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MILLING



Ingersoll

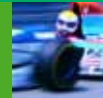


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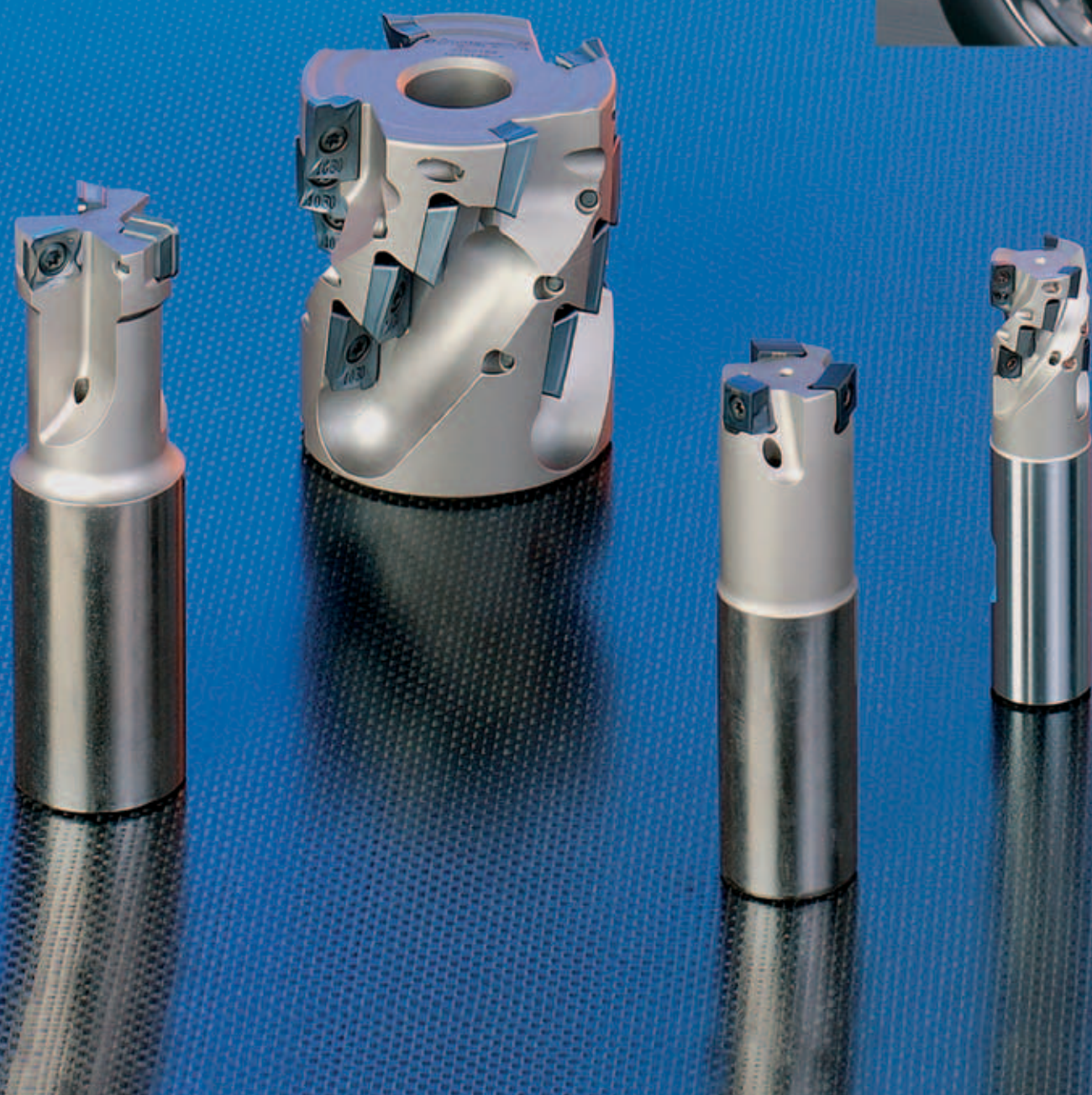
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Ingersoll



M8

END MILLS

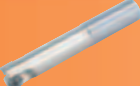
Cutting Tools



Member IMC Group
Ingersoll
Cutting Tools

M9

END MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	.375-1.000	.22	Hi-POS® 0° End Mill	12J1D	M20
	.500-1.500	.22	Hi-POS® End Mill	12J1D (Top•On)	M22
	.375-1.000	.30	Hi-POS™ 0° End Mill	12J1M	M24
	.375-1.250	.34	Hi-POS™ 0° End Mill	TE90AX	M26
	.500-1.250	.44	Hi-POS+™ 0° End Mill	12J1F	M28
	.625-1.500	.44	Hi-POS+™ End Mill	12J1F (Top•On)	M30
	.750-1.250	.44	Hi-POS+™ End Mill	12J1F (Inno•Fit)	M32
	.725-1.500	.49	Hi-POS+™ 0° End Mill	12J1X	M34
	2.000	.21	Hi-POS+™ 15° End Mill	12R1X	M36
	.750-1.500	.49	Hi-POS+™ 0° End Mill	12J1X (Top•On)	M38

	Diameter Range	Cutting Length	Description	Series	Page
	1.000 & 1.250	.60	HI-POS Backdraft End Mill	12J1X (Top•On)	M38
	.500-2.000	.47	HI-POS 0° End Mill	12J1Q	M40
	1.250	.21	HI-POS 15° End Mill	12R1Q	M42
	.750-3.000	.60	HI-POS 0° End Mill	12J1B, 12J4B	M44
	1.000 & 1.250	.60	HI-POS End Mill	12J1B, 12V1B (Top•On)	M46
	1.000-1.500	.60	HI-POS 0° End Mill	12J1B	M48
	2.000	.27	HI-POS 15° End Mill	12R1B	M50
	.970-2.000	.54-.66	HI-POST+ 0° End Mill	12J1E, 12J4E	M52
	1.000 & 1.250	.66	HI-POST+ End Mill	12J1E (Top•On)	M54
	1.000-1.500	.54-.66	HI-POST+ End Mill	12J1E	M56

END MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	.750-2.000	.63	Hi-POST⁺ 0° End Mill	12J1G, 12V1G	M58
	1.000 & 1.250	.63	Hi-POST⁺ End Mill	12J1G (Top-On)	M60
	1.000-1.500	.28	MAX MICRO 0° End Mill	1SJ1V	M62
	1.000-1.500	.28	MAX MICRO 0° End Mill	1SJ1V (Inno-Fit)	M64
	.625-1.250	.31	Hi-POSQUAD 0° End Mill	15J1E	M66
	.625-1.000	.65-1.27	Hi-POS[®] 0° Extended Flute End Mill	22J3D	M68
	.750-1.000	.81-1.08	Hi-POS[®] 0° Fluted End Mill	22J3M	M70
	1.102-1.500	1.14-1.90	Hi-POST⁺ 0° Fluted End Mill	22J3F	M72
	1.102-1.500	1.10-3.00	Hi-POST⁺ Extended Flute End Mill	22J3F (Inno-Fit)	M74
	1.000-2.000	.87-3.80	Hi-POST⁺ 0° Fluted End Mill	22J3X	M76

	Diameter Range	Cutting Length	Description	Series	Page
	1.100 & 2.500	.84-4.00	HI-POST⁺ Extended Flute End Mill	22J3X (Inno•Fit)	M78
	1.000-2.000	1.30-2.10	HI-POS⁺ 0° Fluted End Mill	22J3Q, 22J7Q	M80
	2.000	1.69-4.00	HI-POS⁺ 0° Fluted End Mill	22J3B, 22J5B	M82
	1.500-2.500	1.66-4.42	HI-POST⁺ 0° Fluted Precision End Mill	22J3E	M84
	1.500-2.500	2.26-4.42	HI-POST⁺ Extended Flute End Mill	22J3E (Inno•Fit)	M86
	1.250-1.500	1.62-1.90	HI-POSQUAD⁺ 0° Extended Flute End Mill	25J3E	M88
	1.102-1.500	1.10-2.66	HI-POSQUAD⁺ Extended Flute End Mill	25J3E (Inno•Fit)	M90
	1.250 & 1.500	1.85-2.13	POWER•QUAD⁺ 0° Full Effective End Mill	25J3F, 23J3G	M92
	1.500 & 2.000	2.35-6.10	POWER•QUAD⁺ 0° Heavy Duty Fluted End Mill	23J6G	M94
	2.000	3.07	POWER•MAX⁺ 0° Heavy Duty End Mill	27E2V	M96

END MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	2.000	4.00-4.50	POWERQUAD 0° Replaceable End Cap End Mill	23J2G	M98
	2.500	4.38-5.82	POWERQUAD 0° Replaceable End Cap End Mill	25J3J	M100
	2.000 & 2.500	1.73-2.60	HI-POS 0° Fluted Shell Mill	22J3X	M102
	2.000	1.66-1.70	HI-POS 0° Fluted Shell Mill	22J3Q, 22J3B	M104
	2.500-4.000	2.26-3.78	HI-POS 0° Fluted Precision Shell Mill	22J3E	M106
	2.000-4.000	1.10-4.35	POWERQUAD 0° Fluted Shell Mill	25J3G, 25J3J	M108
	3.000 & 4.000	3.10-4.00	MAX 0° Fluted Shell Mill	2SJ1H, 2SJ1L	M110
	.953-2.175	-	SLOT-MAX T-Slot End Mill	15T1D, 15T1F, 12T1B	M112
	.713-2.096	.10-.18	HI-POS 30°, 45°, 60° Lead Angle End Mill	12P1D, 12N1D, 12M1D	M114
	.713-2.096	.22-.42	HI-POS 30°, 45°, 60° Lead Angle End Mill	12M1Q, 12N1Q, 12N1B, 12P1Q	M116

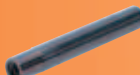
	Diameter Range	Cutting Length	Description	Series	Page
	2.015-2.279	.69-.85	ROUGH-AIR 30°, 45° Lead Angle End Mill	15M1H, 15N1H	M118
	.692 & .564	.22-.24	HI-POSQUAD 45°, 60° Lead Angle End Mill	15N1E, 15P1E	M120
	1.000-1.500	.23-.38	POWER-QUAD 15°, 30°, 45° Lead Angle End Mill	15L1G, 15M1G, 15N1F, 15N1G	M122
	1.000-1.250	.22	HI-POSQUAD 45° Lead Angle End Mill	15N1E (Top-On)	M124
	.750-2.000	.18	MULTI-CUT 45° Lead Angle End Mill	15N1F	M126
	1.000	.26	CHASE-QUAD 45° Lead Angle End Mill	15N1H	M128
	1.436-2.684	.25	POWER-MAX 45° Lead Angle End Mill	19N1B	M130
	.625	..37	HI-POS 0° Center Cutting End Mill	12J1Q	M132
	.750	.50	HI-POS 0° Center Cutting End Mill	12J1B	M134
	1.000-1.500	.87-1.12	HI-POS 0° Center Cutting End Mill	12S1Q, 12S1B	M136

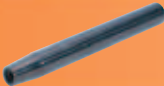
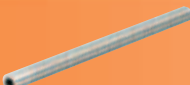
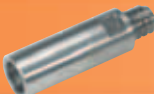
END MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	1.000-2.000	.41	ALUMINATOR 0° End Mill	15U1G	M138
	1.000-1.500	.41	ALUMINATOR 0° End Mill	15U1G (Top•On)	M140
	1.000-2.000	.82	ROUGH-AIR 0° High Speed Router End Mill	15X1X	M142
	1.250 & 1.500	.82	ROUGH-AIR 0° End Mill	15X1X (Top•On)	M144
	1.250 & 1.500	.87	ROUGH-AIR 0° High Speed Router End Mill	15X1W	M146
	2.000	.99	ROUGH-AIR 0° High Speed Router End Mill	15X1Z	M148
	.750-2.000	.95	ROUGH-AIR 0° Indexable Finishing End Mill	15J1H	M150
	.750 & 1.000	-	FAST-BREAK Radius End Mill	15R1V	M152
	1.000	-	FAST-BREAK Radius End Mill	15R4H	M154
	1.000	-	FAST-BREAK Corner Rounding End Mill	15R1V (Top•On)	M156

	Diameter Range	Cutting Length	Description	Series	Page
	1.000	-	FAST•BREAK™ Corner Rounding End Mill	15R4H (Top•On)	M158
	.312-.750	.20-.62	CHIP•SURFER™ Center Cutting	47C, 48C	M160
	.312-.750	.20-.62	CHIP•SURFER™ Center Cutting	47C, 47D	M161
	.312-.500	.20-.37	CHIP•SURFER™ Center Cutting	46J, 46D	M162
	.312-.750	.20-.62	CHIP•SURFER™ Center Cutting	47J, 47D	M163
	.312-.625	.20-.62	CHIP•SURFER™ Center Cutting	48D, 48J, 49D, 49J	M164
	.312-.750	.20-.50	CHIP•SURFER™ Center Cutting	45D, 45J, 46D, 46J	M165
	.375-.625	.38-.60	CHIP•SURFER™ Drill Mill Tip	45D	M166
	.375-.625	.38-.60	CHIP•SURFER™ Flat Bottom Plunge Cutter	45V	M167
	.375-.629	.02-.04	CHIP•SURFER™ Ultra High Feed Tip	45A	M168

END MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	.375-.500	.19-.27	CHIP•SURFER Backdraft Toroidal Tip	48U	M169
	.312-.625	.31-.63	CHIP•SURFER Ball Nose Tip	45B	M170
	.500	.40	CHIP•SURFER Ball Nose Tip	45X	M171
	.312-.625	.20-.62	CHIP•SURFER Ball Nose Tip	45B, 47B	M172
	.390 & .625	.06-.29	CHIP•SURFER Chamfer & Spotting Tip	45N, 45M, 45P	M173
	.500-.787	.20-.29	CHIP•SURFER Chamfer & Countersink Tip	47N, 48N	M174
	.394-.630	.49-.75	CHIP•SURFER Corner Rounding Tip	45R	M175
	.056-.375	.12-.19	CHIP•SURFER T-Slot Milling Tip	18T	M176
	.625	.13	CHIP•SURFER Chamfer V-Form Tip	18T	M178
	-	-	CHIP•SURFER Straight Shanks	-	M179

	Diameter Range	Cutting Length	Description	Series	Page
	-	-	CHIP•SURFER Conical Shanks	-	M180
	-	-	CHIP•SURFER Straight Shanks-No Neck	S0	M181
	-	-	CHIP•SURFER Extensions	-	M182
	-	-	CHIP•SURFER Blanks	-	M183
	-	-	CHIP•SURFER Ball Nose Blanks	-	M184
	-	-	CHIP•SURFER T-Slot Format Blanks	-	M185


0° END MILL SERIES 12J1D

Diameters

Drill Hole
.375"-1.000"

Cutting Edge Length

.22"

Insert Corner

.008", .015", .031" and .062"R



Shoulder



Channeling



Ramping



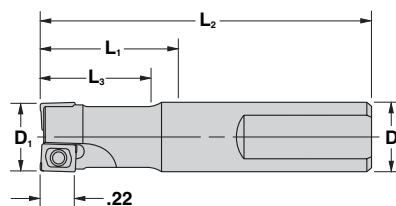
Corkscrew



Pocketing

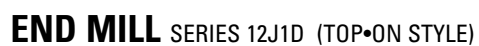


Facing

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M20

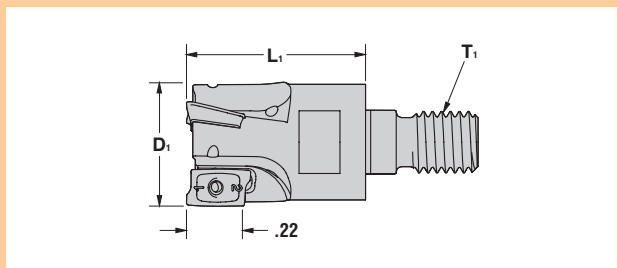
CHASEline



Insert Corner
.008", .015", .031" and .062"R



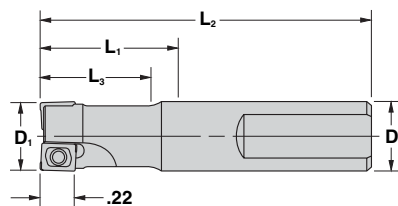
Coolant Thru



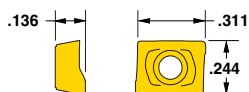
See pages M390-M399 for TopOn System Components.

CHASE*line*

Facing

[illegible]

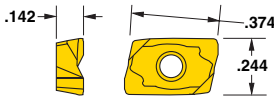
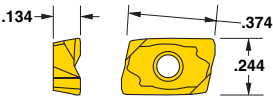
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HARDWARE

M25

INSERTS

			
AXMT0903_R-EML 	AXMT0903PER-AL 		

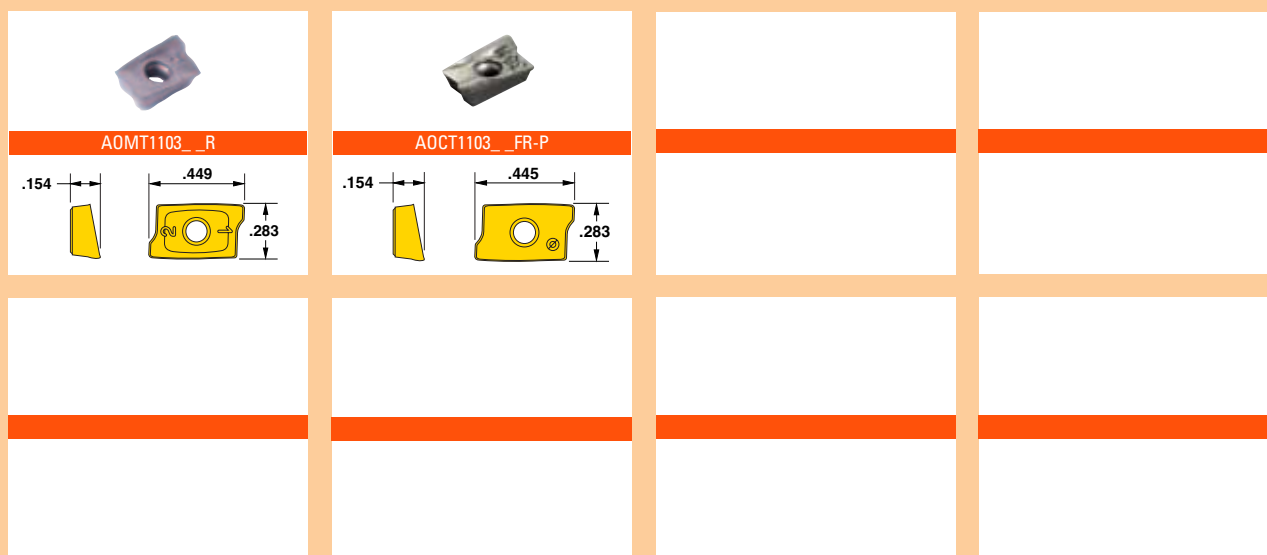
Insert Number	Application	Corner	Grades						
			TT	9030	8030	8020	7030	6030	K10
			IN	2005	2030	1030	2040	2015	10K
AXMT0903PER-EML	Multi-Purpose	.020 _R	■	■	■	■	■	■	
AXMT090308R-EML	Multi-Purpose	.031 _R	■			■	■	■	
AXMT090316R-EML	Multi-Purpose	.062 _R	■			■	■		
AXMT0903PER-AL	Ground/Polished (for Alum.)	.020 _R							■

HARDWARE

Insert Screw			Driver	
Cutter Diameter	Part No.	Torque	Part No.	
.375-1.00	SM25-055-21	10-15 in. lbs.	TD8	
1.125-2.000	SM25-075-20	10-15 in. lbs.	TD8	

For technical information, see page M477.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Multi-Purpose	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished (for Alum.)	.015R		■					
AOMT110308R	Multi-Purpose	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished (for Alum.)	.031R		■					
AOMT110316R	Multi-Purpose	.062R			■	■	■	■	■
AOMT110332R	Multi-Purpose	.125R*			■	■	■	■	■

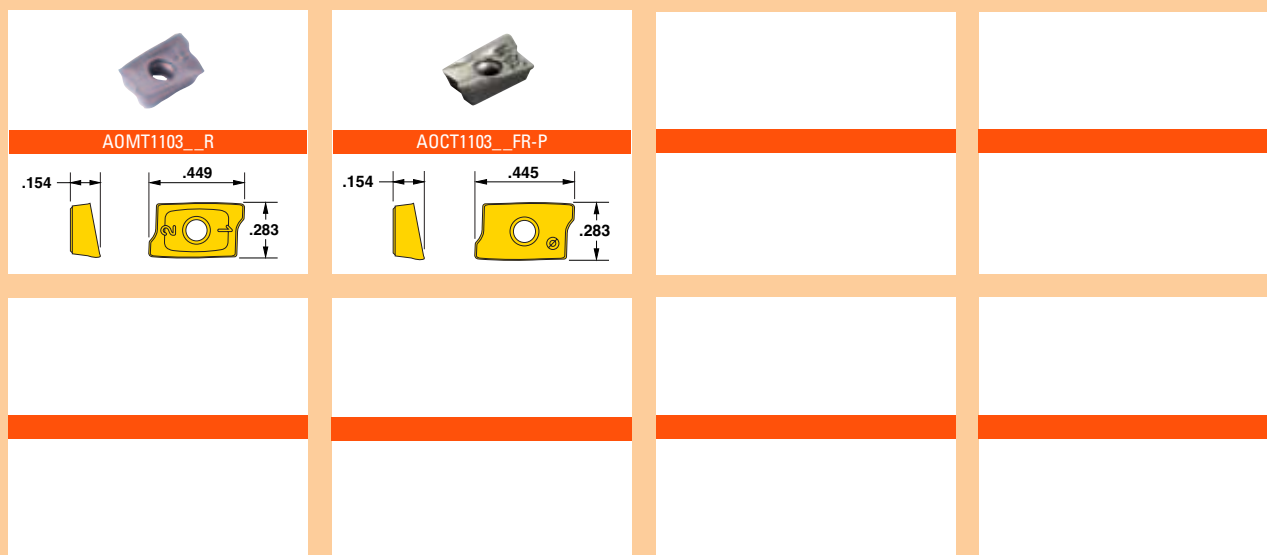
*Cutter body must be relieved to accept .125"R insert.

HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.500	SM25-054-00	10-15 in. lbs.	DS-T08V (Tx-08)
.625-1.250	SM25-064-00	10-15 in. lbs.	DS-T08V (Tx-08)

For technical information, see page M478.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Multi-Purpose	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished (for Alum.)	.015R		■					
AOMT110308R	Multi-Purpose	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished (for Alum.)	.031R		■					
AOMT110316R	Multi-Purpose	.062R			■	■	■	■	■
AOMT110332R	Multi-Purpose	.125R*			■	■	■	■	■

*Cutter body must be relieved to accept .125"R insert.

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)	

For technical information, see page M478.

Diameters	Cutting Edge Length	Insert Corner
.750" to 1.250"	.44"	.015", .031", .062" and .125"



Shoulder



Channeling



Ramping



Corkscrew



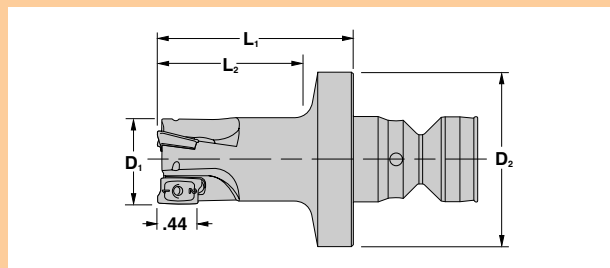
Pocketing



Facing

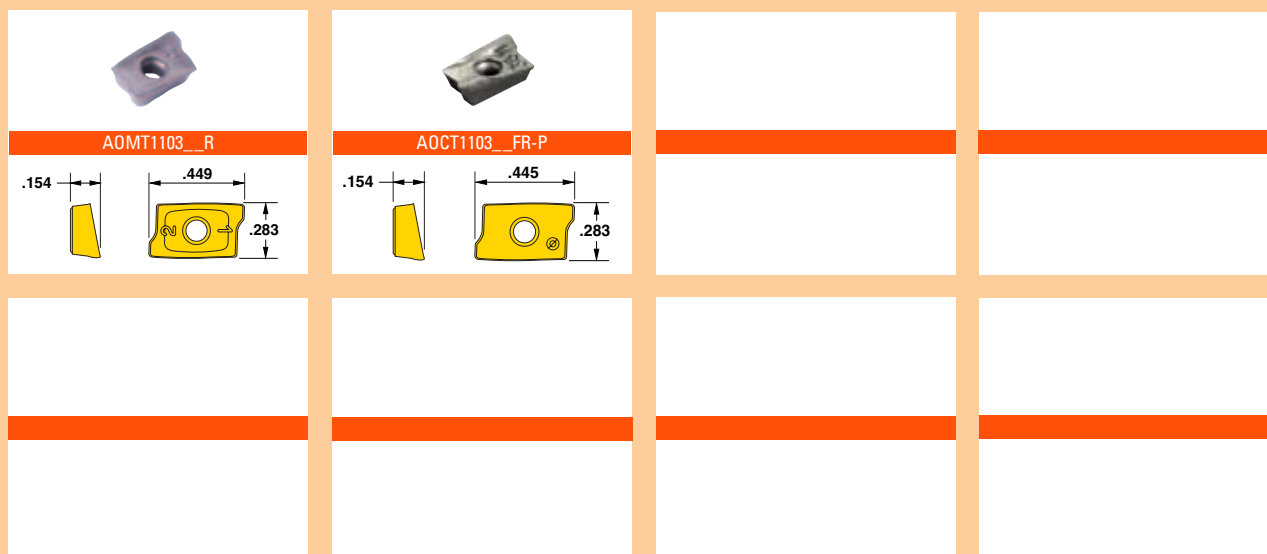


Coolant Thru

[illegible]

See pages M358-M361 for InnoFit System Components.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Multi-Purpose	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished (for Alum.)	.015R		■					
AOMT110308R	Multi-Purpose	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished (for Alum.)	.031R		■					
AOMT110316R	Multi-Purpose	.062R			■	■	■	■	■
AOMT110332R	Multi-Purpose	.125R*			■	■	■	■	■

*Cutter body must be relieved to accept .125"R insert.

HARDWARE

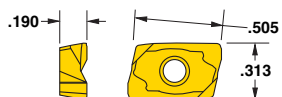
Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.750	SM25-054-00	10-15 in. lbs.	DS-T08V (Tx-08)
1.000-1.250	SM25-064-00	10-15 in. lbs.	DS-T08V (Tx-08)

For technical information, see page M478.

INSERTS



AOMT1204



Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408R	Multi-Purpose	.031R	■	■	■	■	■	■	
AOMT120408FR	Hi-Temp/Titanium	.031R	■	■					
AOMT120416R	Multi-Purpose	.062R	■	■	■	■	■		
AOMT120432R	Multi-Purpose	.125R	■	■	■	■	■		
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

HARDWARE

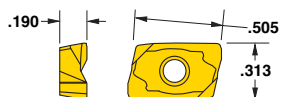
Insert Screw		Driver	
Part No.	Torque	Part No.	
SM35-076-10	25-30 in. lbs.	DS-T10T (Tx-10)	

For technical information, see page M474.

INSERTS



AOMT1204__R



Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408R	Multi-Purpose	.018R	■	■	■	■	■	■	
AOMT120408FR	Precision	.018R	■	■					
AOMT120416R	Multi-Purpose	.018R	■	■	■	■			
AOMT120432R	Multi-Purpose	.018R	■	■	■	■			
AOMT120408FR-HS	Ground/Polished (for Alum.)	.018R							■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM35-076-10	25-30 in. lbs.	DS-T10T (Tx-10)	

For technical information, see page M474.

0° END MILL SERIES 12J1X (TOP•ON STYLE)

Diameters
 .750" to 1.500"

Max. Depth of Cut
 .49"

Insert Corner
 .032", .062" and .125"R



Shoulder



Channeling



Ramping



Corkscrew



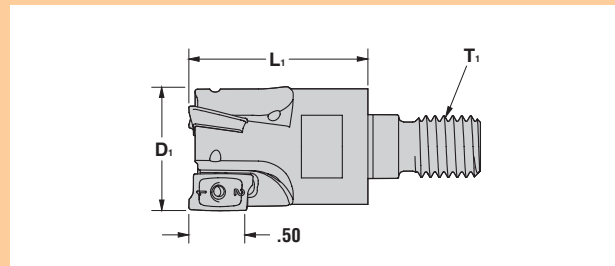
Pocketing



Facing



Coolant Thru



D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Inserts	Wrench Size	Ramp Angle
.750	M10	12J1X-07015X6R01	1.50	2	15mm	7.0
1.000	M12	12J1X-10015X7R01	1.50	3	17mm	4.5
1.250	M16	12J1X-12017X8R01	1.75	4	22mm	3.5
1.500	M16	12J1X-15017X8R01	1.75	5	22mm	2.0

BACKDRAFT END MILL SERIES 12V1X (TOP•ON STYLE)

Diameters
 .750" to 1.250"

Cutting Edge Length
 .50"

Insert Corner
 .031", .062" and .125"R



Shoulder



Channeling



Ramping



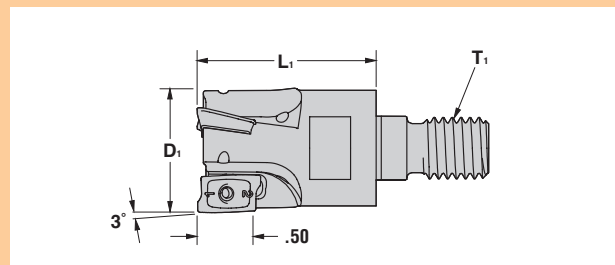
Corkscrew



Pocketing



Coolant Thru



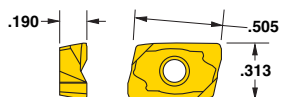
D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Inserts	Wrench Size	Ramp Angle
.750	M10	12V1X-07015X6R01	1.50	2	15mm	NA
1.000	M12	12V1X-10015X7R01	1.50	2	17mm	NA
1.000	M12	12V1X-10015X7R02	1.50	3	17mm	NA
1.500	M16	12V1X-12017X8R01	1.75	4	22mm	NA

See pages M390-M399 for TopOn System Components.

INSERTS



AOMT1204__R



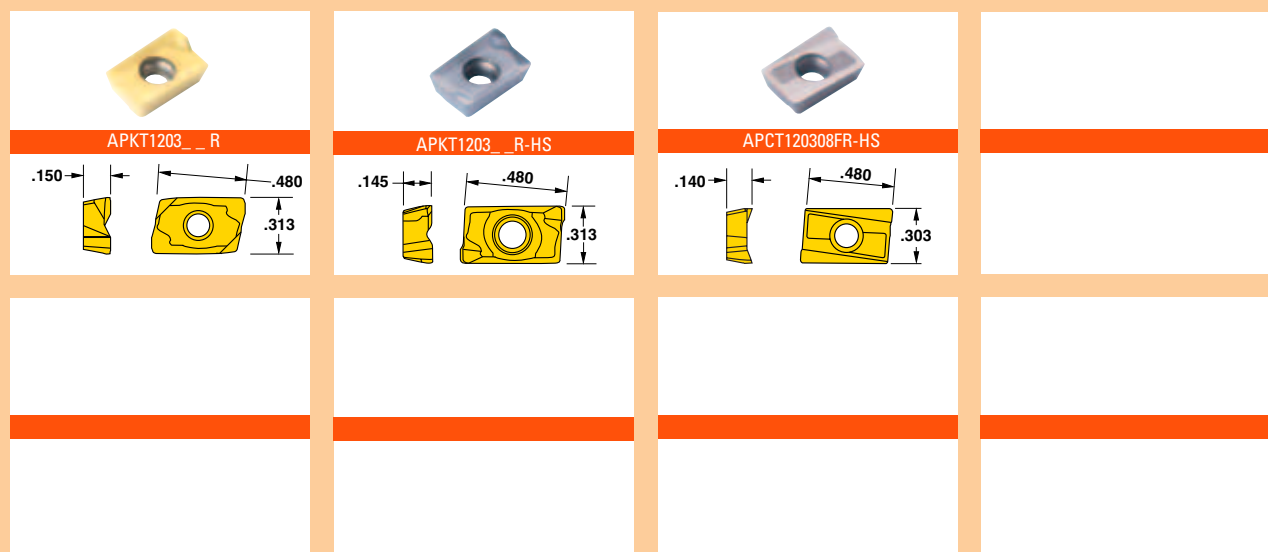
Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408R	Multi-Purpose	.031R	■	■	■	■	■	■	
AOMT120408FR	Precision	.031R	■	■					
AOMT120416R	Multi-Purpose	.062R	■	■	■	■			
AOMT120432R	Multi-Purpose	.125R	■	■	■	■			
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM35-076-10	25-30 in. lbs.	DS-T10T (Tx-10)	

For technical information, see page M474.

INSERTS



Insert Number	Application	Corner	Grades								
			IN	30M	40P	2005	2030	2015	2040	1030	5015
APKT120308R	Multi-Purpose	.031R			■	■	■	■	■	■	
APKT120308R-HS	Hi-Temp/Titanium	.031R		■						■	
APKT120304R-HS	Hi-Temp/Titanium	.015R		■						■	
APCT120308FR-HS	Ground/Polished (for Alum.)	.031R			■						
APKT120316R	Multi-Purpose	.062R			■	■	■	■	■	■	
APKT120324R	Multi-Purpose	.093R			■						
APKT120332R	Multi-Purpose	.125R		■	■	■	■		■	■	
APKT120364R	Multi-Purpose	.250R			■					■	
			</								

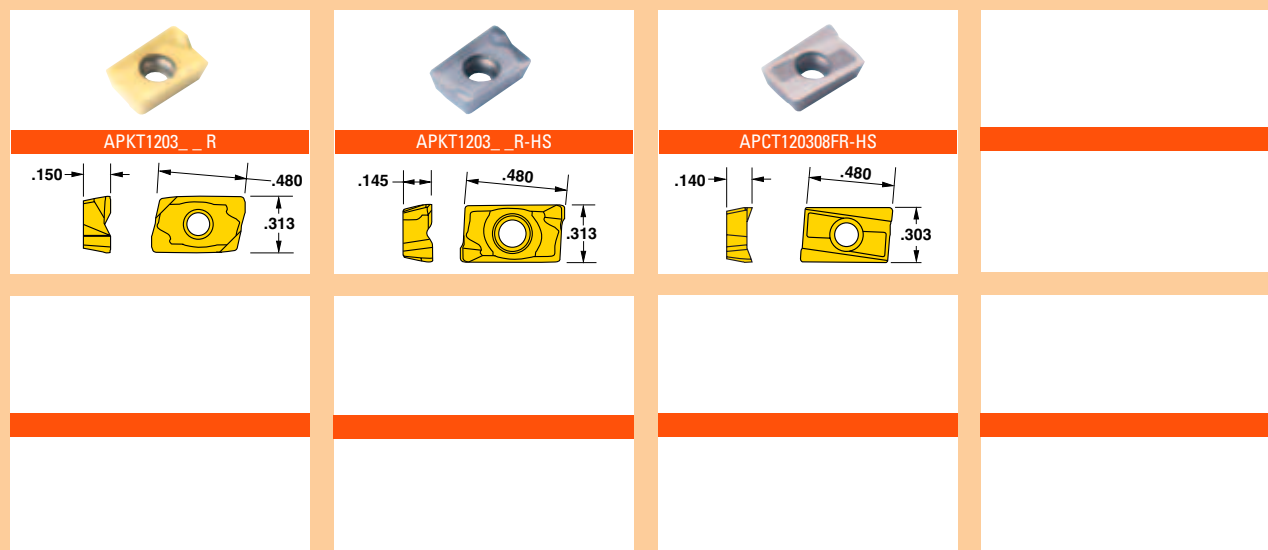
HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)	

For technical information, see page M476.

Coolant Temperature

INSERTS



Insert Number	Application	Corner	Grades								
			IN	30M	40P	2005	2030	2015	2040	1030	5015
APKT120308R	Multi-Purpose	.018R			■	■	■	■	■	■	■
APKT120308R-HS	Hi-Temp/Titanium	.018R		■						■	
APKT120304R-HS	Hi-Temp/Titanium	.018R		■						■	
APCT120308FR-HS	Ground/Polished (for Alum.)	.018R		■							
APKT120316R	Multi-Purpose	.018R			■	■	■	■	■	■	
APKT120324R	Multi-Purpose	.018R			■						
APKT120332R	Multi-Purpose	.018R		■	■	■	■		■	■	
APKT120364R	Multi-Purpose	.018R			■					■	

HARDWARE

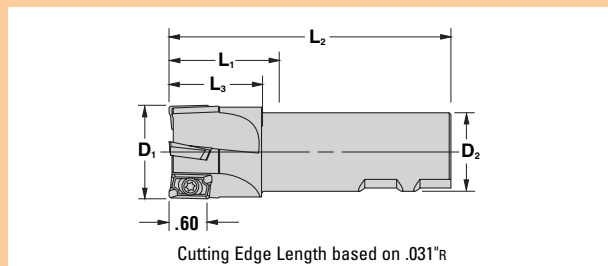
Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)	

For technical information, see page M476.

Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R

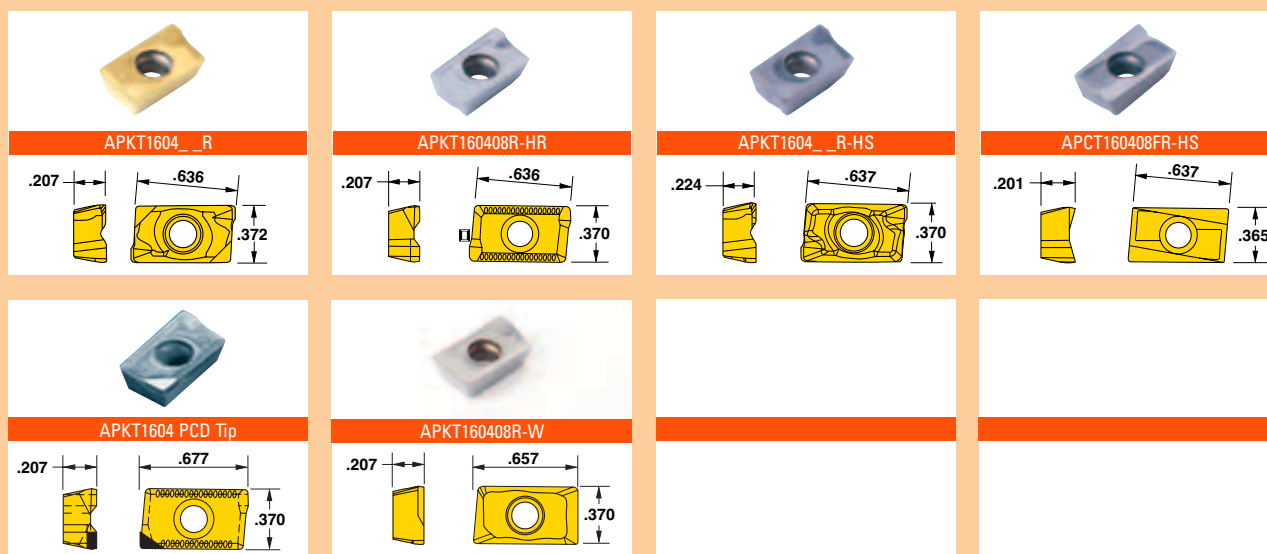


Coolant Thru



* Does not have coolant through.

INSERTS



Insert Number	Application	Corner	Grades										
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015	90D
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■	
APKT160408R-HR	Multi-Purpose	.031R			■							■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■								■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■								■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■								■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■									
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■	■
APKT160424R	Multi-Purpose	.093R			■			■				■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■	■
APKT160448R	Multi-Purpose	.187R			■							■	
APKT160464R	Multi-Purpose	.250R		■	■							■	■
APKT160408R-W	Wiper	.031R										■	■
APKT160404R-HR	PCD Tipped*	.015R											■

*Max DOC is .12".

HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.750	SM40-084-20	30-35 in. lbs.	DS-T15T (Tx-15)
.970-3.000	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

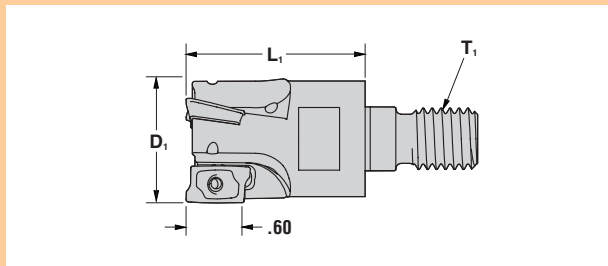
For technical information, see page M474.

HI-POS™ END MILL SERIES 12J1B (TOP•ON STYLE)

Diameters
1.000" and 1.250"

Cutting Edge Length
.60"

Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R



D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Flutes	Wrench Size	Ramp Angle Using APCT/APKT w/.030R
1.000	M12	12J1B-10012X7R01	1.25	2	17mm	5.4
1.250	M16	12J1B-12015X8R01	1.25	2	22mm	3.9
1.250	M16	12J1B-12015X8R02	1.50	3	22mm	3.0

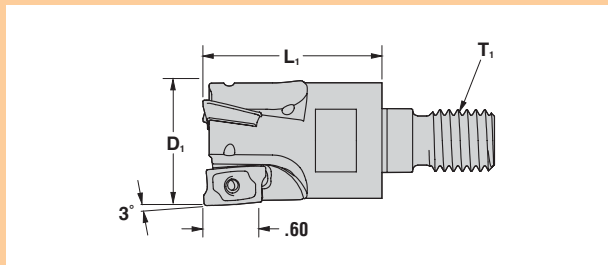
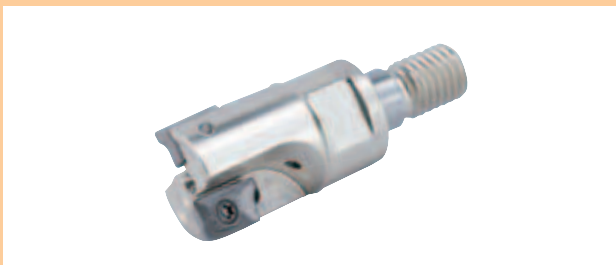
*Cutter body must be relieved for radii larger than .125"R.

HI-POS™ BACKDRAFT END MILL SERIES 12V1B (TOP•ON STYLE)

Diameters
1.000" and 1.250"

Cutting Edge Length
.60"

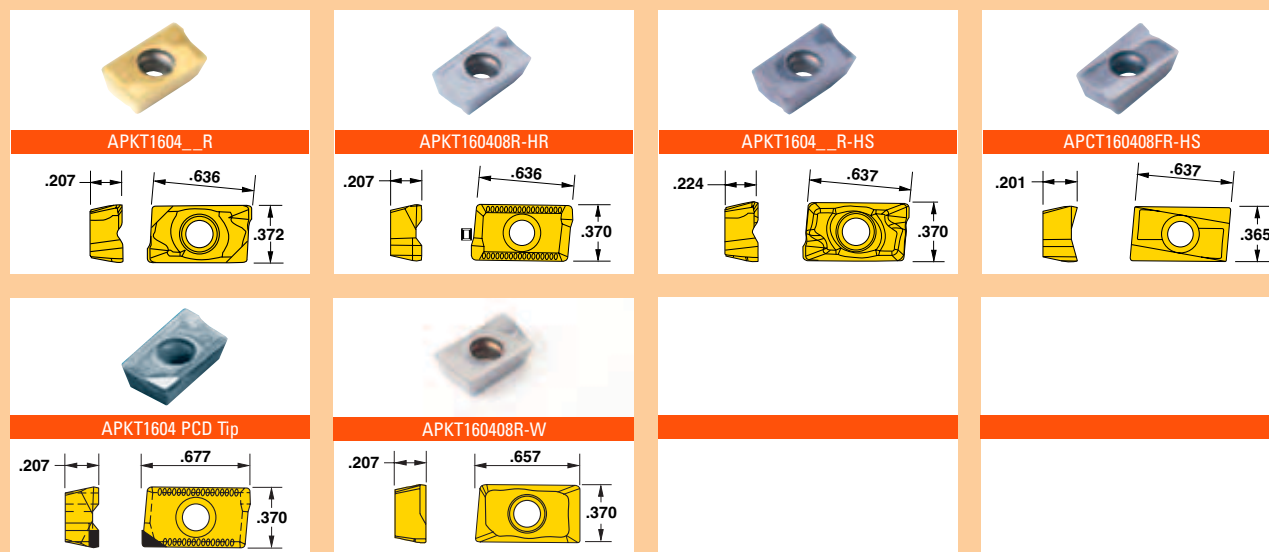
Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R



D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Flutes	Wrench Size
1.000	M12	12V1B-10012X7R01	1.25	2	17mm
1.250	M16	12V1B-12015X8R01	1.25	2	22mm
1.250	M16	12V1B-12015X8R02	1.50	3	22mm

See pages M390-M399 for TopOn System Components.

INSERTS



Insert Number	Application	Corner	Grades										
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015	90D
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■	
APKT160408R-HR	Multi-Purpose	.031R			■							■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■								■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■								■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■								■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■									
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■	■
APKT160424R	Multi-Purpose	.093R			■			■				■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■	■
APKT160448R	Multi-Purpose	.187R			■							■	
APKT160464R	Multi-Purpose	.250R		■	■							■	■
APKT160408R-W	Wiper	.031R										■	■
APKT160404R-HR	PCD Tipped*	.015R											■

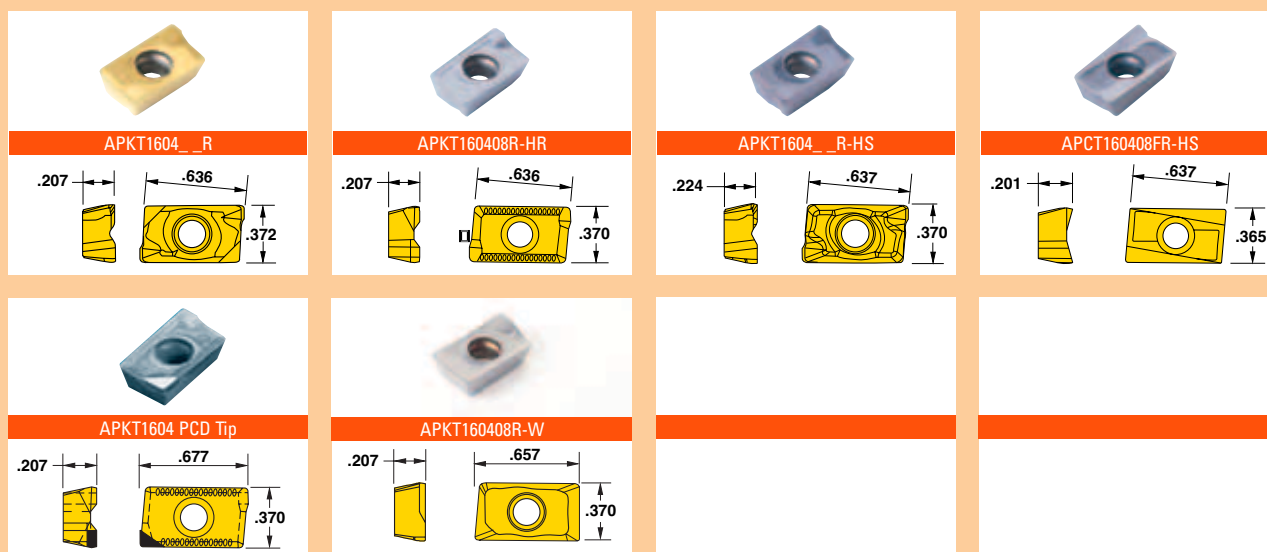
*Max DOC is .12".

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M474.

INSERTS



Insert Number	Application	Corner	Grades										
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015	90D
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■	
APKT160408R-HR	Multi-Purpose	.031R			■							■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■								■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■								■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■								■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■									
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■	■
APKT160424R	Multi-Purpose	.093R			■			■				■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■	■
APKT160448R	Multi-Purpose	.187R			■							■	
APKT160464R	Multi-Purpose	.250R		■	■							■	■
APKT160408R-W	Wiper	.031R										■	■
APKT160404R-HR	PCD Tipped*	.015R											■

*Max DOC is .12".

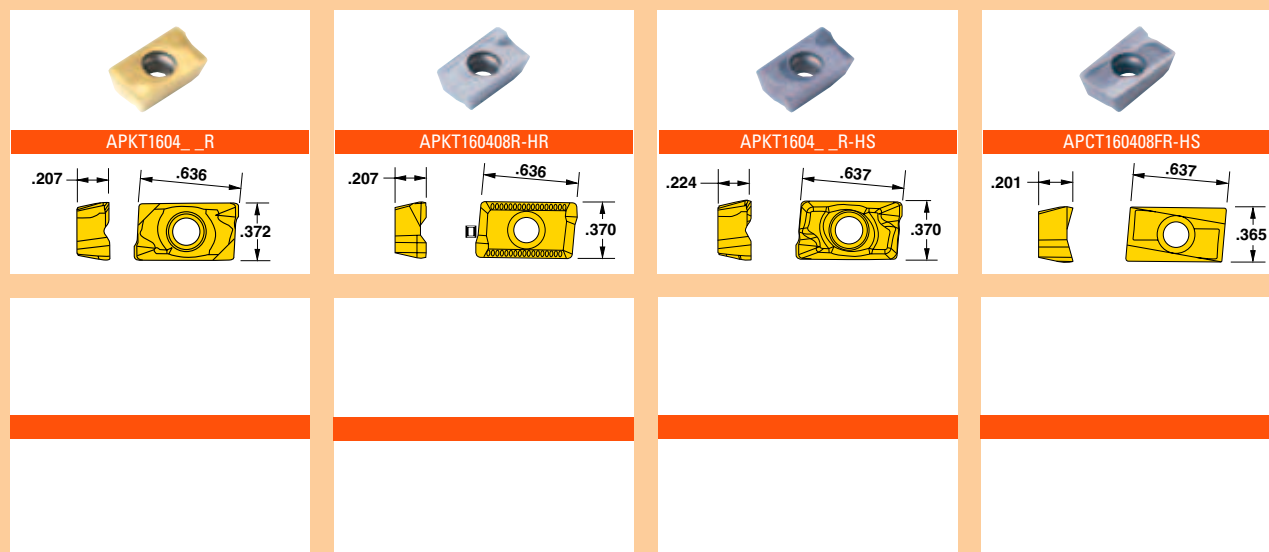
HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M474.

• SERIES 12R1B uses unused insert edges from 2J1B, 2J4B, 12J1B, 12J4B, 12N1B, 22J5B cutters.

INSERTS



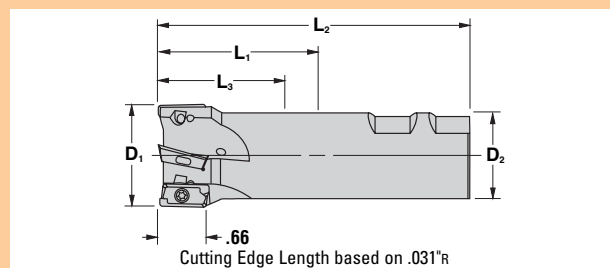
Insert Number	Application	Corner	Grades									
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015
APKT160408R	Multi-Purpose	.027R			■	■	■	■	■	■	■	■
APKT160408R-HR	Multi-Purpose	.027R			■						■	
APKT160408R-HS	Hi-Temp/Titanium	.027R		■							■	
APKT160404R-HS	Hi-Temp/Titanium	.027R		■							■	
APKT160416R-HS	Hi-Temp/Titanium	.027R		■							■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.027R		■								
APKT160416R	Multi-Purpose	.027R			■		■	■	■	■	■	■
APKT160424R	Multi-Purpose	.027R			■			■			■	■
APKT160432R	Multi-Purpose	.027R		■	■		■	■	■	■	■	■
APKT160448R	Multi-Purpose	.027R			■						■	
APKT160464R	Multi-Purpose	.027R		■	■						■	■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

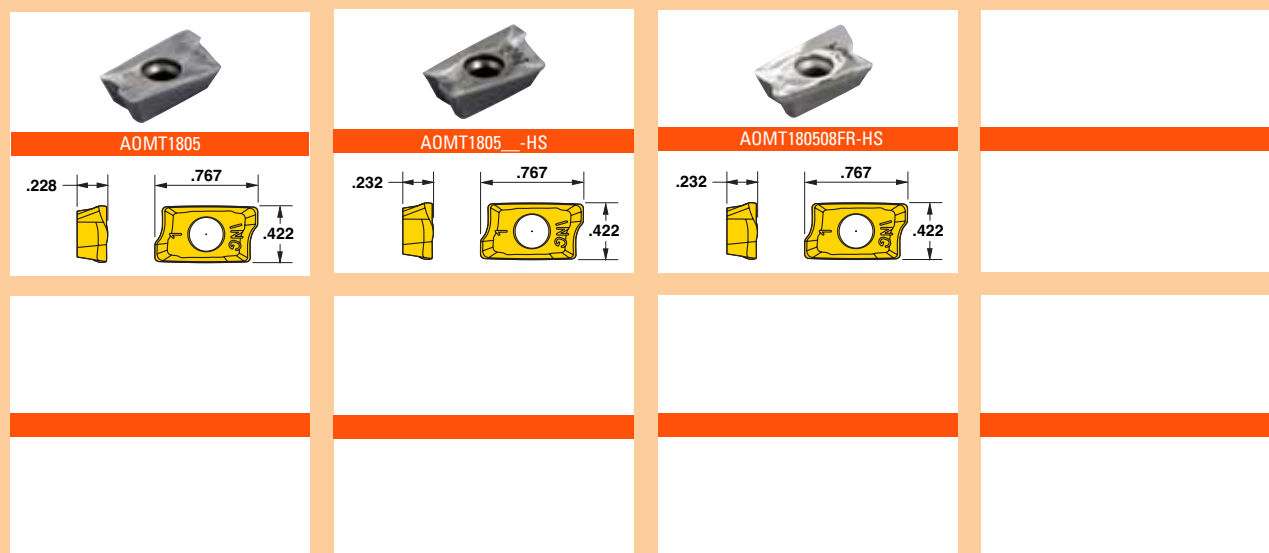
For technical information, see page M474.

Insert Corner
.031", .062", .093",
.125", .187" and .250"R



CHASE*line*

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R		■	■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■
AOMT180548R *	Multi-Purpose	.187R			■				
AOMT180564R *	Multi-Purpose	.250R			■			■	■
AOMT180508L	Multi-Purpose	.031R							■

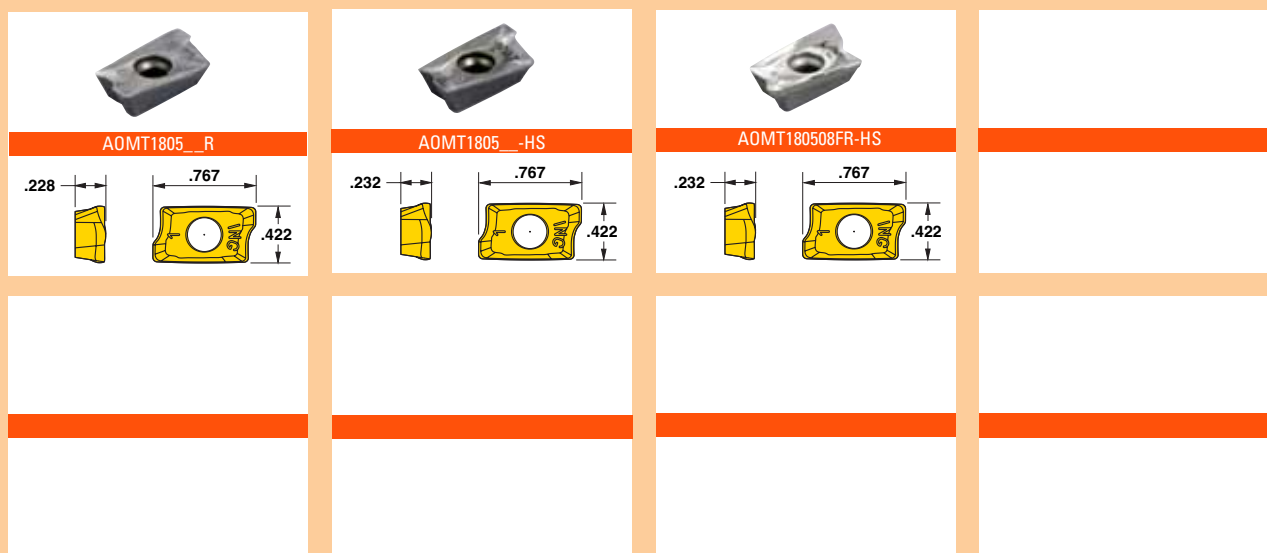
*For 12J4E Series Cutters

HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.970-1.000	SM40-084-20	30-35 in. lbs.	DS-T15T (Tx-15)
1.250-2.000	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M480.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R		■	■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■
AOMT180508L	Multi-Purpose	.031R							■

HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.970-1.000	SM40-084-20	30-35 in. lbs.	DS-T15T (Tx-15)
1.250-2.000	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

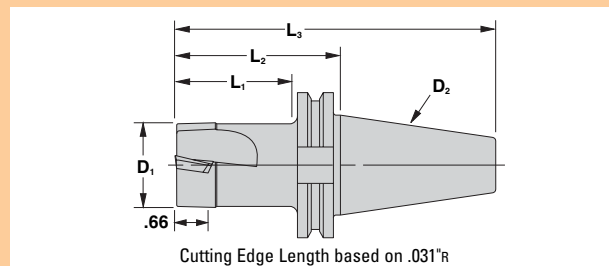
For technical information, see page M480.

Diameters

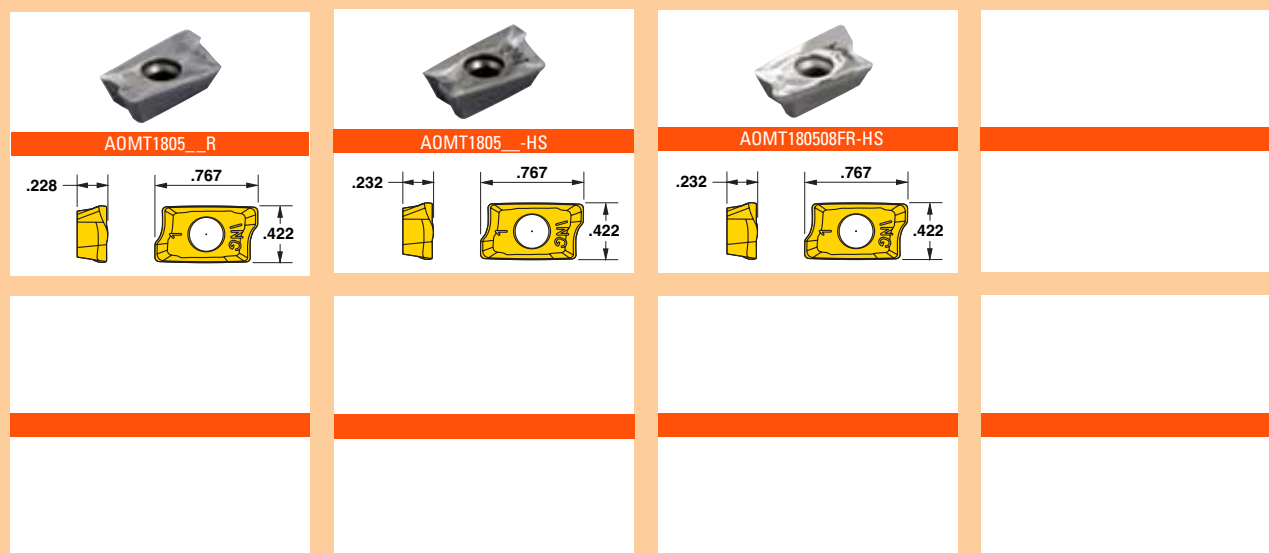
1.000" to 1.500"

Cutting Edge Length

Insert Corner

[illegible]

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R		■	■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■
AOMT180508L	Multi-Purpose	.031R							■

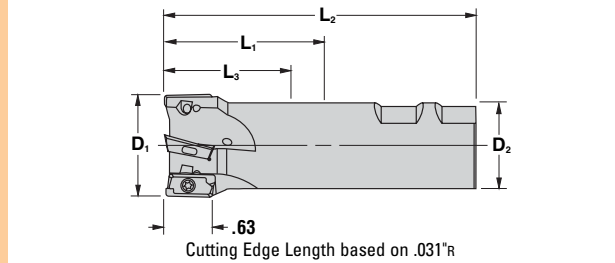
HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
1.000	SM40-084-20	30-35 in. lbs.	DS-T15T (Tx-15)
1.250-1.500	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M480.

