| new | | 3/16 | .030 | 5/16 | 2 | 4 | 83244 | HSV-S-40187-R.030 |
| new | | 1/4 | .030 | 5/16 | 2-1/2 | 4 | 84036 | HSM-016-40187-R.030 |
| new | | 1/4 | .030 | 7/16 | 2-1/2 | 4 | 84037 | HSM-023-40187-R.030 |
| new | | 1/4 | .030 | 9/16 | 2-1/2 | 4 | 84038 | HSM-029-40187-R.030 |
| new | | 3/16 | .030 | 5/8 | 2-1/2 | 4 | 83245 | HSV-R-40187-R.030 |
| new | | 1/4 | .030 | 3/4 | 2-1/2 | 4 | 84039 | HSM-040-40187-R.030 |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 115

# 4 FLUTE - CORNER RADIUS New Items!

## HSV-4 / HSM-4

### Variable Pitch (cont.)

continued from previous page

| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 3/8 | 2 | 4 | 83246 | HSV-S-40250-R.010 | new |
| | 1/4 | .010 | 1/2 | 2-1/2 | 4 | 83247 | HSV-SR-40250-R.010 | new |
| | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 83248 | HSV-R-40250-R.010 | new |
| | 1/4 | .020 | 3/8 | 2 | 4 | 82303 | HSV-S-40250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 4 | 82304 | HSV-SR-40250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 4 | 82305 | HSV-R-40250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 4 | 82306 | HSV-M-40250-R.020 | |
| | 1/4 | .030 | 3/8 | 2 | 4 | 83249 | HSV-S-40250-R.030 | new |
| | 1/4 | .030 | 1/2 | 2-1/2 | 4 | 83250 | HSV-SR-40250-R.030 | new |
| | 1/4 | .030 | 3/4 | 2-1/2 | 4 | 83251 | HSV-R-40250-R.030 | new |
| | 1/4 | .030 | 1 | 3 | 4 | 83252 | HSV-M-40250-R.030 | new |
| | 1/4 | .060 | 3/8 | 2 | 4 | 83253 | HSV-S-40250-R.060 | new |
| | 1/4 | .060 | 1/2 | 2-1/2 | 4 | 83254 | HSV-SR-40250-R.060 | new |
| | 1/4 | .060 | 3/4 | 2-1/2 | 4 | 83255 | HSV-R-40250-R.060 | new |
| | 1/4 | .060 | 1 | 3 | 4 | 83256 | HSV-M-40250-R.060 | new |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 4 | 82307 | HSV-S-40375-R.020 | |
| | 3/8 | .020 | 7/8 | 3 | 4 | 82308 | HSV-SR-40375-R.020 | |
| | 3/8 | .020 | 1 | 3 | 4 | 82309 | HSV-R-40375-R.020 | |
| | 3/8 | .020 | 1-1/4 | 3 | 4 | 82310 | HSV-M-40375-R.020 | |
| | 3/8 | .030 | 1/2 | 2 | 4 | 82311 | HSV-S-40375-R.030 | |
| | 3/8 | .030 | 7/8 | 3 | 4 | 82312 | HSV-SR-40375-R.030 | |
| | 3/8 | .030 | 1 | 3 | 4 | 82313 | HSV-R-40375-R.030 | |
| | 3/8 | .030 | 1-1/4 | 3 | 4 | 82314 | HSV-M-40375-R.030 | |
| | 3/8 | .060 | 1/2 | 2 | 4 | 83257 | HSV-S-40375-R.060 | new |
| | 3/8 | .060 | 7/8 | 3 | 4 | 83258 | HSV-SR-40375-R.060 | new |
| | 3/8 | .060 | 1 | 3 | 4 | 83259 | HSV-R-40375-R.060 | new |
| 1/2 | 1/2 | .015 | 5/8 | 2-1/2 | 4 | 83260 | HSV-S-40500-R.015 | new |
| | 1/2 | .015 | 1 | 3 | 4 | 83261 | HSV-SR-40500-R.015 | new |
| | 1/2 | .015 | 1-1/4 | 3 | 4 | 83262 | HSV-R-40500-R.015 | new |
| | 1/2 | .020 | 5/8 | 2-1/2 | 4 | 82315 | HSV-S-40500-R.020 | |
| | 1/2 | .020 | 1 | 3 | 4 | 82316 | HSV-SR-40500-R.020 | |
| | 1/2 | .020 | 1-1/4 | 3 | 4 | 82317 | HSV-R-40500-R.020 | |
| | 1/2 | .020 | 1-5/8 | 4 | 4 | 82318 | HSV-M-40500-R.020 | |
| | 1/2 | .030 | 5/8 | 2-1/2 | 4 | 82319 | HSV-S-40500-R.030 | |
| | 1/2 | .030 | 1 | 3 | 4 | 82320 | HSV-SR-40500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 4 | 82321 | HSV-R-40500-R.030 | |
| | 1/2 | .030 | 1-5/8 | 4 | 4 | 82322 | HSV-M-40500-R.030 | |
| | 1/2 | .060 | 5/8 | 2-1/2 | 4 | 82323 | HSV-S-40500-R.060 | |
| | 1/2 | .060 | 1 | 3 | 4 | 82324 | HSV-SR-40500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 3 | 4 | 82325 | HSV-R-40500-R.060 | |
| | 1/2 | .060 | 1-5/8 | 4 | 4 | 82326 | HSV-M-40500-R.060 | |
| | 1/2 | .125 | 5/8 | 2-1/2 | 4 | 83263 | HSV-S-40500-R.125 | new |
| | 1/2 | .125 | 1 | 3 | 4 | 83264 | HSV-SR-40500-R.125 | new |
| | 1/2 | .125 | 1-1/4 | 3 | 4 | 83265 | HSV-R-40500-R.125 | new |
| | 1/2 | .125 | 1-5/8 | 4 | 4 | 83266 | HSV-M-40500-R.125 | new |
| 5/8 | 5/8 | .030 | 1-1/4 | 3-1/2 | 4 | 83267 | HSV-SR-40625-R.030 | new |
| | 5/8 | .030 | 1-5/8 | 3-1/2 | 4 | 83268 | HSV-R-40625-R.030 | new |
| | 5/8 | .030 | 2 | 4 | 4 | 83269 | HSV-M-40625-R.030 | new |
| 3/4 | 3/4 | .030 | 7/8 | 3 | 4 | 83270 | HSV-S-40750-R.030 | new |
| | 3/4 | .030 | 1-1/4 | 4 | 4 | 83271 | HSV-SR-40750-R.030 | new |
| | 3/4 | .030 | 1-5/8 | 4 | 4 | 82327 | HSV-R-40750-R.030 | |
| | 3/4 | .030 | 2-1/4 | 5 | 4 | 82328 | HSV-M-40750-R.030 | |
| | 3/4 | .030 | 3-1/4 | 6 | 4 | 83272 | HSV-L-40750-R.030 | new |

* .0005 max TIR

# HEV-5 / HSM-5

HEM

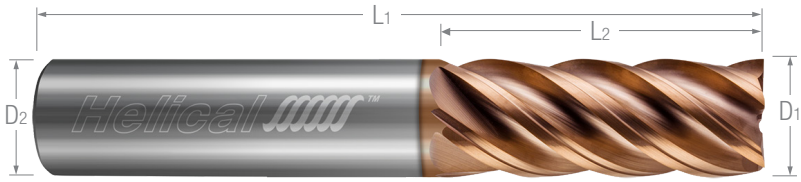
New Items!

## 5 FLUTE - SQUARE

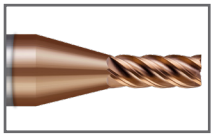
### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 116 for A*plus* coating




HSM series feature enlarged shanks for added strength



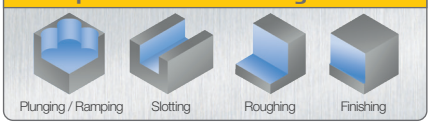
| | Cutter Diameter* $D_1$ $^{+.0005"}_{-.0005"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.010"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| new | 1/32 | 1/4 | 3/32 | 2-1/2 | 5 | 84081 | HSM-030-50031 |
| new | | 1/4 | 5/32 | 2-1/2 | 5 | 84082 | HSM-050-50031 |
| new | 3/64 | 1/4 | 5/32 | 2-1/2 | 5 | 84083 | HSM-033-50047 |
| new | | 1/4 | 1/4 | 2-1/2 | 5 | 84084 | HSM-053-50047 |
| new | 1/16 | 1/4 | 3/16 | 2-1/2 | 5 | 84085 | HSM-030-50062 |
| new | | 1/4 | 5/16 | 2-1/2 | 5 | 84086 | HSM-050-50062 |
| new | 5/64 | 1/4 | 1/4 | 2-1/2 | 5 | 84087 | HSM-032-50078 |
| new | | 1/4 | 3/8 | 2-1/2 | 5 | 84088 | HSM-048-50078 |
| new | 3/32 | 1/4 | 9/32 | 2-1/2 | 5 | 84089 | HSM-030-50093 |
| new | | 1/4 | 1/2 | 2-1/2 | 5 | 84090 | HSM-053-50093 |

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | 1/4 | 1-1/2 | 5 | 59833 | HEV-S-50125 |
| new | | 1/4 | 1/4 | 2-1/2 | 5 | 84091 | HSM-020-50125 |
| | | 1/8 | 3/8 | 2 | 5 | 82525 | HEV-SR-50125 |
| new | | 1/4 | 3/8 | 2-1/2 | 5 | 84092 | HSM-030-50125 |
| | | 1/8 | 1/2 | 2-1/2 | 5 | 81840 | HEV-R-50125 |
| new | | 1/4 | 1/2 | 2-1/2 | 5 | 84093 | HSM-040-50125 |
| | | 1/8 | 5/8 | 2-1/2 | 5 | 82526 | HEV-A-50125 |
| new | | 1/8 | 3/4 | 2-1/2 | 5 | 82949 | HEV-M-50125 |
| new | 5/32 | 3/16 | 3/16 | 2 | 5 | 82950 | HEV-S-50156 |
| new | | 3/16 | 7/16 | 2-1/2 | 5 | 82951 | HEV-R-50156 |
| new | | 3/16 | 9/16 | 2-1/2 | 5 | 82952 | HEV-M-50156 |
| | 3/16 | 3/16 | 5/16 | 2 | 5 | 59834 | HEV-S-50187 |
| new | | 1/4 | 5/16 | 2-1/2 | 5 | 84094 | HSM-016-50187 |
| | | 3/16 | 7/16 | 2 | 5 | 82527 | HEV-SR-50187 |
| new | | 1/4 | 7/16 | 2-1/2 | 5 | 84095 | HSM-023-50187 |
| | | 3/16 | 9/16 | 2-1/2 | 5 | 59835 | HEV-R-50187 |
| new | | 1/4 | 9/16 | 2-1/2 | 5 | 84096 | HSM-029-50187 |
| | | 3/16 | 3/4 | 2-1/2 | 5 | 81841 | HEV-M-50187 |
| new | | 1/4 | 3/4 | 2-1/2 | 5 | 84097 | HSM-040-50187 |
| new | | 3/16 | 1 | 2-1/2 | 5 | 82953 | HEV-ML-50187 |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 132



# 5 FLUTE - SQUARE New Items!

## Variable Pitch (cont.)

HEV-5 / HSM-5

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Tplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 7/32 | 1/4 | 5/16 | 2 | 5 | 82954 | HEV-S-50218 | new |
| | 1/4 | 7/16 | 2-1/2 | 5 | 82955 | HEV-R-50218 | new |
| 1/4 | 1/4 | 3/8 | 2 | 5 | 59836 | HEV-S-50250 | |
| | 1/4 | 1/2 | 2-1/2 | 5 | 59837 | HEV-SR-50250 | |
| | 1/4 | 3/4 | 2-1/2 | 5 | 59838 | HEV-R-50250 | |
| | 1/4 | 1 | 3 | 5 | 81842 | HEV-M-50250 | |
| | 1/4 | 1-1/4 | 3 | 5 | 82528 | HEV-L-50250 | |
| | 1/4 | 1-1/2 | 3 | 5 | 82956 | HEV-LX-50250 | new |
| 5/16 | 5/16 | 7/16 | 2 | 5 | 59839 | HEV-S-50312 | |
| | 5/16 | 13/16 | 2-1/2 | 5 | 59840 | HEV-R-50312 | |
| | 5/16 | 1 | 3 | 5 | 59841 | HEV-M-50312 | |
| 3/8 | 3/8 | 1/2 | 2 | 5 | 59842 | HEV-S-50375 | |
| | 3/8 | 3/4 | 2-1/2 | 5 | 82529 | HEV-SR-50375 | |
| | 3/8 | 1 | 3 | 5 | 59843 | HEV-R-50375 | |
| | 3/8 | 1-1/4 | 3 | 5 | 59844 | HEV-M-50375 | |
| | 3/8 | 1-1/2 | 3-1/2 | 5 | 81843 | HEV-L-50375 | |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 5 | 59845 | HEV-S-50500 | |
| | 1/2 | 1 | 3 | 5 | 59846 | HEV-SR-50500 | |
| | 1/2 | 1-1/4 | 3 | 5 | 59847 | HEV-R-50500 | |
| | 1/2 | 1-5/8 | 4 | 5 | 59848 | HEV-M-50500 | |
| | 1/2 | 2 | 4 | 5 | 81844 | HEV-L-50500 | |
| 5/8 | 5/8 | 3/4 | 3 | 5 | 59849 | HEV-S-50625 | |
| | 5/8 | 1-1/4 | 3-1/2 | 5 | 59850 | HEV-SR-50625 | |
| | 5/8 | 1-5/8 | 3-1/2 | 5 | 59851 | HEV-R-50625 | |
| | 5/8 | 2-1/8 | 4 | 5 | 81845 | HEV-M-50625 | |
| | 5/8 | 2-1/2 | 5 | 5 | 81846 | HEV-L-50625 | |
| 3/4 | 3/4 | 1 | 3 | 5 | 59852 | HEV-S-50750 | |
| | 3/4 | 1-5/8 | 4 | 5 | 59853 | HEV-R-50750 | |
| | 3/4 | 2-1/4 | 5 | 5 | 59854 | HEV-M-50750 | |
| | 3/4 | 2-3/4 | 5 | 5 | 81847 | HEV-L-50750 | |
| | 3/4 | 3-1/4 | 6 | 5 | 82957 | HEV-LX-50750 | new |
| 1 | 1 | 2 | 4-1/2 | 5 | 81848 | HEV-R-51000 | |
| | 1 | 2-5/8 | 5 | 5 | 81849 | HEV-M-51000 | |

* .0005 max TIR

# HEV-5 / HSM-5

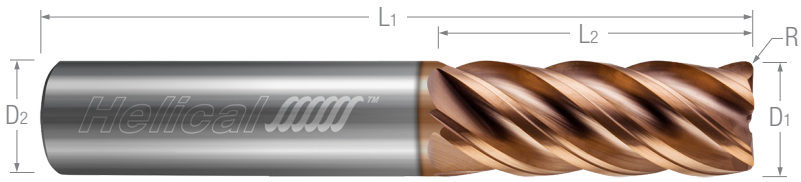
New Items!

## 5 FLUTE - CORNER RADIUS

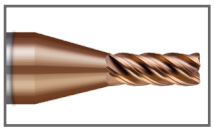
### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 119 for A*plus* coating




HSM series feature enlarged shanks for added strength



| | Cutter Dia.* $D_1$ +.0005" −.0005" | Shank Dia. $D_2$ (h6) | Corner Radius R +.001" −.001" | LOC $L_2$ +.010" −.000" | OAL $L_1$ +.062" −.062" | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 1/32 | 1/4 | **.005** | 3/32 | 2-1/2 | 5 | 84057 | HSM-030-50031-R.005 |
| new | | 1/4 | **.005** | 5/32 | 2-1/2 | 5 | 84058 | HSM-050-50031-R.005 |
| new | 3/64 | 1/4 | **.010** | 5/32 | 2-1/2 | 5 | 84059 | HSM-033-50047-R.010 |
| new | | 1/4 | **.010** | 1/4 | 2-1/2 | 5 | 84060 | HSM-053-50047-R.010 |
| new | 1/16 | 1/4 | **.010** | 3/16 | 2-1/2 | 5 | 84061 | HSM-030-50062-R.010 |
| new | | 1/4 | **.010** | 5/16 | 2-1/2 | 5 | 84062 | HSM-050-50062-R.010 |
| new | 5/64 | 1/4 | **.010** | 1/4 | 2-1/2 | 5 | 84063 | HSM-032-50078-R.010 |
| new | | 1/4 | **.010** | 3/8 | 2-1/2 | 5 | 84064 | HSM-048-50078-R.010 |
| new | 3/32 | 1/4 | **.010** | 9/32 | 2-1/2 | 5 | 84065 | HSM-030-50093-R.010 |
| new | | 1/4 | **.010** | 1/2 | 2-1/2 | 5 | 84066 | HSM-053-50093-R.010 |

| | $D_1$ +.000" −.002" | $D_2$ (h6) | R +.002" −.002" | $L_2$ +.032" −.000" | $L_1$ +.062" −.062" | | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 5 | 59855 | HEV-S-50125-R.010 |
| new | | 1/4 | **.010** | 1/4 | 2-1/2 | 5 | 84067 | HSM-020-50125-R.010 |
| new | | 1/8 | **.010** | 3/8 | 2 | 5 | 82970 | HEV-SR-50125-R.010 |
| new | | 1/4 | **.010** | 3/8 | 2-1/2 | 5 | 84068 | HSM-030-50125-R.010 |
| | | 1/8 | **.010** | 1/2 | 2-1/2 | 5 | 81850 | HEV-R-50125-R.010 |
| new | | 1/4 | **.010** | 1/2 | 2-1/2 | 5 | 84069 | HSM-040-50125-R.010 |
| new | | 1/8 | **.010** | 3/4 | 2-1/2 | 5 | 82971 | HEV-M-50125-R.010 |
| new | | 1/8 | **.015** | 1/4 | 1-1/2 | 5 | 82972 | HEV-S-50125-R.015 |
| new | | 1/8 | **.015** | 1/2 | 2-1/2 | 5 | 82973 | HEV-R-50125-R.015 |
| | | 1/8 | **.030** | 1/4 | 1-1/2 | 5 | 81851 | HEV-S-50125-R.030 |
| new | | 1/4 | **.030** | 1/4 | 2-1/2 | 5 | 84074 | HSM-020-50125-R.030 |
| new | | 1/4 | **.030** | 3/8 | 2-1/2 | 5 | 84075 | HSM-030-50125-R.030 |
| | | 1/8 | **.030** | 1/2 | 2-1/2 | 5 | 81852 | HEV-R-50125-R.030 |
| new | | 1/4 | **.030** | 1/2 | 2-1/2 | 5 | 84076 | HSM-040-50125-R.030 |
| new | | 1/8 | **.030** | 3/4 | 2-1/2 | 5 | 82974 | HEV-M-50125-R.030 |

*.0005 max TIR

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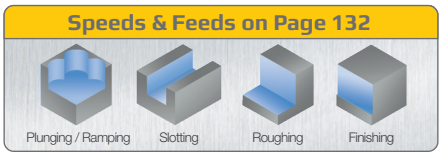

# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-5 / HSM-5

continued from previous page

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Tplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 3/16 | 3/16 | .010 | 5/16 | 2 | 5 | 59856 | HEV-S-50187-R.010 | |
| | 1/4 | .010 | 5/16 | 2-1/2 | 5 | 84070 | HSM-016-50187-R.010 | new |
| | 3/16 | .010 | 7/16 | 2 | 5 | 82975 | HEV-SR-50187-R.010 | new |
| | 1/4 | .010 | 7/16 | 2-1/2 | 5 | 84071 | HSM-023-50187-R.010 | new |
| | 3/16 | .010 | 9/16 | 2-1/2 | 5 | 59857 | HEV-R-50187-R.010 | |
| | 1/4 | .010 | 9/16 | 2-1/2 | 5 | 84072 | HSM-029-50187-R.010 | new |
| | 3/16 | .010 | 3/4 | 2-1/2 | 5 | 81853 | HEV-M-50187-R.010 | |
| | 1/4 | .010 | 3/4 | 2-1/2 | 5 | 84073 | HSM-040-50187-R.010 | new |
| | 3/16 | .015 | 5/16 | 2 | 5 | 82976 | HEV-S-50187-R.015 | new |
| | 3/16 | .015 | 9/16 | 2-1/2 | 5 | 82977 | HEV-R-50187-R.015 | new |
| | 3/16 | .030 | 5/16 | 2 | 5 | 81854 | HEV-S-50187-R.030 | |
| | 1/4 | .030 | 5/16 | 2-1/2 | 5 | 84077 | HSM-016-50187-R.030 | new |
| | 1/4 | .030 | 7/16 | 2-1/2 | 5 | 84078 | HSM-023-50187-R.030 | new |
| | 3/16 | .030 | 9/16 | 2-1/2 | 5 | 81855 | HEV-R-50187-R.030 | |
| | 1/4 | .030 | 9/16 | 2-1/2 | 5 | 84079 | HSM-029-50187-R.030 | new |
| | 3/16 | .030 | 3/4 | 2-1/2 | 5 | 81856 | HEV-M-50187-R.030 | |
| | 1/4 | .030 | 3/4 | 2-1/2 | 5 | 84080 | HSM-040-50187-R.030 | new |
| 1/4 | 1/4 | .010 | 3/8 | 2 | 5 | 82978 | HEV-S-50250-R.010 | new |
| | 1/4 | .010 | 1/2 | 2-1/2 | 5 | 82979 | HEV-SR-50250-R.010 | new |
| | 1/4 | .010 | 3/4 | 2-1/2 | 5 | 82980 | HEV-R-50250-R.010 | new |
| | 1/4 | .015 | 3/8 | 2 | 5 | 82981 | HEV-S-50250-R.015 | new |
| | 1/4 | .015 | 1/2 | 2-1/2 | 5 | 82982 | HEV-SR-50250-R.015 | new |
| | 1/4 | .015 | 3/4 | 2-1/2 | 5 | 82983 | HEV-R-50250-R.015 | new |
| | 1/4 | .020 | 3/8 | 2 | 5 | 59858 | HEV-S-50250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 5 | 59859 | HEV-SR-50250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 5 | 59860 | HEV-R-50250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 5 | 81857 | HEV-M-50250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 5 | 82984 | HEV-L-50250-R.020 | new |
| | 1/4 | .030 | 3/8 | 2 | 5 | 59861 | HEV-S-50250-R.030 | |
| | 1/4 | .030 | 1/2 | 2-1/2 | 5 | 59862 | HEV-SR-50250-R.030 | |
| | 1/4 | .030 | 3/4 | 2-1/2 | 5 | 59863 | HEV-R-50250-R.030 | |
| | 1/4 | .030 | 1 | 3 | 5 | 81858 | HEV-M-50250-R.030 | |
| | 1/4 | .030 | 1-1/4 | 3 | 5 | 82985 | HEV-L-50250-R.030 | new |
| | 1/4 | .060 | 3/8 | 2 | 5 | 81859 | HEV-S-50250-R.060 | |
| | 1/4 | .060 | 1/2 | 2-1/2 | 5 | 81860 | HEV-SR-50250-R.060 | |
| | 1/4 | .060 | 3/4 | 2-1/2 | 5 | 81861 | HEV-R-50250-R.060 | |
| | 1/4 | .060 | 1 | 3 | 5 | 81862 | HEV-M-50250-R.060 | |
| | 1/4 | .060 | 1-1/4 | 3 | 5 | 82986 | HEV-L-50250-R.060 | new |
| 5/16 | 5/16 | .020 | 7/16 | 2 | 5 | 59864 | HEV-S-50312-R.020 | |
| | 5/16 | .020 | 13/16 | 2-1/2 | 5 | 59865 | HEV-R-50312-R.020 | |
| | 5/16 | .020 | 1 | 3 | 5 | 81863 | HEV-M-50312-R.020 | |
| | 5/16 | .030 | 7/16 | 2 | 5 | 82987 | HEV-S-50312-R.030 | new |
| | 5/16 | .030 | 13/16 | 2-1/2 | 5 | 82988 | HEV-R-50312-R.030 | new |
| | 5/16 | .030 | 1 | 3 | 5 | 82989 | HEV-M-50312-R.030 | new |

*.0005 max TIR

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# HEV-5 / HSM-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Tplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 3/8 | 3/8 | .010 | 1/2 | 2 | 5 | 82990 | HEV-S-50375-R.010 |
| new | | 3/8 | .010 | 1 | 3 | 5 | 82991 | HEV-R-50375-R.010 |
| new | | 3/8 | .015 | 1 | 3 | 5 | 82992 | HEV-R-50375-R.015 |
| | | 3/8 | .020 | 1/2 | 2 | 5 | 59866 | HEV-S-50375-R.020 |
| | | 3/8 | .020 | 1 | 3 | 5 | 59867 | HEV-R-50375-R.020 |
| | | 3/8 | .020 | 1-1/4 | 3 | 5 | 59868 | HEV-M-50375-R.020 |
| | | 3/8 | .020 | 1-1/2 | 3-1/2 | 5 | 81864 | HEV-L-50375-R.020 |
| | | 3/8 | .030 | 1/2 | 2 | 5 | 59869 | HEV-S-50375-R.030 |
| new | | 3/8 | .030 | 3/4 | 2-1/2 | 5 | 82993 | HEV-SR-50375-R.030 |
| | 3/8 | 3/8 | .030 | 1 | 3 | 5 | 59870 | HEV-R-50375-R.030 |
| | | 3/8 | .030 | 1-1/4 | 3 | 5 | 59871 | HEV-M-50375-R.030 |
| | | 3/8 | .030 | 1-1/2 | 3-1/2 | 5 | 81865 | HEV-L-50375-R.030 |
| | | 3/8 | .060 | 1/2 | 2 | 5 | 59872 | HEV-S-50375-R.060 |
| new | | 3/8 | .060 | 3/4 | 2-1/2 | 5 | 82994 | HEV-SR-50375-R.060 |
| | | 3/8 | .060 | 1 | 3 | 5 | 59873 | HEV-R-50375-R.060 |
| | | 3/8 | .060 | 1-1/4 | 3 | 5 | 59874 | HEV-M-50375-R.060 |
| | | 3/8 | .060 | 1-1/2 | 3-1/2 | 5 | 81866 | HEV-L-50375-R.060 |
| new | | 3/8 | .090 | 1/2 | 2 | 5 | 82995 | HEV-S-50375-R.090 |
| new | | 3/8 | .090 | 1 | 3 | 5 | 82996 | HEV-R-50375-R.090 |
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 5 | 82997 | HEV-S-50500-R.010 |
| new | | 1/2 | .010 | 1 | 3 | 5 | 82998 | HEV-SR-50500-R.010 |
| new | | 1/2 | .010 | 1-1/4 | 3 | 5 | 82999 | HEV-R-50500-R.010 |
| new | | 1/2 | .015 | 5/8 | 2-1/2 | 5 | 83000 | HEV-S-50500-R.015 |
| new | | 1/2 | .015 | 1 | 3 | 5 | 83001 | HEV-SR-50500-R.015 |
| new | | 1/2 | .015 | 1-1/4 | 3 | 5 | 83002 | HEV-R-50500-R.015 |
| new | | 1/2 | .020 | 5/8 | 2-1/2 | 5 | 83003 | HEV-S-50500-R.020 |
| new | | 1/2 | .020 | 1 | 3 | 5 | 83004 | HEV-SR-50500-R.020 |
| new | | 1/2 | .020 | 1-1/4 | 3 | 5 | 83005 | HEV-R-50500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 5 | 59875 | HEV-S-50500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 5 | 59876 | HEV-SR-50500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 5 | 59877 | HEV-R-50500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 5 | 59878 | HEV-M-50500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 5 | 81867 | HEV-L-50500-R.030 |
| new | | 1/2 | .030 | 2-1/2 | 5 | 5 | 83006 | HEV-LX-50500-R.030 |
| | 1/2 | 1/2 | .060 | 5/8 | 2-1/2 | 5 | 59879 | HEV-S-50500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 5 | 59880 | HEV-SR-50500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 5 | 59881 | HEV-R-50500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 5 | 59882 | HEV-M-50500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 5 | 81868 | HEV-L-50500-R.060 |
| | | 1/2 | .090 | 5/8 | 2-1/2 | 5 | 81869 | HEV-S-50500-R.090 |
| | | 1/2 | .090 | 1 | 3 | 5 | 81870 | HEV-SR-50500-R.090 |
| | | 1/2 | .090 | 1-1/4 | 3 | 5 | 81871 | HEV-R-50500-R.090 |
| | | 1/2 | .090 | 1-5/8 | 4 | 5 | 81872 | HEV-M-50500-R.090 |
| | | 1/2 | .090 | 2 | 4 | 5 | 81873 | HEV-L-50500-R.090 |
| | | 1/2 | .120 | 5/8 | 2-1/2 | 5 | 59883 | HEV-S-50500-R.120 |
| | | 1/2 | .120 | 1 | 3 | 5 | 59884 | HEV-SR-50500-R.120 |
| | | 1/2 | .120 | 1-1/4 | 3 | 5 | 59885 | HEV-R-50500-R.120 |
| | | 1/2 | .120 | 1-5/8 | 4 | 5 | 59886 | HEV-M-50500-R.120 |
| | | 1/2 | .120 | 2 | 4 | 5 | 81874 | HEV-L-50500-R.120 |

*.0005 max TIR

continued on next page

# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-5

continued from previous page

| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Tplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | .030 | 3/4 | 3 | 5 | 59887 | HEV-S-50625-R.030 | |
| | 5/8 | .030 | 1-1/4 | 3-1/2 | 5 | 59888 | HEV-SR-50625-R.030 | |
| | 5/8 | .030 | 1-5/8 | 3-1/2 | 5 | 59889 | HEV-R-50625-R.030 | |
| | 5/8 | .030 | 2-1/8 | 4 | 5 | 81875 | HEV-M-50625-R.030 | |
| | 5/8 | .030 | 2-1/2 | 5 | 5 | 81876 | HEV-L-50625-R.030 | |
| | 5/8 | .060 | 1-1/4 | 3-1/2 | 5 | 81877 | HEV-SR-50625-R.060 | |
| | 5/8 | .060 | 1-5/8 | 3-1/2 | 5 | 81878 | HEV-R-50625-R.060 | |
| | 5/8 | .060 | 2-1/8 | 4 | 5 | 81879 | HEV-M-50625-R.060 | |
| | 5/8 | .120 | 1-5/8 | 3-1/2 | 5 | 83007 | HEV-R-50625-R.120 | new |
| | 5/8 | .120 | 2-1/8 | 4 | 5 | 83008 | HEV-M-50625-R.120 | new |
| 3/4 | 3/4 | .030 | 1 | 3 | 5 | 59890 | HEV-S-50750-R.030 | |
| | 3/4 | .030 | 1-1/4 | 4 | 5 | 83009 | HEV-SR-50750-R.030 | new |
| | 3/4 | .030 | 1-5/8 | 4 | 5 | 59891 | HEV-R-50750-R.030 | |
| | 3/4 | .030 | 2-1/4 | 5 | 5 | 59892 | HEV-M-50750-R.030 | |
| | 3/4 | .030 | 2-3/4 | 5 | 5 | 81880 | HEV-L-50750-R.030 | |
| | 3/4 | .030 | 3-1/4 | 6 | 5 | 83010 | HEV-LX-50750-R.030 | new |
| | 3/4 | .060 | 1 | 3 | 5 | 59893 | HEV-S-50750-R.060 | |
| | 3/4 | .060 | 1-1/4 | 4 | 5 | 83011 | HEV-SR-50750-R.060 | new |
| | 3/4 | .060 | 1-5/8 | 4 | 5 | 59894 | HEV-R-50750-R.060 | |
| | 3/4 | .060 | 2-1/4 | 5 | 5 | 59895 | HEV-M-50750-R.060 | |
| | 3/4 | .060 | 2-3/4 | 5 | 5 | 83012 | HEV-L-50750-R.060 | new |
| | 3/4 | .060 | 3-1/4 | 6 | 5 | 83013 | HEV-LX-50750-R.060 | new |
| | 3/4 | .090 | 1-5/8 | 4 | 5 | 81881 | HEV-R-50750-R.090 | |
| | 3/4 | .120 | 1 | 3 | 5 | 59896 | HEV-S-50750-R.120 | |
| | 3/4 | .120 | 1-5/8 | 4 | 5 | 59897 | HEV-R-50750-R.120 | |
| | 3/4 | .120 | 2-1/4 | 5 | 5 | 59898 | HEV-M-50750-R.120 | |
| | 3/4 | .190 | 1-5/8 | 4 | 5 | 81882 | HEV-R-50750-R.190 | |
| | 3/4 | .250 | 1-5/8 | 4 | 5 | 81883 | HEV-R-50750-R.250 | |
| 1 | 1 | .030 | 1-1/4 | 4 | 5 | 59899 | HEV-S-51000-R.030 | |
| | 1 | .030 | 2 | 4-1/2 | 5 | 59900 | HEV-R-51000-R.030 | |
| | 1 | .030 | 2-5/8 | 5 | 5 | 59901 | HEV-M-51000-R.030 | |
| | 1 | .030 | 3-1/4 | 6 | 5 | 81884 | HEV-L-51000-R.030 | |
| | 1 | .060 | 1-1/4 | 4 | 5 | 81885 | HEV-S-51000-R.060 | |
| | 1 | .060 | 2 | 4-1/2 | 5 | 81886 | HEV-R-51000-R.060 | |
| | 1 | .060 | 2-5/8 | 5 | 5 | 81887 | HEV-M-51000-R.060 | |
| | 1 | .120 | 1-1/4 | 4 | 5 | 81888 | HEV-S-51000-R.120 | |
| | 1 | .120 | 2 | 4-1/2 | 5 | 81889 | HEV-R-51000-R.120 | |
| | 1 | .120 | 2-5/8 | 5 | 5 | 81890 | HEV-M-51000-R.120 | |
| | 1 | .250 | 1-1/4 | 4 | 5 | 81891 | HEV-S-51000-R.250 | |
| | 1 | .250 | 2 | 4-1/2 | 5 | 81892 | HEV-R-51000-R.250 | |
| | 1 | .250 | 2-5/8 | 5 | 5 | 81893 | HEV-M-51000-R.250 | |

*.0005 max TIR

# HEV-6

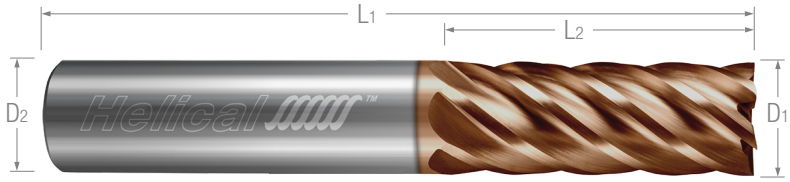
New Items!