0° END MILL SERIES 12J1G, 12V1G

Diameters .750" to 2.000"
Cutting Edge Length .63"
Insert Corner .015", .031", .062", .093", .125", .187" and .250"R



D ₁ Nominal Diameter	New Cutter Number	Old Cutter Number	L ₁ Extension Length	L ₂ Overall Length	L ₃ Projection Length	D ₂ Shank Size/Style	Number of Inserts	Ramp Angle Using APKT1705PER-EM
.750	12J1G-0701284R01	TE90APD.75-W.75-17	1.75	3.75	1.25	.750 Wel.	1	11
1.000	12J1G-1001580R01	TE90APD1.00-W1.00-17	1.75	4.00	1.5	1.000 Wel.	2	5.8
1.000	12J1G-1001580R02*	TE90APD1.00-W1.00-17-C	1.75	4.00	1.50	1.000 Wel.	2	5.8
1.000	12J1G-1001529R01	TE90APD1.00-CAT40-17	2.50	5.19	1.55	40 V-Flange	2	5.8
1.000	12J1G-1003780R01	TE90APD1.00-W1.00-17-L	3.75	6.00	3.50	1.000 Wel.	2	5.8
1.000	12J1G-1005081R01	TE90APD1.00-W1.25-17-XL3	5.00	8.00	1.95	1.250 Wel.	2	5.8
1.000	12J1G-1006080R01	TE90APD1.00-W1.00-17-XL1	6.00	8.00	5.75	1.000 Wel.	2	5.8
1.000	12J1G-1007081R01	TE90APD1.00-W1.25-17-XL4	7.00	10.00	3.94	1.250 Wel.	2	5.8
1.000	12J1G-1008080R01	TE90APD1.00-W1.00-17-XL2	8.00	10.00	7.75	1.000 Wel.	2	5.8
1.250	12J1G-1201681R01	TE90APD1.25-W1.25-17	2.25	4.50	1.6	1.250 Wel.	3	3.5
1.250	12J1G-1201681R02*	TE90APD1.25-W1.25-17-C	2.25	4.50	1.60	1.250 Wel.	3	3.5
1.250	12J1G-1201929R01	TE90APD1.25-CAT40-17	2.87	5.56	1.92	40 V-Flange	3	3.5
1.250	12J1G-1204281R01	TE90APD1.25-W1.25-17-L	4.25	6.50	3.75	1.250 Wel.	3	3.5
1.250	12J1G-1205281R01	TE90APD1.25-W1.25-17-XL1	5.75	8.00	5.25	1.250 Wel.	3	3.5
1.250	12J1G-1207281R01	TE90APD1.25-W1.25-17-XL2	7.75	10.00	7.25	1.250 Wel.	3	3.5
1.500	12J1G-1501681R01	TE90APD1.50-W1.25-17	2.25	4.50	1.60	1.250 Wel.	4	2.3
1.500	12J1G-1501681R02	TE90APD1.50-W1.25-17-B	2.25	4.50	1.60	1.250 Wel.	3	2.3
1.500	12J1G-1501681R03*	TE90APD1.50-W1.25-17-C	2.25	4.50	1.60	1.250 Wel.	4	2.3
1.500	12J1G-1501681R04*	TE90APD1.50-W1.25-17-BC	2.25	4.50	1.60	1.250 Wel.	3	2.3
1.500	12J1G-1501929R01	TE90APD1.50-CAT40-17	2.87	5.56	1.92	40 V-Flange	3	1.6
1.500	12J1G-1501881R01	TE90APD1.50-W1.25-17-L	4.25	6.50	4.25	1.250 Wel.	3	2.3
1.500	12J1G-1505586R01	TE90APD1.50-W1.50-17-XL1	5.50	8.00	5.50	1.500 Wel.	3	2.3
1.500	12J1G-1501881R02	TE90APD1.50-W1.25-17-XL1	5.75	8.00	5.75	1.250 Wel.	3	2.3
1.500	12J1G-1507586R01	TE90APD1.50-W1.50-17-XL2	7.50	10.00	7.50	1.500 Wel.	3	2.3
1.500	12J1G-1508586R01	TE90APD1.50-W1.50-17-XL3	8.50	11.00	8.50	1.500 Wel.	3	2.3
1.750	12J1G-1701781R01	TE90APD1.75-W1.25-17	2.25	4.50	1.70	1.250 Wel.	4	1.8
2.000	12J1G-2001781R01	TE90APD2.00-W1.25-17	2.25	4.50	1.70	1.250 Wel.	5	1.6

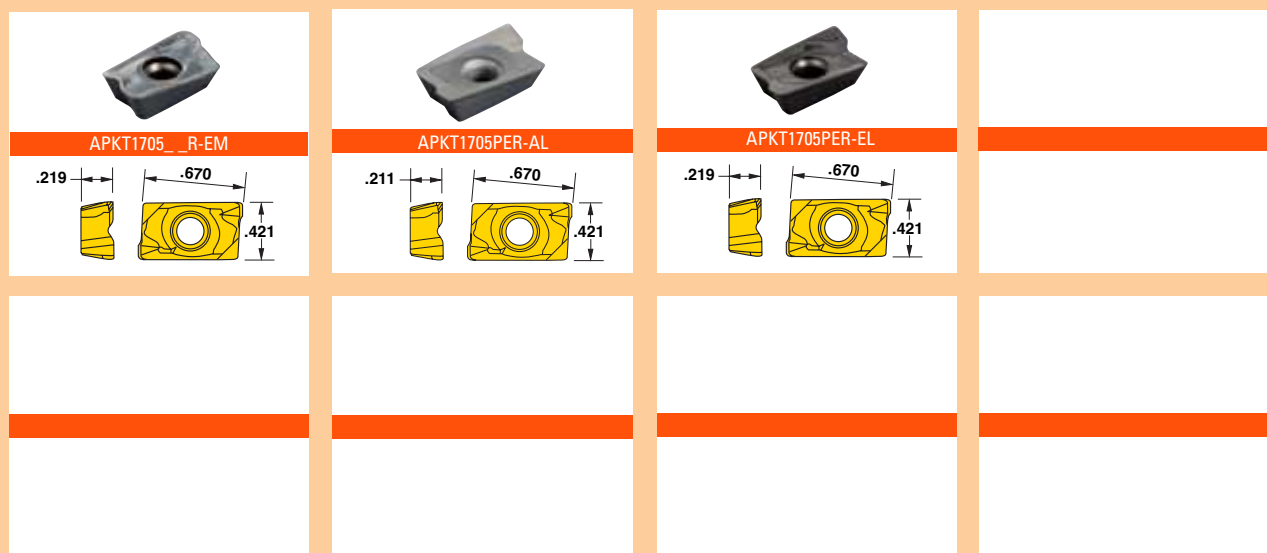
BACKDRIFT END MILLS

D ₁ Nominal Diameter	New Cutter Number	Old Cutter Number	L ₁ Extension Length	L ₂ Overall Length	L ₃ Projection Length	D ₂ Shank Size/Style	Number of Inserts	Ramp Angle
1.000	12V1G-1005781R01	TE90APD1.00-W1.25-17-XL1	5.75	8.00	2.18	1.250 Wel.	2	NA
1.000	12V1G-1007781R01	TE90APD1.00-W1.25-17-XL2	7.75	10.00	4.18	1.250 Wel.	2	NA

* Has coolant through.

CHASEline

INSERTS



Insert Number	Application	Corner	Grades						
			TT	9030	8030	6030	7030	8020	K10
			IN	2005	2030	2010	2040	1030	10K
APKT170504R-EM	Multi-Purpose	.015R						■	■
APKT1705PER-EM	Multi-Purpose	.031R		■	■	■	■	■	■
APKT170516R-EM	Multi-Purpose	.062R		■		■	■	■	■
APKT170524R-EM	Multi-Purpose	.093R		■			■	■	■
APKT170532R-EM	Multi-Purpose	.125R		■			■	■	■
APKT170548R-EM	Multi-Purpose	.187R		■				■	■
APKT170564R-EM	Multi-Purpose	.250R				■	■	■	■
APKT1705PER-AL	Up-Sharp	.031R							■
APKT1705PER-EL	Hi-Temp/Titanium	.031R		■				■	

*Cutter body must be relieved to accept .090"R insert and larger.

HARDWARE

Insert Screw				Driver	
Cutter Diameter	NEW Part No.	Old Part No.	Torque	NEW Part No.	Old Part No.
.750-1.000	SM40-084-20	TS 40080 I	30-35 in. lbs.	DS-T15T (Tx-15)	TD15
1.125-2.000	SM40-093-20	TS 40093 I	30-35 in. lbs.	DS-T15T (Tx-15)	TD15

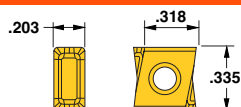
For technical information, see page M474.



INSERTS



DFM213R001



**Insert
Number**

Application

Corner

**Cut Edge
Configuration**

Grades

IN 2005 2030

DFM213R001

Multi-Purpose

.020R

4RH



HARDWARE

Insert Screw

Part No.

SM30-082-00

Torque

13-18 in. lbs.

Driver

Part No.

DS-T09S
(Tx-09)

For technical information, see page M485.

MAXline

 0° END MILL SERIES 1SJ1V (INNO•FIT STYLE)

Diameters

1.000" to 1.500"

Max. Depth of Cut
.28"

Insert Corner
.020"R



Facing



Shoulder



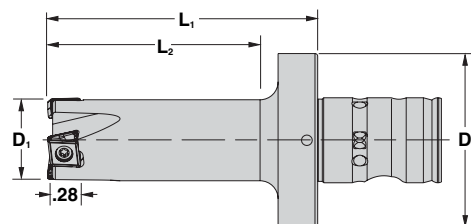
Channeling



Pocketing



Coolant Thru

[illegible]

See pages M358-M361 for InnoFit System Components.

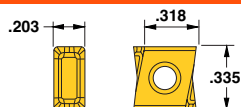
M64

MAXline

INSERTS



DFM213R001



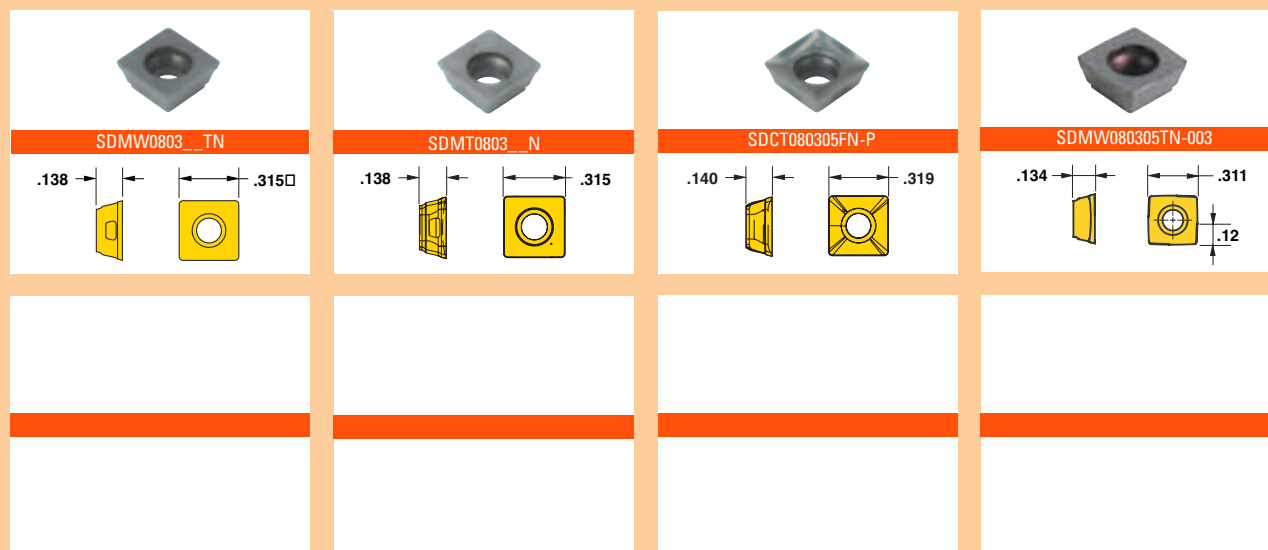
Insert Number	Application	Corner	Cut Edge Configuration	Grades		
				IN	2005	2030
DFM213R001	Multi-Purpose	.020R	4RH	■	■	

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-082-00	13-18 in. lbs.	DS-T09S (Tx-09)	

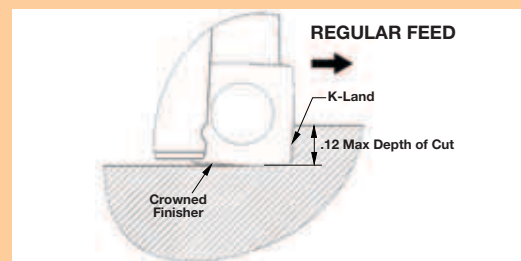
For technical information, see page M485.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
SDMT080305N	Multi-Purpose	.020R			■	■	■	■	■
SDMW080305TN	Heavy-Duty	.020R			■	■	■	■	■
SDCT080305FN-P	Ground/Polished (for Alum.)	.020R		■					
SDMT080308N	Multi-Purpose	.031R							■
SDMW080308TN	Heavy-Duty	.031R							■
SDMT080316N	Multi-Purpose	.062R							■
SDMW080316TN	Heavy-Duty	.062R							■
SDMW080305TN-003*	Wiper	.020R			■		■		

*For creating better face finishes on ferrous materials by placing this insert in all stations. To obtain 4 indexes, a depth of cut below .12" is required.



HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)	

For technical information, see page M481.


0° EXTENDED FLUTE END MILL SERIES 22J3D

Diameters

.625" to 1.000"

Cutting Edge Length

.65" to 1.27"

Insert Corner

.008", .015", .031" and .062"R



Slabbing



Shoulder



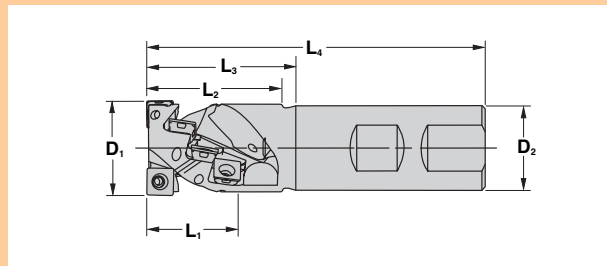
Channeling



Facing



Coolant Thru

[illegible]

M68

CHASEline



HI-POS™ 0° FLUTED END MILL SERIES 22J3M

Diameters
.750" and 1.000"

Cutting Edge Length
.81" to 1.08"

Insert Corner
.015" and .031"R



Channeling



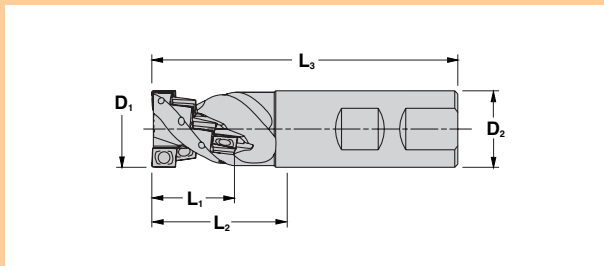
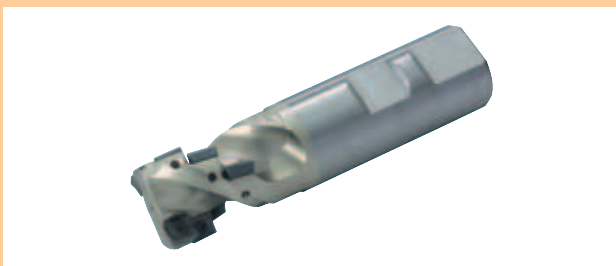
Slabbing



Shoulder



Facing



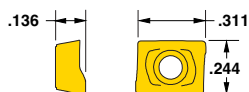
D ₁ Nominal Diameter	Cutter Number	L ₁ Length of Cut	L ₂ Extension Length	L ₃ Overall Length	D ₂ Shank Size/Style	No. of Flutes Total	No. of Flutes Effective	Number of Inserts
---------------------------------------	------------------	------------------------------------	---------------------------------------	-------------------------------------	---------------------------------------	---------------------------	-------------------------------	-------------------------

.750	22J3M-0701584R01	.81	1.50	3.50	.750 Wel.	2	2	6
1.000	22J3M-1002080R01	1.08	1.75	4.00	1.000 Wel.	2	2	8

M70

CHASE*line*

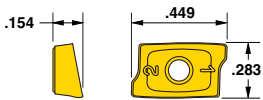
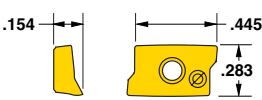
APKT0803 R



HARDWARE

M71

INSERTS

			
AOMT1103_R	AOCT1103_FR-P		
			

Insert Number	Application	Corner*	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Multi-Purpose	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished (for Alum.)	.015R		■					
AOMT110308R	Multi-Purpose	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished (for Alum.)	.031R		■					
AOMT110316R	Multi-Purpose	.062R			■	■	■	■	■
AOMT110332R	Multi-Purpose	.125R**			■	■	■	■	■

*In side stations, use only .015"R to ensure overlap.
 ** Cutter body must be relieved to accept .125"R insert.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)

For technical information, see page M478.


EXTENDED FLUTE END MILL SERIES 22J3F (INNO•FIT STYLE)

Diameters

1.102" to 1.500"

Cutting Edge Length
1.10" to 3.00"

Insert Corner
.015", .031", .062" and
.125"_R



Slabbing



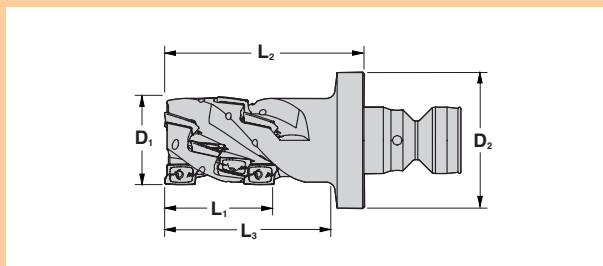
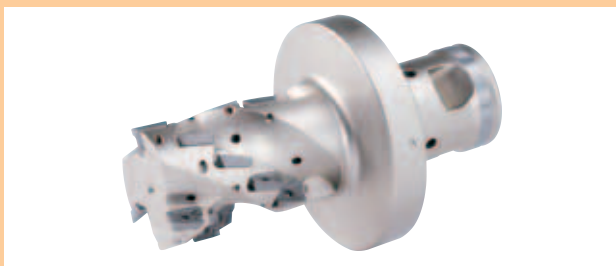
Shoulder



Channeling



Facing

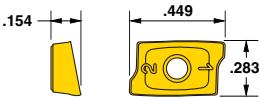
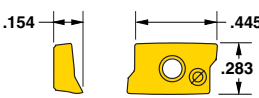
[illegible]

See pages M358-M361 for InnoFit System Components.

M74

CHASEline

INSERTS

			
AOMT1103_R	AOCT1103_FR-P		
			

Insert Number	Application	Corner*	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Multi-Purpose	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished (for Alum.)	.015R		■					
AOMT110308R	Multi-Purpose	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished (for Alum.)	.031R		■					
AOMT110316R	Multi-Purpose	.062R			■	■	■	■	■
AOMT110332R	Multi-Purpose	.125R**			■	■	■	■	■

*In side stations, use only .015"R to ensure overlap.
 ** Cutter body must be relieved to accept .125"R insert.

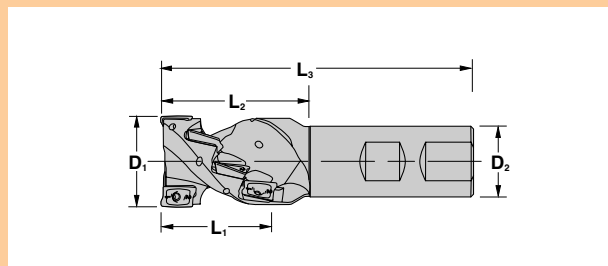
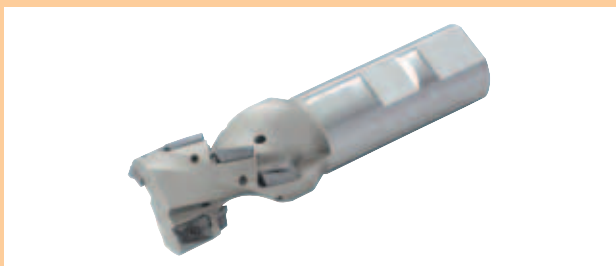
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)

For technical information, see page M478.

HI-POST[™] 0° FLUTED END MILL SERIES 22J3X

Diameters	Cutting Edge Length	Insert Corner
1.000" to 2.000"	.87" to 3.80"	.031", .062" and .125"R

[illegible]

* 1/2 Effective Cutter Design

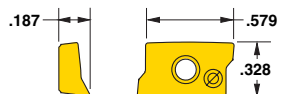
M76

CHASEline

INSERTS



AOMT1204__R



Insert Number	Application	Corner*	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408FR	Hi-Temp/Titanium	.031R	■	■					
AOMT120408R	Multi-Purpose	.031R	■	■	■		■	■	
AOMT120416R	Multi-Purpose	.062R	■	■			■	■	
AOMT120432R	Multi-Purpose	.125R	■	■			■	■	
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

*In side stations, use .031"R or smaller to ensure overlap.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

For technical information, see page M474.



EXTENDED FLUTE END MILL SERIES 22J3X (INNO•FIT STYLE)

Diameters

1.100" to 2.500"

Cutting Edge Length
.84" to 4.00"

Insert Corner
.031", .062" and .125"R



Slabbing



Shoulder



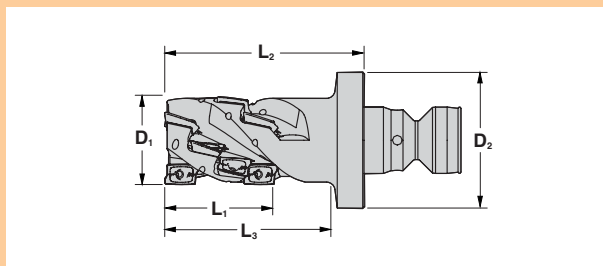
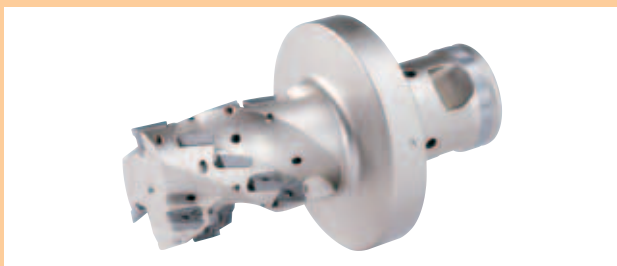
Channeling



Facing



Coolant Thru

[illegible]

*Call for availability. See pages M358-M361 for InnoFit System Components.

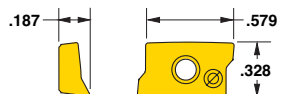
M78

CHASE*line*

INSERTS



AOMT1204__R



Insert Number	Application	Corner*	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408FR	Hi-Temp/Titanium	.031R	■	■					
AOMT120408R	Multi-Purpose	.031R	■	■	■		■	■	
AOMT120416R	Multi-Purpose	.062R	■	■			■	■	
AOMT120432R	Multi-Purpose	.125R	■	■			■	■	
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

*In side stations, use .031"R or smaller to ensure overlap.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

For technical information, see page M474.

0° FLUTED END MILL SERIES 22J3Q, 22J7Q

Diameters

1.000" to 2.000"

Max. Depth of Cut
1.30" to 2.10"

Insert Corner
.015", .031", .062", .093",
.125" and .250"R



Slabbing



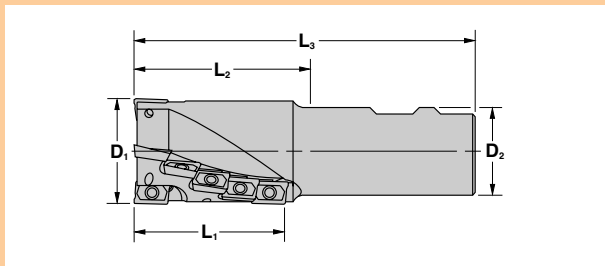
Shoulder



Channeling



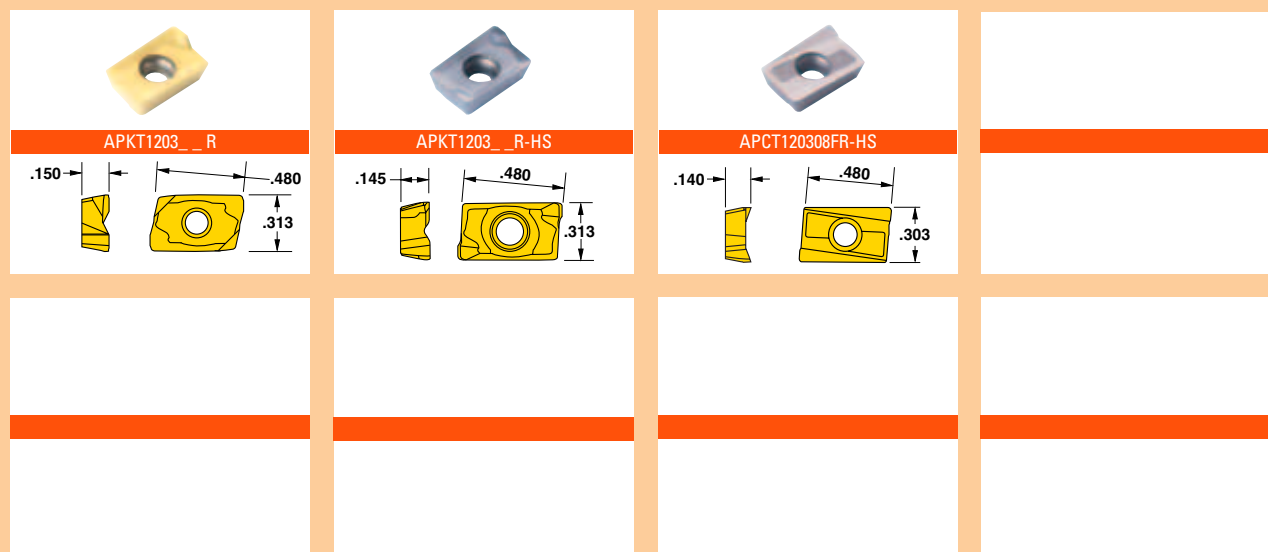
Facing

[illegible]

M80

CHASE*line*

INSERTS



Insert Number	Application	Corner*	Grades								
			IN	30M	40P	2005	2030	2015	2040	1030	5015
APKT120308R	Multi-Purpose	.031R			■	■	■	■	■	■	■
APKT120308R-HS	Hi-Temp/Titanium	.031R		■						■	
APKT120304R-HS	Hi-Temp/Titanium	.015R		■						■	
APCT120308FR-HS	Ground/Polished (for Alum.)	.031R		■							
APKT120316R	Multi-Purpose	.062R			■	■	■	■	■	■	
APKT120324R	Multi-Purpose	.093R			■						
APKT120332R	Multi-Purpose	.125R		■	■	■	■		■	■	
APKT120364R	Multi-Purpose	.250R			■					■	

*In side stations, use .015"r or smaller to ensure overlap.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)

For technical information, see page M476.

0° FLUTED END MILL SERIES 22J5B, 22J3B

Diameters
 2.000"

Max. Depth of Cut
 1.69" to 4.00"

Insert Corner
 .015", .031", .062", .093",
 .125", .187" and .250"R



Slabbing



Shoulder



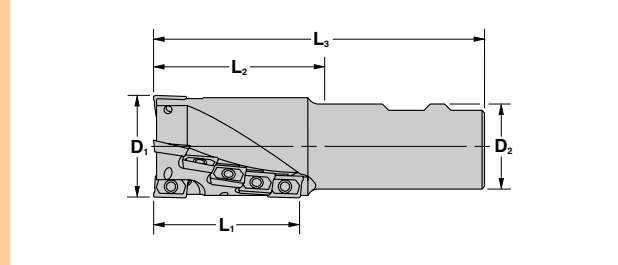
Channeling



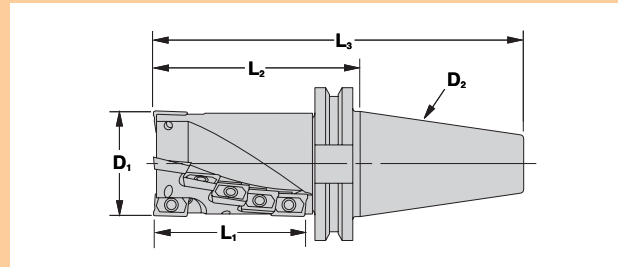
Facing



Coolant Thru



D ₁ Nominal Diameter	Cutter Number	L ₁ Max. Depth of Cut	L ₂ Extension Length	L ₃ Overall Length	D ₂ Shank Size/Style	No. of Flutes Eff. Side	No. of Flutes Eff. End	Number of Inserts
2.000	22J5B-2004581R01	1.69	2.25	4.50	1.250 Wel.	2	4	8

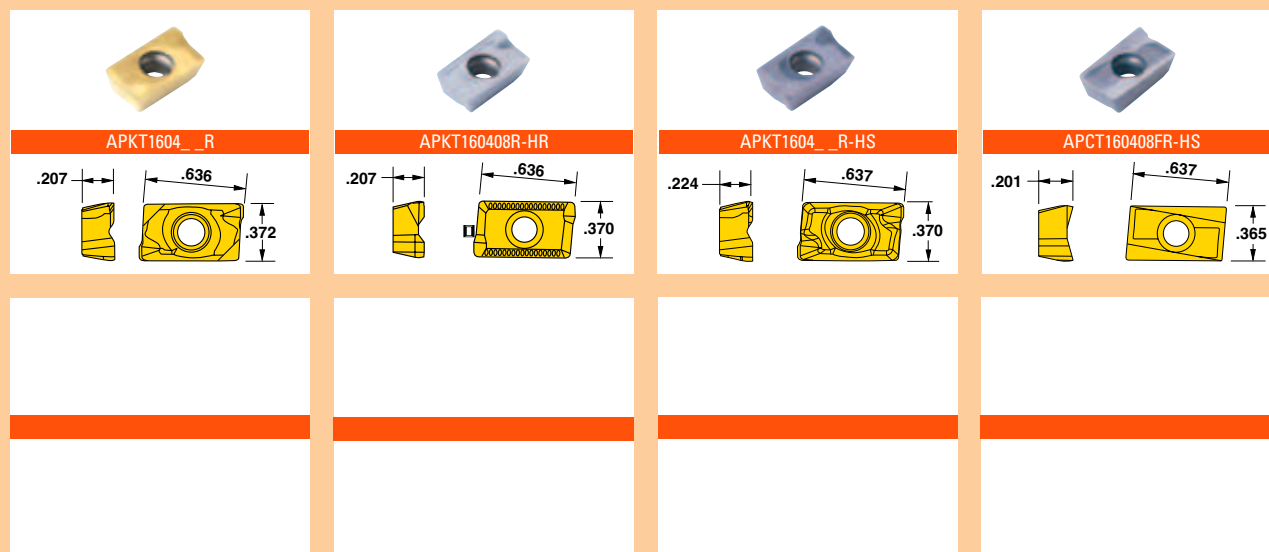


D ₁ Nominal Diameter	Cutter Number	L ₁ Max. Depth of Cut	L ₂ Extension Length	L ₃ Overall Length	D ₂ Shank Size/Style	No. of Flutes Eff. Side	No. of Flutes Eff. End	Number of Inserts
2.000	22J3B-2006048R01	3.92	6.00	10.00	50 V-Flange	4	4	28
2.000	22J5B-2006048R01	4.00	6.00	10.00	50 V-Flange	2	4	18

M82

CHASEline

INSERTS



Insert Number	Application	Corner*	Grades									
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■
APKT160408R-HR	Multi-Purpose	.031R			■						■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■							■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■							■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■							■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■								
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■
APKT160424R	Multi-Purpose	.093R			■			■			■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■
APKT160448R	Multi-Purpose	.187R		■	■						■	
APKT160464R	Multi-Purpose	.250R		■	■						■	■

*In side stations, use .015"r or smaller to ensure overlap.

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M474.

HIPoST⁺ 0° FLUTED PRECISION FINISHING END MILL SERIES 22J3E

Diameters
1.500" to 2.500"

Max. Depth of Cut
1.66" to 4.42"

Insert Corner
.015", .031", .062", .093"
and .125"R



Slabbing



Shoulder



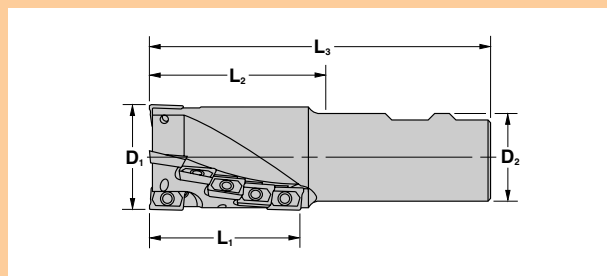
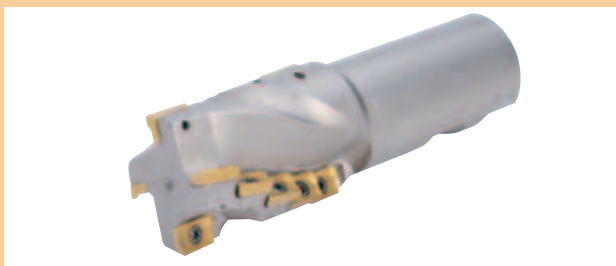
Channeling



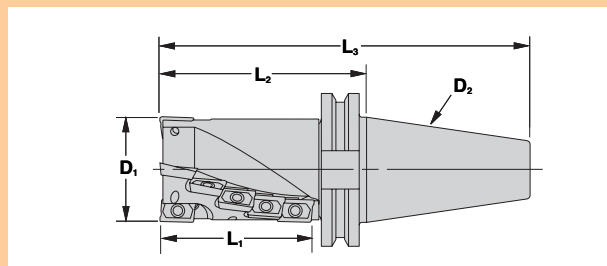
Facing



Coolant Thru



D ₁ Nominal Diameter	Cutter Number	L ₁ Max. Depth of Cut	L ₂ Extension Length	L ₃ Overall Length	D ₂ Shank Size/Style	No. of Flutes Effective	No. of Flutes Total	Number of Inserts
1.500	22J3E-1502381R01	1.66	2.33	4.58	1.250 Wel.	2	2	6
2.000	22J3E-2002381R01	1.66	2.33	4.58	1.250 Wel.	3	3	9

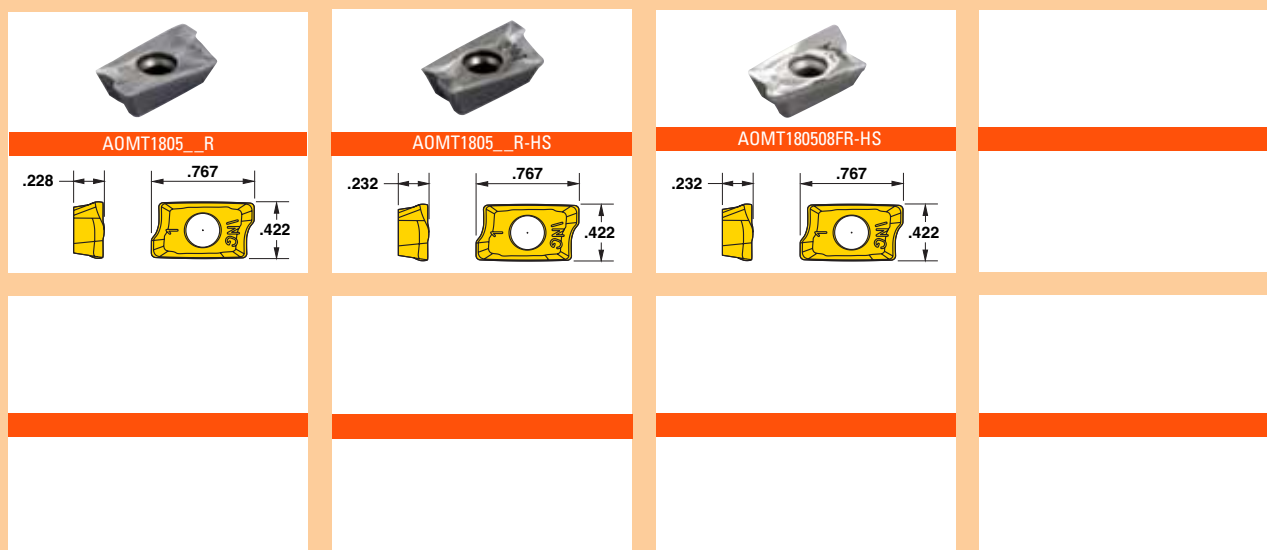


D ₁ Nominal Diameter	Cutter Number	L ₁ Max. Depth of Cut	L ₂ Extension Length	L ₃ Overall Length	D ₂ Shank Size/Style	No. of Flutes Eff. Side	No. of Flutes Eff. End	Number of Inserts
2.000	22J3E-2005548R01	3.87	5.50	9.50	50 V-Flange	3	3	21
2.500	22J3E-2506048R01	4.42	6.00	10.00	50 V-Flange	4	4	32

M84

CHASEline

INSERTS



Insert Number	Application	Corner*	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R			■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■

*In side stations, use .015"R or smaller to ensure overlap.

HARDWARE

Cutter Diameter	Insert Screw		Driver
	Part No.	Torque	
1.50	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)
2.00	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

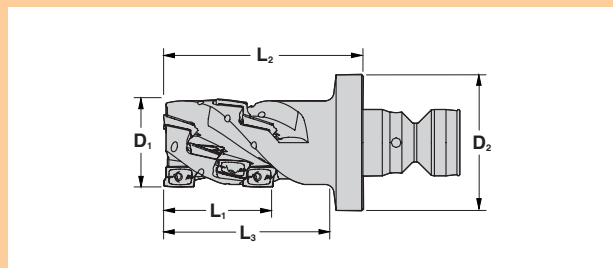
For technical information, see page M480.



Insert Corner
.031", .062", .093" and
.125"_R



Coolant Thru

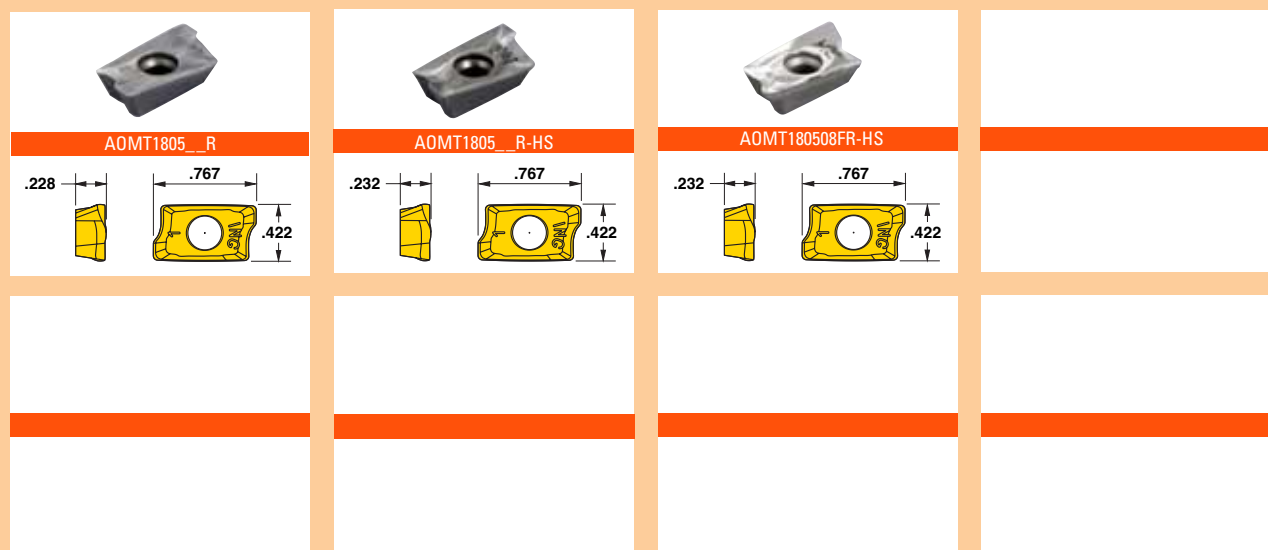


See pages M358-M361 for InnoFit System Components.

CHASEline

M86

INSERTS



Insert Number	Application	Corner*	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R			■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	
AOMT180524R	Multi-Purpose	.093R			■			■	
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	

*In side stations, use .015"r or smaller to ensure overlap.

HARDWARE

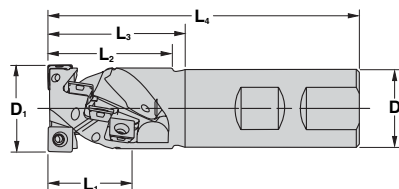
Cutter Diameter	Insert Screw		Driver
	Part No.	Torque	
1.50	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)
2.00	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M480.

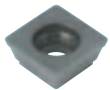
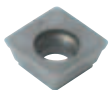
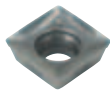
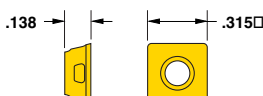
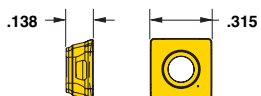
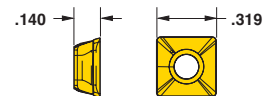
Insert Corner
.020", .031" and
.062"R



Coolant Thru

M88

INSERTS

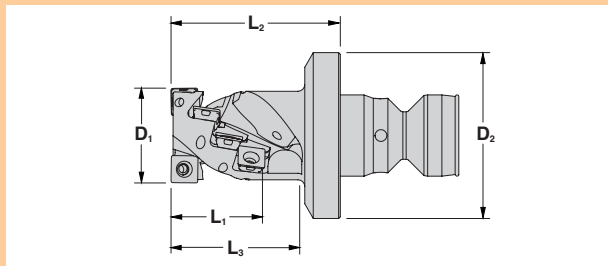
			
SDMW0803_TN	SDMT0803_N	SDCT080305FN-P	
			

Insert Number	Application	Station	Corner	Grades						
				IN	30M	2005	2030	2015	2040	1030
SDMT080305N	Multi-Purpose	End or Side	.020R			■	■	■	■	■
SDMW080305TN	Heavy-Duty	End or Side	.020R			■	■	■	■	■
SDCT080305FN-P	Ground/Polished (for Alum.)	End or Side	.020R		■					
SDMT080308N	Multi-Purpose	End Only	.031R							■
SDMW080308TN	Heavy-Duty	End Only	.031R							■
SDMT080316N	Multi-Purpose	End Only	.062R							■
SDMW080316TN	Heavy-Duty	End Only	.062R							■

HARDWARE

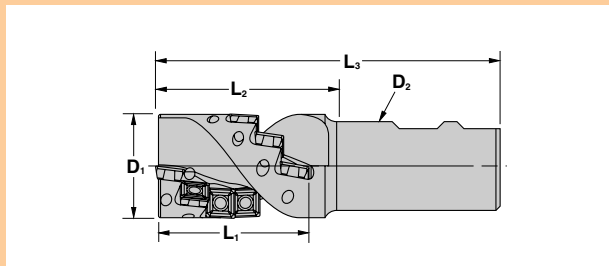
Insert Screw		Driver	
Part No.	Torque		Part No.
SM30-065-00	13-18 in. lbs.		DS-T09T (Tx-09)

For technical information, see page M481.



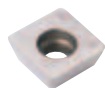
M90

M90

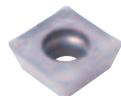
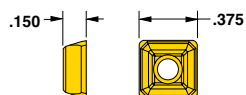


CHASEline

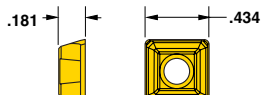
INSERTS



SHLT090308N-HR



SHLT110408TN-HR

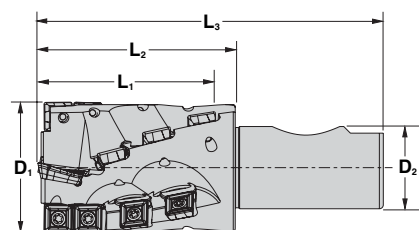
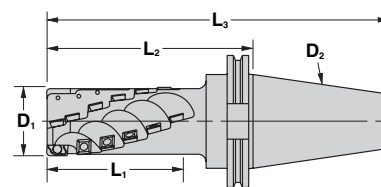


Insert Number	Application	Corner	Grades					
			IN	30M	40P	6530	2005	1030
SHLT090308N-HR	Multi-Purpose	.031R	■				■	■
SHLT110408TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■

HARDWARE

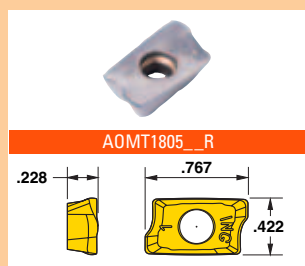
Insert Series	Insert Screw		Driver
	Part No.	Torque	
SHLT09	SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)
SHLT11	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M479.

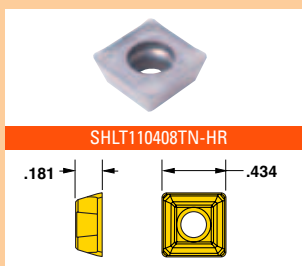


*Specially engineered weldon style shank draws cutter into the face of the holder for increased rigidity.

INSERTS



AOMT1805...R



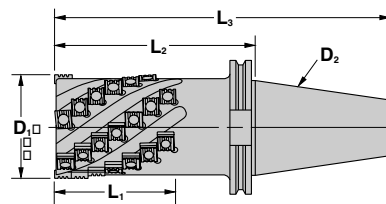
SHLT110408TN-HR

Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	6530
AOMT180508R	Multi-Purpose	.031R	■	■	■	■	■	■	
AOMT180516R	Multi-Purpose	.062R	■	■	■	■	■	■	
AOMT180524R	Multi-Purpose	.093R	■				■	■	
AOMT180532R	Multi-Purpose	.125R	■	■	■	■	■	■	
SHLT110408TN-HR	Multi-Purpose	.031R	■					■	■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M479.



M96

POWERQUAD™ 0° REPLACEABLE END CAP END MILL SERIES 23J2G

Diameters 2.000"	Max. Depth of Cut 4.00" to 4.50"	Insert Corner .031", .062", .093" and .125"R
----------------------------	--	---



Slabbing



Shoulder



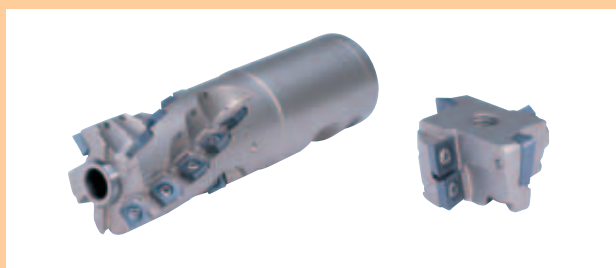
Channeling



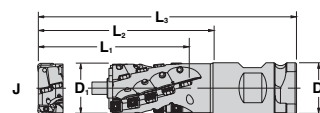
Contouring



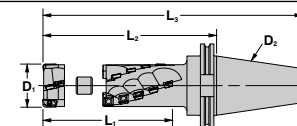
Facing



Drawing A-
Rear Mounted
Style



Drawing B-
Face Mounted
Style



D ₁ Nominal Diameter	Cutter Assembly	Cap Style	End Cap Mounting Type	L ₁ Max. Depth of Cut	L ₂ Extension	L ₃ Overall Length	D ₂ Shank Size/Style	No. of Flutes Eff. Side	No. of Flutes Eff. End	Total Flutes
2.000	23J2G-2005052A01	J	Rear	4.50	5.00	8.25	2.000 Wel/Put	2	2	4
2.000	23J2G-2006148A01	J	Face	4.00	6.13	10.13	50 V-Flange	2	2	4

ASSEMBLY COMPONENTS

Cutter Assembly	Body	End Cap	Centering Bushing	Drawing Type
23J2G-2005052A01	23J2G-20HL452R01	23J2G-20EC172R01	PZ-0499	A
23J2G-2006148A01	23J2G-20HL548R01	23J2G-20EC168R01	PZ-0499	B

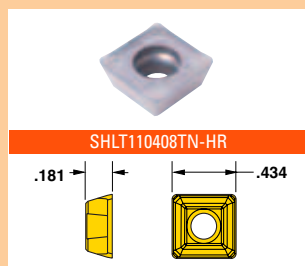
HARDWARE

Insert Series	Insert Screw		Driver	
	Part No.	Torque	Part No.	
APKT16, SHLT11	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)	

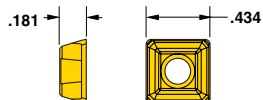
Retention Bolt			
Mounting Style	Part No.	Drive Size	Torque
Rear	SD08LA2	5/8" hex	105 ft. lbs.
Face	SD08-21	10mm hex	105 ft. lbs.

CHASEline

CUTTER BODY INSERTS

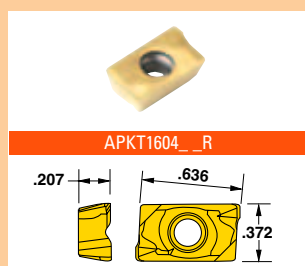


SHLT110408TN-HR

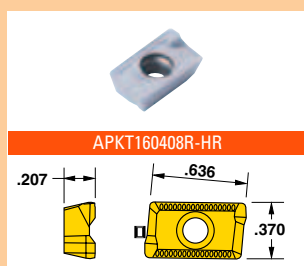
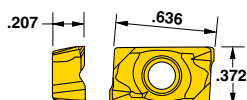


Assembly Type	Cutter Body	Drawing Type	Insert Qty.	Insert Number	Grades					
					IN	30M	40P	6530	2005	1030
Side Inserts										
J	23J2G-20HL452R01	A	18	SHLT110408TN-HR		■	■	■	■	■
J	23J2G-20HL548R01	B	18	SHLT110408TN-HR		■	■	■	■	■

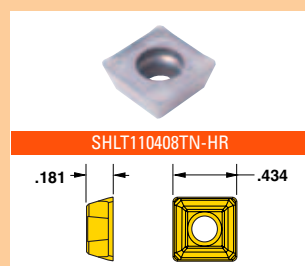
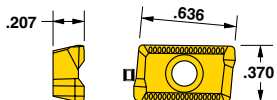
END CAP INSERTS



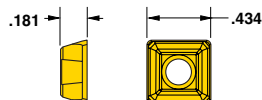
APKT1604_ _R



APKT160408R-HR



SHLT110408TN-HR

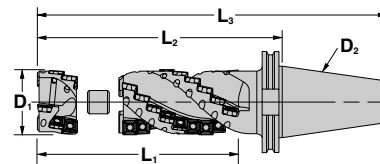


Assembly Type	Cutter Cap Number	Insert Qty.	Insert Number	Corner	Grades							
					IN	15K	30M	40P	1515	6530	2005	1030
End Inserts												
A	23J2G-20EC172R01	2	APKT160416R	.062R								■
A	23J2G-20EC172R01	2	APKT160416R	.062R							■	
A	23J2G-20EC172R01	2	APKT160424R	.093R								■
A	23J2G-20EC172R01	2	APKT160432R	.125R								■
A	23J2G-20EC172R01	2	APKT160432R	.125R							■	
B	23J2G-20EC168R01	2	APKT160408R	.031R								■
B	23J2G-20EC168R01	2	APKT160408R-HR	.031R								■
B	23J2G-20EC168R01	2	APKT160408R	.031R							■	
Side Inserts												
A	23J2G-20EC172R01	4	SHLT110408TN-HR	-			■	■		■	■	■
B	23J2G-20EC168R01	4	SHLT110408TN-HR	-			■	■		■	■	■

For technical information, see page M479.

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Channeling

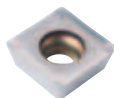


ASSEMBLY COMPONENTS

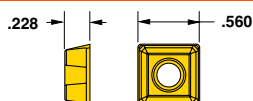
100

CHASE*line*

CUTTER BODY INSERTS



SHLT140508TN-HR



Assembly Type	Cutter Body Part No.	Qty.	Insert Number	Application	Corner	Grades					
						IN	30M	40P	6530	2005	1030
Side Inserts											
Cutter Body	25J3J-25HL448R01	18	SHLT140508TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■
Cutter Body	25J3J-25HL648R01	27	SHLT140508TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■
Cutter Body	25J3J-25HL645R01	27	SHLT140508TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■
End Cap	25J3J-25EC172R01	9	SHLT140508TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■

HARDWARE

Insert/L-Nest Screw		Driver
Part No.	Torque	Part No.
SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)

Retention Bolt			
Mounting Style	Part No.	Drive Size	Torque
Face	SD07-13	10mm hex	105 ft. lbs.

For technical information, see page M479.

0° FLUTED SHELL MILL SERIES 22J3X

Diameters
2.000" and 2.500"

Cutting Edge Length
1.73" to 2.60"

Insert Corner
.031", .062" and .125"R



Channeling



Slabbing



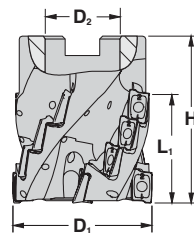
Shoulder



Facing



Coolant Thr

[illegible]

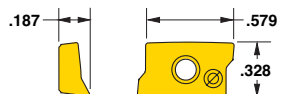
M102

CHASE*line*

INSERTS



AOMT1204__R



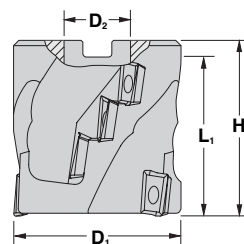
Insert Number	Application	Corner*	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408FR	Hi-Temp/Titanium	.031R	■	■					
AOMT120408R	Multi-Purpose	.031R	■	■	■		■	■	
AOMT120416R	Multi-Purpose	.062R	■	■			■	■	
AOMT120432R	Multi-Purpose	.125R	■	■			■	■	
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

*In side stations, use .031"R or smaller to ensure overlap.

HARDWARE

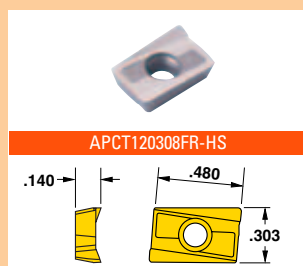
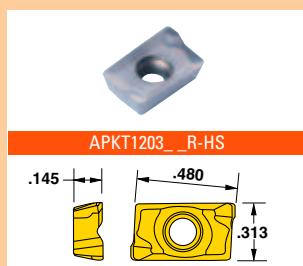
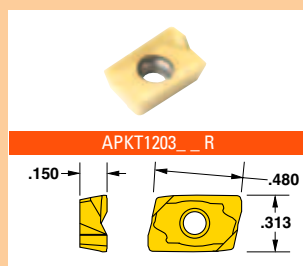
Insert Screw		Driver
Part No.	Torque	Part No.
SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

For technical information, see page M474.

M104

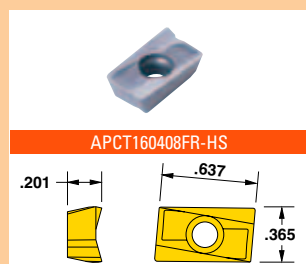
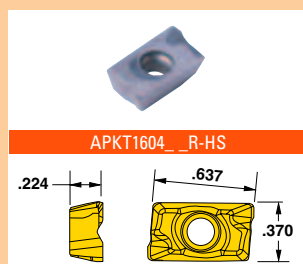
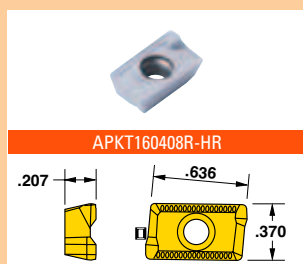
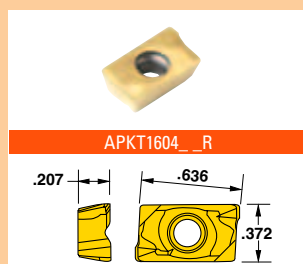
CHASE*line*

22J3Q INSERTS



Insert Number	Application	Corner*	Grades								
			IN	30M	40P	2005	2030	2015	2040	1030	5015
APKT120308R	Multi-Purpose	.031R			■	■	■	■	■	■	
APKT120308R-HS	Hi-Temp/Titanium	.031R		■					■		
APKT120304R-HS	Hi-Temp/Titanium	.015R		■					■		
APCT120308FR-HS	Ground/Polished (for Alum.)	.031R		■							
APKT120316R	Multi-Purpose	.062R			■	■	■	■	■		
APKT120324R	Multi-Purpose	.093R			■						
APKT120332R	Multi-Purpose	.125R		■	■	■	■	■	■	■	
APKT120364R	Multi-Purpose	.250R			■				■		

22J3B INSERTS



Insert Number	Application	Corner*	Grades									
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	
APKT160408R-HR	Multi-Purpose	.031R			■						■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■							■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■							■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■							■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■								
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	
APKT160424R	Multi-Purpose	.093R			■		■				■	
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	
APKT160448R	Multi-Purpose	.187R		■	■						■	
APKT160464R	Multi-Purpose	.250R		■	■						■	

*In side stations, use .031"R or smaller to ensure overlap.

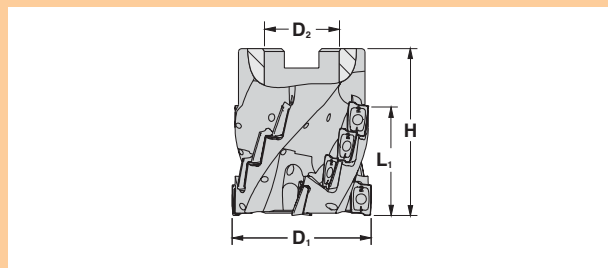
Relieve 22J3Q and 22J3B cutter bodies for insert radii larger than .125".

For technical information, see page M474.

Diameters

2.500" to 4.000"

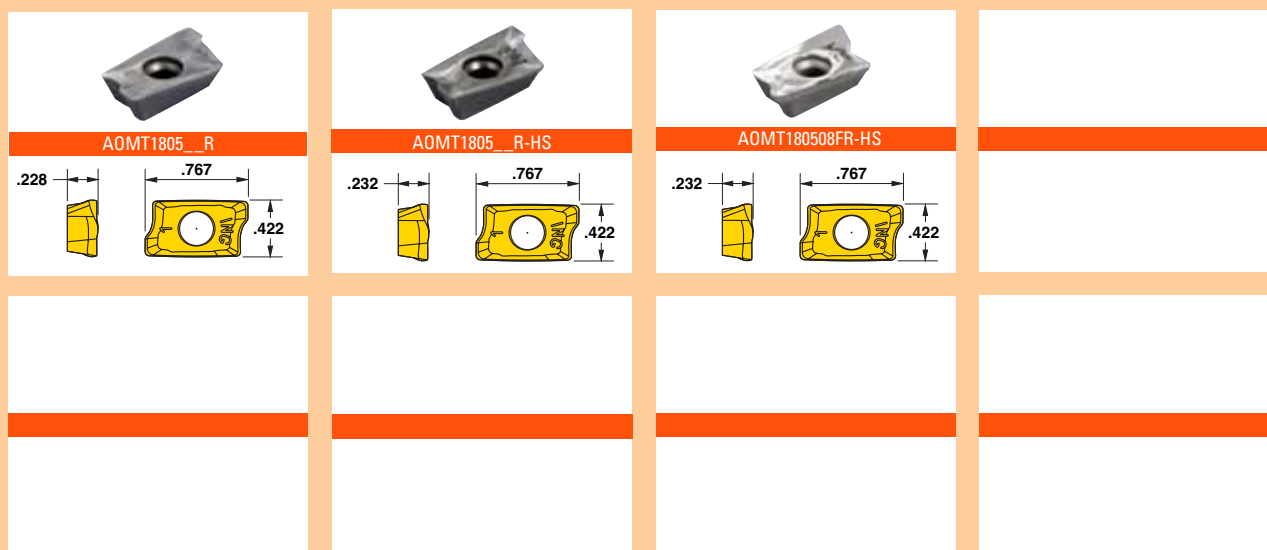
Insert Corner
.015", .031", .062", .093"
and .125"R

[illegible]

CHASE*line*



INSERTS



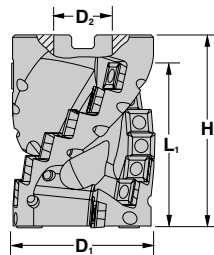
Insert Number	Application	Corner*	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R			■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■

*In side stations, use .031"R or smaller to ensure overlap.

HARDWARE

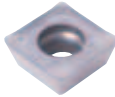
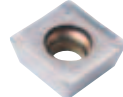
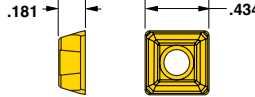
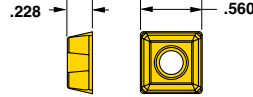
Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)
Retention Bolt		Drive Size
Cutter Series	Part No.	Drive Size
22J3E-25	SD-08-52	3/8" hex
22J3E-30	SD-10-51	1/2" hex

For technical information, see page M480.



M108

INSERTS

			
SHLT110408TN-HR	SHLH1405_TN-HR		
			

Insert Number	Application	Corner	Grades					
			IN	30M	40P	6530	2005	1030
SHLT110408TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■
SHLT140508TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■
SHLT140516TN-HR*	Multi-Purpose	.062R					■	■

*For End Station only.

HARDWARE

Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
SHLT11	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)
SHLT14	SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)

Retention Bolt		
Cutter Series	Part No.	Drive Size
25J3G-20020	SD-06-48	5/16" hex
25J3G-20022	SD-06-49	5/16" hex
25J3J-25035	SD-08-52	3/8" hex
25J3J-30040	SD-10-54	1/2" hex
25J3J-40050	SD-12-79	5/8" hex

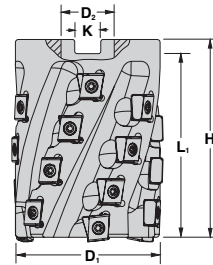
For technical information, see page M479.



Insert Corner
.031", .062", .093"
and .125"R



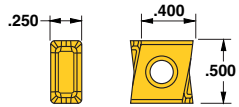
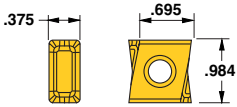
Facing

[illegible]

MAXline

M110

INSERTS

			
DPM324R 	DPM424R 		

Insert Number	Application	Station	Corner	Grade				
				IN	1530	2015	2005	2040
2SJ1H-30								
DPM324R001	Multi-Purpose	End or Side	.031R		■	■	■	
DPM324R002	Multi-Purpose	End Only	.062R		■		■	
2SJ1L-40								
DPM424R001	Multi-Purpose	End or Side	.031R			■	■	■
DPM424R002	Multi-Purpose	End Only	.062R				■	
DPM424R003	Multi-Purpose	End Only	.093R				■	
DPM424R004	Multi-Purpose	End Only	.125R				■	

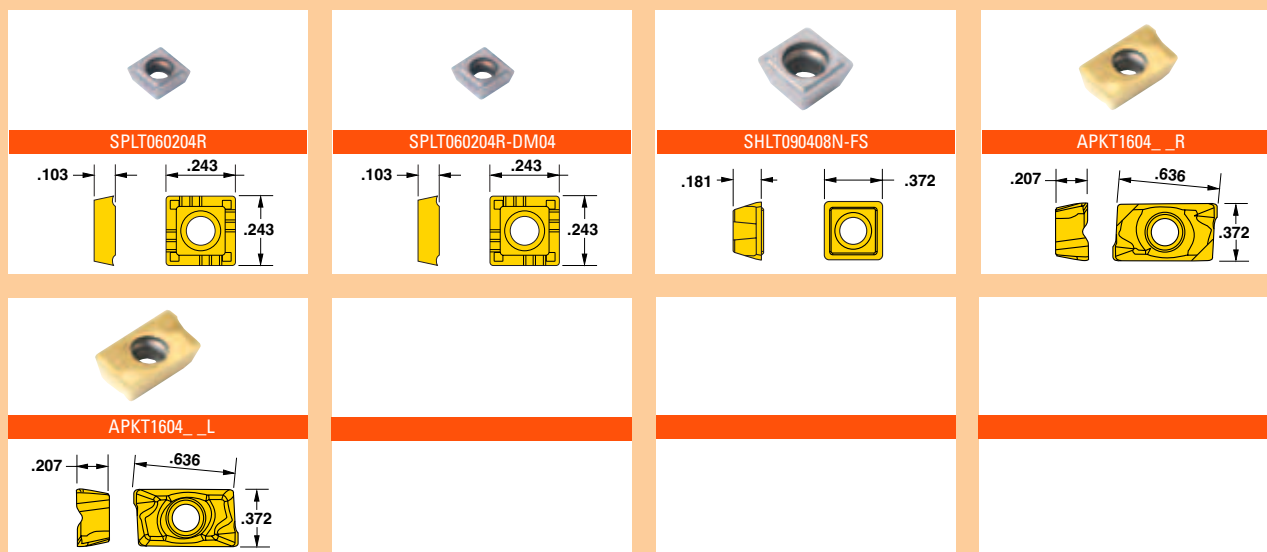
HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)	
SM50-160-10	35-40 in. lbs.	DS-0034 (Tx-20)	

Retention Bolt		
Cutter Series	Part No.	Drive Size
2SJ1H-30	SD-10-54	1/2" hex
2SJ1L-40	SD-12-79	5/8" hex

For technical information, see page M484.

INSERTS



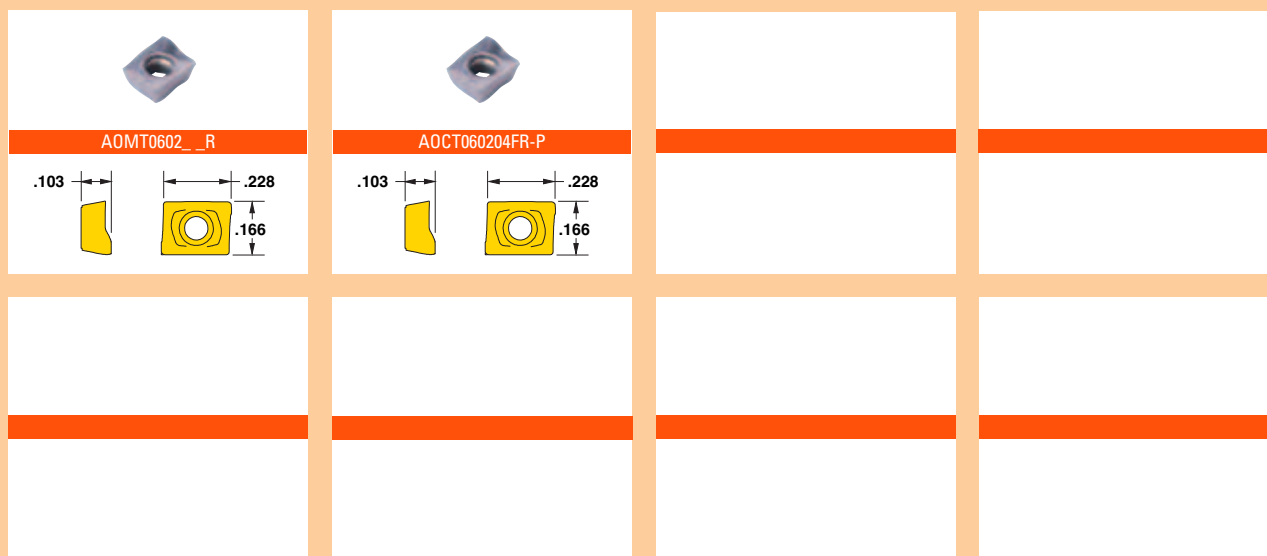
Cutter Number	Qty. Each	Insert Number	Application	Corner	Grades						
					IN	30M	6515	2005	1030	1040	5015
15T1D-0902580R01	4	SPLT060204R	2-edge, High Pos. Multi-Purpose	.015R	■				■	■	
15T1D-0902580R01	4	SPLT060204R-DM04	4-edge Multi-Purpose	.015R					■		
15T1F-1201280R01	2	SHLT090408N-FS	Multi-Purpose	.031R			■	■	■		
15T1F-1401580R01	4	SHLT090408N-FS	Multi-Purpose	.031R			■	■	■		
12T1B-1701981R01	2	APKT160408R	Multi-Purpose	.031R					■		■
12T1B-1701981R01	2	APKT160408L	Multi-Purpose	.031R					■		■
12T1B-2102281R01	2	APKT160408R	Multi-Purpose	.031R					■		■
12T1B-2102281R01	2	APKT160408L	Multi-Purpose	.031R					■		■

HARDWARE

Insert Screw				Driver
Insert Series	Part No.	Torque	Part No.	
15T1D	SM22-052-00	7-11 in. lbs.	DS-T07F (Tx-07)	
15T1F-12	SM40-080-30	30-35 in. lbs.	DS-T15T (Tx-15)	
15T1F-14	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	
12T1B	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M506.

INSERTS



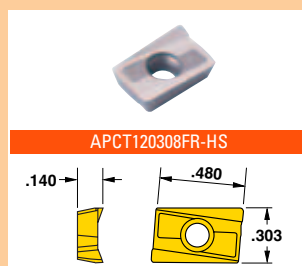
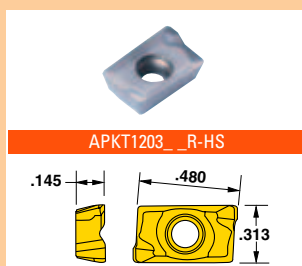
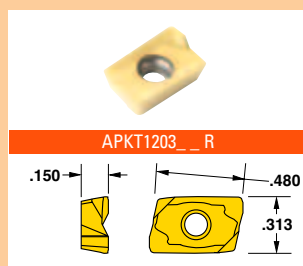
Insert Number	Application	Corner	Grades				
			IN	2005	2030	1030	05S
AOMT060202R	Multi-Purpose	.008R	■	■		■	
AOMT060204R	Multi-Purpose	.015R	■	■			
AOMT060208R	Multi-Purpose	.031R	■	■			
AOMT060216R	Multi-Purpose	.062R	■	■			
AOCT060204FR-P	Ground/Polished	.015R					■

HARDWARE

Insert Screw		Driver	Preset Torque Driver	Bit for Torque Driver
Part No.	Torque	Part No.	Part No.	Part No.
SM18-041-00	5 in. lbs.	DS-TP06S (Tx Plus 06)	DTN005S	DS-TP06TB

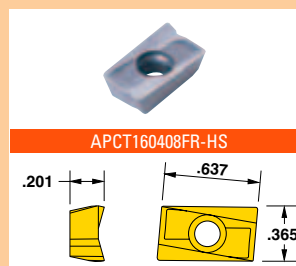
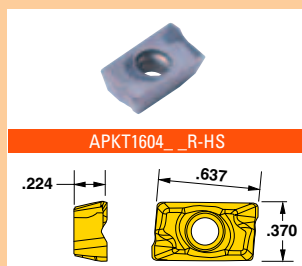
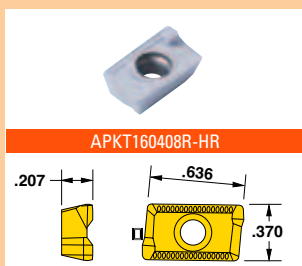
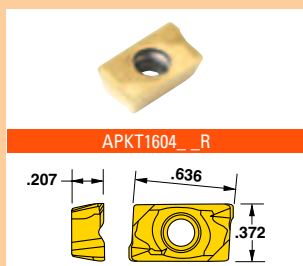
For technical information, see page M475.

12M1Q, 12N1Q, 12P1Q INSERTS



Insert Number	Application	Corner	Grades								
			IN	30M	40P	2005	2030	1030	5015	2015	2040
APKT120308R	Multi-Purpose	.031R			■	■	■	■	■		■
APKT120308R-HS	Hi-Temp/Titanium	.031R		■				■			
APKT120304R-HS	Hi-Temp/Titanium	.015R		■				■			
APCT120308FR-HS	Ground/Polished (for Alum.)	.031R		■							
APKT120316R	Multi-Purpose	.062R			■	■	■	■		■	■

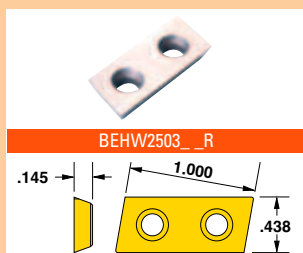
12N1B INSERTS



Insert Number	Application	Corner	Grades									
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015
APKT160408R-HR	Multi-Purpose	.031R			■							■
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■
APKT160408R-HS	Hi-Temp/Titanium	.031R		■								■
APKT160404R-HS	Hi-Temp/Titanium	.015R		■								■
APKT160416R-HS	Hi-Temp/Titanium	.062R		■								■
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■								
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■

For technical information, see page M474 and M476.

INSERTS

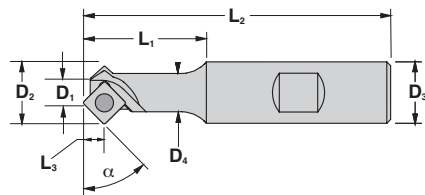


Insert Number	Application	Corner	Grades		
			IN	15K	1540
BEHW250304R	Multi-Purpose	.015R			■
BEHW250308R	Multi-Purpose	.031R			■
BEHW250316R	Multi-Purpose	.062R			■
BEHW250304R-P	Ground/Polished	.015R		■	
BEHW250308R-P	Ground/Polished	.031R		■	
BEHW250316R-P	Ground/Polished	.062R		■	

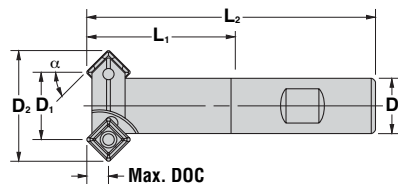
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M477.

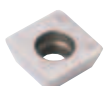
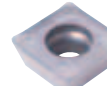
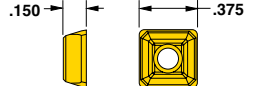
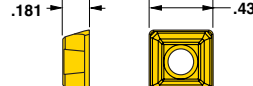


M120



M122

INSERTS

			
SHLT090308N-HR	SHLT110408TN-HR		
			

Cutter Series	Insert Number	Application	Corner	Grades					
				IN	30M	40P	6530	2005	1030
15N1F	SHLT090308N-HR	Multi-Purpose	.031R	■				■	■
15L1G, 15M1G, 15N1G	SHLT110408TN-HR	Multi-Purpose	.031R	■	■	■	■	■	■

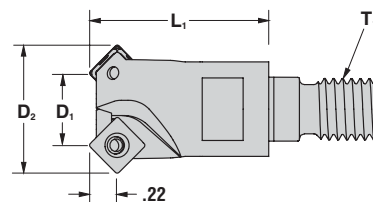
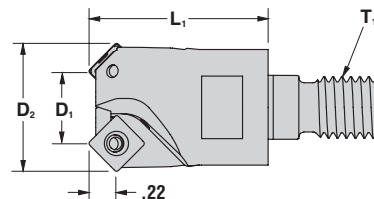
HARDWARE

Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
SHLT09	SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)
SHLT11	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M474.



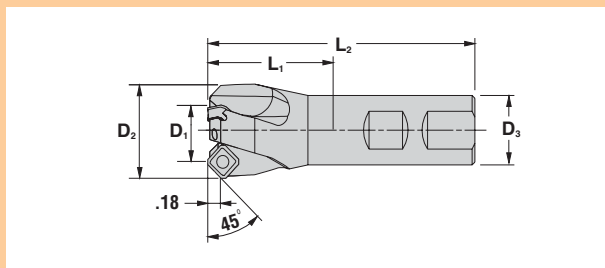
Coolant Temperature



124

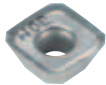
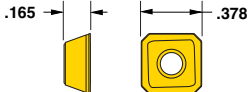
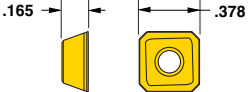
CHASEline

Facing



M126

INSERTS

			
SEKT09T3AFN	SEKT09T3AFFN-P		
			

Insert Number	Application	Corner	Grades					
			IN	30M	2005	2030	2040	1030
SEKT09T3AFN	Multi-Purpose	.045 x 45°			■	■	■	■
SEKT09T3AFFN-P	Ground/Polished (for Alum.)	.045 x 45°		■				

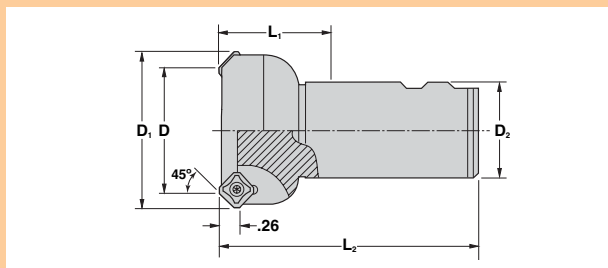
HARDWARE

Insert Screw	Driver
Part No.	Part No.
SM30-065-00	DS-T09W (Tx-09)
Torque	
13-18 in. lbs.	

For technical information, see page M481.



Facing



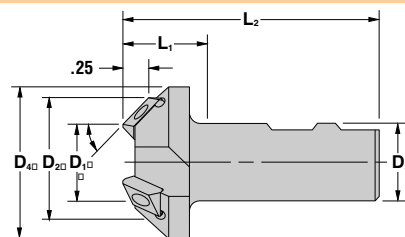
M128

Technical drawing of a 1/2-13 UNF-2A hex nut. The side view on the left shows a height of .150. The end view on the right shows a major diameter of .520.



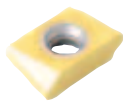
HARDWARE

M129

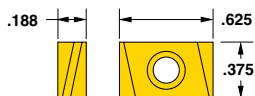


M130

INSERTS



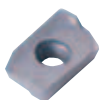
LSE323R002

[illegible]

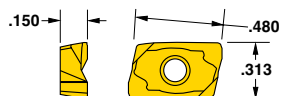
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)

INSERTS



APKT120308R-001



Insert Number	Application	Corner	Grade	
			IN	40P
APKT120308R-001	Center Cutting	.031R		■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)	

For technical information, see page M476.

 **0° CENTER CUTTING END MILL** SERIES 12J1B

Diameter
.750"

Max. Depth of Cut
.50"

Insert Corner
.031"R



Plunging



Ramping



Pocketing



Corkscrew



Channeling



Shoulder



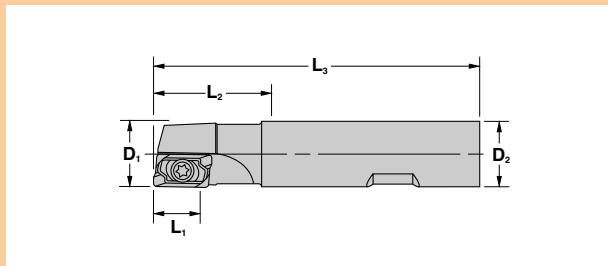
Center Cutting



Facing



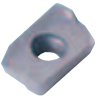
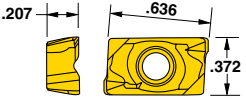
Coolant Thru

[illegible]

M134

CHASE*line*

INSERTS

			
APKT160408R-001			
			

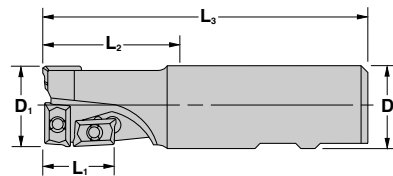
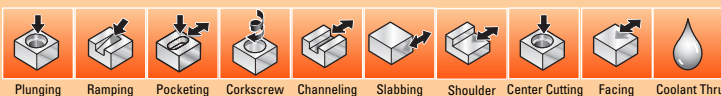
Insert Number	Application	Corner	Grade	
			IN	40P
APKT160408R-001	Center Cutting	.031R	■	

HARDWARE

Insert Screw		Driver	
Part No.	Torque		Part No.
SM40-084-20	30-35 in. lbs.		DS-T15T (Tx-15)

For technical information, see page M474.

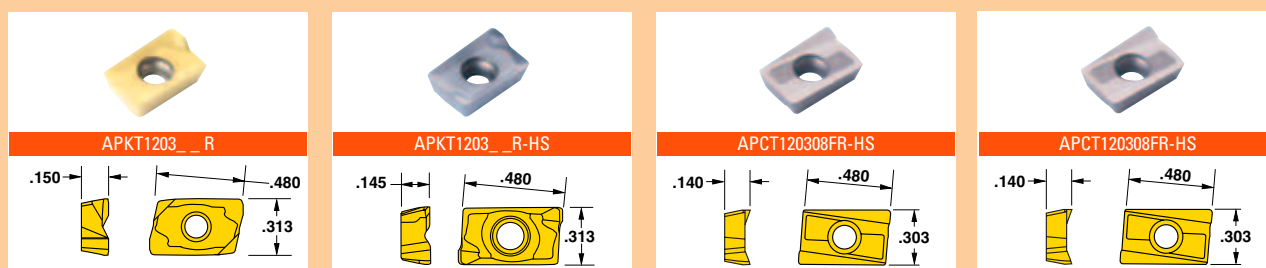
Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R

[illegible]

Insert Screw

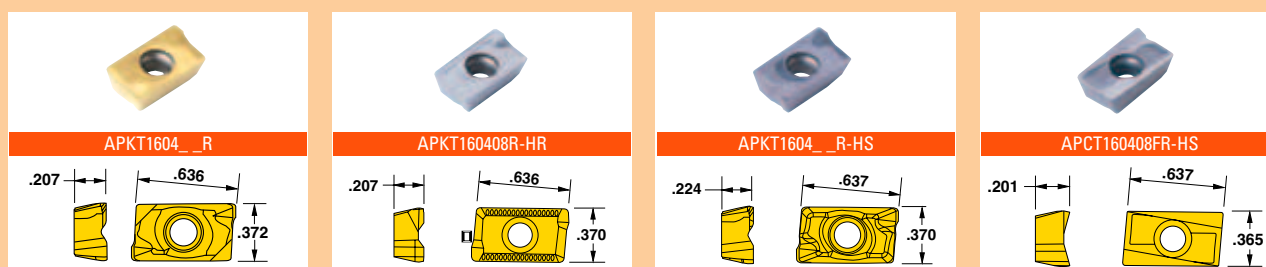
Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
APKT12	SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)
APKT16	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

12S1Q INSERTS



Insert Number	Application	Corner	Grades								
			IN	30M	40P	2005	2030	2015	2040	1030	5015
APKT120308R	Multi-Purpose	.031R			■	■	■	■	■	■	
APKT120308R-HS	Hi-Temp/Titanium	.031R		■						■	
APKT120304R-HS	Hi-Temp/Titanium	.015R		■						■	
APCT120308FR-HS	Ground/Polished (for Alum.)	.031R		■							
APKT120316R	Multi-Purpose	.062R			■	■	■	■	■		
APKT120324R	Multi-Purpose	.093R			■						
APKT120332R	Multi-Purpose	.125R		■	■	■	■	■	■	■	
APKT120364R	Multi-Purpose	.250R			■					■	

12S1B INSERTS

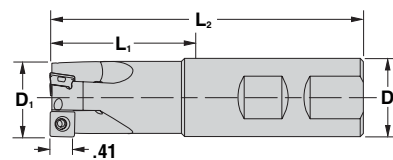


Insert Number	Application	Corner	Grades									
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■
APKT160408R-HR	Multi-Purpose	.031R			■						■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■							■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■							■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■							■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■								
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■
APKT160424R	Multi-Purpose	.093R			■			■			■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■
APKT160448R	Multi-Purpose	.187R		■	■						■	
APKT160464R	Multi-Purpose	.250R		■	■						■	■

For technical information, see page M474 and M476.



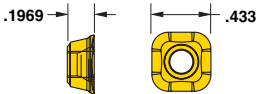
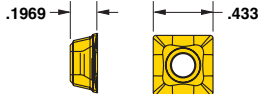
Coolant Thru

[illegible]

CHASEline

M138

INSERTS

			
SHET1105_FN-P	SHET1105_FR-P		
			

Insert Number	Application	Corner	Grade	
			IN	15K
SHET110505FR-P	Ground/Polished	.020R	■	
SHET110508FR-P	Ground/Polished	.031R	■	
SHET110516FR-P	Ground/Polished	.062R	■	
SHET110524FN-P	Ground/Polished	.093R	■	
SHET110532FN-P	Ground/Polished	.125R	■	

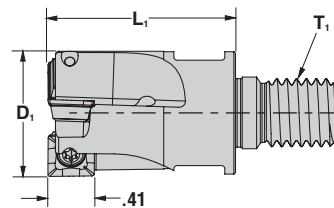
HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M480.



Coolant Thru



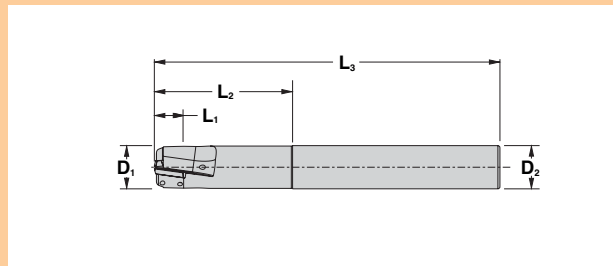
Cutting Edge Length based on .020"R



M140

M140

CHASEline

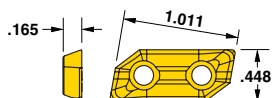


M142

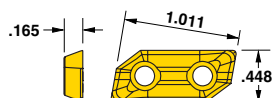
INSERTS



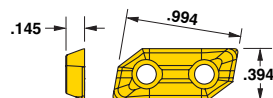
XEET2504_R-P



XEET2504_R-PW



XEET2504XR-P



Insert Number	Application	Corner	Grade	
			IN	15K
XEET250408R-P	Ground/Polished	.031R	■	
XEET250416R-P	Ground/Polished	.062R	■	
XEET250424R-P	Ground/Polished	.093R	■	
XEET250432R-P	Ground/Polished	.125R	■	
XEET250408R-PW	Wiper	.031R	■	
XEET25040XR-P*	Ground/Polished	.031R	■	

*1.00" diameter tool ONLY.

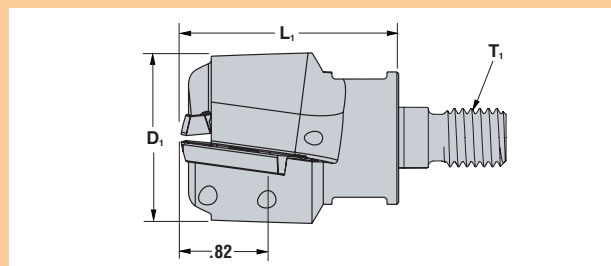
HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-070-00	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M480.



Coolant

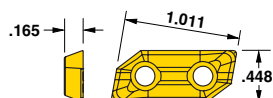


M144

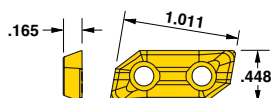
INSERTS



XEET2504_ _R-P



XEET2504_ _R-PW



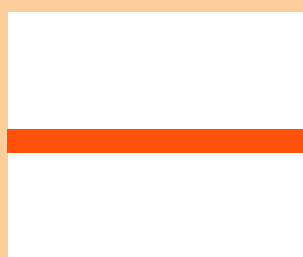
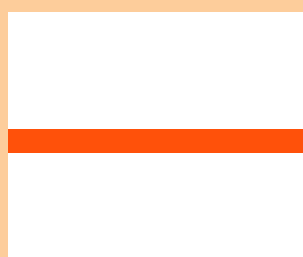
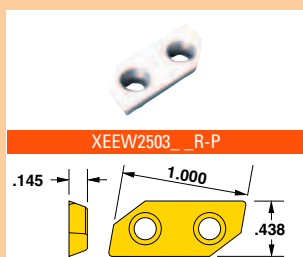
Insert Number	Application	Corner	Grade	
			IN	15K
XEET250408R-P	Ground/Polished	.031R	■	
XEET250416R-P	Ground/Polished	.062R	■	
XEET250424R-P	Ground/Polished	.093R	■	
XEET250432R-P	Ground/Polished	.125R	■	
XEET250408R-PW	Wiper	.031R	■	

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-070-00	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M480.

INSERTS



Insert Number	Application	Corner	Grade	
			IN	15K
XEEW250308R-P	Ground/Polished	.031R	■	
XEEW250332R-P	Ground/Polished	.125R	■	

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M480.



ROUGH AIR™

0° HIGH-SPEED ROUTER END MILL (ALUMINUM)

SERIES 15X1Z

Diameters
2.000"

Max. Depth of Cut
.99"

Insert Corner
.5mm, .031", .062", .125", 5mm,
and .250"R



Shoulder



Channeling



Ramping



Pocketing



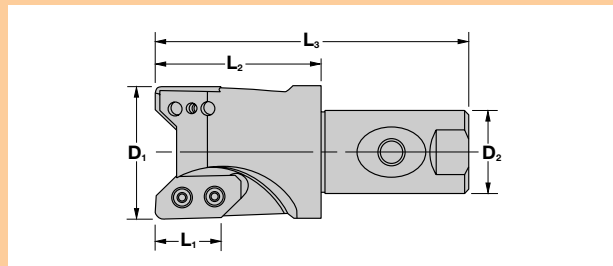
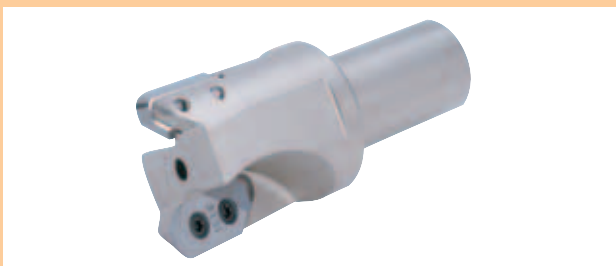
Corkscrew



Facing



Coolant



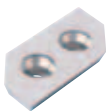
D ₁ Nominal Diameter	Cutter Number	L ₁ Max. Depth of Cut	L ₂ Extension Length	L ₃ Overall Length	D ₂ Shank Size/Style	Number of Inserts	Accepts Insert Radii	Ramp Angle Using XFEB3305
2.000	15X1Z-2002581R01	.99	2.50	4.75	1.250 Modified Weldon	2	.5mm-.125	15.0
2.000	15X1Z-2002581R02	.99	2.50	4.75	1.250 Modified Weldon	2	5mm-.250	15.0
2.000	15X1Z-20060S2R01	.99	6.00	9.75	2.000 Cylindrical	2	.5mm-.125	15.0
2.000	15X1Z-2005548R01	.99	5.50	9.50	50 V-Flange	2	5mm-.250	15.0



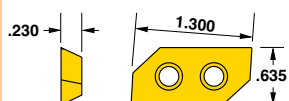
M148

CHASE*line*

INSERTS



XFEB3305_R-P



Insert Number	Application	Corner	Grade	
			IN	15K
XFEB330504R-P	Ground/Polished	.5mm (.020)R	■	
XFEB330508R-P	Ground/Polished	.031R	■	
XFEB330508R-PW	Wiper	.031R	■	
XFEB330516R-P	Ground/Polished	.062R	■	
XFEB330532R-P	Ground/Polished	.125R	■	
XFEB330550R-P	Ground/Polished	5mm (.197)R	■	
XFEB330550L-P	Ground/Polished	5mm (.197)R	■	
XFEB330564R-P	Ground/Polished	.250R	■	

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM50-100-10	40-45 in. lbs.	DS-T20T (Tx-20)	

For technical information, see page M480.

ROUGHAIR™ 0° INDEXABLE FINISHING END MILL SERIES 15J1H

Diameters
 .750" to 2.000"

Cutting Edge Length
 .95"

Insert Corner
 .015", .031", .062" and .125"R



Slabbing



Shoulder



Channeling



Ramping



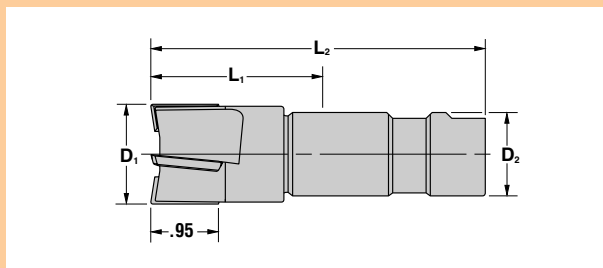
Pocketing



Corkscrew



Facing



D ₁ Nominal Diameter	Cutter Number	L ₁ Extension Length	L ₂ Overall Length	D ₂ Shank Size/Style	Number of Inserts
.750	15J1H-0702280R01	2.25	4.50	1.000 Weldon	1
1.000	15J1H-1002281R01	2.25	4.50	1.250 Weldon	1
1.250	15J1H-1202781R01	2.75	5.00	1.250 Weldon	2
1.500	15J1H-1502781R01	2.75	5.00	1.250 Weldon	3
2.000	15J1H-2002782R01	2.75	6.00	2.000 Weldon	3

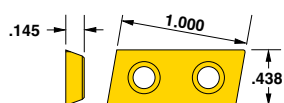
RAMP ANGLES

Diameter	Cutter Number	Ramp Angle°	Insert Used
.750	15J1H-0702280R01	12.9	BEHW250308R
1.000	15J1H-1002281R01	7.0	BEHW250308R
1.250	15J1H-1202781R01	4.9	BEHW250308R
1.500	15J1H-1502781R01	3.5	BEHW250308R
2.000	15J1H-2002782R01	2.3	BEHW250308R

INSERTS



BEHW2503__R



Workpiece Material	Insert Number	Application	Corner	Grades		
				IN	15K	1540
Steel & Stainless	BEHW250304R	Multi-Purpose	.015R			■
Steel & Stainless	BEHW250308R	Multi-Purpose	.031R			■
Steel & Stainless	BEHW250316R	Multi-Purpose	.062R			■
Steel & Stainless	BEHW250332R	Multi-Purpose	.125R			■
Aluminum	BEHW250304R-P	Ground/Polished	.015R		■	
Aluminum	BEHW250308R-P	Ground/Polished	.031R		■	
Aluminum	BEHW250316R-P	Ground/Polished	.062R		■	
Aluminum	BEHW250332R-P	Ground/Polished	.125R		■	

HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.750-1.000	SE06-028-00	25-30 in. lbs.	DS-T15T (Tx-15)
1.250-2.000	SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M475.

FAST•BREAK® RADIUS END MILL SERIES 15R1V

Diameters
.750" and 1.000"

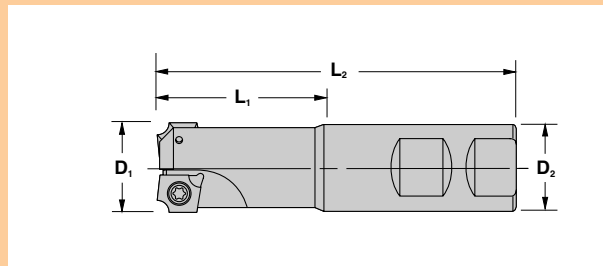
Insert Corner
.031", .062", .094" and .125"R (convex)



Corner Rounding



Coolant



D ₁ Nominal Diameter	Cutter Number	L ₁ Extension Length	L ₂ Overall Length	D ₂ Shank Style/Size	Number of Inserts	Accepts Insert Radius
.750	15R1V-0702084R01	2.00	4.25	.750 Weldon	1	.031-.125
1.000	15R1V-1002080R01	2.00	4.25	1.000 Weldon	2	.031-.125

1 Cutter, 8 Inserts and 1 Driver in a Pak.

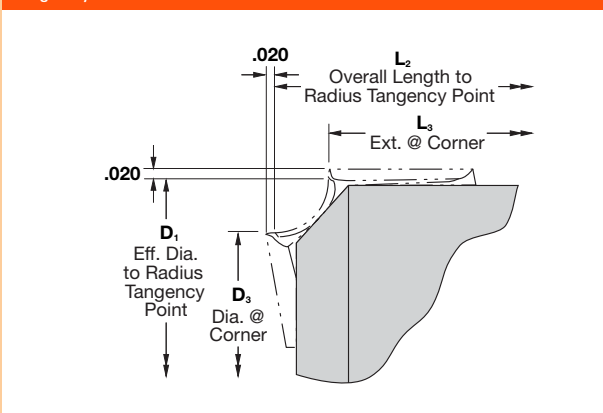
ORDER THIS Pak Number	D ₁ Nom. Dia.	End Mill Cutter Number	End Mill Insert Numbers (QTY)	*D ₃ Dia. @ Corner	*L ₃ Ext. @ Corner	L ₁ Ext. Length	L ₂ Overall Length	D ₂ Shank Style	No. of Inserts
15R1V-0702084K01	.750	15R1V-0702084R01	(2) BEEW120308R-CR (.031R)	.684	1.985	2.000	4.25	.750 Weldon	1
			(2) BEEW120316R-CR (.062R)	.623	1.950				
			(2) BEEW120325R-CR (.094R)	.552	1.910				
			(2) BEEW120332R-CR (.125R)	.495	1.875				
15R1V-1002080K01	1.000	15R1V-1002080R01	(2) BEEW120308R-CR (.031R)	.934	1.985	2.000	4.25	1.00 Weldon	2
			(2) BEEW120316R-CR (.062R)	.873	1.950				
			(2) BEEW120325R-CR (.094R)	.802	1.910				
			(2) BEEW120332R-CR (.125R)	.745	1.875				

*See Tangency chart below.

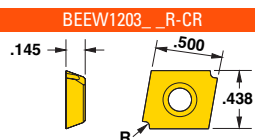
Fast•Break PAKS



Tangency



CHASEline



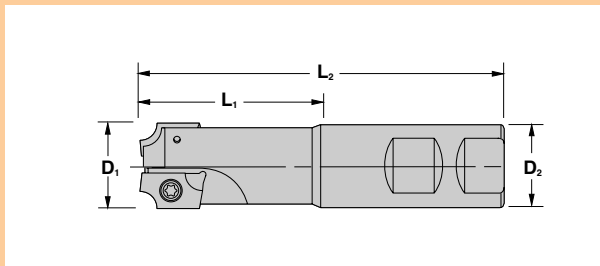
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SE06-028-00	25-30 in. lbs.	DS-T15T (Tx-15)

FAST•BREAK® RADIUS END MILL SERIES 15R4H

Diameters
1.000"

Insert Corner
.187" and .250"R (convex)

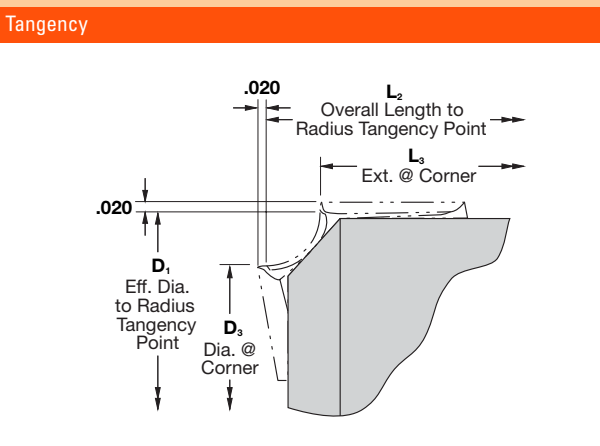


D ₁ Nominal Diameter	Cutter Number	L ₁ Extension Length	L ₂ Overall Length	D ₂ Shank Style/Size	Number of Inserts	Accepts Insert Radius
1.000	15R4H-1002080R01	2.00	4.25	1.000 Weldon	2	.187-.250

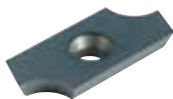
1 Cutter, 4 Inserts and 1 Driver in a Pak.

ORDER THIS Pak Number	D ₁ Nom. Dia.	End Mill Cutter Number	End Mill Insert Numbers (QTY)	*D ₃ Dia. @ Corner	*L ₃ Ext. @ Corner	L ₁ Ext. Length	L ₂ Overall Length	D ₂ Shank Style	No. of Inserts
15R4H-1002080K01	1.000	15R4H-1002080R01	(2) FEEW250348R-CR (.062R) (2) FEEW250364R-CR (.094R)	.644 .500	1.846 1.750	2.000	4.25	1.000 Weldon	2

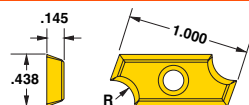
*See Tangency chart below.



INSERTS



FEEW2503__R-CR

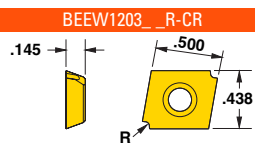


Insert Number	Convex Corner	Grade	
		IN	2030
FEEW250348R-CR	.187R		■
FEEW250364R-CR	.250R		■

HARDWARE

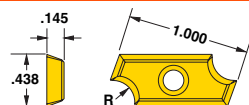
Insert Screw		Driver	
Part No.	Torque		Part No.
SE06-028-00	25-30 in. lbs.		DS-T15T (Tx-15)

For technical information, see page M478.

[illegible]

Insert Screw		Driver
Part No.	Torque	Part No.
SE06-028-00	25-30 in. lbs.	DS-T15T (Tx-15)

FEEW2503__R-CR



HARDWARE

M159

CHASEline



SOLID CARBIDE SERRATED ROUGHING TIP

SERIES 47C, 47D, 48C, 48D

(0° LEAD, 45° HELIX, CENTER CUTTING)

Diameters
.312" to .750"

Grade
IN2005

Corner
Chamfer & Radius



Shoulder



Channeling



Ramping



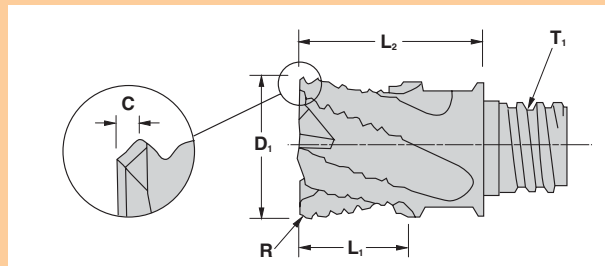
Corkscrew



Pocketing



Facing

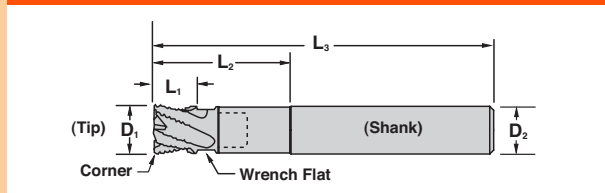


Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	C Corner
47C-3120TQRN01	4	.312	.20	T05	.39	.010 x 45
47C-3727T6RN01	4	.375	.27	T06	.50	.013 x 45
47D-3727T6RN03	4	.375	.27	T06	.50	.031
47C-5037T8RN01	4	.500	.37	T08	.65	.012 x 45
47D-5037T8RN03	4	.500	.37	T08	.65	.031
47D-5037T8RN06	4	.500	.37	T08	.65	.062
47C-6247TRRN01	5	.625	.47	T10	.80	.014 x 45
48C-7562TSRN01	6	.750	.62	T12	1.00	.016 x 45
48D-7562TSRN06	6	.750	.62	T12	1.00	.062

Chip•Surfer Paks



Tip and Shank



Order This Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Diameter	End Mill Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assm Length	Wrench
S050T08KA-06-02	(2) 47C-5037T8RN01	S050T08SA-06 (Steel)	.500	.012 x 45	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-02	(2) 47C-5037T8RN01	S050T08CA-25 (Carbide)	.500	.012 x 45	.500 Cyl	.37	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

Diameters
.312" to .750"

Grade
IN2005

Corner Chamfer & Radius



Shoulder



Channeling



Ramping



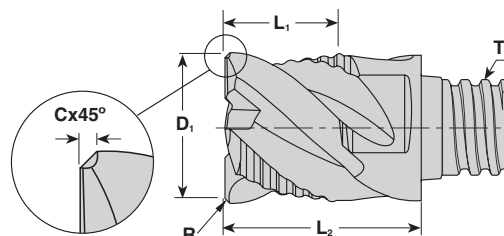
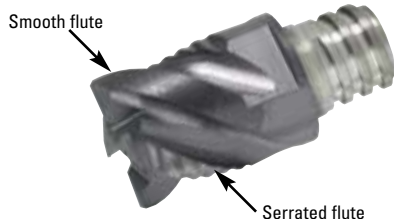
Corkscrew



Pocketing



Facing

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

M161

Diameters

Grade
IN2005

Corner
Sharp, .015", .031" and
.062"R



Shoulder



Channeling



Ramping



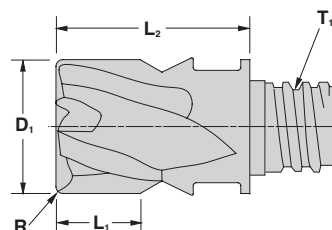
Corkscrew



Pocketing



Facing



Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
------------------	------	---------------------------------------	--	----------------------------------	---------------------------------------	-----------------------

3-FLUTE END MILL HEADS

46J-3120TQRD04	3	.312	.20	T05	.39	SHARP
46D-3120TQRD03	3	.312	.20	T05	.39	.031
46J-3727T6RD05	3	.375	.27	T06	.50	SHARP
46D-3727T6RD01	3	.375	.27	T06	.50	.015
46D-3727T6RD03	3	.375	.27	T06	.50	.031
46D-3727T6RD06	3	.375	.27	T06	.50	.062
46J-5037T8RD06	3	.500	.37	T08	.65	SHARP
46D-5037T8RD01	3	.500	.37	T08	.65	.015
46D-5037T8RD03	3	.500	.37	T08	.65	.031
46D-5037T8RD06	3	.500	.37	T08	.65	.062

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHIP SURFER™ SOLID CARBIDE CENTER CUTTING END MILL TIP SERIES 47J, 47D
(0° LEAD, 45° HELIX, HIGH PRECISION)

Diameters
.312" to .750"

Grade
IN2005, IN3005

Corner
Sharp, .015", .031" and
.062"R



Shoulder



Channeling



Ramping



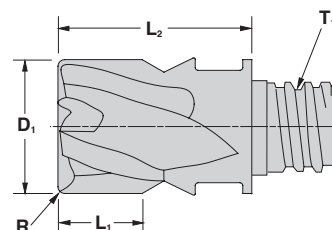
Corkscrew



Pocketing



Facing



Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
4-FLUTE END MILL HEADS						
47J-3120TQRD04	4	.312	.20	T05	.39	SHARP
47D-3120TQRD01	4	.312	.20	T05	.39	.015
47D-3120TQRD03	4	.312	.20	T05	.39	.031
47D-3120TQRD06	4	.312	.20	T05	.39	.062
47J-3727T6RD05	4	.375	.27	T06	.50	SHARP
47D-3727T6RD01	4	.375	.27	T06	.50	.015
47D-3727T6RD03*	4	.375	.27	T06	.50	.031
47D-3727T6RD06	4	.375	.27	T06	.50	.062
47J-5037T8RD06	4	.500	.37	T08	.65	SHARP
47D-5037T8RD01	4	.500	.37	T08	.65	.015
47D-5037T8RD03	4	.500	.37	T08	.65	.031
47D-5037T8RD06	4	.500	.37	T08	.65	.062
47J-6247TRRD08	4	.625	.47	T10	.80	SHARP
47D-6247TRRD03	4	.625	.47	T10	.80	.031
47D-7562TSRD03	4	.750	.62	T12	1.00	.031

* Also offered in Grade IN3005- diamond coated for milling graphite.

Order This Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Diameter	R End Mill Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assm Length	Wrench
S037T06KA-06-11	(2) 47D-3727T6RD03	S037T06SA-06 (Steel)	.375	.031	.375 Cyl	.27	1.00	3.50	WS-0029
S050T08KA-06-11	(2) 47D-5037T8RD03	S050T08SA-06 (Steel)	.500	.031	.500 Cyl	.37	1.18	4.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

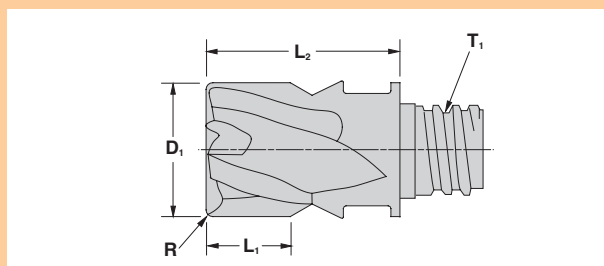
CHASEline

CHIP SURFER™ SOLID CARBIDE FINISHING END MILL TIP SERIES 48D, 48J, 49D, 49J
(0° LEAD, 45° HELIX, NOT CENTER CUTTING)

Diameters
.312" to .625"

Grade
IN2005

Corner
Sharp, .015", .031" and .062"R



Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
48J-3120TQRD04	6	.312	.20	T05	.39	SHARP
48D-3120TQRD03	6	.312	.20	T05	.39	.031
48J-3727T6RD05	6	.375	.27	T06	.50	SHARP
48D-3727T6RD01	6	.375	.27	T06	.50	.015
48D-3727T6RD03	6	.375	.27	T06	.50	.031
48D-3727T6RD06	6	.375	.27	T06	.50	.062
48J-5037T8RD06	6	.500	.37	T08	.65	SHARP
48D-5037T8RD01	6	.500	.37	T08	.65	.015
48D-5037T8RD03	6	.500	.37	T08	.65	.031
48D-5037T8RD06	6	.500	.37	T08	.65	.062
49J-6247TRRD08	8	.625	.47	T10	.80	SHARP
49D-6247TRRD03	8	.625	.47	T10	.80	.031
49D-6247TRRD06	8	.625	.47	T10	.80	.062
49D-7562TSRD03	10	.750	.62	T12	1.00	.031
49D-7562TSRD06	10	.750	.62	T12	1.00	.062

Wrench (Not included with carbide tip or shank purchase).

Size	Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

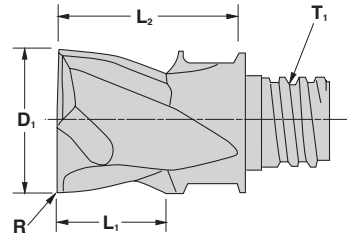
CHASEline

CHIP•SURFER™ 0° LEAD, 45° HELIX, POLISHED, SHARP, FOR ALUMINUM SERIES 45D, 45J, 46D, 46J
(CENTER CUTTING)

Diameters
.312" to .750"

Grade
IN05S

Corner
Sharp and .020"r

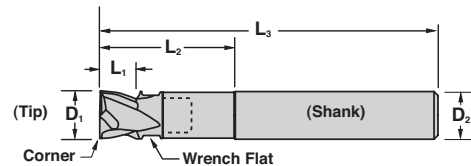


Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
46D-3120TQRD02-P	3	.312	.20	T05	.39	.020
45J-3727T6RD05-P	2	.375	.27	T06	.50	SHARP
45D-3727T6RD02-P	2	.375	.27	T06	.50	.020
46D-3727T6RD02-P	3	.375	.27	T06	.50	.020
45J-5037T8RD06-P	2	.500	.37	T08	.65	SHARP
45D-5037T8RD02-P	2	.500	.37	T08	.65	.020
46D-5037T8RD02-P	3	.500	.37	T08	.65	.020
46J-6239TRRD08-P	3	.625	.39	T10	.80	SHARP
46D-7550TSRD02-P	3	.750	.50	T12	1.00	.020

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-04	(2) 45J-3727T6RD05-P	S037T06SA-06 (Steel)	.375	Sharp	.375 Cylindrical	.27	.98	3.48	WS-0029
S050T08KA-06-04	(2) 45J-5037T8RD06-P	S050T08SA-06 (Steel)	.500	Sharp	.500 Cylindrical	.37	1.16	4.13	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-14	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

CHIP SURFER™ DRILL-MILL TIP SERIES 45D

Diameters
.375" to .625"

Grade
IN2005

Corner
.015"R



Drill



Std. Bottom



Shoulder



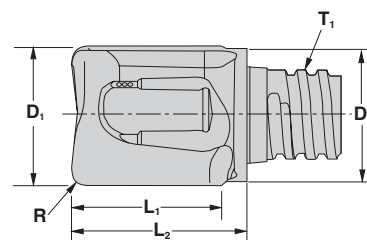
Pocketing



Ramping



Channeling



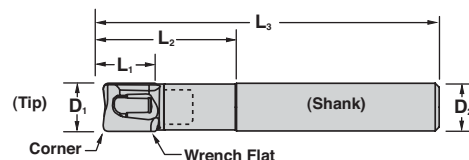
Cutter Number	Eff.	D ₁ Nominal Diameter	D ₂ Flange Diameter	T ₁ Thread Size	L ₁ Edge Length	L ₂ Extension Length	R Corner Radius
45D-3738T6RA01	2	.375	.35	T06	.38	.48	.015
45D-5045T8RA01	2	.500	.48	T08	.45	.60	.015
45D-6263T8RA01	2	.625	.60	T10	.60	.75	.015

*Drill depth not to exceed 2/3 edge length.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-D1	(2) 45D-3738T6RA01	S037T06SA-06 (Steel)	.375	.015	.375 Cylindrical	.38	.98	3.48	WS-0029
S050T08KA-06-D1	(2) 45D-5045T8RA01	S050T08SA-06 (Steel)	.500	.015	.500 Cylindrical	.45	1.13	4.10	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

FLAT BOTTOM PLUNGE CUTTER SERIES 45V

Diameters
 .375" - .625"
Grade
 IN2005
Corner
 .031"R



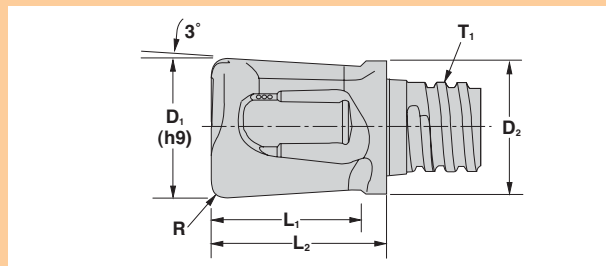
Drill



Flat Bottom



Plunge



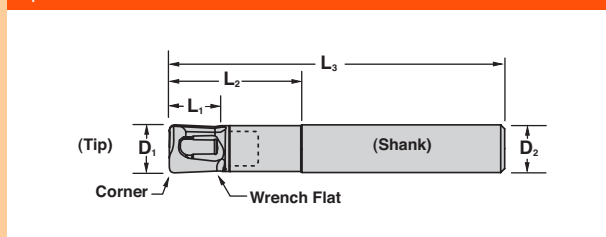
Cutter Number	Eff.	D ₁ Nominal Diameter	D ₂ Flange Diameter	T ₁ Thread Size	L ₃ Edge Length	L ₂ Extension Length	R Corner Radius
45V-3738T6RA03	2	.375	.35	T06	.38	.48	.031
45V-5045T8RA03	2	.500	.48	T08	.45	.60	.031
45V-6260T8RA03	2	.625	.60	T10	.60	.75	.031

*Drill depth not to exceed 2/3 edge length.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-P1	(2) 45V-3738T6RA03	S037T06SA-06 (Steel)	.375	.030	.375 Cylindrical	.38	.98	3.48	WS-0029
S050T08KA-06-P1	(2) 45V-5045T8RA03	S050T08SA-06 (Steel)	.500	.030	.500 Cylindrical	.45	1.13	4.10	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

SOLID CARBIDE ULTRA HIGH-FEED TIP SERIES 45A

Diameters
 .375" to .629"

Grade
 IN2005

Corner
 .080", .100" and .120"R



Contour



Channeling



Ramping



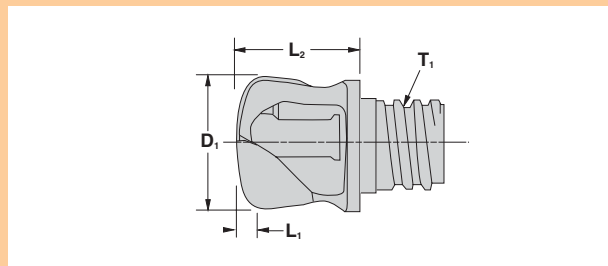
Corkscrew



Pocketing

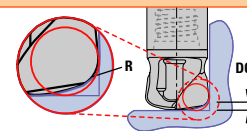


Facing



Cutter Number	D ₁ Nominal Diameter	Eff.	L ₁ Depth of Cut	T Thread Size	L ₂ Extension Length	R Corner Radius	Ramp Angle
45A-3703T6RA06	.375	2	.02	T06	.47	.080	10°
45A10001T6RA20	.394 (10mm)	2	.02	T06	.49	.080	10°
45A12001T8RA25	.472 (12mm)	2	.04	T08	.44	.100	10°
45A-5004T8RA08	.500	2	.04	T08	.49	.100	10°
45A16001TRRA30	.629 (16mm)	2	.04	T10	.80	.120	10°

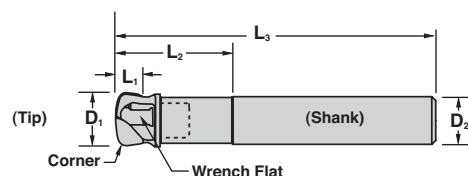
Program as though they are a square bottom end mill with noted corner radius.
 This method will ensure and minimize remaining stock for secondary passes.



Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Dia.	D ₂ End Mill Corner	L ₁ Shank Adaption	L ₂ Length of Cut	L ₃ Projection Length	Assem. Length	Wrench
S037T06KA-06-F2	(2) 45A-3703T6RA06	S037T06SA-06 (stl)	.375	.08	.375 Cyl	.02	.98	3.48	WS-0029
S037T06KA-20-F2	(2) 45A-3703T6RA06	S037T06CA-20 (carb)	.375	.08	.375 Cyl	.02	2.43	5.23	WS-0029
S050T08KA-06-F1	(2) 45A12001T8RA25	S050T08SA-061(stl)	.472 (12mm)	.10	.500 Cyl	.04	1.07	3.94	WS-0030
S050T08KA-25-F1	(2) 45A12001T8RA25	S050T08CA-251(carb)	.472 (12mm)	.10	.500 Cyl	.04	2.90	5.94	WS-0030
S050T08KA-06-F2	(2) 45A-5004T8RA08	S050T08SA-06 (stl)	.500	.10	.500 Cyl	.04	1.33	4.30	WS-0030
S050T08KA-25-F2	(2) 45A-5004T8RA08	S050T08CA-25 (carb)	.500	.10	.500 Cyl	.04	3.25	6.30	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

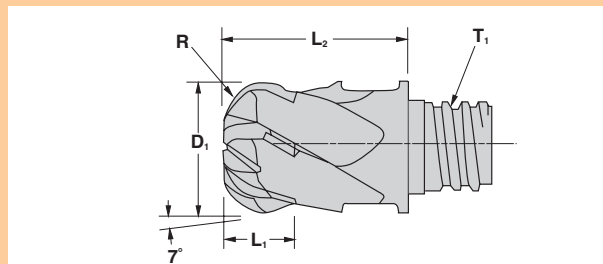
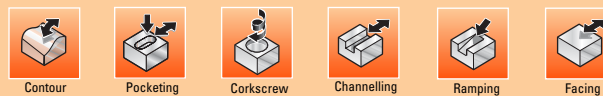
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M483.



SOLID CARBIDE BACKDRAFT TOROIDAL TIP SERIES 48U

Diameters .375" to .500"	Grades IN2005, IN3005	Corner .031", .062" and .125"R
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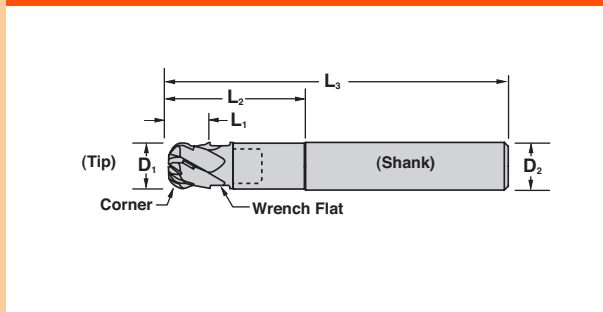
Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius	Ramp Angle
*48U-3719T6RB03	6	.375	.19	T06	.50	.031	9°
48U-3719T6RB06	6	.375	.19	T06	.50	.062	9°
48U-5027T8RB03	6	.500	.27	T08	.65	.031	9°
48U-5027T8RB06	6	.500	.27	T08	.65	.062	9°
48U-5027T8RB12	6	.500	.27	T08	.65	.125	9°

*Also offered in grade IN3005- diamond coated for milling graphite.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) Chamfer/Spotter Tip	Straight Shank	D ₁ Dia.	Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-B1	(2) 48U-3719T6RB06	S037T06SA-06 (stl)	.375	.06	.375 Cyl	.19	1.00	3.50	WS-0029
S037T06KA-20-B1	(2) 48U-3719T6RB06	S037T06CA-20 (car)	.375	.06	.375 Cyl	.19	2.95	5.25	WS-0029
S050T08KA-06-B1	(2) 48U-5027T8RB06	S050T08SA-06 (stl)	.500	.06	.500 Cyl	.27	1.18	4.15	WS-0030
S050T08KA-25-B1	(2) 48U-5027T8RB06	S050T08CA-25 (car)	.500	.06	.500 Cyl	.27	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

CHIP SURFER™ BALL NOSE TIP SERIES 45B

Diameters
.312" to .625"

Grade
IN2005

Corner
.156", .187", .250" and .312"R



Contouring



Pocketing



Corkscrew



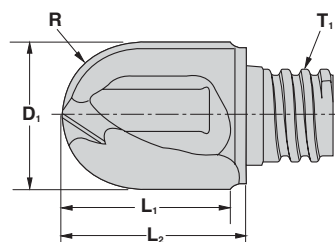
Channelling



Ramping



Plunging

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-04	60
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

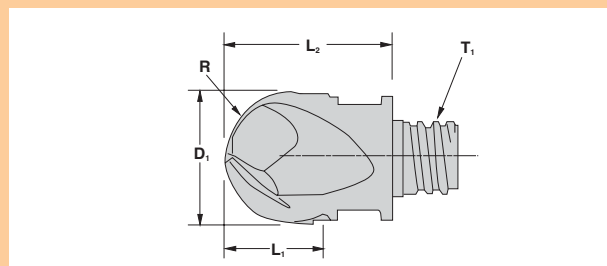
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

HIGH PRECISION HELICAL BALL NOSE TIP SERIES 45B, 47B

Diameters .312" to .625"	Grade IN2005, IN3005	Corner .156", .187", .250", .312" and .374"R
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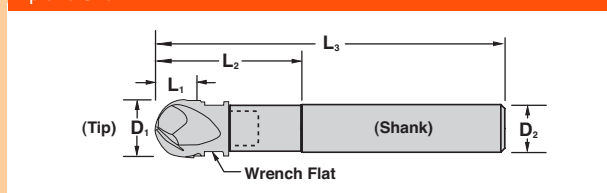
Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius	Tolerance
45B-3120TQRB03	2	.312	.20	T05	.39	.156	.0004
47B-3120TQRB03	4	.312	.20	T05	.39	.156	.0004
45B-3727T6RB05	2	.375	.27	T06	.51	.187	.0004
47B-3727T6RB05*	4	.375	.27	T06	.51	.187	.0004
45B-5037T8RB06	2	.500	.37	T08	.65	.250	.0004
47B-5037T8RB06	4	.500	.37	T08	.65	.250	.0004
45B-6235TRRB08	2	.625	.35	T10	.80	.312	.0004
47B-6247TRRB08	4	.625	.47	T10	.80	.312	.0004
45B-7550TSRB10	2	.750	.50	T12	1.00	.374	.0004
47B-7562TSRB10	4	.750	.62	T12	1.00	.374	.0004

*Also offered in grade IN3005- diamond coated for milling graphite.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) Ball Nose Tip	Straight Shank	D ₁ Ball Nose Dia.	Ball Nose Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-05	(2) 47B-3727T6RB05	S037T06SA-06 (Steel)	.375	.187	.375 Cyl	.27	1.00	3.50	WS-0029
S037T06KA-20-05	(2) 47B-3727T6RB05	S037T06CA-20 (Carbide)	.375	.187	.375 Cyl	.27	2.45	5.25	WS-0029
S050T08KA-06-05	(2) 47B-5037T8RB06	S050T08SA-06 (Steel)	.500	.250	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-05	(2) 47B-5037T8RB06	S050T08CA-25 (Carbide)	.500	.250	.500 Cyl	.37	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

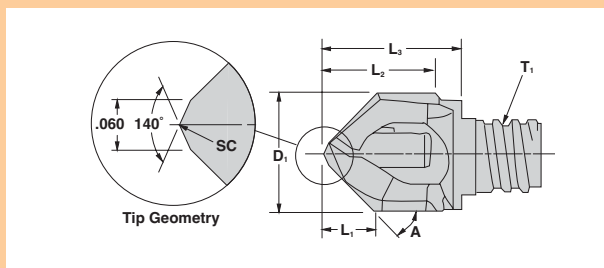
CHASEline

CHAMFER AND SPOTTING TIP SERIES 45N, 45M, 45P

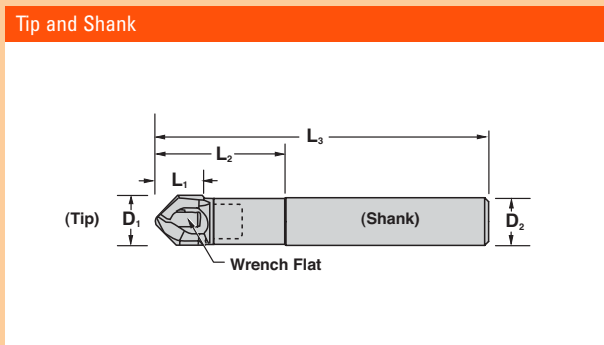
Diameter
 .390" and .625"

Grades
 IN2005

Nominal Chamfer Angle
 30°, 45°, 60° and 72°



Cutter Number	A Nominal Chamfer Angle	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Depth	L ₃ Extension Length
45N10009T6RA45	45°	2	.390	.18	T06	.35	.50
45N10009T6RA72	72°	2	.390	.06	T06	.35	.50
45N16015TRRA45	45°	2	.625	.29	T10	.59	.75
45M10009T6RA30	30°	2	.390	.26	T06	.37	.50
45P10009T6RA60	60°	2	.390	.10	T06	.39	.50



ORDER THIS Pak Number	(QTY) Chamfer/Spotter Tip	Straight Shank	D ₁ Dia.	Included Angle	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-07	(2) 45N10009T6RA45	S037T06SA-06 (Steel)	.400	90°	.375 Cylindrical	.46	.96	3.50	WS-0029

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

Diameters

Grade
IN2005

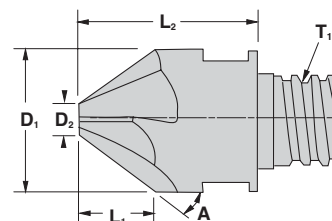
Nominal Chamfer Angle
45°



Chamfering



Counter-Sink

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T08	WS-0044	DT-130-10	130
T12	WS-0059	DT-250-16	250

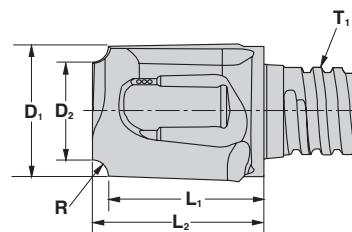
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHIP SURFER™

SOLID CARBIDE CORNER ROUNDING

SERIES 45R



Wrench (Not included with carbide tip or shank purchase).

When assembling, be sure carbide tip is seated firmly on shank with no gap.

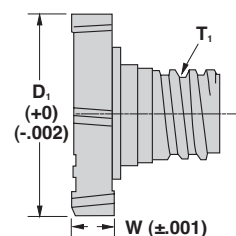
For technical information, see page M482.

 PRECISION T-SLOT MILLING TIP SERIES 18T

Diameters
.056" to .375"

Grade
IN1030

Corner
.015"R and .006" x 45° chamfer

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Torx Driver	Torx Driver Part No.	Optional Torque Bit / Hex Drive
1	DS-T20T	DS-T20B / .250"
2	DS-T25T	DS-T25B / .250"
3	DS-T30T	DS-T30B / .250"
4	DS-T40T	DS-T40B / .250"
5	DS-T50L	DS-T50B / .312"

For technical information, see page M482.

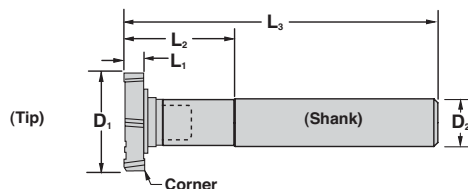
CHASE*line*

PAKS FOR PRECISION T-SLOT MILLING TIP SERIES 18T

Chip-Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) T-Slot Tip	Straight Shank	D ₁ T-Slot Dia.	T-Slot Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-08	(2) 18T-6208T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.078	.70	3.10	DS-T20T
S037T06KA-06-18	(2) 18T-6212T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.125	.75	3.15	DS-T20T
S037T06KA-06-28	(2) 18T-6216T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.156	.80	3.19	DS-T20T
S050T08KA-06-38	(2) 18T-7519T8RN01	S050T08SA-06 (Steel)	.750	.015	.500 Cylindrical	.187	.85	3.72	DS-T30T
S050T08KA-06-48	(2) 18T-7525T8RN01	S050T08SA-06 (Steel)	.750	.015	.500 Cylindrical	.250	.91	3.78	DS-T30T

PAKS FOR SNAP RING GROOVES SERIES 18T

Contents

4 Different Tips, 1 Shank, 1 Wrench



Slotting

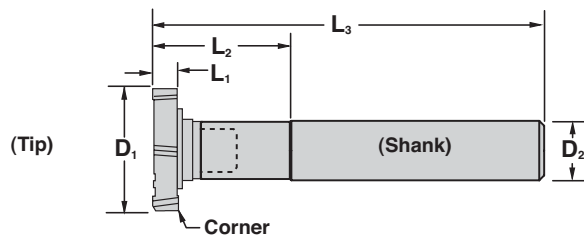


T-Slotting

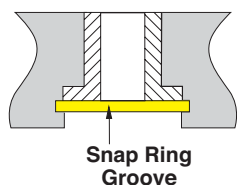


T-Slot Pak

(6 Flutes) Multi-Purpose, PVD - TiAlN-Coated IN1030



Order This Pak Number	Shank	(Qty) T-Slot Tips	L ₁ Width of Cut	D ₁ Nominal Diameter	L ₂ Projection Length	L ₃ Assm Length	Corner	D ₂ Shank Adaption	Wrench
S037T06KA-12-98	S037T06CA-12(Carbide)	(1) 18T-6205T6RN02	.056	.625	1.45	4.190	.015R	.375 Cyl	DS-T20T
		(1) 18T-6206T6RN02	.068						
		(1) 18T-6208T6RN02	.086						
		(1) 18T-6212T6RN01	.125						



Snap Ring
Groove



Internal Snap Ring

For technical information, see page M482.

CHASEline

 FRONT/BACK CHAMFER, V-FORM TIP SERIES 18T

Diameter
.625"

Grade
IN1030

Corner
.062" x 45° Chamfer



Chamfering



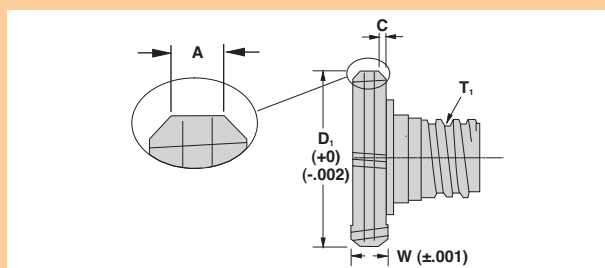
Slotting



T-Slotting



Counter-Sink

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	DS-T20T	DS-T20B	90

When assembling, be sure carbide tip is seated firmly on shank with no gap.

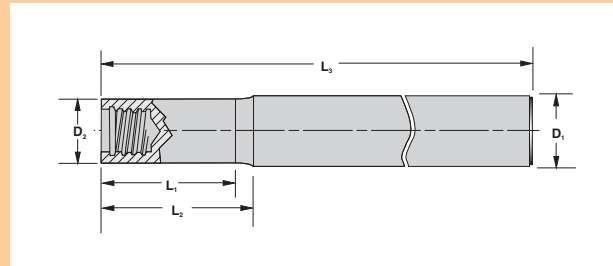
For technical information, see page M482.