## 6 FLUTE - SQUARE

### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 136 for A*plus* coating




| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | 3/8 | 2 | 6 | 59902 | HEV-S-60250 |
| | | 1/4 | 1/2 | 2-1/2 | 6 | 59903 | HEV-SR-60250 |
| | | 1/4 | 3/4 | 2-1/2 | 6 | 59904 | HEV-R-60250 |
| | | 1/4 | 1 | 3 | 6 | 81894 | HEV-M-60250 |
| new | | 1/4 | 1-1/4 | 3 | 6 | 83303 | HEV-L-60250 |
| new | | 1/4 | 1-1/2 | 3 | 6 | 83304 | HEV-LX-60250 |
| new | 5/16 | 5/16 | 7/16 | 2 | 6 | 83305 | HEV-S-60312 |
| new | | 5/16 | 3/4 | 2-1/2 | 6 | 83306 | HEV-R-60312 |
| new | | 5/16 | 1 | 3 | 6 | 83307 | HEV-M-60312 |
| | 3/8 | 3/8 | 1/2 | 2 | 6 | 59905 | HEV-S-60375 |
| new | | 3/8 | 3/4 | 2-1/2 | 6 | 83308 | HEV-SR-60375 |
| | | 3/8 | 1 | 3 | 6 | 59906 | HEV-R-60375 |
| | | 3/8 | 1-1/4 | 3 | 6 | 59907 | HEV-M-60375 |
| | | 3/8 | 1-1/2 | 3-1/2 | 6 | 81895 | HEV-L-60375 |
| new | | 3/8 | 2 | 4 | 6 | 83309 | HEV-LX-60375 |
| | 1/2 | 1/2 | 5/8 | 2-1/2 | 6 | 59908 | HEV-S-60500 |
| | | 1/2 | 1 | 3 | 6 | 59909 | HEV-SR-60500 |
| | | 1/2 | 1-1/4 | 3 | 6 | 59910 | HEV-R-60500 |
| | | 1/2 | 1-5/8 | 4 | 6 | 59911 | HEV-M-60500 |
| | | 1/2 | 2 | 4 | 6 | 81896 | HEV-L-60500 |
| new | | 1/2 | 2-1/2 | 5 | 6 | 83310 | HEV-LX-60500 |
| new | 5/8 | 5/8 | 3/4 | 3 | 6 | 83311 | HEV-S-60625 |
| new | | 5/8 | 1-1/4 | 3-1/2 | 6 | 83312 | HEV-SR-60625 |
| new | | 5/8 | 1-5/8 | 3-1/2 | 6 | 83313 | HEV-R-60625 |
| new | | 5/8 | 2 | 4 | 6 | 83314 | HEV-M-60625 |
| new | | 5/8 | 2-1/2 | 5 | 6 | 83315 | HEV-L-60625 |
| new | 3/4 | 3/4 | 1 | 3 | 6 | 83316 | HEV-S-60750 |
| | | 3/4 | 1-5/8 | 4 | 6 | 81897 | HEV-R-60750 |
| | | 3/4 | 2-1/4 | 5 | 6 | 81898 | HEV-M-60750 |
| | | 3/4 | 2-3/4 | 5 | 6 | 81899 | HEV-L-60750 |
| new | | 3/4 | 3-1/4 | 6 | 6 | 83317 | HEV-LX-60750 |

* .0005 max TIR

Speeds & Feeds on Page 147

# 6 FLUTE - BALL New Items!

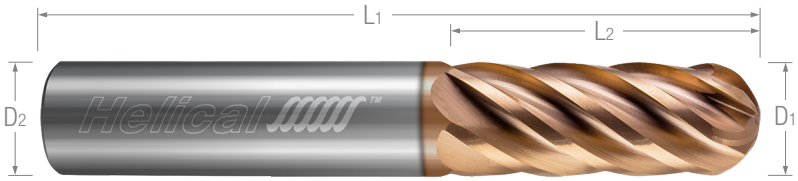
## Variable Pitch

HEM

**HEV-6**

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 138 for A*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 2 | 6 | 81924 | HEV-S-60250-BN | |
| | 1/4 | 1/2 | 2-1/2 | 6 | 81925 | HEV-SR-60250-BN | |
| | 1/4 | 3/4 | 2-1/2 | 6 | 81926 | HEV-R-60250-BN | |
| | 1/4 | 1 | 3 | 6 | 81927 | HEV-M-60250-BN | |
| | 1/4 | 1-1/4 | 3 | 6 | 82595 | HEV-L-60250-BN | |
| 5/16 | 5/16 | 7/16 | 2 | 6 | 83364 | HEV-S-60312-BN | new |
| | 5/16 | 3/4 | 2-1/2 | 6 | 83365 | HEV-R-60312-BN | new |
| | 5/16 | 1 | 3 | 6 | 83366 | HEV-M-60312-BN | new |
| 3/8 | 3/8 | 1/2 | 2 | 6 | 81928 | HEV-S-60375-BN | |
| | 3/8 | 3/4 | 2-1/2 | 6 | 83367 | HEV-SR-60375-BN | new |
| | 3/8 | 1 | 3 | 6 | 81929 | HEV-R-60375-BN | |
| | 3/8 | 1-1/4 | 3 | 6 | 81930 | HEV-M-60375-BN | |
| | 3/8 | 1-1/2 | 3-1/2 | 6 | 82596 | HEV-L-60375-BN | |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 6 | 81931 | HEV-S-60500-BN | |
| | 1/2 | 1 | 3 | 6 | 81932 | HEV-SR-60500-BN | |
| | 1/2 | 1-1/4 | 3 | 6 | 81933 | HEV-R-60500-BN | |
| | 1/2 | 1-5/8 | 4 | 6 | 81934 | HEV-M-60500-BN | |
| | 1/2 | 2 | 4 | 6 | 81935 | HEV-L-60500-BN | |
| | 1/2 | 2-1/2 | 5 | 6 | 83368 | HEV-LX-60500-BN | new |
| 5/8 | 5/8 | 3/4 | 3 | 6 | 83369 | HEV-S-60625-BN | new |
| | 5/8 | 1-1/4 | 3-1/2 | 6 | 83370 | HEV-SR-60625-BN | new |
| | 5/8 | 1-5/8 | 3-1/2 | 6 | 83371 | HEV-R-60625-BN | new |
| 3/4 | 3/4 | 1 | 3 | 6 | 81936 | HEV-S-60750-BN | |
| | 3/4 | 1-5/8 | 4 | 6 | 81937 | HEV-R-60750-BN | |
| | 3/4 | 2-1/4 | 5 | 6 | 83372 | HEV-M-60750-BN | new |
| 1 | 1 | 2 | 4-1/2 | 6 | 81938 | HEV-R-61000-BN | |

* .0005 max TIR

Speeds & Feeds on Page 147

# HEV-6

HEM

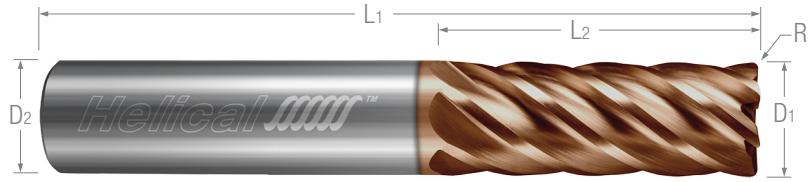
New Items!

## 6 FLUTE - CORNER RADIUS

### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 139 for A*plus* coating




| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | .020 | 3/8 | 2 | 6 | 59912 | HEV-S-60250-R.020 |
| | | 1/4 | .020 | 1/2 | 2-1/2 | 6 | 59913 | HEV-SR-60250-R.020 |
| | | 1/4 | .020 | 3/4 | 2-1/2 | 6 | 59914 | HEV-R-60250-R.020 |
| | | 1/4 | .020 | 1 | 3 | 6 | 81900 | HEV-M-60250-R.020 |
| new | | 1/4 | .020 | 1-1/4 | 3 | 6 | 83324 | HEV-L-60250-R.020 |
| | | 1/4 | .030 | 3/8 | 2 | 6 | 59915 | HEV-S-60250-R.030 |
| | | 1/4 | .030 | 1/2 | 2-1/2 | 6 | 59916 | HEV-SR-60250-R.030 |
| | | 1/4 | .030 | 3/4 | 2-1/2 | 6 | 59917 | HEV-R-60250-R.030 |
| | | 1/4 | .030 | 1 | 3 | 6 | 81901 | HEV-M-60250-R.030 |
| new | | 1/4 | .030 | 1-1/4 | 3 | 6 | 83325 | HEV-L-60250-R.030 |
| | | 1/4 | .060 | 3/8 | 2 | 6 | 81902 | HEV-S-60250-R.060 |
| | | 1/4 | .060 | 1/2 | 2-1/2 | 6 | 81903 | HEV-SR-60250-R.060 |
| | | 1/4 | .060 | 3/4 | 2-1/2 | 6 | 81904 | HEV-R-60250-R.060 |
| | | 1/4 | .060 | 1 | 3 | 6 | 81905 | HEV-M-60250-R.060 |
| new | | 1/4 | .060 | 1-1/4 | 3 | 6 | 83326 | HEV-L-60250-R.060 |
| | 5/16 | 5/16 | .020 | 7/16 | 2 | 6 | 82587 | HEV-S-60312-R.020 |
| new | | 5/16 | .020 | 3/4 | 2-1/2 | 6 | 83327 | HEV-R-60312-R.020 |
| | | 5/16 | .030 | 7/16 | 2 | 6 | 82588 | HEV-S-60312-R.030 |
| new | | 5/16 | .030 | 3/4 | 2-1/2 | 6 | 83328 | HEV-R-60312-R.030 |
| new | | 5/16 | .060 | 7/16 | 2 | 6 | 83329 | HEV-S-60312-R.060 |
| new | | 5/16 | .060 | 3/4 | 2-1/2 | 6 | 83330 | HEV-R-60312-R.060 |
| | 3/8 | 3/8 | .020 | 1/2 | 2 | 6 | 59918 | HEV-S-60375-R.020 |
| | | 3/8 | .020 | 1 | 3 | 6 | 59919 | HEV-R-60375-R.020 |
| | | 3/8 | .020 | 1-1/4 | 3 | 6 | 59920 | HEV-M-60375-R.020 |
| new | | 3/8 | .020 | 1-1/2 | 3-1/2 | 6 | 83331 | HEV-L-60375-R.020 |
| | | 3/8 | .030 | 1/2 | 2 | 6 | 59921 | HEV-S-60375-R.030 |
| | | 3/8 | .030 | 1 | 3 | 6 | 59922 | HEV-R-60375-R.030 |
| | | 3/8 | .030 | 1-1/4 | 3 | 6 | 59923 | HEV-M-60375-R.030 |
| new | | 3/8 | .030 | 1-1/2 | 3-1/2 | 6 | 83332 | HEV-L-60375-R.030 |
| | | 3/8 | .060 | 1/2 | 2 | 6 | 59924 | HEV-S-60375-R.060 |
| | | 3/8 | .060 | 1 | 3 | 6 | 59925 | HEV-R-60375-R.060 |
| | | 3/8 | .060 | 1-1/4 | 3 | 6 | 59926 | HEV-M-60375-R.060 |
| | | 3/8 | .060 | 1-1/2 | 3-1/2 | 6 | 83333 | HEV-L-60375-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 147

continued on next page

# 6 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-6

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Tplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | **.090** | 1/2 | 2 | 6 | **81906** | HEV-S-60375-R.090 | |
| | 3/8 | **.090** | 1 | 3 | 6 | **81907** | HEV-R-60375-R.090 | |
| | 3/8 | **.090** | 1-1/4 | 3 | 6 | **83334** | HEV-M-60375-R.090 | new |
| | 3/8 | **.090** | 1-1/2 | 3-1/2 | 6 | **83335** | HEV-L-60375-R.090 | new |
| 1/2 | 1/2 | **.010** | 1 | 3 | 6 | **83336** | HEV-SR-60500-R.010 | new |
| | 1/2 | **.010** | 1-1/4 | 3 | 6 | **83337** | HEV-R-60500-R.010 | new |
| | 1/2 | **.015** | 1 | 3 | 6 | **83338** | HEV-SR-60500-R.015 | new |
| | 1/2 | **.015** | 1-1/4 | 3 | 6 | **83339** | HEV-R-60500-R.015 | new |
| | 1/2 | **.020** | 1 | 3 | 6 | **83340** | HEV-SR-60500-R.020 | new |
| | 1/2 | **.020** | 1-1/4 | 3 | 6 | **83341** | HEV-R-60500-R.020 | new |
| | 1/2 | **.030** | 5/8 | 2-1/2 | 6 | **59927** | HEV-S-60500-R.030 | |
| | 1/2 | **.030** | 1 | 3 | 6 | **59928** | HEV-SR-60500-R.030 | |
| | 1/2 | **.030** | 1-1/4 | 3 | 6 | **59929** | HEV-R-60500-R.030 | |
| | 1/2 | **.030** | 1-5/8 | 4 | 6 | **59930** | HEV-M-60500-R.030 | |
| | 1/2 | **.030** | 2 | 4 | 6 | **81908** | HEV-L-60500-R.030 | |
| | 1/2 | **.060** | 5/8 | 2-1/2 | 6 | **59931** | HEV-S-60500-R.060 | |
| | 1/2 | **.060** | 1 | 3 | 6 | **59932** | HEV-SR-60500-R.060 | |
| | 1/2 | **.060** | 1-1/4 | 3 | 6 | **59933** | HEV-R-60500-R.060 | |
| | 1/2 | **.060** | 1-5/8 | 4 | 6 | **59934** | HEV-M-60500-R.060 | |
| | 1/2 | **.060** | 2 | 4 | 6 | **81909** | HEV-L-60500-R.060 | |
| | 1/2 | **.090** | 5/8 | 2-1/2 | 6 | **83342** | HEV-S-60500-R.090 | new |
| | 1/2 | **.090** | 1 | 3 | 6 | **83343** | HEV-SR-60500-R.090 | new |
| | 1/2 | **.090** | 1-1/4 | 3 | 6 | **82589** | HEV-R-60500-R.090 | |
| | 1/2 | **.090** | 1-5/8 | 4 | 6 | **82590** | HEV-M-60500-R.090 | |
| | 1/2 | **.090** | 2 | 4 | 6 | **82591** | HEV-L-60500-R.090 | |
| | 1/2 | **.125** | 5/8 | 2-1/2 | 6 | **59935** | HEV-S-60500-R.125 | |
| | 1/2 | **.125** | 1 | 3 | 6 | **59936** | HEV-SR-60500-R.125 | |
| | 1/2 | **.125** | 1-1/4 | 3 | 6 | **59937** | HEV-R-60500-R.125 | |
| | 1/2 | **.125** | 1-5/8 | 4 | 6 | **59938** | HEV-M-60500-R.125 | |
| | 1/2 | **.125** | 2 | 4 | 6 | **81910** | HEV-L-60500-R.125 | |
| 5/8 | 5/8 | **.030** | 1-1/4 | 3-1/2 | 6 | **83344** | HEV-SR-60625-R.030 | new |
| | 5/8 | **.030** | 1-5/8 | 3-1/2 | 6 | **83345** | HEV-R-60625-R.030 | new |
| | 5/8 | **.060** | 1-1/4 | 3-1/2 | 6 | **83346** | HEV-SR-60625-R.060 | new |
| | 5/8 | **.060** | 1-5/8 | 3-1/2 | 6 | **83347** | HEV-R-60625-R.060 | new |
| | 5/8 | **.090** | 1-1/4 | 3-1/2 | 6 | **83348** | HEV-SR-60625-R.090 | new |
| | 5/8 | **.090** | 1-5/8 | 3-1/2 | 6 | **83349** | HEV-R-60625-R.090 | new |
| | 5/8 | **.125** | 1-1/4 | 3-1/2 | 6 | **83350** | HEV-SR-60625-R.125 | new |
| | 5/8 | **.125** | 1-5/8 | 3-1/2 | 6 | **83351** | HEV-R-60625-R.125 | new |

* .0005 max TIR

continued on next page

# HEV-6

New Items!

## 6 FLUTE - CORNER RADIUS
Variable Pitch (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 3/4 | 3/4 | .030 | 1 | 3 | 6 | 83352 | HEV-S-60750-R.030 |
| | | 3/4 | .030 | 1-5/8 | 4 | 6 | 81911 | HEV-R-60750-R.030 |
| | | 3/4 | .030 | 2-1/4 | 5 | 6 | 81912 | HEV-M-60750-R.030 |
| | | 3/4 | .030 | 2-3/4 | 5 | 6 | 81913 | HEV-L-60750-R.030 |
| new | | 3/4 | .030 | 3-1/4 | 6 | 6 | 83353 | HEV-LX-60750-R.030 |
| | | 3/4 | .060 | 1-5/8 | 4 | 6 | 81914 | HEV-R-60750-R.060 |
| | | 3/4 | .060 | 2-1/4 | 5 | 6 | 81915 | HEV-M-60750-R.060 |
| | | 3/4 | .060 | 2-3/4 | 5 | 6 | 81916 | HEV-L-60750-R.060 |
| | | 3/4 | .090 | 1 | 3 | 6 | 81989 | HEV-S-60750-R.090 |
| | | 3/4 | .090 | 1-5/8 | 4 | 6 | 81917 | HEV-R-60750-R.090 |
| | | 3/4 | .090 | 2-1/4 | 5 | 6 | 81918 | HEV-M-60750-R.090 |
| | | 3/4 | .090 | 2-3/4 | 5 | 6 | 81919 | HEV-L-60750-R.090 |
| new | | 3/4 | .125 | 1 | 3 | 6 | 83354 | HEV-S-60750-R.125 |
| new | | 3/4 | .125 | 1-5/8 | 4 | 6 | 83355 | HEV-R-60750-R.125 |
| new | | 3/4 | .125 | 2-1/4 | 5 | 6 | 83356 | HEV-M-60750-R.125 |
| | | 3/4 | .190 | 1 | 3 | 6 | 81990 | HEV-S-60750-R.190 |
| new | | 3/4 | .250 | 1 | 3 | 6 | 83357 | HEV-S-60750-R.250 |
| new | | 3/4 | .250 | 1-5/8 | 4 | 6 | 83358 | HEV-R-60750-R.250 |
| new | | 3/4 | .250 | 2-1/4 | 5 | 6 | 83359 | HEV-M-60750-R.250 |
| new | | 3/4 | .250 | 2-3/4 | 5 | 6 | 83360 | HEV-L-60750-R.250 |
| | 1 | 1 | .030 | 2 | 4-1/2 | 6 | 81920 | HEV-R-61000-R.030 |
| | | 1 | .030 | 2-5/8 | 5 | 6 | 81921 | HEV-M-61000-R.030 |
| | | 1 | .060 | 2 | 4-1/2 | 6 | 81922 | HEV-R-61000-R.060 |
| | | 1 | .060 | 2-5/8 | 5 | 6 | 81923 | HEV-M-61000-R.060 |

* .0005 max TIR

# 7 FLUTE - SQUARE New Item!

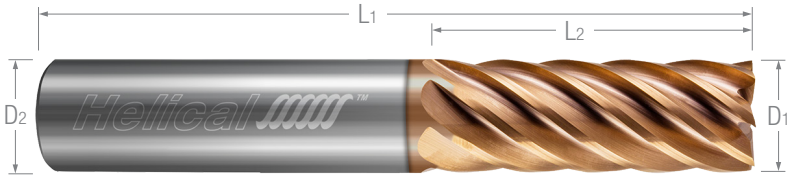
## Variable Pitch

HEM

**HEV-7**

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

For steel applications, see page 148 for A*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Decription |
|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 3/8 | 2 | 7 | 59939 | HEV-S-70250 |
| | 1/4 | 1/2 | 2 | 7 | 59940 | HEV-SR-70250 |
| | 1/4 | 3/4 | 2-1/2 | 7 | 59941 | HEV-R-70250 |
| | 1/4 | 1 | 3 | 7 | 83375 | HEV-M-70250 new |
| 3/8 | 3/8 | 1/2 | 2 | 7 | 59942 | HEV-S-70375 |
| | 3/8 | 3/4 | 2-1/2 | 7 | 59943 | HEV-SR-70375 |
| | 3/8 | 1 | 2-1/2 | 7 | 59944 | HEV-R-70375 |
| | 3/8 | 1-1/2 | 3-1/2 | 7 | 81939 | HEV-L-70375 |
| 1/2 | 1/2 | 5/8 | 2-1/2 | 7 | 59945 | HEV-S-70500 |
| | 1/2 | 1 | 3 | 7 | 59946 | HEV-SR-70500 |
| | 1/2 | 1-1/4 | 3 | 7 | 59947 | HEV-R-70500 |
| | 1/2 | 1-5/8 | 4 | 7 | 59948 | HEV-M-70500 |
| | 1/2 | 2 | 4 | 7 | 81940 | HEV-L-70500 |
| 5/8 | 5/8 | 3/4 | 3 | 7 | 81941 | HEV-S-70625 |
| | 5/8 | 1-1/4 | 3-1/2 | 7 | 81942 | HEV-SR-70625 |
| | 5/8 | 1-5/8 | 4 | 7 | 81943 | HEV-R-70625 |
| | 3/4 | 1-5/8 | 4 | 7 | 81944 | HEV-R-70750 |
| | 3/4 | 2-1/4 | 5 | 7 | 81945 | HEV-M-70750 |
| | 1 | 2 | 5 | 7 | 81946 | HEV-R-71000 |

* .0005 max TIR

Speeds & Feeds on Page 156

# HEV-7

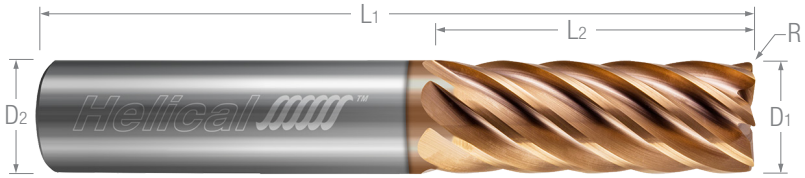
New Items!

## 7 FLUTE - CORNER RADIUS

### Variable Pitch

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

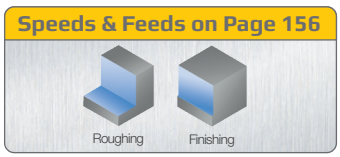
For steel applications, see page 150 for A*plus* coating




| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | .020 | 3/8 | 2 | 7 | 59949 | HEV-S-70250-R.020 |
| | | 1/4 | .020 | 1/2 | 2 | 7 | 59950 | HEV-SR-70250-R.020 |
| | | 1/4 | .020 | 3/4 | 2-1/2 | 7 | 59951 | HEV-R-70250-R.020 |
| new | | 1/4 | .020 | 1 | 3 | 7 | 83389 | HEV-M-70250-R.020 |
| | 3/8 | 3/8 | .020 | 1/2 | 2 | 7 | 59952 | HEV-S-70375-R.020 |
| | | 3/8 | .020 | 3/4 | 2-1/2 | 7 | 59953 | HEV-SR-70375-R.020 |
| | | 3/8 | .020 | 1 | 2-1/2 | 7 | 59954 | HEV-R-70375-R.020 |
| | | 3/8 | .020 | 1-1/2 | 3-1/2 | 7 | 81947 | HEV-L-70375-R.020 |
| new | | 3/8 | .060 | 1/2 | 2 | 7 | 83390 | HEV-S-70375-R.060 |
| new | | 3/8 | .060 | 3/4 | 2-1/2 | 7 | 83391 | HEV-SR-70375-R.060 |
| new | | 3/8 | .060 | 1 | 2-1/2 | 7 | 83392 | HEV-R-70375-R.060 |
| new | 1/2 | 1/2 | .020 | 5/8 | 2-1/2 | 7 | 83393 | HEV-S-70500-R.020 |
| new | | 1/2 | .020 | 1 | 3 | 7 | 83394 | HEV-SR-70500-R.020 |
| new | | 1/2 | .020 | 1-1/4 | 3 | 7 | 83395 | HEV-R-70500-R.020 |
| new | | 1/2 | .020 | 1-5/8 | 4 | 7 | 83396 | HEV-M-70500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 7 | 59955 | HEV-S-70500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 7 | 59956 | HEV-SR-70500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 7 | 59957 | HEV-R-70500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 7 | 59958 | HEV-M-70500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 7 | 81948 | HEV-L-70500-R.030 |
| new | | 1/2 | .060 | 5/8 | 2-1/2 | 7 | 83397 | HEV-S-70500-R.060 |
| new | | 1/2 | .060 | 1 | 3 | 7 | 83398 | HEV-SR-70500-R.060 |
| new | | 1/2 | .060 | 1-1/4 | 3 | 7 | 83399 | HEV-R-70500-R.060 |
| | 5/8 | 5/8 | .030 | 3/4 | 3 | 7 | 81949 | HEV-S-70625-R.030 |
| | | 5/8 | .030 | 1-1/4 | 3-1/2 | 7 | 81950 | HEV-SR-70625-R.030 |
| | | 5/8 | .030 | 1-5/8 | 4 | 7 | 81951 | HEV-R-70625-R.030 |
| new | | 5/8 | .060 | 1-1/4 | 3-1/2 | 7 | 83400 | HEV-SR-70625-R.060 |
| new | | 5/8 | .060 | 1-5/8 | 4 | 7 | 83401 | HEV-R-70625-R.060 |
| | 3/4 | 3/4 | .030 | 1 | 3 | 7 | 81952 | HEV-S-70750-R.030 |
| | | 3/4 | .030 | 1-1/4 | 3-1/2 | 7 | 81953 | HEV-SR-70750-R.030 |
| | | 3/4 | .030 | 1-5/8 | 4 | 7 | 81954 | HEV-R-70750-R.030 |
| | | 3/4 | .030 | 2-1/4 | 5 | 7 | 81955 | HEV-M-70750-R.030 |
| new | | 3/4 | .060 | 1 | 3 | 7 | 83402 | HEV-S-70750-R.060 |
| new | | 3/4 | .060 | 1-5/8 | 4 | 7 | 83403 | HEV-R-70750-R.060 |
| new | | 3/4 | .060 | 2-1/4 | 5 | 7 | 83404 | HEV-M-70750-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 156



# MULTI-FLUTE - CORNER RADIUS

New Items!

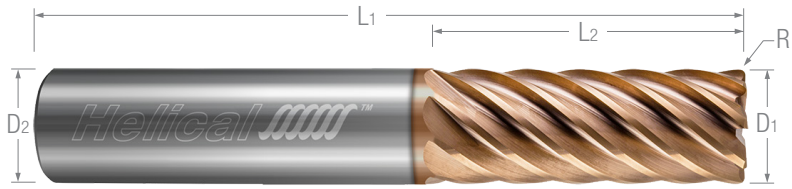
HEM

## HXF

### Finisher

- Offers proven performance and extended tool life in stainless steels, high temp alloys, and hardened steels up to 65 Rc
- Well-suited for increased wear resistance in a wide range of ferrous materials, including low and medium alloy steels, tool steels, and cast iron
- Designed with high flute count for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

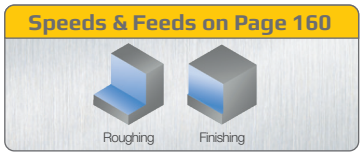
For steel applications, see page 159 for A*plus* coating




| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 3/8 | 2 | 7 | **59959** | HXF-S-070250-R.020 | |
| | 1/4 | **.020** | 1/2 | 2 | 7 | **83517** | HXF-SR-070250-R.020 | new |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 7 | **59960** | HXF-R-070250-R.020 | |
| 3/8 | 3/8 | **.020** | 1/2 | 2 | 7 | **59961** | HXF-S-070375-R.020 | |
| | 3/8 | **.020** | 3/4 | 2-1/2 | 7 | **83518** | HXF-SR-070375-R.020 | new |
| | 3/8 | **.020** | 1 | 3 | 7 | **59962** | HXF-R-070375-R.020 | |
| | 3/8 | **.020** | 1-1/4 | 3 | 7 | **83519** | HXF-M-070375-R.020 | new |
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 8 | **59963** | HXF-S-080500-R.030 | |
| | 1/2 | **.030** | 1 | 3 | 8 | **59964** | HXF-SR-080500-R.030 | |
| | 1/2 | **.030** | 1-1/4 | 3 | 8 | **59965** | HXF-R-080500-R.030 | |
| | 1/2 | **.030** | 1-5/8 | 3-1/2 | 8 | **83520** | HXF-M-080500-R.030 | new |
| 3/4 | 3/4 | **.060** | 1 | 3 | 12 | **59966** | HXF-S-120750-R.060 | |
| | 3/4 | **.060** | 1-5/8 | 4 | 12 | **59967** | HXF-R-120750-R.060 | |

* .0005 max TIR

Speeds & Feeds on Page 160



# END MILLS FOR TITANIUM

## Titanium & Titanium Alloys


| | ROUGHERS | | | PG |
|---|---|---|---|---|
| new | 5 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 186 |
| new | 6 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 188 |
| new | 7 Flute | Corner Radius | Chipbreaker Rougher - Variable Pitch | 190 |

| | 5 FLUTE | | | PG |
|---|---|---|---|---|
| new | 5 Flute | Corner Radius | Variable Pitch | 192 |
| | 5 Flute | Corner Radius | Variable Pitch - Metric | 198 |

| | 6 FLUTE | | | PG |
|---|---|---|---|---|
| new | 6 Flute | Corner Radius | Variable Pitch - For High Efficiency Milling | 200 |
| new | 6 Flute | Ball | Variable Pitch | 203 |
| new | 6 Flute | Corner Radius | Variable Pitch | 204 |
| | 6 Flute | Corner Radius | Variable Pitch - Metric | 207 |

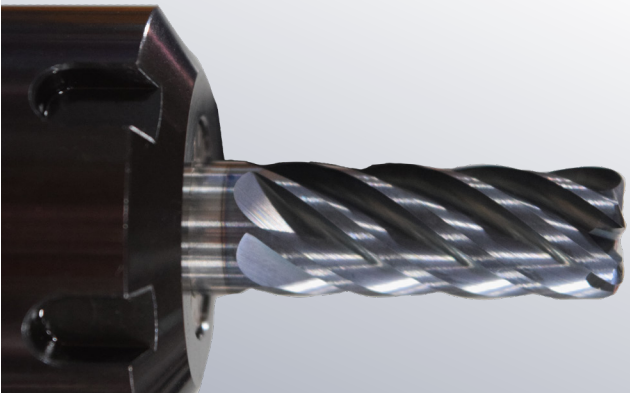
| | 7 FLUTE | | | PG |
|---|---|---|---|---|
| new | 7 Flute | Corner Radius | Variable Pitch | 209 |
| | 7 Flute | Corner Radius | Variable Pitch - Metric | 211 |

| | MULTI-FLUTE | | | PG |
|---|---|---|---|---|
| new | Multi-Flute | Corner Radius | Finisher | 213 |

## MADE FOR HIGH EFFICIENCY MILLING (HEM)

### HVTI-6 End Mill for Titanium pg 200

Experience higher Metal Removal Rates (MRR) and enjoy 20% more time in the cut with Helical's 6-flute variable pitch end mill for titanium, designed with a unique combination of rake, core, and edge geometries for exceptionally reliable and controlled wear.



Extensive testing in Ti 6-4 has proven its excellence in extending tool life and elevating part quality. This tool is a workhorse for HEM in Titanium.

# 5 FLUTE - CORNER RADIUS

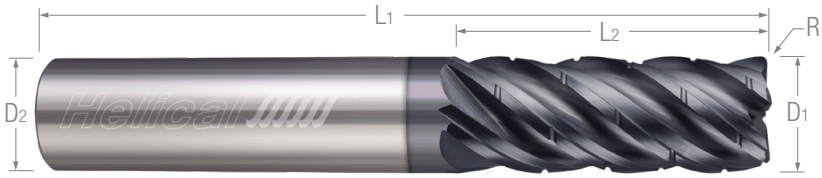
**New Items!**

HEM

**HEV-C-5**

## Chipbreaker Rougher - Variable Pitch

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 5 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

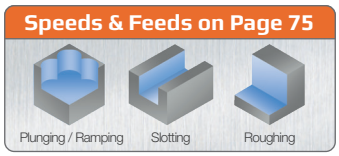



| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | .010 | 1/4 | 1-1/2 | 5 | 59391 | HEV-C-S-50125-R.010 | |
| | 1/8 | .010 | 3/8 | 2 | 5 | 82213 | HEV-C-SR-50125-R.010 | |
| | 1/8 | .010 | 1/2 | 2-1/2 | 5 | 59392 | HEV-C-R-50125-R.010 | |
| | 1/8 | .010 | 5/8 | 2-1/2 | 5 | 82214 | HEV-C-A-50125-R.010 | |
| | 1/8 | .010 | 3/4 | 2-1/2 | 5 | 83068 | HEV-C-M-50125-R.010 | new |
| 3/16 | 3/16 | .010 | 5/16 | 2 | 5 | 59393 | HEV-C-S-50187-R.010 | |
| | 3/16 | .010 | 7/16 | 2 | 5 | 81956 | HEV-C-SR-50187-R.010 | |
| | 3/16 | .010 | 9/16 | 2-1/2 | 5 | 59394 | HEV-C-R-50187-R.010 | |
| | 3/16 | .010 | 3/4 | 2-1/2 | 5 | 81957 | HEV-C-M-50187-R.010 | |
| | 3/16 | .010 | 1 | 2-1/2 | 5 | 83069 | HEV-C-ML-50187-R.010 | new |
| | 3/16 | .030 | 5/16 | 2 | 5 | 83070 | HEV-C-S-50187-R.030 | new |
| | 3/16 | .030 | 7/16 | 2 | 5 | 83071 | HEV-C-SR-50187-R.030 | new |
| | 3/16 | .030 | 9/16 | 2-1/2 | 5 | 83072 | HEV-C-R-50187-R.030 | new |
| | 3/16 | .030 | 3/4 | 2-1/2 | 5 | 83073 | HEV-C-M-50187-R.030 | new |
| 1/4 | 1/4 | .020 | 3/8 | 2 | 5 | 59395 | HEV-C-S-50250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 5 | 59396 | HEV-C-SR-50250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 5 | 59397 | HEV-C-R-50250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 5 | 59398 | HEV-C-M-50250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 5 | 82215 | HEV-C-L-50250-R.020 | |
| | 1/4 | .020 | 1-1/2 | 3 | 5 | 83074 | HEV-C-LX-50250-R.020 | new |
| | 1/4 | .030 | 3/8 | 2 | 5 | 83075 | HEV-C-S-50250-R.030 | new |
| | 1/4 | .030 | 1/2 | 2-1/2 | 5 | 83076 | HEV-C-SR-50250-R.030 | new |
| | 1/4 | .030 | 3/4 | 2-1/2 | 5 | 83077 | HEV-C-R-50250-R.030 | new |
| | 1/4 | .030 | 1 | 3 | 5 | 83078 | HEV-C-M-50250-R.030 | new |
| 5/16 | 5/16 | .020 | 7/16 | 2 | 5 | 59399 | HEV-C-S-50312-R.020 | |
| | 5/16 | .020 | 13/16 | 2-1/2 | 5 | 59400 | HEV-C-R-50312-R.020 | |
| | 5/16 | .020 | 1-1/4 | 3 | 5 | 82216 | HEV-C-L-50312-R.020 | |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 5 | 59401 | HEV-C-S-50375-R.020 | |
| | 3/8 | .020 | 3/4 | 2-1/2 | 5 | 81958 | HEV-C-SR-50375-R.020 | |
| | 3/8 | .020 | 1 | 3 | 5 | 59402 | HEV-C-R-50375-R.020 | |
| | 3/8 | .020 | 1-1/4 | 3 | 5 | 59403 | HEV-C-M-50375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 5 | 82217 | HEV-C-L-50375-R.020 | |
| | 3/8 | .020 | 2 | 4 | 5 | 83079 | HEV-C-LX-50375-R.020 | new |

* .0005 max TIR

continued on next page

**Speeds & Feeds on Page 75**



# HEV-C-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch (cont.)



continued from previous page

| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 3/8 | 3/8 | .030 | 1/2 | 2 | 5 | 83080 | HEV-C-S-50375-R.030 |
| new | | 3/8 | .030 | 3/4 | 2-1/2 | 5 | 83081 | HEV-C-SR-50375-R.030 |
| new | | 3/8 | .030 | 1 | 3 | 5 | 83082 | HEV-C-R-50375-R.030 |
| new | | 3/8 | .030 | 1-1/4 | 3 | 5 | 83083 | HEV-C-M-50375-R.030 |
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 5 | 83084 | HEV-C-S-50500-R.010 |
| new | | 1/2 | .010 | 1 | 3 | 5 | 83085 | HEV-C-SR-50500-R.010 |
| new | | 1/2 | .010 | 1-1/4 | 3 | 5 | 83086 | HEV-C-R-50500-R.010 |
| new | | 1/2 | .010 | 1-5/8 | 4 | 5 | 83087 | HEV-C-M-50500-R.010 |
| new | | 1/2 | .010 | 2 | 4 | 5 | 83088 | HEV-C-L-50500-R.010 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 5 | 59404 | HEV-C-S-50500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 5 | 59405 | HEV-C-SR-50500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 5 | 59406 | HEV-C-R-50500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 5 | 59407 | HEV-C-M-50500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 5 | 59408 | HEV-C-L-50500-R.030 |
| | | 1/2 | .030 | 2-1/2 | 5 | 5 | 81959 | HEV-C-LX-50500-R.030 |
| | | 1/2 | .030 | 3-1/8 | 6 | 5 | 82218 | HEV-C-X-50500-R.030 |
| | | 1/2 | .030 | 3-5/8 | 6 | 5 | 82219 | HEV-C-Y-50500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 5 | 81960 | HEV-C-S-50500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 5 | 81961 | HEV-C-SR-50500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 5 | 81962 | HEV-C-R-50500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 5 | 81963 | HEV-C-M-50500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 5 | 81964 | HEV-C-L-50500-R.060 |
| | | 1/2 | .060 | 2-1/2 | 5 | 5 | 81965 | HEV-C-LX-50500-R.060 |
| new | | 1/2 | .060 | 3-1/8 | 6 | 5 | 83089 | HEV-C-X-50500-R.060 |
| | 5/8 | 5/8 | .030 | 3/4 | 3 | 5 | 59409 | HEV-C-S-50625-R.030 |
| | | 5/8 | .030 | 1-1/4 | 3-1/2 | 5 | 59410 | HEV-C-SR-50625-R.030 |
| | | 5/8 | .030 | 1-5/8 | 3-1/2 | 5 | 59411 | HEV-C-R-50625-R.030 |
| | | 5/8 | .030 | 2-1/8 | 4 | 5 | 59412 | HEV-C-M-50625-R.030 |
| | | 5/8 | .030 | 2-1/2 | 5 | 5 | 82220 | HEV-C-L-50625-R.030 |
| | | 5/8 | .030 | 3-1/4 | 6 | 5 | 82221 | HEV-C-LX-50625-R.030 |
| | | 5/8 | .060 | 3/4 | 3 | 5 | 81966 | HEV-C-S-50625-R.060 |
| | | 5/8 | .060 | 1-1/4 | 3-1/2 | 5 | 81967 | HEV-C-SR-50625-R.060 |
| | | 5/8 | .060 | 1-5/8 | 3-1/2 | 5 | 81968 | HEV-C-R-50625-R.060 |
| | | 5/8 | .060 | 2-1/8 | 4 | 5 | 81969 | HEV-C-M-50625-R.060 |
| | 3/4 | 3/4 | .030 | 1 | 3 | 5 | 59413 | HEV-C-S-50750-R.030 |
| | | 3/4 | .030 | 1-5/8 | 4 | 5 | 59414 | HEV-C-R-50750-R.030 |
| | | 3/4 | .030 | 2-1/4 | 5 | 5 | 59415 | HEV-C-M-50750-R.030 |
| | | 3/4 | .030 | 2-3/4 | 5 | 5 | 59416 | HEV-C-L-50750-R.030 |
| | | 3/4 | .030 | 3-1/4 | 6 | 5 | 59417 | HEV-C-LX-50750-R.030 |
| | | 3/4 | .030 | 4 | 6-1/2 | 5 | 82222 | HEV-C-X-50750-R.030 |
| | | 3/4 | .060 | 1 | 3 | 5 | 81970 | HEV-C-S-50750-R.060 |
| | | 3/4 | .060 | 1-5/8 | 4 | 5 | 81971 | HEV-C-R-50750-R.060 |
| | | 3/4 | .060 | 2-1/4 | 5 | 5 | 81972 | HEV-C-M-50750-R.060 |
| | | 3/4 | .060 | 2-3/4 | 5 | 5 | 81973 | HEV-C-L-50750-R.060 |
| | | 3/4 | .060 | 3-1/4 | 6 | 5 | 81974 | HEV-C-LX-50750-R.060 |
| | 1 | 1 | .030 | 1-1/4 | 4 | 5 | 59418 | HEV-C-S-51000-R.030 |
| | | 1 | .030 | 2 | 4-1/2 | 5 | 59419 | HEV-C-R-51000-R.030 |