CHASEline

NECKED DOWN STRAIGHT SHANKS

Thread Connections
T05, T06, T08, T10 and T12

Shank Materials
Steel or Carbide



T ₁ Thread Size	Part Number	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length	D ₁ Shank Diameter	D ₂ Mating Diameter
----------------------------------	----------------	--	---------------------------------------	-------------------------------------	-------------------------------------	--------------------------------------

STEEL SHANKS

T05	S031T05SA-05	.51	.59	2.50	.312	.300
T06	S037T06SA-06	.50	.60	3.00	.375	.364
T08	S050T08SA-06	.53	.63	3.50	.500	.480
T08	*S050T08SA-061	.53	.63	3.50	.500	.455
T10	S075T10SA-00	-	.13	2.75	.750	.750
T10	S062T10SA-06	.68	.78	4.00	.625	.600
T12	S075T12SA-08	.88	1.00	5.00	.750	.720
T12	WB100T12SA-00	-	.24	3.00	1.000	.720

CARBIDE SHANKS

T05	S031T05CA-09	.95	1.00	3.00	.312	.300
T05	S031T05CA-19	1.95	2.00	4.00	.312	.300
T06	S037T06CA-12	1.20	1.25	4.00	.375	.364
T06	S037T06CA-20	1.95	2.00	4.75	.375	.364
T08	S050T08CA-15	1.45	1.50	4.00	.500	.480
T08	*S050T08CA-151	1.45	1.50	4.00	.500	.455
T08	S050T08CA-25	2.45	2.50	5.50	.500	.480
T08	*S050T08CA-251	2.45	2.50	5.50	.500	.455
T10	S062T10CA-34	3.43	3.50	5.50	.625	.600
T10	S062T10CA-49	4.93	5.00	7.00	.625	.600
T12	S075T12CA-14	1.43	1.50	4.00	.750	.720
T12	S075T12CA-29	2.93	3.00	5.50	.750	.720
T12	S075T12CA-44	4.43	4.50	8.00	.750	.720

*Necked down shanks for 12mm tips.

M179





Thread Connections

T05, T06, T08, T10 and T12

Shank Materials

Carbide and Steel



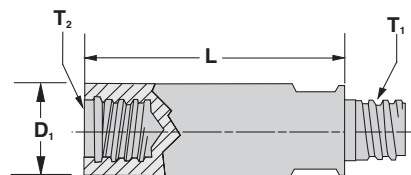
Due to tolerance, Shank Diameter will be slightly larger than tip diameter.

[illegible]

 EXTENSIONS

Extension Length
1.000" to 1.500"

Thread Size
T05, T06, T08, T10 and T12

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

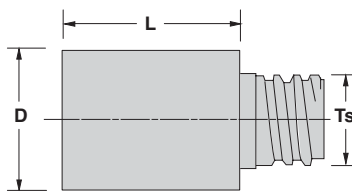
M182

CHASE*line*

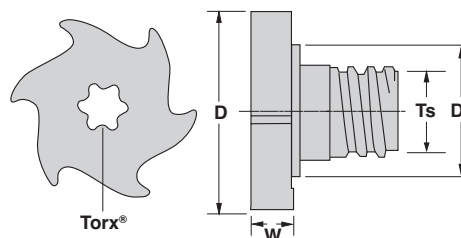
CHIP SURFER™ BLANKS

Diameters
.315" to .787"

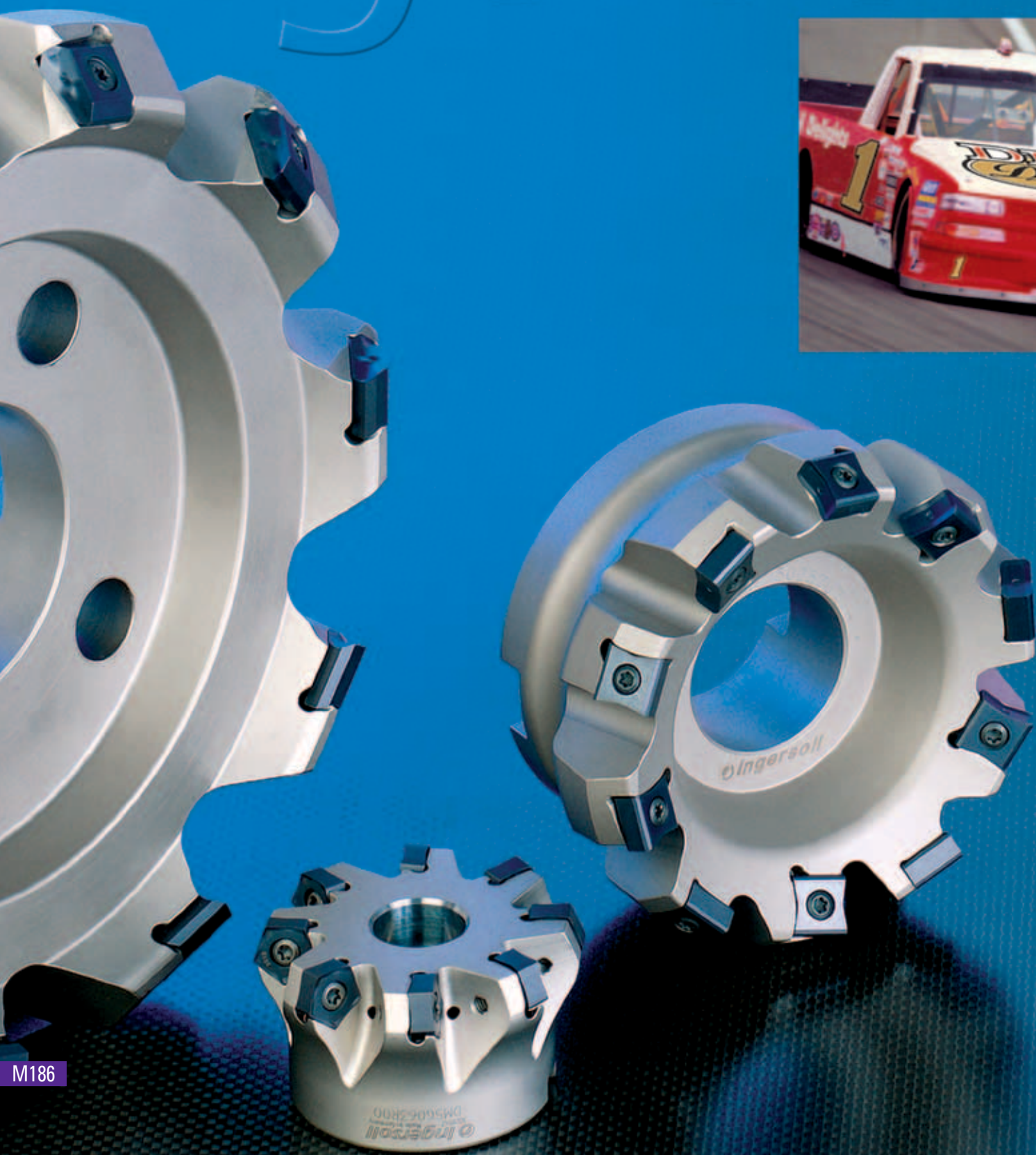
T05, T06, T08, T10 and T12

[illegible]

Thread Size
T05, T06, T08 and T10

[illegible]

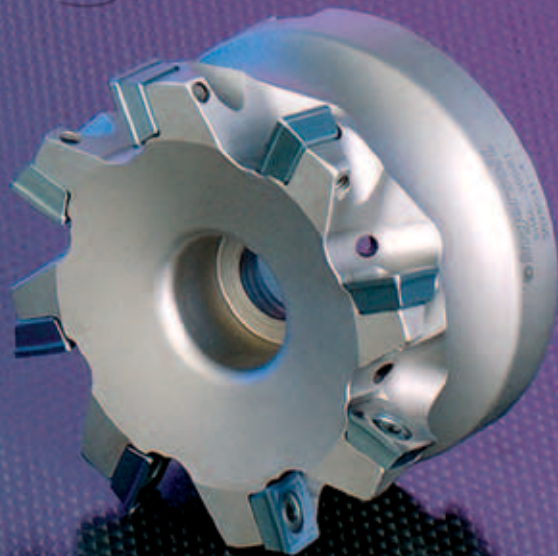
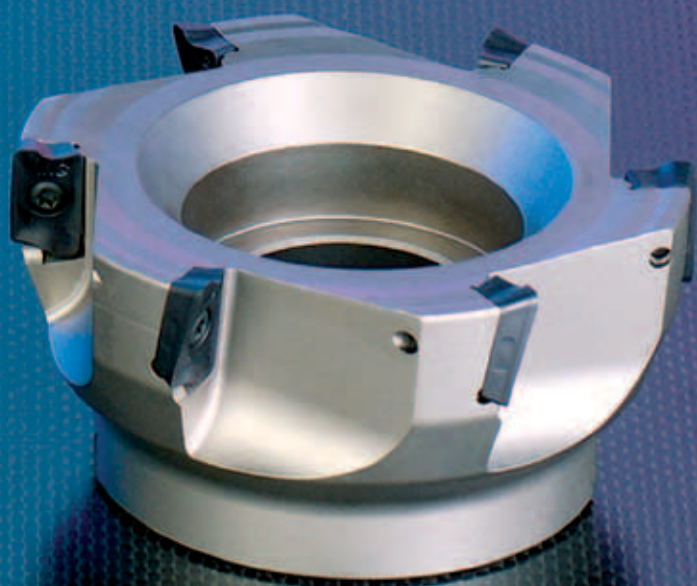
Ingersoll



CUTTING TOOLS
CUTTING TOOLS

FACE MILLS

Cutting Tools



Member IMC Group
 **Ingersoll**
Cutting Tools

M187

FACE MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	3.000-12.000	.68	 Face Mill	SJ6N	M194
	2.000-8.000	.46	 Face Mill	SJ6H	M196
	2.000-8.000	.36	 Face Mill	SJ5E	M198
	1.500-2.500	.28	 Face Mill	SJ5V	M200
	1.500-2.500	.28	 Face Mill	SJ6V	M202
	6.000-12.000	.50	 Face Mill	SN2R	M204
	3.000-12.000	.35	 Face Mill	SN6N	M206
	2.500-12.000	.18	 Face Mill	VM6V	M208
	2.500-12.000	.20	 Face Mill	VL6V	M210
	2.000-12.000	.23-.46	 Face Mill	VK6V	M212

CUTTING TOOLS

	Diameter Range	Cutting Length	Description	Series	Page
	2.000-12.000	.25-.46	V-MAX Face Mill	VK6V	M214
	2.000-12.000	.23-.46	V-MAX Face Mill	VK5V	M216
	2.000-4.000	.47	HI-POSQUAD 0° Face Mill	5J1H	M218
	1.500-4.000	.31	HI-POSQUAD 0° Face Mill	5J1E	M220
	2.000-6.000	.43	CHASEQUAD 0° Face Mill	5J2H	M222
	1.500	.22	HI-POS 0° Face Mill	2J1D	M224
	1.500-4.000	.43	HI-POS+ 0° Face Mill	2J1F	M226
	1.500-4.000	.50	HI-POS+ 0° Face Mill	2J1X	M228
	3.000	.21	HI-POS+ 15° Face Mill	2L1X	M228
	1.500-4.000	.47	HI-POS 0° Face Mill	2J1Q	M230

FACE MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	2.500	.21	Hi-POS 15° Face Mill	2L1Q	M230
	2.000-8.000	.63	Hi-POS+ 0° Face Mill	2J1G	M232
	2.000-8.000	.68	Hi-POS+ 0° Face Mill	2J1E, 2J4E	M232
	2.500-4.000	.31	Hi-POS+ 15° Face Mill	2L1E	M234
	2.000-8.000	.60	Hi-POS 0° Face Mill	2J1B, 2J4B	M236
	2.500-8.000	.27	Hi-POS 15° Face Mill	2L1B	M236
	2.000-6.000	.41	ALUMINATOR Face Mill	5H6G	M238
	2.000-6.000	.15-.24	IRON-EATER 0° SiNi Face Mill	5J2H	M240
	1.500-6.000	.23	Hi-POSDEKA 20° Lead Angle Face Mill	DM6G, DM5G	M242
	2.000-4.000	.13	CHASE-OCTO 45° Lead Face Mill	5N6H	M244

	Diameter Range	Cutting Length	Description	Series	Page
	2.12-5.62	.16	CHASE OCTO 45° Face Mill	5N6K	M246
	2.500-8.000	.19	CHASE OCTO 43° Lead Angle Face Mill	5N2L	M248
	3.000-8.000	.41	POWER QUAD+ 45° Face Mill	5N6R	M250
	2.000-8.000	.26	CHASE QUAD 45° Lead Angle Face Mill	5N2H	M252
	1.250-2.500	.18	MULTI-CUT 45° Face Mill	5N6F	M254
	2.500-10.000	.25	FLEXLOK Face Mill	6X1V, 6X2V	M256
	2.500-10.000	.25	FLEXLOK Face Mill	6X3V, 6X4V	M258
	3.000-8.000	.01	MAX Face Mill	SF6H, SF6N	M260
	2.000-6.000	.82	ROUGH-AIR Router Face Mill	5X6X	M262
	2.500-10.000	.99	ROUGH-AIR Aluminum Router Face Mill	5X6Z	M264

FACE MILLS

	Diameter Range	Cutting Length	Description	Series	Page
	2.000-10.000	.60	POWER-MAX Hi-Density Positive Face Mill	6K8B	M266
	4.000-12.500	Varies	Cartridge Face Mill	4W2A	M268

CUTTING TOOLS

FACE MILLS

	Diameter Range	Cutting Length	Description	Series	Page



FACE MILLS

 0° LEAD HEAVY DEPTH FACE MILL SERIES SJ6N

Diameters
3.000" to 12.000"

Cutting Edge Length
.68" (4RH)

Insert Corner
.031", .062", .093" and .125"R



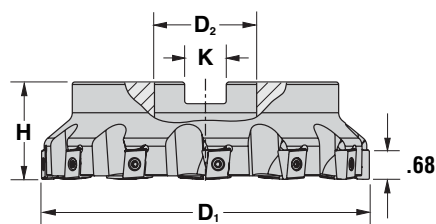
Facing



Shoulder



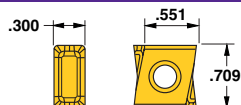
Channeling

[illegible]

INSERTS



DPM434R



Insert Number	Application	Corner	Cut Edge Configuration	Grades						
				IN	05S	1530	2005	2015	2040	6515
DPM434R001	Multi-Purpose	.031R	4RH			■	■	■	■	
DPM434R002	Multi-Purpose	.062R	4RH			■	■	■	■	■
DPM434R003	Multi-Purpose	.093R	4RH			■				
DPM434R004	Multi-Purpose	.125R	4RH			■				
DPM434R001-P	Ground/Polished (for Alum.)	.031R	4RH		■					

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM50-160-10	35-40 in. lbs.	DS-T20T (TX-20)

For technical information, see page M493.

MAXline

 0° LEAD LOW DENSITY FACE MILL SERIES SJ6H

Diameters
2.000" to 8.000"

Cutting Edge Length
.46" (4RH)

Insert Corner
.031" and .063"R



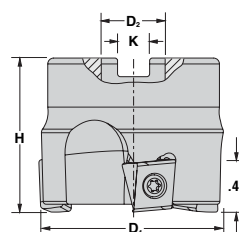
Facing



Shoulder



Channeling

[illegible]

MAX 0° LEAD HI-DENSITY FACE MILL SERIES SJ5E

Diameters
2.000" to 8.000"

Cutting Edge Length
.36" (4RH)

Insert Corner
.031"R



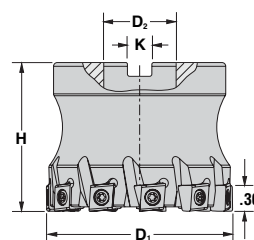
Facing



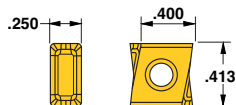
Shoulder



Channeling

[illegible]

DPM314R001

[illegible]

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (TX-15)



Diameters

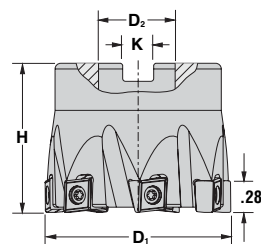
1.500" to 2.500"

Max. Depth of Cut

.28"

Insert Corner

.020"R

[illegible]



Diameters

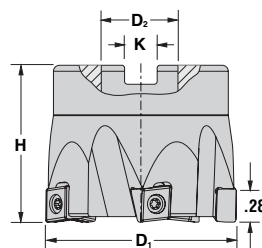
1.500" to 2.500"

Max. Depth of Cut

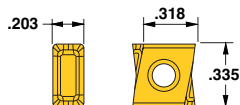
.28"

Insert Corner

.020"R

[illegible]

DFM213R001



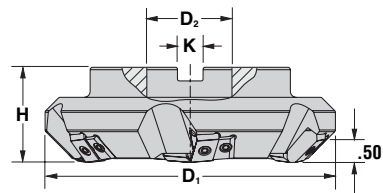
Grades

IN	2005	2030
----	------	------

Insert Screw		Driver
Part No.	Torque	Part No.
SM30-082-00	13-18 in. lbs.	DS-T09S (Tx-09)



Insert Corner
.150" x 45° chamfer

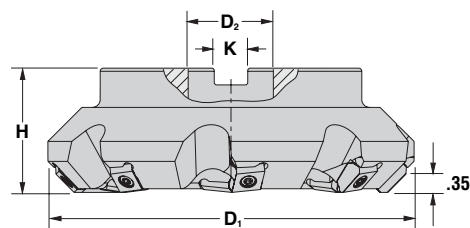
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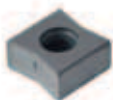
Insert Corner
.125" x 45° chamfer



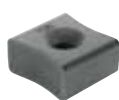
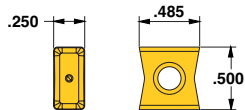
Lead Angle

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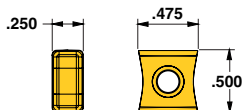
INSERTS



NNE324R107



NCE324R107



Insert Number	Application	Corner	Cut Edge Configuration	Grades						
				IN	2005	2015	2030	2040	6515	70N
NNE324R107	Multi-Purpose	.031R	8 indexes	■	■	■	■	■		
NCE324R107	Multi-Purpose	.031R	8 indexes							■

Will also accept NNE324-100, NNE432-102 but surface finish will be affected.

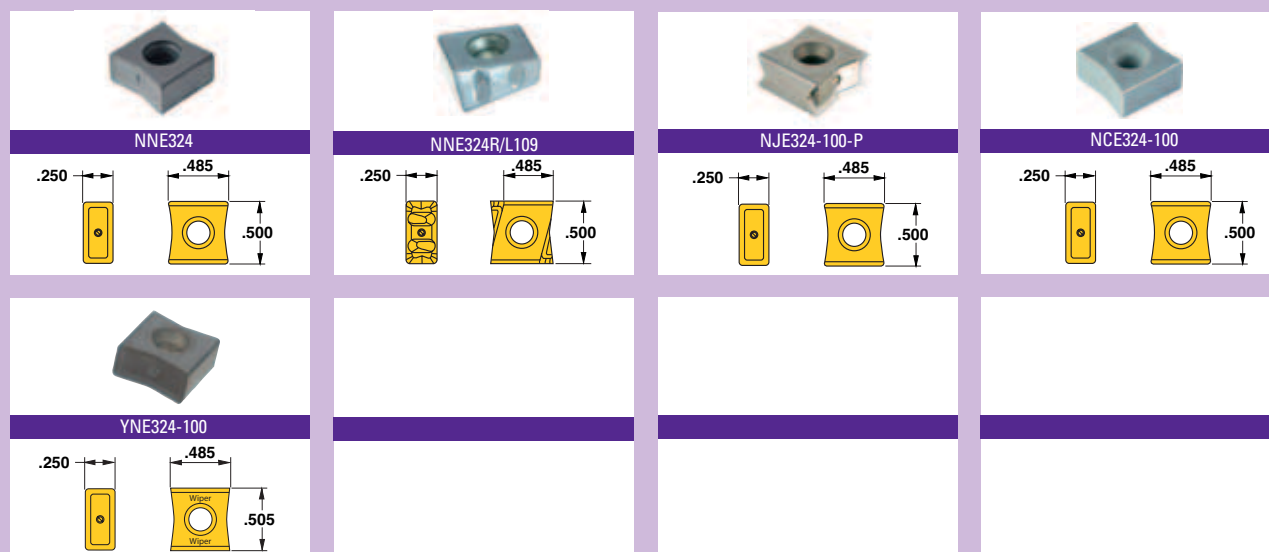
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M495.

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INSERTS



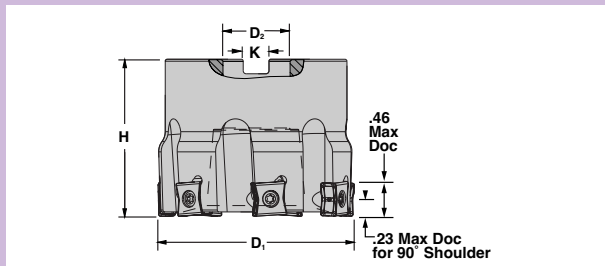
Insert Number	Application	Corner	Cut Edge Configuration	Grades									
				IN	2005	2010	2030	2015	2040	1530	6515	15K	70N
NNE324-100	Multi-Purpose	.031R	4RH/4LH				■	■	■	■	■		
NNE324-102	Multi-Purpose	.063R	4RH/4LH				■	■	■	■	■		
NNE324-104	Multi-Purpose	.031 x 45°	4RH/4LH			■		■				■	
NNE324-125	Multi-Purpose	.125R	4RH/4LH				■						
YNE324-100	Wiper	.031R	2RH/2LH				■	■	■			■	
NNE324R109	Multi-Purpose	.031R	4RH	■	■	■	■	■	■			■	
NNE324L109	Multi-Purpose	.031R	4LH	■		■	■	■	■			■	
NJE324-100-P	Ground/Polished (for Alum.)	.031R	4RH/4LH										■
NCE324-100	SiN for Cast Iron	.031R	4RH/4LH										■

HARDWARE

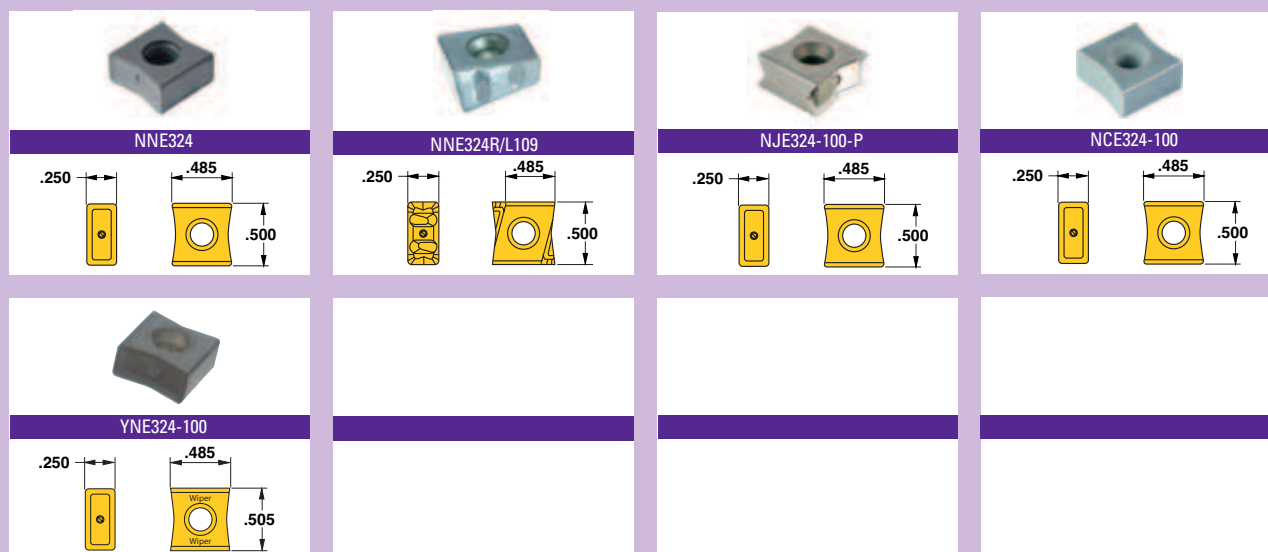
Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M495.

MAXline



INSERTS



Insert Number	Application	Corner	Cut Edge Configuration	Grades									
				IN	2005	2010	2030	2015	2040	1530	6515	15K	70N
NNE324-100	Multi-Purpose	.031R	4RH/4LH		■		■	■	■	■	■		
NNE324-102	Multi-Purpose	.063R	4RH/4LH				■	■	■	■	■		
NNE324-104	Multi-Purpose	.031 x 45°	4RH/4LH			■		■				■	
NNE324-125	Multi-Purpose	.125R	4RH/4LH				■						
YNE324-100	Wiper	.031R	2RH/2LH				■	■	■			■	
NNE324R109	Multi-Purpose	.031R	4RH		■	■	■	■	■			■	
NNE324L109	Multi-Purpose	.031R	4LH		■		■	■	■			■	
NJE324-100-P	Ground/Polished (for Alum.)	.031R	4RH/4LH										■
NCE324-100	SiN for Cast Iron	.031R	4RH/4LH										■

HARDWARE

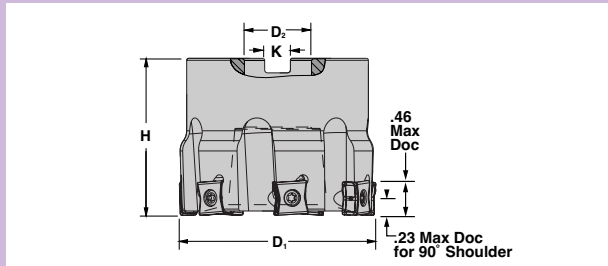
Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M495.

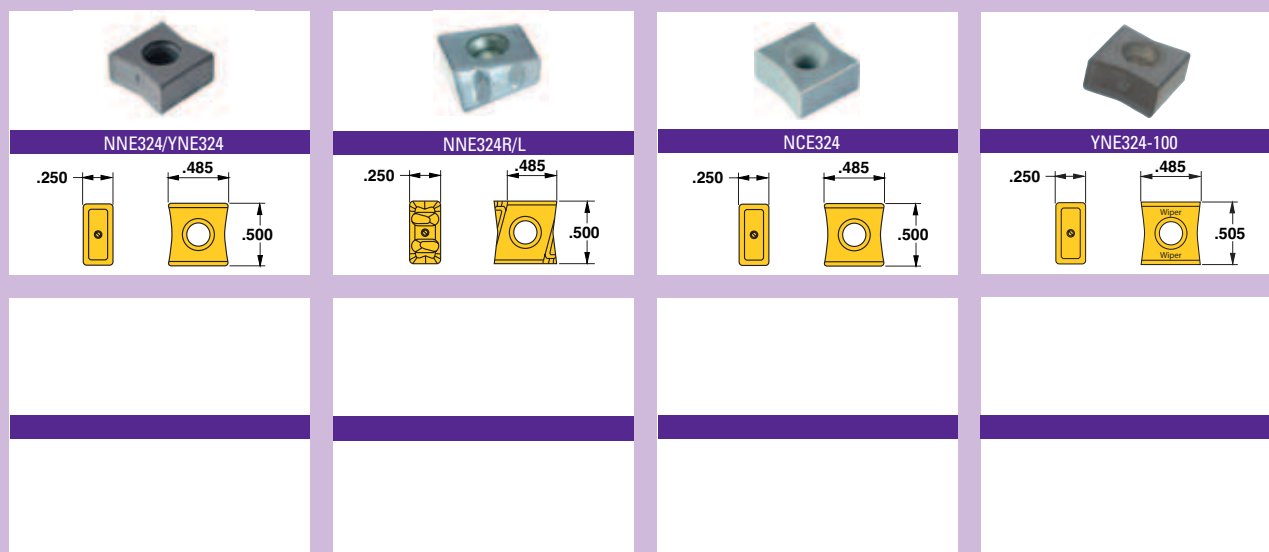
MAXline

 0° HI-DENSITY FACE MILL SERIES VK5V

Diameters	Cutting Edge Length	Insert Corner
2.000" to 12.000"	.46"	.031", .063", .125"R and
	.23" (4RH/4LH)	.031" x 45° chamfer

[illegible]

INSERTS



Insert Number	Application	Corner	Cut Edge Configuration	Grades								
				IN	2005	2010	2030	2015	2040	1530	6515	70N
NNE324-100	Multi-Purpose	.031R	4RH/4LH		■		■	■	■	■	■	
NNE324-102	Multi-Purpose	.063R	4RH/4LH				■	■	■			■
NNE324-104	Multi-Purpose	.031 x 45°	4RH/4LH			■		■				
NNE324-125	Multi-Purpose	.125R	4RH/4LH				■					
YNE324-100	Wiper	.031R	2RH/2LH				■	■	■			■
NNE324R109	Multi-Purpose	.031R	4RH	■	■	■	■	■	■			■
NNE324L109	Multi-Purpose	.031R	4LH	■	■	■	■	■	■			■
NCE324-100	SiN for Cast Iron	.031R	4RH/4LH									■

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

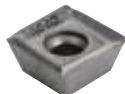
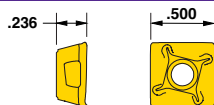
For technical information, see page M495.

MAXline

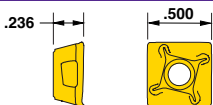
INSERTS



SDMT120608R



SDMT120608FR



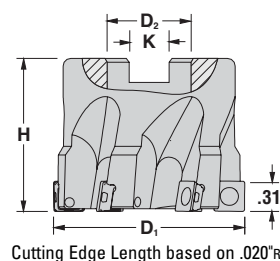
Insert Number	Geometry	Application	Corner	Grades				
				IN	2005	1030	5015	2030
SDMT120608R	Positive/Positive	Multi-Purpose	.031R	■	■	■		
SDMT120608FR	HiPos	HiTemp/Titanium	.031R	■				■

HARDWARE

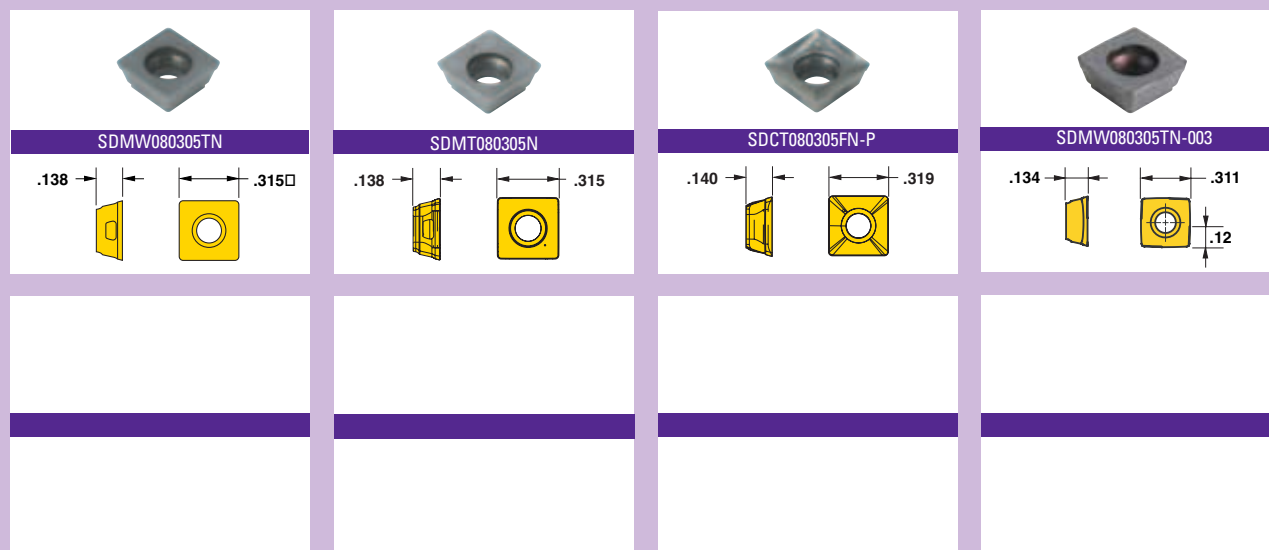
Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M489.

11

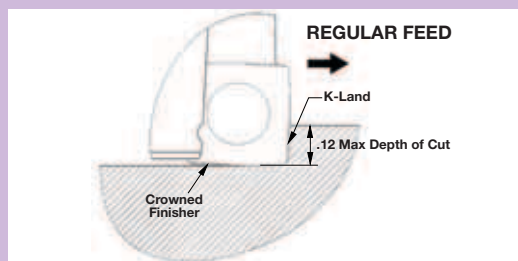
[illegible]

INSERTS



Insert Number	Application	Corner	Grades					
			IN	30M	2005	2030	2015	2040 1030
SDMT080305N	Multi-Purpose	.020R			■	■	■	■
SDMW080305TN	Heavy-Duty	.020R			■	■	■	■
SDCT080305FN-P	Ground/Polished (for Alum.)	.020R		■				
SDMT080308N	Multi-Purpose	.031R						■
SDMW080308TN	Heavy-Duty	.031R						■
SDMT080316N	Multi-Purpose	.062R						■
SDMW080316TN	Heavy-Duty	.062R						■
SDMW080305TN-003*	Wiper	.020R			■		■	

*For creating better face finishes on ferrous materials by placing this insert in all stations. To obtain 4 indexes, a depth of cut below .12" is required.



HARDWARE

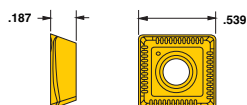
Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)	

For technical information, see page M487.

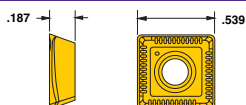
INSERTS



SEMT1304PETR-M



SEHT130408FR-P



Insert Number	Geometry	Application	Corner	Grades					
				TT	9030	8020	7030	6030	K10
SEMT1304PETR-M	Pos/Pos	Multi-Purpose	.031R		■	■	■	■	
SEHT130408FR-P	Pos/Pos	Ground/Polished (for Alum.)	.031R						■

HARDWARE

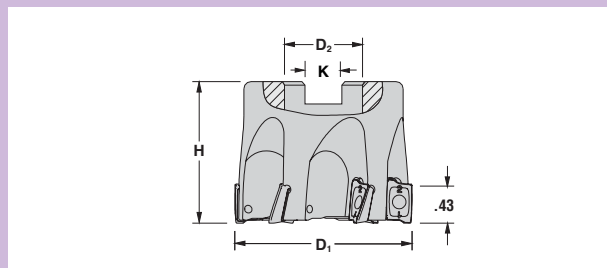
Seat/Shim		Seat/Shim Screw	
New Part No.	Old Part No.	New Part No.	Old Part No.
SJ-0030	TSD12T3N	SM60-093-S0	TS6040093S

Insert Screw		Wrench	
New Part No.	Old Part No.	Torque	Part No.
SM40-120-20	TS401201	30-35 in. lbs.	DS-T15T (T-T15)

For technical information, see page M489.



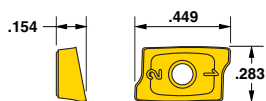
Insert Corner
.008", .015", .031" and .062"R

[illegible]

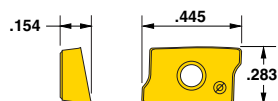
INSERTS



AOMT1103



AOCT1103



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Multi-Purpose	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished	.015R		■					
AOMT110308R	Multi-Purpose	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished	.031R		■					
AOMT110316R	Multi-Purpose	.062R			■	■	■	■	■
AOMT110332R	Multi-Purpose	.125R*			■	■	■	■	■

*Cutter body must be relieved to accept .125R insert.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)

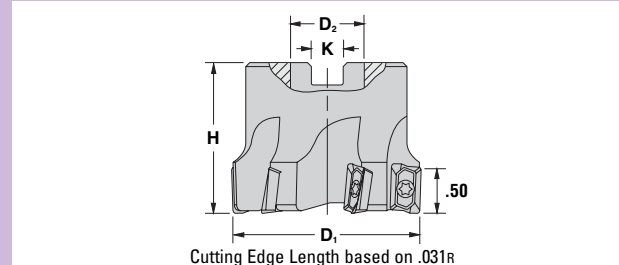
For technical information, see page M487.

0° FACE MILL SERIES 2J1X

Diameters
1.500" to 4.000"

Cutting Edge Length
.50"

Insert Corner
.031", .062" and .125"R



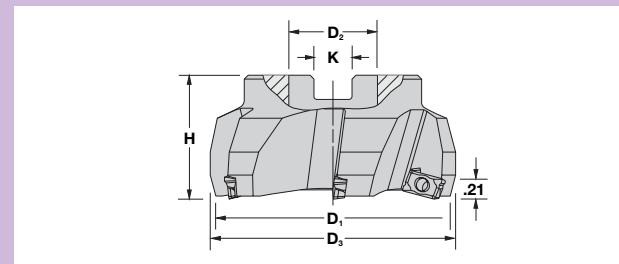
D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Retention Bolt	K Keyway
1.500	2J1X-15R01	4	1.570	.500	SD-04-85	.25
2.000	2J1X-20R01	3	1.570	.750	SD-06-46	.31
2.000	2J1X-20R02	6	1.570	.750	SD-06-46	.31
2.500	2J1X-25R01	5	1.570	.750	SD-06-46	.31
3.000	2J1X-30R01	8	1.750	1.000	SD-08-47	.38
4.000	2J1X-40R01	10	2.000	1.500	-	.62

15° FACE MILL SERIES 2L1X uses unused insert edges from 2J1X, 12J1X, 22J7X, 22J3X and 12V1X cutters.

Diameters
3.000"

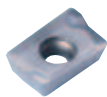
Cutting Edge Length
.21"

Insert Corner
.018"R

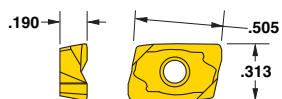


D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	D ₃ Overall Diameter	Retention Bolt	K Keyway
3.000	2L1X-30R01	5	1.750	1.00	2.65	SD-08-47	.38

INSERTS



AOMT1204_R



Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408R	Multi-Purpose	.031R	■	■	■	■	■	■	
AOMT120408FR	Hi-Temp/Titanium	.031R	■	■					
AOMT120416R	Multi-Purpose	.062R	■	■	■	■	■		
AOMT120432R	Multi-Purpose	.125R	■	■	■	■	■		
AOMT120408FR-HS	UpSharp	.031R	■	■	■	■	■		■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)	

For technical information, see page M487.

HI-POS™ 0° FACE MILL SERIES 2J1Q

Diameters
1.500" to 4.000"

Cutting Edge Length
.47"

Insert Corner
.015", .031", .062", .093",
.125" and .250"R



Facing



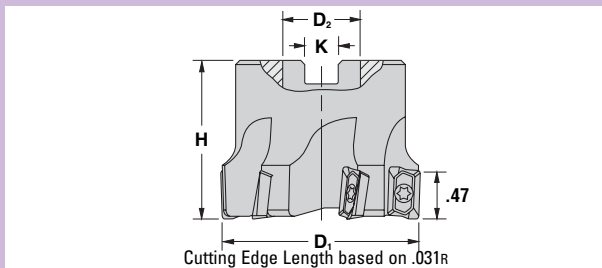
Shoulder



Channeling



Pocketing



D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Retention Bolt	K Keyway
1.500	2J1Q-15R01	4	1.570	.500	SD-04-85	.25
1.500	2J1Q-15R02	3	1.570	.500	SD-04-85	.25
2.000	2J1Q-20R01	3	1.570	.750	SD-06-46	.31
2.000	2J1Q-20R02	6	1.570	.750	SD-06-46	.31
2.500	2J1Q-25R01	5	1.570	.750	SD-06-46	.31
3.000	2J1Q-30R01	5	1.750	1.000	SD-08-47	.38
3.000	2J1Q-30R02	8	1.750	1.000	SD-08-47	.38
4.000	2J1Q-40R01	5	2.000	1.500	-	.62
4.000	2J1Q-40R02	10	2.000	1.500	-	.62

HI-POS™ 15° FACE MILL SERIES 2L1Q uses unused insert edges from 2J1Q, 12J1Q, 12M1Q, 12N1Q, 12P1Q, 22J3Q, 22J7Q cutters.

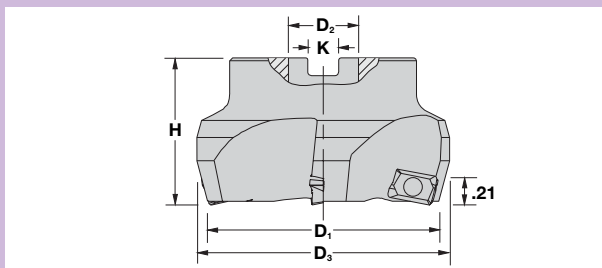
Diameter
2.500"

Cutting Edge Length
.21"

Insert Corner
.018"R



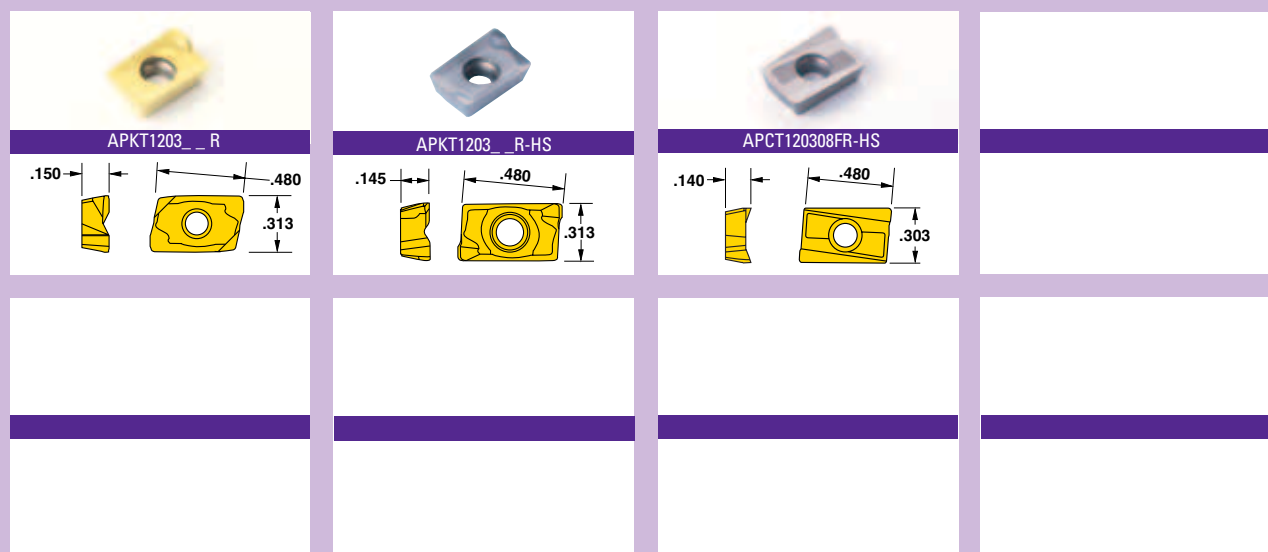
Facing



D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	D ₃ Overall Diameter	Retention Bolt	K Keyway
2.500	2L1Q-25R01	5	1.570	.750	2.70	SD-06-46	.31



INSERTS



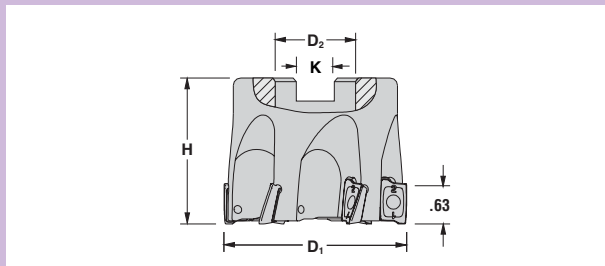
Insert Number	Application	Corner	Grades								
			IN	30M	40P	2005	2030	2015	2040	1030	5015
APKT120308R	Multi-Purpose	.031R			■	■	■	■	■	■	
APKT120308R-HS	Hi-Temp/Titanium	.031R			■					■	
APKT120304R-HS	Hi-Temp/Titanium	.015R			■					■	
APCT120308FR-HS	Ground/Polished (for Alum.)	.031R			■						
APKT120316R	Multi-Purpose	.062R				■	■	■	■	■	
APKT120324R	Multi-Purpose	.093R				■					
APKT120332R	Multi-Purpose	.125R		■	■	■	■		■	■	
APKT120364R	Multi-Purpose	.250R				■				■	

HARDWARE

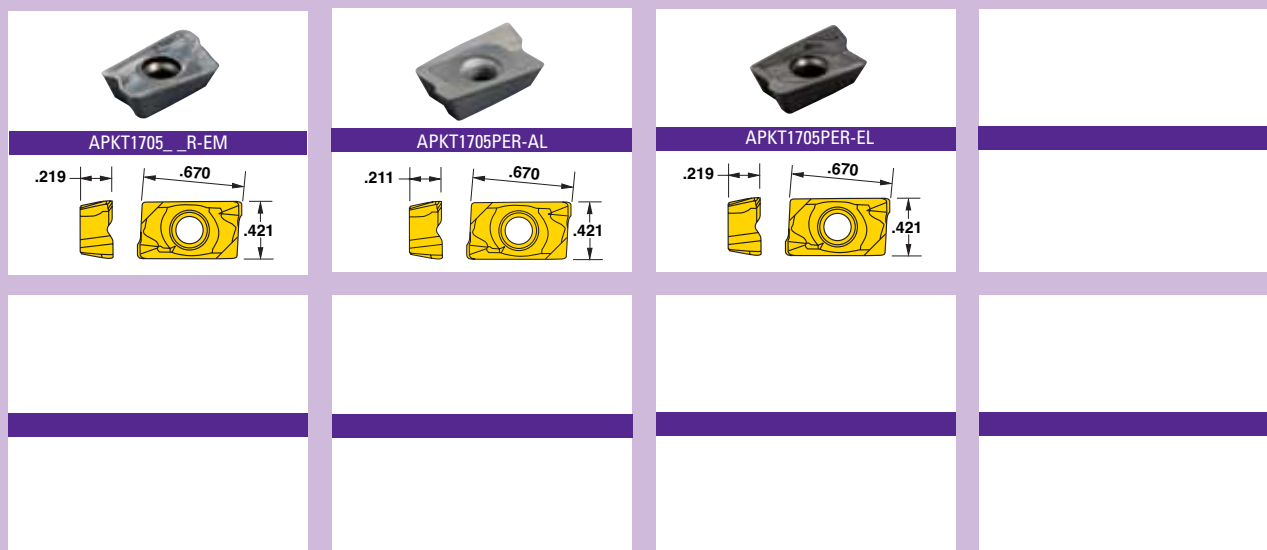
Insert Screw		Driver
Part No.	Torque	Part No.
SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)

For technical information, see page M486.

Pocketing



INSERTS



Insert Number	Application	Corner	Grades						
			TT	9030	8030	6030	7030	8020	K10
			IN	2005	2030	2010	2040	1030	10K
APKT170504R-EM	Multi-Purpose	.015R						■	■
APKT1705PER-EM	Multi-Purpose	.031R		■	■	■	■	■	■
APKT170516R-EM	Multi-Purpose	.062R		■		■	■	■	■
APKT170524R-EM	Multi-Purpose	.093R		■			■	■	■
APKT170532R-EM	Multi-Purpose	.125R		■			■	■	■
APKT170548R-EM	Multi-Purpose	.187R		■				■	■
APKT170564R-EM	Multi-Purpose	.250R				■	■	■	■
APKT1705PER-AL	Multi-Purpose	.031R							■
APKT1705PER-EL	Multi-Purpose	.031R		■				■	

*Cutter body must be relieved to accept .093"R insert and larger.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M487.

0° FACE MILL SERIES 2J1E, 2J4E

Diameters
2.000" to 8.000"

Cutting Edge Length
.68"

Insert Corner
.031", .062", .093", .125"
and 250"R



Facing



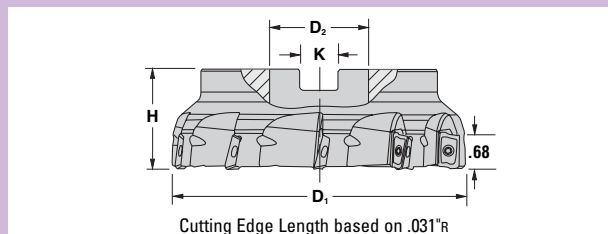
Shoulder



Channeling



Pocketing



D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Retention Bolt	Bolt Circle	Accepts Insert Radius	K Keyway
2.000	2J1E-20R01	3	1.570	.750	SD-06-46	-	.015"-.125"	.31
2.000	2J1E-20R02	5	1.570	.750	SD-06-46	-	.015"-.125"	.31
2.500	2J1E-25R01	4	1.570	.750	SD-06-46	-	.015"-.125"	.31
2.500	2J1E-25R02	6	1.570	.750	SD-06-46	-	.015"-.125"	.31
3.000	2J1E-30R03	4	1.750	1.000	SD-08-47	-	.015"-.125"	.38
3.000	2J1E-30R01	5	1.750	1.000	SD-08-47	-	.015"-.125"	.38
3.000	2J1E-30R02	7	1.750	1.000	SD-08-47	-	.015"-.125"	.38
4.000	2J1E-40R01	6	2.000	1.500	-	-	.015"-.125"	.62
4.000	2J1E-40R02	8	2.000	1.500	-	-	.015"-.125"	.62
5.000	2J1E-50R01	7	2.000	1.500	-	-	.015"-.125"	.62
5.000	2J1E-50R02	9	2.000	1.500	-	-	.015"-.125"	.62
6.000	2J1E-60R01	8	2.000	2.000	-	-	.015"-.125"	.75
6.000	2J1E-60R02	10	2.000	2.000	-	-	.015"-.125"	.75
8.000	2J1E-80R01	10	2.480	2.500		4.00	.015"-.125"	1.00
8.000	2J1E-80R02	12	2.480	2.500		4.00	.015"-.125"	1.00
2.000	2J4E-20R02	5	1.570	.750	SD-06-46	-	.187"-.250"	.31
3.000	2J4E-30R02	7	1.750	1.000	SD-08-47	-	.187"-.250"	.38
4.000	2J4E-40R02	8	2.000	1.500	-	-	.187"-.250"	.62

15° FACE MILL SERIES 2L1E uses unused insert edges from 2J1E, 2J4E, 12J1E, 12J4E, 22J3E cutters.

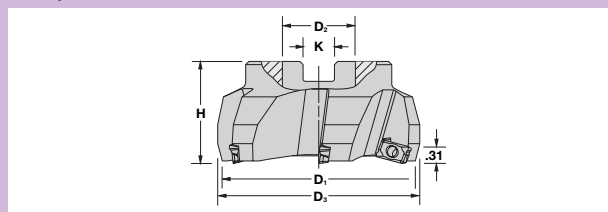
Diameters
2.500" and 4.000"

Cutting Edge Length
.31"

Insert Corner
.027"R



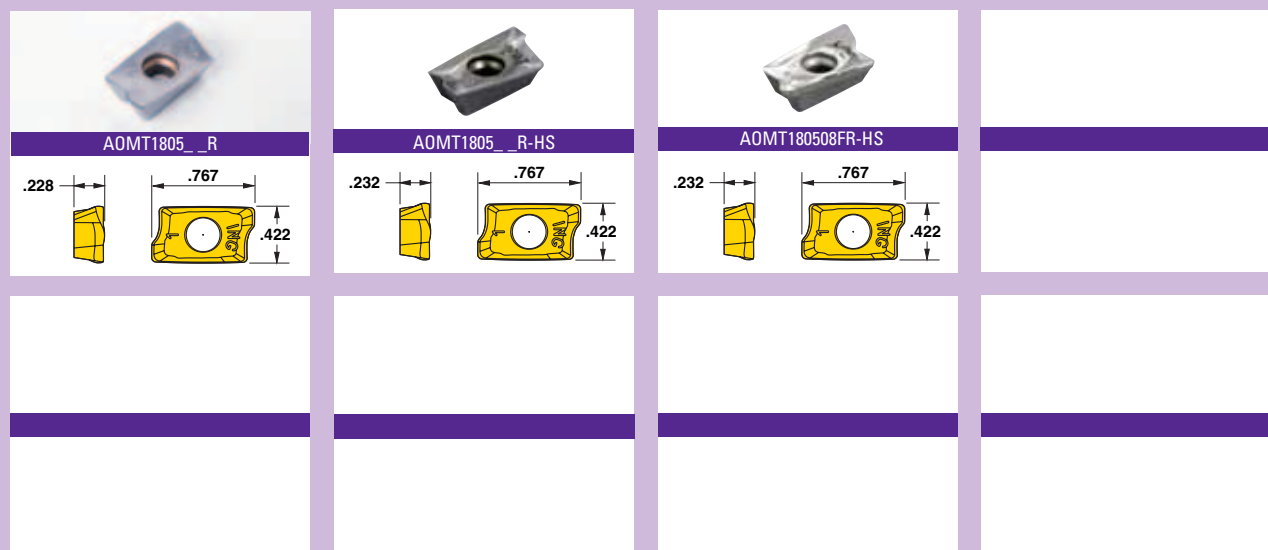
Facing



D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	D ₃ Overall Diameter	Retention Bolt	K Keyway
2.500	2L1E-25R01	4	1.570	.750	2.70	SD-06-46	.31
4.000	2L1E-40R01	6	2.000	1.500	4.20	-	.62

CHASEline

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R			■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■
AOMT180548R	Multi-Purpose	.187R			■				
AOMT180564R	Multi-Purpose	.250R			■			■	■
AOMT180508L	Multi-Purpose	.031R							■

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

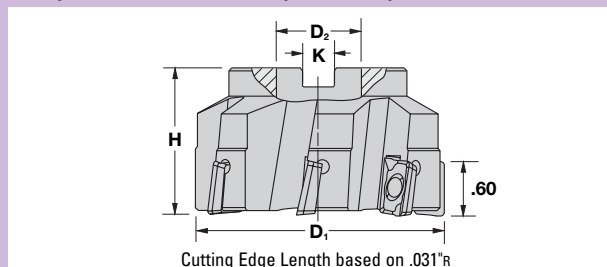
For technical information, see page M486.

0° FACE MILL SERIES 2J1B, 2J4B

Diameters
2.000" to 8.000"

Cutting Edge Length
.60"

Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R



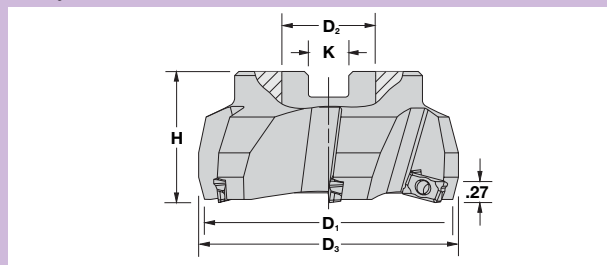
D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Bolt Circle	Retention Bolt	Accepts Insert Radius	K Keyway
2.000	2J1B-20R01	5	1.570	.750	-	SD-06-46	.015"-.125"	.31
2.000	2J1B-20R02	3	1.570	.750	-	SD-06-46	.015"-.125"	.31
2.500	2J1B-25R01	6	1.570	.750	-	SD-06-46	.015"-.125"	.31
3.000	2J1B-30R01	7	1.750	1.000	-	SD-08-47	.015"-.125"	.38
3.000	2J1B-30R02	4	1.750	1.000	-	SD-08-47	.015"-.125"	.38
4.000	2J1B-40R01	8	2.000	1.500	-	-	.015"-.125"	.62
4.000	2J1B-40R02	6	2.000	1.500	-	-	.015"-.125"	.62
5.000	2J1B-50R01	9	2.000	1.500	-	-	.015"-.125"	.62
6.000	2J1B-60R01	10	2.000	2.000	-	-	.015"-.125"	.75
6.000	2J1B-60R02	8	2.000	2.000	-	-	.015"-.125"	.75
6.000	2J1B-60R03	8	2.000	1.500	-	-	.015"-.125"	.62
8.000	2J1B-80R01	12	2.480	2.500	4.00	-	.015"-.125"	1.00
2.000	2J4B-20R01	5	1.570	.750	-	SD-06-46	.187"-.250"	.31
3.000	2J4B-30R01	7	1.750	1.000	-	SD-08-47	.187"-.250"	.38
4.000	2J4B-40R01	8	2.000	1.500	-	-	.187"-.250"	.62

15° FACE MILL SERIES 2L1B uses unused insert edges from 2J1B, 2J4B, 12J1B, 12J4B, 12N1B, 22J5B cutters.

Diameters
2.500" to 8.000"

Cutting Edge Length
.27"

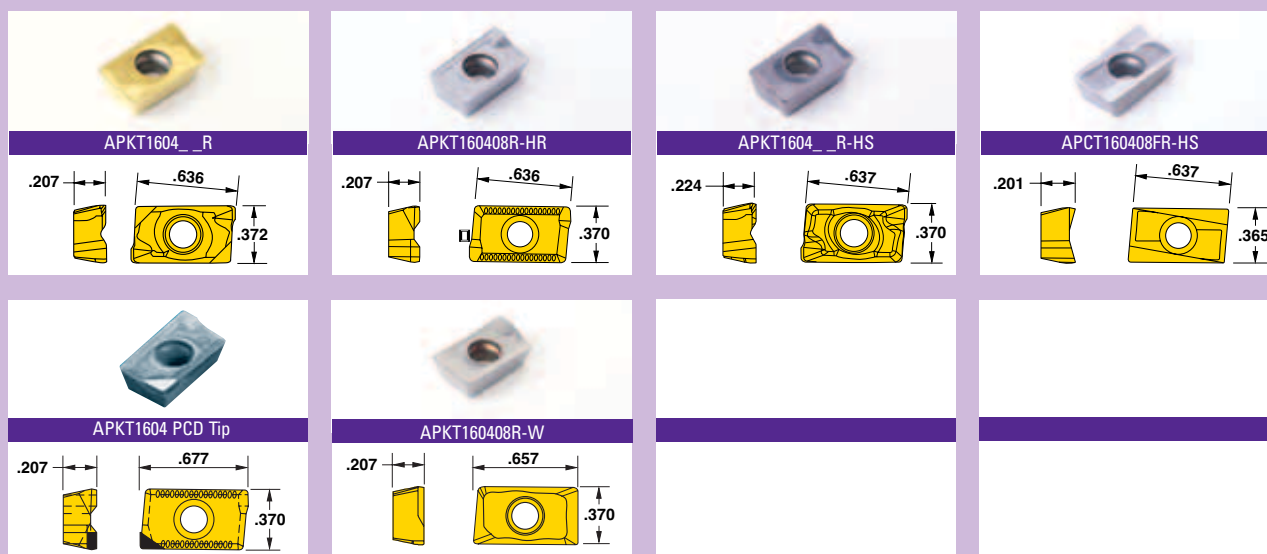
Insert Corner
.027"R



D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	D ₃ Overall Diameter	Bolt Circle	Retention Bolt	K Keyway
2.500	2L1B-25R01	4	1.570	.750	2.70	-	SD-06-46	.31
4.000	2L1B-40R01	6	2.000	1.500	4.20	-	-	.62
6.000	2L1B-60R01	7	2.000	2.000	6.20	-	-	.75
8.000	2L1B-80R01	9	2.480	2.500	8.20	4.00	-	1.00

CHASEline

INSERTS



Insert Number	Application	Corner	Grades										
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015	90D
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■	
APKT160408R-HR	Multi-Purpose	.031R			■							■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■								■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■								■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■								■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■									
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■	■
APKT160424R	Multi-Purpose	.093R			■			■				■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■	■
APKT160448R	Multi-Purpose	.187R			■							■	
APKT160464R	Multi-Purpose	.250R		■	■							■	■
APKT160408R-W	Wiper	.031R										■	■
APKT160404R-HR	PCD Tipped*	.015R											■

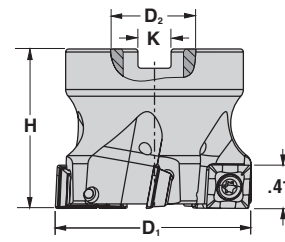
*Max DOC is .12".

HARDWARE

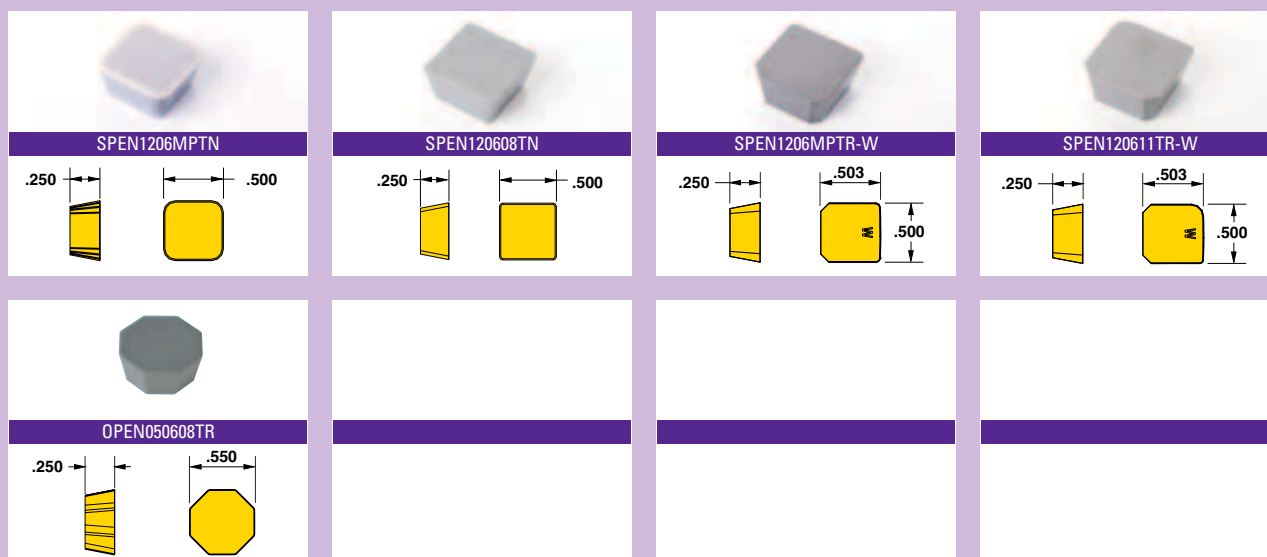
Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.750	SM40-084-20	30-35 in. lbs.	DS-T15T (Tx-15)
.970-3.000	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M487.

Coolant Thru

[illegible]

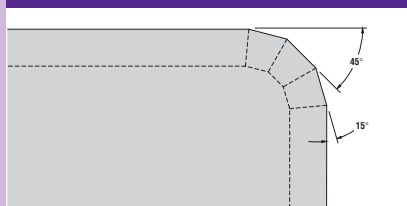
INSERTS



Insert Number	Application	Corner	Number of Indexes	Grades		
				IN	70N	2060
SPEN1206MPTN	Multi-Purpose	(see Fig. 1)	4		■	
SPEN120608TN	Multi-Purpose	.031R	4		■	
SPEN1206MPTR-W*	Wiper	(see Fig. 1)	1		■	
SPEN120611TR-W*	Wiper	.031R	1		■	
OPEN050608TR	Multi-Purpose	.031R	8			■

*Both wiper inserts are marked with a "W" along the actual cutting edge.

Insert Corner (Fig. 1)

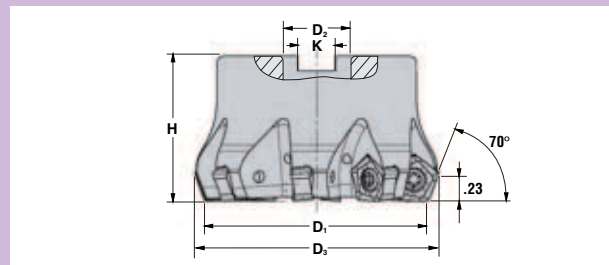


HARDWARE

Insert Seat		Seat Screw		Driver	
Part No.		Part No.	Torque	Part No.	
PA-0575		SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)	
Wedge		Differential Screw		Driver	
Part No.		Part No.	Torque	Part No.	
2H-422-01		SB-04-13	75 in. lbs.	WS-0022 (1/8" hex)	

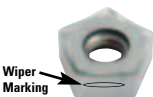
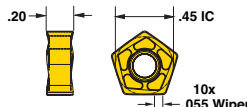
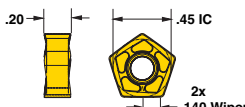
For technical information, see page M489.