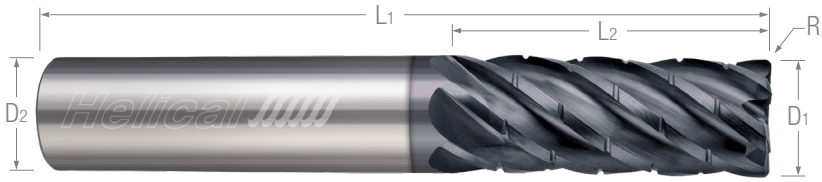
* .0005 max TIR

# 6 FLUTE - CORNER RADIUS New Items!

## HEV-C-6

### Chipbreaker Rougher - Variable Pitch

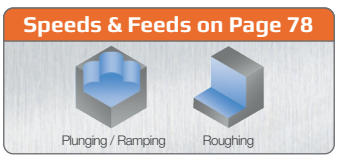
- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 6 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 3/8 | 2 | 6 | 83125 | HEV-C-S-60250-R.010 | new |
| | 1/4 | .010 | 1/2 | 2-1/2 | 6 | 83126 | HEV-C-SR-60250-R.010 | new |
| | 1/4 | .010 | 3/4 | 2-1/2 | 6 | 83127 | HEV-C-R-60250-R.010 | new |
| | 1/4 | .010 | 1 | 3 | 6 | 83128 | HEV-C-M-60250-R.010 | new |
| | 1/4 | .020 | 3/8 | 2 | 6 | 82223 | HEV-C-S-60250-R.020 | |
| | 1/4 | .020 | 1/2 | 2-1/2 | 6 | 82224 | HEV-C-SR-60250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 6 | 82225 | HEV-C-R-60250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 6 | 82226 | HEV-C-M-60250-R.020 | |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 6 | 83129 | HEV-C-S-60375-R.010 | new |
| | 3/8 | .010 | 3/4 | 2-1/2 | 6 | 83130 | HEV-C-SR-60375-R.010 | new |
| | 3/8 | .010 | 1 | 3 | 6 | 83131 | HEV-C-R-60375-R.010 | new |
| | 3/8 | .010 | 1-1/4 | 3 | 6 | 83132 | HEV-C-M-60375-R.010 | new |
| | 3/8 | .030 | 1/2 | 2 | 6 | 82227 | HEV-C-S-60375-R.030 | |
| | 3/8 | .030 | 3/4 | 2-1/2 | 6 | 82228 | HEV-C-SR-60375-R.030 | |
| | 3/8 | .030 | 1 | 3 | 6 | 82229 | HEV-C-R-60375-R.030 | |
| | 3/8 | .030 | 1-1/4 | 3 | 6 | 82230 | HEV-C-M-60375-R.030 | |
| 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 6 | 83133 | HEV-C-S-60500-R.010 | new |
| | 1/2 | .010 | 1 | 3 | 6 | 83134 | HEV-C-SR-60500-R.010 | new |
| | 1/2 | .010 | 1-1/4 | 3 | 6 | 83135 | HEV-C-R-60500-R.010 | new |
| | 1/2 | .010 | 1-5/8 | 4 | 6 | 83136 | HEV-C-M-60500-R.010 | new |
| | 1/2 | .010 | 2 | 4 | 6 | 83137 | HEV-C-L-60500-R.010 | new |
| | 1/2 | .010 | 2-1/2 | 5 | 6 | 83138 | HEV-C-LX-60500-R.010 | new |
| | 1/2 | .030 | 5/8 | 2-1/2 | 6 | 82231 | HEV-C-S-60500-R.030 | |
| | 1/2 | .030 | 1 | 3 | 6 | 82232 | HEV-C-SR-60500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 6 | 82233 | HEV-C-R-60500-R.030 | |
| | 1/2 | .030 | 1-5/8 | 4 | 6 | 82234 | HEV-C-M-60500-R.030 | |
| | 1/2 | .030 | 2 | 4 | 6 | 82235 | HEV-C-L-60500-R.030 | |
| | 1/2 | .030 | 2-1/2 | 5 | 6 | 82236 | HEV-C-LX-60500-R.030 | |
| | 1/2 | .060 | 5/8 | 2-1/2 | 6 | 82237 | HEV-C-S-60500-R.060 | |
| | 1/2 | .060 | 1 | 3 | 6 | 82238 | HEV-C-SR-60500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 3 | 6 | 82239 | HEV-C-R-60500-R.060 | |
| | 1/2 | .060 | 1-5/8 | 4 | 6 | 82240 | HEV-C-M-60500-R.060 | |
| | 1/2 | .060 | 2 | 4 | 6 | 82241 | HEV-C-L-60500-R.060 | |
| | 1/2 | .060 | 2-1/2 | 5 | 6 | 82242 | HEV-C-LX-60500-R.060 | |

* .0005 max TIR

Speeds & Feeds on Page 78

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# HEV-C-6

New Items!

## 6 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch (cont.)



continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 5/8 | 5/8 | **.030** | 1-1/4 | 3-1/2 | 6 | **83139** | HEV-C-SR-60625-R.030 |
| new | | 5/8 | **.030** | 1-5/8 | 3-1/2 | 6 | **83140** | HEV-C-R-60625-R.030 |
| new | | 5/8 | **.030** | 2 | 4 | 6 | **83141** | HEV-C-M-60625-R.030 |
| | | 5/8 | **.060** | 1-1/4 | 3-1/2 | 6 | **82243** | HEV-C-SR-60625-R.060 |
| | | 5/8 | **.060** | 1-5/8 | 3-1/2 | 6 | **82244** | HEV-C-R-60625-R.060 |
| | | 5/8 | **.060** | 2 | 4 | 6 | **82245** | HEV-C-M-60625-R.060 |
| new | 3/4 | 3/4 | **.030** | 1-5/8 | 4 | 6 | **83142** | HEV-C-R-60750-R.030 |
| new | | 3/4 | **.030** | 2-1/4 | 5 | 6 | **83143** | HEV-C-M-60750-R.030 |
| new | | 3/4 | **.030** | 2-3/4 | 5 | 6 | **83144** | HEV-C-L-60750-R.030 |
| | | 3/4 | **.060** | 1-5/8 | 4 | 6 | **82246** | HEV-C-R-60750-R.060 |
| | | 3/4 | **.060** | 2-1/4 | 5 | 6 | **82247** | HEV-C-M-60750-R.060 |
| | | 3/4 | **.060** | 2-3/4 | 5 | 6 | **82248** | HEV-C-L-60750-R.060 |

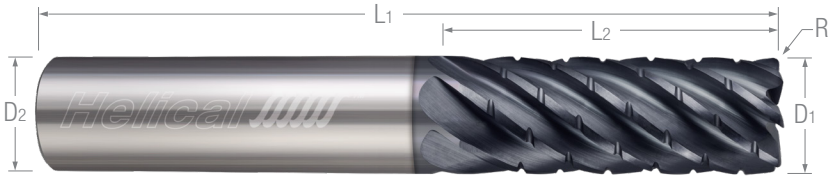
* .0005 max TIR

# 7 FLUTE - CORNER RADIUS New Items!

## HEV-C-7

### Chipbreaker Rougher - Variable Pitch

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch and offset chipbreaker geometry for optimal chip evacuation, reduced harmonics, and reduced tool pressure
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .020 | 3/8 | 2 | 7 | 59420 | HEV-C-S-70250-R.020 | |
| | 1/4 | .020 | 1/2 | 2 | 7 | 59421 | HEV-C-SR-70250-R.020 | |
| | 1/4 | .020 | 3/4 | 2-1/2 | 7 | 59422 | HEV-C-R-70250-R.020 | |
| | 1/4 | .020 | 1 | 3 | 7 | 82249 | HEV-C-M-70250-R.020 | |
| | 1/4 | .020 | 1-1/4 | 3 | 7 | 83163 | HEV-C-L-70250-R.020 | new |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 7 | 59423 | HEV-C-S-70375-R.020 | |
| | 3/8 | .020 | 3/4 | 2-1/2 | 7 | 59424 | HEV-C-SR-70375-R.020 | |
| | 3/8 | .020 | 1 | 2-1/2 | 7 | 59425 | HEV-C-R-70375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 7 | 82250 | HEV-C-L-70375-R.020 | |
| | 3/8 | .060 | 1/2 | 2 | 7 | 83164 | HEV-C-S-70375-R.060 | new |
| | 3/8 | .060 | 3/4 | 2-1/2 | 7 | 83165 | HEV-C-SR-70375-R.060 | new |
| | 3/8 | .060 | 1 | 2-1/2 | 7 | 83166 | HEV-C-R-70375-R.060 | new |
| 1/2 | 1/2 | .020 | 5/8 | 2-1/2 | 7 | 83167 | HEV-C-S-70500-R.020 | new |
| | 1/2 | .020 | 1 | 3 | 7 | 83168 | HEV-C-SR-70500-R.020 | new |
| | 1/2 | .020 | 1-1/4 | 3 | 7 | 83169 | HEV-C-R-70500-R.020 | new |
| | 1/2 | .020 | 1-5/8 | 4 | 7 | 83170 | HEV-C-M-70500-R.020 | new |
| | 1/2 | .020 | 2 | 4 | 7 | 83171 | HEV-C-L-70500-R.020 | new |
| | 1/2 | .030 | 5/8 | 2-1/2 | 7 | 59426 | HEV-C-S-70500-R.030 | |
| | 1/2 | .030 | 1 | 3 | 7 | 59427 | HEV-C-SR-70500-R.030 | |
| | 1/2 | .030 | 1-1/4 | 3 | 7 | 59428 | HEV-C-R-70500-R.030 | |
| | 1/2 | .030 | 1-5/8 | 4 | 7 | 59429 | HEV-C-M-70500-R.030 | |
| | 1/2 | .030 | 2 | 4 | 7 | 81975 | HEV-C-L-70500-R.030 | |
| | 1/2 | .030 | 2-1/2 | 5 | 7 | 82251 | HEV-C-LX-70500-R.030 | |
| | 1/2 | .030 | 3-1/8 | 6 | 7 | 82252 | HEV-C-X-70500-R.030 | |
| | 1/2 | .060 | 5/8 | 2-1/2 | 7 | 81978 | HEV-C-S-70500-R.060 | |
| | 1/2 | .060 | 1 | 3 | 7 | 81979 | HEV-C-SR-70500-R.060 | |
| | 1/2 | .060 | 1-1/4 | 3 | 7 | 81980 | HEV-C-R-70500-R.060 | |
| | 1/2 | .060 | 1-5/8 | 4 | 7 | 81981 | HEV-C-M-70500-R.060 | |
| | 1/2 | .060 | 2 | 4 | 7 | 81982 | HEV-C-L-70500-R.060 | |
| | 1/2 | .060 | 2-1/2 | 5 | 7 | 83172 | HEV-C-LX-70500-R.060 | new |

continued on next page

Speeds & Feeds on Page 82
Roughing

# HEV-C-7

New Items!

## 7 FLUTE - CORNER RADIUS

### Chipbreaker Rougher - Variable Pitch (cont.)



continued from previous page

| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 5/8 | 5/8 | **.030** | 3/4 | 3 | 7 | **83173** | HEV-C-S-70625-R.030 |
| | | 5/8 | **.030** | 1-1/4 | 3-1/2 | 7 | **59430** | HEV-C-SR-70625-R.030 |
| | | 5/8 | **.030** | 1-5/8 | 4 | 7 | **59431** | HEV-C-R-70625-R.030 |
| | | 5/8 | **.030** | 2-1/8 | 4 | 7 | **81976** | HEV-C-M-70625-R.030 |
| | | 5/8 | **.060** | 1-1/4 | 3-1/2 | 7 | **81983** | HEV-C-SR-70625-R.060 |
| | | 5/8 | **.060** | 1-5/8 | 4 | 7 | **81984** | HEV-C-R-70625-R.060 |
| | | 5/8 | **.060** | 2-1/8 | 4 | 7 | **81985** | HEV-C-M-70625-R.060 |
| new | 3/4 | 3/4 | **.030** | 1-1/4 | 3-1/2 | 7 | **83174** | HEV-C-SR-70750-R.030 |
| | | 3/4 | **.030** | 1-5/8 | 4 | 7 | **59432** | HEV-C-R-70750-R.030 |
| | | 3/4 | **.030** | 2-1/4 | 5 | 7 | **59433** | HEV-C-M-70750-R.030 |
| | | 3/4 | **.030** | 2-3/4 | 5 | 7 | **81977** | HEV-C-L-70750-R.030 |
| new | | 3/4 | **.030** | 3-1/4 | 6 | 7 | **83175** | HEV-C-LX-70750-R.030 |
| new | | 3/4 | **.060** | 1-1/4 | 3-1/2 | 7 | **83176** | HEV-C-SR-70750-R.060 |
| | | 3/4 | **.060** | 1-5/8 | 4 | 7 | **81986** | HEV-C-R-70750-R.060 |
| | | 3/4 | **.060** | 2-1/4 | 5 | 7 | **81987** | HEV-C-M-70750-R.060 |
| | | 3/4 | **.060** | 2-3/4 | 5 | 7 | **81988** | HEV-C-L-70750-R.060 |

* .0005 max TIR

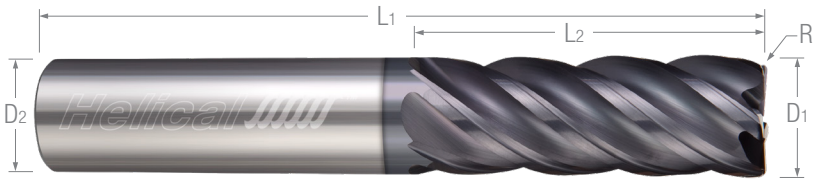
# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch

**HEV-5**

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA






| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | **.010** | 1/4 | 1-1/2 | 5 | **34017** | | HEV-S-50125-R.010 |
| | 1/8 | **.010** | 3/8 | 2 | 5 | **81718** | | HEV-SR-50125-R.010 |
| | 1/8 | **.010** | 1/2 | 2-1/2 | 5 | **34032** | | HEV-R-50125-R.010 |
| | 1/8 | **.010** | 5/8 | 2-1/2 | 5 | **81719** | | HEV-A-50125-R.010 |
| | 1/8 | **.010** | 3/4 | 2-1/2 | 5 | **34047** | | HEV-M-50125-R.010 |
| | 1/8 | **.015** | 1/4 | 1-1/2 | 5 | **81720** | | HEV-S-50125-R.015 |
| | 1/8 | **.015** | 3/8 | 2 | 5 | **82530** | | HEV-SR-50125-R.015 |
| | 1/8 | **.015** | 1/2 | 2-1/2 | 5 | **81721** | | HEV-R-50125-R.015 |
| | 1/8 | **.030** | 1/4 | 1-1/2 | 5 | **45017** | | HEV-S-50125-R.030 |
| | 1/8 | **.030** | 3/8 | 2 | 5 | **82531** | | HEV-SR-50125-R.030 |
| | 1/8 | **.030** | 1/2 | 2-1/2 | 5 | **45032** | | HEV-R-50125-R.030 |
| | 1/8 | **.030** | 5/8 | 2-1/2 | 5 | **82532** | | HEV-A-50125-R.030 |
| | 1/8 | **.030** | 3/4 | 2-1/2 | 5 | **45047** | | HEV-M-50125-R.030 |
| 5/32 | 3/16 | **.010** | 3/16 | 2 | 5 | **81722** | | HEV-S-50156-R.010 |
| | 3/16 | **.010** | 7/16 | 2-1/2 | 5 | **81723** | | HEV-R-50156-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 5 | **81724** | | HEV-M-50156-R.010 |
| 3/16 | 3/16 | **.010** | 5/16 | 2 | 5 | **34062** | | HEV-S-50187-R.010 |
| | 3/16 | **.010** | 7/16 | 2 | 5 | **81725** | | HEV-SR-50187-R.010 |
| | 3/16 | **.010** | 9/16 | 2-1/2 | 5 | **34077** | | HEV-R-50187-R.010 |
| | 3/16 | **.010** | 3/4 | 2-1/2 | 5 | **34092** | | HEV-M-50187-R.010 |
| | 3/16 | **.010** | 1 | 2-1/2 | 5 | **81726** | | HEV-ML-50187-R.010 |
| | 3/16 | **.015** | 5/16 | 2 | 5 | **81727** | | HEV-S-50187-R.015 |
| | 3/16 | **.015** | 7/16 | 2 | 5 | **82533** | | HEV-SR-50187-R.015 |
| | 3/16 | **.015** | 9/16 | 2-1/2 | 5 | **81728** | | HEV-R-50187-R.015 |
| | 3/16 | **.015** | 3/4 | 2-1/2 | 5 | **82534** | | HEV-M-50187-R.015 |
| | 3/16 | **.015** | 1 | 2-1/2 | 5 | **82535** | | HEV-ML-50187-R.015 |
| | 3/16 | **.030** | 5/16 | 2 | 5 | **45062** | | HEV-S-50187-R.030 |
| | 3/16 | **.030** | 7/16 | 2 | 5 | **81729** | | HEV-SR-50187-R.030 |
| | 3/16 | **.030** | 9/16 | 2-1/2 | 5 | **45077** | | HEV-R-50187-R.030 |
| | 3/16 | **.030** | 3/4 | 2-1/2 | 5 | **45092** | | HEV-M-50187-R.030 |
| | 3/16 | **.030** | 1 | 2-1/2 | 5 | **82536** | | HEV-ML-50187-R.030 |

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# HEV-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | LOC $L_2$ $^{+.032"}_{-.000"}$ | OAL $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| | 7/32 | 1/4 | .010 | 5/16 | 2 | 5 | 81730 | | HEV-S-50218-R.010 |
| | | 1/4 | .010 | 7/16 | 2-1/2 | 5 | 81731 | | HEV-R-50218-R.010 |
| | 1/4 | 1/4 | .010 | 3/8 | 2 | 5 | 81732 | | HEV-S-50250-R.010 |
| | | 1/4 | .010 | 1/2 | 2-1/2 | 5 | 81733 | | HEV-SR-50250-R.010 |
| | | 1/4 | .010 | 3/4 | 2-1/2 | 5 | 81734 | | HEV-R-50250-R.010 |
| | | 1/4 | .010 | 1 | 3 | 5 | 82537 | | HEV-M-50250-R.010 |
| | | 1/4 | .010 | 1-1/4 | 3 | 5 | 82538 | | HEV-L-50250-R.010 |
| | | 1/4 | .015 | 3/8 | 2 | 5 | 81735 | | HEV-S-50250-R.015 |
| | | 1/4 | .015 | 1/2 | 2-1/2 | 5 | 81736 | | HEV-SR-50250-R.015 |
| | | 1/4 | .015 | 3/4 | 2-1/2 | 5 | 81737 | | HEV-R-50250-R.015 |
| | | 1/4 | .015 | 1 | 3 | 5 | 82539 | | HEV-M-50250-R.015 |
| | | 1/4 | .015 | 1-1/4 | 3 | 5 | 82540 | | HEV-L-50250-R.015 |
| | | 1/4 | .020 | 3/8 | 2 | 5 | 34107 | 34107W | HEV-S-50250-R.020 |
| new | | 1/4 | .020 | 3/8 | 4 | 5 | 82958 | | HEV-S-50250-R.020 |
| | | 1/4 | .020 | 1/2 | 2-1/2 | 5 | 34122 | 34122W | HEV-SR-50250-R.020 |
| | | 1/4 | .020 | 3/4 | 2-1/2 | 5 | 34137 | 34137W | HEV-R-50250-R.020 |
| new | | 1/4 | .020 | 3/4 | 4 | 5 | 82959 | | HEV-R-50250-R.020 |
| | | 1/4 | .020 | 1 | 3 | 5 | 34152 | 34152W | HEV-M-50250-R.020 |
| | | 1/4 | .020 | 1-1/4 | 3 | 5 | 34157 | | HEV-L-50250-R.020 |
| | | 1/4 | .020 | 1-1/2 | 3 | 5 | 82541 | | HEV-LX-50250-R.020 |
| new | | 1/4 | .030 | 3/8 | 2 | 5 | 45107 | 45107W | HEV-S-50250-R.030 |
| new | | 1/4 | .030 | 1/2 | 2-1/2 | 5 | 45122 | 45122W | HEV-SR-50250-R.030 |
| new | | 1/4 | .030 | 3/4 | 2-1/2 | 5 | 45137 | 45137W | HEV-R-50250-R.030 |
| new | | 1/4 | .030 | 1 | 3 | 5 | 45152 | 45152W | HEV-M-50250-R.030 |
| | | 1/4 | .030 | 1-1/4 | 3 | 5 | 45157 | | HEV-L-50250-R.030 |
| | | 1/4 | .030 | 1-1/2 | 3 | 5 | 82542 | | HEV-LX-50250-R.030 |
| new | | 1/4 | .060 | 3/8 | 2 | 5 | 45108 | 45108W | HEV-S-50250-R.060 |
| new | | 1/4 | .060 | 1/2 | 2-1/2 | 5 | 45123 | 45123W | HEV-SR-50250-R.060 |
| new | | 1/4 | .060 | 3/4 | 2-1/2 | 5 | 45138 | 45138W | HEV-R-50250-R.060 |
| new | | 1/4 | .060 | 1 | 3 | 5 | 45153 | 45153W | HEV-M-50250-R.060 |
| | | 1/4 | .060 | 1-1/4 | 3 | 5 | 45158 | | HEV-L-50250-R.060 |
| | | 1/4 | .060 | 1-1/2 | 3 | 5 | 82543 | | HEV-LX-50250-R.060 |
| | 9/32 | 5/16 | .020 | 7/16 | 2 | 5 | 81738 | | HEV-S-50281-R.020 |
| | | 5/16 | .020 | 3/4 | 2-1/2 | 5 | 81739 | | HEV-R-50281-R.020 |
| | | 5/16 | .020 | 1 | 3 | 5 | 81740 | | HEV-M-50281-R.020 |
| | 5/16 | 5/16 | .010 | 7/16 | 2 | 5 | 81741 | | HEV-S-50312-R.010 |
| | | 5/16 | .010 | 13/16 | 2-1/2 | 5 | 81742 | | HEV-R-50312-R.010 |
| new | | 5/16 | .020 | 7/16 | 2 | 5 | 34167 | 34167W | HEV-S-50312-R.020 |
| new | | 5/16 | .020 | 13/16 | 2-1/2 | 5 | 34182 | 34182W | HEV-R-50312-R.020 |
| new | | 5/16 | .020 | 1 | 3 | 5 | 34197 | 34197W | HEV-M-50312-R.020 |
| | | 5/16 | .020 | 1-1/4 | 3 | 5 | 81743 | | HEV-L-50312-R.020 |
| | | 5/16 | .020 | 1-9/16 | 4 | 5 | 82544 | | HEV-LX-50312-R.020 |
| new | | 5/16 | .030 | 7/16 | 2 | 5 | 45167 | 45167W | HEV-S-50312-R.030 |
| new | | 5/16 | .030 | 13/16 | 2-1/2 | 5 | 45182 | 45182W | HEV-R-50312-R.030 |
| new | | 5/16 | .030 | 1 | 3 | 5 | 45197 | 45197W | HEV-M-50312-R.030 |
| | | 5/16 | .030 | 1-1/4 | 3 | 5 | 82545 | | HEV-L-50312-R.030 |
| | | 5/16 | .060 | 7/16 | 2 | 5 | 45168 | | HEV-S-50312-R.060 |
| | | 5/16 | .060 | 13/16 | 2-1/2 | 5 | 45183 | | HEV-R-50312-R.060 |
| | | 5/16 | .060 | 1 | 3 | 5 | 45198 | | HEV-M-50312-R.060 |

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# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-5

continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 3/8 | 3/8 | .010 | 1/2 | 2 | 5 | 81744 | | HEV-S-50375-R.010 | |
| | 3/8 | .010 | 3/4 | 2-1/2 | 5 | 82546 | | HEV-SR-50375-R.010 | |
| | 3/8 | .010 | 1 | 3 | 5 | 81745 | | HEV-R-50375-R.010 | |
| | 3/8 | .010 | 1-1/4 | 3 | 5 | 81746 | | HEV-M-50375-R.010 | |
| | 3/8 | .010 | 1-1/2 | 3-1/2 | 5 | 81747 | | HEV-L-50375-R.010 | |
| | 3/8 | .015 | 1/2 | 2 | 5 | 81748 | | HEV-S-50375-R.015 | |
| | 3/8 | .015 | 3/4 | 2-1/2 | 5 | 82547 | | HEV-SR-50375-R.015 | |
| | 3/8 | .015 | 1 | 3 | 5 | 81749 | | HEV-R-50375-R.015 | |
| | 3/8 | .015 | 1-1/4 | 3 | 5 | 82548 | | HEV-M-50375-R.015 | |
| | 3/8 | .020 | 1/2 | 2 | 5 | 34212 | 34212W | HEV-S-50375-R.020 | |
| | 3/8 | .020 | 1/2 | 4 | 5 | 82960 | | HEV-S-50375-R.020 | new |
| | 3/8 | .020 | 3/4 | 2-1/2 | 5 | 81750 | | HEV-SR-50375-R.020 | |
| | 3/8 | .020 | 1 | 3 | 5 | 34227 | 34227W | HEV-R-50375-R.020 | |
| | 3/8 | .020 | 1 | 6 | 5 | 82961 | | HEV-R-50375-R.020 | new |
| | 3/8 | .020 | 1-1/4 | 3 | 5 | 34242 | 34242W | HEV-M-50375-R.020 | |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 5 | 34247 | | HEV-L-50375-R.020 | |
| | 3/8 | .030 | 1/2 | 2 | 5 | 45212 | 45212W | HEV-S-50375-R.030 | |
| | 3/8 | .030 | 3/4 | 2-1/2 | 5 | 81751 | | HEV-SR-50375-R.030 | |
| | 3/8 | .030 | 1 | 3 | 5 | 45227 | 45227W | HEV-R-50375-R.030 | |
| | 3/8 | .030 | 1-1/4 | 3 | 5 | 45242 | 45242W | HEV-M-50375-R.030 | |
| | 3/8 | .030 | 1-1/2 | 3-1/2 | 5 | 45247 | 45247W | HEV-L-50375-R.030 | |
| | 3/8 | .060 | 1/2 | 2 | 5 | 45213 | 45213W | HEV-S-50375-R.060 | |
| | 3/8 | .060 | 3/4 | 2-1/2 | 5 | 81752 | | HEV-SR-50375-R.060 | |
| | 3/8 | .060 | 1 | 3 | 5 | 45228 | 45228W | HEV-R-50375-R.060 | |
| | 3/8 | .060 | 1-1/4 | 3 | 5 | 45243 | 45243W | HEV-M-50375-R.060 | |
| | 3/8 | .060 | 1-1/2 | 3-1/2 | 5 | 45248 | | HEV-L-50375-R.060 | |
| | 3/8 | .090 | 1/2 | 2 | 5 | 45214 | | HEV-S-50375-R.090 | |
| | 3/8 | .090 | 1 | 3 | 5 | 45229 | | HEV-R-50375-R.090 | |
| | 3/8 | .090 | 1-1/4 | 3 | 5 | 45244 | | HEV-M-50375-R.090 | |
| | 3/8 | .090 | 1-1/2 | 3-1/2 | 5 | 45249 | | HEV-L-50375-R.090 | |
| | 3/8 | .125 | 1/2 | 2 | 5 | 82549 | | HEV-S-50375-R.125 | |
| | 3/8 | .125 | 1 | 3 | 5 | 82550 | | HEV-R-50375-R.125 | |
| | 3/8 | .125 | 1-1/4 | 3 | 5 | 82551 | | HEV-M-50375-R.125 | |

*.0005 max TIR

continued on next page

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# HEV-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 5 | 81753 | 81753W | HEV-S-50500-R.010 |
| new | | 1/2 | .010 | 1 | 3 | 5 | 81754 | 81754W | HEV-SR-50500-R.010 |
| new | | 1/2 | .010 | 1-1/4 | 3 | 5 | 81755 | 81755W | HEV-R-50500-R.010 |
| | | 1/2 | .010 | 1-5/8 | 4 | 5 | 81756 | | HEV-M-50500-R.010 |
| | | 1/2 | .010 | 2 | 4 | 5 | 81757 | | HEV-L-50500-R.010 |
| new | | 1/2 | .015 | 5/8 | 2-1/2 | 5 | 81758 | 81758W | HEV-S-50500-R.015 |
| new | | 1/2 | .015 | 1 | 3 | 5 | 81759 | 81759W | HEV-SR-50500-R.015 |
| new | | 1/2 | .015 | 1-1/4 | 3 | 5 | 81760 | 81760W | HEV-R-50500-R.015 |
| | | 1/2 | .015 | 1-5/8 | 4 | 5 | 82552 | | HEV-M-50500-R.015 |
| | | 1/2 | .015 | 2 | 4 | 5 | 82553 | | HEV-L-50500-R.015 |
| new | | 1/2 | .020 | 5/8 | 2-1/2 | 5 | 81761 | 81761W | HEV-S-50500-R.020 |
| new | | 1/2 | .020 | 1 | 3 | 5 | 81762 | 81762W | HEV-SR-50500-R.020 |
| new | | 1/2 | .020 | 1-1/4 | 3 | 5 | 81763 | 81763W | HEV-R-50500-R.020 |
| | | 1/2 | .020 | 1-5/8 | 4 | 5 | 82554 | | HEV-M-50500-R.020 |
| | | 1/2 | .020 | 2 | 4 | 5 | 82555 | | HEV-L-50500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 5 | 34257 | 34257W | HEV-S-50500-R.030 |
| new | | 1/2 | .030 | 5/8 | 4 | 5 | 82962 | | HEV-S-50500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 5 | 34272 | 34272W | HEV-SR-50500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 5 | 34287 | 34287W | HEV-R-50500-R.030 |
| new | | 1/2 | .030 | 1-1/4 | 6 | 5 | 82963 | | HEV-R-50500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 5 | 34302 | 34302W | HEV-M-50500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 5 | 34307 | 34307W | HEV-L-50500-R.030 |
| | | 1/2 | .030 | 2-1/2 | 5 | 5 | 81764 | | HEV-LX-50500-R.030 |
| | | 1/2 | .030 | 3-1/8 | 6 | 5 | 82556 | | HEV-X-50500-R.030 |
| | | 1/2 | .030 | 3-5/8 | 6 | 5 | 82557 | | HEV-Y-50500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 5 | 45257 | 45257W | HEV-S-50500-R.060 |
| new | | 1/2 | .060 | 5/8 | 4 | 5 | 82964 | | HEV-S-50500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 5 | 45272 | 45272W | HEV-SR-50500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 5 | 45287 | 45287W | HEV-R-50500-R.060 |
| new | | 1/2 | .060 | 1-1/4 | 6 | 5 | 82965 | | HEV-R-50500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 5 | 45302 | 45302W | HEV-M-50500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 5 | 45307 | 45307W | HEV-L-50500-R.060 |
| | | 1/2 | .060 | 2-1/2 | 5 | 5 | 81765 | | HEV-LX-50500-R.060 |
| new | | 1/2 | .090 | 5/8 | 2-1/2 | 5 | 45258 | 45258W | HEV-S-50500-R.090 |
| new | | 1/2 | .090 | 1 | 3 | 5 | 45273 | 45273W | HEV-SR-50500-R.090 |
| | | 1/2 | .090 | 1-1/4 | 3 | 5 | 45288 | 45288W | HEV-R-50500-R.090 |
| | | 1/2 | .090 | 1-5/8 | 4 | 5 | 45303 | | HEV-M-50500-R.090 |
| | | 1/2 | .090 | 2 | 4 | 5 | 45308 | | HEV-L-50500-R.090 |
| | | 1/2 | .090 | 2-1/2 | 5 | 5 | 82558 | | HEV-LX-50500-R.090 |
| new | | 1/2 | .120 | 5/8 | 2-1/2 | 5 | 45259 | 45259W | HEV-S-50500-R.120 |
| new | | 1/2 | .120 | 1 | 3 | 5 | 45274 | 45274W | HEV-SR-50500-R.120 |
| | | 1/2 | .120 | 1-1/4 | 3 | 5 | 45289 | 45289W | HEV-R-50500-R.120 |
| | | 1/2 | .120 | 1-5/8 | 4 | 5 | 45304 | 45304W | HEV-M-50500-R.120 |
| new | | 1/2 | .120 | 2 | 4 | 5 | 45309 | 45309W | HEV-L-50500-R.120 |
| | | 1/2 | .120 | 2-1/2 | 5 | 5 | 82559 | | HEV-LX-50500-R.120 |
| | | 1/2 | .125 | 5/8 | 2-1/2 | 5 | 81766 | | HEV-S-50500-R.125 |
| | | 1/2 | .125 | 1 | 3 | 5 | 81767 | | HEV-SR-50500-R.125 |
| | | 1/2 | .125 | 1-1/4 | 3 | 5 | 81768 | | HEV-R-50500-R.125 |
| | | 1/2 | .125 | 1-5/8 | 4 | 5 | 82560 | | HEV-M-50500-R.125 |

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# 5 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-5

continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | .030 | 3/4 | 3 | 5 | 34317 | | HEV-S-50625-R.030 | |
| | 5/8 | .030 | 1-1/4 | 3-1/2 | 5 | 34322 | 34322W | HEV-SR-50625-R.030 | |
| | 5/8 | .030 | 1-5/8 | 3-1/2 | 5 | 34332 | 34332W | HEV-R-50625-R.030 | |
| | 5/8 | .030 | 2-1/8 | 4 | 5 | 34347 | 34347W | HEV-M-50625-R.030 | |
| | 5/8 | .030 | 2-1/2 | 5 | 5 | 34352 | | HEV-L-50625-R.030 | |
| | 5/8 | .030 | 3-1/4 | 6 | 5 | 82561 | | HEV-LX-50625-R.030 | |
| | 5/8 | .060 | 3/4 | 3 | 5 | 45317 | | HEV-S-50625-R.060 | |
| | 5/8 | .060 | 1-1/4 | 3-1/2 | 5 | 45322 | | HEV-SR-50625-R.060 | |
| | 5/8 | .060 | 1-5/8 | 3-1/2 | 5 | 45332 | | HEV-R-50625-R.060 | |
| | 5/8 | .060 | 2-1/8 | 4 | 5 | 45347 | | HEV-M-50625-R.060 | |
| | 5/8 | .060 | 2-1/2 | 5 | 5 | 45352 | | HEV-L-50625-R.060 | |
| | 5/8 | .090 | 3/4 | 3 | 5 | 45318 | | HEV-S-50625-R.090 | |
| | 5/8 | .090 | 1-1/4 | 3-1/2 | 5 | 45323 | | HEV-SR-50625-R.090 | |
| | 5/8 | .090 | 1-5/8 | 3-1/2 | 5 | 45333 | | HEV-R-50625-R.090 | |
| | 5/8 | .090 | 2-1/8 | 4 | 5 | 45348 | | HEV-M-50625-R.090 | |
| | 5/8 | .090 | 2-1/2 | 5 | 5 | 45353 | | HEV-L-50625-R.090 | |
| | 5/8 | .120 | 3/4 | 3 | 5 | 45319 | | HEV-S-50625-R.120 | |
| | 5/8 | .120 | 1-1/4 | 3-1/2 | 5 | 45324 | | HEV-SR-50625-R.120 | |
| | 5/8 | .120 | 1-5/8 | 3-1/2 | 5 | 45334 | | HEV-R-50625-R.120 | |
| | 5/8 | .120 | 2-1/8 | 4 | 5 | 45349 | | HEV-M-50625-R.120 | |
| | 5/8 | .120 | 2-1/2 | 5 | 5 | 45354 | | HEV-L-50625-R.120 | |
| | 5/8 | .120 | 3-1/4 | 6 | 5 | 82562 | | HEV-LX-50625-R.120 | |
| 3/4 | 3/4 | .010 | 1 | 3 | 5 | 81769 | | HEV-S-50750-R.010 | |
| | 3/4 | .010 | 1-5/8 | 4 | 5 | 81770 | | HEV-R-50750-R.010 | |
| | 3/4 | .010 | 2-1/4 | 5 | 5 | 81771 | | HEV-M-50750-R.010 | |
| | 3/4 | .015 | 1 | 3 | 5 | 81772 | | HEV-S-50750-R.015 | |
| | 3/4 | .015 | 1-5/8 | 4 | 5 | 81773 | | HEV-R-50750-R.015 | |
| | 3/4 | .015 | 2-1/4 | 5 | 5 | 81774 | | HEV-M-50750-R.015 | |
| | 3/4 | .020 | 1 | 3 | 5 | 81775 | | HEV-S-50750-R.020 | |
| | 3/4 | .020 | 1-5/8 | 4 | 5 | 81776 | | HEV-R-50750-R.020 | |
| | 3/4 | .020 | 2-1/4 | 5 | 5 | 81777 | | HEV-M-50750-R.020 | |
| | 3/4 | .030 | 1 | 3 | 5 | 34362 | 34362W | HEV-S-50750-R.030 | |
| | 3/4 | .030 | 1 | 6 | 5 | 82966 | | HEV-S-50750-R.030 | new |
| | 3/4 | .030 | 1-1/4 | 4 | 5 | 81778 | | HEV-SR-50750-R.030 | |
| | 3/4 | .030 | 1-5/8 | 4 | 5 | 34377 | 34377W | HEV-R-50750-R.030 | |
| | 3/4 | .030 | 1-5/8 | 6 | 5 | 82967 | | HEV-R-50750-R.030 | new |
| | 3/4 | .030 | 2-1/4 | 5 | 5 | 34392 | 34392W | HEV-M-50750-R.030 | |
| | 3/4 | .030 | 2-3/4 | 5 | 5 | 34397 | | HEV-L-50750-R.030 | |
| | 3/4 | .030 | 3-1/4 | 6 | 5 | 34402 | | HEV-LX-50750-R.030 | |
| | 3/4 | .030 | 4 | 6-1/2 | 5 | 82563 | | HEV-X-50750-R.030 | |
| | 3/4 | .060 | 1 | 3 | 5 | 45362 | 45362W | HEV-S-50750-R.060 | new |
| | 3/4 | .060 | 1 | 6 | 5 | 82968 | | HEV-S-50750-R.060 | new |
| | 3/4 | .060 | 1-1/4 | 4 | 5 | 81779 | | HEV-SR-50750-R.060 | |
| | 3/4 | .060 | 1-5/8 | 4 | 5 | 45377 | 45377W | HEV-R-50750-R.060 | |
| | 3/4 | .060 | 1-5/8 | 6 | 5 | 82969 | | HEV-R-50750-R.060 | new |
| | 3/4 | .060 | 2-1/4 | 5 | 5 | 45392 | 45392W | HEV-M-50750-R.060 | |
| | 3/4 | .060 | 2-3/4 | 5 | 5 | 45397 | | HEV-L-50750-R.060 | |
| | 3/4 | .060 | 3-1/4 | 6 | 5 | 45402 | | HEV-LX-50750-R.060 | |
| | 3/4 | .060 | 4 | 6-1/2 | 5 | 82564 | | HEV-X-50750-R.060 | |

*.0005 max TIR

continued on next page

# HEV-5

New Items!

## 5 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| Cutter Dia.* $D_1$ +.000" −.002" | Shank Dia. $D_2$ (h6) | Corner Radius R +.002" −.002" | LOC $L_2$ +.032" −.000" | OAL $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | *Aplus* Coated + Weldon Flat | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | **.090** | 1 | 3 | 5 | **45363** | | HEV-S-50750-R.090 |
| | 3/4 | **.090** | 1-5/8 | 4 | 5 | **45378** | **45378W** | HEV-R-50750-R.090 |
| | 3/4 | **.090** | 2-1/4 | 5 | 5 | **45393** | | HEV-M-50750-R.090 |
| | 3/4 | **.090** | 2-3/4 | 5 | 5 | **45398** | | HEV-L-50750-R.090 |
| | 3/4 | **.090** | 3-1/4 | 6 | 5 | **45403** | | HEV-LX-50750-R.090 |
| | 3/4 | **.120** | 1 | 3 | 5 | **45364** | | HEV-S-50750-R.120 |
| | 3/4 | **.120** | 1-1/4 | 4 | 5 | **81780** | | HEV-SR-50750-R.120 |
| | 3/4 | **.120** | 1-5/8 | 4 | 5 | **45379** | **45379W** | HEV-R-50750-R.120 |
| | 3/4 | **.120** | 2-1/4 | 5 | 5 | **45394** | **45394W** | HEV-M-50750-R.120 |
| | 3/4 | **.120** | 2-3/4 | 5 | 5 | **45399** | | HEV-L-50750-R.120 |
| | 3/4 | **.120** | 3-1/4 | 6 | 5 | **45404** | | HEV-LX-50750-R.120 |
| | 3/4 | **.190** | 1 | 3 | 5 | **45365** | | HEV-S-50750-R.190 |
| | 3/4 | **.190** | 1-5/8 | 4 | 5 | **45380** | **45380W** | HEV-R-50750-R.190 |
| | 3/4 | **.190** | 2-1/4 | 5 | 5 | **45395** | | HEV-M-50750-R.190 |
| | 3/4 | **.190** | 2-3/4 | 5 | 5 | **45400** | | HEV-L-50750-R.190 |
| | 3/4 | **.190** | 3-1/4 | 6 | 5 | **45405** | | HEV-LX-50750-R.190 |
| | 3/4 | **.250** | 1 | 3 | 5 | **45366** | | HEV-S-50750-R.250 |
| | 3/4 | **.250** | 1-5/8 | 4 | 5 | **45381** | **45381W** | HEV-R-50750-R.250 |
| | 3/4 | **.250** | 2-1/4 | 5 | 5 | **45396** | | HEV-M-50750-R.250 |
| | 3/4 | **.250** | 2-3/4 | 5 | 5 | **45401** | | HEV-L-50750-R.250 |
| | 3/4 | **.250** | 3-1/4 | 6 | 5 | **45406** | | HEV-LX-50750-R.250 |
| 1 | 1 | **.030** | 1-1/4 | 4 | 5 | **34407** | | HEV-S-51000-R.030 |
| | 1 | **.030** | 2 | 4-1/2 | 5 | **34422** | | HEV-R-51000-R.030 |
| | 1 | **.030** | 2-5/8 | 5 | 5 | **34437** | | HEV-M-51000-R.030 |
| | 1 | **.030** | 3-1/4 | 6 | 5 | **34442** | | HEV-L-51000-R.030 |
| | 1 | **.030** | 4-1/4 | 7 | 5 | **34447** | | HEV-X-51000-R.030 |
| | 1 | **.060** | 1-1/4 | 4 | 5 | **45407** | | HEV-S-51000-R.060 |
| | 1 | **.060** | 2 | 4-1/2 | 5 | **45422** | | HEV-R-51000-R.060 |
| | 1 | **.060** | 2-5/8 | 5 | 5 | **45437** | | HEV-M-51000-R.060 |
| | 1 | **.060** | 3-1/4 | 6 | 5 | **45442** | | HEV-L-51000-R.060 |
| | 1 | **.060** | 4-1/4 | 7 | 5 | **45447** | | HEV-X-51000-R.060 |
| new | 1 | **.090** | 1-1/4 | 4 | 5 | **45408** | | HEV-S-51000-R.090 |
| new | 1 | **.090** | 2 | 4-1/2 | 5 | **45423** | | HEV-R-51000-R.090 |
| new | 1 | **.090** | 2-5/8 | 5 | 5 | **45438** | | HEV-M-51000-R.090 |
| | 1 | **.120** | 1-1/4 | 4 | 5 | **45409** | | HEV-S-51000-R.120 |
| | 1 | **.120** | 2 | 4-1/2 | 5 | **45424** | | HEV-R-51000-R.120 |
| | 1 | **.120** | 2-5/8 | 5 | 5 | **45439** | | HEV-M-51000-R.120 |
| | 1 | **.120** | 3-1/4 | 6 | 5 | **45444** | | HEV-L-51000-R.120 |
| | 1 | **.120** | 4-1/4 | 7 | 5 | **45449** | | HEV-X-51000-R.120 |
| | 1 | **.190** | 2 | 4-1/2 | 5 | **45425** | | HEV-R-51000-R.190 |
| | 1 | **.190** | 3-1/4 | 6 | 5 | **45445** | | HEV-L-51000-R.190 |
| | 1 | **.190** | 4-1/4 | 7 | 5 | **45450** | | HEV-X-51000-R.190 |
| | 1 | **.250** | 1-1/4 | 4 | 5 | **45411** | | HEV-S-51000-R.250 |
| | 1 | **.250** | 2 | 4-1/2 | 5 | **45426** | | HEV-R-51000-R.250 |
| | 1 | **.250** | 2-5/8 | 5 | 5 | **45441** | | HEV-M-51000-R.250 |
| | 1 | **.250** | 3-1/4 | 6 | 5 | **45446** | | HEV-L-51000-R.250 |
| | 1 | **.250** | 4-1/4 | 7 | 5 | **45451** | | HEV-X-51000-R.250 |

*.0005 max TIR

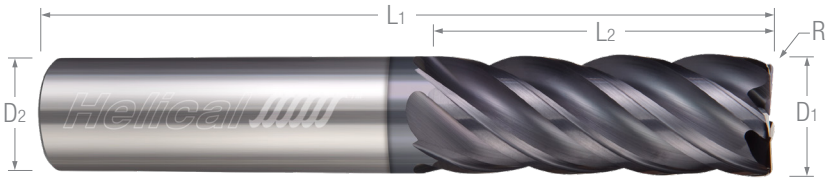
# 5 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch

**MHEV-5**
**METRIC**

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 5 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA






| Cutter Dia.* $D_1$ +.00 mm −.05 mm | Shank Dia. $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 5 | **59517** | MHEV-015-50600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 5 | **59535** | MHEV-020-50600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 5 | **59569** | MHEV-030-50600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 5 | **59518** | MHEV-015-50600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 5 | **59536** | MHEV-020-50600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 5 | **59570** | MHEV-030-50600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 5 | **59520** | MHEV-015-50800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 5 | **59538** | MHEV-020-50800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 5 | **59572** | MHEV-030-50800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 5 | **59521** | MHEV-015-50800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 5 | **59539** | MHEV-020-50800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 5 | **59573** | MHEV-030-50800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 5 | **59523** | MHEV-015-51000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 5 | **59541** | MHEV-020-51000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 5 | **59555** | MHEV-025-51000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 5 | **59524** | MHEV-015-51000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 5 | **59542** | MHEV-020-51000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 5 | **59556** | MHEV-025-51000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 5 | **59526** | MHEV-015-51200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 5 | **59544** | MHEV-020-51200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 5 | **59558** | MHEV-025-51200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 5 | **59527** | MHEV-015-51200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 5 | **59545** | MHEV-020-51200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 5 | **59559** | MHEV-025-51200-R1.00 |
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 5 | **59529** | MHEV-015-51600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 5 | **59547** | MHEV-020-51600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 5 | **59561** | MHEV-025-51600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 5 | **59530** | MHEV-015-51600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 5 | **59548** | MHEV-020-51600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 5 | **59562** | MHEV-025-51600-R1.00 |

* .013 mm max TIR

continued on next page

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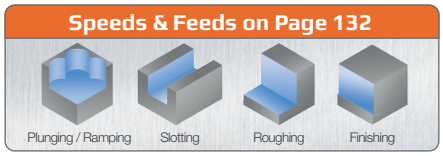


# MHEV-5
## METRIC

# 5 FLUTE - CORNER RADIUS - METRIC
## Variable Pitch (cont.)

continued from previous page

| Cutter Dia.* $D_1$ +.00 mm −.05 mm | Shank Dia. $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 5 | **59532** | MHEV-015-52000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 5 | **59550** | MHEV-020-52000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 5 | **59564** | MHEV-025-52000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 5 | **59533** | MHEV-015-52000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 5 | **59551** | MHEV-020-52000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 5 | **59565** | MHEV-025-52000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 5 | **59553** | MHEV-020-52500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 5 | **59567** | MHEV-025-52500-R1.00 |

* .013 mm max TIR



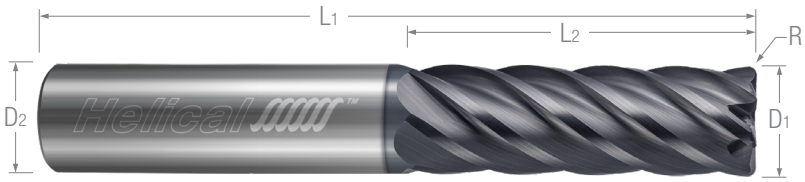
Access customized running parameters for your specific setup and material at
www.machiningadvisorpro.com
Download on the App Store
GET IT ON Google Play

# 6 FLUTE - CORNER RADIUS New Items!

## HVTI-6

### Variable Pitch - For High Efficiency Milling

- Specially engineered for optimal performance in High Efficiency Milling (HEM) of Titanium 6Al4V and other titanium alloys
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Not for use in traditional slotting and roughing toolpaths
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




Extensive testing has proven HVTI-6's excellence in extending tool life for HEM operations in Titanium

| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .010 | 3/8 | 2 | 6 | 83887 | HVTI-015-60250-R.010 | new |
| | 1/4 | .010 | 1/2 | 2-1/2 | 6 | 82059 | HVTI-020-60250-R.010 | |
| | 1/4 | .010 | 3/4 | 2-1/2 | 6 | 82060 | HVTI-030-60250-R.010 | |
| | 1/4 | .010 | 1 | 3 | 6 | 82061 | HVTI-040-60250-R.010 | |
| | 1/4 | .010 | 1-1/4 | 3 | 6 | 83888 | HVTI-050-60250-R.010 | new |
| | 1/4 | .020 | 1/2 | 2-1/2 | 6 | 83889 | HVTI-020-60250-R.020 | new |
| | 1/4 | .020 | 3/4 | 2-1/2 | 6 | 83890 | HVTI-030-60250-R.020 | new |
| | 1/4 | .020 | 1 | 3 | 6 | 83891 | HVTI-040-60250-R.020 | new |
| | 1/4 | .030 | 3/8 | 2 | 6 | 83892 | HVTI-015-60250-R.030 | new |
| | 1/4 | .030 | 1/2 | 2-1/2 | 6 | 82062 | HVTI-020-60250-R.030 | |
| | 1/4 | .030 | 3/4 | 2-1/2 | 6 | 82063 | HVTI-030-60250-R.030 | |
| | 1/4 | .030 | 1 | 3 | 6 | 82064 | HVTI-040-60250-R.030 | |
| | 1/4 | .030 | 1-1/4 | 3 | 6 | 83893 | HVTI-050-60250-R.030 | new |
| | 1/4 | .060 | 1/2 | 2-1/2 | 6 | 83894 | HVTI-020-60250-R.060 | new |
| | 1/4 | .060 | 3/4 | 2-1/2 | 6 | 83895 | HVTI-030-60250-R.060 | new |
| | 1/4 | .060 | 1 | 3 | 6 | 83896 | HVTI-040-60250-R.060 | new |
| 5/16 | 5/16 | .030 | 7/16 | 2 | 6 | 83897 | HVTI-014-60312-R.030 | new |
| | 5/16 | .030 | 3/4 | 2-1/2 | 6 | 83898 | HVTI-024-60312-R.030 | new |
| | 5/16 | .030 | 1 | 3 | 6 | 83899 | HVTI-032-60312-R.030 | new |
| | 5/16 | .030 | 1-1/4 | 3 | 6 | 83900 | HVTI-040-60312-R.030 | new |
| | 5/16 | .060 | 7/16 | 2 | 6 | 83901 | HVTI-014-60312-R.060 | new |
| | 5/16 | .060 | 3/4 | 2-1/2 | 6 | 83902 | HVTI-024-60312-R.060 | new |
| | 5/16 | .060 | 1 | 3 | 6 | 83903 | HVTI-032-60312-R.060 | new |
| | 5/16 | .060 | 1-1/4 | 3 | 6 | 83904 | HVTI-040-60312-R.060 | new |
| 3/8 | 3/8 | .010 | 1/2 | 2 | 6 | 83905 | HVTI-013-60375-R.010 | new |
| | 3/8 | .010 | 3/4 | 2-1/2 | 6 | 83906 | HVTI-020-60375-R.010 | new |
| | 3/8 | .010 | 1 | 3 | 6 | 82065 | HVTI-026-60375-R.010 | |
| | 3/8 | .010 | 1-1/4 | 3 | 6 | 82066 | HVTI-033-60375-R.010 | |
| | 3/8 | .010 | 1-1/2 | 3-1/2 | 6 | 82067 | HVTI-040-60375-R.010 | |
| | 3/8 | .010 | 1-3/4 | 4 | 6 | 83907 | HVTI-046-60375-R.010 | new |
| | 3/8 | .020 | 1 | 3 | 6 | 83908 | HVTI-026-60375-R.020 | new |
| | 3/8 | .020 | 1-1/4 | 3 | 6 | 83909 | HVTI-033-60375-R.020 | new |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 6 | 83910 | HVTI-040-60375-R.020 | new |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 202

# HVTI-6

HEM

New Items!

## 6 FLUTE - CORNER RADIUS

### Variable Pitch - For High Efficiency Milling (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 3/8 | 3/8 | .030 | 1/2 | 2 | 6 | 83911 | HVTI-013-60375-R.030 |
| new | | 3/8 | .030 | 3/4 | 2-1/2 | 6 | 83912 | HVTI-020-60375-R.030 |
| | | 3/8 | .030 | 1 | 3 | 6 | 82068 | HVTI-026-60375-R.030 |
| | | 3/8 | .030 | 1-1/4 | 3 | 6 | 82069 | HVTI-033-60375-R.030 |
| | | 3/8 | .030 | 1-1/2 | 3-1/2 | 6 | 82070 | HVTI-040-60375-R.030 |
| new | | 3/8 | .030 | 1-3/4 | 4 | 6 | 83913 | HVTI-046-60375-R.030 |
| new | | 3/8 | .060 | 1 | 3 | 6 | 83914 | HVTI-026-60375-R.060 |
| new | | 3/8 | .060 | 1-1/4 | 3 | 6 | 83915 | HVTI-033-60375-R.060 |
| new | | 3/8 | .060 | 1-1/2 | 3-1/2 | 6 | 83916 | HVTI-040-60375-R.060 |
| | 1/2 | 1/2 | .010 | 1 | 3 | 6 | 82071 | HVTI-020-60500-R.010 |
| | | 1/2 | .010 | 1-1/4 | 3 | 6 | 82072 | HVTI-025-60500-R.010 |
| | | 1/2 | .010 | 1-5/8 | 4 | 6 | 82073 | HVTI-032-60500-R.010 |
| | | 1/2 | .010 | 2 | 4 | 6 | 82074 | HVTI-040-60500-R.010 |
| new | | 1/2 | .010 | 2-1/2 | 5 | 6 | 83917 | HVTI-050-60500-R.010 |
| new | | 1/2 | .020 | 1 | 3 | 6 | 83918 | HVTI-020-60500-R.020 |
| new | | 1/2 | .020 | 1-1/4 | 3 | 6 | 83919 | HVTI-025-60500-R.020 |
| new | | 1/2 | .020 | 1-5/8 | 4 | 6 | 83920 | HVTI-032-60500-R.020 |
| new | | 1/2 | .020 | 2 | 4 | 6 | 83921 | HVTI-040-60500-R.020 |
| new | | 1/2 | .030 | 5/8 | 2-1/2 | 6 | 83922 | HVTI-012-60500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 6 | 82075 | HVTI-020-60500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 6 | 82076 | HVTI-025-60500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 6 | 82077 | HVTI-032-60500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 6 | 82078 | HVTI-040-60500-R.030 |
| new | | 1/2 | .030 | 2-1/2 | 5 | 6 | 83923 | HVTI-050-60500-R.030 |
| new | | 1/2 | .030 | 3-1/8 | 6 | 6 | 83924 | HVTI-062-60500-R.030 |
| new | | 1/2 | .060 | 5/8 | 2-1/2 | 6 | 83925 | HVTI-012-60500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 6 | 82079 | HVTI-020-60500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 6 | 82080 | HVTI-025-60500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 6 | 82081 | HVTI-032-60500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 6 | 82082 | HVTI-040-60500-R.060 |
| | | 1/2 | .120 | 1 | 3 | 6 | 82083 | HVTI-020-60500-R.120 |
| | | 1/2 | .120 | 1-1/4 | 3 | 6 | 82084 | HVTI-025-60500-R.120 |
| | | 1/2 | .120 | 1-5/8 | 4 | 6 | 82085 | HVTI-032-60500-R.120 |
| | | 1/2 | .120 | 2 | 4 | 6 | 82086 | HVTI-040-60500-R.120 |
| new | 5/8 | 5/8 | .030 | 1-1/4 | 3-1/2 | 6 | 83926 | HVTI-020-60625-R.030 |
| new | | 5/8 | .030 | 1-5/8 | 3-1/2 | 6 | 83927 | HVTI-026-60625-R.030 |
| new | | 5/8 | .030 | 2 | 4 | 6 | 83928 | HVTI-032-60625-R.030 |
| new | | 5/8 | .030 | 2-1/2 | 5 | 6 | 83929 | HVTI-040-60625-R.030 |
| new | | 5/8 | .060 | 1-1/4 | 3-1/2 | 6 | 83930 | HVTI-020-60625-R.060 |
| new | | 5/8 | .060 | 1-5/8 | 3-1/2 | 6 | 83931 | HVTI-026-60625-R.060 |
| new | | 5/8 | .060 | 2 | 4 | 6 | 83932 | HVTI-032-60625-R.060 |
| new | | 5/8 | .060 | 2-1/2 | 5 | 6 | 83933 | HVTI-040-60625-R.060 |
| new | | 5/8 | .120 | 1-1/4 | 3-1/2 | 6 | 83934 | HVTI-020-60625-R.120 |
| new | | 5/8 | .120 | 1-5/8 | 3-1/2 | 6 | 83935 | HVTI-026-60625-R.120 |
| new | | 5/8 | .120 | 2 | 4 | 6 | 83936 | HVTI-032-60625-R.120 |
| new | | 5/8 | .120 | 2-1/2 | 5 | 6 | 83937 | HVTI-040-60625-R.120 |

* .0005 max TIR

continued on next page

# 6 FLUTE - CORNER RADIUS New Items!

## Variable Pitch - For High Efficiency Milling (cont.)

HVTI-6

continued from previous page

| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 3/4 | 3/4 | **.030** | 1-5/8 | 4 | 6 | **82087** | HVTI-021-60750-R.030 | |
| | 3/4 | **.030** | 2-1/4 | 5 | 6 | **82088** | HVTI-030-60750-R.030 | |
| | 3/4 | **.030** | 2-3/4 | 5 | 6 | **83938** | HVTI-036-60750-R.030 | new |
| | 3/4 | **.060** | 1-5/8 | 4 | 6 | **82089** | HVTI-021-60750-R.060 | |
| | 3/4 | **.060** | 2-1/4 | 5 | 6 | **82090** | HVTI-030-60750-R.060 | |
| | 3/4 | **.060** | 2-3/4 | 5 | 6 | **83939** | HVTI-036-60750-R.060 | new |
| | 3/4 | **.090** | 1-5/8 | 4 | 6 | **82091** | HVTI-021-60750-R.090 | |
| | 3/4 | **.090** | 2-1/4 | 5 | 6 | **82092** | HVTI-030-60750-R.090 | |
| | 3/4 | **.120** | 1-5/8 | 4 | 6 | **82093** | HVTI-021-60750-R.120 | |
| | 3/4 | **.120** | 2-1/4 | 5 | 6 | **82094** | HVTI-030-60750-R.120 | |
| | 3/4 | **.120** | 2-3/4 | 5 | 6 | **83940** | HVTI-036-60750-R.120 | new |
| 1 | 1 | **.030** | 2 | 4-1/2 | 6 | **82095** | HVTI-020-61000-R.030 | |
| | 1 | **.030** | 2-5/8 | 5 | 6 | **82096** | HVTI-026-61000-R.030 | |
| | 1 | **.060** | 2 | 4-1/2 | 6 | **82097** | HVTI-020-61000-R.060 | |
| | 1 | **.060** | 2-5/8 | 5 | 6 | **82098** | HVTI-026-61000-R.060 | |
| | 1 | **.120** | 2 | 4-1/2 | 6 | **82099** | HVTI-020-61000-R.120 | |
| | 1 | **.120** | 2-5/8 | 5 | 6 | **82100** | HVTI-026-61000-R.120 | |

* .0005 max TIR

## HVTI-6

| Material Guide | | Hardness | SFM | Inches Per Tooth (IPT) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 1/4 | | 3/8 | | 1/2 | | 3/4 | | 1 | |
| | | | | HEM | Fin | HEM | Fin | HEM | Fin | HEM | Fin | HEM | Fin |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0029 | .0021 | .0045 | .0024 | .0057 | .0028 | .0084 | .0034 | .0107 | .0041 |
| | | 75 - 98 HRB | 250 | .0025 | .0019 | .0037 | .0022 | .0048 | .0026 | .0070 | .0031 | .0089 | .0037 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0015 | .0015 | .0023 | .0017 | .0029 | .0020 | .0043 | .0024 | .0054 | .0029 |
| | | 21 - 36 HRC | 75 | .0014 | .0015 | .0022 | .0017 | .0028 | .0020 | .0041 | .0023 | .0052 | .0028 |
| | | 36 - 50 HRC | 70 | .0012 | .0014 | .0019 | .0015 | .0024 | .0018 | .0035 | .0022 | .0044 | .0026 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0041 | .0025 | .0062 | .0028 | .0079 | .0033 | .0116 | .0039 | .0147 | .0048 |
| | | 75 - 98 HRB | 275 | .0034 | .0023 | .0052 | .0026 | .0066 | .0030 | .0097 | .0036 | .0123 | .0044 |
| | | 21 - 36 HRC | 250 | .0025 | .0020 | .0039 | .0022 | .0050 | .0026 | .0073 | .0031 | .0093 | .0038 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0020 | .0017 | .0031 | .0020 | .0039 | .0023 | .0057 | .0028 | .0073 | .0034 |
| | | 36 - 50 HRC | 160 | .0018 | .0017 | .0028 | .0019 | .0036 | .0022 | .0052 | .0027 | .0067 | .0032 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0017 | .0016 | .0026 | .0018 | .0033 | .0022 | .0049 | .0026 | .0062 | .0031 |
| | | 21 - 36 HRC | 170 | .0017 | .0016 | .0025 | .0018 | .0032 | .0021 | .0047 | .0025 | .0060 | .0030 |
| | | 36 - 50 HRC | 65 | .0011 | .0013 | .0017 | .0015 | .0022 | .0017 | .0032 | .0021 | .0040 | .0025 |

| Milling Process | ADOC | RDOC |
|---|---|---|
| HEM (High Efficiency Milling) | Up to Max LOC | Up to 10% Diameter |
| Fin (Finishing) | Up to Max LOC | 4%-6% Diameter |

NOTES:

IPT values shown are for 2.5xD length of cut tools, and should be adjusted for longer or shorter lengths of cut. For more accurate running parameters, please refer to Machining Advisor Pro.

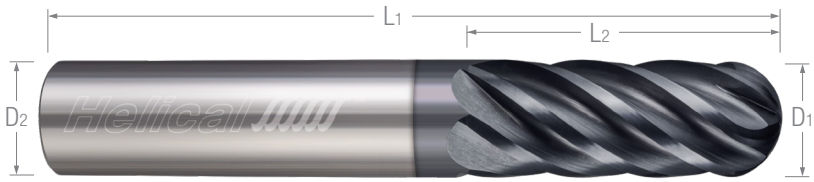
# HEV-6

New Items!

## 6 FLUTE - BALL

### Variable Pitch

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| | 1/4 | 1/4 | 3/8 | 2 | 6 | 59434 | HEV-S-60250-BN |
| | | 1/4 | 1/2 | 2-1/2 | 6 | 59435 | HEV-SR-60250-BN |
| | | 1/4 | 3/4 | 2-1/2 | 6 | 59436 | HEV-R-60250-BN |
| | | 1/4 | 1 | 3 | 6 | 59437 | HEV-M-60250-BN |
| | | 1/4 | 1-1/4 | 3 | 6 | 59438 | HEV-L-60250-BN |
| new | | 1/4 | 1-1/2 | 3 | 6 | 83361 | HEV-LX-60250-BN |
| | 5/16 | 5/16 | 7/16 | 2 | 6 | 59439 | HEV-S-60312-BN |
| | | 5/16 | 3/4 | 2-1/2 | 6 | 59440 | HEV-R-60312-BN |
| | | 5/16 | 1 | 3 | 6 | 59441 | HEV-M-60312-BN |
| | 3/8 | 3/8 | 1/2 | 2 | 6 | 59442 | HEV-S-60375-BN |
| | | 3/8 | 3/4 | 2-1/2 | 6 | 82592 | HEV-SR-60375-BN |
| | | 3/8 | 1 | 3 | 6 | 59443 | HEV-R-60375-BN |
| | | 3/8 | 1-1/4 | 3 | 6 | 59444 | HEV-M-60375-BN |
| | | 3/8 | 1-1/2 | 3-1/2 | 6 | 59445 | HEV-L-60375-BN |
| new | | 3/8 | 2 | 4 | 6 | 83362 | HEV-LX-60375-BN |
| | 1/2 | 1/2 | 5/8 | 2-1/2 | 6 | 59446 | HEV-S-60500-BN |
| | | 1/2 | 1 | 3 | 6 | 59447 | HEV-SR-60500-BN |
| | | 1/2 | 1-1/4 | 3 | 6 | 59448 | HEV-R-60500-BN |
| | | 1/2 | 1-5/8 | 4 | 6 | 59449 | HEV-M-60500-BN |
| | | 1/2 | 2 | 4 | 6 | 59450 | HEV-L-60500-BN |
| | | 1/2 | 2-1/2 | 5 | 6 | 82593 | HEV-LX-60500-BN |
| | 5/8 | 5/8 | 3/4 | 3 | 6 | 59451 | HEV-S-60625-BN |
| | | 5/8 | 1-1/4 | 3-1/2 | 6 | 59452 | HEV-SR-60625-BN |
| | | 5/8 | 1-5/8 | 3-1/2 | 6 | 59453 | HEV-R-60625-BN |
| | 3/4 | 3/4 | 1 | 3 | 6 | 59454 | HEV-S-60750-BN |
| | | 3/4 | 1-5/8 | 4 | 6 | 59455 | HEV-R-60750-BN |
| | | 3/4 | 2-1/4 | 5 | 6 | 59456 | HEV-M-60750-BN |
| new | | 3/4 | 2-3/4 | 5 | 6 | 83363 | HEV-L-60750-BN |
| | 1 | 1 | 2 | 4-1/2 | 6 | 59457 | HEV-R-61000-BN |
| | | 1 | 2-5/8 | 5 | 6 | 82594 | HEV-M-61000-BN |

* .0005 max TIR

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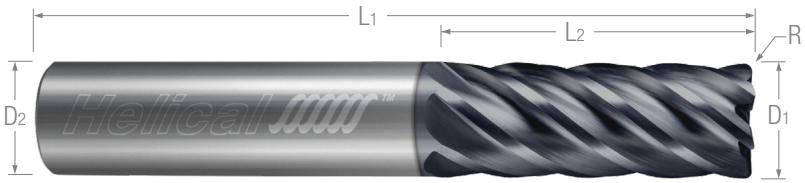
# 6 FLUTE - CORNER RADIUS New Items!

## Variable Pitch

HEM

**HEV-6**

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | .020 | 3/8 | 2 | 6 | 59280 | HEV-S-60250-R.020 |
| | 1/4 | .020 | 1/2 | 2-1/2 | 6 | 59283 | HEV-SR-60250-R.020 |
| | 1/4 | .020 | 3/4 | 2-1/2 | 6 | 59286 | HEV-R-60250-R.020 |
| | 1/4 | .020 | 1 | 3 | 6 | 59289 | HEV-M-60250-R.020 |
| | 1/4 | .020 | 1-1/4 | 3 | 6 | 59292 | HEV-L-60250-R.020 |
| | 1/4 | .020 | 1-1/2 | 3 | 6 | 82569 | HEV-LX-60250-R.020 |
| | 1/4 | .030 | 3/8 | 2 | 6 | 59281 | HEV-S-60250-R.030 |
| | 1/4 | .030 | 1/2 | 2-1/2 | 6 | 59284 | HEV-SR-60250-R.030 |
| | 1/4 | .030 | 3/4 | 2-1/2 | 6 | 59287 | HEV-R-60250-R.030 |
| | 1/4 | .030 | 1 | 3 | 6 | 59290 | HEV-M-60250-R.030 |
| | 1/4 | .030 | 1-1/4 | 3 | 6 | 59293 | HEV-L-60250-R.030 |
| | 1/4 | .060 | 3/8 | 2 | 6 | 59282 | HEV-S-60250-R.060 |
| | 1/4 | .060 | 1/2 | 2-1/2 | 6 | 59285 | HEV-SR-60250-R.060 |
| | 1/4 | .060 | 3/4 | 2-1/2 | 6 | 59288 | HEV-R-60250-R.060 |
| | 1/4 | .060 | 1 | 3 | 6 | 59291 | HEV-M-60250-R.060 |
| | 1/4 | .060 | 1-1/4 | 3 | 6 | 59294 | HEV-L-60250-R.060 |
| | 1/4 | .060 | 1-1/2 | 3 | 6 | 82570 | HEV-LX-60250-R.060 |
| 5/16 | 5/16 | .020 | 7/16 | 2 | 6 | 59295 | HEV-S-60312-R.020 |
| | 5/16 | .020 | 3/4 | 2-1/2 | 6 | 59298 | HEV-R-60312-R.020 |
| | 5/16 | .020 | 1 | 3 | 6 | 59301 | HEV-M-60312-R.020 |
| | 5/16 | .030 | 7/16 | 2 | 6 | 59296 | HEV-S-60312-R.030 |
| | 5/16 | .030 | 3/4 | 2-1/2 | 6 | 59299 | HEV-R-60312-R.030 |
| | 5/16 | .030 | 1 | 3 | 6 | 59302 | HEV-M-60312-R.030 |
| | 5/16 | .060 | 7/16 | 2 | 6 | 59297 | HEV-S-60312-R.060 |
| | 5/16 | .060 | 3/4 | 2-1/2 | 6 | 59300 | HEV-R-60312-R.060 |
| | 5/16 | .060 | 1 | 3 | 6 | 59303 | HEV-M-60312-R.060 |
| 3/8 | 3/8 | .020 | 1/2 | 2 | 6 | 59304 | HEV-S-60375-R.020 |
| | 3/8 | .020 | 3/4 | 2-1/2 | 6 | 82571 | HEV-SR-60375-R.020 |
| | 3/8 | .020 | 1 | 3 | 6 | 59308 | HEV-R-60375-R.020 |
| | 3/8 | .020 | 1-1/4 | 3 | 6 | 59312 | HEV-M-60375-R.020 |
| | 3/8 | .020 | 1-1/2 | 3-1/2 | 6 | 59316 | HEV-L-60375-R.020 |
| | 3/8 | .020 | 2 | 4 | 6 | 83318 | HEV-LX-60375-R.020 new |

* .0005 max TIR

continued on next page

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# HEV-6

New Items!