Coolant T



*Optional

INSERTS

			
PNCU0805GNTR 	PNCU0805GNTR-001 		

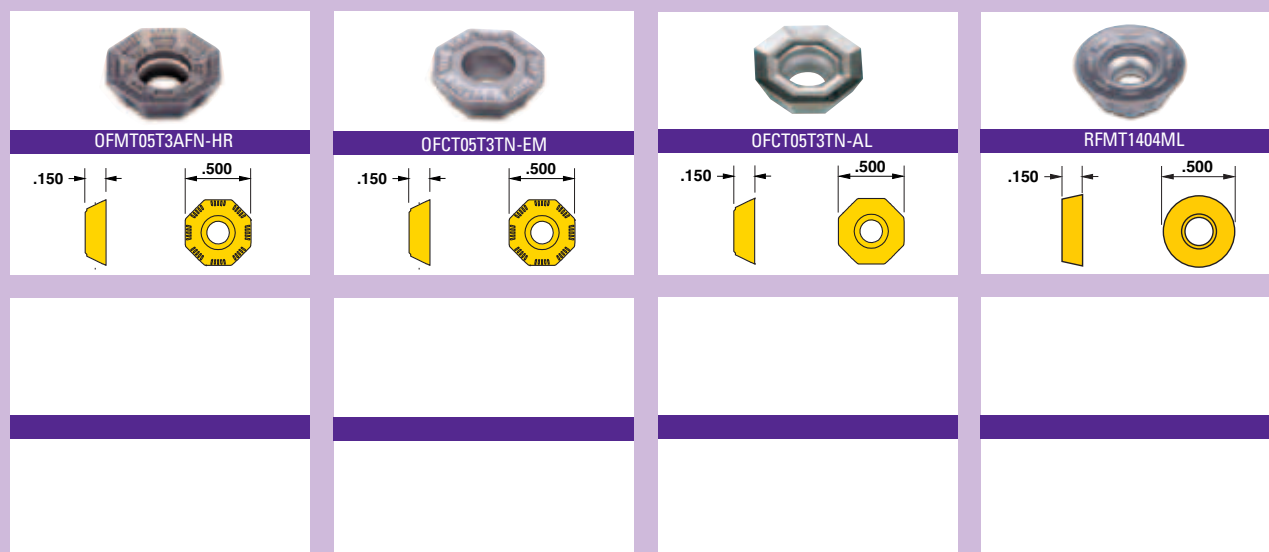
Insert Number	Application	Corner	Grades					
			IN	1030	2005	2015	2030	2505
PNCU0805GNTR	Multi-Purpose	.030R	■	■	■	■		
PNCU0805GNTR-001	Wiper	.030R		■				■

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-100-10	40 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M492.

INSERTS



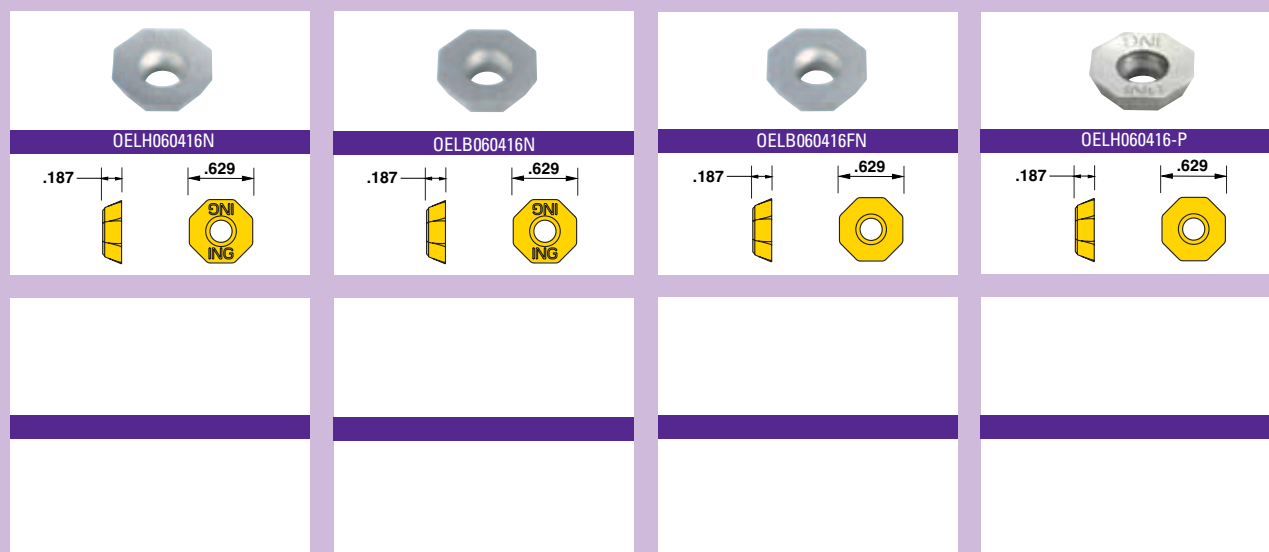
Insert Number	Geometry	Application	Corner	Grades					
				TT	9030	8020	7030	6030	K10
OFMT05T3AFN-HR	Medium/Light	Multi-Purpose	.024R	■	■	■			
OFCT05T3TN-EM	Medium	Multi-Purpose	.024R	■	■	■	■	■	
OFCT05T3TN-AL	Positive	Ground/Polished (for Alum.)	.024R						■
RFMT1404ML	Medium/Light	Button	.275R			■			

HARDWARE

Insert Screw			Driver
New Part No.	Old Part. No.	Torque	Part No.
SM40-093-20	TS400931	30-35 in. lbs.	DS-T15T (T-T15)

For technical information, see page M490.

INSERTS



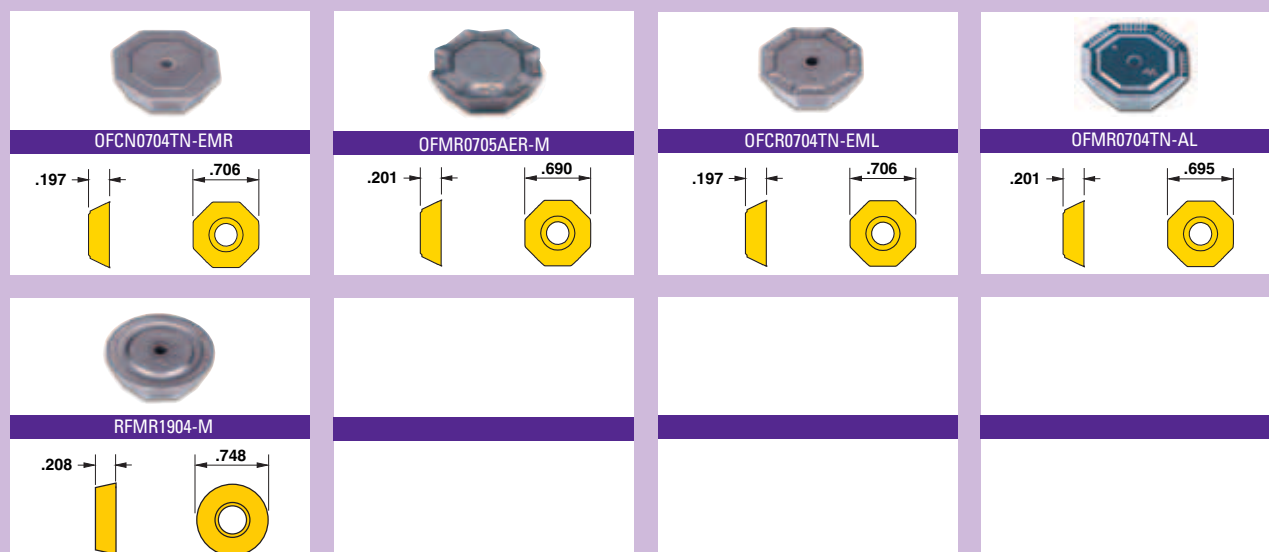
Insert Number	Application	Corner	Grades						
			IN	40P	1530	1540	2030	30M	2005
OELH060416N	Multi-Purpose	.060R			■		■		■
OELB060416N	Multi-Purpose	.060R		■	■	■	■		■
OELB060416FN	UpSharp	.060R					■		
OELH060416-P	Ground/Polished (for Alum.)	.060R						■	

HARDWARE

Overall Diameter	Insert Screw	Driver	
	Part No.	Torque	Part No.
3.00-6.00	SM50-127-10	45-50 in. lbs.	DS-T20T (Tx-20)
2.500	SM50-100-10	40-45 in. lbs.	DS-T20T (Tx-20)

For technical information, see page M490.

INSERTS



Insert Number	Cutting Edge Configuration	Application	Corner	Grades					
				TT	9030	8020	7030	6030	K10
				IN	2005	1030	2040	2010	10K
OFCN0704TN-EMR	Pos. Flat Top	Multi-Purpose/Heavy-Duty	.031R			■	■	■	
OFMR0704AER-M	Pos. Land	Multi-Purpose	.024R		■	■	■		
OFCR0704TN-EML	Pos. Land	Hi-Temp/Titanium	.031R		■	■	■	■	
OFMR0704TN-AL	Pos. Sharp	Ground/Polished (for Alum.)	.031R						■
RFMR1904-M	Pos/Pos	Button	.375R		■	■	■	■	

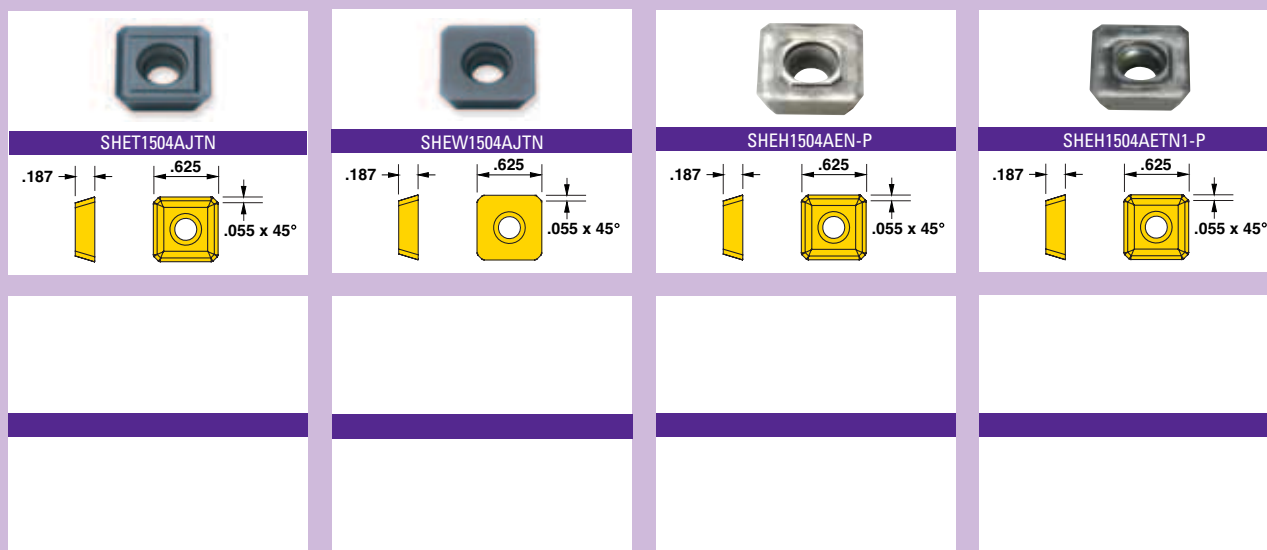
HARDWARE

Wedge		Wrench	
New Part No.	Old Part No.	New Part No.	Old Part No.
2M0811-01	WFZ8-OF	DS-H05T	T-W4

Wedge Screw		
Cutter Diameter	New Part No.	Old Part No.
2.50	SB080-02	WS8S
3.00-8.00	SB080-01	WS8

For technical information, see page M490.

INSERTS



Insert Number	Application	Corner	Grades					
			IN	2010	2040	1030	2005	15K
SHET1504AJTN	Multi-Purpose	.055 x 45°	■	■	■	■		
SHEW1504AJTN	Heavy-Duty	.055 x 45°			■			
SHEH1504AEN-P	Ground/Polished (for Alum.)	.055 x 45°						■
SHEH1504AETN1-P	Hi-Temp/Titanium	.055 x 45°					■	

HARDWARE

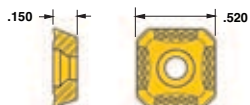
Insert Screw		Driver	
Part No.	Torque	Part No.	
SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)	

For technical information, see page M490.

INSERTS



SEKT12T3AFTN-M



SEKT12T3AFTR-WC



Insert Number	Application	Corner	Grades					
			TT	9030	8020	7030	6030	CT5000
			IN	2005	1030	2040	2010	-
SEKT12T3AFTN-M	Multi-Purpose	.100 x 45°	■	■	■	■	■	■
SEKT12T3AFTR-WC	Wiper	Crowned Wiper			■	■	■	

HARDWARE

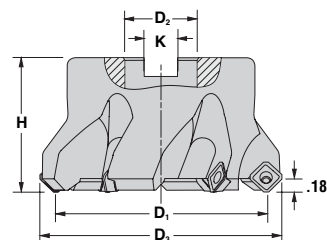
Seat/Shim		Seat Screw	
New Part No.	Old Part No.	New Part No.	Old Part No.
SJ-0029	TSE12T3N	SM50-062-S0	TS5035062S
Insert Screw		Wrench	
New Part No.	Old Part No.	Torque	Part No.
SM35-110-00	TS351101	25-30 in. lbs.	DS-T15T (T-T15)

For technical information, see page M489.

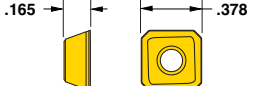
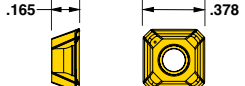
1.250" to 2.500"

.18"

.045" x 45°

[illegible]

INSERTS

			
SEKT09T3	SEKT09T3AFFN-P		
			

Insert Number	Application	Corner	Grades					
			IN	30M	2005	2030	2040	1030
SEKT09T3AFN	Multi-Purpose	.045 x 45°		■	■	■	■	■
SEKT09T3AFFN-P	Ground/Polished (for Alum.)	.045 x 45°	■					

HARDWARE

Insert Screw		Driver	
Part No.	Torque		Part No.
SM30-082-00	13-18 in. lbs.		DS-T09W (Tx-09)

For technical information, see page M489.

Diameters
2.500" to 10.000"

Cutting Edge Length
.25"

Insert Corner
.015" to .093"R

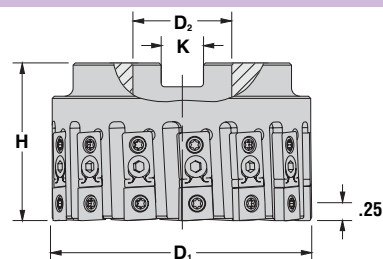

Facing



Shoulder



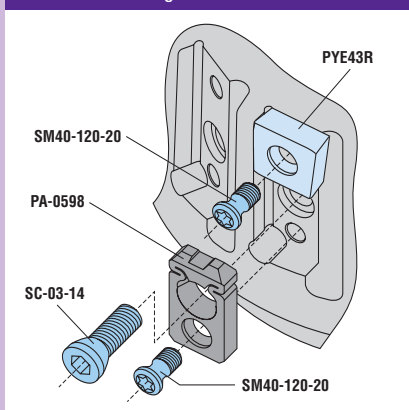
Coolant Thru



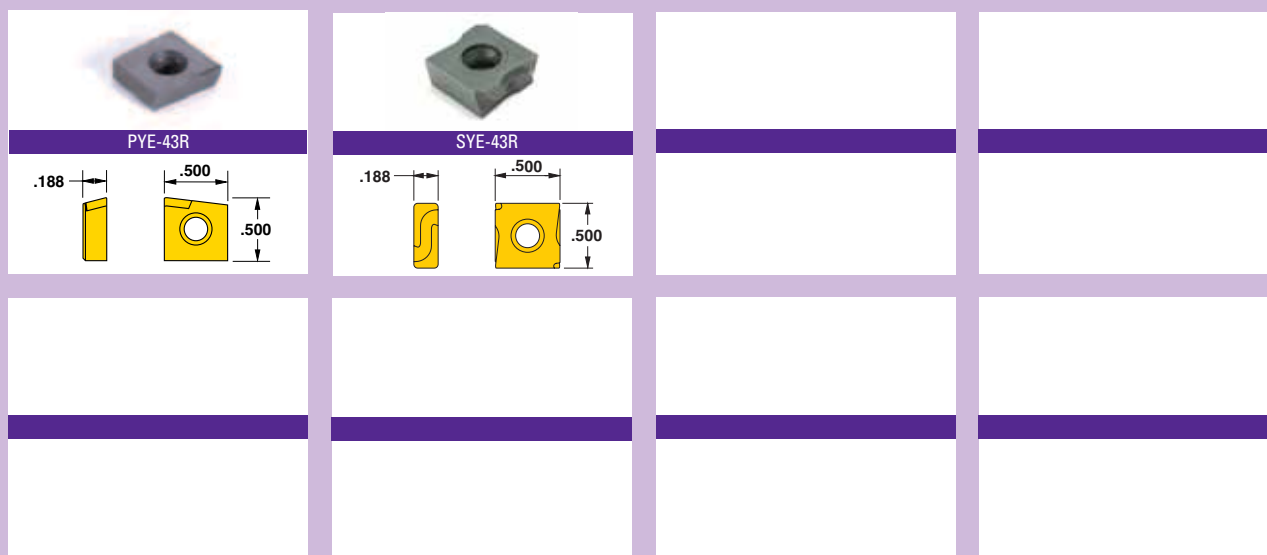
D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Bolt Circle	Weight with Carbide	RPM Max	K Keyway
2.500	6X2V-02R01	4	2.000	1.000	-	.8 lbs.	30,000	.38
3.000	6X2V-03R01	6	2.000	1.000	-	1.1 lbs.	27,500	.38
4.000	6X2V-04R01	8	2.000	1.250	-	1.7 lbs.	24,000	.50
5.000	6X2V-05R01	10	2.380	1.500	-	3.0 lbs.	20,000	.62
6.000	6X2V-06R01	12	2.380	1.500	-	4.2 lbs.	17,500	.62
8.000	6X2V-08R01	16	2.380	2.500	4.00	7.6 lbs.	16,000	1.00
10.000	6X2V-10R01	20	2.380	2.500	4.00	11.4 lbs.	15,500	1.00
2.500	6X1V-02R01	6	2.000	1.000	-	.85 lbs.	30,000	.38
3.000	6X1V-03R01	8	2.000	1.000	-	1.1 lbs.	27,500	.38
4.000	6X1V-04R01	12	2.000	1.250	-	2.0 lbs.	24,000	.50
5.000	6X1V-05R01	15	2.380	1.500	-	3.0 lbs.	20,000	.62
6.000	6X1V-06R01	18	2.380	1.500	-	4.2 lbs.	17,500	.62
8.000	6X1V-08R01	24	2.380	2.500	4.00	7.6 lbs.	16,000	1.00
10.000	6X1V-10R01	30	2.380	2.500	4.00	11.4 lbs.	15,500	1.00

*For use with Coolant-Through-Spindle applications.

Hardware Configuration



INSERTS



Insert Number	Application	Corner	Grades		
			IN	90D	10K
PYE-43R001	PCD	.093R	■		
PYE-43R002	PCD	.015R	■		
PYE-43R003	PCD	.031R	■		
SYE-43R001-P	Ground/Polished (for Alum.)	.031R			■

HARDWARE

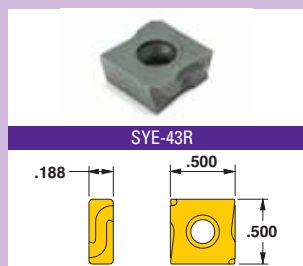
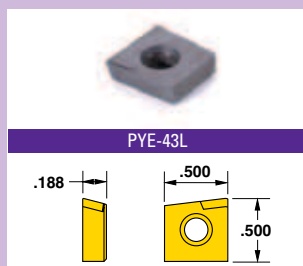
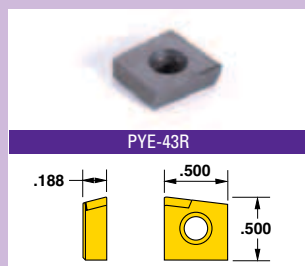
Insert/Seat Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

Cutter Diameter	Adjustable Seat	Barrel Screw	
	Part No.	Part No.	Drive Size
2.500-10.000	PA-0598	SC-03-14	4mm hex

Coolant Hardware		
Cutter Diameter	Part No.	Type
2.50-3.00	n/a	-
4.00	CZ-0104	Lock-screw
5.00-6.00	CZ-0097	Lock-screw
8.00+	CZ-0091	Manifold Plate

For technical information, see page M492.

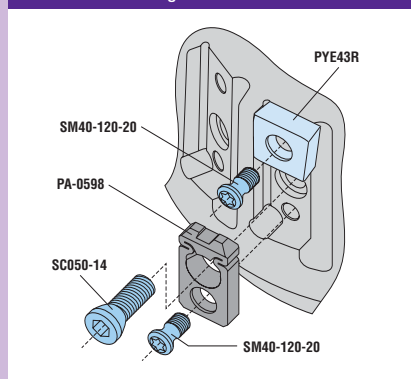
INSERTS



Insert Number	Application	Corner	Cutting Edges	Grades			
				IN	10K	90D	2015
PYE-43R001	PCD	.093R	1			■	
PYE-43R002	PCD	.015R	1			■	
PYE-43R003	PCD	.031R	1			■	
PYE-43L001	PCD, Left-Hand*	.093R	1			■	
PYE-43L003	PCD, Left-Hand*	.031R	1			■	
SYE-43R001	Cast Iron	.031R					■
SYE-43R001-P	Ground/Polished (for Alum.)	.031R			■		

*For special order left-hand cutters.

Hardware Configuration



HARDWARE

Insert/Seat Screw		Driver
Part No.	Torque	Part No.
SM40-120-20	25-30 in. lbs.	DS-T15T (Tx-15)

Cutter Series	Fixed Seat	Adjustable Seat	Barrel Screw	
	Part No.	Part No.	Part No.	Drive size
2.500-10.000	PA-0605	PA-0598	SC050-14	4mm hex

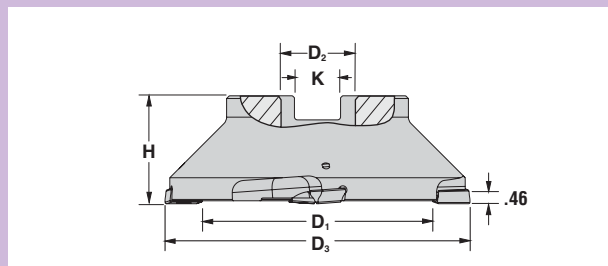
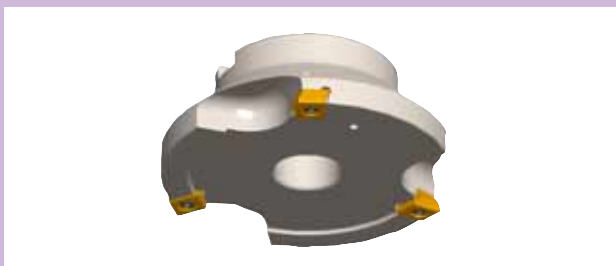
For technical information, see page M492.

MAX FINISHING FACE MILL SERIES SF6H, SF6N

Diameters
3.000" to 8.000"

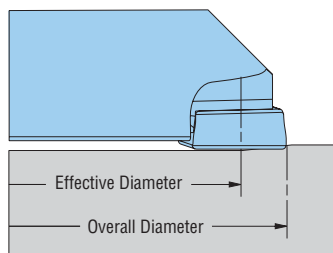
Max. Depth of Cut
.01" (.003-.005" Recommended)

Insert Corner
.031"R



D ₁ Effective Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	D ₃ Overall Diameter	Bolt Circle	Retention Bolt	K Keyway
3.000	SF6H-03R01	3	1.750	1.250	3.49	-	SD-10-47	.50
4.000	SF6H-04R01	3	1.750	1.250	4.49	-	SD-10-47	.50
6.000	SF6N-06R01	4	2.375	2.500	6.70	-	SD-12-01	1.00
8.000	SF6N-08R01	16	2.375	2.500	8.70	4.00	-	1.00

SMax Finish Diameter

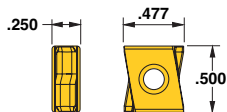


The nominal "finish" diameter is measured to the center of the insert.

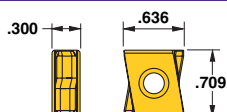
INSERTS



YXM324L001



YXM434L001



Cutter Series	Insert Number	Application	Corner	Grades		
				IN	1510	1540
SF6H Series	YXM324L001	Finishing	.031R	■	■	
SF6N Series	YXM434L001	Finishing	.031R	■	■	

HARDWARE

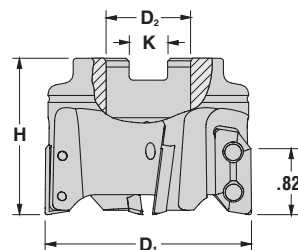
Cutter Series	Insert Screw		Driver
	Part No.	Torque	
SF6H	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)
SF6N	SM50-160-10	35-40 in. lbs.	DS-T20T (TX-20)

For technical information, see page M493.

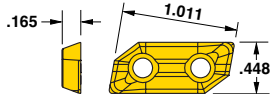
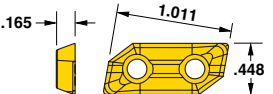
Insert Corner
.031", .062", .093"
and .125"R



Coolant Thru

[illegible]

INSERTS

			
XEET2504	Wiper		
			

Insert Number	Application	Corner	Grades	
			IN	15K
XEET250408R-P	Ground/Polished (for Alum.)	.031R	■	
XEET250416R-P	Ground/Polished (for Alum.)	.062R	■	
XEET250424R-P	Ground/Polished (for Alum.)	.093R	■	
XEET250432R-P	Ground/Polished (for Alum.)	.125R	■	
XEET250408R-PW	Wiper	.031R	■	

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-090-00	30-35 in. lbs.	DS-T15S (Tx-15)

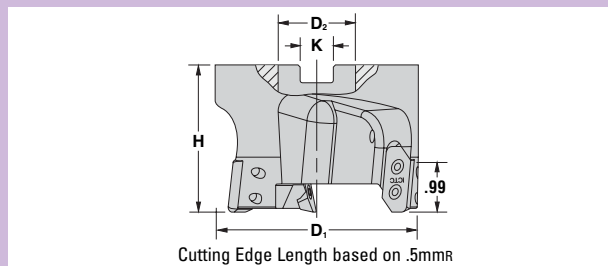
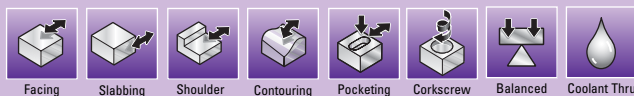
For technical information, see page M491.

ROUGH[®]AIR™ 0° HIGH SPEED ROUTER FACE MILL (FOR ALUMINUM) SERIES 5X6Z

Diameters
2.500" to 10.000"

Cutting Edge Length
.99"

Insert Corner
.5mm, .031", .062",
.125" and .250"r



D ₁ Nominal Diameter	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Ramp Angle	Bolt Circle	Retention Bolt	K Keyway
2.500	5X6Z-20R01	3	2.880	1.000	11°	-	SD-08-48	.38
3.000	5X6Z-30R01	3	2.880	1.250	8°	-	SD-10-48	.50
4.000	5X6Z-40R01	3	2.880	1.500	5°	-	SD-12-89	.62
*5.000	5X6Z-50R01	3	2.880	1.500	4°	-	SD-12-89	.62
*6.000	5X6Z-60R01	3	2.880	1.500	3°	-	SD-12-89	.62
*8.000	5X6Z-80R01	4	2.880	2.500	2°	4.00	SD-10-51	1.00
*10.000	5X6Z-10R01	4	2.880	2.500	1.8°	4.00	SD-10-51	1.00

*Check for availability.

SAFETY REQUIREMENTS FOR PROPER OPERATION

- Use extreme caution when handling BEHB and BFEB inserts. The cutting edges are extremely sharp.
- Special insert loading instructions: first lightly tighten both insert screws. Next, completely tighten the bottom screw. Finally, tighten the top screw (to appropriate torque limits).
- Proper torque values are critical to the safe operation of this tool. When applying this product, a properly calibrated torque wrench is required to ensure that the proper amount of torque is present for each insert screw.
- Whenever indexing or changing inserts, the insert screw must be lubricated with an anti-seize compound for proper operation.
- Insert screws must be changed whenever an insert is replaced.
- When using Series 15A1Z medium-duty tools (less than 2.000" in diameter) in excess of 6,000 RPM, it is highly recommended the assembly be dynamically balanced according to balancing quality grades established in ISO 1940 G6.3.
- Series 15A1Z heavy-duty tools and 5J2Z face mills are balanced for use up to 10,000 SFM according to balancing quality grades established in ISO 1940 to appropriate tolerances for each tool. It is highly recommended that assemblies be dynamically balanced according to balancing quality grades established in ISO 1940 G6.3. For safe operation above 10,000 SFM, contact your Ingersoll Cutting Tool representative for application review prior to use.

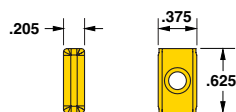
- When balancing an assembly, it is highly recommended that the imbalance is corrected in the adaptor to provide the ability to interchange cutters while maintaining a balanced condition.
- It is not recommended that any indexable tools be operated in excess of 10,000 SFM. See your Ingersoll Cutting Tool representative for application review prior to use.
- Damaged tools should be returned to Ingersoll to be evaluated for repair.

DISCLAIMERS AND ADDITIONAL INFORMATION

- All safety guidelines must be followed for proper operation of this product.
- At high speeds, observe all proper safety precautions when applying this product.
- Products outlined may be covered under one or all of the following patents: U.S. Patents: 4411564, 4566827, 4597695, 4712949, 4790693, 5639189, Pat. Pending. Foreign Patents: Canada: 1220020, 1222369, 1260689, 1270631; Mexico: 158836; Brazil: P18400767

CHASEline

LXD323-110



HARDWARE

M267

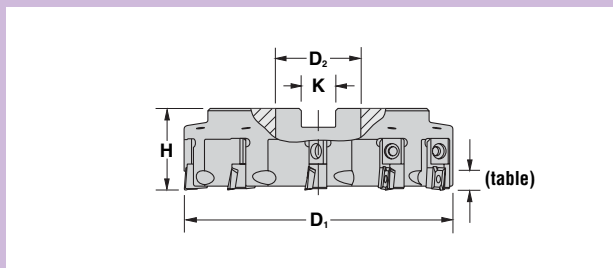
MAXline

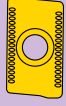
MULTIPLE GEOMETRY CARTRIDGE FACE MILL SERIES 4W2A

Diameters
4.000" to 12.500"

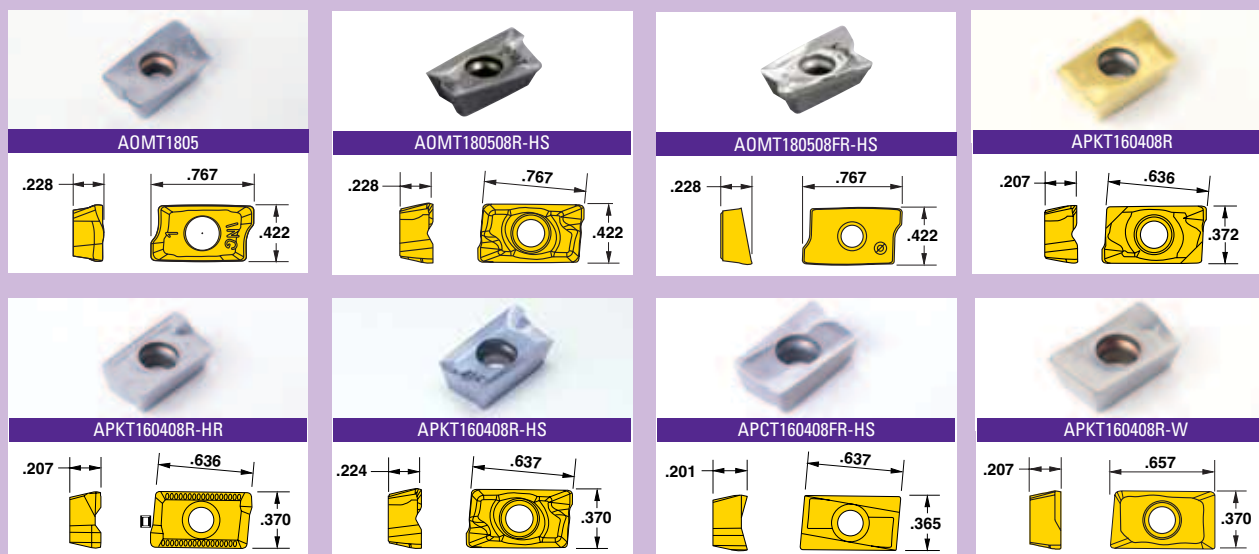
Max. Depth of Cut
Varies by Insert Type

Insert Corner
Varies by Insert Type



Insert Style	D ₁ Nominal Dia.	Cartridge Number	Cutter Number	Number of Inserts	H Height	D ₂ Bore Diameter	Bolt Circle	Weight with Cartridges	K Keyway
HI POS + 	4.020	52E-11R01	4W2A-04R01	6	2.460	1.500	—	4.11 lbs.	.63
	6.020	52E-11R01	4W2A-06R01	8	2.460	1.500	—	10.13 lbs.	.63
	8.020	52E-11R01	4W2A-08R01	10	2.460	2.500	4.00	17.11 lbs.	1.00
	10.020	52E-11R01	4W2A-10R01	12	2.460	2.500	4.00	28.7 lbs.	1.00
	12.020	52E-11R01	4W2A-12R01	14	2.460	2.500	4.00, 7.00	39.15 lbs.	1.00
45° HIGH SHEER 	4.000	52J-11R01	4W2A-04R01	6	2.460	1.500	—	4.11 lbs.	.63
	6.000	52J-11R01	4W2A-06R01	8	2.460	1.500	—	10.13 lbs.	.63
	8.000	52J-11R01	4W2A-08R01	10	2.460	2.500	4.00	17.11 lbs.	1.00
	10.000	52J-11R01	4W2A-10R01	12	2.460	2.500	4.00	28.7 lbs.	1.00
	12.000	52J-11R01	4W2A-12R01	14	2.460	2.500	4.00, 7.00	39.15 lbs.	1.00
V MAX 	4.000	52K-11R02	4W2A-04R01	6	2.460	1.500	—	4.11 lbs.	.63
	6.000	52K-11R02	4W2A-06R01	8	2.460	1.500	—	10.13 lbs.	.63
	8.000	52K-11R02	4W2A-08R01	10	2.460	2.500	4.00	17.11 lbs.	1.00
	10.000	52K-11R02	4W2A-10R01	12	2.460	2.500	4.00	28.7 lbs.	1.00
	12.000	52K-11R02	4W2A-12R01	14	2.460	2.500	4.00, 7.00	39.15 lbs.	1.00
.750 BUTTON 	4.500	55M-11R01	4W2A-04R01	6	2.375	1.500	—	4.14 lbs.	.63
	6.500	55M-11R01	4W2A-06R01	8	2.375	1.500	—	11.0 lbs.	.63
	8.500	55M-11R01	4W2A-08R01	10	2.375	2.500	4.00	18.0 lbs.	1.00
	10.500	55M-11R01	4W2A-10R01	12	2.375	2.500	4.00	28.14 lbs.	1.00
	12.500	55M-11R01	4W2A-12R01	14	2.375	2.500	4.00, 7.00	40.5 lbs.	1.00
HI-POS 	4.000	52B-11R01	4W2A-04R01	6	2.375	1.500	—	4.11 lbs.	.63
	6.000	52B-11R01	4W2A-06R01	8	2.375	1.500	—	10.13 lbs.	.63
	8.000	52B-11R01	4W2A-08R01	10	2.375	2.500	4.00	17.11 lbs.	1.00
	10.000	52B-11R01	4W2A-10R01	12	2.375	2.500	4.00	28.8 lbs.	1.00
	12.000	52B-11R01	4W2A-12R01	14	2.375	2.500	4.00, 7.00	39.15 lbs.	1.00
DEKA 	4.000	55H-11R07	4W2A-04R01	6	2.460	1.500	—	4.11 lbs.	.63
	6.000	55H-11R07	4W2A-06R01	8	2.460	1.500	—	10.13 lbs.	.63
	8.000	55H-11R07	4W2A-08R01	10	2.460	2.500	4.00	17.11 lbs.	1.00
	10.000	55H-11R07	4W2A-10R01	12	2.460	2.500	4.00	28.8 lbs.	1.00
	12.000	55H-11R07	4W2A-12R01	14	2.460	2.500	4.00, 7.00	39.15 lbs.	1.00

INSERT/HARDWARE CONFIGURATIONS

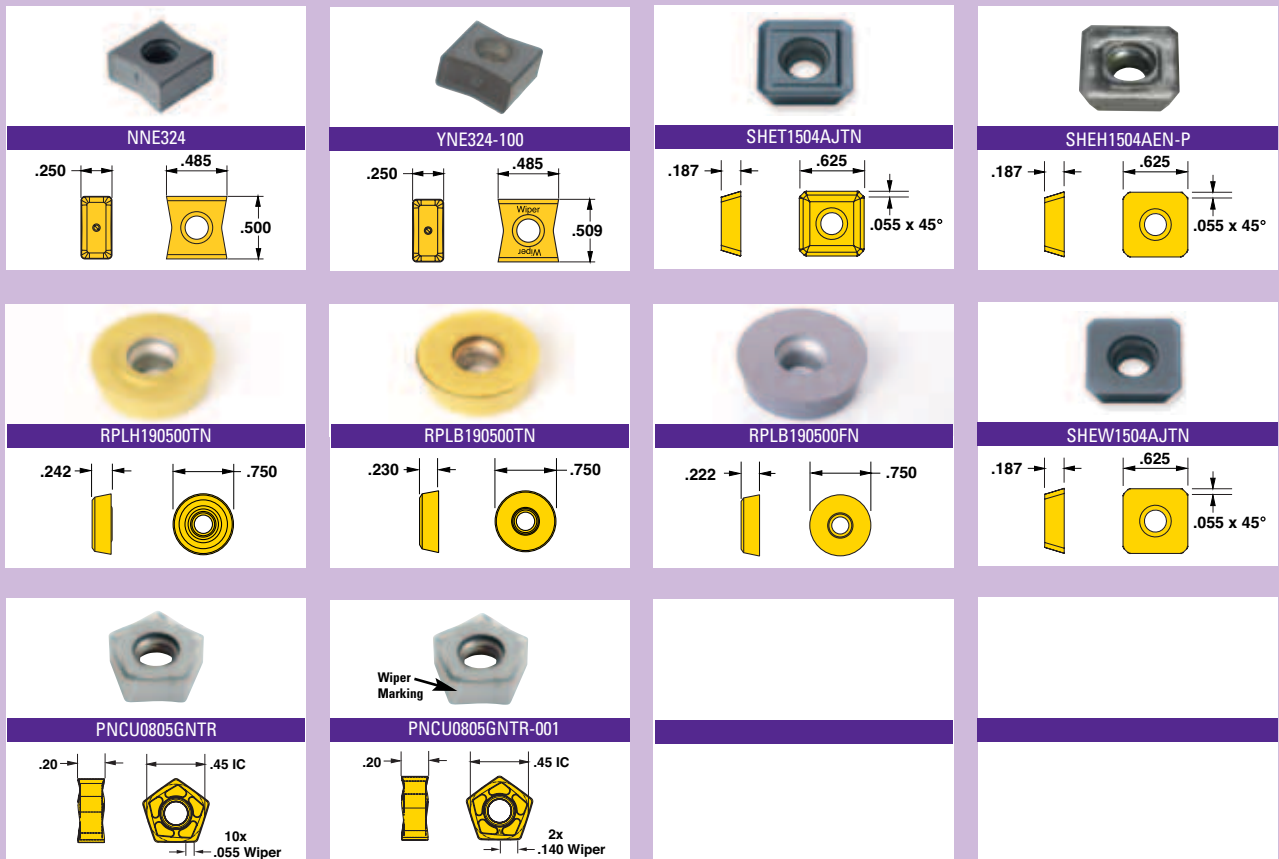


0° Lead HiPos+, HiPos				Grades												
Cartridge Style	Insert Number	Application	Corner	Grades												
				IN	30M	40P	90D	6530	2005	2030	2015	2040	1030	5015	1530	6515
	AOMT180508R-HS	Ground/Polished (for Alum.)	.031R	■												
	AOMT180508R	Helical Positive	.031R							■	■	■	■	■		
	AOMT180516R	Helical Positive	.062R							■	■	■	■	■		
	AOMT180524R	Helical Positive	.093R *							■		■		■		
	AOMT180532R	Helical Positive	.125R *							■	■	■	■	■		
	AOMT180508R-HS	HiTemp/Titanium	.031R							■	■					
	AOMT180516R-HS	HiTemp/Titanium	.062R							■	■					
	APKT160408R	Multi-Purpose	.031R			■		■		■	■	■	■	■	■	
	APKT160408R-HR	Multi-Purpose-Pressed	.031R			■								■		
	APKT160408R-HS	HiTemp/Titanium	.031R		■									■		
	APKT160404R-HS	HiTemp/Titanium	.015R		■									■		
	APKT160404R-HR	Multi-Purpose-Pressed	.015R				■									
	APKT160416R-HS	HiTemp/Titanium	.062R		■									■		
	APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■											
	APKT160416R	Multi-Purpose	.062R			■					■	■	■	■	■	
	APKT160416R	Multi-Purpose	.062R						■							
	APKT160408R-W	Wiper	.031R											■	■	

* May need to relieve cartridge body to accept larger radii on heavy advance per tooth applications.

MULTIPLE GEOMETRY CARTRIDGE FACE MILL SERIES 4W2A (CONT.)

INSERTS



0° Lead VMax															
Cartridge Style	Insert Number	Application	Corner	Cut Edge Configuration	IN	04S	2005	2010	2030	2015	2040	1530	6515	15K	70N
	NNE324-100	Multi-Purpose	.031R	4RH/4LH					■	■	■	■	■		
	NNE324-102	Multi-Purpose	.063R	4RH/4LH					■	■	■	■	■		
	NNE324-104	Multi-Purpose	.031 x 45°	4RH/4LH				■		■				■	
	NNE324-125	Multi-Purpose	.125R	4RH/4LH					■						
	YNE324-100	Wiper	.031R	2RH/2LH					■		■				
	NNE324R109	Multi-Purpose	.031R	4RH			■	■	■	■	■		■		
	NJE324-100-P	Ground/Polished (for Alum.)	.031R	4RH/4LH (Polished)		■									■
	NCE324-100	Iron	.031R	4RH/4LH (SiNit)											■

.750 Button					Grades					
Cartridge Style	Insert Number	Application	Corner		IN	40P	1530	1540	6530	2030
	RPLH190500TN	Positive Rake Face w/K-Land	.375R							
	RPLB190500TN	Positive Flat Top w/K-Land	.375R							
	RPLB190500FN	Sharp Flat Top	.375R							

45° High Shear				Grades					
Cartridge Style	Insert Number	Application	Corner	IN	15K	1030	2010	2040	2005

	SHET1504AJTN	Positive Hook	.055 x 45°			■	■	■	■
	SHEW1504AJTN	Flat Top	.055 x 45°					■	
	SHEH1504AEN-P	Un-Sharp, Ground/Polished	.055 x 45°		■				

Deka				Grades					
Cartridge Style	Insert Number	Application	Corner	IN	1030	2005	2015	2030	2505

	PNCU0805GNTR	Multi-Purpose	.030R		■	■	■	■	
	PNCU0805GNTR-001	Wiper	.030R			■			■

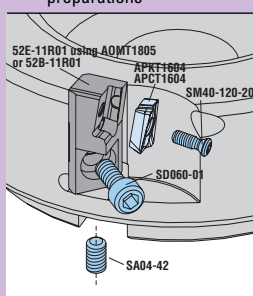
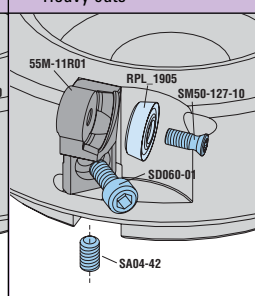
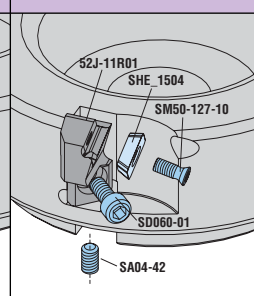
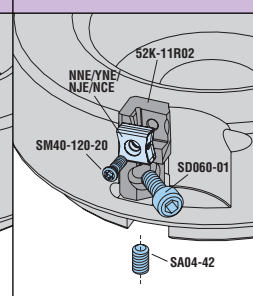
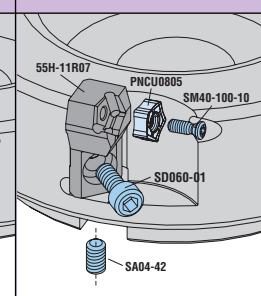
HARDWARE

Insert Screw			Driver
Insert Style	Part No.	Torque	Part No.
Hi-Pos+ / HiPos	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)
.750" Button	SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)
45° High Shear	SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)
VMax	SM40-120-20	25-30 in. lbs.	DS-T15T (Tx-15)
HiPosDeka	SM40-100-10	40 in. lbs.	DS-T15T (Tx-15)

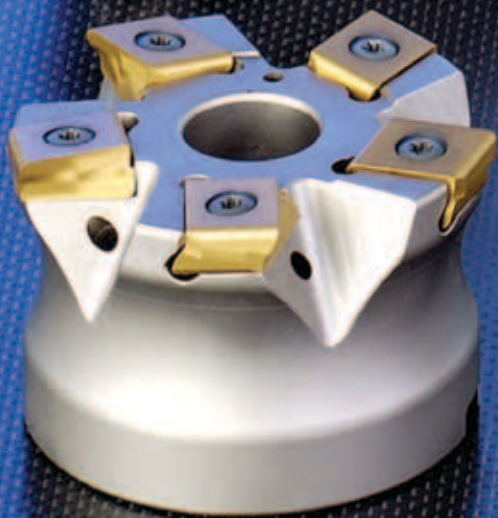
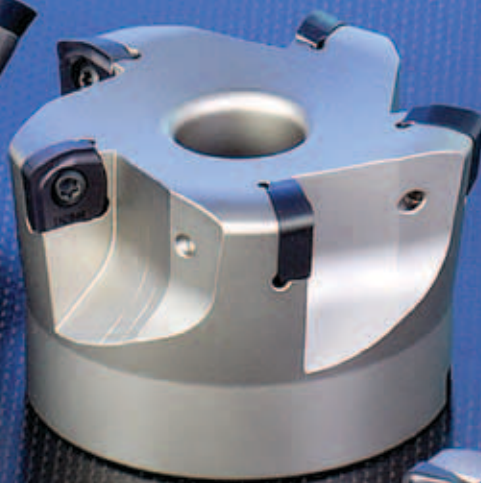
Cartridge		Cartridge Screw		Driver
Insert Style	Part No.	Part No.	Torque	Part No.
Hi-Pos +	52E-11R01	SD060-01	150-180 in. lbs.	DS-H05T (5mm hex)
Hi-Pos	52B-11R01	SD060-01	150-180 in. lbs.	DS-H05T (5mm hex)
.750" Button	55M-11R01	SD060-01	150-180 in. lbs.	DS-H05T (5mm hex)
45° High Shear	52J-11R01	SD060-01	150-180 in. lbs.	DS-H05T (5mm hex)
V-Max 0°	52K-11R02	SD060-01	150-180 in. lbs.	DS-H05T (5mm hex)
HiPosDeka	55H-11R07	SD060-01	150-180 in. lbs.	DS-H05T (5mm hex)

Axial Adjusting Screw	Driver
Part No.	Part No.
SA04-42	DS-H03T (3mm hex)

Insert/Hardware Configurations

0° HiPos & HiPos+	.750" I.C. Button	45° High Shear	0° VMax	0° HiPosDeka
- High positive geometry - Variety of edge preparations	- Double positive geometry - Strong, free cutting inserts - Heavy cuts	- Double positive geometry - High Axial Shear	0° lead angle 4 Strong cutting edges	20° lead angle 10 Strong cutting edges
				

Ingersoll



CUTTING TOOLS

CONTOUR MILLING

Cutting Tools



Member IMC Group
Ingersoll
Cutting Tools

M273

CONTOUR

CONTOUR MILLING

	Diameter Range	Cutting Length	Description	Series	Page
	2.000-4.000	.40-.60	PUNCH•IN MAX Plunging Cutter	SHU	M276
	2.000-6.000	.23-.47 (radial)	V-MAX PUNCH•IN Plunging Cutter	VHU	M278
	2.000-4.000	.56	PUNCH•INQUAD Plunging Cutter	DHU	M280
	.750-1.500	.28-.43	PUNCH•INQUAD Plunging Cutter	DHU (Top•On)	M282
	2.000-4.000	.06-.08	FORM•MASTER ^{SPEED} High Feed Face Mill	5V6E, 5V6H	M284
	.750-1.500	.06-.08	FORM•MASTER ^{SPEED} High Feed End Mill	15V1E, 15V1H (Top•On)	M286
	2.000-6.000	5mm-10mm	FORM•MASTER ⁺ Button Cutters	5W7	M288
	.750-1.500	3mm-8mm	FORM•MASTER ⁺ Button Cutter	15B (Top•On)	M290
	2.000-6.000	.25-.50	FORM•MASTER Button Face Mill	5W6	M292
	2.000	.25-.37	FORM•MASTER HI-TORK Button Face Mill	5W6	M294

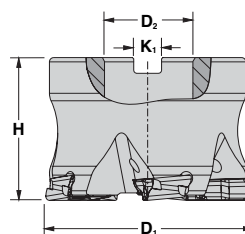
	Diameter Range	Cutting Length	Description	Series	Page
	4.000-6.000	.50	FORM MASTER Button Face Mill	5W6S	M294
	1.000-1.500	.25	FORM MASTER Button End Mill	15B1H	M296
	1.000-2.000	1.10-2.75	FORM BALL High Shear Ball Nose	15W7V, 25W1V	M298
	1.000-2.000	1.18-3.39	POWER BALL+ Heavy-Duty Plunging Ball Nose End Mill	13W7X, 23W1X	M300
	.750-2.000	.81-2.65	POWER BALL One Effective Ball Nose End Mill	16W, 26W	M302
	1.250-3.000	1.06-3.65	POWER BALL Two Effective Ball Nose End Mill	16W7B, 26W1B, 16W7J, 26W1G	M304
	.375-1.000	.18-.50	SPEED BALL Small Diameter Ball Nose End Mill	12W, 12W(Top•On)	M306
	.625-1.500	.04	FORM MASTER V Back Draft Finish Cutter	15V	M308
	2.000	.27	FORM MASTER V Back Draft Finish Shell Mill	15V	M308
	.625-1.500	.17-.27	FORM MASTER V Back Draft Finish Cutter	15V (Top•On)	M310



Insert Corner
.063"R



Coolant Thru

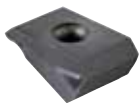
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*Can be used with **INNOFIT** system.

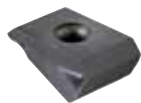
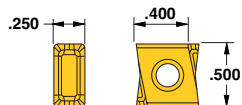
MAXline

M276

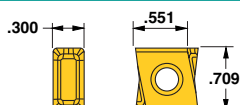
INSERTS



DPM324L050



DPM434L050



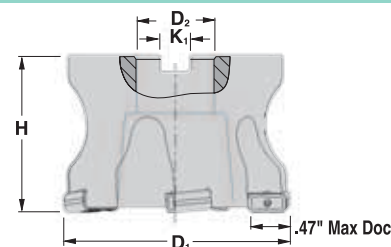
Insert Number	Application	Corner	Grades			
			IN	1530	2005	2015
DPM324L050	Multi-Purpose	.063R	■	■	■	
DPM434L050	Multi-Purpose	.063R	■	■	■	

HARDWARE

Insert Number	Insert Screw		Driver	
	Part No.	Torque	Part No.	
DPM324L050	SM40-120-20	25-30 in. lbs.	DS-T15T (Tx-15)	
DPM434L050	SM50-160-10	35-40 in. lbs.	DS-T20T (Tx-20)	

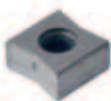
For technical information, see page M501.

Insert Corner
.031", .063", .125"R

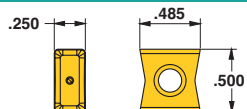


*Can be used with **INNOFIT** system. **Note:** RH plungers can use remaining insert edges from a RH 0° lead VK6V, VK5V or 4W2A cutter. If using long edge V-Max use a RH insert in a LH tool and a LH insert in a RH tool.

INSERTS



NNE324



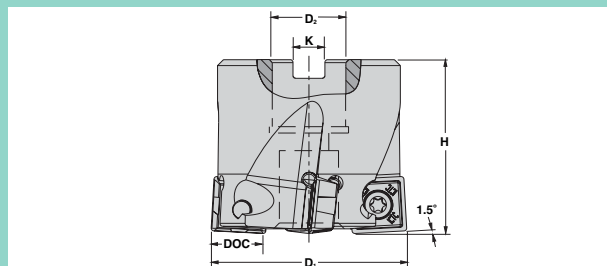
Insert Number	Application	Corner	Grades					
			IN	1530	2015	2030	2040	6515
NNE324-100	Multi-Purpose	.031R		■	■	■	■	■
NNE324-102	Multi-Purpose	.063R			■	■	■	■
NNE324-125	Multi-Purpose	.125R				■		

HARDWARE

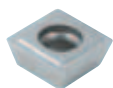
Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-00 (SE02-75)	25-30 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M501.

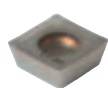
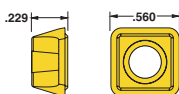
Coolant Thru

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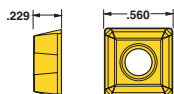
INSERTS



SHLT1405_N-FS



SHLT1405_TN-HR



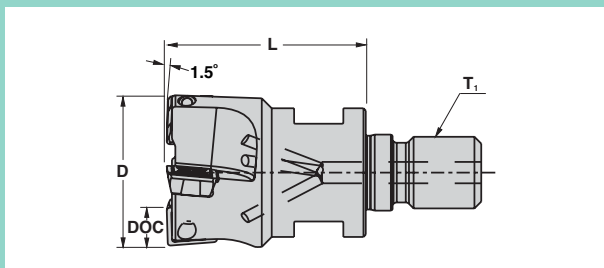
Insert Number	Application	Cutting Edge Configuration	Corner	Grades				
				IN	1030	2005	6515	6530
SHLT140508N-FS	Heavy Duty	Strong Neutral	.031R	■	■	■		
SHLT140516N-FS	Heavy Duty	Strong Neutral	.062R	■	■			
SHLT140532N-FS	Heavy Duty	Strong Neutral	.125R			■		
SHLT140508TN-HR	Multi-Purpose	Pos/Pos	.031R	■	■			■
SHLT140516TN-HR	Multi-Purpose	Pos/Pos	.062R	■	■			

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)

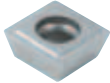
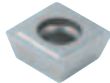
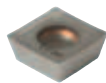
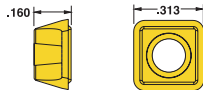
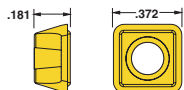
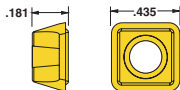
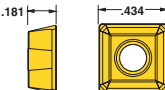
For technical information, see page M502.

Coolant Thru



See pages M390-M399 for TopOn System Components.

INSERTS

			
SPLT07	SHLT090408N-FS	SHLT1104_N-FS	SHLT110408TN-HR
			

Insert Number	Application	Cutting Edge Configuration	Corner	Grades				
				IN	1030	2005	6530	6515
SPLT07T308N-PH	Multi-Purpose	Pos/Pos	.031R	■	■			
SHLT090408N-FS	Heavy Duty	Pos/Pos	.031R	■	■			
SHLT090416N-FS	Heavy Duty	Strong Neutral	.062R	■				
SHLT110408N-FS	Heavy Duty	Strong Neutral	.031R	■	■			■
SHLT110416N-FS	Heavy Duty	Strong Neutral	.062R	■				
SHLT110408TN-HR	Multi-Purpose	Pos/Pos	.031R	■	■	■		

HARDWARE

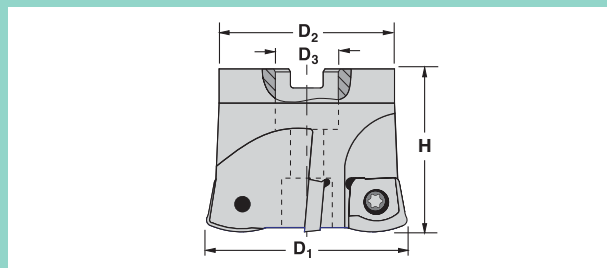
Insert Series	Insert Screw		Driver
	Part No.	Torque	
SPLT07	SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)
SHLT09	SM40-080-30	30-35 in. lbs.	DS-T15T (Tx-15)
SHLT11	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M502.

Geometry

Positive/Positive

Pocketing



*Identifies cutter with 2 week delivery

UHLD130515R-MM	UHLD08T310R-M		

HARDWARE

M285

D&Mline

Diameters
.750" to 1.500"
20,0 to 42,0mm

Max. Depth of Cut
15V1E: .06" (1,5mm)
15V1H: .08" (2,0mm)

Geometry

Positive/Positive



Contouring



Facing



Ramping



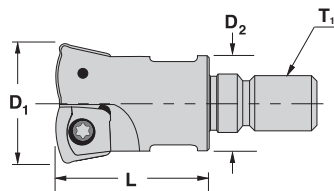
Corkscrew



Pocketing



Coolant Thru

[illegible]

*Identifies cutter with 2 week delivery

UHLD130515R-MM	UHLD08T310R-M		

HARDWARE

M287

D&M*line*

Diameters
2.000" and 6.000"

Cutting Edge Radius
5, 6, 8 and 10mm

Button I.C.
10, 12, 16 and 20mm



Contouring



Facing



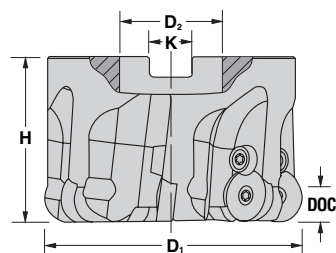
Ramping



Corkscrew

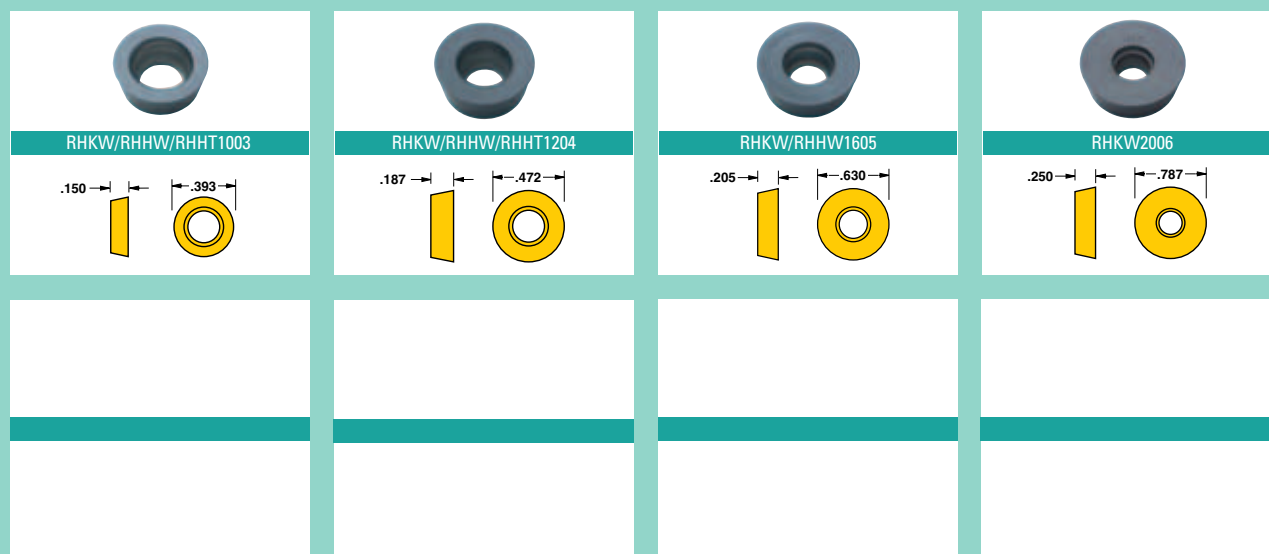


Pocketing

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*Can be used with **INNOFIT** system.

INSERTS



Insert Number	Insert Inscribed Circle	Application	Corner	Grades					
				IN	2005	2015	2040	2004	05S
RHKW1003M0TN	10mm	Multi-Purpose	.197R	■			■		
RHKW1204M0TN	12mm	Multi-Purpose	.236R	■			■		
RHKW1605M0TN	16mm	Multi-Purpose	.315R	■	■		■		
RHKW2006M0TN	20mm	Multi-Purpose	.394R			■	■		
RHHW1003M0TN	10mm	Precision	.197R	■	■	■		■	
RHHW1204M0TN	12mm	Precision	.236R	■	■	■		■	
RHHW1605M0TN	16mm	Precision	.315R	■	■	■		■	
RHHT1003M0FN-P	10mm	Ground/Polished (for Alum.)	.197R						■
RHHT1204M0FN-P	12mm	Ground/Polished (for Alum.)	.236R						■

HARDWARE

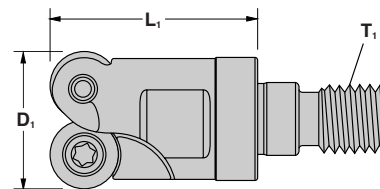
Insert Screw			Driver
Inscribed Circle	Part No.	Torque	Part No.
10mm, 12mm	SM40-080-10	25-30 in. lbs.	DS-T15T (Tx-15)
16mm, 20mm	SM50-100-10	35-40 in. lbs.	DS-T20T (Tx-20)

Insert Screw	Clamp	Clamp Screw
Inscribed Circle	Part No.	Part No.
10mm, 12mm	-	SF035-01
16mm, 20mm	CL-5000	SM50-100-10

For technical information, see page M499.

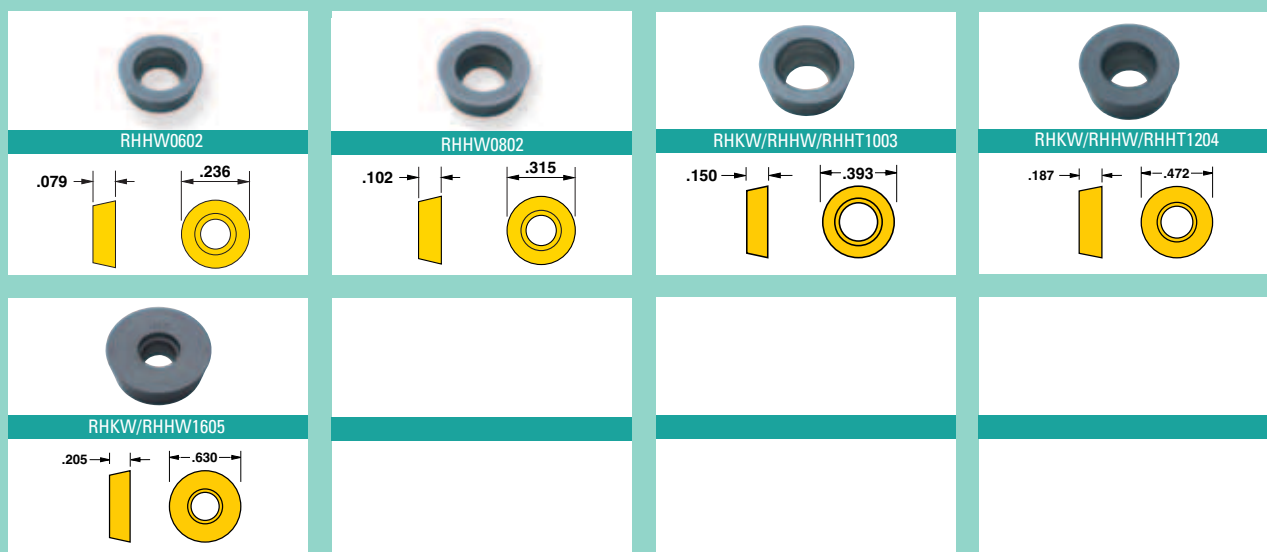


Coolant Th



See pages M390-M399 for TopOn System Components.