## 6 FLUTE - CORNER RADIUS

### Variable Pitch (cont.)

continued from previous page

| | Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| | 3/8 | 3/8 | .030 | 1/2 | 2 | 6 | 59305 | HEV-S-60375-R.030 |
| | | 3/8 | .030 | 3/4 | 2-1/2 | 6 | 82572 | HEV-SR-60375-R.030 |
| | | 3/8 | .030 | 1 | 3 | 6 | 59309 | HEV-R-60375-R.030 |
| | | 3/8 | .030 | 1-1/4 | 3 | 6 | 59313 | HEV-M-60375-R.030 |
| | | 3/8 | .030 | 1-1/2 | 3-1/2 | 6 | 59317 | HEV-L-60375-R.030 |
| | | 3/8 | .030 | 2 | 4 | 6 | 82573 | HEV-LX-60375-R.030 |
| | | 3/8 | .060 | 1/2 | 2 | 6 | 59306 | HEV-S-60375-R.060 |
| | | 3/8 | .060 | 3/4 | 2-1/2 | 6 | 82574 | HEV-SR-60375-R.060 |
| | | 3/8 | .060 | 1 | 3 | 6 | 59310 | HEV-R-60375-R.060 |
| | | 3/8 | .060 | 1-1/4 | 3 | 6 | 59314 | HEV-M-60375-R.060 |
| | | 3/8 | .060 | 1-1/2 | 3-1/2 | 6 | 59318 | HEV-L-60375-R.060 |
| | | 3/8 | .060 | 2 | 4 | 6 | 82575 | HEV-LX-60375-R.060 |
| | | 3/8 | .090 | 1/2 | 2 | 6 | 59307 | HEV-S-60375-R.090 |
| | | 3/8 | .090 | 3/4 | 2-1/2 | 6 | 82576 | HEV-SR-60375-R.090 |
| | | 3/8 | .090 | 1 | 3 | 6 | 59311 | HEV-R-60375-R.090 |
| | | 3/8 | .090 | 1-1/4 | 3 | 6 | 59315 | HEV-M-60375-R.090 |
| | | 3/8 | .090 | 1-1/2 | 3-1/2 | 6 | 59319 | HEV-L-60375-R.090 |
| | | 3/8 | .090 | 2 | 4 | 6 | 82577 | HEV-LX-60375-R.090 |
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 6 | 83319 | HEV-S-60500-R.010 |
| | | 1/2 | .010 | 1 | 3 | 6 | 82578 | HEV-SR-60500-R.010 |
| | | 1/2 | .010 | 1-1/4 | 3 | 6 | 82579 | HEV-R-60500-R.010 |
| new | | 1/2 | .015 | 5/8 | 2-1/2 | 6 | 83320 | HEV-S-60500-R.015 |
| | | 1/2 | .015 | 1 | 3 | 6 | 82580 | HEV-SR-60500-R.015 |
| | | 1/2 | .015 | 1-1/4 | 3 | 6 | 82581 | HEV-R-60500-R.015 |
| | | 1/2 | .020 | 1 | 3 | 6 | 82582 | HEV-SR-60500-R.020 |
| | | 1/2 | .020 | 1-1/4 | 3 | 6 | 82583 | HEV-R-60500-R.020 |
| | | 1/2 | .030 | 5/8 | 2-1/2 | 6 | 59320 | HEV-S-60500-R.030 |
| | | 1/2 | .030 | 1 | 3 | 6 | 59324 | HEV-SR-60500-R.030 |
| | | 1/2 | .030 | 1-1/4 | 3 | 6 | 59328 | HEV-R-60500-R.030 |
| | | 1/2 | .030 | 1-5/8 | 4 | 6 | 59332 | HEV-M-60500-R.030 |
| | | 1/2 | .030 | 2 | 4 | 6 | 59336 | HEV-L-60500-R.030 |
| | | 1/2 | .030 | 2-1/2 | 5 | 6 | 82584 | HEV-LX-60500-R.030 |
| | | 1/2 | .060 | 5/8 | 2-1/2 | 6 | 59321 | HEV-S-60500-R.060 |
| | | 1/2 | .060 | 1 | 3 | 6 | 59325 | HEV-SR-60500-R.060 |
| | | 1/2 | .060 | 1-1/4 | 3 | 6 | 59329 | HEV-R-60500-R.060 |
| | | 1/2 | .060 | 1-5/8 | 4 | 6 | 59333 | HEV-M-60500-R.060 |
| | | 1/2 | .060 | 2 | 4 | 6 | 59337 | HEV-L-60500-R.060 |
| | | 1/2 | .060 | 2-1/2 | 5 | 6 | 82585 | HEV-LX-60500-R.060 |
| | | 1/2 | .090 | 5/8 | 2-1/2 | 6 | 59322 | HEV-S-60500-R.090 |
| | | 1/2 | .090 | 1 | 3 | 6 | 59326 | HEV-SR-60500-R.090 |
| | | 1/2 | .090 | 1-1/4 | 3 | 6 | 59330 | HEV-R-60500-R.090 |
| | | 1/2 | .090 | 1-5/8 | 4 | 6 | 59334 | HEV-M-60500-R.090 |
| | | 1/2 | .090 | 2 | 4 | 6 | 59338 | HEV-L-60500-R.090 |
| | | 1/2 | .090 | 2-1/2 | 5 | 6 | 82586 | HEV-LX-60500-R.090 |
| | | 1/2 | .125 | 5/8 | 2-1/2 | 6 | 59323 | HEV-S-60500-R.125 |
| | | 1/2 | .125 | 1 | 3 | 6 | 59327 | HEV-SR-60500-R.125 |
| | | 1/2 | .125 | 1-1/4 | 3 | 6 | 59331 | HEV-R-60500-R.125 |
| | | 1/2 | .125 | 1-5/8 | 4 | 6 | 59335 | HEV-M-60500-R.125 |
| | | 1/2 | .125 | 2 | 4 | 6 | 59339 | HEV-L-60500-R.125 |
| new | | 1/2 | .125 | 2-1/2 | 5 | 6 | 83321 | HEV-LX-60500-R.125 |

* .0005 max TIR

continued on next page

# 6 FLUTE - CORNER RADIUS New Items!

## Variable Pitch (cont.)

HEV-6

continued from previous page

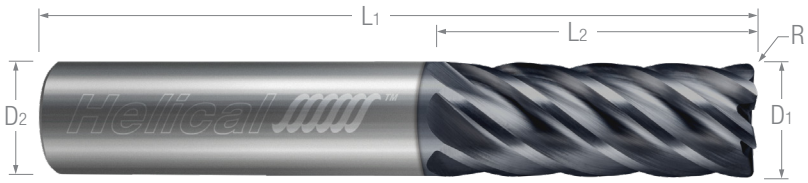
| Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.002"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 6 | **59340** | HEV-S-60625-R.030 | |
| | 5/8 | **.030** | 1-1/4 | 3-1/2 | 6 | **59341** | HEV-SR-60625-R.030 | |
| | 5/8 | **.030** | 1-5/8 | 3-1/2 | 6 | **59345** | HEV-R-60625-R.030 | |
| | 5/8 | **.030** | 2 | 4 | 6 | **59349** | HEV-M-60625-R.030 | |
| | 5/8 | **.030** | 2-1/2 | 5 | 6 | **59353** | HEV-L-60625-R.030 | |
| | 5/8 | **.060** | 1-1/4 | 3-1/2 | 6 | **59342** | HEV-SR-60625-R.060 | |
| | 5/8 | **.060** | 1-5/8 | 3-1/2 | 6 | **59346** | HEV-R-60625-R.060 | |
| | 5/8 | **.060** | 2 | 4 | 6 | **59350** | HEV-M-60625-R.060 | |
| | 5/8 | **.090** | 1-1/4 | 3-1/2 | 6 | **59343** | HEV-SR-60625-R.090 | |
| | 5/8 | **.090** | 1-5/8 | 3-1/2 | 6 | **59347** | HEV-R-60625-R.090 | |
| | 5/8 | **.090** | 2 | 4 | 6 | **59351** | HEV-M-60625-R.090 | |
| | 5/8 | **.125** | 1-1/4 | 3-1/2 | 6 | **59344** | HEV-SR-60625-R.125 | |
| | 5/8 | **.125** | 1-5/8 | 3-1/2 | 6 | **59348** | HEV-R-60625-R.125 | |
| | 5/8 | **.125** | 2 | 4 | 6 | **59352** | HEV-M-60625-R.125 | |
| 3/4 | 3/4 | **.030** | 1 | 3 | 6 | **59354** | HEV-S-60750-R.030 | |
| | 3/4 | **.030** | 1-5/8 | 4 | 6 | **59360** | HEV-R-60750-R.030 | |
| | 3/4 | **.030** | 2-1/4 | 5 | 6 | **59366** | HEV-M-60750-R.030 | |
| | 3/4 | **.030** | 2-3/4 | 5 | 6 | **59372** | HEV-L-60750-R.030 | |
| | 3/4 | **.030** | 3-1/4 | 6 | 6 | **59378** | HEV-LX-60750-R.030 | |
| | 3/4 | **.060** | 1 | 3 | 6 | **59355** | HEV-S-60750-R.060 | |
| | 3/4 | **.060** | 1-5/8 | 4 | 6 | **59361** | HEV-R-60750-R.060 | |
| | 3/4 | **.060** | 2-1/4 | 5 | 6 | **59367** | HEV-M-60750-R.060 | |
| | 3/4 | **.060** | 2-3/4 | 5 | 6 | **59373** | HEV-L-60750-R.060 | |
| | 3/4 | **.060** | 3-1/4 | 6 | 6 | **83322** | HEV-LX-60750-R.060 | new |
| | 3/4 | **.090** | 1 | 3 | 6 | **59356** | HEV-S-60750-R.090 | |
| | 3/4 | **.090** | 1-5/8 | 4 | 6 | **59362** | HEV-R-60750-R.090 | |
| | 3/4 | **.090** | 2-1/4 | 5 | 6 | **59368** | HEV-M-60750-R.090 | |
| | 3/4 | **.090** | 2-3/4 | 5 | 6 | **59374** | HEV-L-60750-R.090 | |
| | 3/4 | **.125** | 1 | 3 | 6 | **59357** | HEV-S-60750-R.125 | |
| | 3/4 | **.125** | 1-5/8 | 4 | 6 | **59363** | HEV-R-60750-R.125 | |
| | 3/4 | **.125** | 2-1/4 | 5 | 6 | **59369** | HEV-M-60750-R.125 | |
| | 3/4 | **.125** | 2-3/4 | 5 | 6 | **59375** | HEV-L-60750-R.125 | |
| | 3/4 | **.190** | 1 | 3 | 6 | **59358** | HEV-S-60750-R.190 | |
| | 3/4 | **.190** | 1-5/8 | 4 | 6 | **59364** | HEV-R-60750-R.190 | |
| | 3/4 | **.190** | 2-1/4 | 5 | 6 | **59370** | HEV-M-60750-R.190 | |
| | 3/4 | **.190** | 2-3/4 | 5 | 6 | **59376** | HEV-L-60750-R.190 | |
| | 3/4 | **.250** | 1 | 3 | 6 | **59359** | HEV-S-60750-R.250 | |
| | 3/4 | **.250** | 1-5/8 | 4 | 6 | **59365** | HEV-R-60750-R.250 | |
| | 3/4 | **.250** | 2-1/4 | 5 | 6 | **59371** | HEV-M-60750-R.250 | |
| | 3/4 | **.250** | 2-3/4 | 5 | 6 | **59377** | HEV-L-60750-R.250 | |
| | 3/4 | **.250** | 3-1/4 | 6 | 6 | **83323** | HEV-LX-60750-R.250 | new |
| 1 | 1 | **.030** | 2 | 4-1/2 | 6 | **59379** | HEV-R-61000-R.030 | |
| | 1 | **.030** | 2-5/8 | 5 | 6 | **59383** | HEV-M-61000-R.030 | |
| | 1 | **.030** | 3-1/4 | 6 | 6 | **59387** | HEV-L-61000-R.030 | |
| | 1 | **.060** | 2 | 4-1/2 | 6 | **59380** | HEV-R-61000-R.060 | |
| | 1 | **.060** | 2-5/8 | 5 | 6 | **59384** | HEV-M-61000-R.060 | |
| | 1 | **.060** | 3-1/4 | 6 | 6 | **59388** | HEV-L-61000-R.060 | |
| | 1 | **.125** | 2 | 4-1/2 | 6 | **59381** | HEV-R-61000-R.125 | |
| | 1 | **.125** | 2-5/8 | 5 | 6 | **59385** | HEV-M-61000-R.125 | |
| | 1 | **.125** | 3-1/4 | 6 | 6 | **59389** | HEV-L-61000-R.125 | |
| | 1 | **.250** | 2 | 4-1/2 | 6 | **59382** | HEV-R-61000-R.250 | |
| | 1 | **.250** | 2-5/8 | 5 | 6 | **59386** | HEV-M-61000-R.250 | |
| | 1 | **.250** | 3-1/4 | 6 | 6 | **59390** | HEV-L-61000-R.250 | |

* .0005 max TIR

# MHEV-6
## METRIC

# 6 FLUTE - CORNER RADIUS - METRIC
## Variable Pitch

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- 6 flute variable pitch design for reduced harmonics and increased feed rates
- Center cutting
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.6 mm −1.6 mm | Flutes | A*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 6 | **59575** | MHEV-015-60600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 6 | **59593** | MHEV-020-60600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 6 | **59627** | MHEV-030-60600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 6 | **59576** | MHEV-015-60600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 6 | **59594** | MHEV-020-60600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 6 | **59628** | MHEV-030-60600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 6 | **59578** | MHEV-015-60800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 6 | **59596** | MHEV-020-60800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 6 | **59630** | MHEV-030-60800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 6 | **59579** | MHEV-015-60800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 6 | **59597** | MHEV-020-60800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 6 | **59631** | MHEV-030-60800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 6 | **59581** | MHEV-015-61000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 6 | **59599** | MHEV-020-61000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 6 | **59613** | MHEV-025-61000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 6 | **59582** | MHEV-015-61000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 6 | **59600** | MHEV-020-61000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 6 | **59614** | MHEV-025-61000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 6 | **59584** | MHEV-015-61200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 6 | **59602** | MHEV-020-61200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 6 | **59616** | MHEV-025-61200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 6 | **59585** | MHEV-015-61200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 6 | **59603** | MHEV-020-61200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 6 | **59617** | MHEV-025-61200-R1.00 |
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 6 | **59587** | MHEV-015-61600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 6 | **59605** | MHEV-020-61600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 6 | **59619** | MHEV-025-61600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 6 | **59588** | MHEV-015-61600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 6 | **59606** | MHEV-020-61600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 6 | **59620** | MHEV-025-61600-R1.00 |

* .013 mm max TIR

continued on next page

Speeds & Feeds on Page 147

# 6 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch (cont.)

**MHEV-6**
**METRIC**

continued from previous page

| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.6 mm −1.6 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 6 | **59590** | MHEV-015-62000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 6 | **59608** | MHEV-020-62000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 6 | **59622** | MHEV-025-62000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 6 | **59591** | MHEV-015-62000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 6 | **59609** | MHEV-020-62000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 6 | **59623** | MHEV-025-62000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 6 | **59611** | MHEV-020-62500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 6 | **59625** | MHEV-025-62500-R1.00 |

* .013 mm max TIR



Access customized running parameters for your specific setup and material at
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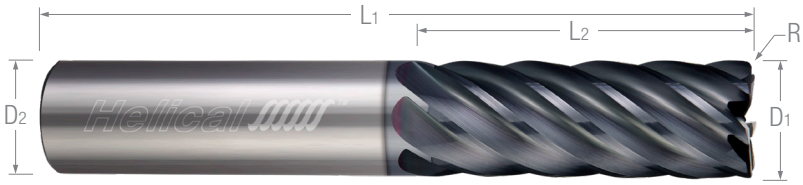
# HEV-7

New Items!

## 7 FLUTE - CORNER RADIUS

### Variable Pitch

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA

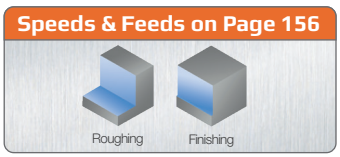



| | Cutter Diameter* $D_1$ $^{+.000"}_{-.002"}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.002"}_{-.000"}$ | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| new | 1/4 | 1/4 | .010 | 3/8 | 2 | 7 | 83376 | HEV-S-70250-R.010 |
| new | | 1/4 | .010 | 1/2 | 2 | 7 | 83377 | HEV-SR-70250-R.010 |
| new | | 1/4 | .010 | 3/4 | 2-1/2 | 7 | 83378 | HEV-R-70250-R.010 |
| new | | 1/4 | .010 | 1 | 3 | 7 | 83379 | HEV-M-70250-R.010 |
| | | 1/4 | .020 | 3/8 | 2 | 7 | 27107 | HEV-S-70250-R.020 |
| | | 1/4 | .020 | 1/2 | 2 | 7 | 27122 | HEV-SR-70250-R.020 |
| | | 1/4 | .020 | 3/4 | 2-1/2 | 7 | 27137 | HEV-R-70250-R.020 |
| | | 1/4 | .020 | 1 | 3 | 7 | 27152 | HEV-M-70250-R.020 |
| | | 1/4 | .020 | 1-1/4 | 3 | 7 | 82655 | HEV-L-70250-R.020 |
| | | 1/4 | .060 | 3/8 | 2 | 7 | 81807 | HEV-S-70250-R.060 |
| | | 1/4 | .060 | 1/2 | 2 | 7 | 81808 | HEV-SR-70250-R.060 |
| | | 1/4 | .060 | 3/4 | 2-1/2 | 7 | 81809 | HEV-R-70250-R.060 |
| | | 1/4 | .060 | 1 | 3 | 7 | 81810 | HEV-M-70250-R.060 |
| new | 3/8 | 3/8 | .010 | 1/2 | 2 | 7 | 83380 | HEV-S-70375-R.010 |
| new | | 3/8 | .010 | 3/4 | 2-1/2 | 7 | 83381 | HEV-SR-70375-R.010 |
| new | | 3/8 | .010 | 1 | 2-1/2 | 7 | 83382 | HEV-R-70375-R.010 |
| new | | 3/8 | .010 | 1-1/2 | 3-1/2 | 7 | 83383 | HEV-L-70375-R.010 |
| | | 3/8 | .020 | 1/2 | 2 | 7 | 27212 | HEV-S-70375-R.020 |
| | | 3/8 | .020 | 3/4 | 2-1/2 | 7 | 27227 | HEV-SR-70375-R.020 |
| | | 3/8 | .020 | 1 | 2-1/2 | 7 | 27242 | HEV-R-70375-R.020 |
| | | 3/8 | .020 | 1-1/2 | 3-1/2 | 7 | 27247 | HEV-L-70375-R.020 |
| | | 3/8 | .020 | 2 | 4 | 7 | 82656 | HEV-LX-70375-R.020 |
| | | 3/8 | .060 | 1/2 | 2 | 7 | 81811 | HEV-S-70375-R.060 |
| | | 3/8 | .060 | 3/4 | 2-1/2 | 7 | 81812 | HEV-SR-70375-R.060 |
| | | 3/8 | .060 | 1 | 2-1/2 | 7 | 81813 | HEV-R-70375-R.060 |
| new | 1/2 | 1/2 | .010 | 5/8 | 2-1/2 | 7 | 83384 | HEV-S-70500-R.010 |
| new | | 1/2 | .010 | 1 | 3 | 7 | 83385 | HEV-SR-70500-R.010 |
| new | | 1/2 | .010 | 1-1/4 | 3 | 7 | 83386 | HEV-R-70500-R.010 |
| new | | 1/2 | .010 | 1-5/8 | 4 | 7 | 83387 | HEV-M-70500-R.010 |
| new | | 1/2 | .010 | 2 | 4 | 7 | 83388 | HEV-L-70500-R.010 |
| | | 1/2 | .020 | 5/8 | 2-1/2 | 7 | 81814 | HEV-S-70500-R.020 |
| | | 1/2 | .020 | 1 | 3 | 7 | 81815 | HEV-SR-70500-R.020 |
| | | 1/2 | .020 | 1-1/4 | 3 | 7 | 81816 | HEV-R-70500-R.020 |
| | | 1/2 | .020 | 1-5/8 | 4 | 7 | 81817 | HEV-M-70500-R.020 |
| | | 1/2 | .020 | 2 | 4 | 7 | 81818 | HEV-L-70500-R.020 |

* .0005 max TIR

continued on next page

Speeds & Feeds on Page 156



# 7 FLUTE - CORNER RADIUS New Items!

HEM

## HEV-7

## Variable Pitch (cont.)

continued from previous page

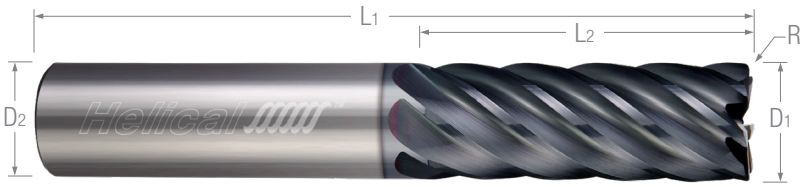
| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 7 | **27257** | HEV-S-70500-R.030 |
| | 1/2 | **.030** | 1 | 3 | 7 | **27272** | HEV-SR-70500-R.030 |
| | 1/2 | **.030** | 1-1/4 | 3 | 7 | **27287** | HEV-R-70500-R.030 |
| | 1/2 | **.030** | 1-5/8 | 4 | 7 | **27302** | HEV-M-70500-R.030 |
| | 1/2 | **.030** | 2 | 4 | 7 | **27307** | HEV-L-70500-R.030 |
| | 1/2 | **.030** | 2-1/2 | 5 | 7 | **82657** | HEV-LX-70500-R.030 |
| | 1/2 | **.030** | 3-1/8 | 6 | 7 | **82658** | HEV-X-70500-R.030 |
| | 1/2 | **.060** | 5/8 | 2-1/2 | 7 | **81819** | HEV-S-70500-R.060 |
| | 1/2 | **.060** | 1 | 3 | 7 | **81820** | HEV-SR-70500-R.060 |
| | 1/2 | **.060** | 1-1/4 | 3 | 7 | **81821** | HEV-R-70500-R.060 |
| | 1/2 | **.060** | 1-5/8 | 4 | 7 | **81822** | HEV-M-70500-R.060 |
| | 1/2 | **.060** | 2 | 4 | 7 | **81823** | HEV-L-70500-R.060 |
| 5/8 | 5/8 | **.030** | 3/4 | 3 | 7 | **27317** | HEV-S-70625-R.030 |
| | 5/8 | **.030** | 1-1/4 | 3-1/2 | 7 | **27322** | HEV-SR-70625-R.030 |
| | 5/8 | **.030** | 1-5/8 | 4 | 7 | **27332** | HEV-R-70625-R.030 |
| | 5/8 | **.030** | 2-1/8 | 4 | 7 | **27347** | HEV-M-70625-R.030 |
| | 5/8 | **.030** | 2-1/2 | 5 | 7 | **82659** | HEV-L-70625-R.030 |
| | 5/8 | **.060** | 1-1/4 | 3-1/2 | 7 | **81824** | HEV-SR-70625-R.060 |
| | 5/8 | **.060** | 1-5/8 | 4 | 7 | **81825** | HEV-R-70625-R.060 |
| 3/4 | 3/4 | **.030** | 1 | 3 | 7 | **27362** | HEV-S-70750-R.030 |
| | 3/4 | **.030** | 1-1/4 | 3-1/2 | 7 | **27367** | HEV-SR-70750-R.030 |
| | 3/4 | **.030** | 1-5/8 | 4 | 7 | **27377** | HEV-R-70750-R.030 |
| | 3/4 | **.030** | 2-1/4 | 5 | 7 | **27392** | HEV-M-70750-R.030 |
| | 3/4 | **.030** | 2-3/4 | 5 | 7 | **82660** | HEV-L-70750-R.030 |
| | 3/4 | **.030** | 3-1/4 | 6 | 7 | **82661** | HEV-LX-70750-R.030 |
| | 3/4 | **.060** | 1 | 3 | 7 | **81826** | HEV-S-70750-R.060 |
| | 3/4 | **.060** | 1-5/8 | 4 | 7 | **81827** | HEV-R-70750-R.060 |
| | 3/4 | **.060** | 2-1/4 | 5 | 7 | **81828** | HEV-M-70750-R.060 |
| 1 | 1 | **.030** | 1-1/4 | 4 | 7 | **27407** | HEV-S-71000-R.030 |
| | 1 | **.030** | 2 | 5 | 7 | **27422** | HEV-R-71000-R.030 |
| | 1 | **.030** | 3-1/4 | 6 | 7 | **27442** | HEV-L-71000-R.030 |

* .0005 max TIR

# MHEV-7
## METRIC

# 7 FLUTE - CORNER RADIUS - METRIC
## Variable Pitch

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Engineered for excellent performance in High Efficiency Milling (HEM)
- 7 flute variable pitch design for reduced harmonics and increased feed rates
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA



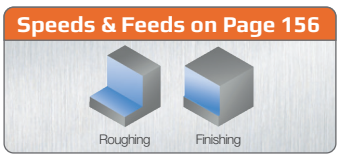

| Cutter Diameter* $D_1$ +.00 mm −.05 mm | Shank Diameter $D_2$ (h6) | Corner Radius R +.05 mm −.05 mm | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | **.50 mm** | 9.00 mm | 63 mm | 7 | **59633** | MHEV-015-70600-R0.50 |
| | 6.00 mm | **.50 mm** | 12.00 mm | 63 mm | 7 | **59651** | MHEV-020-70600-R0.50 |
| | 6.00 mm | **.50 mm** | 18.00 mm | 63 mm | 7 | **59685** | MHEV-030-70600-R0.50 |
| | 6.00 mm | **1.00 mm** | 9.00 mm | 63 mm | 7 | **59634** | MHEV-015-70600-R1.00 |
| | 6.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 7 | **59652** | MHEV-020-70600-R1.00 |
| | 6.00 mm | **1.00 mm** | 18.00 mm | 63 mm | 7 | **59686** | MHEV-030-70600-R1.00 |
| 8 mm | 8.00 mm | **.50 mm** | 12.00 mm | 63 mm | 7 | **59636** | MHEV-015-70800-R0.50 |
| | 8.00 mm | **.50 mm** | 16.00 mm | 63 mm | 7 | **59654** | MHEV-020-70800-R0.50 |
| | 8.00 mm | **.50 mm** | 24.00 mm | 75 mm | 7 | **59688** | MHEV-030-70800-R0.50 |
| | 8.00 mm | **1.00 mm** | 12.00 mm | 63 mm | 7 | **59637** | MHEV-015-70800-R1.00 |
| | 8.00 mm | **1.00 mm** | 16.00 mm | 63 mm | 7 | **59655** | MHEV-020-70800-R1.00 |
| | 8.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 7 | **59689** | MHEV-030-70800-R1.00 |
| 10 mm | 10.00 mm | **.50 mm** | 15.00 mm | 63 mm | 7 | **59639** | MHEV-015-71000-R0.50 |
| | 10.00 mm | **.50 mm** | 20.00 mm | 63 mm | 7 | **59657** | MHEV-020-71000-R0.50 |
| | 10.00 mm | **.50 mm** | 25.00 mm | 75 mm | 7 | **59671** | MHEV-025-71000-R0.50 |
| | 10.00 mm | **1.00 mm** | 15.00 mm | 63 mm | 7 | **59640** | MHEV-015-71000-R1.00 |
| | 10.00 mm | **1.00 mm** | 20.00 mm | 63 mm | 7 | **59658** | MHEV-020-71000-R1.00 |
| | 10.00 mm | **1.00 mm** | 25.00 mm | 75 mm | 7 | **59672** | MHEV-025-71000-R1.00 |
| 12 mm | 12.00 mm | **.50 mm** | 18.00 mm | 75 mm | 7 | **59642** | MHEV-015-71200-R0.50 |
| | 12.00 mm | **.50 mm** | 24.00 mm | 75 mm | 7 | **59660** | MHEV-020-71200-R0.50 |
| | 12.00 mm | **.50 mm** | 30.00 mm | 75 mm | 7 | **59674** | MHEV-025-71200-R0.50 |
| | 12.00 mm | **1.00 mm** | 18.00 mm | 75 mm | 7 | **59643** | MHEV-015-71200-R1.00 |
| | 12.00 mm | **1.00 mm** | 24.00 mm | 75 mm | 7 | **59661** | MHEV-020-71200-R1.00 |
| | 12.00 mm | **1.00 mm** | 30.00 mm | 75 mm | 7 | **59675** | MHEV-025-71200-R1.00 |

* .013 mm max TIR

continued on next page



Speeds & Feeds on Page 156



# 7 FLUTE - CORNER RADIUS - METRIC

## Variable Pitch (cont.)

**MHEV-7**
**METRIC**

continued from previous page

| Cutter Diameter* $D_1$ $^{+.00\ mm}_{-.05\ mm}$ | Shank Diameter $D_2$ (h6) | Corner Radius R $^{+.05\ mm}_{-.05\ mm}$ | Length of Cut $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.60\ mm}_{-1.60\ mm}$ | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 16 mm | 16.00 mm | **.50 mm** | 24.00 mm | 89 mm | 7 | **59645** | MHEV-015-71600-R0.50 |
| | 16.00 mm | **.50 mm** | 32.00 mm | 89 mm | 7 | **59663** | MHEV-020-71600-R0.50 |
| | 16.00 mm | **.50 mm** | 40.00 mm | 89 mm | 7 | **59677** | MHEV-025-71600-R0.50 |
| | 16.00 mm | **1.00 mm** | 24.00 mm | 89 mm | 7 | **59646** | MHEV-015-71600-R1.00 |
| | 16.00 mm | **1.00 mm** | 32.00 mm | 89 mm | 7 | **59664** | MHEV-020-71600-R1.00 |
| | 16.00 mm | **1.00 mm** | 40.00 mm | 89 mm | 7 | **59678** | MHEV-025-71600-R1.00 |
| 20 mm | 20.00 mm | **.50 mm** | 30.00 mm | 89 mm | 7 | **59648** | MHEV-015-72000-R0.50 |
| | 20.00 mm | **.50 mm** | 40.00 mm | 100 mm | 7 | **59666** | MHEV-020-72000-R0.50 |
| | 20.00 mm | **.50 mm** | 50.00 mm | 125 mm | 7 | **59680** | MHEV-025-72000-R0.50 |
| | 20.00 mm | **1.00 mm** | 30.00 mm | 89 mm | 7 | **59649** | MHEV-015-72000-R1.00 |
| | 20.00 mm | **1.00 mm** | 40.00 mm | 100 mm | 7 | **59667** | MHEV-020-72000-R1.00 |
| | 20.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 7 | **59681** | MHEV-025-72000-R1.00 |
| 25 mm | 25.00 mm | **1.00 mm** | 50.00 mm | 125 mm | 7 | **59669** | MHEV-020-72500-R1.00 |
| | 25.00 mm | **1.00 mm** | 64.00 mm | 125 mm | 7 | **59683** | MHEV-025-72500-R1.00 |

* .013 mm max TIR

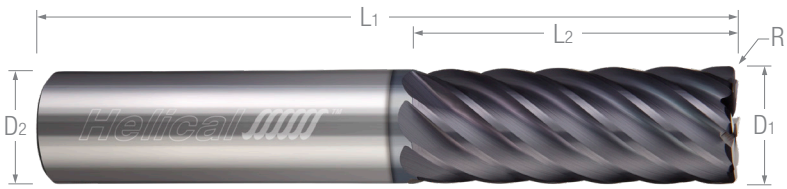
# HXF

New Item!

## MULTI-FLUTE - CORNER RADIUS

Finisher

- Offers outstanding performance and high temperature resistance in titanium and titanium alloys
- Designed with high flute count for excellent performance in light profiling, High Efficiency Milling (HEM), and finishing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Cutter Diameter* $D_1$ +.000" −.002" | Shank Diameter $D_2$ (h6) | Corner Radius R +.002" −.002" | Length of Cut $L_2$ +.032" −.000" | Overall Length $L_1$ +.062" −.062" | Flutes | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | **.020** | 3/8 | 2 | 7 | **36016** | HXF-S-070250-R.020 |
| | 1/4 | **.020** | 1/2 | 2 | 7 | **81832** | HXF-SR-070250-R.020 |
| | 1/4 | **.020** | 3/4 | 2-1/2 | 7 | **36031** | HXF-R-070250-R.020 |
| 3/8 | 3/8 | **.020** | 1/2 | 2 | 7 | **36046** | HXF-S-070375-R.020 |
| | 3/8 | **.020** | 3/4 | 2-1/2 | 7 | **81833** | HXF-SR-070375-R.020 |
| | 3/8 | **.020** | 1 | 3 | 7 | **36061** | HXF-R-070375-R.020 |
| | 3/8 | **.020** | 1-1/4 | 3 | 7 | **81834** | HXF-M-070375-R.020 |
| 1/2 | 1/2 | **.030** | 5/8 | 2-1/2 | 8 | **36076** | HXF-S-080500-R.030 |
| | 1/2 | **.030** | 1 | 3 | 8 | **36091** | HXF-SR-080500-R.030 |
| | 1/2 | **.030** | 1-1/4 | 3 | 8 | **36106** | HXF-R-080500-R.030 |
| | 1/2 | **.030** | 1-5/8 | 3-1/2 | 8 | **81835** | HXF-M-080500-R.030 |
| | 1/2 | **.030** | 2 | 3-1/2 | 8 | **81836** | HXF-L-080500-R.030 |
| 5/8 | 5/8 | **.060** | 3/4 | 3 | 10 | **36121** | HXF-S-100625-R.060 |
| | 5/8 | **.060** | 1-5/8 | 3-1/2 | 10 | **36136** | HXF-R-100625-R.060 |
| 3/4 | 3/4 | **.060** | 1 | 3 | 12 | **36151** | HXF-S-120750-R.060 |
| | 3/4 | **.060** | 1-5/8 | 4 | 12 | **36166** | HXF-R-120750-R.060 |
| | 3/4 | **.060** | 2 | 4 | 12 | **81837** | HXF-M-120750-R.060 |
| 1 | 1 | **.060** | 1-1/4 | 4 | 14 | **36181** | HXF-S-141000-R.060 |
| new | 1 | **.060** | 2 | 4-1/2 | 14 | **36196** | HXF-R-141000-R.060 |

* .0005 max TIR

Speeds & Feeds on Page 160

# FREE HEM GUIDEBOOK

## A Machinist's Guide to Increasing Shop Productivity with High Efficiency Milling

### HEM Defined

Decode the ins and outs of high efficiency milling, high speed machining, and how to take advantage of HEM techniques with miniature tooling.

### Best Practices

Learn how to increase your shop's efficiency with strategies that shorten cycle times, enhance part finish, and avoid premature tool wear.

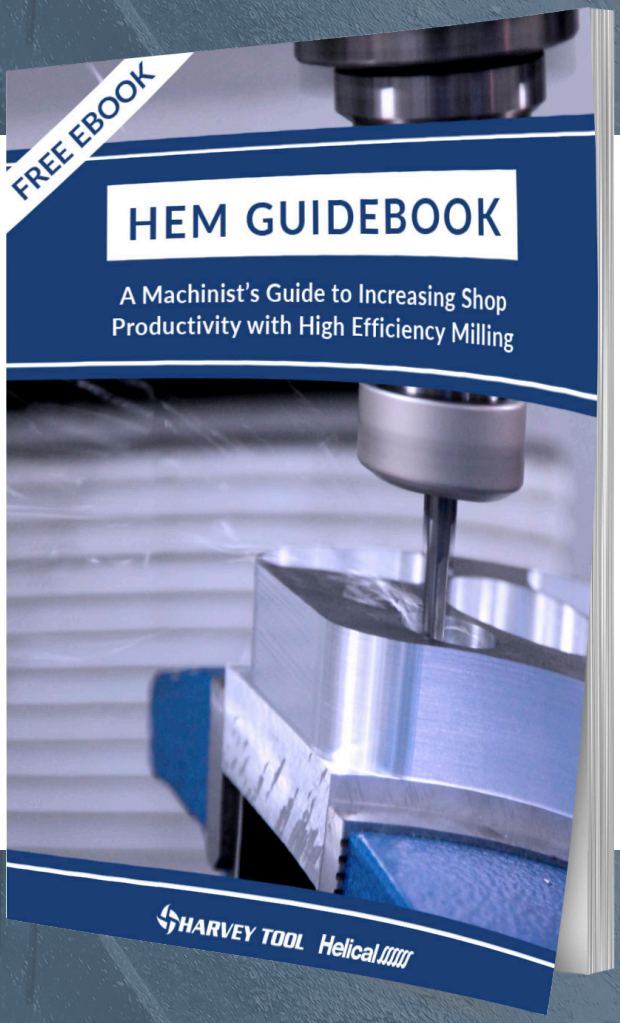
### Pro Tips

Access exclusive HEM tips, milling insights, and case studies from professional machinists with real experience utilizing HEM practices.

Helical Solutions and Harvey Tool have teamed up to provide a free ebook on High Efficiency Milling techniques.

The HEM Guidebook is jam-packed with over 50 pages of milling strategies, best practices, and pro tips relevant to any machinist aiming to boost their shop's efficiency. High Efficiency Milling, also referred to as dynamic milling or high efficiency machining, is proven to improve productivity, decrease cycle times, and increase tool life.

Download your copy today and let High Efficiency Milling lead the way to a more profitable, productive shop.




**www.helicaltool.com/hem**

# HIGH FEED END MILLS

Designed for high feed applications, Helical's High Feed End Mills take advantage of chip thinning with a specifically engineered end profile to increase machining efficiencies. Similar to High Efficiency Milling (HEM) techniques, the milling technique for these tools allows for drastically increased feed rates to maximize chip thickness and keep radial forces low. Helical's High Feed End Mills are engineered for Steels up to 45 Rc, stocked with T*plus* coating, and offered in coolant through styles.

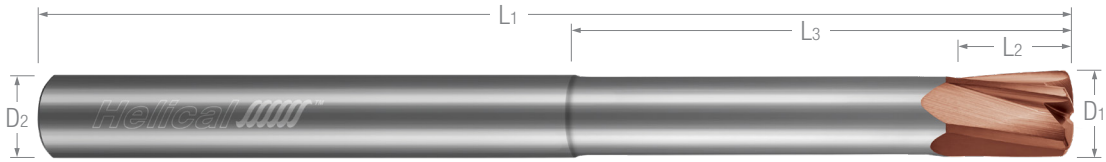

| | HIGH FEED END MILLS | PG |
|---|---|---|
| new | Steels Up to 45 Rc - Variable Pitch - Reduced Neck | 216 |
| | Steels Up to 45 Rc - Metric - Variable Pitch - Reduced Neck | 217 |
| new | Steels Up to 45 Rc - Variable Pitch - Coolant Through - Reduced Neck | 218 |
| | Steels Up to 45 Rc - Metric - Variable Pitch - Coolant Through - Reduced Neck | 219 |

# HIGH FEED END MILLS New Items!

## HFV

## Steels Up to 45 Rc - Variable Pitch - Reduced Neck

- Specifically engineered end profile for optimal tool engagement and reduced cutting forces
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Geometry proven to achieve maximum feed rates in steels up to 45 Rc
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA




| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Theoretical Radius** | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/8 | 2 | 1/4 | .110 | 4 | .0157 | 82663 | HFV-RN-020-40125 | |
| | 1/8 | 1/8 | 2 | 1/2 | .110 | 4 | .0157 | 82664 | HFV-RN-040-40125 | |
| | 1/4 | 1/8 | 2-1/2 | 1/2 | .110 | 4 | .0157 | 83725 | HFV-RN-040-40125 | new |
| | 1/8 | 1/8 | 2 | 3/4 | .110 | 4 | .0157 | 82665 | HFV-RN-060-40125 | |
| | 1/4 | 1/8 | 2-1/2 | 3/4 | .110 | 4 | .0157 | 83726 | HFV-RN-060-40125 | new |
| | 1/4 | 1/8 | 2-1/2 | 1 | .110 | 4 | .0157 | 83727 | HFV-RN-080-40125 | new |
| | 1/4 | 1/8 | 2-1/2 | 1-1/4 | .110 | 4 | .0157 | 83728 | HFV-RN-100-40125 | new |
| 3/16 | 3/16 | 3/16 | 2-1/2 | 3/8 | .165 | 4 | .0235 | 82666 | HFV-RN-020-40187 | |
| | 3/16 | 3/16 | 2-1/2 | 3/4 | .165 | 4 | .0235 | 82667 | HFV-RN-040-40187 | |
| | 1/4 | 3/16 | 2-1/2 | 3/4 | .165 | 4 | .0235 | 83729 | HFV-RN-040-40187 | new |
| | 3/16 | 3/16 | 2-1/2 | 1-1/8 | .165 | 4 | .0235 | 82668 | HFV-RN-060-40187 | |
| | 1/4 | 3/16 | 2-1/2 | 1-1/8 | .165 | 4 | .0235 | 83730 | HFV-RN-060-40187 | new |
| | 1/4 | 3/16 | 3 | 1-1/2 | .165 | 4 | .0235 | 83731 | HFV-RN-080-40187 | new |
| | 1/4 | 3/16 | 3 | 1-7/8 | .165 | 4 | .0235 | 83732 | HFV-RN-100-40187 | new |
| 1/4 | 1/4 | 1/4 | 3 | 1/2 | .220 | 5 | .0314 | 82669 | HFV-RN-020-50250 | |
| | 1/4 | 1/4 | 3 | 1 | .220 | 5 | .0314 | 82670 | HFV-RN-040-50250 | |
| | 1/4 | 1/4 | 3 | 1-1/2 | .220 | 5 | .0314 | 82671 | HFV-RN-060-50250 | |
| | 1/4 | 1/4 | 4 | 2 | .220 | 5 | .0314 | 83719 | HFV-RN-080-50250 | new |
| | 1/4 | 1/4 | 4 | 2-1/2 | .220 | 5 | .0314 | 83720 | HFV-RN-100-50250 | new |
| 3/8 | 3/8 | 3/8 | 4 | 3/4 | .330 | 5 | .0471 | 82672 | HFV-RN-020-50375 | |
| | 3/8 | 3/8 | 4 | 1-1/2 | .330 | 5 | .0471 | 82673 | HFV-RN-040-50375 | |
| | 3/8 | 3/8 | 4 | 2-1/4 | .330 | 5 | .0471 | 82674 | HFV-RN-060-50375 | |
| | 3/8 | 3/8 | 6 | 3 | .330 | 5 | .0471 | 83721 | HFV-RN-080-50375 | new |
| | 3/8 | 3/8 | 6 | 3-3/4 | .330 | 5 | .0471 | 83722 | HFV-RN-100-50375 | new |
| 1/2 | 1/2 | 1/2 | 5 | 1 | .440 | 5 | .0628 | 82675 | HFV-RN-020-50500 | |
| | 1/2 | 1/2 | 5 | 2 | .440 | 5 | .0628 | 82676 | HFV-RN-040-50500 | |
| | 1/2 | 1/2 | 5 | 3 | .440 | 5 | .0628 | 82677 | HFV-RN-060-50500 | |
| | 1/2 | 1/2 | 7 | 4 | .440 | 5 | .0628 | 83723 | HFV-RN-080-50500 | new |
| | 1/2 | 1/2 | 7 | 5 | .440 | 5 | .0628 | 83724 | HFV-RN-100-50500 | new |

* .0005 max TIR **Theoretical radius for use when programming in CAM software

See page 217 for diagram of theoretical radius

Speeds & Feeds on Page 220

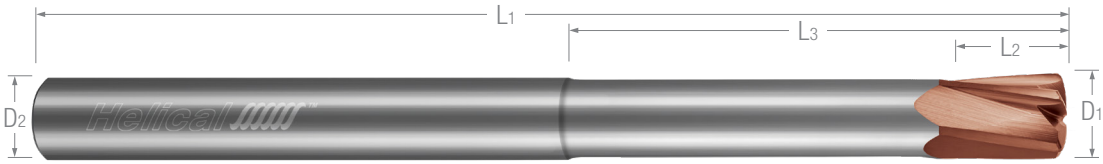
**MHFV**
**METRIC**

# HIGH FEED END MILLS

## Steels Up to 45 Rc - Metric - Variable Pitch - Reduced Neck



- Specifically engineered end profile for optimal tool engagement and reduced cutting forces
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Geometry proven to achieve maximum feed rates in steels up to 45 Rc
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

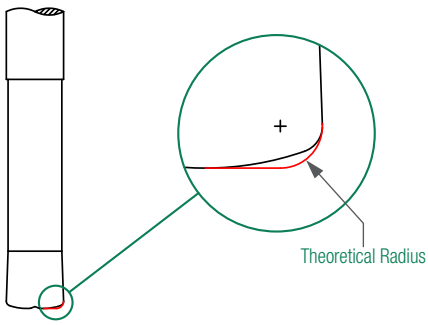



| Cutter Dia.* $D_1$ +.00 mm −.05 mm | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ +.80 mm −.00 mm | Overall Length $L_1$ +1.60 mm −1.60 mm | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Theoretical Radius** | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 3 mm | 3.00 mm | 3.00 mm | 50 mm | 6.00 mm | 2.64 mm | 4 | .377 mm | **82678** | MHFV-RN-020-40300 |
| | 3.00 mm | 3.00 mm | 50 mm | 12.00 mm | 2.64 mm | 4 | .377 mm | **82679** | MHFV-RN-040-40300 |
| | 3.00 mm | 3.00 mm | 50 mm | 18.00 mm | 2.64 mm | 4 | .377 mm | **82680** | MHFV-RN-060-40300 |
| 4 mm | 4.00 mm | 4.00 mm | 63 mm | 8.00 mm | 3.52 mm | 4 | .502 mm | **82681** | MHFV-RN-020-40400 |
| | 4.00 mm | 4.00 mm | 63 mm | 16.00 mm | 3.52 mm | 4 | .502 mm | **82682** | MHFV-RN-040-40400 |
| | 4.00 mm | 4.00 mm | 63 mm | 24.00 mm | 3.52 mm | 4 | .502 mm | **82683** | MHFV-RN-060-40400 |
| 6 mm | 6.00 mm | 6.00 mm | 75 mm | 12.00 mm | 5.28 mm | 5 | .754 mm | **82684** | MHFV-RN-020-50600 |
| | 6.00 mm | 6.00 mm | 75 mm | 24.00 mm | 5.28 mm | 5 | .754 mm | **82685** | MHFV-RN-040-50600 |
| | 6.00 mm | 6.00 mm | 75 mm | 36.00 mm | 5.28 mm | 5 | .754 mm | **82686** | MHFV-RN-060-50600 |
| 8 mm | 8.00 mm | 8.00 mm | 100 mm | 16.00 mm | 7.04 mm | 5 | 1.005 mm | **82687** | MHFV-RN-020-50800 |
| | 8.00 mm | 8.00 mm | 100 mm | 32.00 mm | 7.04 mm | 5 | 1.005 mm | **82688** | MHFV-RN-040-50800 |
| | 8.00 mm | 8.00 mm | 100 mm | 48.00 mm | 7.04 mm | 5 | 1.005 mm | **82689** | MHFV-RN-060-50800 |
| 10 mm | 10.00 mm | 10.00 mm | 125 mm | 20.00 mm | 8.80 mm | 5 | 1.257 mm | **82690** | MHFV-RN-020-51000 |
| | 10.00 mm | 10.00 mm | 125 mm | 40.00 mm | 8.80 mm | 5 | 1.257 mm | **82691** | MHFV-RN-040-51000 |
| | 10.00 mm | 10.00 mm | 125 mm | 60.00 mm | 8.80 mm | 5 | 1.257 mm | **82692** | MHFV-RN-060-51000 |
| 12 mm | 12.00 mm | 12.00 mm | 125 mm | 24.00 mm | 10.55 mm | 5 | 1.508 mm | **82693** | MHFV-RN-020-51200 |
| | 12.00 mm | 12.00 mm | 125 mm | 48.00 mm | 10.55 mm | 5 | 1.508 mm | **82694** | MHFV-RN-040-51200 |
| | 12.00 mm | 12.00 mm | 125 mm | 72.00 mm | 10.55 mm | 5 | 1.508 mm | **82695** | MHFV-RN-060-51200 |

* .013 mm max TIR **Theoretical radius for use when programming in CAM software

**Visit www.helicaltool.com to download precise Simulation Files for all Feed Mills.**

**In the absence of a Simulation File, use the Theoretical Radius to approximate Helical's feed mills as corner radius end mills within your CAM software.**



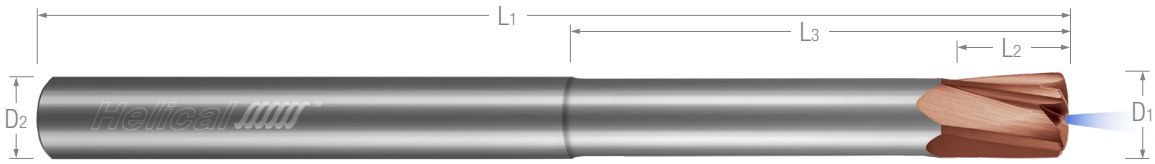

**Speeds & Feeds on Page 220**

# HIGH FEED END MILLS New Items!

**HFVC**

## Steels up to 45 Rc - Variable Pitch - Coolant Through - Reduced Neck

- Specifically engineered end profile for optimal tool engagement and reduced cutting forces
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Geometry proven to achieve maximum feed rates in steels up to 45 Rc
- Straight-through coolant hole for superior chip evacuation and heat management at the cutting edge
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

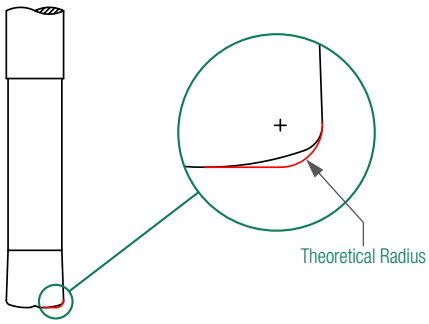



| Cutter Dia.* $D_1$ $^{+.000"}_{-.002"}$ | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Reach (LBS) $L_3$ | Neck Dia. | Flutes | Theoretical Radius** | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/4 | 1/4 | 1/4 | 3 | 1/2 | .220 | 5 | .0314 | 82696 | HFVC-RN-020-50250 | |
| | 1/4 | 1/4 | 3 | 1 | .220 | 5 | .0314 | 82697 | HFVC-RN-040-50250 | |
| | 1/4 | 1/4 | 3 | 1-1/2 | .220 | 5 | .0314 | 82698 | HFVC-RN-060-50250 | |
| | 1/4 | 1/4 | 4 | 2 | .220 | 5 | .0314 | 83733 | HFVC-RN-080-50250 | new |
| | 1/4 | 1/4 | 4 | 2-1/2 | .220 | 5 | .0314 | 83734 | HFVC-RN-100-50250 | new |
| 3/8 | 3/8 | 3/8 | 4 | 3/4 | .330 | 5 | .0471 | 82699 | HFVC-RN-020-50375 | |
| | 3/8 | 3/8 | 4 | 1-1/2 | .330 | 5 | .0471 | 82700 | HFVC-RN-040-50375 | |
| | 3/8 | 3/8 | 4 | 2-1/4 | .330 | 5 | .0471 | 82701 | HFVC-RN-060-50375 | |
| | 3/8 | 3/8 | 6 | 3 | .330 | 5 | .0471 | 83735 | HFVC-RN-080-50375 | new |
| | 3/8 | 3/8 | 6 | 3-3/4 | .330 | 5 | .0471 | 83736 | HFVC-RN-100-50375 | new |
| 1/2 | 1/2 | 1/2 | 5 | 1 | .440 | 5 | .0628 | 82702 | HFVC-RN-020-50500 | |
| | 1/2 | 1/2 | 5 | 2 | .440 | 5 | .0628 | 82703 | HFVC-RN-040-50500 | |
| | 1/2 | 1/2 | 5 | 3 | .440 | 5 | .0628 | 82704 | HFVC-RN-060-50500 | |
| | 1/2 | 1/2 | 7 | 4 | .440 | 5 | .0628 | 83737 | HFVC-RN-080-50500 | new |
| | 1/2 | 1/2 | 7 | 5 | .440 | 5 | .0628 | 83738 | HFVC-RN-100-50500 | new |

* .0005 max TIR **Theoretical radius for use when programming in CAM software

**Visit www.helicaltool.com to download precise Simulation Files for all Feed Mills.**

**In the absence of a Simulation File, use the Theoretical Radius to approximate Helical's feed mills as corner radius end mills within your CAM software.**




**Speeds & Feeds on Page 220**

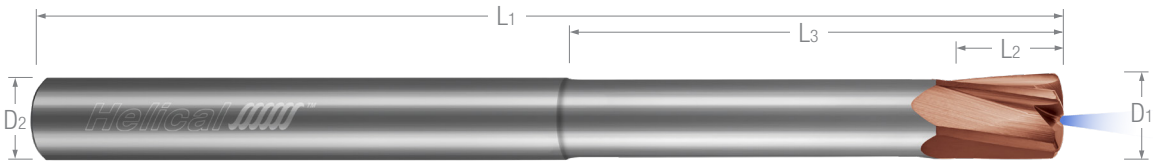
**MHFVC**
**METRIC**

# HIGH FEED END MILLS

## Steels Up to 45 Rc - Metric - Variable Pitch Coolant Through - Reduced Neck



- Specifically engineered end profile for optimal tool engagement and reduced cutting forces
- Variable pitch geometry results in higher quality parts by decreasing chatter and harmonics
- Geometry proven to achieve maximum feed rates in steels up to 45 Rc
- Straight-through coolant hole for superior chip evacuation and heat management at the cutting edge
- Reduced neck provides maximum strength in long reach and deep pocketing applications
- End cutting geometry (non-center cutting)
- h6 shank tolerance for high precision tool holders
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- Solid carbide
- CNC ground in the USA

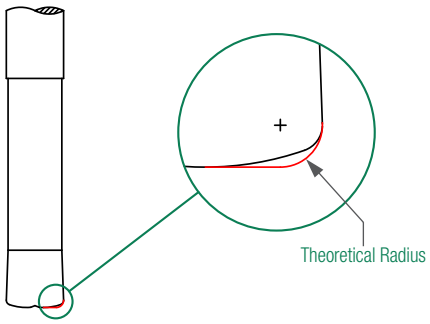



| Cutter Dia.* $D_1$ $^{+.00\ mm}_{-.05\ mm}$ | Shank Dia. $D_2$ (h6) | Length of Cut $L_2$ $^{+.80\ mm}_{-.00\ mm}$ | Overall Length $L_1$ $^{+1.60\ mm}_{-1.60\ mm}$ | Reach (LBS) $L_3$ | Neck Diameter | Flutes | Theoretical Radius** | T*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 6 mm | 6.00 mm | 6.00 mm | 75 mm | 12.00 mm | 5.28 mm | 5 | .734 mm | **82705** | MHFVC-RN-020-50600 |
| | 6.00 mm | 6.00 mm | 75 mm | 24.00 mm | 5.28 mm | 5 | .734 mm | **82706** | MHFVC-RN-040-50600 |
| | 6.00 mm | 6.00 mm | 75 mm | 36.00 mm | 5.28 mm | 5 | .734 mm | **82707** | MHFVC-RN-060-50600 |
| 8 mm | 8.00 mm | 8.00 mm | 100 mm | 16.00 mm | 7.04 mm | 5 | .979 mm | **82708** | MHFVC-RN-020-50800 |
| | 8.00 mm | 8.00 mm | 100 mm | 32.00 mm | 7.04 mm | 5 | .979 mm | **82709** | MHFVC-RN-040-50800 |
| | 8.00 mm | 8.00 mm | 100 mm | 48.00 mm | 7.04 mm | 5 | .979 mm | **82710** | MHFVC-RN-060-50800 |
| 10 mm | 10.00 mm | 10.00 mm | 125 mm | 20.00 mm | 8.80 mm | 5 | 1.224 mm | **82711** | MHFVC-RN-020-51000 |
| | 10.00 mm | 10.00 mm | 125 mm | 40.00 mm | 8.80 mm | 5 | 1.224 mm | **82712** | MHFVC-RN-040-51000 |
| | 10.00 mm | 10.00 mm | 125 mm | 60.00 mm | 8.80 mm | 5 | 1.224 mm | **82713** | MHFVC-RN-060-51000 |
| 12 mm | 12.00 mm | 12.00 mm | 125 mm | 24.00 mm | 10.55 mm | 5 | 1.469 mm | **82714** | MHFVC-RN-020-51200 |
| | 12.00 mm | 12.00 mm | 125 mm | 48.00 mm | 10.55 mm | 5 | 1.469 mm | **82715** | MHFVC-RN-040-51200 |
| | 12.00 mm | 12.00 mm | 125 mm | 72.00 mm | 10.55 mm | 5 | 1.469 mm | **82716** | MHFVC-RN-060-51200 |

* .013 mm max TIR **Theoretical radius for use when programming in CAM software

**Visit www.helicaltool.com to download precise Simulation Files for all Feed Mills.**

**In the absence of a Simulation File, use the Theoretical Radius to approximate Helical's feed mills as corner radius end mills within your CAM software.**




**Speeds & Feeds on Page 220**

# SPEEDS & FEEDS

## High Feed End Mills

**HFV**



### HFV / HFVC

| Material Guide | | Hardness | SFM | Inches Per Tooth (IPT) 1/8 Rgh | 1/8 Fin | 3/16 Rgh | 3/16 Fin | 1/4 Rgh | 1/4 Fin | 3/8 Rgh | 3/8 Fin | 1/2 Rgh | 1/2 Fin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 800 | .0027 | .0057 | .0040 | .0085 | .0053 | .0113 | .0080 | .0140 | .0107 | .0187 |
| | | 75 - 98 HRB | 750 | .0020 | .0037 | .0030 | .0055 | .0040 | .0073 | .0060 | .0110 | .0080 | .0147 |
| | | 21 - 36 HRC | 700 | .0013 | .0025 | .0020 | .0038 | .0027 | .0050 | .0040 | .0075 | .0053 | .0100 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 600 | .0027 | .0057 | .0040 | .0085 | .0053 | .0113 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 550 | .0027 | .0047 | .0040 | .0070 | .0053 | .0093 | .0080 | .0140 | .0107 | .0187 |
| | | 36 - 50 HRC | 400 | .0020 | .0033 | .0030 | .0050 | .0040 | .0067 | .0060 | .0100 | .0080 | .0133 |
| | | > 50 HRC | 350 | .0013 | .0020 | .0020 | .0030 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 550 | .0027 | .0057 | .0040 | .0085 | .0053 | .0113 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 500 | .0027 | .0047 | .0040 | .0070 | .0053 | .0093 | .0080 | .0140 | .0107 | .0187 |
| | | 36 - 50 HRC | 450 | .0020 | .0033 | .0030 | .0050 | .0040 | .0067 | .0060 | .0100 | .0080 | .0133 |
| | | > 50 HRC | 400 | .0013 | .0020 | .0020 | .0030 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 450 | .0027 | .0067 | .0040 | .0100 | .0053 | .0133 | .0080 | .0140 | .0107 | .0187 |
| | | 75 - 98 HRB | 500 | .0027 | .0060 | .0040 | .0090 | .0053 | .0120 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 450 | .0027 | .0047 | .0040 | .0070 | .0053 | .0093 | .0080 | .0140 | .0107 | .0187 |
| | | 36 - 50 HRC | 400 | .0020 | .0033 | .0030 | .0050 | .0040 | .0067 | .0060 | .0100 | .0080 | .0133 |
| | | > 50 HRC | 350 | .0013 | .0020 | .0020 | .0030 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 500 | .0027 | .0053 | .0040 | .0080 | .0053 | .0107 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 450 | .0027 | .0047 | .0040 | .0070 | .0053 | .0093 | .0080 | .0140 | .0107 | .0187 |
| | | 36 - 50 HRC | 400 | .0022 | .0040 | .0033 | .0060 | .0043 | .0080 | .0065 | .0120 | .0087 | .0160 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 750 | .0025 | .0037 | .0038 | .0055 | .0050 | .0073 | .0075 | .0110 | .0100 | .0147 |
| | | 21 - 36 HRC | 650 | .0027 | .0053 | .0040 | .0080 | .0053 | .0107 | .0080 | .0140 | .0107 | .0187 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 450 | .0025 | .0037 | .0038 | .0055 | .0050 | .0073 | .0075 | .0110 | .0100 | .0147 |
| | | 36 - 50 HRC | 400 | .0020 | .0033 | .0030 | .0050 | .0040 | .0067 | .0060 | .0100 | .0080 | .0133 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 600 | .0027 | .0083 | .0040 | .0125 | .0053 | .0140 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 550 | .0027 | .0063 | .0040 | .0095 | .0053 | .0127 | .0080 | .0140 | .0107 | .0187 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 550 | .0027 | .0056 | .0040 | .0084 | .0053 | .0111 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 450 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 | .0080 | .0120 | .0107 | .0160 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 500 | .0027 | .0056 | .0040 | .0084 | .0053 | .0111 | .0080 | .0140 | .0107 | .0187 |
| | | 21 - 36 HRC | 450 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 | .0080 | .0120 | .0107 | .0160 |
| | | 36 - 50 HRC | 400 | .0013 | .0020 | .0020 | .0030 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 600 | .0027 | .0047 | .0040 | .0070 | .0053 | .0094 | .0080 | .0140 | .0107 | .0187 |
| | | 75 - 98 HRB | 550 | .0027 | .0043 | .0040 | .0065 | .0053 | .0087 | .0080 | .0130 | .0107 | .0172 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 200 | .0027 | .0038 | .0040 | .0056 | .0053 | .0075 | .0080 | .0113 | .0107 | .0150 |
| | | 21 - 36 HRC | 180 | .0027 | .0033 | .0040 | .0049 | .0053 | .0066 | .0080 | .0098 | .0107 | .0130 |
| | | 36 - 50 HRC | 150 | .0022 | .0028 | .0033 | .0042 | .0043 | .0056 | .0065 | .0084 | .0087 | .0112 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 350 | .0027 | .0047 | .0040 | .0070 | .0053 | .0094 | .0080 | .0140 | .0107 | .0187 |
| | | 75 - 98 HRB | 400 | .0027 | .0042 | .0040 | .0063 | .0053 | .0084 | .0080 | .0127 | .0107 | .0168 |
| | | 21 - 36 HRC | 325 | .0027 | .0040 | .0040 | .0060 | .0053 | .0080 | .0080 | .0120 | .0107 | .0158 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 300 | .0027 | .0033 | .0040 | .0049 | .0053 | .0066 | .0080 | .0098 | .0107 | .0130 |
| | | 36 - 50 HRC | 250 | .0025 | .0023 | .0038 | .0035 | .0050 | .0047 | .0075 | .0070 | .0100 | .0093 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 225 | .0020 | .0023 | .0030 | .0035 | .0040 | .0047 | .0060 | .0070 | .0080 | .0093 |
| | | 21 - 36 HRC | 150 | .0027 | .0035 | .0040 | .0053 | .0053 | .0070 | .0080 | .0105 | .0107 | .0140 |
| | | 36 - 50 HRC | 90 | .0020 | .0023 | .0030 | .0035 | .0040 | .0047 | .0060 | .0070 | .0080 | .0093 |

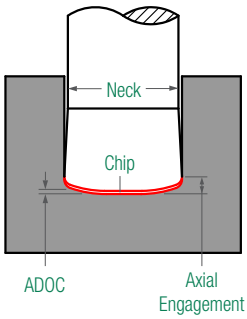
| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Slot (Full Slotting) | < 35 HRC | 3.00%-5.00% Diameter | 100% Diameter |
| | ≥ 35 HRC | 2.50%-4.00% Diameter | 100% Diameter |
| Rgh (Traditional Roughing) | < 35 HRC | 3.00%-5.00% Diameter | Up to 65% Diameter |
| | ≥ 35 HRC | 2.75%-4.25% Diameter | Up to 65% Diameter |

NOTES:

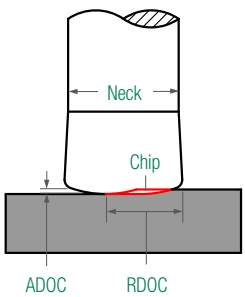
IPT values shown are for 3xD reach tools, and should be adjusted for longer or shorter reaches. For tools with reaches greater than 3xD, IPT should be reduced.

Please note for slotting applications, axial engagement will increase while axial stepdown (ADOC) remains the same.

**Slotting**




**Roughing**

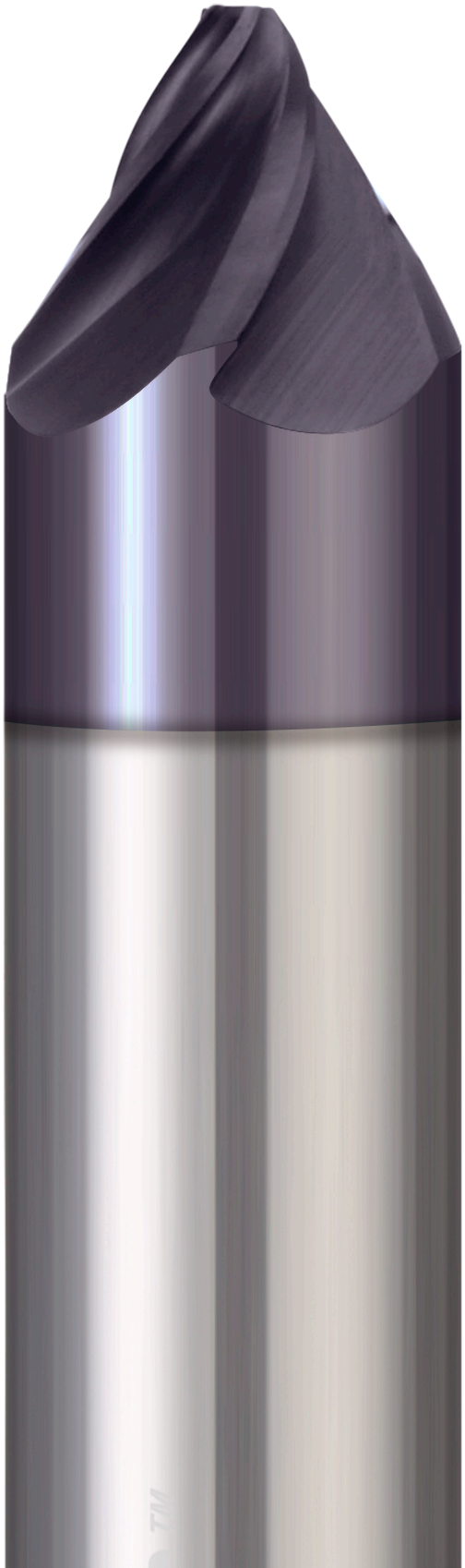


# SPECIALTY PROFILES

## Chamfer Cutters & Combination Chamfer / End Mills

Helical's offering of Chamfer Mills include two unique flute styles: straight flute, and helical flute. Our Straight Flute Chamfer Cutters are fully stocked in 2 and 4 flute options, and are perfect for generating high quality results in standard operations. Our Helical Flute Chamfer Cutters, engineered for versatility and excellent performance in chamfering and side milling applications, are offered with a tipped-off end profile in 3 or 5 flutes, or in a pointed end profile in 2 and 4 flutes.

Finally, Helical's new Combination Chamfer / End Mills are a great choice for profile milling and chamfering applications where tool space in your machine is limited. With a variable helix and helically fluted tip design, these combination tools provide versatility without sacrificing performance.




| | CHAMFER MILLS | | | PG |
|---|---|---|---|---|
| | 2 & 4 Flute | Chamfer Mills | Straight Flute | 222 |
| new | 2 & 4 Flute | Chamfer Mills | Helical Flute - High Performance | 224 |
| new | 3 & 5 Flute | Chamfer mills | Helical Flute - High Performance | 225 |

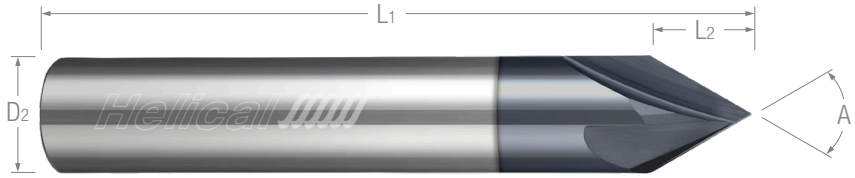
| | COMBINATION CHAMFER / END MILLS | | | PG |
|---|---|---|---|---|
| new | 4 Flute | Combination Mills | 4 Flute - High Performance | 228 |

# CHAMFER MILLS - STRAIGHT FLUTE

**HCM**

## 2 & 4 Flute

- Designed for universal chamfering applications
- Offered with 2 and 4 flutes for soft and hard materials
- Ground with positive axial rake and clearance for optimal performance
- h6 shank tolerance for high precision tool holders
- A*plus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| Included Angle A +0°30' −0°30' | Shank Diameter* D2 (h6) | Web Thickness (MAX) | Length of Cut L2 | Overall Length L1 +.062" −.062" | Flutes | Uncoated | A*plus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|
| 60° | 1/8 | .015 | .108 | 2 | 2 | **06225** | **06228** | HCM60-20125 |
| | 3/16 | .018 | .162 | 2 | 2 | **06240** | **06243** | HCM60-20187 |
| | 3/16 | .018 | .162 | 2 | 4 | **06330** | **06333** | HCM60-40187 |
| | 1/4 | .020 | .216 | 2-1/2 | 2 | **06255** | **06258** | HCM60-20250 |
| | 1/4 | .020 | .216 | 2-1/2 | 4 | **06345** | **06348** | HCM60-40250 |
| | 3/8 | .035 | .324 | 2-1/2 | 2 | **06270** | **06273** | HCM60-20375 |
| | 3/8 | .035 | .324 | 2-1/2 | 4 | **06360** | **06363** | HCM60-40375 |
| | 1/2 | .040 | .433 | 3 | 2 | **06285** | **06288** | HCM60-20500 |
| | 1/2 | .040 | .433 | 3 | 4 | **06375** | **06378** | HCM60-40500 |
| | 3/4 | .045 | .649 | 3 | 4 | **06390** | **06393** | HCM60-40750 |
| 90º | 1/8 | .015 | .062 | 2 | 2 | **06015** | **06018** | HCM90-20125 |
| | 3/16 | .018 | .093 | 2 | 2 | **06030** | **06033** | HCM90-20187 |
| | 3/16 | .018 | .093 | 2 | 4 | **06120** | **06123** | HCM90-40187 |
| | 1/4 | .020 | .125 | 2-1/2 | 2 | **06045** | **06048** | HCM90-20250 |
| | 1/4 | .020 | .125 | 2-1/2 | 4 | **06135** | **06138** | HCM90-40250 |
| | 3/8 | .035 | .187 | 2-1/2 | 2 | **06060** | **06063** | HCM90-20375 |
| | 3/8 | .035 | .187 | 2-1/2 | 4 | **06150** | **06153** | HCM90-40375 |
| | 1/2 | .040 | .250 | 3 | 2 | **06075** | **06078** | HCM90-20500 |
| | 1/2 | .040 | .250 | 3 | 4 | **06165** | **06168** | HCM90-40500 |
| | 3/4 | .045 | .375 | 3 | 4 | **06180** | **06183** | HCM90-40750 |
| 120° | 1/8 | .015 | .037 | 2 | 2 | **06405** | **06408** | HCM120-20125 |
| | 3/16 | .018 | .056 | 2 | 2 | **06420** | **06423** | HCM120-20187 |
| | 3/16 | .018 | .056 | 2 | 4 | **06480** | **06483** | HCM120-40187 |
| | 1/4 | .020 | .075 | 2-1/2 | 2 | **06435** | **06438** | HCM120-20250 |
| | 1/4 | .020 | .075 | 2-1/2 | 4 | **06495** | **06498** | HCM120-40250 |
| | 3/8 | .035 | .112 | 2-1/2 | 2 | **06450** | **06453** | HCM120-20375 |
| | 3/8 | .035 | .112 | 2-1/2 | 4 | **06510** | **06513** | HCM120-40375 |
| | 1/2 | .040 | .150 | 3 | 2 | **06465** | **06468** | HCM120-20500 |
| | 1/2 | .040 | .150 | 3 | 4 | **06525** | **06528** | HCM120-40500 |
| | 3/4 | .045 | .225 | 3 | 4 | **06540** | **06543** | HCM120-40750 |