INSERTS



Insert Number	Insert Inscribed Circle	Application	Corner	Grades					
				IN	2004	2015	2005	2040	05S
RHKW1003M0TN	10mm	Multi-Purpose	.197R			■	■		
RHKW1204M0TN	12mm	Multi-Purpose	.236R			■	■		
RHKW1605M0TN	16mm	Multi-Purpose	.315R		■	■	■		
RHHW0602M0TN	6mm	Precision	.120R	■		■			
RHHW0802M0TN	8mm	Precision	.158R	■	■	■			
RHHW1003M0TN	10mm	Precision	.197R	■	■	■	■		
RHHW1204M0TN	12mm	Precision	.236R	■	■	■	■		
RHHW1605M0TN	16mm	Precision	.315R			■	■		
RHHT1003M0FN-P	10mm	Ground/Polished (for Alum.)	.197R						■
RHHT1204M0FN-P	12mm	Ground/Polished (for Alum.)	.236R						■

HARDWARE

Insert Inscribed Circle	Insert Screw		Clamp	Clamp Screw		Driver
	Part No.	Torque		Part No.	Part No.	
6mm	SM25-049-00	10-15 in. lbs.	-	-	-	DS-T08W (Tx-08)
8mm	SM30-053-00	13-18 in. lbs.	-	-	-	DS-T09W (Tx-09)
10mm	SM40-070-10	30-35 in. lbs.	-	-	-	DS-T15T (Tx-15)
12mm	SM40-080-10	30-35 in. lbs.	-	SF035-01	-	DS-T15T (Tx-15)
16mm	SM50-100-10	35-40 in. lbs.	CL-5000	SM50-100-10	-	DS-T20T (Tx-20)

For technical information, see page M499.

FORMMASTER™ BUTTON FACE MILL SERIES 5W6

Diameters	Cutting Edge Length	Button I.C.
2.000" to 6.000"	.25", .37" and .50"	.500", .750" and 1.000"R



Plunging



Facing



Ramping



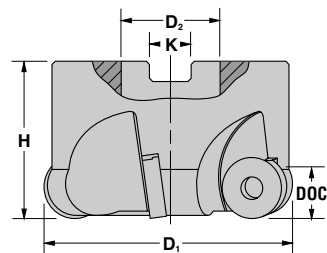
Contouring



Pocketing



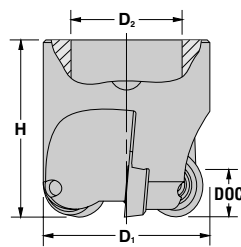
Channeling



D ₁ Nominal Diameter	Cutter Number	Insert Inscribed Circle	Cutting Edge Length	Number of Inserts	H Height	D ₂ Bore Diameter	Weight with Carbide	Retention Bolt	K Keyway Dimensions
2.000	5W6H-20R01	.500	.25	4	1.625	.750	0.7 lb.	SD-06-46	.32
2.500	5W6H-25R01	.500	.25	5	1.625	.750	1.3 lb.	SD-06-46	.32
2.000	5W6H-20R02	.500	.25	3	1.625	.750	0.6 lb.	SD-06-46	.32
3.000	5W6M-30R01	.750	.37	5	1.750	1.000	1.9 lb.	SD-08-46	.38
3.000	5W6H-30R01	.500	.25	6	1.750	1.000	2.0 lb.	SD-08-46	.38
3.000	5W6M-30R02	.750	.37	4	1.750	1.000	2.0 lb.	SD-08-46	.38
4.000	5W6M-40R01	.750	.37	6	2.000	1.250	4.5 lb.	SD-10-47	.50
4.000	5W6H-40R01	.500	.25	7	2.000	1.250	4.8 lb.	SD-10-47	.50
4.000	5W6M-40R02	.750	.37	5	2.000	1.250	4.4 lb.	SD-10-47	.50
4.000	5W6R-40R01	1.000	.50	5	2.500	1.500	5.6 lb.	SD-12-82	.62
5.000	5W6R-50R01	1.000	.50	6	2.500	1.500	9.8 lb.	SD-12-82	.62
6.000	5W6M-60R01	.750	.37	8	2.375	1.500	10.6 lb.	SD-12-82	.62
6.000	5W6M-60R02	.750	.37	7	2.375	1.500	11.5 lb.	SD-12-82	.62
6.000	5W6R-60R01	1.000	.50	7	2.500	1.500	11.3 lb.	SD-12-82	.62



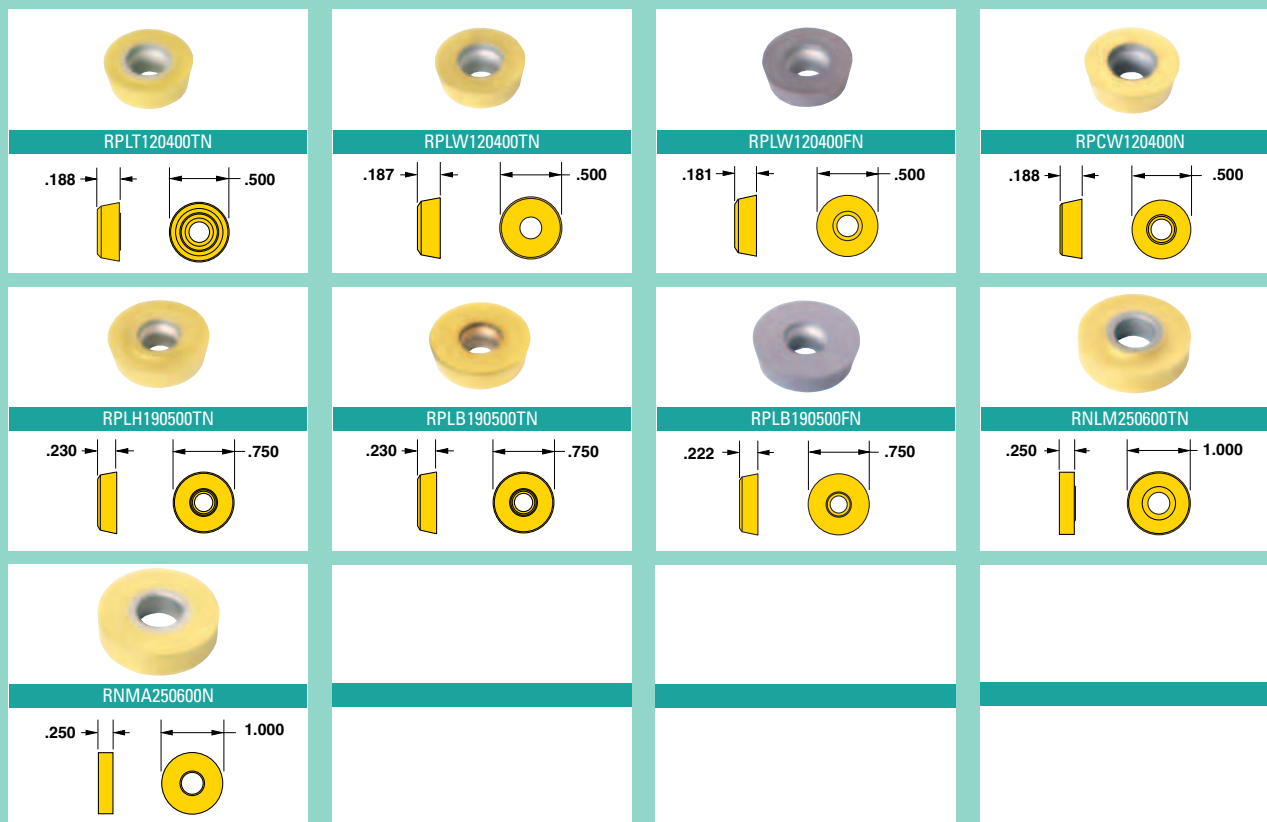
HI-TORK™ STYLE



D ₁ Nominal Diameter	Cutter Number	Insert Inscribed Circle	Cutting Edge Length	Number of Inserts	H Height	D ₂ Bore Diameter	Weight with Carbide	Retention Bolt
2.000	5W6H-20R03	.500	.25	3	2.000	1.250	0.9 lb.	SA06-37
2.000	5W6M-20R03	.750	.37	3	2.000	1.250	0.8 lb.	SA06-37

™ = Precision Components

INSERTS



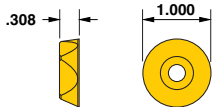
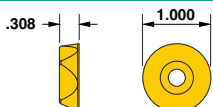
Insert Number	Insert Inscribed Circle	Application	Cutting Edge Configuration	Corner	Grades						
					IN	40P	1530	1540	6530	2030	2040
RPLT120400TN	.500	Precision	Positive Rake Face	.25R		■	■	■	■	■	
RPLW120400TN	.500	Multi-Purpose	Positive Flat Top	.25R			■	■	■	■	
RPLW120400FN	.500	Multi-Purpose	Sharp Flat Top	.25R							■
RPCW120400N	.500	Multi-Purpose	Precision Flat Top	.25R			■	■		■	■
RPLH190500TN	.750	Multi-Purpose	Positive Rake Face	.37R		■	■	■	■	■	
RPLB190500TN	.750	Multi-Purpose	Positive Flat Top	.37R			■	■	■	■	
RPLB190500FN	.750	Multi-Purpose	Sharp Flat Top	.37R							■
RNLM250600TN	1.000	Multi-Purpose	Positive Rake Face	.50R		■	■	■	■	■	
RNMA250600N	1.000	Heavy Duty	Negative Flat Top	.50R		■		■			

HARDWARE

Insert Screw				Driver	
Insert I.C.	Part No.	Torque		Part No.	
.500	SM40-120-20	30-35 in. lbs.		DS-T15T	(Tx-15)
.750	SM50-127-10	35-40 in. lbs.		DS-T20T	(Tx-20)
1.000	SC-04-17	40-45 in. lbs.		WS-0022	(1/8" hex)

For technical information, see page M500.

INSERTS

			
RPLB250700TN-VL 	RPLB250700 		

Insert Number	Application	Cutting Edge Configuration	Corner	Grades		
				IN	2030	2040
RPLB250700TN-VL*	Heavy Duty	Positive Variable Land	.50R	■	■	
RPLB250700FN	Multi-Purpose	Positive Flat Top	.50R	■	■	

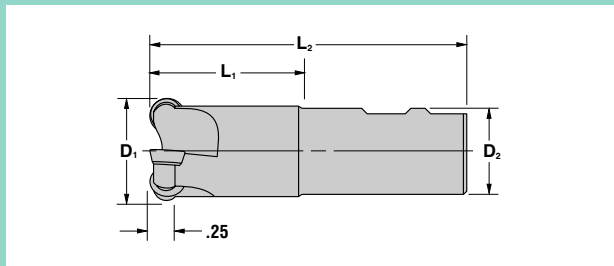
*Do not use in 5W6S-40R20 or 5W6S-60R20 progressive index series mills.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SE25-063-10	45-50 in. lbs.	DS-T25T (Tx-25)

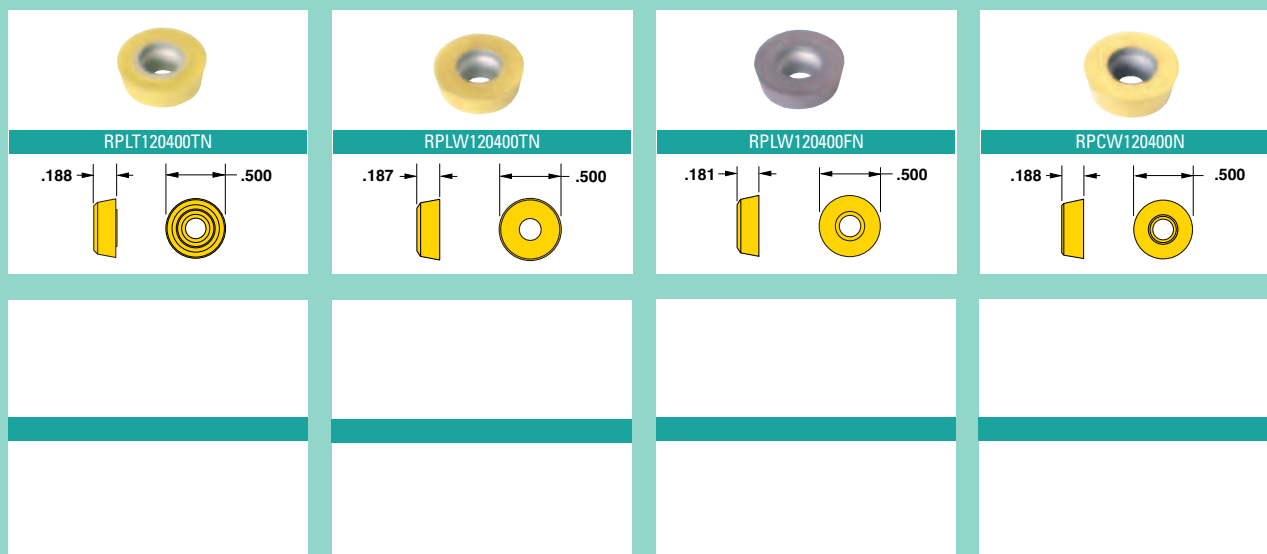
For technical information, see page M500.

Corkscrew



1.000	15B1H-1003080R01	3.00	5.25	1.000 Weldon	1	.500	.9 lb.
1.250	15B1H-1203781R01	3.75	6.00	1.250 Weldon	2	.500	1.6 lb.
1.500	15B1H-1502281R01	2.25	4.50	1.250 Weldon	3	.500	1.6 lb.
1.500	15B1H-1503781R01	3.75	8.00	1.250 Weldon	3	.500	2.1 lb.

INSERTS



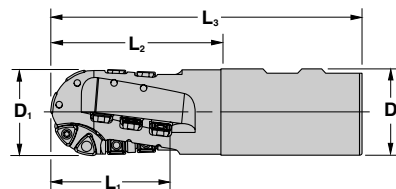
Insert Number	Insert Inscribed Circle	Application	Cutting Edge Configuration	Corner	Grades						
					IN	40P	1530	1540	6530	2030	2040
RPLT120400TN	.500	Precision	Positive Rake Face	.25R	■	■	■	■	■	■	■
RPLW120400TN	.500	Multi-Purpose	Positive Flat Top	.25R			■	■	■	■	
RPLW120400FN	.500	Multi-Purpose	Sharp Flat Top	.25R						■	
RPCW120400N	.500	Multi-Purpose	Flat Top	.25R						■	

HARDWARE

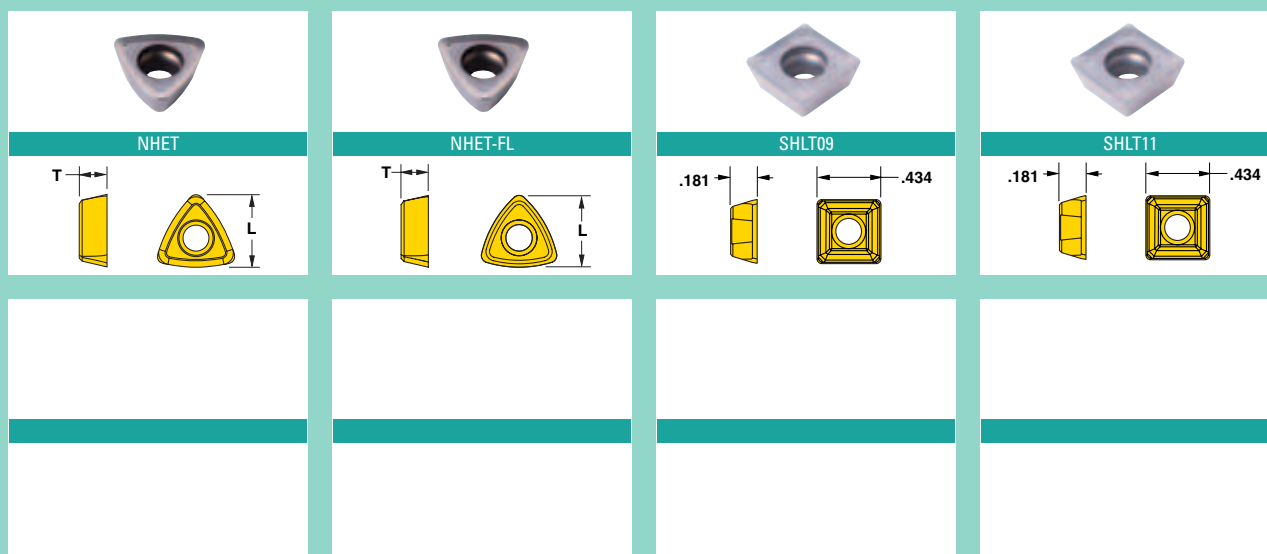
Insert Screw		Driver
Part No.	Torque	Part No.
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M499.

10/10

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INSERTS



Cutter Diameter	Insert Number	Application	L Length	T Thickness	Grades			
					IN	30M	1030	2005
Nose Inserts								
1.000	NHET250300R	Precision	.402	.150		■	■	
1.000	NHET250300R-FL	K-Land	.402	.141				■
1.250	NHET310300R	Precision	.411	.150		■	■	
1.250	NHET310300R-FL	K-Land	.411	.141				■
1.500	NHET380400R	Precision	.476	.188		■	■	
1.500	NHET380400R-FL	K-Land	.476	.180				■
2.000	NHET500400R	Precision	.488	.188		■	■	
2.000	NHET500400R-FL	K-Land	.488	.180				■
Side Inserts								
1.000	SHLT090308N-HR	Standard	-	-		■	■	■
1.250	SHLT090308N-HR	Standard	-	-		■	■	■
1.500	SHLT110408TN-HR	Standard	-	-		■	■	■
2.000	SHLT110408TN-HR	Standard	-	-		■	■	■

HARDWARE

Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
NHET 25, 31/SHET 03	SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)
NHET 38, 50/SHET 11	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M498.



HEAVY-DUTY PLUNGING BALL NOSE END MILL

SERIES 13W7X, 23W1X

Diameters

1.000" to 2.000", 50,0mm

Max. Depth of Cut

1.18" to 3.39"



Plunging



Contouring



Ramping



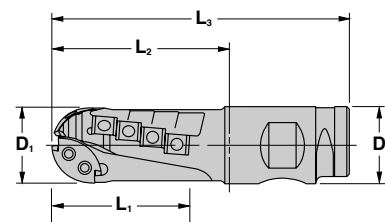
Channeling



Pocketing



Corkscrew

[illegible]

*Tapered after 3.00" Depth of cut.

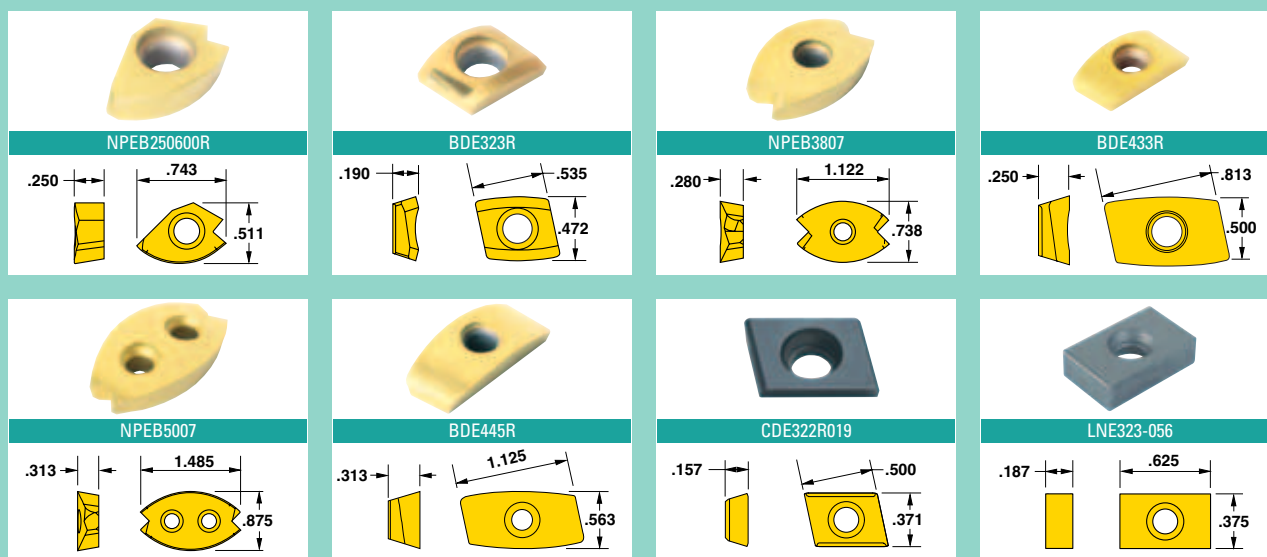
HARDWARE

Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
NPEB38/BDE433	SM50-127-10	40-45 in. lbs.	DS-T20T (Tx-20)
BDE323	SM50-096-20	40-45 in. lbs.	DS-T20T (Tx-20)
NPEB50/BDE445	SM50-160-10	40-45 in. lbs.	DS-T20T (Tx-20)
CDE322	SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)
LNE323	SM35-110-00	30-35 in. lbs.	DS-T15T (Tx-15)
LNE424	SM50-120-00	30-35 in. lbs.	DS-T15T (Tx-15)

M300

D&Mline

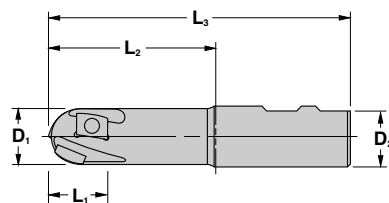
INSERTS



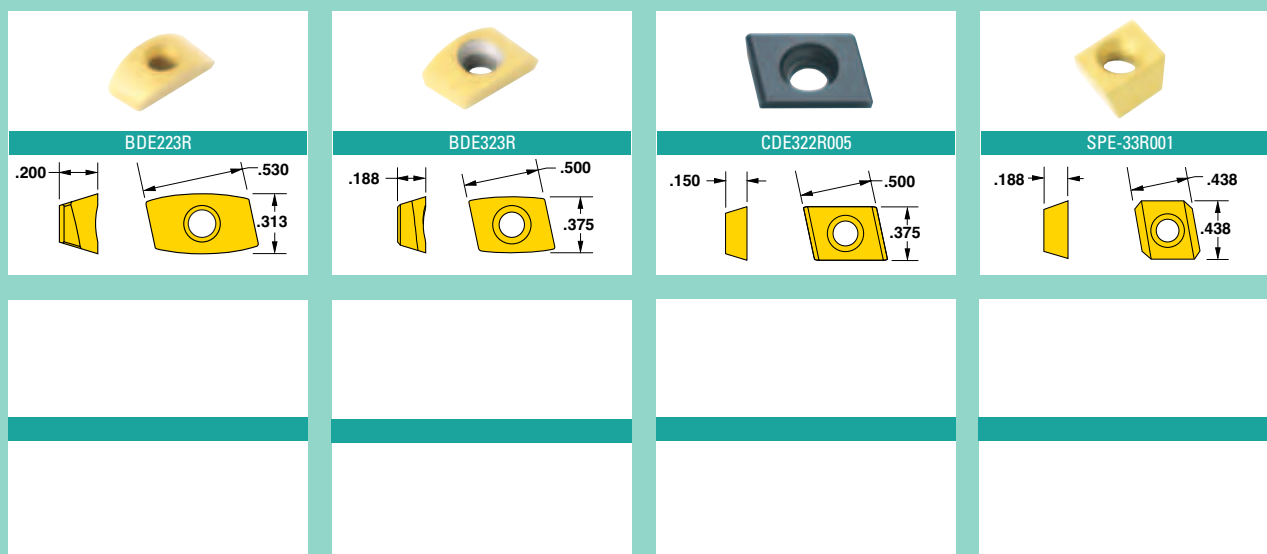
Cutter Diameter	Quantity Each	Insert Number	Application	Grades				
				IN	40P	1530	1540	6530
Nose Inserts								
1.000	1	NPEB250600R	Standard			■	■	
1.000	1	BDE323R048	Standard			■	■	
1.250	1	NPEB310600R	Standard			■		■
1.250	1	BDE323R034	Standard			■		■
1.250	1	NPEB310600TR	Heavy Duty				■	
1.250	1	BDE323R038	Heavy Duty				■	
1.500	1	NPEB380700R	Standard			■		■
1.500	1	BDE433R001	Standard			■		■
1.500	1	NPEB380700TR	Heavy Duty				■	
1.500	1	BDE433R002	Heavy Duty				■	
2.000 or 50,0 mm	1	NPEB500700R	Standard			■		
2.000 or 50,0 mm	1	BDE445R003	Standard			■		
2.000 or 50,0 mm	1	NPEB500700TR	Heavy Duty				■	
2.000 or 50,0 mm	1	BDE445R002	Heavy Duty				■	
Side Inserts								
1.000	2	CDE322R019	Standard			■		
1.250 or 1.500	4	LNE323-056	Standard		■			
2.000 or 50,0 mm	8	LNE424-004	Standard		■			

For technical information, see page M498.

10



INSERTS



Cutter Diameter	Insert Number	Application	Grades								
			IN	10K	15K	40P	6530	1515	1510	1530	2030
Nose Inserts											
.750	BDE223R001	Standard			■					■	■
.750	BDE223R060	Precision						■			
1.000	BDE323R001	Standard			■	■		■		■	■
1.250	BDE323R003	Standard			■					■	■
1.500	BDE323R004	Standard								■	■
2.000	BDE323R005	Standard									■
Side Inserts											
.750-1.500	CDE322R005	Standard		■	■	■	■	■	■		■
2.000	SPE-33R001	Standard		■		■					■

HARDWARE

Cutter Diameter	Nose Insert Screw		Driver
	Part No.	Torque	
.750	SE05-031-00	18-22 in. lbs.	DS-T10T (Tx-10)
1.000-2.000	SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)

Cutter Diameter	Side Insert Screw		Driver
	Part No.	Torque	
1.000-2.000	SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M496.

POWERBALL™ TWO-EFFECTIVE BALL NOSE END MILL

SERIES 16W7B, 26W1B, 16W7J, 26W1L

Diameters
1.250" to 3.000"

Cutting Edge Length
1.06" to 3.65"



Contouring



Ramping



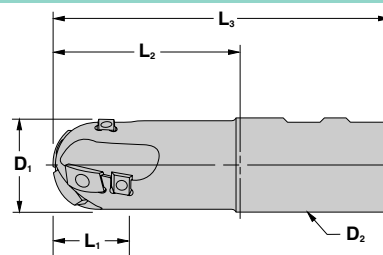
Pocketing



Corkscrew



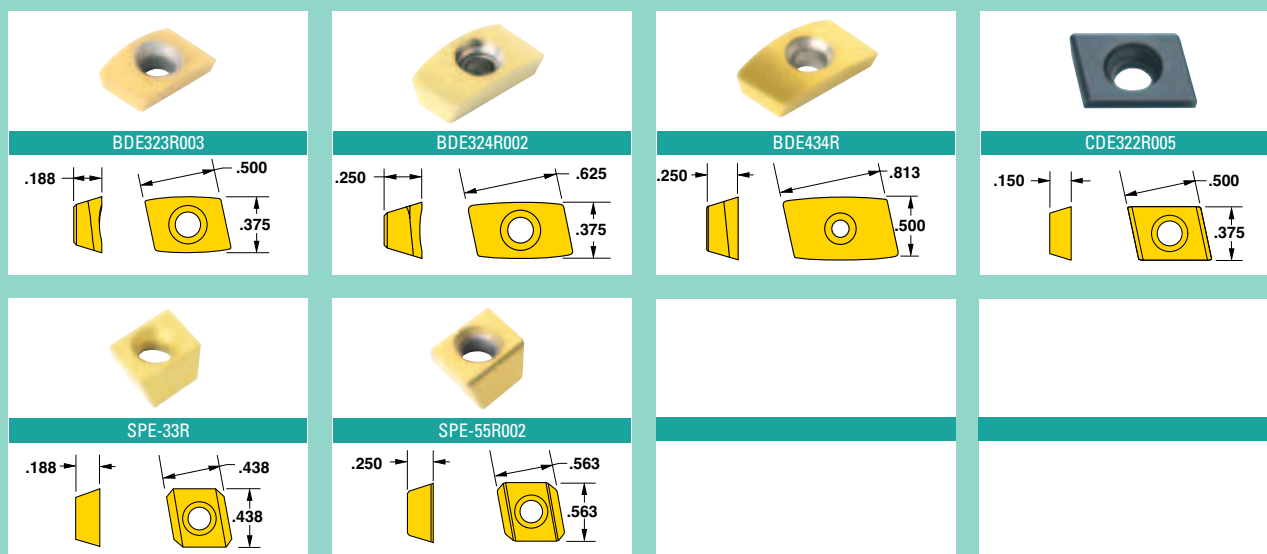
Channeling

[illegible]

M304

D&Mline

INSERTS



Cutter Diameter	Insert Number	Application	Grades								
			IN	10K	15K	40P	6530	1515	1510	1530	2030
Nose Inserts											
1.250	BDE323R003	Standard			■						■
1.500	BDE324R002	Standard			■		■				
2.000	BDE434R001	Standard			■		■	■			
3.000	BDE434R002	Standard					■				
Side Inserts											
1.250	CDE322R005	Standard		■	■	■	■	■	■		■
1.500 or 2.000	SPE-33R001	Standard		■		■				■	■
3.000	SPE-55R002	Standard		■		■	■			■	

HARDWARE

Nose Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
BDE323	SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)
BDE324	SE06-042-00	25-30 in. lbs.	DS-T15T (Tx-15)
BDE434	SE10-049-00	25-30 in. lbs.	DS-T15T (Tx-15)

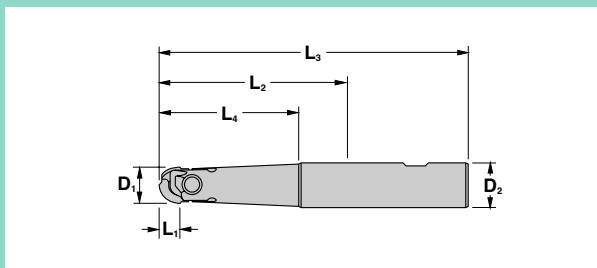
Side Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
CDE322/SPE-33	SE06-037-00	25-30 in. lbs.	DS-T15T (Tx-15)
SPE-55	SE10-049-00	25-30 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M496.

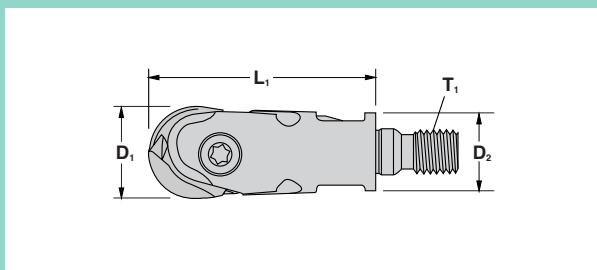
Diameters
.375" to 1.000"

Max. Depth of Cut
Full Radius

Insert Corner
.187" to .500"R

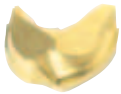


D ₁ Nominal Diameter	Cutter Number	L ₁ Max DOC	L ₂ Extension	L ₃ Overall Length	D ₂ Shank Size/Style	Effective Flutes	L ₄ Body Length/Style
.375	12W7S-0301579R01	.18	1.59	3.50	.625 Weldon	1	1.5-Straight
.375	12W8S-03040S6R01	.18	4.09	6.00	.625 Straight	1	2.0-Taper
.500	12W7T-05022S5R01	.25	2.22	4.00	.500 Straight	2	1.2-Straight
.500	12W8T-0502579R01	.25	2.59	4.50	.625 Weldon	2	2.0-Taper
.500	12W8T-05043S6R01	.25	4.34	6.25	.625 Straight	2	2.2-Taper
.625	12W7U-0603084R01	.31	3.00	5.00	.750 Weldon	2	1.6-Straight
.625	12W8U-06050S7R01	.31	5.00	7.00	.750 Straight	2	2.5-Taper
.750	12W7V-0704084R01	.37	4.00	6.00	.750 Weldon	2	2.5-Straight
.750	12W8V-0705780R01	.37	5.75	8.00	1.000 Weldon	2	3.5-Taper
.750	12W8V-07067S9R01	.37	6.75	9.00	1.250 Straight	2	4.5-Taper
1.000	12W7W-1004480R01	.50	4.45	6.70	1.000 Weldon	2	2.7-Straight
1.000	12W8W-1007781R01	.50	7.75	10.00	1.250 Weldon	2	5.0-Taper



D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension from Holder	D ₂ Flange Diameter	Number of Inserts	Wrench Size
.375"	M8	12W7S010030X5R00	1.18"	0.51"	1	10mm
.500"	M8	12W7T012030X5R00	1.18"	0.51"	1	10mm
.625"	M8	12W7U016032X5R00	1.28"	0.51"	1	10mm
.625"	M10	12W7U016045X6R00	1.77"	0.71"	1	15mm
.750"	M10	12W7V020040X6R00	1.57"	0.71"	1	15mm
.750"	M12	12W7V020055X7R00	2.16"	0.82"	1	18mm
1.000"	M12	12W7W025060X7R00	2.36"	0.82"	1	18mm
1.000"	M16	12W7W025060X8R00	2.36"	1.14"	1	25mm

INSERTS

			
NCET090200R	NCEX-Standard	NCHX-Precision	
			

Cutter Diameter	Quantity Each	Insert Number	Application	Cutting Edge Configuration	Indexes/Insert	Grades		
						IN	1530	1030
.375	1	NCET090200R	Standard	Positive Hook	2	■		
.500	1	NCEX120300R	Standard	Positive Hook	1	■		
.500	1	NCHX120300R	Precision	Positive Hook	1			■
.625	1	NCEX150500R	Standard	Positive Hook	1	■		
.625	1	NCHX150500R	Precision	Positive Hook	1			■
.750	1	NCEX190500R	Standard	Positive Hook	1	■		
.750	1	NCHX190500R	Precision	Positive Hook	1			■
1.000	1	NCEX250600R	Standard	Positive Hook	1	■		
1.000	1	NCHX250600R	Precision	Positive Hook	1			■

HARDWARE

Cutter Diameter	Insert Screw		Driver	Retaining Ring
	Part No.	Torque		Part No.
.375	SM25-055-10	9-11.5 in. lbs.	DS-T08W (Tx-08)	-
.500	SF050-01	53-58 in. lbs.	DS-T15T (Tx-15)	RR-03-01
.625	SF060-01	65-70 in. lbs.	DS-T20T (Tx-20)	RR-03-02
.750	SF080-01	105-110 in. lbs.	DS-T25T (Tx-25)	RR-04-01
1.000	SF080-02	105-110 in. lbs.	DS-T25T (Tx-25)	RR-04-01

For technical information, see page M496.

Diameters
.625" to 1.500"

Cutting Edge Length
.040" wiping flat

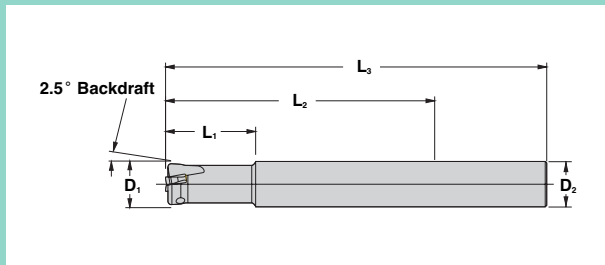
Insert Corner Radius
1mm (.039), 2mm (.078)



Contouring



Shoulder



D ₁ Nominal Diameter	Cutter Number	Insert	L ₁ Projection Length	L ₂ Extension	L ₃ Overall Length	D ₂ Shank Size/Style	Effective Flutes
.625	15V1D-06060S6R01	CNHU06	3.04	6.09	8.00	.625 Straight	2
.750	15V1D-07060S7R01	CNHU06	3.00	6.00	8.00	.750 Straight	2
.750	15V1D-07060S7R02	CNHU06	3.00	6.00	8.00	.750 Straight	3
1.000	15V1D-10057S1R01	CNHU06	2.87	5.75	8.00	1.000 Straight	3
1.250	15V1D-12077S9R01	CNHU06	2.87	7.75	10.00	1.250 Straight	4
1.500	15V1D-15073S5R01	CNHU06	3.67	7.34	10.00	1.500 Straight	5
1.000	15V1G-10057S1R01	CNHU11	2.87	5.75	8.00	1.000 Straight	2
1.250	15V1G-12077S9R01	CNHU11	3.87	7.75	10.00	1.250 Straight	3
1.500	15V1G-15073S5R01	CNHU11	3.67	7.34	10.00	1.500 Straight	4

Diameters
2.000"

Cutting Edge Length
.27" with .040" wiping flat

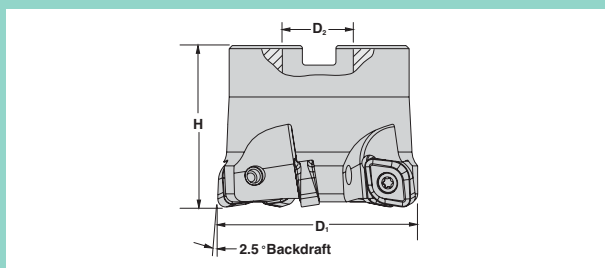
Insert Corner Radius
2mm (.078)



Contouring



Shoulder

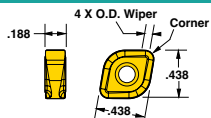


D ₁ Nominal Diameter	Cutter Number	Insert	H Height	D ₂ Bore Diameter	Drive	Effective Flutes	Coolant
2.000	5V6G-20R01	CNHU11	1.570	.750	.312 Radial Keyway	5	No
2.000	5V6G-20R02	CNHU11	2.000	1.250	Hi Tork Style™	5	No

INSERTS

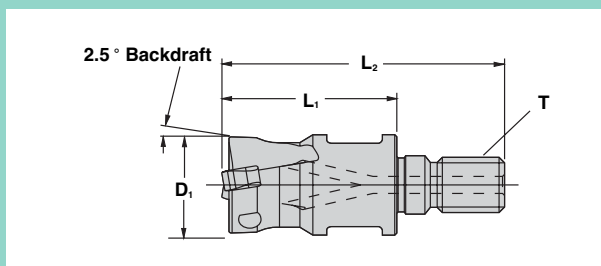


CNHU1104

[illegible]

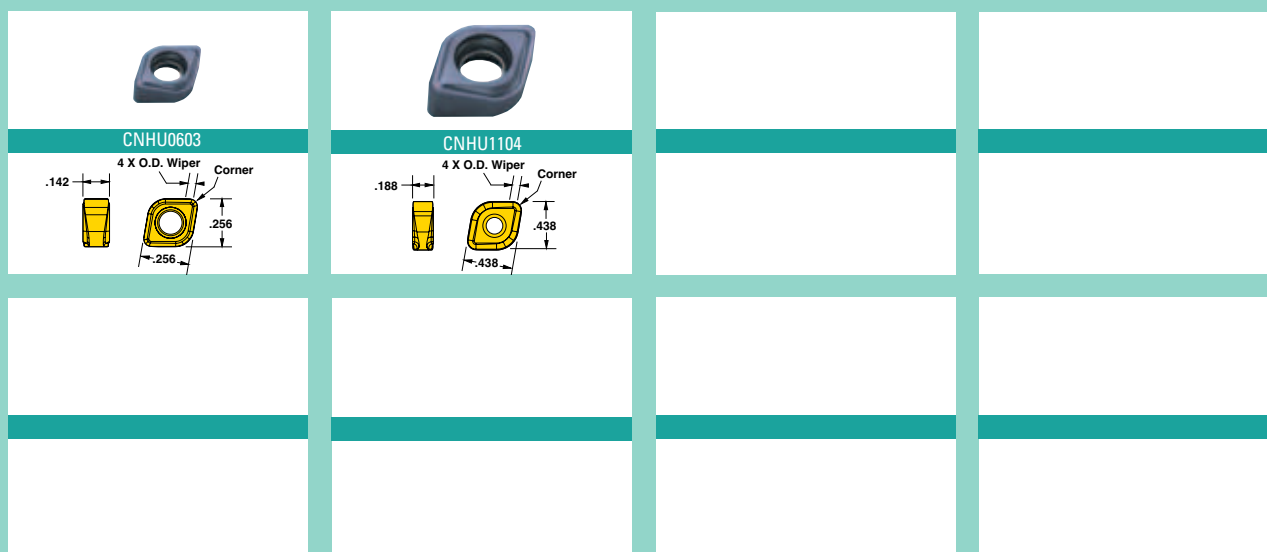
HARDWARE

	Side Insert Screw		Driver
Insert Series	Part No.	Torque	Part No.
15V1D	SM25-075-20	7-10 in. lbs.	DS-T08W (Tx-08)
15V1G	SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)



M310

INSERTS



Cutter Series	Insert Number	Application	Indexes per Insert	Corner	Grades			
					IN	1030	2005	2040
15V1D	CNHU060310N	Finishing/Semi-Finishing	4	1 mm (.039R)	■	■	■	
15V1G	CNHU110420N	Finishing/Semi-Finishing	4	2 mm (.078R)		■		

HARDWARE

Insert Series	Side Insert Screw		Driver
	Part No.	Torque	
15V1D	SM25-075-20	7-10 in. lbs.	DS-T08W (Tx-08)
15V1G	SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

For technical information, see page M501.



SOLID CARBIDE SERRATED ROUGHING TIP

SERIES 47C, 47D, 48C, 48D

(0° LEAD, 45° HELIX, CENTER CUTTING)

Diameters
.312" to .750"

Grade
IN2005

Corner
Chamfer & Radius



Shoulder



Channeling



Ramping



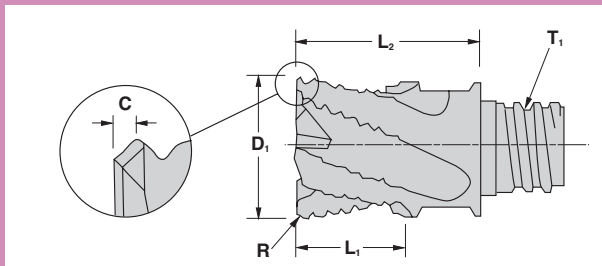
Corkscrew



Pocketing



Facing

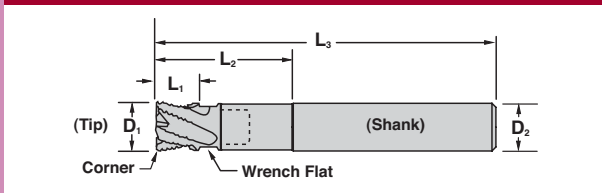


Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	C Corner
47C-3120TQRN01	4	.312	.20	T05	.39	.010 x 45
47C-3727T6RN01	4	.375	.27	T06	.50	.013 x 45
47D-3727T6RN03	4	.375	.27	T06	.50	.031
47C-5037T8RN01	4	.500	.37	T08	.65	.012 x 45
47D-5037T8RN03	4	.500	.37	T08	.65	.031
47D-5037T8RN06	4	.500	.37	T08	.65	.062
47C-6247TRRN01	5	.625	.47	T10	.80	.014 x 45
48C-7562TSRN01	6	.750	.62	T12	1.00	.016 x 45
48D-7562TSRN06	6	.750	.62	T12	1.00	.062

Chip•Surfer Paks



Tip and Shank



Order This Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Diameter	End Mill Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assm Length	Wrench
S050T08KA-06-02	(2) 47C-5037T8RN01	S050T08SA-06 (Steel)	.500	.012 x 45	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-02	(2) 47C-5037T8RN01	S050T08CA-25 (Carbide)	.500	.012 x 45	.500 Cyl	.37	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

Diameters
.312" to .750"

Grade
IN2005

Corner Chamfer & Radius



Shoulder



Channeling



Ramping



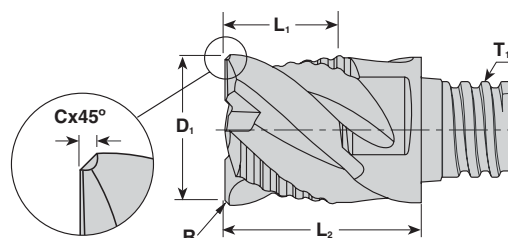
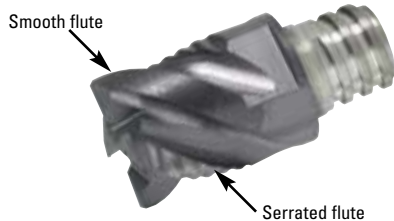
Corkscrew



Pocketing



Facing

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.



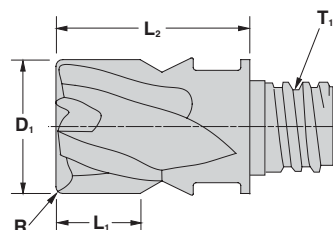
SOLID CARBIDE CENTER CUTTING END MILL TIP

SERIES 46J, 46D

Corner
Sharp, .015", .031" and
.062"_R



Facing



Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
------------------	------	---------------------------------------	--	----------------------------------	---------------------------------------	-----------------------

46-I-3120TORB04

46J-3120TQRD04	3	.312	.20	T05	.39	SHARP
46D-3120TQRD03	3	.312	.20	T05	.39	.031
46J-3727T6RD05	3	.375	.27	T06	.50	SHARP
46D-3727T6RD01	3	.375	.27	T06	.50	.015
46D-3727T6RD03	3	.375	.27	T06	.50	.031
46D-3727T6RD06	3	.375	.27	T06	.50	.062
46J-5037T8RD06	3	.500	.37	T08	.65	SHARP
46D-5037T8RD01	3	.500	.37	T08	.65	.015
46D-5037T8RD03	3	.500	.37	T08	.65	.031
46D-5037T8RD06	3	.500	.37	T08	.65	.062

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130

For technical information, see page M482.

CHASE*line*

M402

CHIP SURFER™ SOLID CARBIDE CENTER CUTTING END MILL TIP SERIES 47J, 47D
(0° LEAD, 45° HELIX, HIGH PRECISION)

Diameters
.312" to .750"

Grade
IN2005, IN3005

Corner
Sharp, .015", .031" and
.062"R



Shoulder



Channeling



Ramping



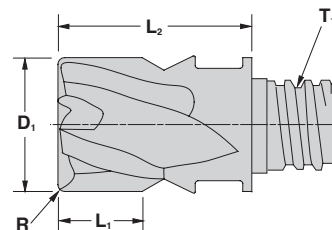
Corkscrew



Pocketing



Facing



Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
4-FLUTE END MILL HEADS						
47J-3120TQRD04	4	.312	.20	T05	.39	SHARP
47D-3120TQRD01	4	.312	.20	T05	.39	.015
47D-3120TQRD03	4	.312	.20	T05	.39	.031
47D-3120TQRD06	4	.312	.20	T05	.39	.062
47J-3727T6RD05	4	.375	.27	T06	.50	SHARP
47D-3727T6RD01	4	.375	.27	T06	.50	.015
47D-3727T6RD03*	4	.375	.27	T06	.50	.031
47D-3727T6RD06	4	.375	.27	T06	.50	.062
47J-5037T8RD06	4	.500	.37	T08	.65	SHARP
47D-5037T8RD01	4	.500	.37	T08	.65	.015
47D-5037T8RD03	4	.500	.37	T08	.65	.031
47D-5037T8RD06	4	.500	.37	T08	.65	.062
47J-6247TRRD08	4	.625	.47	T10	.80	SHARP
47D-6247TRRD03	4	.625	.47	T10	.80	.031
47D-7562TSRD03	4	.750	.62	T12	1.00	.031

* Also offered in Grade IN3005- diamond coated for milling graphite.

Order This Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Diameter	R End Mill Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assm Length	Wrench
S037T06KA-06-11	(2) 47D-3727T6RD03	S037T06SA-06 (Steel)	.375	.031	.375 Cyl	.27	1.00	3.50	WS-0029
S050T08KA-06-11	(2) 47D-5037T8RD03	S050T08SA-06 (Steel)	.500	.031	.500 Cyl	.37	1.18	4.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

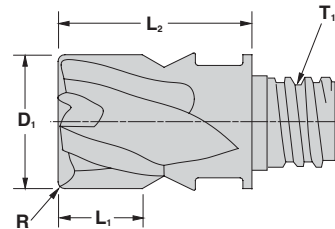
For technical information, see page M482.

CHASEline



SERIES 48D, 48J, 49D, 49J

Corner
Sharp, .015", .031" and .062"R



Wrench (Not included with carbide tip or shank purchase).

When assembling, be sure carbide tip is seated firmly on shank with no gap.

CHASE*line*

M404

CHIP•SURFER™ 0° LEAD, 45° HELIX, POLISHED, SHARP, FOR ALUMINUM SERIES 45D, 45J, 46D, 46J
(CENTER CUTTING)

Diameters
.312" to .750"

Grade
IN05S

Corner
Sharp and .020"r



Shoulder

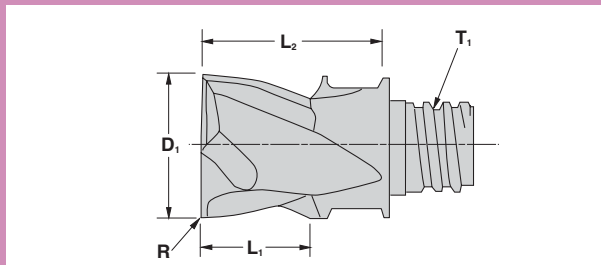
Channeling

Ramping

Corkscrew

Pocketing

Facing

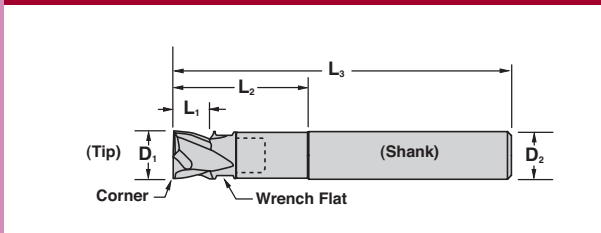


Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
46D-3120TQRD02-P	3	.312	.20	T05	.39	.020
45J-3727T6RD05-P	2	.375	.27	T06	.50	SHARP
45D-3727T6RD02-P	2	.375	.27	T06	.50	.020
46D-3727T6RD02-P	3	.375	.27	T06	.50	.020
45J-5037T8RD06-P	2	.500	.37	T08	.65	SHARP
45D-5037T8RD02-P	2	.500	.37	T08	.65	.020
46D-5037T8RD02-P	3	.500	.37	T08	.65	.020
46J-6239TRRD08-P	3	.625	.39	T10	.80	SHARP
46D-7550TSRD02-P	3	.750	.50	T12	1.00	.020

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-04	(2) 45J-3727T6RD05-P	S037T06SA-06 (Steel)	.375	Sharp	.375 Cylindrical	.27	.98	3.48	WS-0029
S050T08KA-06-04	(2) 45J-5037T8RD06-P	S050T08SA-06 (Steel)	.500	Sharp	.500 Cylindrical	.37	1.16	4.13	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-14	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

DRILL-MILL TIP SERIES 45D

Diameters
 .375" to .625"
Grade
 IN2005
Corner
 .015"R



Drill



Std. Bottom



Shoulder



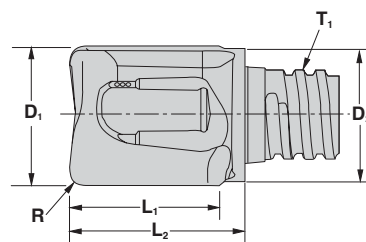
Pocketing



Ramping



Channeling



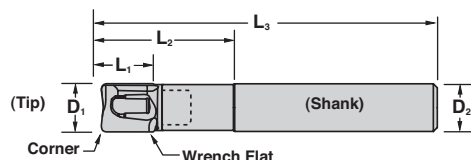
Cutter Number	Eff.	D ₁ Nominal Diameter	D ₂ Flange Diameter	T ₁ Thread Size	L ₁ Edge Length	L ₂ Extension Length	R Corner Radius
45D-3738T6RA01	2	.375	.35	T06	.38	.48	.015
45D-5045T8RA01	2	.500	.48	T08	.45	.60	.015
45D-6263T10RA01	2	.625	.60	T10	.60	.75	.015

*Drill depth not to exceed 2/3 edge length.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-D1	(2) 45D-3738T6RA01	S037T06SA-06 (Steel)	.375	.015	.375 Cylindrical	.38	.98	3.48	WS-0029
S050T08KA-06-D1	(2) 45D-5045T8RA01	S050T08SA-06 (Steel)	.500	.015	.500 Cylindrical	.45	1.13	4.10	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

FLAT BOTTOM PLUNGE CUTTER SERIES 45V

Diameters
 .375" - .625"
Grade
 IN2005
Corner
 .031"R



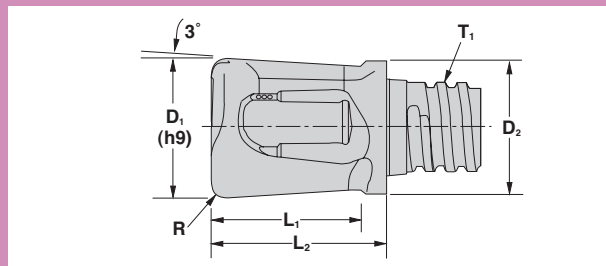
Drill



Flat Bottom



Plunge



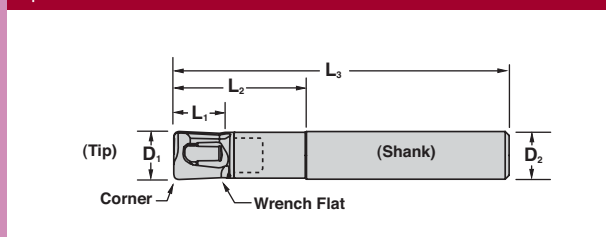
Cutter Number	Eff.	D ₁ Nominal Diameter	D ₂ Flange Diameter	T ₁ Thread Size	L ₃ Edge Length	L ₂ Extension Length	R Corner Radius
45V-3738T6RA03	2	.375	.35	T06	.38	.48	.031
45V-5045T8RA03	2	.500	.48	T08	.45	.60	.031
45V-6260T8RA03	2	.625	.60	T10	.60	.75	.031

*Drill depth not to exceed 2/3 edge length.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-P1	(2) 45V-3738T6RA03	S037T06SA-06 (Steel)	.375	.030	.375 Cylindrical	.38	.98	3.48	WS-0029
S050T08KA-06-P1	(2) 45V-5045T8RA03	S050T08SA-06 (Steel)	.500	.030	.500 Cylindrical	.45	1.13	4.10	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

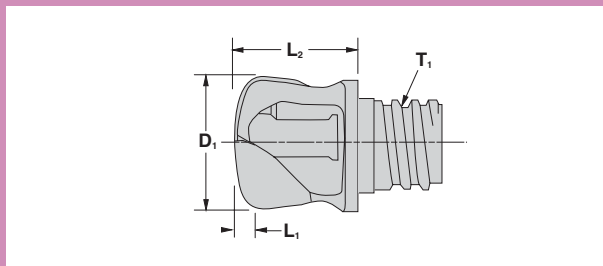
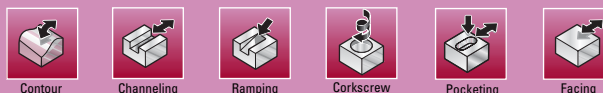
CHASEline

SOLID CARBIDE ULTRA HIGH-FEED TIP SERIES 45A

Diameters
 .375" to .629"

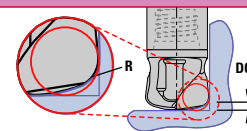
Grade
 IN2005

Corner
 .080", .100" and .120"R



Cutter Number	D ₁ Nominal Diameter	Eff.	L ₁ Depth of Cut	T Thread Size	L ₂ Extension Length	R Corner Radius	Ramp Angle
45A-3703T6RA06	.375	2	.02	T06	.47	.080	10°
45A10001T6RA20	.394 (10mm)	2	.02	T06	.49	.080	10°
45A12001T8RA25	.472 (12mm)	2	.04	T08	.44	.100	10°
45A-5004T8RA08	.500	2	.04	T08	.49	.100	10°
45A16001T8RA30	.629 (16mm)	2	.04	T10	.80	.120	10°

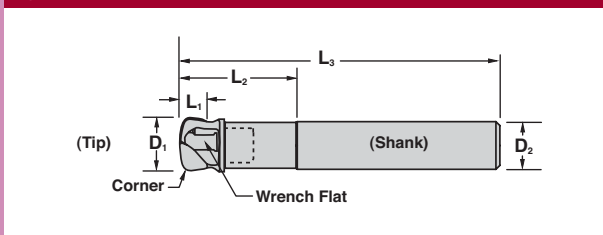
Program as though they are a square bottom end mill with noted corner radius.
 This method will ensure and minimize remaining stock for secondary passes.



Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Dia.	D ₂ End Mill Corner	L ₁ Shank Adaption	L ₂ Length of Cut	L ₃ Projection Length	Assem. Length	Wrench
S037T06KA-06-F2	(2) 45A-3703T6RA06	S037T06SA-06 (stl)	.375	.08	.375 Cyl	.02	.98	3.48	WS-0029
S037T06KA-20-F2	(2) 45A-3703T6RA06	S037T06CA-20 (carb)	.375	.08	.375 Cyl	.02	2.43	5.23	WS-0029
S050T08KA-06-F1	(2) 45A12001T8RA25	S050T08SA-061(stl)	.472 (12mm)	.10	.500 Cyl	.04	1.07	3.94	WS-0030
S050T08KA-25-F1	(2) 45A12001T8RA25	S050T08CA-251(carb)	.472 (12mm)	.10	.500 Cyl	.04	2.90	5.94	WS-0030
S050T08KA-06-F2	(2) 45A-5004T8RA08	S050T08SA-06 (stl)	.500	.10	.500 Cyl	.04	1.33	4.30	WS-0030
S050T08KA-25-F2	(2) 45A-5004T8RA08	S050T08CA-25 (carb)	.500	.10	.500 Cyl	.04	3.25	6.30	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

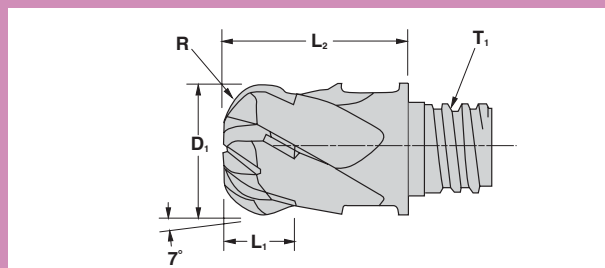
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M483.

CHASEline

SOLID CARBIDE BACKDRAFT TOROIDAL TIP SERIES 48U

Diameters .375" to .500"	Grades IN2005, IN3005	Corner .031", .062" and .125"R
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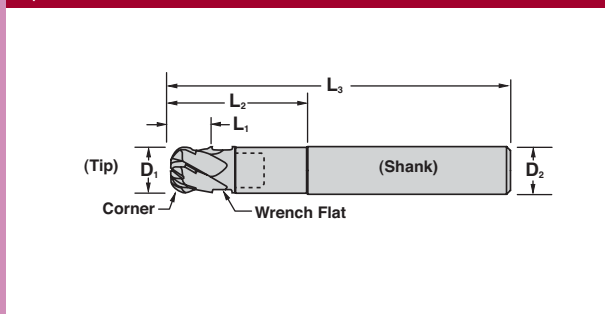
Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius	Ramp Angle
*48U-3719T6RB03	6	.375	.19	T06	.50	.031	9°
48U-3719T6RB06	6	.375	.19	T06	.50	.062	9°
48U-5027T8RB03	6	.500	.27	T08	.65	.031	9°
48U-5027T8RB06	6	.500	.27	T08	.65	.062	9°
48U-5027T8RB12	6	.500	.27	T08	.65	.125	9°

*Also offered in grade IN3005- diamond coated for milling graphite.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) Chamfer/Spotter Tip	Straight Shank	D ₁ Dia.	Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-B1	(2) 48U-3719T6RB06	S037T06SA-06 (stl)	.375	.06	.375 Cyl	.19	1.00	3.50	WS-0029
S037T06KA-20-B1	(2) 48U-3719T6RB06	S037T06CA-20 (car)	.375	.06	.375 Cyl	.19	2.95	5.25	WS-0029
S050T08KA-06-B1	(2) 48U-5027T8RB06	S050T08SA-06 (stl)	.500	.06	.500 Cyl	.27	1.18	4.15	WS-0030
S050T08KA-25-B1	(2) 48U-5027T8RB06	S050T08CA-25 (car)	.500	.06	.500 Cyl	.27	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

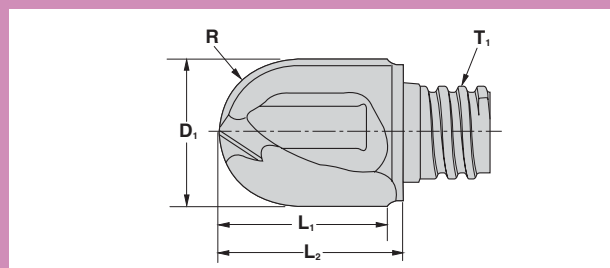
CHASEline



Diameters
.312" to .625"

Grade
IN2005

Corner
.156", .187", .250" and .312"R

[illegible]

Wrench (Not included with carbide tip or shank purchase).