* .0005 max TIR

# HCM

## SPEEDS & FEEDS

### Chamfer Mills - Straight Flute



## HCM

| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Effective Cutting Diameter (Deff) | | | | | | | | |
| | | | | < .125 | ≥ .125 < .1875 | ≥ .1875 < .25 | ≥ .25 < .3125 | ≥ .3125 < .375 | ≥ .375 < .5 | ≥ .5 < .625 | ≥ .625 < .75 | ≥ .75 |
| WROUGHT ALUMINUM ALLOY | 2014, 5052, 6061<br>7050, 7075, 7475 | < 120 HBS<br>≥ 120 HBS | 2200<br>2200 | .0009<br>.0006 | .0018<br>.0012 | .0028<br>.0018 | .0035<br>.0022 | .0045<br>.0028 | .0055<br>.0035 | .0070<br>.0045 | .0090<br>.0055 | .0110<br>.0070 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0<br>360.0, 380.0, 383.0<br>390.0, 520.0, 535.0 | < 120 HBS<br>≥ 120 HBS | 1800<br>1600 | .0012<br>.0010 | .0025<br>.0020 | .0040<br>.0030 | .0050<br>.0040 | .0060<br>.0050 | .0080<br>.0060 | .0100<br>.0080 | .0130<br>.0100 | .0150<br>.0120 |
| COPPER ALLOY | Cu-ETP , CuBe2<br>CuZn30 , CuZn36Pb3<br>CuZn10 , CuSn5 | < 75 HRB<br>75 - 98 HRB | 600<br>450 | .0007<br>.0007 | .0015<br>.0015 | .0022<br>.0022 | .0030<br>.0028 | .0035<br>.0035 | .0045<br>.0045 | .0060<br>.0055 | .0070<br>.0070 | .0090<br>.0090 |
| CARBON STEEL | 10XX, 11XX, 12XX<br>12LXX, ASTM A27<br>ASTM A36 | < 75 HRB<br>75 - 98 HRB<br>21 - 36 HRC | 450<br>450<br>400 | .0010<br>.0007<br>.0005 | .0020<br>.0015<br>.0010 | .0030<br>.0020<br>.0015 | .0040<br>.0028<br>.0020 | .0050<br>.0035<br>.0025 | .0060<br>.0040<br>.0030 | .0080<br>.0055<br>.0040 | .0100<br>.0070<br>.0050 | .0120<br>.0080<br>.0060 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX<br>51XX, 86XX, 93XX | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC<br>> 50 HRC | 400<br>350<br>200<br>90 | .0006<br>.0005<br>.0003<br>.0002 | .0012<br>.0009<br>.0006<br>.0005 | .0018<br>.0015<br>.0010<br>.0007 | .0025<br>.0018<br>.0012<br>.0010 | .0030<br>.0022<br>.0015<br>.0012 | .0035<br>.0028<br>.0020<br>.0015 | .0050<br>.0035<br>.0025<br>.0020 | .0060<br>.0045<br>.0030<br>.0025 | .0070<br>.0055<br>.0040<br>.0030 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC<br>> 50 HRC | 325<br>250<br>150<br>50 | .0005<br>.0005<br>.0003<br>.0002 | .0011<br>.0009<br>.0007<br>.0005 | .0018<br>.0015<br>.0010<br>.0007 | .0022<br>.0018<br>.0012<br>.0010 | .0028<br>.0022<br>.0018<br>.0012 | .0035<br>.0028<br>.0020<br>.0015 | .0045<br>.0035<br>.0028<br>.0020 | .0055<br>.0045<br>.0035<br>.0025 | .0070<br>.0055<br>.0040<br>.0030 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar<br>Maraging 200<br>Maraging 250<br>Maraging 300<br>Maraging 350 | < 75 HRB<br>75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC<br>> 50 HRC | 350<br>400<br>225<br>140<br>45 | .0006<br>.0005<br>.0004<br>.0004<br>.0002 | .0012<br>.0011<br>.0009<br>.0008<br>.0005 | .0020<br>.0015<br>.0012<br>.0012<br>.0007 | .0025<br>.0020<br>.0018<br>.0015<br>.0010 | .0030<br>.0028<br>.0022<br>.0020<br>.0012 | .0040<br>.0030<br>.0025<br>.0022<br>.0015 | .0050<br>.0040<br>.0035<br>.0030<br>.0020 | .0060<br>.0055<br>.0045<br>.0040<br>.0025 | .0080<br>.0060<br>.0050<br>.0045<br>.0030 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50<br>Nitronic 60 , 301, 303<br>304, 304L<br>Incoloy 27-7MO, 316<br>316L, 321, 347 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 250<br>225<br>175 | .0004<br>.0004<br>.0003 | .0009<br>.0009<br>.0007 | .0012<br>.0012<br>.0010 | .0018<br>.0018<br>.0012 | .0022<br>.0022<br>.0018 | .0028<br>.0025<br>.0020 | .0035<br>.0035<br>.0028 | .0045<br>.0045<br>.0035 | .0055<br>.0050<br>.0040 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420<br>440, 430, 446 | 75 - 98 HRB<br>21 - 36 HRC | 325<br>300 | .0004<br>.0005 | .0008<br>.0011 | .0012<br>.0018 | .0018<br>.0022 | .0020<br>.0028 | .0025<br>.0035 | .0035<br>.0045 | .0040<br>.0055 | .0050<br>.0070 |
| PH STAINLESS STEEL | 15-5, 17-4<br>Carpenter 450<br>Carpenter 465 | 21 - 36 HRC<br>36 - 50 HRC | 225<br>120 | .0004<br>.0003 | .0009<br>.0007 | .0012<br>.0010 | .0018<br>.0012 | .0022<br>.0018 | .0028<br>.0020 | .0035<br>.0028 | .0045<br>.0035 | .0055<br>.0040 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB<br>21 - 36 HRC | 450<br>400 | .0011<br>.0008 | .0022<br>.0015 | .0035<br>.0022 | .0045<br>.0030 | .0055<br>.0040 | .0070<br>.0045 | .0090<br>.0060 | .0110<br>.0080 | .0130<br>.0090 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220<br>ASTM A602 | 75 - 98 HRB<br>21 - 36 HRC | 350<br>300 | .0007<br>.0005 | .0012<br>.0009 | .0020<br>.0015 | .0028<br>.0020 | .0035<br>.0022 | .0040<br>.0028 | .0055<br>.0040 | .0070<br>.0045 | .0080<br>.0055 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 325<br>275<br>160 | .0007<br>.0005<br>.0002 | .0012<br>.0010<br>.0005 | .0020<br>.0015<br>.0007 | .0028<br>.0020<br>.0010 | .0035<br>.0025<br>.0012 | .0040<br>.0030<br>.0015 | .0055<br>.0040<br>.0020 | .0070<br>.0050<br>.0025 | .0080<br>.0060<br>.0030 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB<br>75 - 98 HRB | 450<br>450 | .0008<br>.0007 | .0015<br>.0015 | .0022<br>.0020 | .0030<br>.0028 | .0040<br>.0035 | .0045<br>.0040 | .0060<br>.0055 | .0080<br>.0070 | .0090<br>.0080 |
| NICKEL ALLOY | Hastelloy C-22<br>Inconel 625, Waspaloy<br>René 41 , Inconel 718<br>Incoloy 20 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 175<br>150<br>80 | .0004<br>.0004<br>.0004 | .0009<br>.0008<br>.0007 | .0012<br>.0012<br>.0011 | .0018<br>.0015<br>.0015 | .0022<br>.0020<br>.0018 | .0028<br>.0025<br>.0020 | .0035<br>.0030<br>.0028 | .0045<br>.0040<br>.0035 | .0055<br>.0050<br>.0040 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2<br>Ti Grade 3, Ti Grade 4<br>Ti Grade 7, Ti Grade 12 | < 75 HRB<br>75 - 98 HRB<br>21 - 36 HRC | 350<br>400<br>350 | .0009<br>.0005<br>.0005 | .0018<br>.0010<br>.0011 | .0028<br>.0015<br>.0015 | .0035<br>.0020<br>.0022 | .0045<br>.0025<br>.0028 | .0055<br>.0030<br>.0030 | .0070<br>.0040<br>.0045 | .0090<br>.0050<br>.0055 | .0110<br>.0060<br>.0060 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V<br>Ti 10V-2Fe-3Al | 21 - 36 HRC<br>36 - 50 HRC | 200<br>140 | .0004<br>.0004 | .0009<br>.0007 | .0012<br>.0010 | .0018<br>.0015 | .0022<br>.0018 | .0028<br>.0022 | .0035<br>.0030 | .0045<br>.0035 | .0055<br>.0045 |
| COBALT ALLOY | ASTM F562 , ASTM F90<br>ASTM F75, ASTM F799 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 225<br>150<br>80 | .0003<br>.0004<br>.0003 | .0006<br>.0008<br>.0006 | .0008<br>.0012<br>.0010 | .0010<br>.0018<br>.0012 | .0015<br>.0020<br>.0015 | .0018<br>.0025<br>.0020 | .0022<br>.0035<br>.0025 | .0028<br>.0040<br>.0030 | .0035<br>.0050<br>.0040 |

NOTES:

Speed (SFM) and feed (IPT) numbers shown in the table above are considered to be average values. Use a tolerance of ± 25% as needed.

Hardness Scales: HBS = Brinell (500-kgf steel ball)

HRB = Rockwell B

HRC = Rockwell C

# CHAMFER MILLS - HELICAL FLUTE New!

**HPCM**

## 2 & 4 Flute - High Performance - Pointed

- Helically ground with positive axial rake and clearance for high performance chamfering
- Helical flute geometry results in superior part finish
- Pointed tip for precise applications and detailed workpieces
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- *Aplus* coating for added lubricity and higher speeds and feeds in a wide variety of ferrous metals and titanium alloys
- Solid carbide
- CNC ground in the USA

| Incl. Angle A +0°30' −0°30' | Shank Dia.* D2 (h6) | LOC L2 | Overall Length L1 +.062" −.062" | Web Thickness (MAX) | Flutes | *Zplus* Coated | *Aplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 60° | 1/8 | .010 | .100 | 1-1/2 | 2 | 83836 | 83780 | HPCM60-20125 | new |
| | 3/16 | .010 | .154 | 2 | 2 | 83838 | 83782 | HPCM60-20187 | new |
| | 3/16 | .010 | .154 | 2 | 4 | | 83784 | HPCM60-40187 | new |
| | 1/4 | .010 | .208 | 2-1/2 | 2 | 83840 | 83786 | HPCM60-20250 | new |
| | 1/4 | .010 | .208 | 2-1/2 | 4 | | 83788 | HPCM60-40250 | new |
| | 3/8 | .010 | .316 | 2-1/2 | 2 | 83842 | 83790 | HPCM60-20375 | new |
| | 3/8 | .010 | .316 | 2-1/2 | 4 | | 83792 | HPCM60-40375 | new |
| | 1/2 | .010 | .424 | 3 | 2 | 83844 | 83794 | HPCM60-20500 | new |
| | 1/2 | .010 | .424 | 3 | 4 | | 83796 | HPCM60-40500 | new |
| 90° | 1/8 | .010 | .058 | 1-1/2 | 2 | 83846 | 83798 | HPCM90-20125 | new |
| | 1/8 | .010 | .058 | 1-1/2 | 4 | | 83800 | HPCM90-40125 | new |
| | 3/16 | .010 | .089 | 2 | 2 | 83848 | 83802 | HPCM90-20187 | new |
| | 3/16 | .010 | .089 | 2 | 4 | | 83804 | HPCM90-40187 | new |
| | 1/4 | .010 | .120 | 2-1/2 | 2 | 83850 | 83806 | HPCM90-20250 | new |
| | 1/4 | .010 | .120 | 2-1/2 | 4 | | 83808 | HPCM90-40250 | new |
| | 3/8 | .010 | .183 | 2-1/2 | 2 | 83852 | 83810 | HPCM90-20375 | new |
| | 3/8 | .010 | .183 | 2-1/2 | 4 | | 83812 | HPCM90-40375 | new |
| | 1/2 | .010 | .245 | 3 | 2 | 83854 | 83814 | HPCM90-20500 | new |
| | 1/2 | .010 | .245 | 3 | 4 | | 83816 | HPCM90-40500 | new |
| 120° | 1/8 | .010 | .033 | 1-1/2 | 2 | 83856 | 83818 | HPCM120-20125 | new |
| | 3/16 | .010 | .051 | 2 | 2 | 83858 | 83820 | HPCM120-20187 | new |
| | 3/16 | .010 | .051 | 2 | 4 | | 83822 | HPCM120-40187 | new |
| | 1/4 | .010 | .069 | 2-1/2 | 2 | 83860 | 83824 | HPCM120-20250 | new |
| | 1/4 | .010 | .069 | 2-1/2 | 4 | | 83826 | HPCM120-40250 | new |
| | 3/8 | .010 | .105 | 2-1/2 | 2 | 83862 | 83828 | HPCM120-20375 | new |
| | 3/8 | .010 | .105 | 2-1/2 | 4 | | 83830 | HPCM120-40375 | new |
| | 1/2 | .010 | .141 | 3 | 2 | 83864 | 83832 | HPCM120-20500 | new |
| | 1/2 | .010 | .141 | 3 | 4 | | 83834 | HPCM120-40500 | new |

* .0005 max TIR

# HPCM

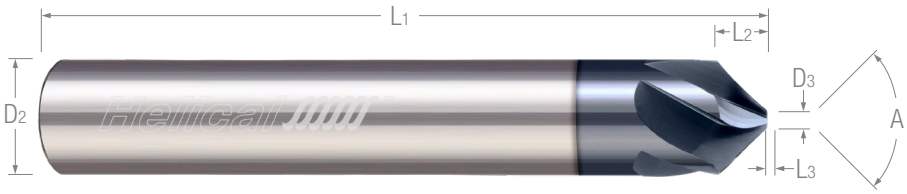
New Items!

## CHAMFER MILLS - HELICAL FLUTE

### 3 & 5 Flute - High Performance - Tipped-Off



- Helically ground with positive axial rake and clearance for high performance chamfering
- Helical flute geometry results in superior part finish
- Flat tip diameter for programming accuracy and increased strength
- h6 shank tolerance for high precision tool holders
- *Zplus* coating offers higher hardness and added lubricity for maximum performance
- *Aplus* coating offers added lubricity and high temperature resistance for faster speeds and feeds and improved tool life
- Solid carbide
- CNC ground in the USA




| | Incl. Angle A +0°30' −0°30' | Shank Dia.* D2 (h6) | LOC L2 | Overall Length L1 +.062" −.062" | Theoretical Tip Length L3 | Tip Diameter D3 +.002" −.002" | Flutes | *Zplus* Coated | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|---|
| new | 60° | 1/8 | .074 | 1-1/2 | .035 | .040 | 3 | 83880 | 83866 | HPCM60-30125 |
| new | | 3/16 | .119 | 2 | .043 | .050 | 3 | 83882 | 83868 | HPCM60-30187 |
| new | | 3/16 | .119 | 2 | .043 | .050 | 5 | | 83870 | HPCM60-50187 |
| | | 1/4 | .164 | 2-1/2 | .052 | .060 | 3 | 59815 | 07001 | HPCM60-30250 |
| | | 1/4 | .164 | 2-1/2 | .052 | .060 | 5 | | 59806 | HPCM60-50250 |
| | | 3/8 | .264 | 2-1/2 | .061 | .070 | 3 | 59816 | 07002 | HPCM60-30375 |
| | | 3/8 | .264 | 2-1/2 | .061 | .070 | 5 | | 07022 | HPCM60-50375 |
| | | 1/2 | .364 | 3 | .069 | .080 | 3 | 59817 | 07003 | HPCM60-30500 |
| | | 1/2 | .364 | 3 | .069 | .080 | 5 | | 07023 | HPCM60-50500 |
| | | 5/8 | .463 | 3 | .078 | .090 | 3 | 59818 | 07004 | HPCM60-30625 |
| | | 5/8 | .463 | 3 | .078 | .090 | 5 | | 07024 | HPCM60-50625 |
| | | 3/4 | .562 | 3 | .087 | .100 | 3 | 59819 | 07005 | HPCM60-30750 |
| | | 3/4 | .562 | 3 | .087 | .100 | 5 | | 07025 | HPCM60-50750 |
| new | 90° | 1/8 | .043 | 1-1/2 | .020 | .040 | 3 | 83884 | 83872 | HPCM90-30125 |
| new | | 1/8 | .043 | 1-1/2 | .020 | .040 | 5 | | 83874 | HPCM90-50125 |
| new | | 3/16 | .069 | 2 | .025 | .050 | 3 | 83886 | 83876 | HPCM90-30187 |
| new | | 3/16 | .069 | 2 | .025 | .050 | 5 | | 83878 | HPCM90-50187 |
| | | 1/4 | .095 | 2-1/2 | .030 | .060 | 3 | 59820 | 07008 | HPCM90-30250 |
| | | 1/4 | .095 | 2-1/2 | .030 | .060 | 5 | | 59807 | HPCM90-50250 |
| | | 3/8 | .153 | 2-1/2 | .035 | .070 | 3 | 59821 | 07009 | HPCM90-30375 |
| | | 3/8 | .153 | 2-1/2 | .035 | .070 | 5 | | 07028 | HPCM90-50375 |
| | | 3/8 | .153 | 4 | .035 | .070 | 5 | | 81838 | HPCM90-50375 |
| | | 1/2 | .210 | 3 | .040 | .080 | 3 | 59822 | 07010 | HPCM90-30500 |
| | | 1/2 | .210 | 3 | .040 | .080 | 5 | | 07029 | HPCM90-50500 |
| | | 1/2 | .210 | 6 | .040 | .080 | 5 | | 81839 | HPCM90-50500 |
| | | 5/8 | .268 | 3 | .045 | .090 | 3 | 59823 | 07011 | HPCM90-30625 |
| | | 5/8 | .268 | 3 | .045 | .090 | 5 | | 07030 | HPCM90-50625 |
| | | 3/4 | .325 | 3 | .050 | .100 | 3 | 59824 | 07012 | HPCM90-30750 |
| | | 3/4 | .325 | 3 | .050 | .100 | 5 | | 07031 | HPCM90-50750 |
| | | 1 | .440 | 4 | .060 | .120 | 5 | | 82662 | HPCM90-51000 |

* .0005 max TIR

continued on next page

# CHAMFER MILLS - HELICAL FLUTE New Items!

HPCM

## 3 & 5 Flute - High Performance (cont.)

continued from previous page

| Incl. Angle A $^{+0°30'}_{-0°30'}$ | Shank Dia.* D2 (h6) | LOC L2 | Overall Length L1 $^{+.062"}_{-.062"}$ | Theoretical Tip Length L3 | Tip Diameter D3 $^{+.002"}_{-.002"}$ | Flutes | *Zplus* Coated | *Aplus* Coated | Tool Description |
|---|---|---|---|---|---|---|---|---|---|
| 100° | 1/4 | .080 | 2-1/2 | .025 | .060 | 3 | **59825** | **59809** | HPCM100-30250 |
| | 1/4 | .080 | 2-1/2 | .025 | .060 | 5 | | **59812** | HPCM100-50250 |
| | 3/8 | .128 | 2-1/2 | .029 | .070 | 3 | **59826** | **59810** | HPCM100-30375 |
| | 3/8 | .128 | 2-1/2 | .029 | .070 | 5 | | **59813** | HPCM100-50375 |
| | 1/2 | .176 | 3 | .034 | .080 | 3 | **59827** | **59811** | HPCM100-30500 |
| | 1/2 | .176 | 3 | .034 | .080 | 5 | | **59814** | HPCM100-50500 |
| 120° | 1/4 | .057 | 2-1/2 | .017 | .060 | 3 | **59828** | **07015** | HPCM120-30250 |
| | 1/4 | .057 | 2-1/2 | .017 | .060 | 5 | | **59808** | HPCM120-50250 |
| | 3/8 | .091 | 2-1/2 | .020 | .070 | 3 | **59829** | **07016** | HPCM120-30375 |
| | 3/8 | .091 | 2-1/2 | .020 | .070 | 5 | | **07034** | HPCM120-50375 |
| | 1/2 | .126 | 3 | .023 | .080 | 3 | **59830** | **07017** | HPCM120-30500 |
| | 1/2 | .126 | 3 | .023 | .080 | 5 | | **07035** | HPCM120-50500 |
| | 5/8 | .157 | 3 | .026 | .090 | 3 | **59831** | **07018** | HPCM120-30625 |
| | 5/8 | .157 | 3 | .026 | .090 | 5 | | **07036** | HPCM120-50625 |
| | 3/4 | .195 | 3 | .029 | .100 | 3 | **59832** | **07019** | HPCM120-30750 |
| | 3/4 | .195 | 3 | .029 | .100 | 5 | | **07037** | HPCM120-50750 |

* .0005 max TIR

# HPCM

## SPEEDS & FEEDS

### Chamfer Mills - Helical Flute



| HPCM | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material Guide | | Hardness | SFM | Inches per Tooth (IPT) | | | | | | | | | |
| | | | | Effective Cutting Diameter (Deff) | | | | | | | | | |
| | | | | < .125 | ≥ .125 < .1875 | ≥ .1875 < .25 | ≥ .25 < .3125 | ≥ .3125 < .375 | ≥ .375 < .5 | ≥ .5 < .625 | ≥ .625 < .75 | ≥ .75 |
| WROUGHT ALUMINUM ALLOY | 2014, 5052, 6061<br>7050, 7075, 7475 | < 120 HBS<br>≥ 120 HBS | 2200<br>2200 | .0009<br>.0006 | .0018<br>.0012 | .0028<br>.0018 | .0035<br>.0022 | .0045<br>.0030 | .0055<br>.0035 | .0070<br>.0045 | .0090<br>.0060 | .0110<br>.0070 |
| CAST ALUMINUM ALLOY | 319.0, 328.0, 355.0<br>360.0, 380.0, 383.0<br>390.0, 520.0, 535.0 | < 120 HBS<br>≥ 120 HBS | 1800<br>1600 | .0012<br>.0011 | .0028<br>.0022 | .0040<br>.0030 | .0055<br>.0045 | .0070<br>.0055 | .0080<br>.0060 | .0110<br>.0090 | .0130<br>.0110 | .0160<br>.0130 |
| COPPER ALLOY | Cu-ETP , CuBe2<br>CuZn30 , CuZn36Pb3<br>CuZn10 , CuSn5 | < 75 HRB<br>75 - 98 HRB | 600<br>450 | .0008<br>.0007 | .0015<br>.0015 | .0022<br>.0022 | .0030<br>.0030 | .0040<br>.0035 | .0045<br>.0045 | .0060<br>.0060 | .0080<br>.0070 | .0090<br>.0090 |
| CARBON STEEL | 10XX, 11XX, 12XX<br>12LXX, ASTM A27<br>ASTM A36 | < 75 HRB<br>75 - 98 HRB<br>21 - 36 HRC | 450<br>450<br>400 | .0010<br>.0007<br>.0005 | .0020<br>.0015<br>.0010 | .0030<br>.0022<br>.0015 | .0040<br>.0028<br>.0020 | .0050<br>.0035<br>.0025 | .0060<br>.0045<br>.0030 | .0080<br>.0055<br>.0040 | .0100<br>.0070<br>.0050 | .0120<br>.0090<br>.0060 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX<br>51XX, 86XX, 93XX | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC<br>> 50 HRC | 400<br>350<br>200<br>90 | .0006<br>.0005<br>.0003<br>.0003 | .0012<br>.0010<br>.0007<br>.0005 | .0020<br>.0015<br>.0010<br>.0008 | .0025<br>.0020<br>.0012<br>.0010 | .0030<br>.0025<br>.0018<br>.0012 | .0040<br>.0028<br>.0020<br>.0015 | .0050<br>.0040<br>.0028<br>.0020 | .0060<br>.0050<br>.0035<br>.0025 | .0080<br>.0055<br>.0040<br>.0030 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC<br>> 50 HRC | 325<br>250<br>150<br>50 | .0006<br>.0005<br>.0003<br>.0002 | .0010<br>.0010<br>.0007<br>.0005 | .0018<br>.0015<br>.0010<br>.0007 | .0022<br>.0020<br>.0012<br>.0010 | .0028<br>.0025<br>.0018<br>.0012 | .0035<br>.0028<br>.0020<br>.0015 | .0045<br>.0040<br>.0028<br>.0020 | .0055<br>.0050<br>.0035<br>.0025 | .0070<br>.0055<br>.0040<br>.0030 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar<br>Maraging 200<br>Maraging 250<br>Maraging 300<br>Maraging 350 | < 75 HRB<br>75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC<br>> 50 HRC | 350<br>400<br>225<br>140<br>45 | .0006<br>.0005<br>.0004<br>.0004<br>.0003 | .0012<br>.0011<br>.0009<br>.0008<br>.0005 | .0020<br>.0018<br>.0012<br>.0012<br>.0008 | .0025<br>.0022<br>.0018<br>.0015<br>.0010 | .0030<br>.0028<br>.0022<br>.0020<br>.0012 | .0040<br>.0035<br>.0028<br>.0025<br>.0015 | .0050<br>.0045<br>.0035<br>.0030<br>.0020 | .0060<br>.0055<br>.0045<br>.0040<br>.0025 | .0080<br>.0070<br>.0055<br>.0050<br>.0030 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50<br>Nitronic 60 , 301, 303<br>304, 304L<br>Incoloy 27-7MO, 316<br>316L, 321, 347 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 250<br>225<br>175 | .0005<br>.0005<br>.0004 | .0009<br>.0009<br>.0007 | .0015<br>.0012<br>.0011 | .0018<br>.0018<br>.0015 | .0022<br>.0022<br>.0018 | .0028<br>.0028<br>.0020 | .0035<br>.0035<br>.0028 | .0045<br>.0045<br>.0035 | .0055<br>.0055<br>.0040 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420<br>440, 430, 446 | 75 - 98 HRB<br>21 - 36 HRC | 325<br>300 | .0004<br>.0006 | .0009<br>.0012 | .0012<br>.0018 | .0018<br>.0022 | .0022<br>.0028 | .0025<br>.0035 | .0035<br>.0045 | .0045<br>.0055 | .0050<br>.0070 |
| PH STAINLESS STEEL | 15-5, 17-4<br>Carpenter 450<br>Carpenter 465 | 21 - 36 HRC<br>36 - 50 HRC | 225<br>120 | .0005<br>.0003 | .0009<br>.0007 | .0012<br>.0010 | .0018<br>.0015 | .0022<br>.0018 | .0028<br>.0020 | .0035<br>.0028 | .0045<br>.0035 | .0055<br>.0040 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB<br>21 - 36 HRC | 450<br>400 | .0012<br>.0008 | .0022<br>.0015 | .0035<br>.0025 | .0045<br>.0030 | .0055<br>.0040 | .0070<br>.0050 | .0090<br>.0060 | .0110<br>.0080 | .0140<br>.0100 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220<br>ASTM A602 | 75 - 98 HRB<br>21 - 36 HRC | 350<br>300 | .0007<br>.0005 | .0012<br>.0010 | .0020<br>.0015 | .0028<br>.0020 | .0035<br>.0025 | .0040<br>.0030 | .0055<br>.0040 | .0070<br>.0050 | .0080<br>.0060 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 325<br>275<br>160 | .0007<br>.0005<br>.0003 | .0015<br>.0010<br>.0005 | .0020<br>.0015<br>.0008 | .0028<br>.0020<br>.0010 | .0035<br>.0025<br>.0012 | .0040<br>.0030<br>.0015 | .0055<br>.0040<br>.0020 | .0070<br>.0050<br>.0025 | .0080<br>.0060<br>.0030 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB<br>75 - 98 HRB | 450<br>450 | .0008<br>.0007 | .0015<br>.0015 | .0022<br>.0022 | .0030<br>.0030 | .0040<br>.0035 | .0045<br>.0045 | .0060<br>.0060 | .0080<br>.0070 | .0090<br>.0090 |
| NICKEL ALLOY | Hastelloy C-22<br>Inconel 625, Waspaloy<br>René 41 , Inconel 718<br>Incoloy 20 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 175<br>150<br>80 | .0005<br>.0004<br>.0004 | .0009<br>.0008<br>.0007 | .0012<br>.0012<br>.0011 | .0018<br>.0018<br>.0015 | .0022<br>.0020<br>.0018 | .0028<br>.0025<br>.0022 | .0035<br>.0035<br>.0030 | .0045<br>.0040<br>.0035 | .0055<br>.0050<br>.0045 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2<br>Ti Grade 3, Ti Grade 4<br>Ti Grade 7, Ti Grade 12 | < 75 HRB<br>75 - 98 HRB<br>21 - 36 HRC | 350<br>400<br>350 | .0009<br>.0005<br>.0006 | .0020<br>.0011<br>.0010 | .0028<br>.0015<br>.0018 | .0040<br>.0020<br>.0022 | .0045<br>.0028<br>.0028 | .0055<br>.0030<br>.0035 | .0080<br>.0040<br>.0045 | .0090<br>.0055<br>.0055 | .0110<br>.0060<br>.0070 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V<br>Ti 10V-2Fe-3Al | 21 - 36 HRC<br>36 - 50 HRC | 200<br>140 | .0005<br>.0004 | .0009<br>.0008 | .0012<br>.0012 | .0018<br>.0015 | .0022<br>.0020 | .0028<br>.0022 | .0035<br>.0030 | .0045<br>.0040 | .0055<br>.0045 |
| COBALT ALLOY | ASTM F562 , ASTM F90<br>ASTM F75, ASTM F799 | 75 - 98 HRB<br>21 - 36 HRC<br>36 - 50 HRC | 225<br>150<br>80 | .0003<br>.0004<br>.0003 | .0006<br>.0009<br>.0007 | .0009<br>.0012<br>.0010 | .0012<br>.0018<br>.0012 | .0015<br>.0022<br>.0018 | .0018<br>.0028<br>.0020 | .0022<br>.0035<br>.0028 | .0030<br>.0045<br>.0035 | .0035<br>.0055<br>.0040 |

NOTES:

Speed (SFM) and feed (IPT) numbers shown in the table above are considered to be average values. Use a tolerance of ± 25% as needed.

Hardness Scales: HBS = Brinell (500-kgf steel ball)

HRB = Rockwell B

HRC = Rockwell C

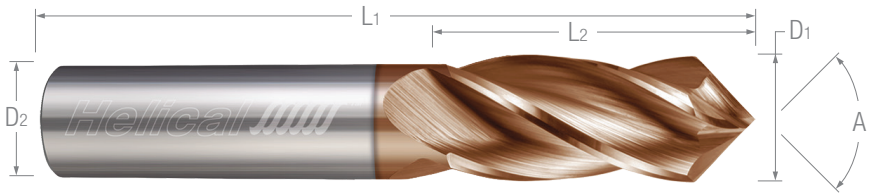
# COMBINATION CHAMFER / END MILLS New!

## 4 Flute - High Performance

**HCCM**

- Engineered for versatility and excellent performance in chamfering and side milling applications
- Specialized helically fluted tip design for superior performance, surface finish, and chip evacuation
- Variable geometry reduces chatter and harmonics and increases material removal rates
- T*plus* coating offers high hardness for improved tool life and increased edge strength in difficult-to-machine materials
- h6 shank tolerance for high precision tool holders
- Solid carbide
- CNC ground in the USA






| Incl. Angle A +0°30' −0°30' | Cutter Diameter* D1 +.000" −.002" | Shank Diameter D2 (h6) | Web Thickness (MAX) | LOC L2 +.032" −.000" | Overall Length L1 +.062" −.062" | Flutes | T*plus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|---|
| 60° | 1/8 | 1/8 | .009 | 1/2 | 1-1/2 | 4 | 83740 | HCCM60-40125 | new |
| | 3/16 | 3/16 | .010 | 5/8 | 2 | 4 | 83742 | HCCM60-40187 | new |
| | 1/4 | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 83744 | HCCM60-40250 | new |
| | 3/8 | 3/8 | .013 | 7/8 | 2-1/2 | 4 | 83746 | HCCM60-40375 | new |
| | 1/2 | 1/2 | .013 | 1 | 3 | 4 | 83748 | HCCM60-40500 | new |
| 90° | 1/8 | 1/8 | .009 | 1/2 | 1-1/2 | 4 | 83750 | HCCM90-40125 | new |
| | 3/16 | 3/16 | .010 | 5/8 | 2 | 4 | 83752 | HCCM90-40187 | new |
| | 1/4 | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 83754 | HCCM90-40250 | new |
| | 3/8 | 3/8 | .013 | 7/8 | 2-1/2 | 4 | 83756 | HCCM90-40375 | new |
| | 1/2 | 1/2 | .013 | 1 | 3 | 4 | 83758 | HCCM90-40500 | new |
| 100° | 1/8 | 1/8 | .009 | 1/2 | 1-1/2 | 4 | 83760 | HCCM100-40125 | new |
| | 1/4 | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 83764 | HCCM100-40250 | new |
| | 3/8 | 3/8 | .013 | 7/8 | 2-1/2 | 4 | 83766 | HCCM100-40375 | new |
| | 1/2 | 1/2 | .013 | 1 | 3 | 4 | 83768 | HCCM100-40500 | new |
| 120° | 1/8 | 1/8 | .009 | 1/2 | 1-1/2 | 4 | 83770 | HCCM120-40125 | new |
| | 3/16 | 3/16 | .010 | 5/8 | 2 | 4 | 83772 | HCCM120-40187 | new |
| | 1/4 | 1/4 | .010 | 3/4 | 2-1/2 | 4 | 83774 | HCCM120-40250 | new |
| | 3/8 | 3/8 | .013 | 7/8 | 2-1/2 | 4 | 83776 | HCCM120-40375 | new |
| | 1/2 | 1/2 | .013 | 1 | 3 | 4 | 83778 | HCCM120-40500 | new |

* .0005 max TIR

# HCCM

## SPEEDS AND FEEDS

### Combination Chamfer / End Mills - 4 Flute - High Performance

| HCCM | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material Guide | | Hardness | SFM | Inches Per Tooth (IPT) | | | | | | | | | | | |
| | | | | 1/8 | | 3/16 | | 1/4 | | 3/8 | | 1/2 | |
| | | | | Rgh | Chf | Rgh | Chf | Rgh | Chf | Rgh | Chf | Rgh | Chf |
| CARBON STEEL | 10XX, 11XX, 12XX, 12LXX, ASTM A27, ASTM A36 | < 75 HRB | 455 | .0012 | .0010 | .0018 | .0020 | .0024 | .0030 | .0036 | .0050 | .0047 | .0060 |
| | | 75 - 98 HRB | 445 | .0009 | .0007 | .0013 | .0015 | .0018 | .0022 | .0026 | .0035 | .0034 | .0045 |
| | | 21 - 36 HRC | 400 | .0006 | .0005 | .0009 | .0010 | .0011 | .0015 | .0017 | .0025 | .0022 | .0030 |
| LOW ALLOY STEEL | 13XX, 41XX, 43XX, 51XX, 86XX, 93XX | 75 - 98 HRB | 390 | .0008 | .0006 | .0011 | .0012 | .0015 | .0020 | .0023 | .0030 | .0030 | .0040 |
| | | 21 - 36 HRC | 340 | .0006 | .0005 | .0009 | .0010 | .0012 | .0015 | .0017 | .0025 | .0022 | .0028 |
| | | 36 - 50 HRC | 260 | .0005 | .0003 | .0007 | .0007 | .0010 | .0010 | .0015 | .0018 | .0019 | .0020 |
| | | > 50 HRC | 155 | .0004 | .0003 | .0006 | .0005 | .0008 | .0008 | .0012 | .0012 | .0015 | .0015 |
| TOOL STEEL | A2, H13, L6, P20, S7 | 75 - 98 HRB | 340 | .0008 | .0005 | .0011 | .0010 | .0015 | .0018 | .0023 | .0028 | .0030 | .0035 |
| | | 21 - 36 HRC | 250 | .0006 | .0005 | .0009 | .0010 | .0012 | .0015 | .0018 | .0025 | .0024 | .0028 |
| | | 36 - 50 HRC | 145 | .0005 | .0003 | .0007 | .0007 | .0010 | .0010 | .0014 | .0018 | .0019 | .0020 |
| | | > 50 HRC | 85 | .0004 | .0002 | .0006 | .0005 | .0008 | .0007 | .0012 | .0012 | .0015 | .0015 |
| SPECIALTY STEEL | 300M, Invar 36, Kovar, Maraging 200, Maraging 250, Maraging 300, Maraging 350 | < 75 HRB | 290 | .0010 | .0006 | .0015 | .0012 | .0020 | .0020 | .0030 | .0030 | .0039 | .0040 |
| | | 75 - 98 HRB | 255 | .0007 | .0005 | .0010 | .0014 | .0014 | .0018 | .0021 | .0028 | .0027 | .0035 |
| | | 21 - 36 HRC | 175 | .0006 | .0004 | .0009 | .0009 | .0012 | .0012 | .0018 | .0022 | .0024 | .0028 |
| | | 36 - 50 HRC | 150 | .0006 | .0004 | .0008 | .0008 | .0011 | .0012 | .0016 | .0020 | .0021 | .0025 |
| | | > 50 HRC | 55 | .0004 | .0003 | .0005 | .0005 | .0007 | .0008 | .0010 | .0012 | .0013 | .0015 |
| AUSTENITIC STAINLESS STEEL | Nitronic 50, Nitronic 60, 301, 303, 304, 304L, Incoloy 27-7MO, 316, 316L, 321, 347 | 75 - 98 HRB | 265 | .0008 | .0005 | .0011 | .0009 | .0015 | .0015 | .0022 | .0022 | .0029 | .0028 |
| | | 21 - 36 HRC | 225 | .0007 | .0005 | .0010 | .0009 | .0014 | .0012 | .0020 | .0022 | .0026 | .0028 |
| | | 36 - 50 HRC | 180 | .0006 | .0004 | .0008 | .0007 | .0011 | .0011 | .0016 | .0018 | .0021 | .0020 |
| MARTENSITIC & FERRITIC STAINLESS STEEL | 403, 410, 416, 420, 440, 430, 446 | 75 - 98 HRB | 300 | .0008 | .0004 | .0011 | .0009 | .0016 | .0012 | .0023 | .0022 | .0030 | .0025 |
| | | 21 - 36 HRC | 280 | .0007 | .0006 | .0010 | .0012 | .0013 | .0018 | .0020 | .0028 | .0026 | .0035 |
| PH STAINLESS STEEL | 15-5, 17-4, Carpenter 450, Carpenter 465 | 21 - 36 HRC | 200 | .0006 | .0005 | .0008 | .0009 | .0011 | .0012 | .0017 | .0022 | .0022 | .0028 |
| | | 36 - 50 HRC | 145 | .0005 | .0003 | .0007 | .0007 | .0010 | .0010 | .0014 | .0018 | .0019 | .0020 |
| GRAY CAST IRON | SAE J431, ASTM A48 | 75 - 98 HRB | 410 | .0013 | .0012 | .0019 | .0022 | .0025 | .0035 | .0037 | .0055 | .0048 | .0070 |
| | | 21 - 36 HRC | 370 | .0007 | .0008 | .0010 | .0015 | .0013 | .0025 | .0020 | .0040 | .0026 | .0050 |
| MALLEABLE CAST IRON | ASTM A47, ASTM A220, ASTM A602 | 75 - 98 HRB | 345 | .0008 | .0007 | .0012 | .0012 | .0016 | .0020 | .0023 | .0035 | .0031 | .0040 |
| | | 21 - 36 HRC | 335 | .0007 | .0005 | .0010 | .0010 | .0014 | .0015 | .0020 | .0025 | .0026 | .0030 |
| NODULAR (DUCTILE) CAST IRON | ASTM A536, ASTM 897 | 75 - 98 HRB | 310 | .0008 | .0007 | .0012 | .0015 | .0016 | .0020 | .0024 | .0035 | .0032 | .0040 |
| | | 21 - 36 HRC | 260 | .0006 | .0005 | .0008 | .0010 | .0011 | .0015 | .0016 | .0025 | .0021 | .0030 |
| | | 36 - 50 HRC | 135 | .0004 | .0003 | .0005 | .0005 | .0007 | .0008 | .0010 | .0012 | .0013 | .0015 |
| PURE NICKEL | Nickel 200, Nickel 201 | < 75 HRB | 285 | .0011 | .0008 | .0016 | .0015 | .0021 | .0022 | .0031 | .0040 | .0041 | .0045 |
| | | 75 - 98 HRB | 250 | .0009 | .0007 | .0013 | .0015 | .0018 | .0022 | .0026 | .0035 | .0034 | .0045 |
| NICKEL ALLOY | Hastelloy C-22, Inconel 625, Waspaloy, René 41, Inconel 718, Incoloy 20 | 75 - 98 HRB | 80 | .0005 | .0005 | .0008 | .0009 | .0011 | .0012 | .0016 | .0022 | .0021 | .0028 |
| | | 21 - 36 HRC | 75 | .0005 | .0004 | .0008 | .0008 | .0010 | .0012 | .0015 | .0020 | .0020 | .0025 |
| | | 36 - 50 HRC | 70 | .0005 | .0004 | .0007 | .0007 | .0009 | .0011 | .0013 | .0018 | .0017 | .0022 |
| PURE TITANIUM | Ti Grade 1, Ti Grade 2, Ti Grade 3, Ti Grade 4, Ti Grade 7, Ti Grade 12 | < 75 HRB | 300 | .0015 | .0009 | .0022 | .0020 | .0029 | .0028 | .0043 | .0045 | .0057 | .0055 |
| | | 75 - 98 HRB | 275 | .0012 | .0005 | .0018 | .0011 | .0024 | .0015 | .0036 | .0028 | .0047 | .0030 |
| | | 21 - 36 HRC | 250 | .0009 | .0006 | .0014 | .0010 | .0018 | .0018 | .0027 | .0028 | .0036 | .0035 |
| TITANIUM ALLOY | Ti 3Al-2.5V, Ti 6Al-4V, Ti 10V-2Fe-3Al | 21 - 36 HRC | 180 | .0007 | .0005 | .0011 | .0009 | .0014 | .0012 | .0021 | .0022 | .0028 | .0028 |
| | | 36 - 50 HRC | 160 | .0007 | .0004 | .0010 | .0008 | .0013 | .0012 | .0020 | .0020 | .0026 | .0022 |
| COBALT ALLOY | ASTM F562, ASTM F90, ASTM F75, ASTM F799 | 75 - 98 HRB | 210 | .0006 | .0003 | .0009 | .0006 | .0012 | .0009 | .0018 | .0015 | .0024 | .0018 |
| | | 21 - 36 HRC | 170 | .0006 | .0004 | .0009 | .0009 | .0012 | .0012 | .0017 | .0028 | .0023 | .0028 |
| | | | 65 | .0004 | .0003 | .0006 | .0007 | .0008 | .0010 | .0012 | .0018 | .0016 | .0020 |

| Milling Process | Hardness | ADOC | RDOC |
|---|---|---|---|
| Rgh (Traditional Roughing) | < 35 HRC | Up to Max LOC | 30%-40% Diameter |
| | ≥ 35 HRC | Up to Max LOC | 25%-35% Diameter |
| Chf (Chamfering) | N/A | 3 Passes | |

NOTES:

Speed (SFM) and feed (IPT) numbers shown in table above are considered to be average values. Use a tolerance of +/-25% as needed.

Effective cutter diameter should be used to select the proper chipload per tooth for chamfering operations.

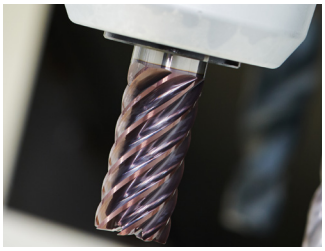
# IN THE LOUPE

## Your Source for Machining Solutions

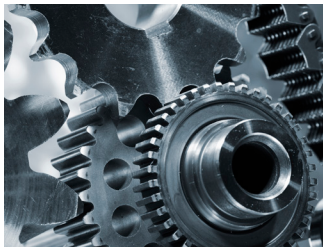
Our technical blog, In the Loupe, is dedicated to machining how-tos, technical tips, and tool selection guides. Access helpful resources at any time and share them easily with fellow machinists at helical.blog/intheloupe.

**How to Avoid Common Part Finish Problems**

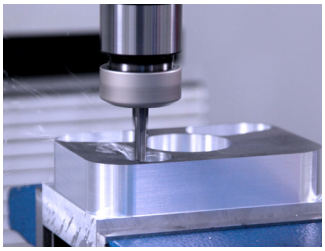
**Optimize Roughing with Chipbreaker Tooling**



**Why Flute Count Matters**

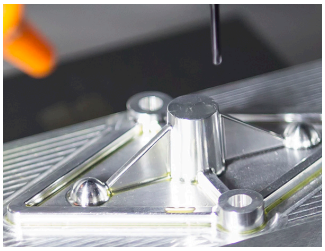


**Titanium Machining Guide**

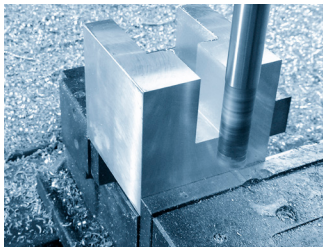


**How to Avoid 4 Major Types of Tool Wear**

**Ball Nose Milling Strategy**



**Corner Engagement: How to Machine Corners**



**Introduction to High Efficiency Milling**

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# TECHNICAL INFORMATION

## Programs, Resources, & More

The following section contains information about our products, programs, and services as well as useful technical guides for optimizing your tool performance. Go to **www.helicaltool.com/resources** for more technical information, resources, and case studies.


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# OUR PART NUMBERS

The easiest way to order tools is by the 5-digit EDP number found in the product table.

## EDP Number

The most accurate way to order our product is by the 5-digit EDP number found within all of our product tables. The EDP number will ensure you receive the correct coating and tool configuration.

| Cutter Diameter* $D_1$ (h6) | Shank Diameter $D_2$ (h6) | Length of Cut $L_2$ $^{+.032"}_{-.000"}$ | Overall Length $L_1$ $^{+.062"}_{-.062"}$ | Flutes | Uncoated | *Zplus* Coated | Tool Description | |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 1/8 | 1/4 | 1-1/2 | 3 | 01015 | 01017 | H35AL-S-30125 | |
| | 1/8 | 3/8 | 2 | 3 | 01030 | 01032 | H35AL-SR-30125 | |
| | 1/8 | 1/2 | 2-1/2 | 3 | 01045 | 01047 | H35AL-R-30125 | |
| | 1/8 | 5/8 | 2-1/2 | 3 | 81359 | 81360 | H35AL-M-30125 | |
| | 1/8 | 3/4 | 2-1/2 | 3 | 81361 | 81362 | H35AL-L-30125 | |
| | 1/8 | 7/8 | 2-1/2 | 3 | 83429 | 83430 | H35AL-LX-30125 | new |
| 3/16 | 3/16 | 5/16 | 2 | 3 | 01090 | 01092 | H35AL-S-30187 | |
| | 3/16 | 7/16 | 2 | 3 | 83431 | 83432 | H35AL-SR-30187 | new |
| | 3/16 | 9/16 | 2-1/2 | 3 | 01105 | 01107 | H35AL-R-30187 | |

## Tool Description

Our tool description is an informative part number that can aid in tool identification. This part number is for informational purposes only and not for ordering tools. You will find these descriptions on tool shanks and packaging.

Not applicable to square corner tools.

| M | H | 35 | - | AL | - | C | - | RN | - | S or 040 | - | 3 | 0500 | - | R.010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metric | Helical | Helix Angle | | **Material Type Part Family**<br>AL - Aluminumn<br>ALV - Aluminum Variable Pitch<br>CCM - Combination Chamfer / End Mill<br>CM - Chamfer Mill<br>EF - Exotic Finisher<br>EV - Exotic Variable Pitch<br>FV - Feed Mill Variable Pitch<br>FVC - Feed Mill Variable Pitch Coolant-Through<br>MG - High Balance<br>MGC - High Balance Coolant-Through<br>PCM - High Performance Chamfer Mill<br>SF - Steel Finisher<br>SV - Steel Variable Pitch<br>SVR - Steel Variable Rougher<br>VTI - Variable Pitch Titanium<br>XF - Multi-Flute Finisher<br>XVR - Multi-Flute Variable Pitch Rougher | | Chipbreaker | | Reduced Neck | | **Length of Cut or LBS (Reach)**<br>S - Stub<br>SR - Stub Regular<br>R - Regular<br>A - Regular/Medium<br>M - Medium<br>ML - Medium Long<br>L - Long<br>LX - Long/Extra Long<br>X - Xtra Long<br>**Multiple**<br>015 = 1.5x<br>040 = 4x<br>120 = 12x | | Number of Flutes | Cutter Diameter (0.000" or 00.00 mm) | | **Corner Radius / Profile**<br>R.010 - .010 Corner Radius<br>R.015 - .015 Corner Radius<br>R.030 - .030 Corner Radius<br>R.060 - .060 Corner Radius<br>R.090 - .090 Corner Radius<br>R.120 - .120 Corner Radius<br>R.190 - .190 Corner Radius<br>R.250 - .250 Corner Radius<br>R0.50 - 0.50 mm Corner Radius<br>R1.00 - 1.00 mm Corner Radius<br>BN - Ball Nose |

### SQUARE

1/2" Diameter, 40° Helix, 3-Flute, Regular Length, Square End

**EDP# 48396**

**H40ALV-R-30500**

### BALL

1/2" Diameter, 40° Helix, 3-Flute, Regular Length, Ball Nose

**EDP# 49286**

**H40ALV-R-30500-BN**

### CORNER RADIUS

1/2" Diameter, 40° Helix, 3-Flute, Regular Length, .030 Corner Radius

**EDP# 48406**

**H40ALV-R-30500-R.030**

# CHOOSING THE RIGHT HELIX ANGLE

Within our aluminum product lines, we offer three helix configurations that can handle any aluminum application. Below is a guideline that can be used to help direct you to the correct helix angle for your job.

## 35° Helix

*(Noted throughout our catalog as H35AL & H35ALV)*

Slower helix design ensures:

- The highest overall tool strength within our aluminum tool offering
- Elevated feed rates due to increased tool strength
- Decreased axial forces and cutting aggressiveness
- Reduced chance of tool pull-out
- Much higher corner strength
- An ideal tool for demanding roughing applications

---

## 40° Helix

*(Noted throughout our catalog as H40ALV)*

Medium helix design ensures:

- Moderate tool strength
- Elevated speed and feed rates utilizing its variable pitch design
- Moderate shear angle and cutting aggressiveness
- Excellent for both roughing & finishing assignments
- More chip clearance and chip management control
- A good combination of both optimum roughing and finishing characteristics

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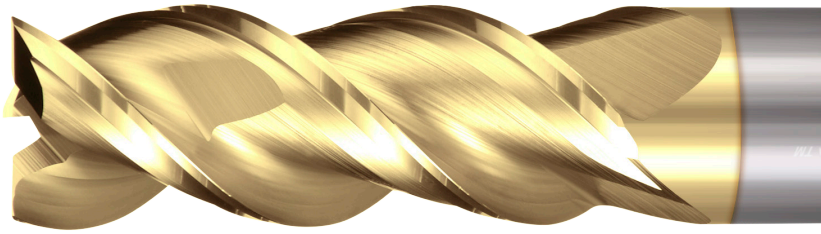


## 45° Helix

*(Noted throughout our catalog as H45AL)*

Higher helix design ensures:

- Superior surface finish results
- A high shear angle and overall cutting aggressiveness
- Lower tool strength, subject to torsional deflection as load is applied
- Good adaptation to high speed machining with low RDOC's
- Heightened probability of tool pull-out (depending on holder type being used)
- An ideal tool for the most demanding finishing applications

# CUSTOM TOOLS

## How We Are Different

Our custom tools consistently outperform competition in even the most difficult-to-machine materials because we adopt a unique "end-to-end" approach to our custom tool program.

We start by gaining a detailed understanding of your requirements. We design your tool by utilizing our proprietary geometries, coatings, and edge prep technology. Your tool is then manufactured to your exact standards. After you receive your custom design, our engineers are on standby to provide technical support and the ideal running parameters for your tool.

## Our Capabilities

Our specials are ground from Solid carbide on state-of-the-art CNC equipment. We manufacture configurations that our competitors won't even quote, including end mills up to 6" in diameter and up to 27" in overall length.

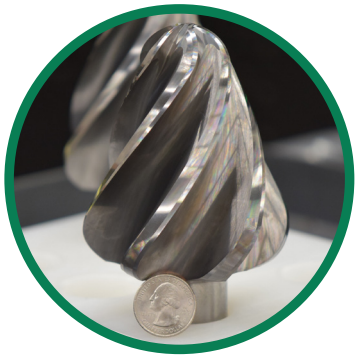
While we specialize in end mills, our team of professional engineers regularly design and manufacture form tools, drills, coolant-fed tooling, step drills, Christmas tree cutters, end mills, and more.

We are committed to providing turnkey solutions for our customers, and we pay attention to the intricate details of every tool to certify its quality and performance.

### We Provide

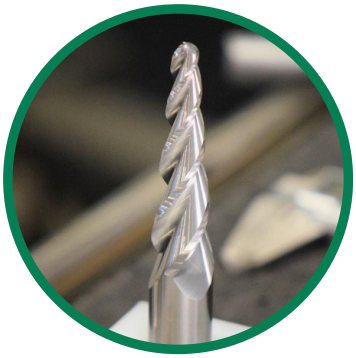
- ✓ Expert knowledge
- ✓ Quick quoting
- ✓ Unbeatable service
- ✓ Fast lead times
- ✓ Quality tooling
- ✓ Machining assitance

## Our Custom Tool Process



### Detailed Understanding of Your Requirements

During the quoting process, **we set ourselves apart** with a team of engineers eager to understand every aspect of your project, from work material and part envelope to machine capabilities and other critical factors.



### Designs Optimized for Your Specfic Application

Our objective is to return a quote **within 48 hours** that includes tool design, dimensions, and expected lead time. We will also provide a copy of your quote to your preferred distributor at a **very competitive price**.

### Outstanding Quality & Reliable Lead Times

After you receive your tool within our reliable lead time windows, our engineers will provide running parameters that assure your tool delivers **ideal performance** while providing accuracy, strength, and **impressive results**.

1-866-543-5422
helicaltech@harveyperformance.com

# TOOL MODIFICATIONS



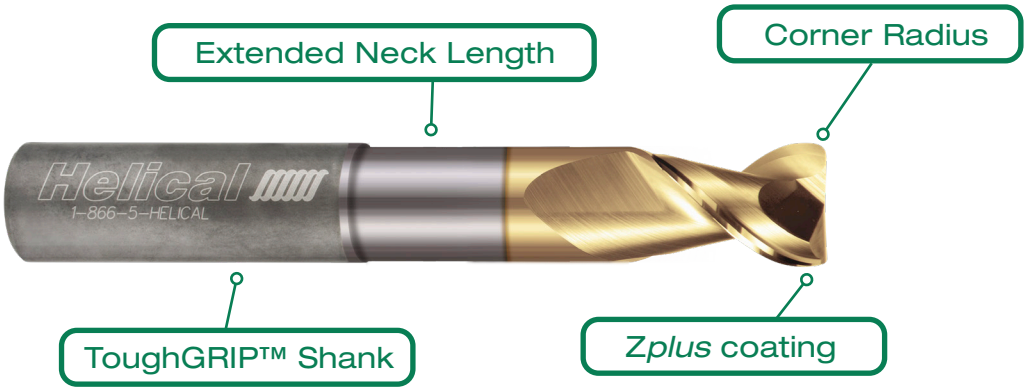
## What We Offer

Custom tool needs can often be accommodated by modifying one of our standard tools. Upon receiving a custom tool RFQ, we will evaluate each modification request to confirm optimal performance. Should we feel a full custom tool design is warranted, we'll quote accordingly.

### BEFORE

**We deliver modifications quickly and encourage you to call your preferred distributor with your needs.**

### AFTER

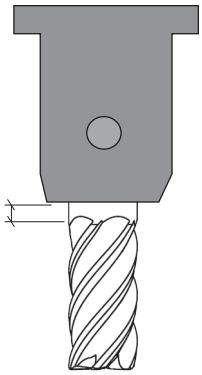



## Possible Modifications Include

- Corner radii
- Haimer Safe-Lock™ shanks
- Neck lengthening (or additions)
- Surface treatments (coatings)
- Wiper flats
- ToughGRIP shank™
- Overall length adjustments
- Shank coolant grooves
- Weldon flats / set screw flats
- Whistle notch
- Chipbreakers

**Please see pages 236-237 for our Shank Modifications**

# SHANK MODIFICATIONS



## Types of Modifications

At Helical, all tools come standard with precision cylindrically ground shanks that meet or exceed h6 shrink fit specifications. If you need a flat, it must be requested at the time of the order. The following shank modifications can be requested:

- Weldon Flats
- Straight Flats
- Coolant Grooves
- Whistle Notch
- HAIMER Safe-Lock™
- ToughGRIP™

Factory-ground flats have several key advantages:

- Flats are ground parallel with centerline of tool
- Flats are consistently level for the entire length of the flat
- Flats are accurately ground with no excess runout

Our "flat location procedure" ensures:

- Flutes will not end up inside of holder, avoiding chip compaction
- Tool "stick out" is minimal in order to achieve optimum tool strength

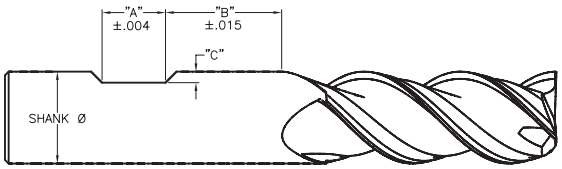
## Weldon Flat Specifications

Weldon Flat specifications are typically based on NAS 986, a high speed steel tool standard, and are measured from the shank end. Currently, there is no standardized specification for high performance Solid carbide end mills. All flats will be ground using the dimensional chart (Figure 1.1) unless specified otherwise at the time of quote/order. Some tool holding systems on the market are designed to the exact NAS 986 standard, and may not be directly compatible with the Helical Solutions Weldon dimensions outlined here.

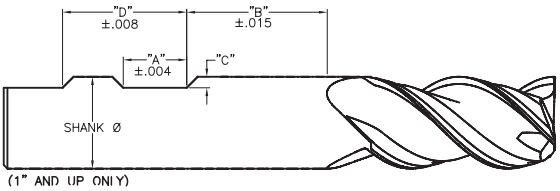
**[Figure 1.1]**

| Shank Dia. | "A" | "B" | "C" | "D" |
|---|---|---|---|---|
| .1250 | .155 | .500 | .012 +.005/-.000 | - |
| .1875 | .155 | .500 | .015 +.005/-.000 | - |
| .250 | .155 | .500 | .017 +.005/-.000 | - |
| .3125 | .295 | .750 | .020 +.005/-.000 | - |
| .375 | .295 | .750 | .050 +.015/-.000 | - |
| .4375 | .345 | .835 | .060 +.015/-.000 | - |
| .500 | .345 | .835 | .060 +.015/-.000 | - |
| .625 | .415 | .900 | .065 +.015/-.000 | - |
| .750 | .470 | .900 | .075 +.015/-.000 | - |
| 1.0000 | .530 | 1.000 | .075 +.015/-.000 | .900* |
| 1.2500 | .530 | 1.000 | .095 +.015/-.000 | .900* |

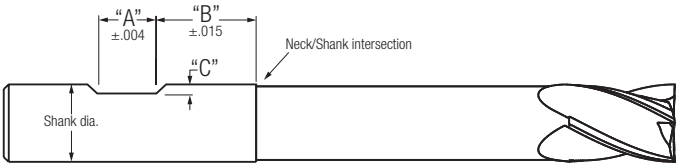
*Note: Not applicable to 1" dia. tools with ≤4 OAL.




**Single Weldon**




**Double Weldon**




**Single Weldon Reduced Neck**

In reduced neck tooling, weldon flats are measured from neck/shank intersection.

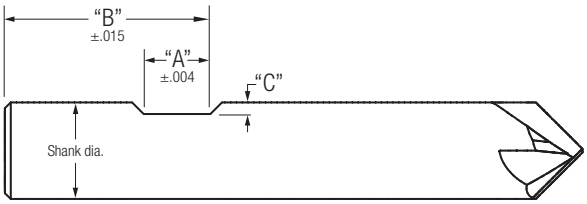
Hand-ground flats are not recommended, as they may cause higher tool runout, a susceptible area of breakage, and inconsistent alignment. Factory warranty is voided with hand-ground flats.

# SHANK MODIFICATIONS



## Chamfer Mill with Weldon Flat Specifications

| Shank Dia. | "A" | "B" | "C" |
|---|---|---|---|
| .1250 | .155 | .928 | .012 +.005/-.000 |
| .1875 | .155 | .928 | .015 +.005/-.000 |
| .2500 | .155 | .928 | .017 +.005/-.000 |
| .3750 | .295 | .928 | .050 +.015/-.000 |
| .5000 | .345 | 1.064 | .060 +.015/-.000 |
| .7500 | .470 | 1.250 | .075 +.015/-.000 |



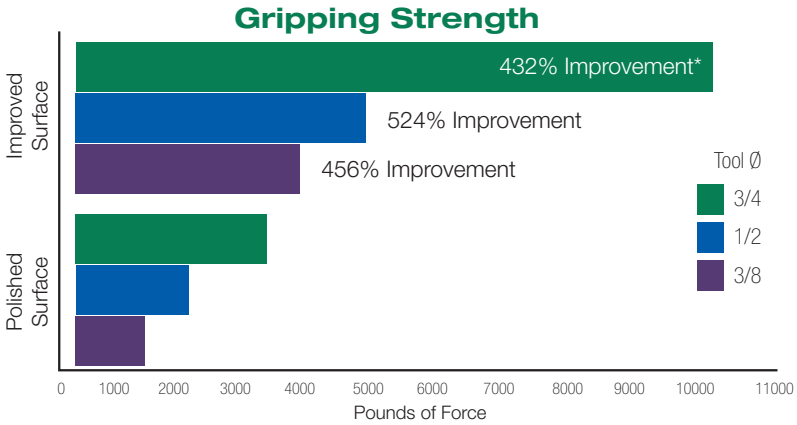

## ToughGRIP™ Shank

The mirror finish provided on most shanks does not always allow the friction needed for superior gripping strength. Helical's ToughGRIP™ shank was designed to solve this problem, giving you peace of mind while machining to ensure your tool and part remain undamaged.

- Maintains shank concentricity and h6 shrink-fit tolerance
- 30 +/- 3 Ra surface roughness, consistent within 2 Ra

**ToughGRIP™ shanks provide increased friction for superior gripping strength.**

### Gripping Strength



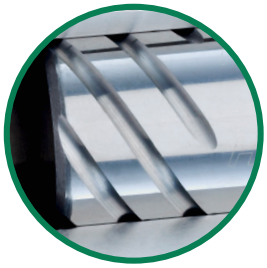

Based on independent laboratory testing. All tests were completed utilizing Command Tooling Systems' line of HYDRO-GRIP® HD Hydraulic tool holders by ETP Transmission.

* Improved surface finish from the ToughGRIP™ exceeded laboratory testing equipment.

## Haimer Safe-Lock™ System

As the first Haimer Safe-Lock licensee, we've been manufacturing this shank configuration successfully since 2008. The added groove modification on the cutting shank works opposite the cutting direction of the flutes, assuring the proper gripping on the cutting tool.

- Drive keys in the chuck and grooves in the tool shank prevent pull-out
- Accurate clamping due to shrink fit technology
- Can accommodate the following diameters: ½", 5/8", ¾", 1", 1-1/4", and 1-1/2".



✓ Minimizes runout
✓ Up to 5x the tool life
✓ No pull-out or spinning

# TOOL RENEWAL

The Program

## What It Is

Some of the world's largest manufacturers working in the industry's most demanding applications rely on Helical's renewal services. We take our role in maximizing our end users' bottom line very seriously and work hard to ensure that our Tool Renewal Program results in cost savings over new tools without sacrificing any aspects of the original design. Our proven process ensures that our end users will continue to experience outstanding productivity post-renewal.

When a tool is simply resharpened, only the cutting portion of the tool is addressed; the tool's critical features such as helix angle, rake, relief, and gash are left unrestored. At Helical, **we do not resharpen tools**. Rather, we entirely restore your tools to their original geometry with our Tool Reconditioning and Remanufacturing services.

## How It Works

We will review the condition of your used tool and return the cutting edge to its original sharpness and strength. Using the same talented staff and state-of-the-art machines that designed and manufactured the original tool, we regrind the tool form – including rake, relief, and clearance angle – onto your cutting edge. Additionally, the renewed tool follows the same inspection, edge prep, and coating process we follow for our new tools.

### Renewal Benefits

- ✓ Cost savings
- ✓ Proven performance
- ✓ Better ROI
- ✓ Same running parameters

## How To Get Started

Our Tool Renewal Program is unique to the industry because of our extensive attention to detail. Both our Tool Reconditioning and Tool Remanufacturing services follow more than a dozen steps to return a tool's geometry to its original state.

We have found that the cost savings our end users experience when choosing whether or not to recondition a set of tools is highly correlated to the number of tools and their diameters. We have established minimum renewal lot sizes by diameter that enable us to provide outstanding renewal services at a great value.

**Tools like our HEV-5 are a popular choice for our Renewal Program, as they are often used in long production runs and high-volume jobs.**

# TOOL RENEWAL

## The Process



Inbound Inspection

1

### CATEGORIZATION

Our inbound inspection process determines which renewal path your tool will take: **reconditioning** or **remanufacturing**. While reconditioning is ideal for tools that have experienced normal wear, remanufacturing is optimal for tools with excessive wear or degradation.

Tool Reconditioning

Tool Remanufacturing

2

### GRINDING

Your tools are reground to match their original specifications. Tools in need of **remanufacturing** go through an **additional step** where a portion of the cutting edge is removed from the tool. As a result, it will have a slightly smaller overall length, but retain its outstanding performance.

3

### EDGE PREP

Your tools then undergo the same **proprietary edge conditioning** procedures as any new tool - including our renowned honing method. In doing so, the cutting portion of the tool is returned to its original strength and sharpness.

**We take quality control seriously. Renewed tools are meticulously inspected after each step in the process.**

4

### COATING

Before your tools reach the final outbound inspection stage, they are **recoated in-house** on state-of-the-art machines. This final step ensures that tools are in the best possible condition for your application and material.

Outbound Inspection

# TYPES OF TOOL ENTRY

## Pre-Drilled Hole

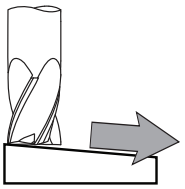
Pre-drilling a hole to full pocket depth (and 5-10% larger than the end mill diameter) is the safest practice of dropping your end mill into a pocket.

This method ensures the least amount of end work abuse and premature tool wear.

## Helical Interpolation

A very common and safe practice with ferrous materials. Employing corner radius end mills during this operation will decrease tool wear and lessen corner breakdown.

We recommend a programmed helix diameter >110-120% of tool diameter.



## Ramping-In

This type of operation can be very successful, but institutes many different torsional forces the cutter must withstand. Finding a corner radius tool with good core strength plus room for proper chip evacuation is key.

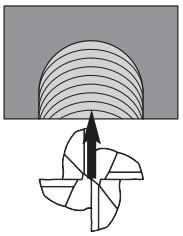
For soft/non-ferrous materials, start with a 3° – 10° ramp angle. For hard/ferrous materials, start at a 1° – 3° angle.

Download Machining Advisor Pro at www.machiningadvisorpro.com to get real-time Helical Interpolation information for your specific application.

## Straight Plunge

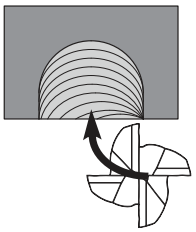
The least preferred method and one that can easily break a tool. The tool must be center cutting. End milling incorporates a flat entry point making chip evacuation tough, tool pressure very high and success random at best.

Drill bits are intended for straight plunging and we highly recommend this type of tool for this operation.



## Straight Entry

Straight entry into the part takes a toll on the cutter. Until the cutter is fully engaged, the feed rate upon entry is recommended to be reduced by at least 50%.



## Roll-In Entry

Rolling into the cut ensures a cutter to work its way to full enagagement and naturally acquire proper chip thickness. The feed rate in this scenario should be reduced by 50%.

**For side entry operations, corner radius tooling will yield the best results.**

# ANGLE OF ENGAGEMENT & CHIP THINNING

## Tool Engagement Angle

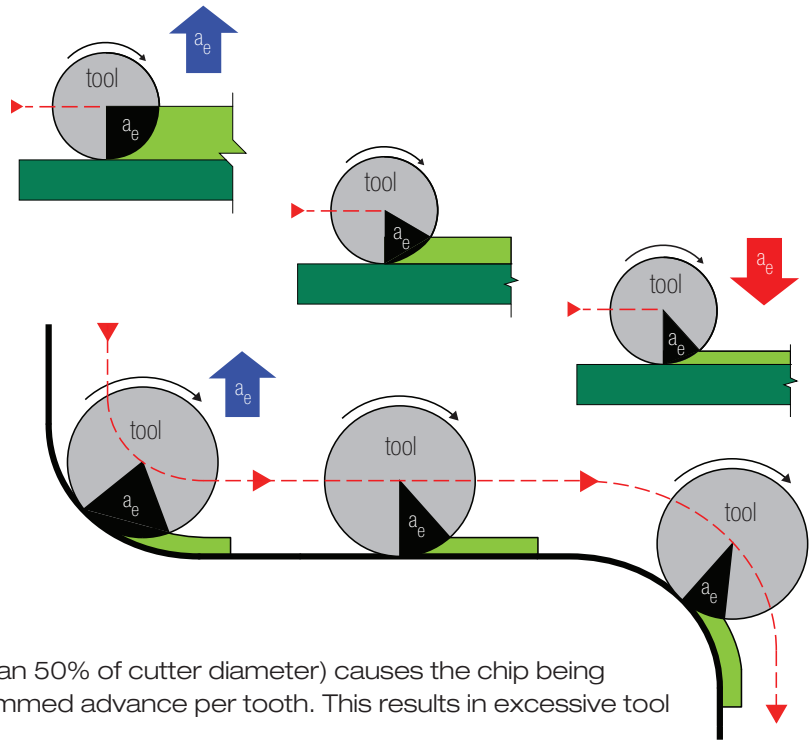
Tool Engagement Angle ($a_e$) is an angular measurement about the periphery of the cutter that is in contact with the material being removed and directly related to the radial chip thickness.

An **Increasing** $a_e$ can result in:

- Higher horsepower requirement
- Increased tool deflection
- Higher spindle load (wear/tear)
- Decreased feed rates

A **decreasing** $a_e$ can result in:

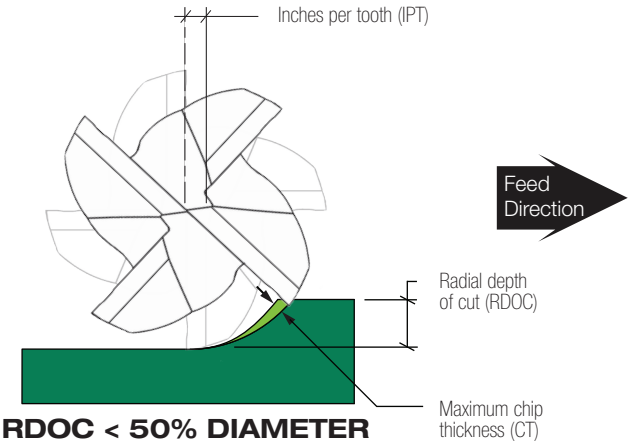
- Lower horsepower requirement
- Decreased tool deflection
- Lower spindle load (wear/tear)
- Increased Feed Rates




## Chip Thinning

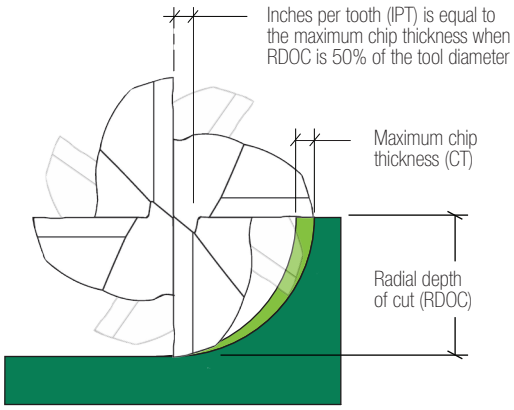
Milling with a light radial depth of cut (less than 50% of cutter diameter) causes the chip being formed to be much thinner than the programmed advance per tooth. This results in excessive tool "rubbing" and premature tool wear/life.

**[Figure 1]**




**RDOC < 50% DIAMETER**

**[Figure 2]**




**RDOC ≥ 50% DIAMETER**

When programming a radial depth of cut (RDOC) less than 1/2 the tool diameter (Figure 1), employ the chip thinning calculation (Figure 3). A chip-thinning adjustment will prolong tool life and help reduce cycle time.

This feed rate adjustment needs to consider drastic tool engagement and angle increases when milling into corners. Significant feed rate reductions in these areas still apply and will need attention.

$$IPT = \frac{CT \times D}{2 \times \sqrt{(D \times RDOC) - RDOC^2}}$$

**[Figure 3]**

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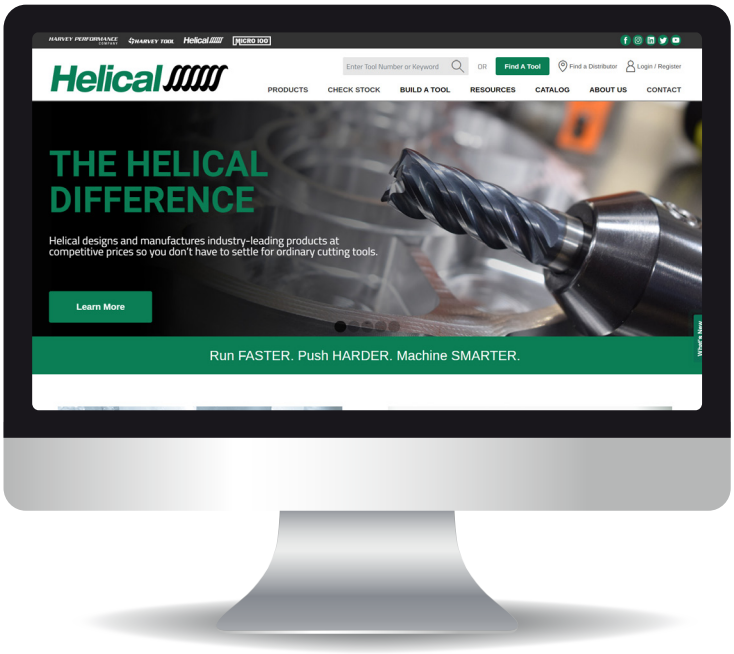


Did you know that you can **place a Helical Solutions order directly to your distributor from our website?** After creating your Helicaltool.com account, you're able to build and send "shopping carts" directly to your participating distributor to order.

## EXCITING WEBSITE FEATURES

### Shopping Cart Functionality

Once logged in, create your own personalized Shopping Carts of Helical tools you're most interested in, then send it directly to a participating distributor, or share it with a colleague or purchasing agent.

### Direct MAP Connection

Once you've found a tool, and are ready to run it, open Machining Advisor Pro (MAP) to automatically and seamlessly generate its running parameters.

### Build a Tool

Design your perfect custom tool directly on our "Build a Tool" page, and even attach a blueprint or napkin drawing to better explain its key properties.

### Expansive Stock Check

Check real-time availability of as many as 50 tools at once to simplify the order planning process and spend more time where it counts: at the spindle.

### Product Table Filtering

Find the perfect Helical Solutions tool for your job quickly and easily by using new filtering functionality on each product table, sorting through an expansive and always growing product offering.

### "Smart-Search" Feature

Simply and quickly search for a Helical Solutions tool, then receive results for its product page, as well as for every technical resource relevant to that tool, presented in one click to save you valuable time and money.

# Let Helical Impress You

## RUN FASTER

Helical end mills are meticulously designed for maximum rigidity to support aggressive speeds and feeds. Use Machining Advisor Pro (page 54) to optimize your running parameters.

## PUSH HARDER

Engineered for optimal performance in non-ferrous and ferrous materials, our unique geometries ensure extended tool life and significantly higher metal removal rates.

## MACHINE SMARTER

Unlike most of the industry's end mills, Helical's products are specifically built to withstand and take full advantage of high efficiency milling techniques.

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### 2 & 4 Flute Pointed Helical Chamfer Cutter

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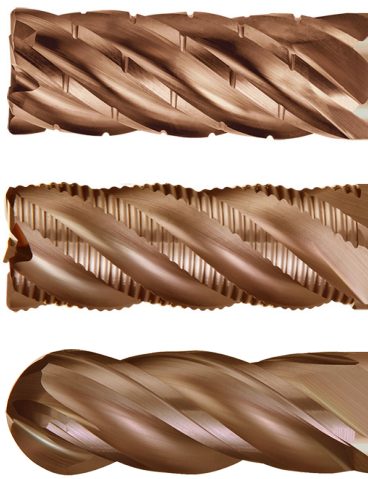
### T*plus* coating expansion in End Mills for Stainless Steels



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