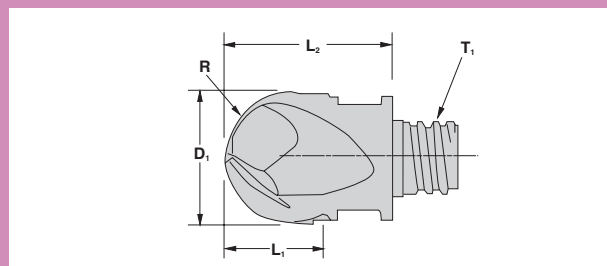
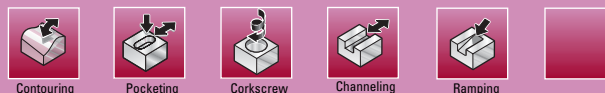
Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-04	60
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

HIGH PRECISION HELICAL BALL NOSE TIP SERIES 45B, 47B

Diameters .312" to .625"	Grade IN2005, IN3005	Corner .156", .187", .250", .312" and .374"R
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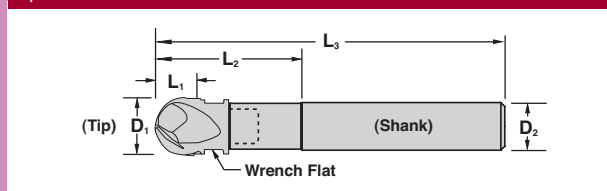
Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius	Tolerance
45B-3120TQRB03	2	.312	.20	T05	.39	.156	.0004
47B-3120TQRB03	4	.312	.20	T05	.39	.156	.0004
45B-3727T6RB05	2	.375	.27	T06	.51	.187	.0004
47B-3727T6RB05*	4	.375	.27	T06	.51	.187	.0004
45B-5037T8RB06	2	.500	.37	T08	.65	.250	.0004
47B-5037T8RB06	4	.500	.37	T08	.65	.250	.0004
45B-6235TRRB08	2	.625	.35	T10	.80	.312	.0004
47B-6247TRRB08	4	.625	.47	T10	.80	.312	.0004
45B-7550TSRB10	2	.750	.50	T12	1.00	.374	.0004
47B-7562TSRB10	4	.750	.62	T12	1.00	.374	.0004

*Also offered in grade IN3005- diamond coated for milling graphite.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) Ball Nose Tip	Straight Shank	D ₁ Ball Nose Dia.	Ball Nose Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-05	(4) 47B-3727T6RB05	S037T06SA-06 (Steel)	.375	.187	.375 Cyl	.27	1.00	3.50	WS-0029
S037T06KA-20-05	(4) 47B-3727T6RB05	S037T06CA-20 (Carbide)	.375	.187	.375 Cyl	.27	2.45	5.25	WS-0029
S050T08KA-06-05	(4) 47B-5037T8RB06	S050T08SA-06 (Steel)	.500	.250	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-05	(4) 47B-5037T8RB06	S050T08CA-25 (Carbide)	.500	.250	.500 Cyl	.37	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

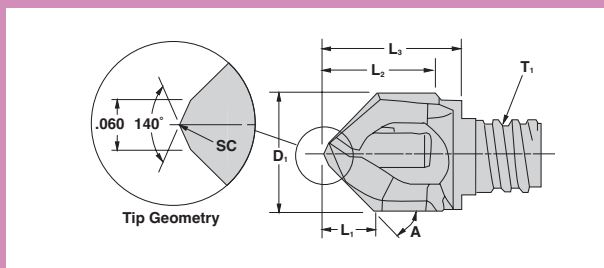
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CHAMFER AND SPOTTING TIP SERIES 45N, 45M, 45P

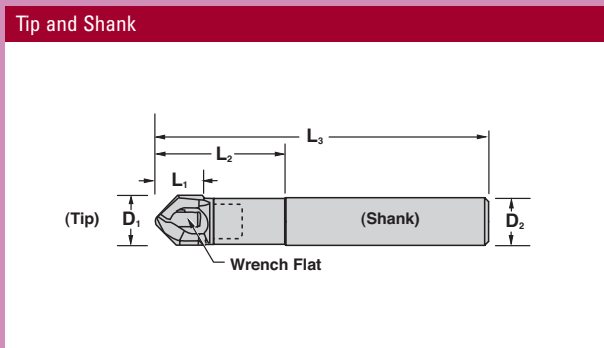
Diameter
 .390" and .625"

Grades
 IN2005

Nominal Chamfer Angle
 30°, 45°, 60° and 72°



Cutter Number	A Nominal Chamfer Angle	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Depth	L ₃ Extension Length
45N10009T6RA45	45°	2	.390	.18	T06	.35	.50
45N10009T6RA72	72°	2	.390	.06	T06	.35	.50
45N16015TRRA45	45°	2	.625	.29	T10	.59	.75
45M10009T6RA30	30°	2	.390	.26	T06	.37	.50
45P10009T6RA60	60°	2	.390	.10	T06	.39	.50



ORDER THIS Pak Number	(QTY) Chamfer/Spotter Tip	Straight Shank	D ₁ Dia.	Included Angle	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-07	(2) 45N10009T6RA45	S037T06SA-06 (Steel)	.400	90°	.375 Cylindrical	.46	.96	3.50	WS-0029

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

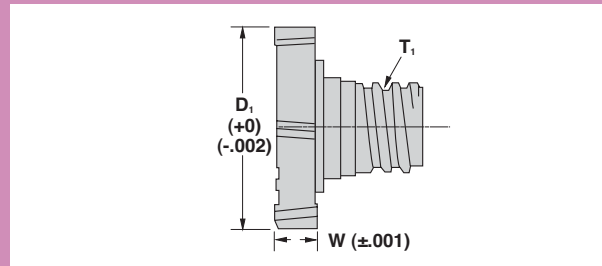
CHASEline

PRECISION T-SLOT MILLING TIP SERIES 18T

Diameters
 .056" to .375"

Grade
 IN1030

Corner
 .015"r and .006" x 45° chamfer



Cutter Number	Eff.	D ₁ Nominal Diameter	W Width	Max. Radial Depth of Cut	T ₁ Thread Size	Corner Radius	Torque Driver (Value)
18T-5006TQRN00	6	.500	.062	.12	T05	.006 x 45°	1 / 60
18T-5012TQRN00	6	.500	.125	.12	T05	.006 x 45°	1 / 60
18T-6205T6RN02	6	.625	.056	.13	T06	.015	1 / 90
18T-6206T6RN01	6	.625	.062	.13	T06	.015	1 / 90
18T-6206T6RN02	6	.625	.068	.13	T06	.015	1 / 90
18T-6208T6RN01	6	.625	.078	.13	T06	.015	1 / 90
18T-6208T6RN02	6	.625	.086	.13	T06	.015	1 / 90
18T-6210T6RN01	6	.625	.105	.13	T06	.015	1 / 90
18T-6212T6RN01	6	.625	.125	.13	T06	.015	2 / 90
18T-6216T6RN01	6	.625	.156	.13	T06	.015	2 / 90
18T-7516T8RN01	6	.750	.156	.13	T08	.015	3 / 130
18T-7519T8RN01	6	.750	.187	.13	T08	.015	3 / 130
18T-7525T8RN01	6	.750	.250	.13	T08	.015	3 / 130
18T-8718T8RN01	6	.875	.187	.19	T08	.015	4 / 130
18T-8725T8RN01	6	.875	.250	.19	T08	.015	4 / 130
18T-8731T8RN01	6	.875	.312	.19	T08	.015	4 / 130
18T-10037TRRN02	6	1.00	.375	.19	T10	.015	5 / 250

Wrench (Not included with carbide tip or shank purchase).

Torx Driver	Torx Driver Part No.	Optional Torque Bit / Hex Drive
1	DS-T20T	DS-T20B / .250"
2	DS-T25T	DS-T25B / .250"
3	DS-T30T	DS-T30B / .250"
4	DS-T40T	DS-T40B / .250"
5	DS-T50L	DS-T50B / .312"

For technical information, see page M482.

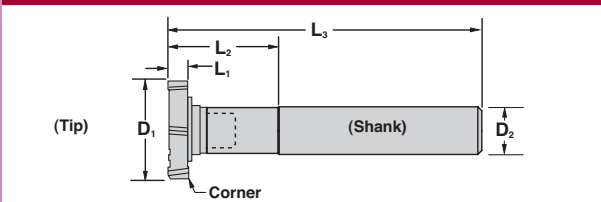
CHASEline

PAKS FOR PRECISION T-SLOT MILLING TIP SERIES 18T

Chip-Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) T-Slot Tip	Straight Shank	D ₁ T-Slot Dia.	T-Slot Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-08	(2) 18T-6208T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.078	.70	3.10	DS-T20T
S037T06KA-06-18	(2) 18T-6212T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.125	.75	3.15	DS-T20T
S037T06KA-06-28	(2) 18T-6216T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.156	.80	3.19	DS-T20T
S050T08KA-06-38	(2) 18T-7519T8RN01	S050T08SA-06 (Steel)	.750	.015	.500 Cylindrical	.187	.85	3.72	DS-T30T
S050T08KA-06-48	(2) 18T-7525T8RN01	S050T08SA-06 (Steel)	.750	.015	.500 Cylindrical	.250	.91	3.78	DS-T30T

PAKS FOR SNAP RING GROOVES SERIES 18T

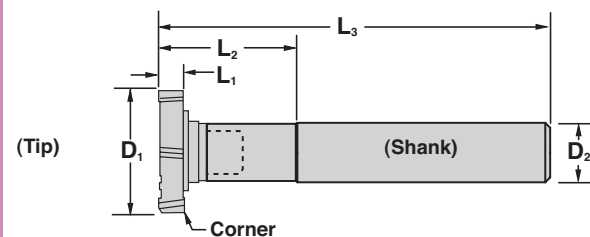
Contents

4 Different Tips, 1 Shank, 1 Wrench

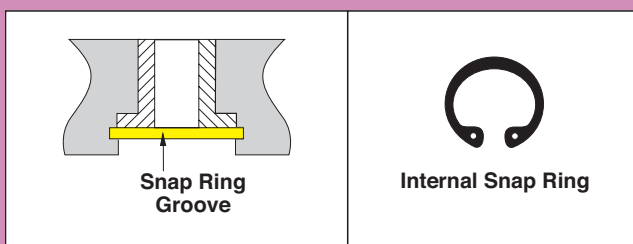


T-Slot Pak

(6 Flutes) Multi-Purpose, PVD - TiAlN-Coated IN1030



Order This Pak Number	Shank	(Qty) T-Slot Tips	L ₁ Width of Cut	D ₁ Nominal Diameter	L ₂ Projection Length	L ₃ Assm Length	D ₂ Shank Adaption	Wrench
S037T06KA-12-98	S037T06CA-12(Carbide)	(1) 18T-6205T6RN02	.056	.625	1.45	4.190	.015R .375 Cyl	DS-T20T
		(1) 18T-6206T6RN02	.068					
		(1) 18T-6208T6RN02	.086					
		(1) 18T-6212T6RN01	.125					



For technical information, see page M482.

CHASEline



Diameter
.625"

Grade
IN1030

Corner
.062" x 45° Chamfer



Chamfering



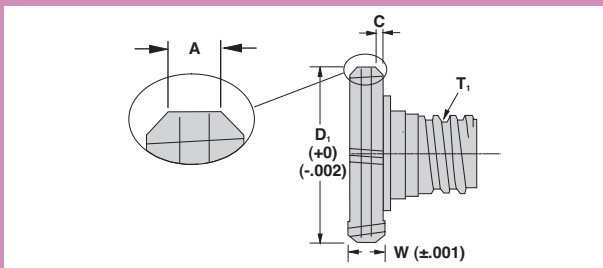
Slotting



T-Slotting



Counter-Sink

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	DS-T20T	DS-T20B	90

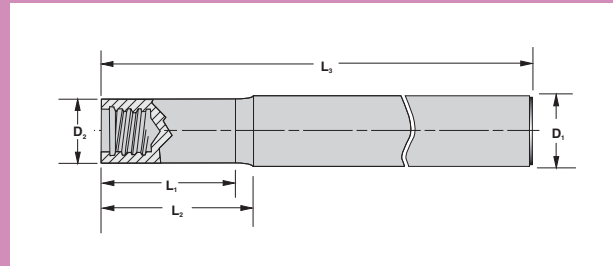
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

NECKED DOWN STRAIGHT SHANKS

Thread Connections
T05, T06, T08, T10 and T12

Shank Materials
Steel or Carbide



T ₁ Thread Size	Part Number	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length	D ₁ Shank Diameter	D ₂ Mating Diameter
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STEEL SHANKS

T05	S031T05SA-05	.51	.59	2.50	.312	.300
T06	S037T06SA-06	.50	.60	3.00	.375	.364
T08	S050T08SA-06	.53	.63	3.50	.500	.480
T08	*S050T08SA-061	.53	.63	3.50	.500	.455
T10	S075T10SA-00	-	.13	2.75	.750	.750
T10	S062T10SA-06	.68	.78	4.00	.625	.600
T12	S075T12SA-08	.88	1.00	5.00	.750	.720
T12	WB100T12SA-00	-	.24	3.00	1.000	.720

CARBIDE SHANKS

T05	S031T05CA-09	.95	1.00	3.00	.312	.300
T05	S031T05CA-19	1.95	2.00	4.00	.312	.300
T06	S037T06CA-12	1.20	1.25	4.00	.375	.364
T06	S037T06CA-20	1.95	2.00	4.75	.375	.364
T08	S050T08CA-15	1.45	1.50	4.00	.500	.480
T08	*S050T08CA-151	1.45	1.50	4.00	.500	.455
T08	S050T08CA-25	2.45	2.50	5.50	.500	.480
T08	*S050T08CA-251	2.45	2.50	5.50	.500	.455
T10	S062T10CA-34	3.43	3.50	5.50	.625	.600
T10	S062T10CA-49	4.93	5.00	7.00	.625	.600
T12	S075T12CA-14	1.43	1.50	4.00	.750	.720
T12	S075T12CA-29	2.93	3.00	5.50	.750	.720
T12	S075T12CA-44	4.43	4.50	8.00	.750	.720

*Necked down shanks for 12mm tips.

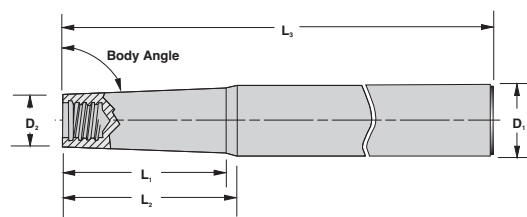
 CHIP SURFER™ CONICAL SHANKS

Thread Connections

T05, T06, T08, T10 and T12

Shank Materials

Steel or Carbide



T ₁ Thread Size	α Body Angle	Part Number	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length	D ₁ Shank Diameter	D ₂ Mating Diameter
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STEEL SHANKS

T06	85°	S062T06SK-13	1.25	1.37	5.00	.625	.364
T06	89°	S062T06SK-21	1.75	2.15	6.30	.625	.364
T08	85°	S062T08SK-08	.75	.85	5.50	.625	.480
T08	89°	S075T08SK-31	2.75	3.15	6.50	.750	.480
T12	85°	S100T12SK-16	-	1.60	6.30	1.000	.720
T12	89°	S100T12SK-34	3.40	3.75	8.00	1.000	.720
T12	85°	S125T12SK-31	-	3.15	7.50	1.250	.720

CARBIDE SHANKS

T05	89°	S037T05CK-15	-	1.50	3.50	.375	.300
T05	89°	S062T05CK-39	3.90	4.00	6.00	.625	.300
T06	88.5°	S050T06CK-25	2.50	2.50	5.50	.500	.364
T06	88.5°	S062T06CK-35	3.37	3.50	6.50	.625	.364
T08	89°	S062T08CK-35	3.45	3.50	6.50	.625	.480
T08	88.5°	S075T08CK-40	3.90	4.00	7.00	.750	.480
T10	89°	S075T10CK-40	-	4.00	6.50	.750	.600
T10	89°	S075T10CK-62	6.24	6.30	8.80	.750	.600
T12	89°	S100T12CK-55	-	5.50	10.00	1.000	.720



M420

CHASE*line*

T05, T06, T08, T10 and T12

Carbide and Steel



Due to tolerance, Shank Diameter will be slightly larger than tip diameter.

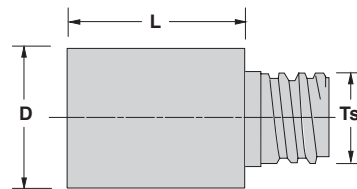
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.315" to .787"

.315" to .787"

T05, T06, T08, T10 and T12

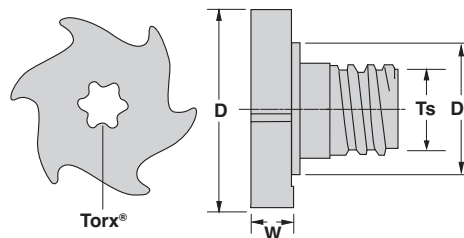
T05, T06, T08, T10 and T12

[illegible]

T-SLOT PREFORM BLANKS

Dimensions
.551" to 1.125"

T05, T06, T08 and T10

[illegible]

DRAW-IN™ HEATING UNIT

Available Toolholders

CAT 40, CAT 50, and HSK-63A

Fits any ER32 collet chuck

Collets

ER32 Adaptors

Tool Diameters

.125" to .500"

4mm to 12mm

Tool Extension Lengths

1.500" to 3.500"

35mm to 85mm

Cycle Time

60 to 90 seconds, plus cool-down

Power

110 volts, 15 amps, 1600 watts

Part
Number

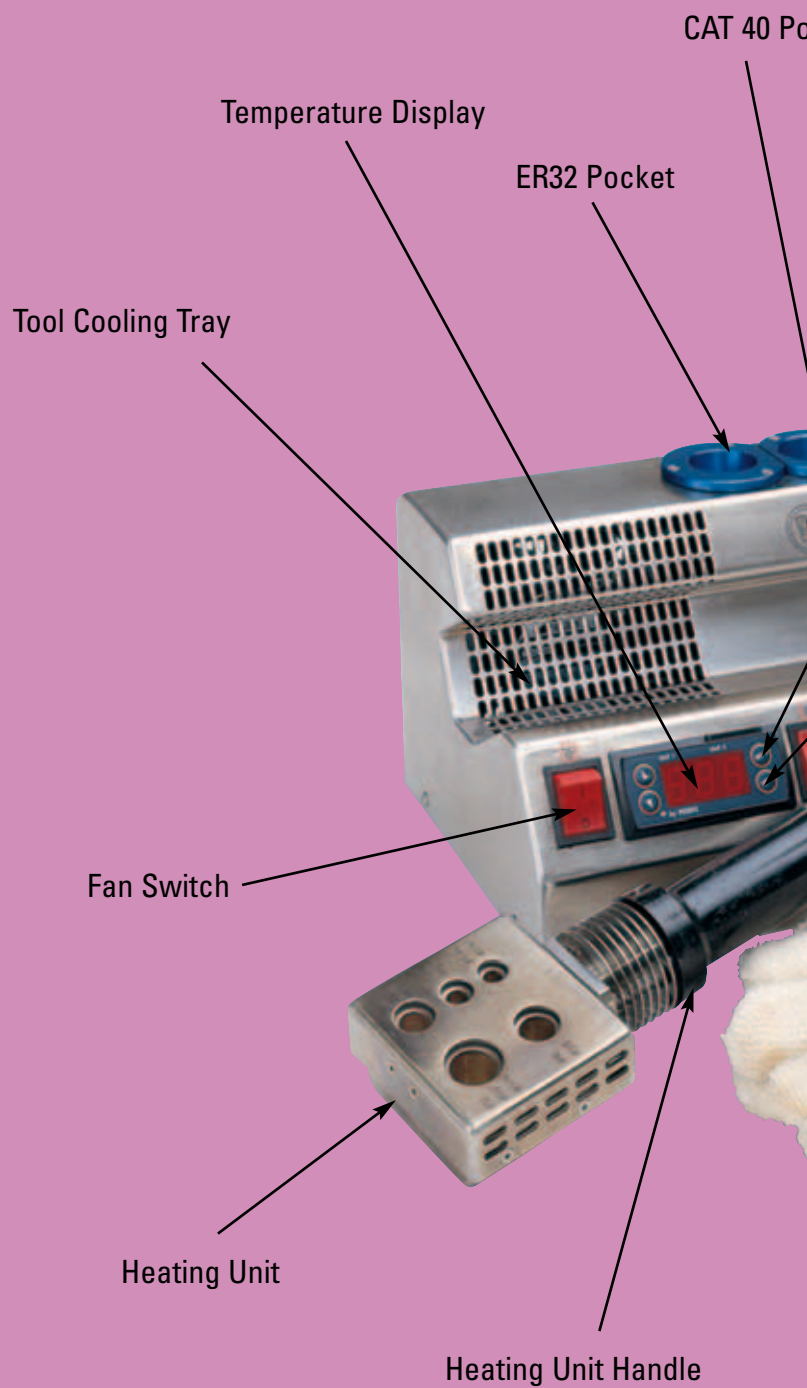
SRI-5000-110

REPLACEMENT PART

HEATING UNIT HANDLE

Part
Number

HEATING HANDL



ocket

Temperature Setting #2

Temperature Setting #1

Power Switch (on/off)

Start Heating Button

Heating Unit Cradle

FEATURES & ADVANTAGES

Thermal Shank Collets

- Collets with slim design and different projections
- Draw•In collets fit into standard ER collet chucks
- High torque transfer due to 360° clamping
- Precision runout
- Excellent repeatability

Heat Shrink Unit

- Compact design
- Flexible use with the portable heating handle
- Heating and cooling with the same unit
- Automatic temperature control
- Quick operating time, 15-45 seconds
- Ready for use in one minute
- Auto safety shutoff of heating unit after 10 minutes

Heat Shrink Chucking System

- Coolant through for oil hole tools*
- Coolant Jet II available
- Symmetrical design for high speed machining
- Quick and easy tool changing
- Unique Draw•In heating unit with portable handle

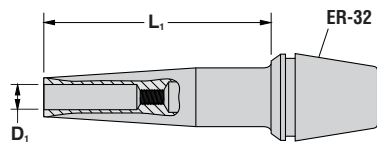
*Special preset screw ordered separately.



Diameters
4, 5, 6, 8, 10, and 12mm

Extension Lengths

35, 60, and 85mm

[illegible]

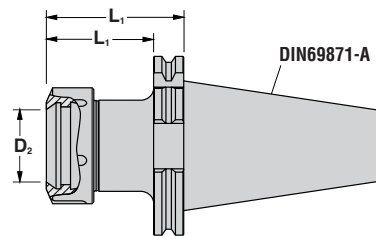
Draw•In is designed for use with solid carbide only.



DRAW-IN™ CAT 50 COLLET CHUCKS

SERIES CAT 50

CAT Standard
CAT 50 ER32



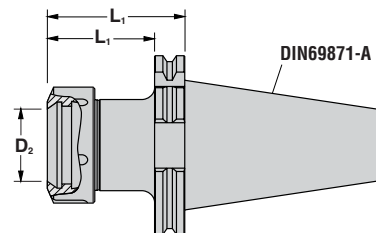
D ₁ Diameter	Part Number	L ₁ Extension Length
1.968"	CAT50ER32X4.000	4.000"
1.968"	CAT50ER32X6.000	6.000"
1.968"	CAT50ER32X8.000	8.000"



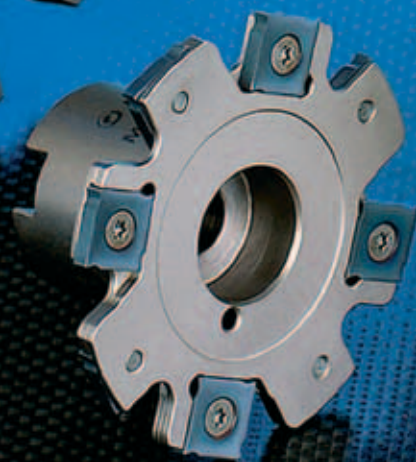
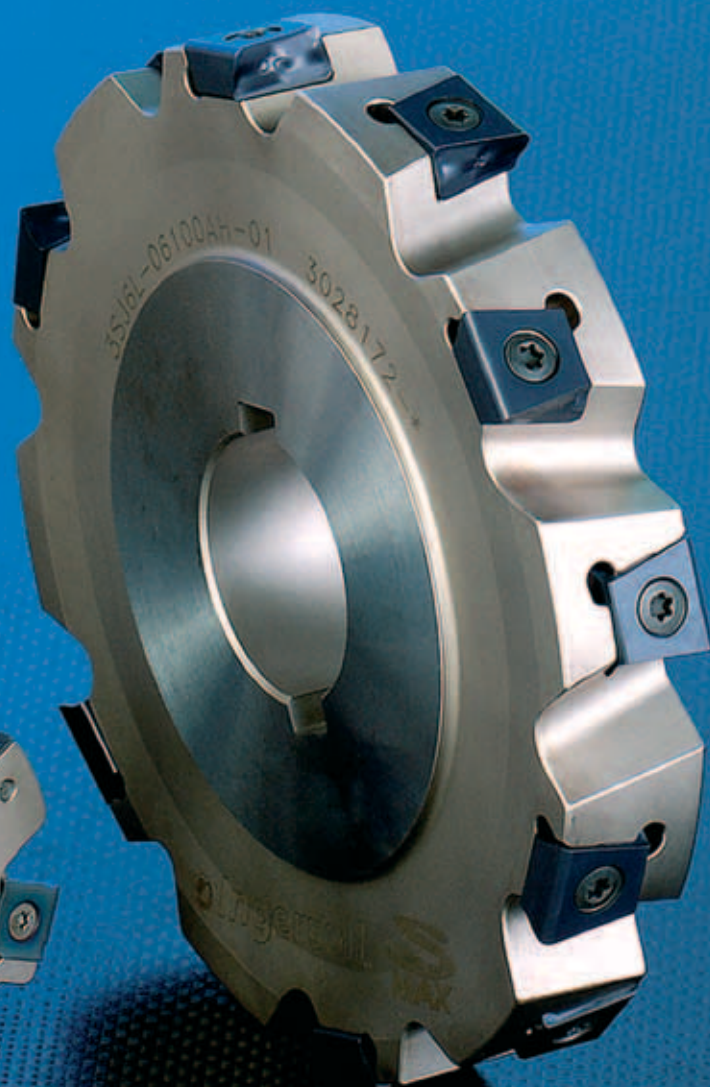
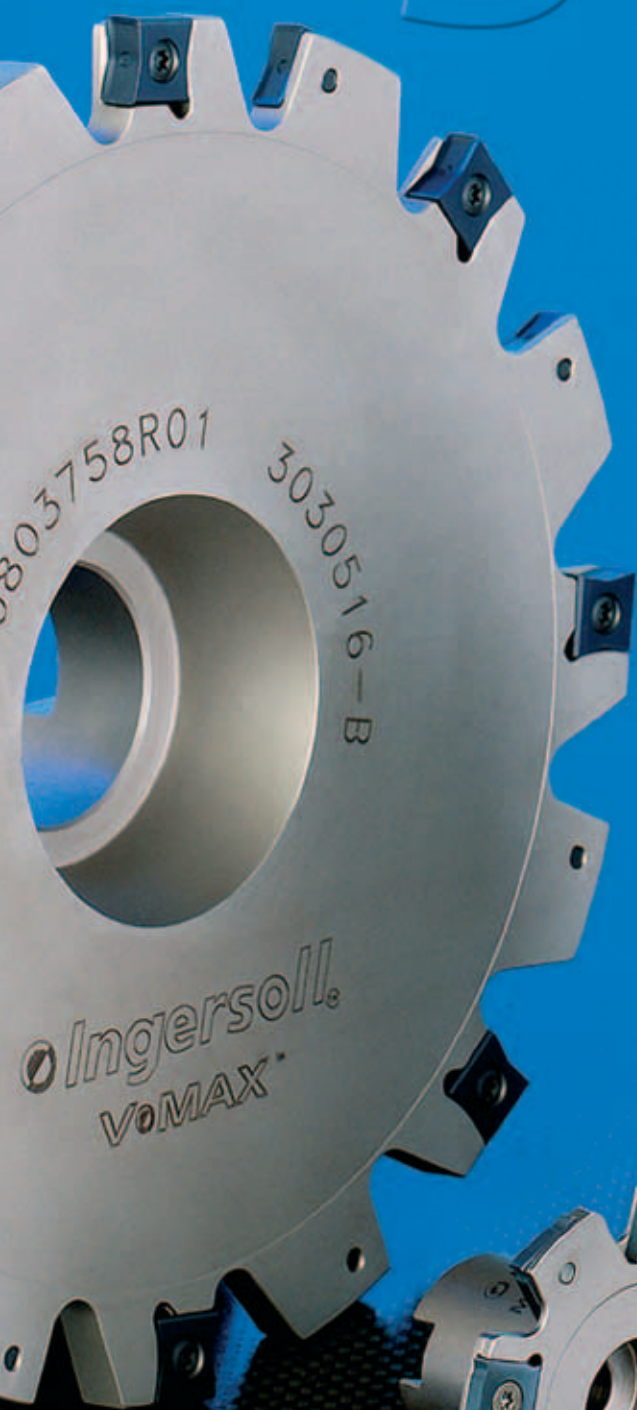
DRAW-IN™ CAT 40 COLLET CHUCKS

SERIES CAT 40

CAT Standard
CAT 40 ER32

[illegible]

Ingersoll



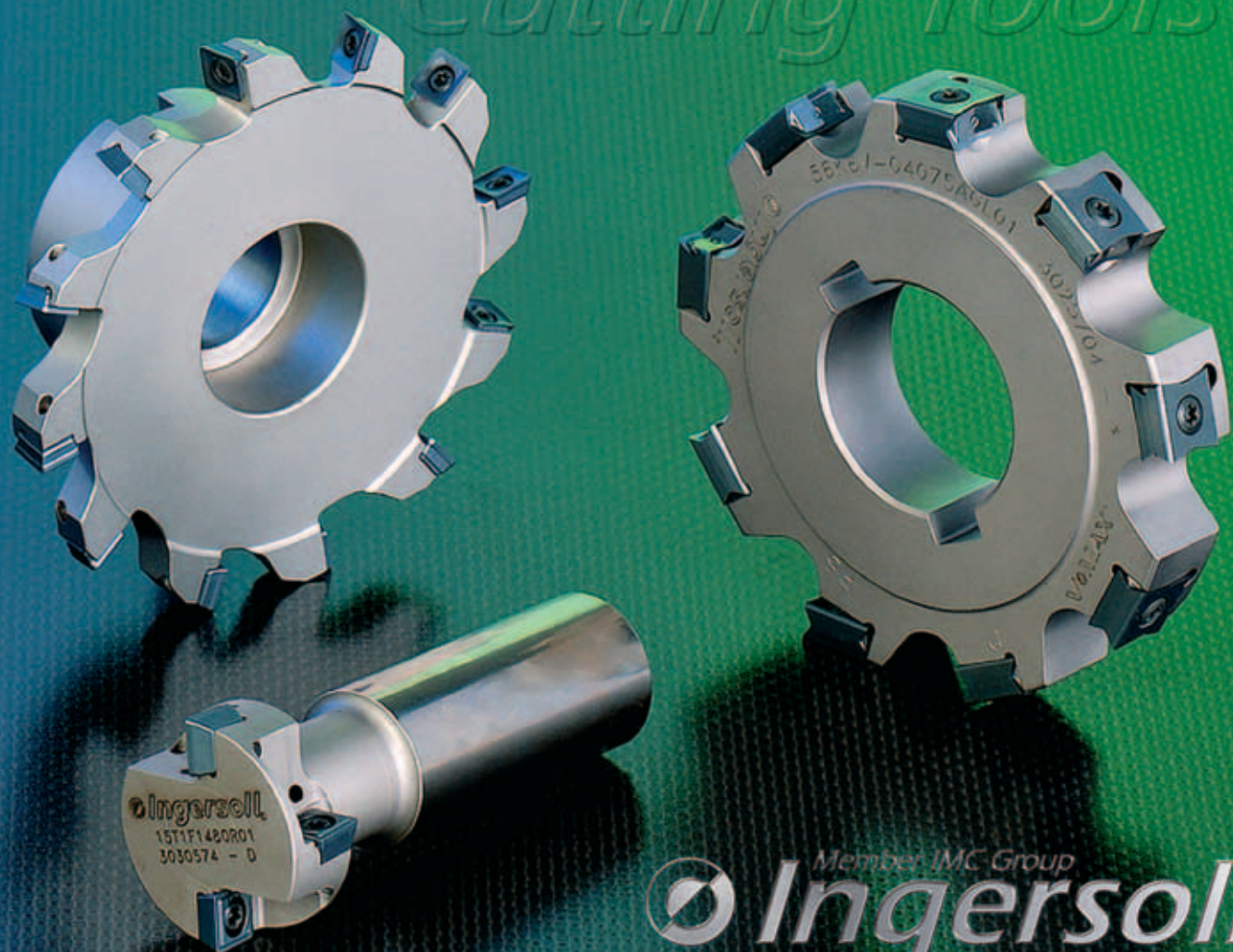
M312

CUTTING TOOLS

CUTTING TOOLS

SLOTTERS

Cutting Tools



Member IMC Group
Ingersoll
Cutting Tools

M313

SLOTTERS

SLOTTERS

	Diameter Range	Width	Description	Series	Page
	4.000-10.000	.625-1.000	 Heavy-Duty Axial Slotters	3SJ6	M316
	4.000-10.000	.625-1.000	 Heavy-Duty Radial Slotters	3SJ6	M318
	3.000-10.000	.460	 Heavy-Duty Half-Side Mill	5VK6V	M320
	4.000-8.000	.375-.500	 Medium-Density Axial Slotter	3VL5V	M322
	4.000-8.000	.375-.500	 Medium-Density Radial Slotter	3VL5V	M324
	.953-2.175	.500-1.250	 T-Slot End Mill	15T, 12T	M326
	3.000-6.000	.063-.250	 Light-Duty Narrow Slotters	31J	M328
	3.000-8.000	.156-.312	 Medium-Duty Axial Slotters	38L5	M330
	2.500-5.000	.156-.312	 Medium-Duty Radial Slotters	38L5	M332
	4.000-8.000	.375-.500	 Medium-Duty Radial Slotters	35J6E	M334

HEAVY-DUTY AXIAL DRIVE SLOTTER SERIES 3SJ6

Diameters
4.000" to 10.000"

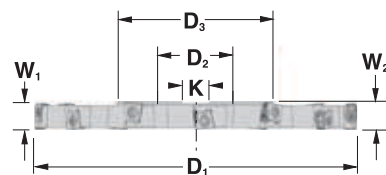
Width of Cut
.625" - 1.000"
(4 indexes)

Insert Corner
.031", .062", .094" and .125"R
(2RH/2LH)



Slotting

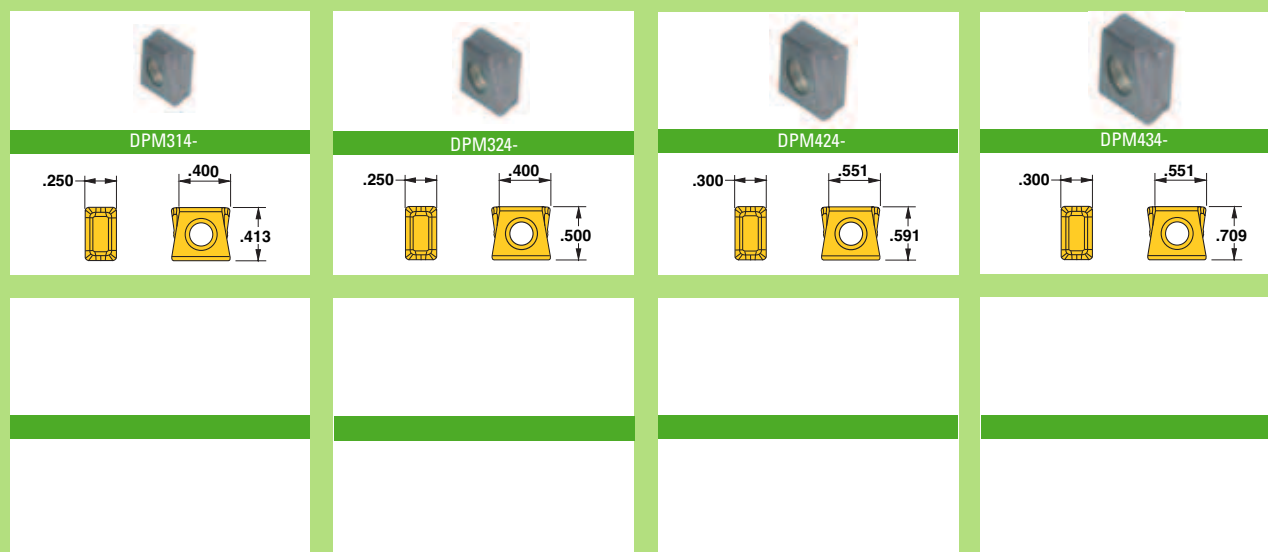
Axial Drive

[illegible]

Product Note: Full and half pitch axial Keyway on stock tools.

*Total Inserts in Cutter are two times the number of effective inserts.

INSERTS



Insert Number	Application	Width Range	Corner	Grades				
				IN	2015	2040	2005	1530
DPM314-001	Multi-Purpose	.612-.747	.031R	■			■	■
DPM314-002	Multi-Purpose	.612-.747	.062R	■			■	■
DPM314-003	Multi-Purpose	.612-.747	.094R	■			■	■
DPM314-004	Multi-Purpose	.612-.747	.125R	■			■	■
DPM324-001	Multi-Purpose	.709-.921	.031R	■			■	■
DPM324-002	Multi-Purpose	.709-.921	.062R	■			■	■
DPM324-003	Multi-Purpose	.709-.921	.094R	■			■	■
DPM324-004	Multi-Purpose	.709-.921	.125R	■			■	■
DPM424-001	Multi-Purpose	.825-1.103	.031R	■	■		■	
DPM424-002	Multi-Purpose	.825-1.103	.062R	■	■		■	
DPM424-003	Multi-Purpose	.825-1.103	.094R	■	■		■	
DPM424-004	Multi-Purpose	.825-1.103	.125R	■	■		■	
DPM434-001	Multi-Purpose	.934-1.341	.031R	■	■	■	■	■
DPM434-002	Multi-Purpose	.934-1.341	.062R	■	■	■	■	
DPM434-003	Multi-Purpose	.934-1.341	.094R				■	
DPM434-004	Multi-Purpose	.934-1.341	.125R				■	

HARDWARE

Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
DPM314, DPM324	SM40-120-20 (SE02-81)	25-30 in. lbs.	DS-T15T (Tx-15)
DPM424, DPM434	SM50-160-10 (SE03-70)	35-40 in. lbs.	DS-T20T (Tx-20)

For technical information, see page M505.

HEAVY-DUTY RADIAL DRIVE SLOTTER SERIES 3SJ6

Diameters
4.000" to 10.000"

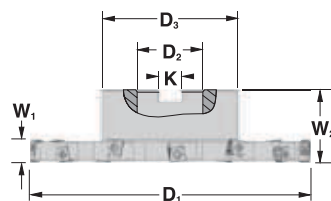
Width of Cut
.625" - 1.000"
(4 indexes)

Insert Corner
.031", .062", .094" and .125"R
(2RH/2LH)



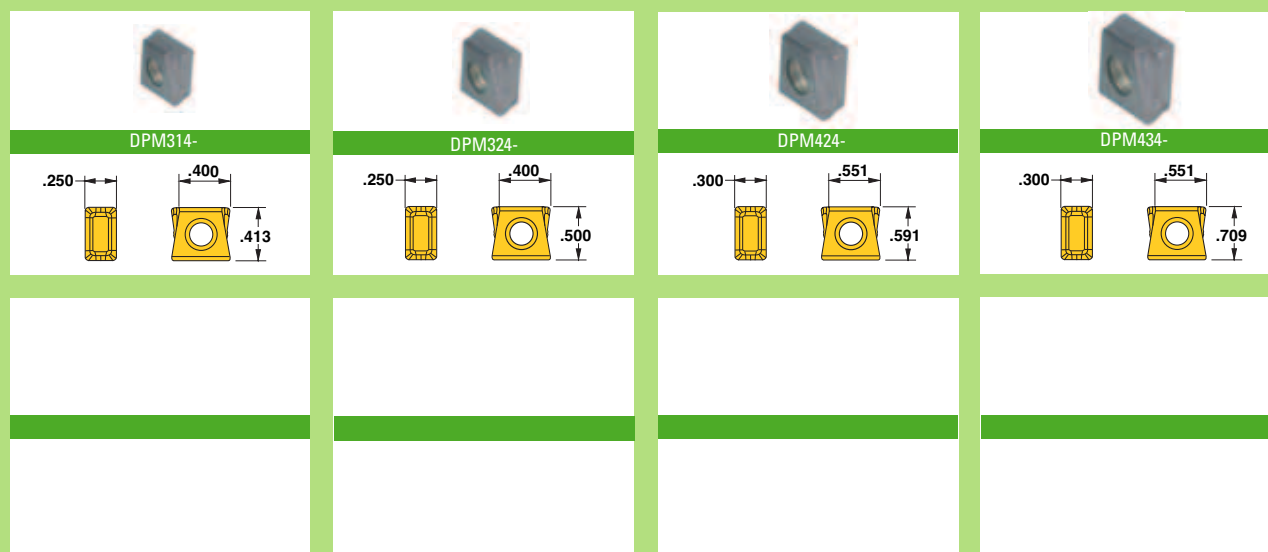
Slotting

Radial Drive

[illegible]

*Total Inserts in Cutter are two times the number of effective inserts.

INSERTS

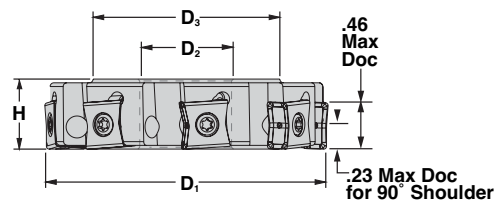


Insert Number	Application	Width Range	Corner	Grades				
				IN	2015	2040	2005	1530
DPM314-001	Multi-Purpose	.612-.747	.031R	■			■	■
DPM314-002	Multi-Purpose	.612-.747	.062R	■			■	■
DPM314-003	Multi-Purpose	.612-.747	.094R	■			■	■
DPM314-004	Multi-Purpose	.612-.747	.125R	■			■	■
DPM324-001	Multi-Purpose	.709-.921	.031R	■			■	■
DPM324-002	Multi-Purpose	.709-.921	.062R	■			■	■
DPM324-003	Multi-Purpose	.709-.921	.094R	■			■	■
DPM324-004	Multi-Purpose	.709-.921	.125R	■			■	■
DPM424-001	Multi-Purpose	.825-1.103	.031R	■	■		■	
DPM424-002	Multi-Purpose	.825-1.103	.062R	■	■		■	
DPM424-003	Multi-Purpose	.825-1.103	.094R	■	■		■	
DPM424-004	Multi-Purpose	.825-1.103	.125R	■	■		■	
DPM434-001	Multi-Purpose	.934-1.341	.031R	■	■		■	■
DPM434-002	Multi-Purpose	.934-1.341	.062R	■	■		■	
DPM434-003	Multi-Purpose	.934-1.341	.094R				■	
DPM434-004	Multi-Purpose	.934-1.341	.125R				■	

HARDWARE

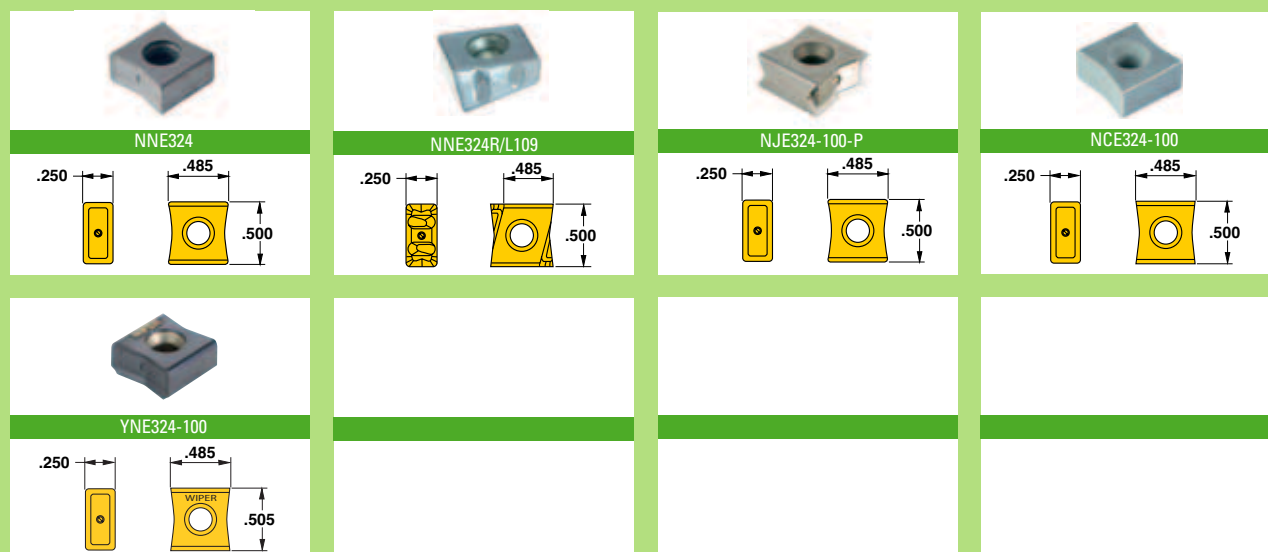
Insert Screw			Driver
Insert Series	Part No.	Torque	Part No.
DPM314, DPM324	SM40-120-20 (SE02-81)	25-30 in. lbs.	DS-T15T (Tx-15)
DPM424, DPM434	SM50-160-10 (SE03-70)	35-40 in. lbs.	DS-T20T (Tx-20)

For technical information, see page M505.



*Total Inserts in Cutter are two times the number of effective inserts.

INSERTS



Insert Number	Application	Corner	Cut Edge Configuration	Grades									
				IN	2005	2010	2030	2015	2040	1530	6515	15K	70N
NNE324-100	Multi-Purpose	.031R	4RH/4LH	■			■	■	■	■	■		
NNE324-102	Multi-Purpose	.063R	4RH/4LH				■	■	■	■	■		
NNE324-104	Multi-Purpose	.031 x 45°	4RH/4LH			■		■				■	
NNE324-125	Multi-Purpose	.125R	4RH/4LH				■						
YNE324-100	Wiper	.031R	2RH/2LH				■	■	■			■	
NNE324R109	Multi-Purpose	.031R	4RH	■	■	■	■	■	■			■	
NNE324L109	Multi-Purpose	.031R	4LH	■			■	■	■			■	
NJE324-100-P	Polished	.031R	4RH/4LH										■
NCE324-100	SiN	.031R	4RH/4LH										■

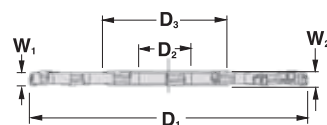
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-120-20 (SE02-81)	25-30 in. lbs.	DS-T15T (Tx-15)

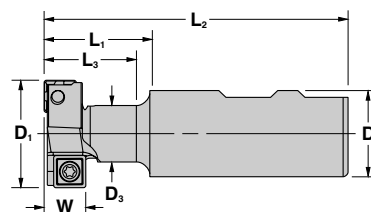
For technical information, see page M506.

MAXline

11

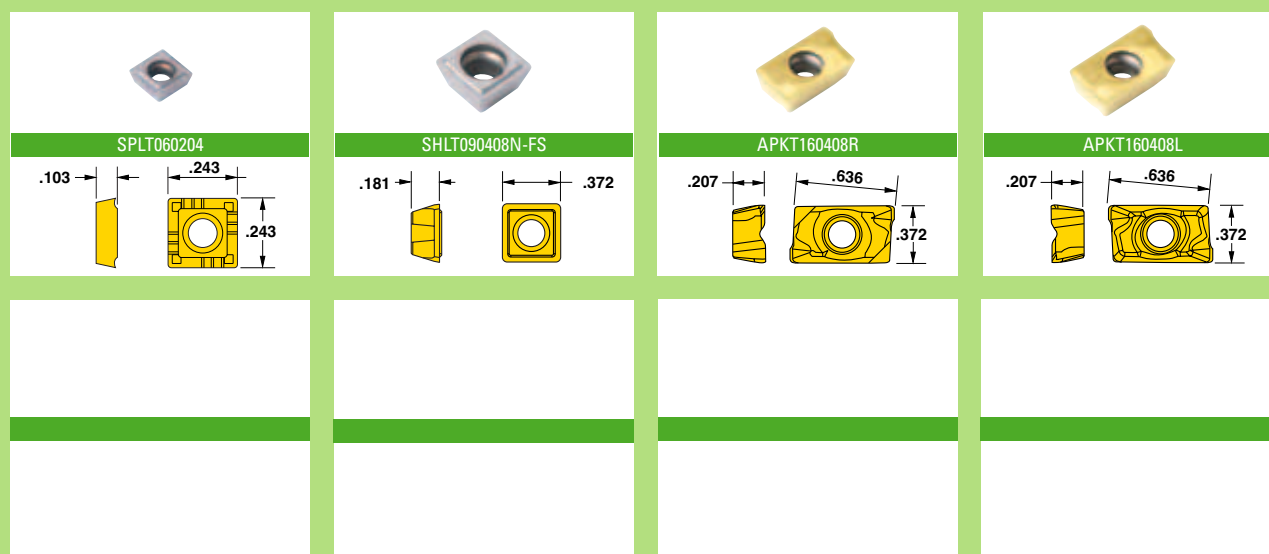


*Total Inserts in Cutter are two times the number of effective inserts.



The channel depth must extend beyond the depth of the T-slot and the channel width should not be less than the “B” dimension for a given ANSI standard T-slot.

INSERTS



Cutter Number	Qty. Each	Insert Number	Application	Corner	Grades						
					IN	30M	6515	2005	1030	1040	5015
15T1D-0902580R01	4	SPLT060204R	Multi-Purpose	.015R	■				■	■	
15T1D-0902580R01	4	SPLT060204R-DM04	Multi-Purpose	.015R					■		
15T1F-1201280R01	2	SHLT090408N-FS	Multi-Purpose	.031R			■	■	■		
15T1F-1401580R01	4	SHLT090408N-FS	Multi-Purpose	.031R			■	■	■		
12T1B-1701981R01	2	APKT160408R	Multi-Purpose	.031R					■		■
12T1B-1701981R01	2	APKT160408L	Multi-Purpose	.031R					■		■
12T1B-2102281R01	2	APKT160408R	Multi-Purpose	.031R					■		■
12T1B-2102281R01	2	APKT160408L	Multi-Purpose	.031R					■		■

HARDWARE

Cutter Series	Insert Screw		Driver
	Part No.	Torque	
15T1D	SM22-052-00	7-11 in. lbs.	DS-T07W (Tx-07)
15T1F-12	SM40-080-30	30-35 in. lbs.	DS-T15T (Tx-15)
15T1F-14	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)
12T1B	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

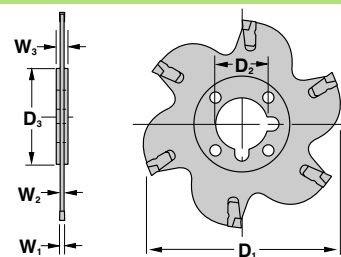
For technical information, see page M506.

SLOT-IN™ LIGHT-DUTY NARROW SLOTTERS SERIES 31J

Diameters
3.000" to 4.000"
 Width of Cut
.063"
 Insert Corner
.006"R; Full Radius



Integral Hub

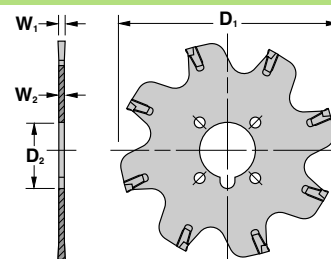


W ₁ Nominal Width	D ₁ Nominal Diameter	Cutter Number	D ₂ Bore Dia.	W ₂ Body Width	W ₃ Hub Width	D ₃ Hub Dia.	Keyway Qty.	Max. Radial DOC	No. of Effective Inserts	Insert Series No.	Max. RPM
.063	3.000	31J6A-03006AF-01	1.000	.049	.094	1.54	2	.71	8	GCXF071601N	1050
.063	4.000	31J6A-04006AF-01	1.000	.049	.094	1.54	2	1.21	10	GCXF071601N	780

Diameters
4.000" to 6.000"
 Width of Cut
.122" to .250"
 Insert Corner
.122", .188" and .250"R



Drive Flange



W ₁ Nominal Width	D ₁ Nominal Diameter	Cutter Number	D ₂ Bore Dia.	W ₂ Body Width	W ₃ Hub Width	D ₃ Hub Dia.	Keyway Qty.	Max. Radial DOC	No. of Effective Inserts	Insert Series No.	Max. RPM
.122	4.000	31J6B-04012AV-01	1.000	.094	-	-	2	1.08	6	GCXF113102N	780
.188	4.000	31J6C-04018AV-01	1.000	.157	-	-	2	1.08	6	GCXF114802N	780
.122	5.000	31J6B-05012AW-01	1.250	.094	-	-	1	1.40	8	GCXF113102N	630
.188	5.000	31J6C-05018AW-01	1.250	.157	-	-	1	1.40	8	GCXF114802N	630
.250	5.000	31J6D-05025AW-01	1.250	.203	-	-	1	1.40	8	GCXF126403N	630
.122	6.000	31J6B-06012AX-01	1.500	.094	-	-	2	1.41	10	GCXF113102N	520
.188	6.000	31J6C-06018AX-01	1.500	.157	-	-	2	1.41	10	GCXF114802N	520
.250	6.000	31J6D-06025AX-01	1.500	.203	-	-	2	1.41	10	GCXF126403N	520

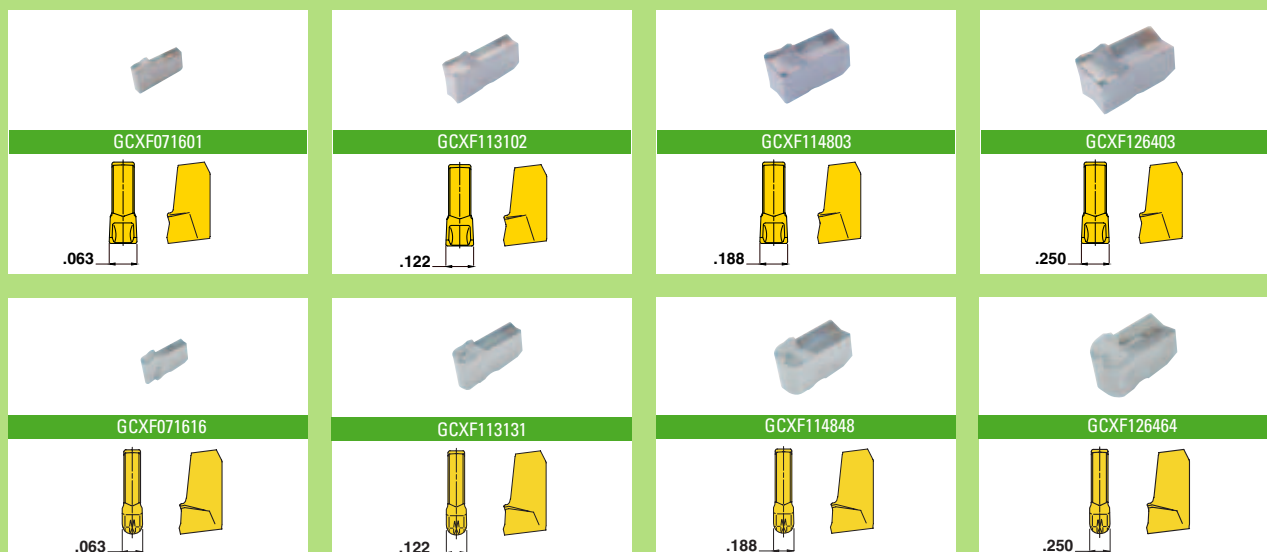
HARDWARE

Insert Extractor	
Cutter Width	Part No.
.063	DR-0032
.122-.250	DR-0031

Drive Flange				
Bore	Part No.	Thickness	Overall Dia.	Keyway
1.000	FL-0002	.390	1.81	.25
1.250	FL-0003	.390	2.16	.32
1.500	FL-0004	.470	3.15	.38



INSERTS



Insert/Cutter Width	Insert Number	Corner	Grades	
			IN	1030
.063	GCXF071601N-E	.006R	■	
	GCXF071616N-E	.031 Full Radius	■	
.122	GCXF113102N-E	.008R	■	
	GCXF113131N-E	.061 Full Radius	■	
.188	GCXF114803N-E	.011R	■	
	GCXF114848N-E	.094 Full Radius	■	
.250	GCXF126403N-E	.014R	■	
	GCXF126464N-E	.125 Full Radius	■	

Insert Loading Procedure

1. Be sure insert pockets are free of dirt prior to assembly.
2. Manually place insert into seat and tap into position using a plastic hammer.
3. When properly seated, there should be no gap between the top of the insert and the cutter body locator.



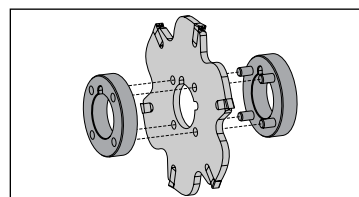
Insert Removal Procedure

1. To remove inserts from the cutter body, first, place insert extractor into space behind the insert.
2. Turn the extractor 90° until the insert is dislodged from the pocket.
3. One extractor is provided with each cutter.



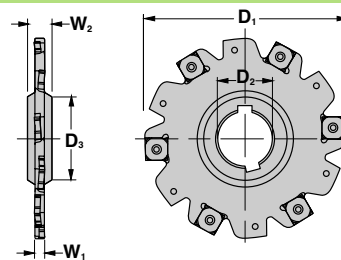
Cutter Mounting

When using drive flange-style cutter bodies, the use of a drive flange set is highly recommended to provide more bearing surface for the drive key. Without the drive flange set, the drive flange key or arbor may be damaged when the cutter is run at high speeds.



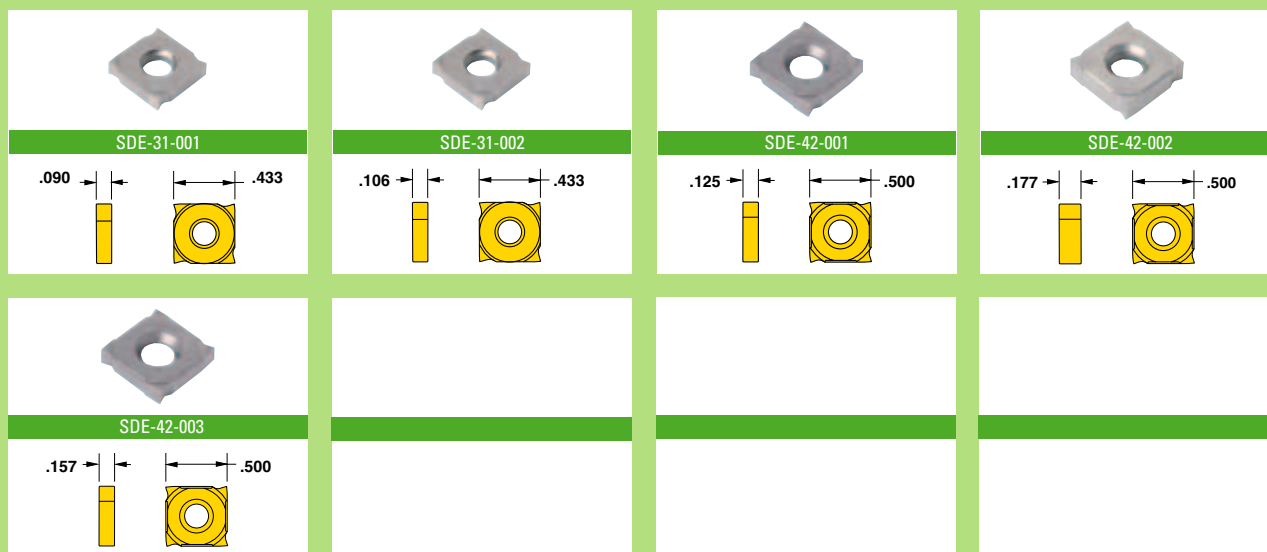


Slotting



M330

INSERTS



Insert Number	Width	Grades	
		IN	1030
SDE-31-001	.156	■	
SDE-31-002	.187	■	
SDE-42-001	.250	■	
SDE-42-002	.312	■	
SDE-42-003	.250*	■	

***Fits ONLY Competitor Cutter!**

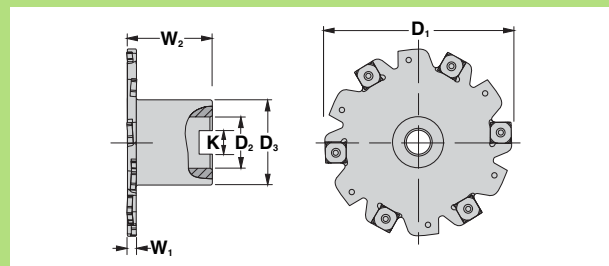
HARDWARE

Cutter Series	Insert Screw		Driver	
	Part No.	Torque	Part No.	
.156	SM35-034-50	25-30 in. lbs.	DS-T09S (Tx-09)	
.187	SM35-042-50	25-30 in. lbs.	DS-T09S (Tx-09)	
.250	SM40-050-50	30-35 in. lbs.	DS-T15S (Tx-15)	
.312	SM40-060-50	30-35 in. lbs.	DS-T15S (Tx-15)	

For technical information, see page M504.

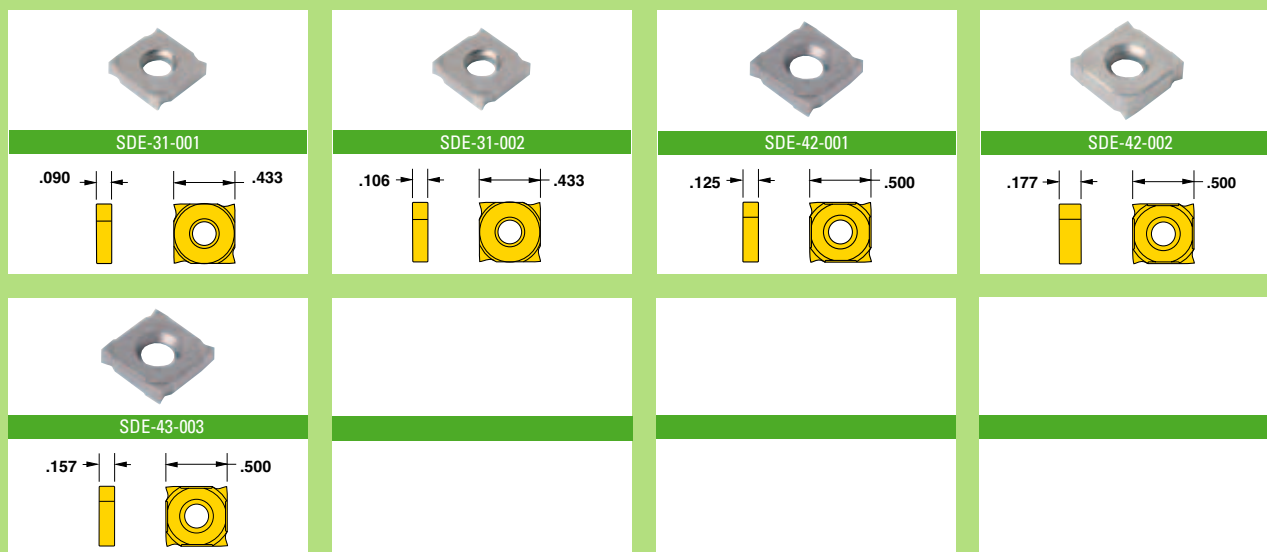


Slotting



M332

INSERTS



Insert Number	Width	Grades	
		IN	1030
SDE-31-001	.156	■	
SDE-31-002	.187	■	
SDE-42-001	.250	■	
SDE-42-002	.312	■	
SDE-42-003	.250*	■	

*Fits ONLY Competitor Cutter!

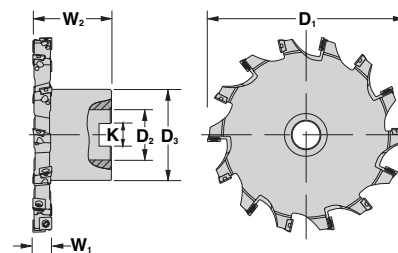
HARDWARE

Cutter Series	Insert Screw		Driver	
	Part No.	Torque	Part No.	
.156	SM35-034-50	25-30 in. lbs.	DS-T09S (Tx-09)	
.187	SM35-042-50	25-30 in. lbs.	DS-T09S (Tx-09)	
.250	SM40-050-50	30-35 in. lbs.	DS-T15S (Tx-15)	
.312	SM40-060-50	30-35 in. lbs.	DS-T15S (Tx-15)	

For technical information, see page M504.

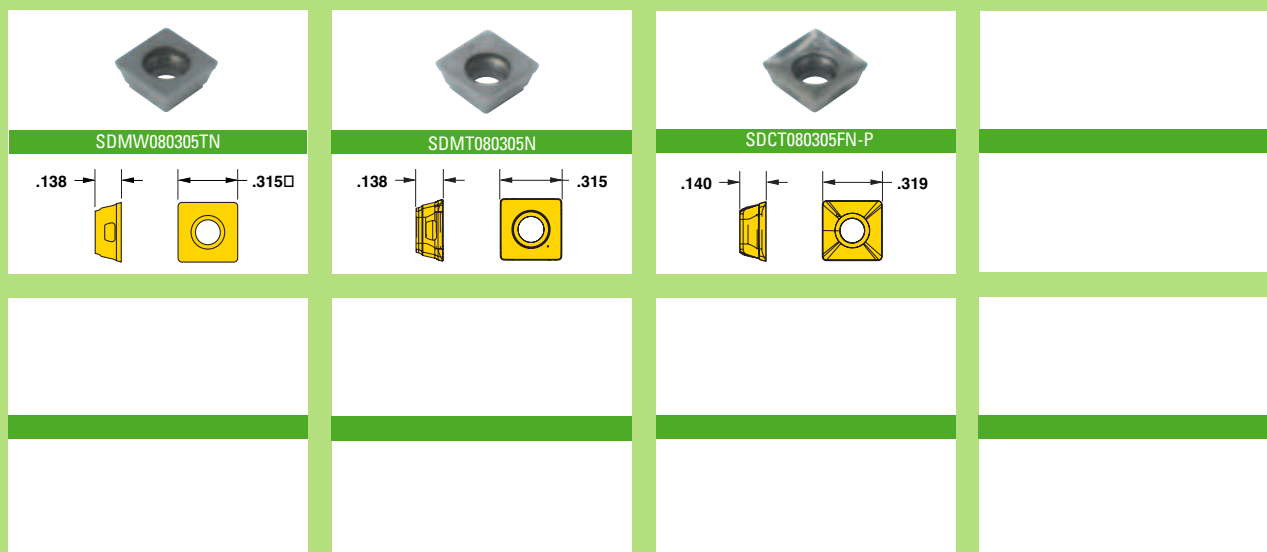


Slotting



*Total Inserts in Cutter are two times the number of effective inserts.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
SDMT080305N	Multi-Purpose	.020R			■	■	■	■	■
SDMW080305TN	Flat Top	.020R			■	■	■	■	■
SDCT080305FN-P	Ground/Polished	.020R		■					
SDMT080308N	Multi-Purpose	.031R							■
SDMW080308TN	Flat Top	.031R							■
SDMT080316N	Multi-Purpose	.062R							■
SDMW080316TN	Flat Top	.062R							■

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)

For technical information, see page M504

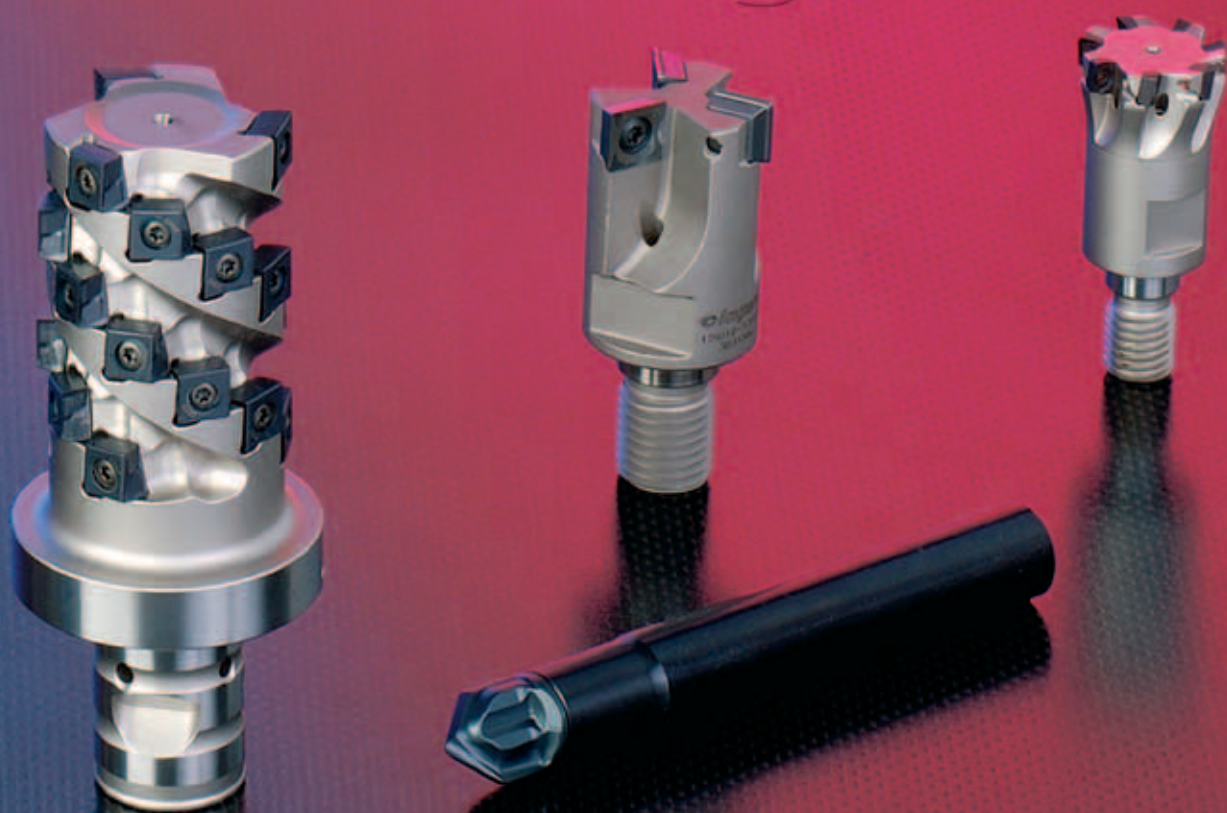
Ingersoll



M336

MODULAR

Cutting Tools



Member IMC Group
Ingersoll
Cutting Tools

M337

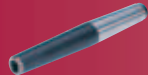
MODULAR

	Diameter Range	Cutting Length	Description	Series	Page
	.750-1.250	.44	Hi-POST End Mill	12J1F (Inno•Fit)	M346
	1.000-1.500	.28	MAX MICRO 0° End Mill	1SJ1V (Inno•Fit)	M348
	1.102-1.500	1.10-3.00	Hi-POST Extended Flute End Mill	22J3F (Inno•Fit)	M350
	1.000-2.500	.84-4.00	Hi-POST Extended Flute End Mill	22J3X (Inno•Fit)	M352
	1.500-2.500	2.26-4.42	Hi-POST Extended Flute End Mill	22J3E (Inno•Fit)	M354
	1.102-1.500	1.10-2.66	Hi-POSQUAD Full Effective End Mill	25J3E (Inno•Fit)	M356
	1.93-3.07	-	INNO•FIT Spindle Adaptor	C40Z/C50Z	M358
	.500-1.500	-	INNO•FIT Face Mill Adaptor	Z4SM/Z5SM	M359
	1.93	-	TOP•ON to INNO•FIT Adaptor	Z4MOD	M360
	1.93 & 3.07	-	INNO•FIT Reducer & Extension	Z5Z4/Z4Z4/Z5Z5	M361

M338

	Diameter Range	Cutting Length	Description	Series	Page
	.500-1.500	.22	Hi-POS End Mill	12J1D (Top•On)	M362
	.625-1.500	.44	Hi-POS+ End Mill	12J1F (Top•On)	M364
	.750-1.500	.50	Hi-POS+ End Mill	12J1X, 12V1X (Top•On)	M366
	1.000-1.250	.60	Hi-POS End Mill	12J1B, 12V1B (Top•On)	M368
	1.000-1.250	.66	Hi-POS+ End Mill	12J1E (Top•On)	M370
	1.000-1.250	.63	Hi-POS+ End Mill	12J1G (Top•On)	M372
	1.000-1.250	.22	Hi-POSQUAD Lead Angle End Mill	15N1E (Top•On)	M374
	1.000-1.500	.41	ALUMINATOR 0° End Mill	15U1G (Top•On)	M376
	1.250-1.500	.82	ROUGH-AIR End Mill	15X1X (Top•On)	M378
	1.000	-	FAST-BREAK Corner Rounding End Mill	15R1V (Top•On)	M380

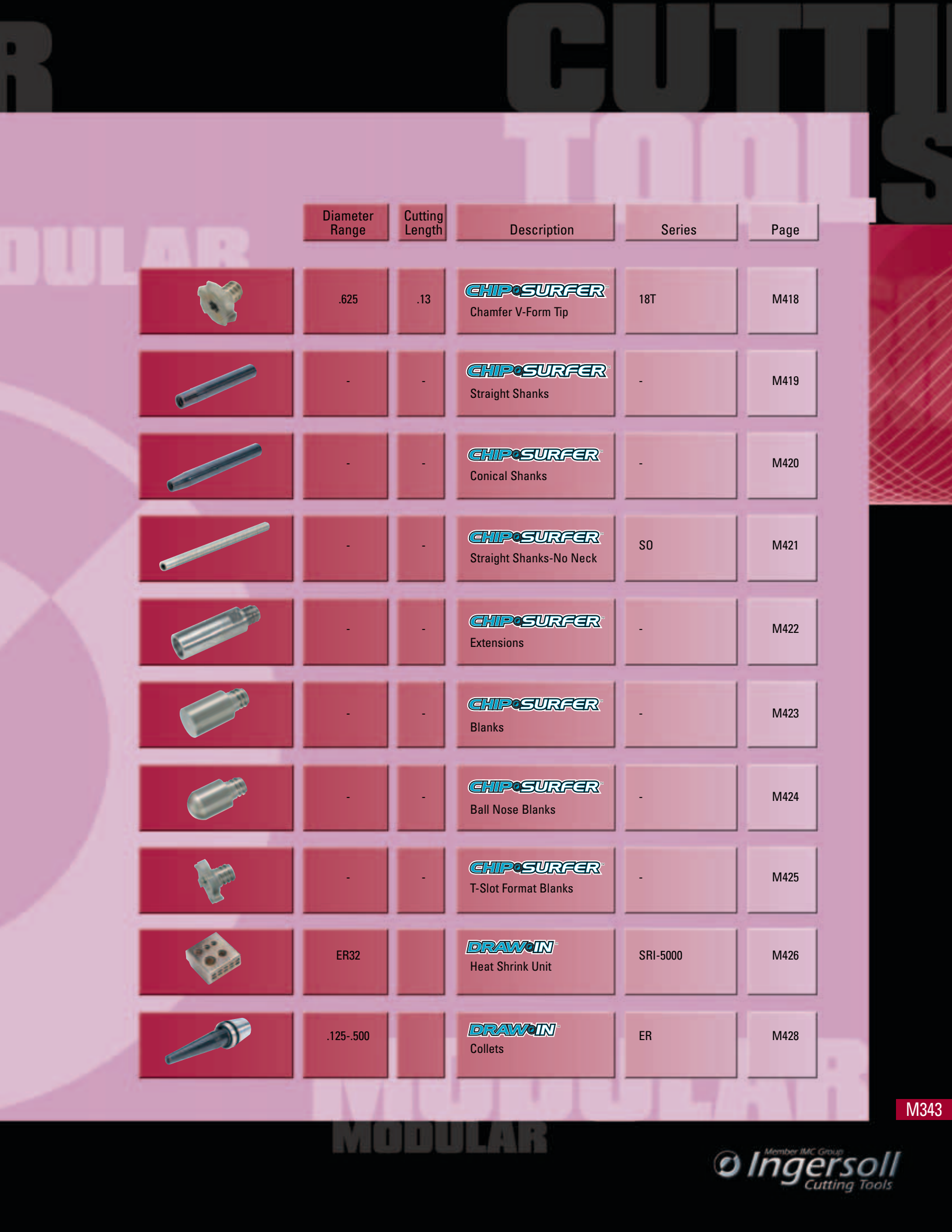
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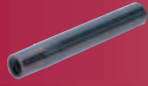
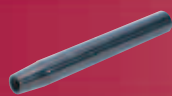
	Diameter Range	Cutting Length	Description	Series	Page
	1.000	-	FAST•BREAK Corner Rounding End Mill	15R4H (Top•On)	M382
	.750-1.500	-	FORM•MASTER+ Button Cutter	15B1 (Top•On)	M384
	.375-1.000	-	SPEED•BALL Ball Nose	12W (Top•On)	M386
	.625-1.500	.82	FORM•MASTERV Back Draft Finish Cutter	15V (Top•On)	M388
	-	-	TOP•ON Straight & Conical Steel Shanks		M390
	-	-	TOP•ON Carbide Shanks		M391
	-	-	TOP•ON 40-Taper/50-Taper Screw-In Holders		M392
	-	-	TOP•ON HSK Standard Screw-In Holders		M393
	-	-	TOP•ON 50-Taper & DIN 50-Taper Holders for Slow Taper Shanks		M394
	-	-	TOP•ON Slow Taper Shanks		M395, 397

	Diameter Range	Cutting Length	Description	Series	Page
	-	-	TOP-ON HSK Holders for Slow Taper Shanks		M396
	-	-	TOP-ON Reducers		M398
	-	-	TOP-ON Extensions		M399
	.312-.750	.20-.62	CHIP-SURFER Center Cutting	47C, 47D, 48C, 48D	M400
	.312-.750	.20-.62	CHIP-SURFER Center Cutting	47C, 47D	M401
	.312-.500	.20-.37	CHIP-SURFER Center Cutting	46J, 46D	M402
	.312-.750	.20-.62	CHIP-SURFER Center Cutting	47J, 47D	M403
	.312-.625	.20-.62	CHIP-SURFER Center Cutting	48D, 48J, 49D, 49J	M404
	.312-.750	.20-.50	CHIP-SURFER Center Cutting	45D, 45J, 46D, 46J	M405
	.375-.625	.38-.60	CHIP-SURFER Drill Mill Tip	45D	M406

MODULAR

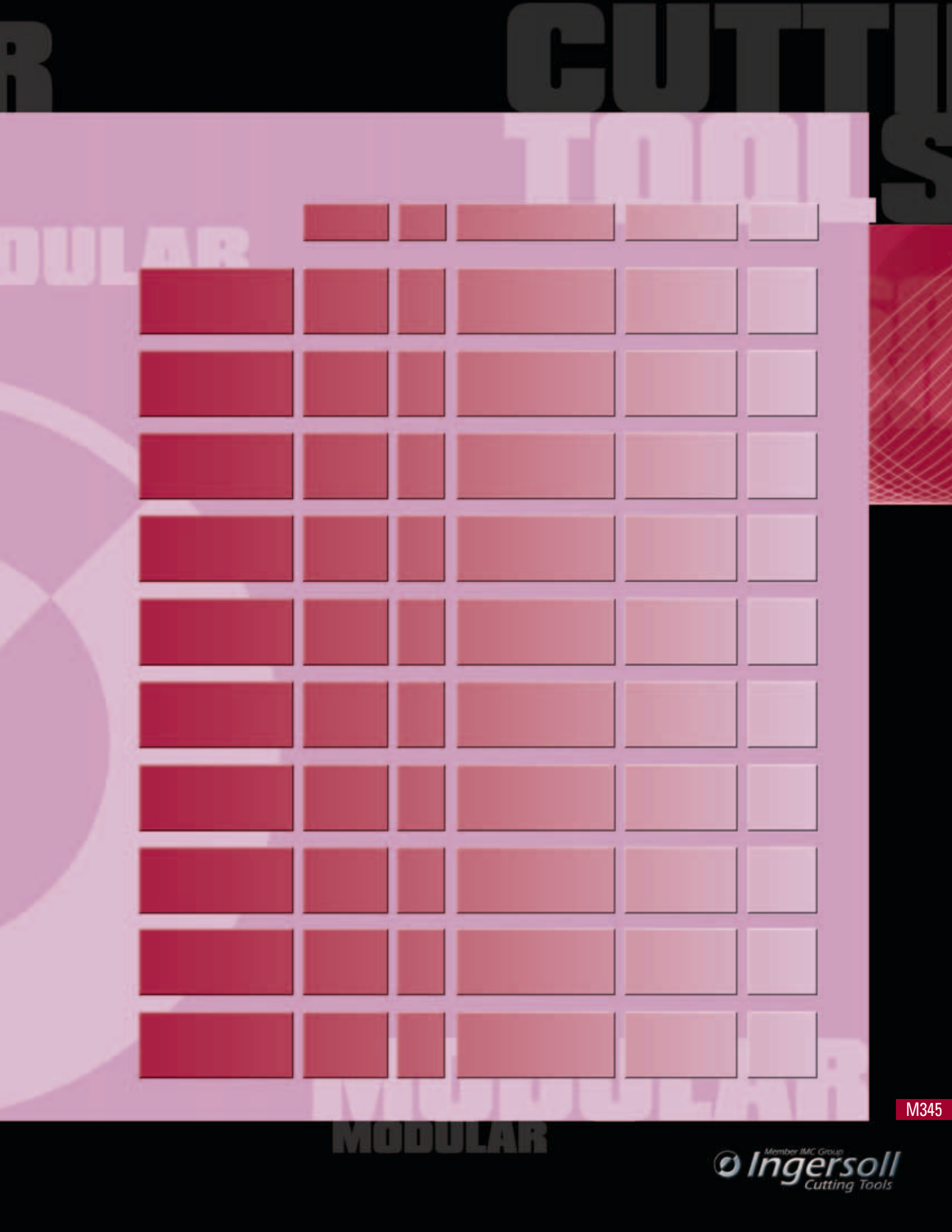
	Diameter Range	Cutting Length	Description	Series	Page
	.375-.625	.38-.60	CHIP•SURFER Flat Bottom Plunge Cutter	45V	M407
	.375-.629	.02-.04	CHIP•SURFER Ultra High Feed Tip	45A	M408
	.375-.500	.19-.27	CHIP•SURFER Backdraft Toroidal Tip	48U	M409
	.312-.625	.31-.63	CHIP•SURFER Ball Nose Tip	45B	M410
	.500	.40	CHIP•SURFER Ball Nose Tip	45X	M411
	.312-.625	.20-.62	CHIP•SURFER Ball Nose Tip	45B, 47B	M412
	.390 & .625	.06-.29	CHIP•SURFER Chamfer & Spotting Tip	45N, 45M, 45P	M413
	.500-.787	.20-.29	CHIP•SURFER Chamfer & Countersink Tip	47N, 48N	M414
	.394-.630	.49-.75	CHIP•SURFER Corner Rounding Tip	45R	M415
	.056-.375	.12-.19	CHIP•SURFER T-Slot Milling Tip	18T	M416



	Diameter Range	Cutting Length	Description	Series	Page
	.625	.13	CHIP•SURFER Chamfer V-Form Tip	18T	M418
	-	-	CHIP•SURFER Straight Shanks	-	M419
	-	-	CHIP•SURFER Conical Shanks	-	M420
	-	-	CHIP•SURFER Straight Shanks-No Neck	S0	M421
	-	-	CHIP•SURFER Extensions	-	M422
	-	-	CHIP•SURFER Blanks	-	M423
	-	-	CHIP•SURFER Ball Nose Blanks	-	M424
	-	-	CHIP•SURFER T-Slot Format Blanks	-	M425
	ER32		DRAW•IN Heat Shrink Unit	SRI-5000	M426
	.125-.500		DRAW•IN Collets	ER	M428

MODULAR

	Diameter Range	Cutting Length	Description	Series	Page
	-	-	DRAW-IN HSK Collet SETS	ER	M430
	50mm	-	DRAW-IN HSK Collet Chucks	HSK-A63	M430
	1.968	-	DRAW-IN CAT 50 Collet Chucks	CAT 50	M431
	1.968	-	DRAW-IN CAT 40 Collet Chucks	CAT40	M431



M345

END MILL SERIES 12J1F (INNO•FIT STYLE)

Diameters	Cutting Edge Length	Insert Corner
.750" to 1.250"	.44"	.015", .031", .062" and .125"R



Shoulder



Channeling



Ramping



Corkscrew



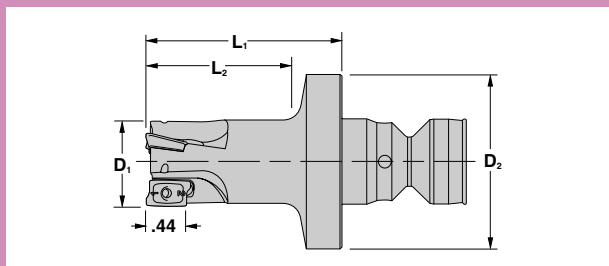
Pocketing



Facing

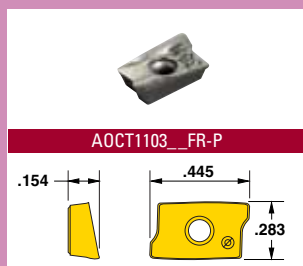
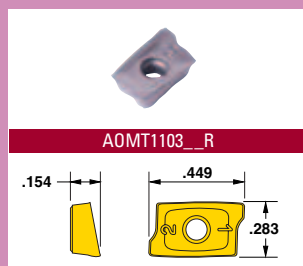


Coolant Thru

[illegible]

See pages M358-M361 for InnoFit System Components.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Helical Positive	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished	.015R		■					
AOMT110308R	Helical Positive	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished	.031R		■					
AOMT110316R	Helical Positive	.062R			■	■	■	■	■
AOMT110332R	Helical Positive	.125R*			■	■	■	■	■

*Cutter body must be relieved to accept .125R insert.

HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.750	SM25-054-00	10-15 in. lbs.	DS-T08V (Tx-08)
1.000-1.250	SM25-064-00	10-15 in. lbs.	DS-T08V (Tx-08)

For technical information, see page M478 .

MICRO 0° END MILL SERIES 1SJ1V (INNO•FIT STYLE)

Diameters

1.000" to 1.500"

Max. Depth of Cut
.28"

Insert Corner
.020"R



Facing



Shoulder



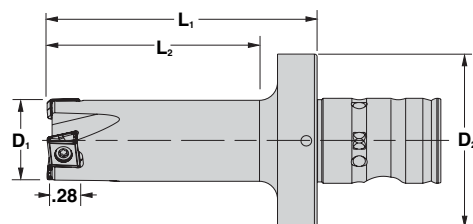
Channeling



Pocketing



Coolant Thru

[illegible]

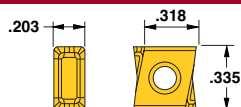
See pages M358-M361 for InnoFit System Components.

MAXline

INSERTS



DFM213R001



**Insert
Number**

Application

Corner

**Cut Edge
Configuration**

Grades

IN 2005 2030

DFM213R001

Multi-Purpose

.020R

4RH



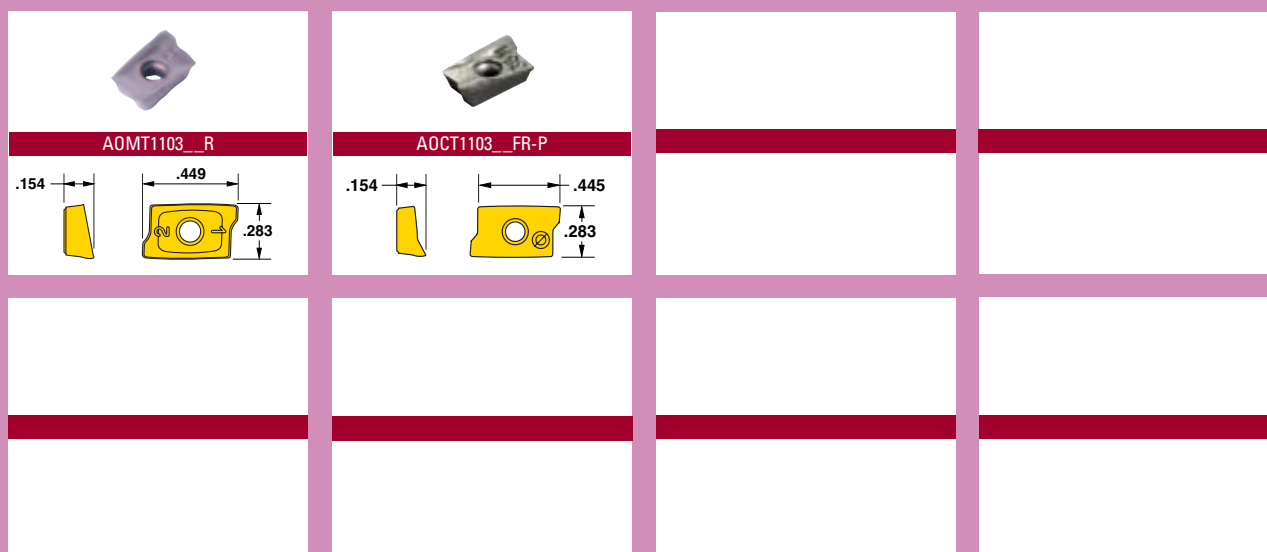
HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM30-082-00	13-18 in. lbs.	DS-T09S (Tx-09)	

For technical information, see page M485.

MAXline

INSERTS



Insert Number	Application	Corner*	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Helical Positive	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished	.015R		■					
AOMT110308R	Helical Positive	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished	.031R		■					
AOMT110316R	Helical Positive	.062R			■	■	■	■	■
AOMT110332R	Helical Positive	.125R**			■	■	■	■	■

*In side stations, use only .015"R to ensure overlap.
 ** Cutter body must be relieved to accept .125R insert.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)

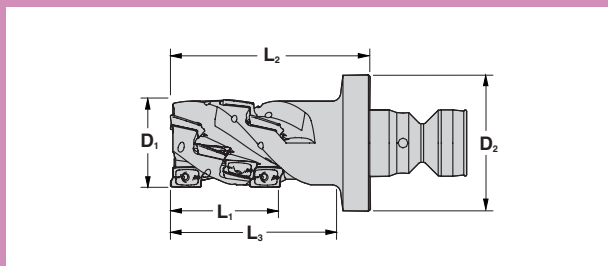
For technical information, see page M478.



EXTENDED FLUTE END MILL SERIES 22J3X (INNO•FIT STYLE)



Coolant Temperature

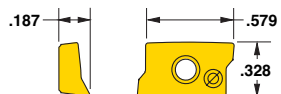
[illegible]

*Call for availability. See pages M358-M361 for InnoFit System Components.

INSERTS



AOMT1204__R



Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408FR	Helical Positive	.031R	■	■					
AOMT120408R	Helical Positive	.031R	■	■	■		■	■	
AOMT120416R	Helical Positive	.062R	■	■			■	■	
AOMT120432R	Helical Positive	.125R	■	■			■	■	
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

*In side stations, use .031"R or smaller to ensure overlap.

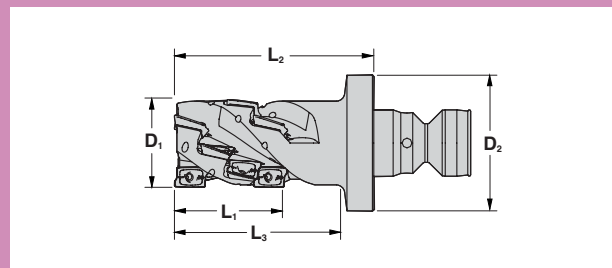
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

For technical information, see page M474.



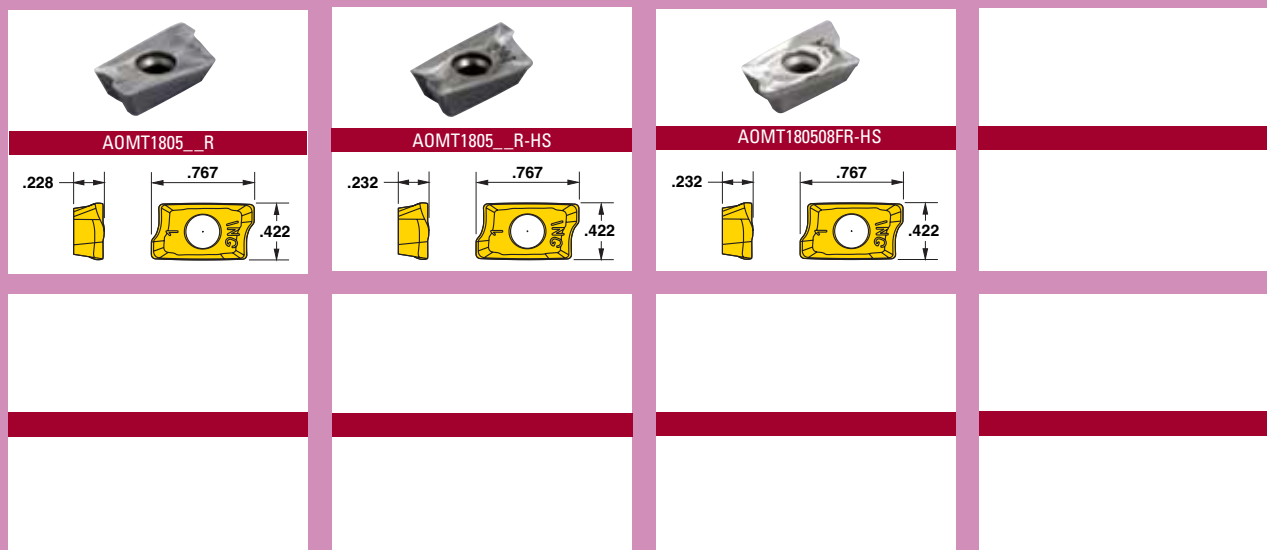
Insert Corner
.031", .062", .093" and
.125"_R



M354

CHASEline

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R			■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■

In side stations, use .015"R or smaller to ensure overlap.

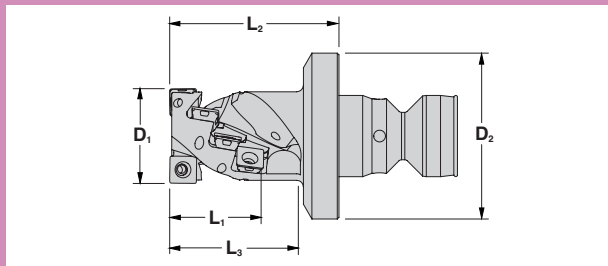
HARDWARE

Cutter Diameter	Insert Screw		Driver
	Part No.	Torque	Part No.
1.50	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)
2.00	SM40-120-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see pageM480.

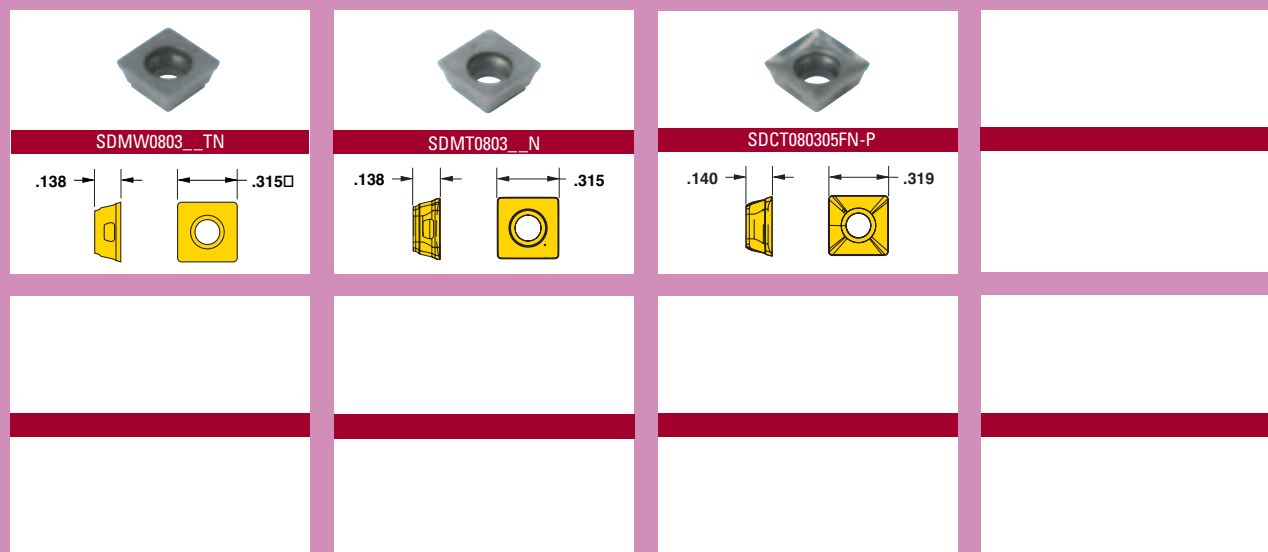
[illegible]

Facing



See pages M358-M361 for InnoFit System Components.

INSERTS



Insert Number	Application	Station*	Corner	Grades						
				IN	30M	2005	2030	2015	2040	1030
SDMT080305N	Multi-Purpose	End or Side	.020R			■	■	■	■	■
SDMW080305TN	Flat Top	End or Side	.020R			■	■	■	■	■
SDCT080305FN-P	Ground/Polished (for Alum.)	End or Side	.020R		■					
SDMT080308N	Multi-Purpose	End Only	.031R							■
SDMW080308TN	Flat Top	End Only	.031R							■
SDMT080316N	Multi-Purpose	End Only	.062R							■
SDMW080316TN	Flat Top	End Only	.062R							■

*In side stations, use .020" to ensure overlap.

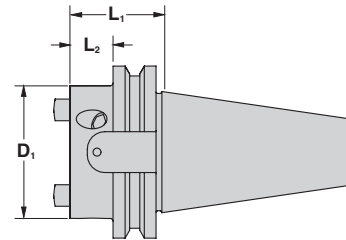
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM30-065-00	13-18 in. lbs.	DS-T09W (Tx-09)

For technical information, see page M481.

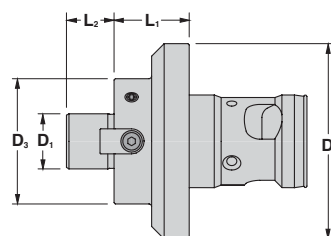
M259

1.93" and 3.07"

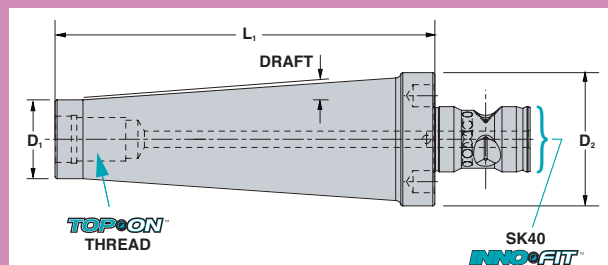


M258

First Drain
.500"-1.500"

[illegible]

A vertical collage of three images. The top image shows a blue and red Formula 1 car. The middle image is a red abstract pattern. The bottom image shows a cake with M360 logo candles.

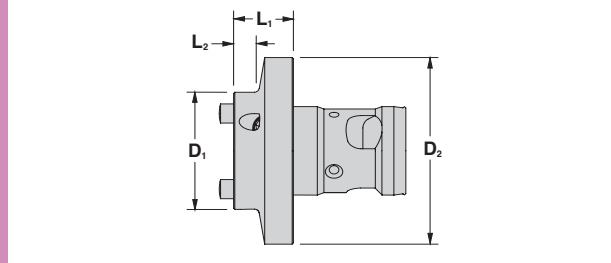
[illegible]

CHASE*line*

M360

INNOFIT™ REDUCER

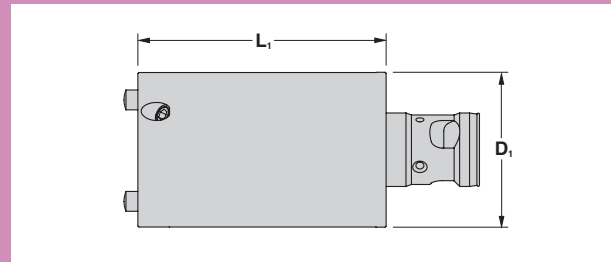
Diameter
1.93"



D ₁ Nominal Diameter	Adaption	Cutter Number	L ₁ Extension Length	L ₂ Projection Length	D ₂ Flange Diameter
1.93	SK40, SK50	Z5Z4 SA025	.985	.355	3.07
1.93	SK40, SK50	Z5Z4 SA050	1.970	1.340	3.07
1.93	SK40, SK50	Z5Z4 SA075	2.955	2.320	3.07
1.93	SK40, SK50	Z5Z4 SA100	3.940	3.310	3.07

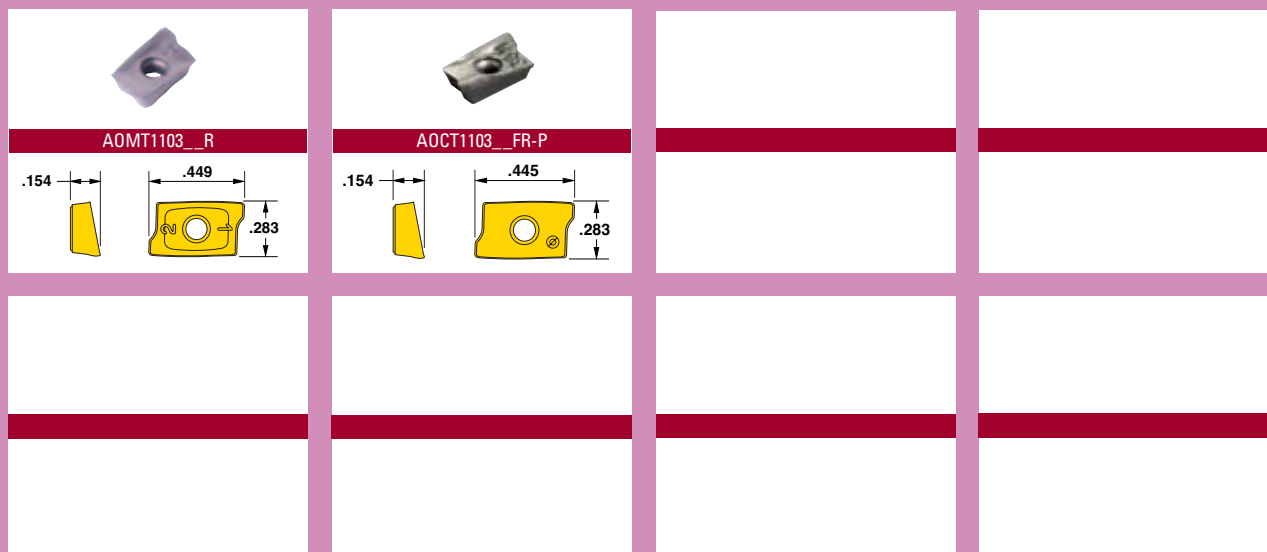
INNOFIT™ EXTENSION

Diameters
1.93" and 3.07"



D ₁ Nominal Diameter	Adaption	Cutter Number	L ₁ Extension Length
1.93	SK40	Z4Z4 SA050	1.970
1.93	SK40	Z4Z4 SA075	2.950
1.93	SK40	Z4Z4 SA100	3.940
3.07	SK50	Z5Z5 SA075	2.950
3.07	SK50	Z5Z5 SA100	3.940
3.07	SK50	Z5Z5 SA125	4.925

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT110304R	Helical Positive	.015R			■	■	■	■	■
AOCT110304FR-P	Ground/Polished	.015R		■					
AOMT110308R	Helical Positive	.031R			■	■	■	■	■
AOCT110308FR-P	Ground/Polished	.031R		■					
AOMT110316R	Helical Positive	.062R			■	■	■	■	■
AOMT110332R	Helical Positive	.125R*			■	■	■	■	■

*Cutter body must be relieved to accept .125R insert.

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM25-064-00	10-15 in. lbs.	DS-T08W (Tx-08)

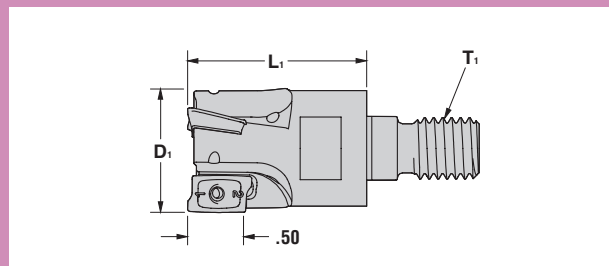
For technical information, see page M478.

0° END MILL SERIES 12J1X (TOP•ON STYLE)

Diameters
 .750" to 1.500"

Max. Depth of Cut
 .49"

Insert Corner
 .032", .062" and .125"R



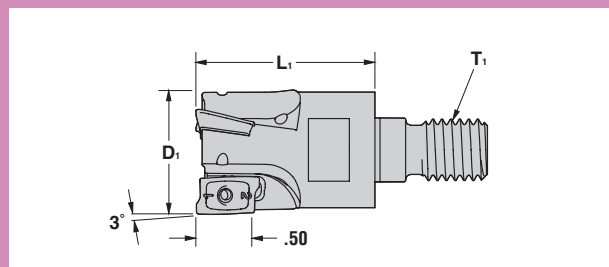
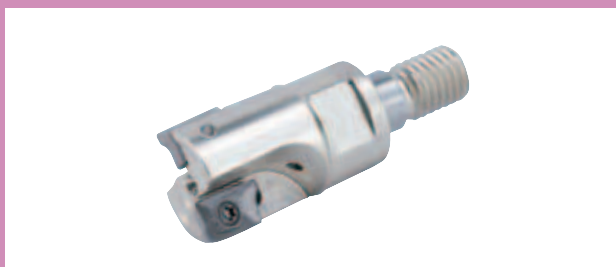
D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Inserts	Wrench Size	Ramp Angle
.750	M10	12J1X-07015X6R01	1.50	2	15mm	7.0
1.000	M12	12J1X-10015X7R01	1.50	3	17mm	4.5
1.250	M16	12J1X-12017X8R01	1.75	4	22mm	3.5
1.500	M16	12J1X-15017X8R01	1.75	5	22mm	2.0

BACKDRAFT END MILL SERIES 12V1X (TOP•ON STYLE)

Diameters
 .750" to 1.250"

Cutting Edge Length
 .50"

Insert Corner
 .031", .062" and .125"R



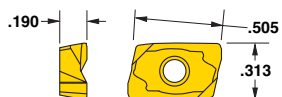
D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Inserts	Wrench Size	Ramp Angle
.750	M10	12V1X-07015X6R01	1.50	2	15mm	NA
1.000	M12	12V1X-10015X7R01	1.50	2	17mm	NA
1.000	M12	12V1X-10015X7R02	1.50	3	17mm	NA
1.500	M16	12V1X-12017X8R01	1.75	4	22mm	NA

See pages M390-M399 for TopOn System Components.

INSERTS



AOMT1204__R



Insert Number	Application	Corner	Grades						
			IN	2005	2030	2015	2040	1030	10K
AOMT120408R	Multi-Purpose	.031R	■	■	■	■	■	■	
AOMT120408FR	Landed Edge	.031R	■	■					
AOMT120416R	Multi-Purpose	.062R	■	■	■	■	■		
AOMT120432R	Multi-Purpose	.125R	■	■	■	■	■		
AOMT120408FR-HS	Ground/Polished (for Alum.)	.031R							■

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

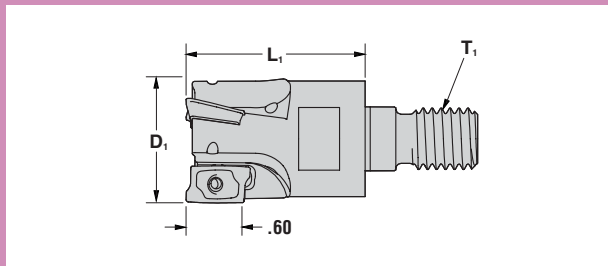
For technical information, see page M474.

HI•POS™ END MILL SERIES 12J1B (TOP•ON STYLE)

Diameters
1.000" and 1.250"

Cutting Edge Length
.60"

Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R



D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Flutes	Wrench Size	Ramp Angle Using APCT/APKT w/.030R
1.000	M12	12J1B-10012X7R01	1.25	2	17mm	5.4
1.250	M16	12J1B-12015X8R01	1.25	2	22mm	3.9
1.250	M16	12J1B-12015X8R02	1.50	3	22mm	3.0

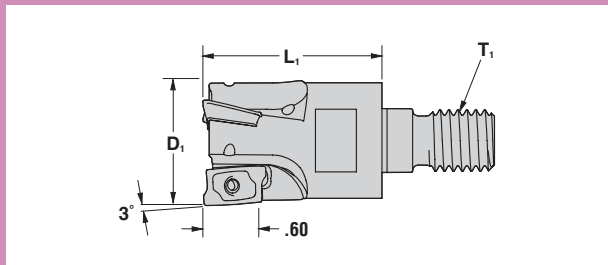
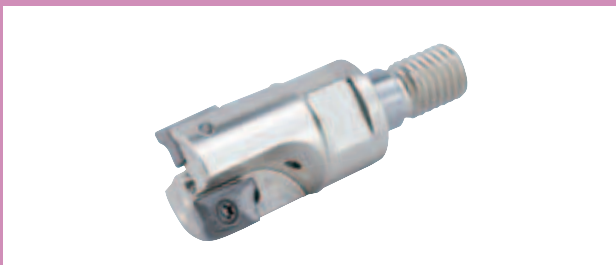
*Cutter body must be relieved for radii larger than .125".

HI•POS™ BACKDRAFT END MILL SERIES 12V1B (TOP•ON STYLE)

Diameters
1.000" and 1.250"

Cutting Edge Length
.60"

Insert Corner
.015", .031", .062", .093",
.125", .187" and .250"R

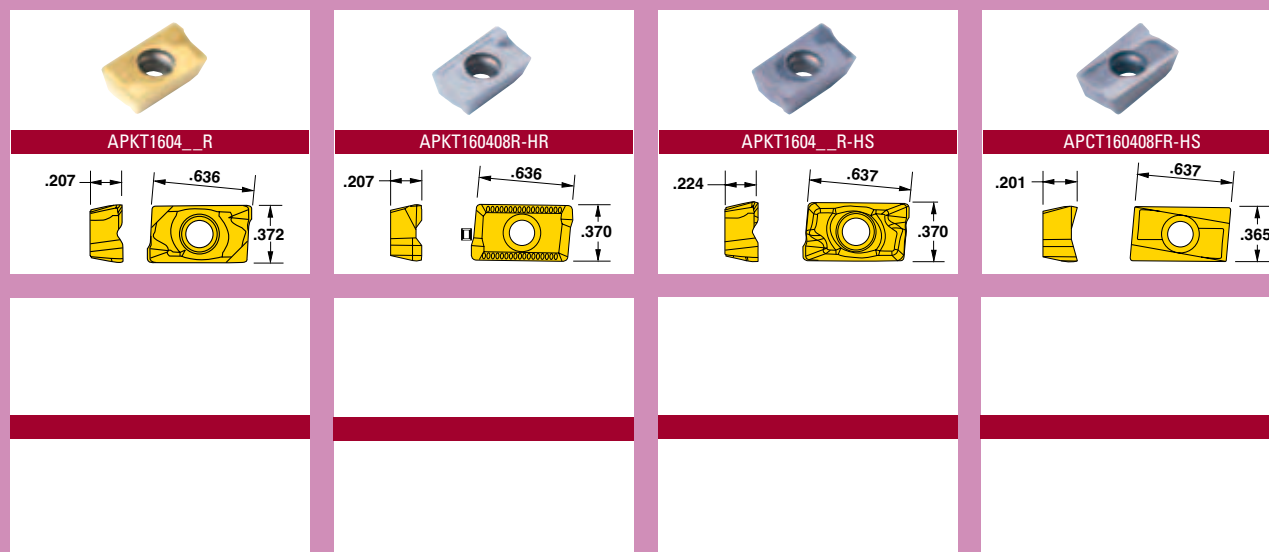


D ₁ Nominal Diameter	T ₁ Adaption	Cutter Number	L ₁ Extension Length	Number of Flutes	Wrench Size
1.000	M12	12V1B-10012X7R01	1.25	2	17mm
1.250	M16	12V1B-12015X8R01	1.25	2	22mm
1.250	M16	12V1B-12015X8R02	1.50	3	22mm

See pages M390-M399 for TopOn System Components.

CHASEline

INSERTS



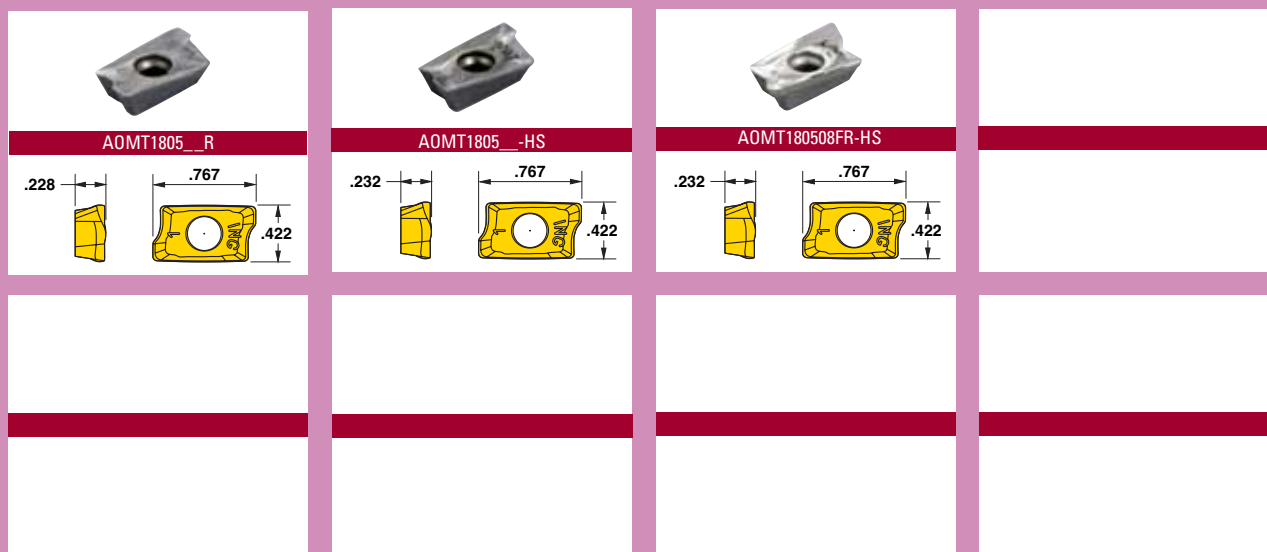
Insert Number	Application	Corner	Grades										
			IN	30M	40P	6530	2005	2030	2015	2040	1030	5015	90D
APKT160408R	Multi-Purpose	.031R			■	■	■	■	■	■	■	■	
APKT160408R-HR	Multi-Purpose	.031R			■							■	
APKT160408R-HS	Hi-Temp/Titanium	.031R		■								■	
APKT160404R-HS	Hi-Temp/Titanium	.015R		■								■	
APKT160416R-HS	Hi-Temp/Titanium	.062R		■								■	
APCT160408FR-HS	Ground/Polished (for Alum.)	.031R		■									
APKT160416R	Multi-Purpose	.062R			■		■	■	■	■	■	■	
APKT160424R	Multi-Purpose	.093R			■			■				■	■
APKT160432R	Multi-Purpose	.125R		■	■		■	■	■	■	■	■	
APKT160448R	Multi-Purpose	.187R			■							■	
APKT160464R	Multi-Purpose	.250R		■	■							■	■
APKT160408R-W	Wiper	.031R										■	■
APKT160404R-HR	PCD Tipped (120° DOC)	.015R											■

HARDWARE

Insert Screw		Driver	
Part No.	Torque	Part No.	
SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)	

For technical information, see page M474.

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
AOMT180504R-HS	Hi-Temp/Titanium	.015R				■			
AOMT180508R-HS	Hi-Temp/Titanium	.031R		■	■	■			
AOMT180516R-HS	Hi-Temp/Titanium	.062R		■	■	■			
AOMT180508FR-HS	Ground/Polished (for Alum.)	.031R		■					
AOMT180508R	Multi-Purpose	.031R			■	■	■	■	■
AOMT180516R	Multi-Purpose	.062R			■	■	■	■	■
AOMT180524R	Multi-Purpose	.093R			■			■	■
AOMT180532R	Multi-Purpose	.125R			■	■	■	■	■
AOMT180508L	Multi-Purpose	.031R							■

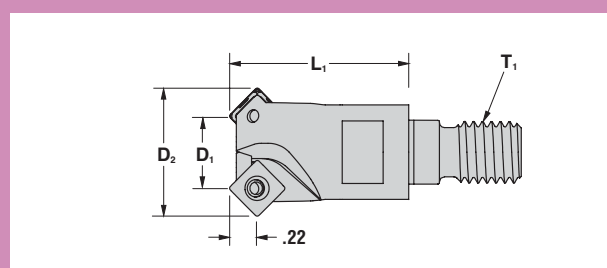
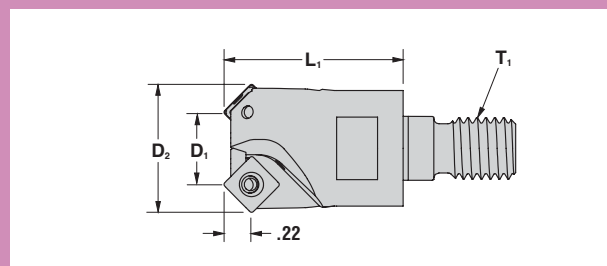
HARDWARE

Insert Screw			Driver
Cutter Diameter	Part No.	Torque	Part No.
.970-1.000	SM40-084-20	30-35 in. lbs.	DS-T15T (Tx-15)
1.250-2.000	SM40-093-20	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M480.



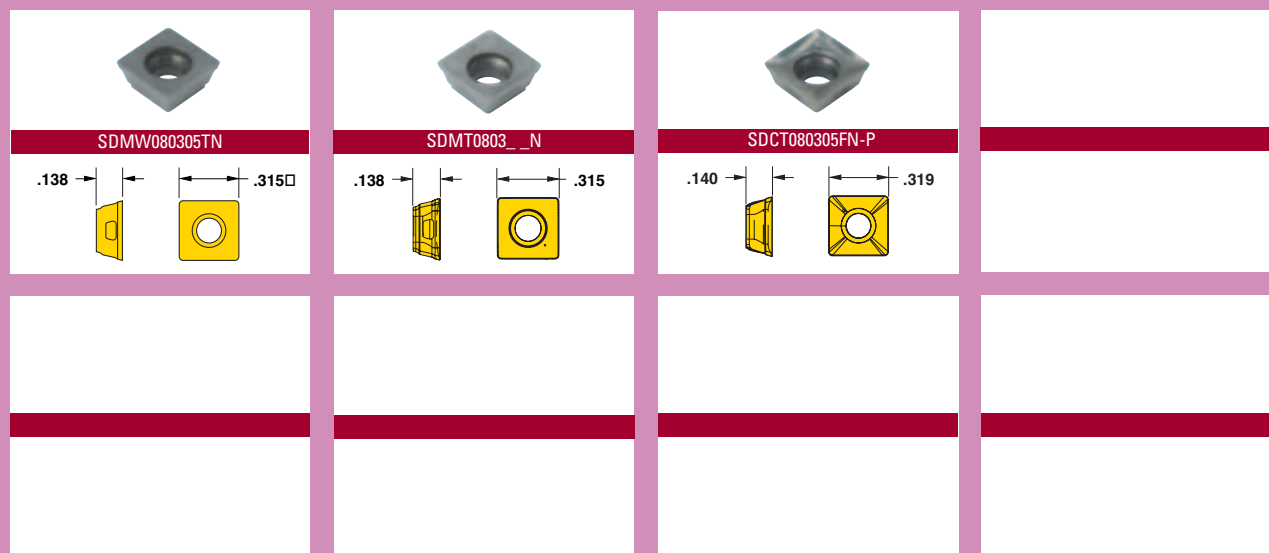
Coolant Temperature

[illegible]

M374

CHASEline

INSERTS



Insert Number	Application	Corner	Grades						
			IN	30M	2005	2030	2015	2040	1030
SDMT080305N	Multi-Purpose	.020R			■	■	■	■	■
SDMW080305TN	Flat Top	.020R			■	■	■	■	■
SDCT080305FN-P	Ground/Polished (for Alum.)	.020R		■					
SDMT080308N	Multi-Purpose	.031R							■
SDMT080308TN	Flat Top	.031R							■
SDMT080316N	Multi-Purpose	.062R							■
SDMT080316TN	Flat Top	.062R							■

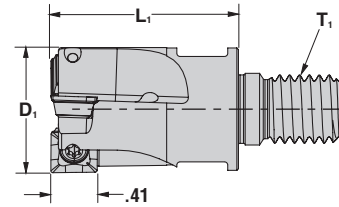
HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM30-065-00	13-18 in. lbs.	DS-T09T (Tx-09)

For technical information, see page M481.



Coolant Thru

[illegible]

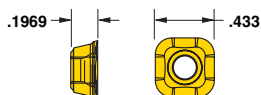
M376

CHASE*line*

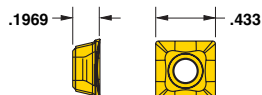
INSERTS



SHET1105__FN-P



SHET1105__FR-P



Insert
Number

Application

Corner

Grade

IN 15K

SHET110505FR-P

Ground/Polished (for Alum.)

.020R



SHET110508FR-P

Ground/Polished (for Alum.)

.031R



SHET110516FR-P

Ground/Polished (for Alum.)

.062R



SHET110524FN-P

Ground/Polished (for Alum.)

.093R



SHET110532FN-P

Ground/Polished (for Alum.)

.125R



HARDWARE

Insert Screw

Driver

Part No.

Torque

Part No.

SM40-093-20

30-35 in. lbs.

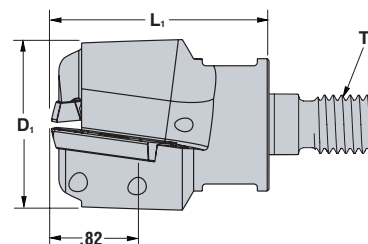
DS-T15T
(Tx-15)

For technical information, see page M480.

CHASEline

M377

Shoulder Channeling Ramping Pocketing Corkscrew Facing Coolant

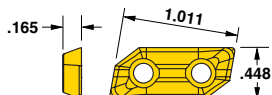
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See pages M390-M399 for TopOn System Components.

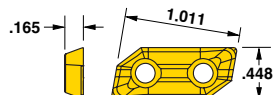
INSERTS



XEET2504_R-P



XEET2504_R-PW



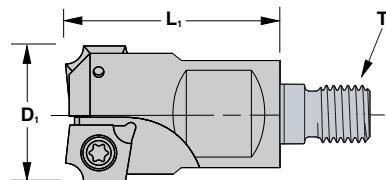
Insert Number	Application	Corner	Grade	
			IN	15K
XEET250408R-P	Ground/Polished (for Alum.)	.031R	■	
XEET250416R-P	Ground/Polished (for Alum.)	.062R	■	
XEET250424R-P	Ground/Polished (for Alum.)	.093R	■	
XEET250432R-P	Ground/Polished (for Alum.)	.125R	■	
XEET250408R-PW	Wiper	.031R	■	

HARDWARE

Insert Screw		Driver
Part No.	Torque	Part No.
SM40-070-00	30-35 in. lbs.	DS-T15T (Tx-15)

For technical information, see page M480.

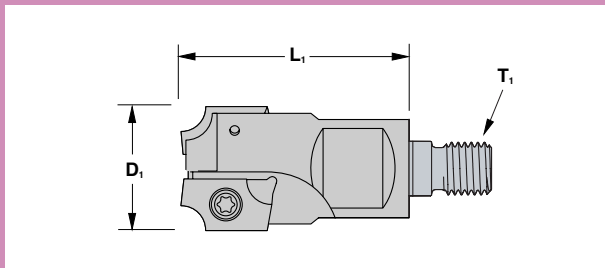
Corner Rounding



See pages M390-M399 for TopOn System Components.



Corner Rounding

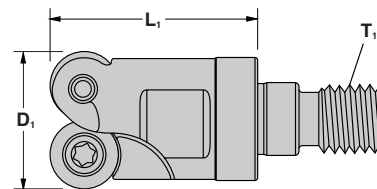


M292

M382

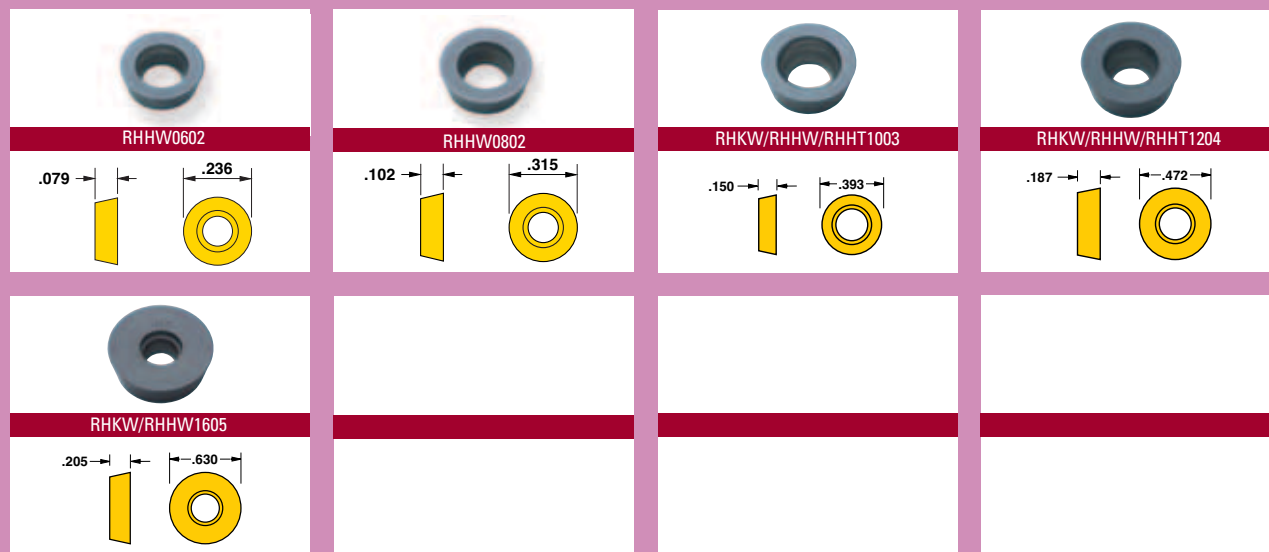


Coolant Th



See pages M390-M399 for TopOn System Components.

INSERTS



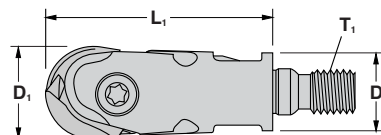
Insert Number	Insert Inscribed Circle	Application	Grades					
			IN	2004	2015	2005	2040	05S
RHKW1003MOTN	10mm	Multi-Purpose				■	■	
RHKW1204MOTN	12mm	Multi-Purpose				■	■	
RHKW1605MOTN	16mm	Multi-Purpose			■	■	■	
RHHW0602MOTN	6mm	Precision		■		■		
RHHW0802MOTN	8mm	Precision		■	■	■		
RHHW1003MOTN	10mm	Precision		■	■	■	■	
RHHW1204MOTN	12mm	Precision		■	■	■	■	
RHHW1605MOTN	16mm	Precision				■	■	
RHHT1003MOFN-P	10mm	Ground/Polished (for Alum.)						■
RHHT1204MOFN-P	12mm	Ground/Polished (for Alum.)						■

HARDWARE

Insert Inscribed Circle	Insert Screw		Clamp	Clamp Screw		Driver
	Part No.	Torque		Part No.	Part No.	
6mm	SM25-049-00	10-15 in. lbs.	-	-	-	DS-T08W (Tx-08)
8mm	SM30-053-00	13-18 in. lbs.	-	-	-	DS-T09W (Tx-09)
10mm	SM40-070-10	30-35 in. lbs.	-	-	-	DS-T15T (Tx-15)
12mm	SM40-080-10	30-35 in. lbs.	-	SF035-01	-	DS-T15T (Tx-15)
16mm	SM50-100-10	35-40 in. lbs.	CL-5000	SM50-100-10	-	DS-T20T (Tx-20)

For technical information, see page M499.

Plunging



INSERTS

			
NCET090200R	NCEX-Standard	NCHX-Precision	
			

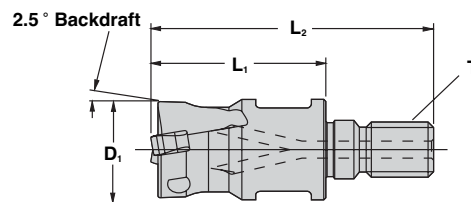
Cutter Diameter	Quantity Each	Insert Number	Application	Indexes/Insert	Grades		
					IN	1530	1030
.375	1	NCET090200R	Standard	2	■		
.500	1	NCEX120300R	Standard	1	■		
.500	1	NCHX120300R	Precision	1			■
.625	1	NCEX150500R	Standard	1	■		
.625	1	NCHX150500R	Precision	1			■
.750	1	NCEX190500R	Standard	1	■		
.750	1	NCHX190500R	Precision	1			■
1.000	1	NCEX250600R	Standard	1	■		
1.000	1	NCHX250600R	Precision	1			■

HARDWARE

Cutter Diameter	Insert Screw		Driver	Retaining Ring	
	Part No.	Torque		Part No.	
.375	SM25-055-10	9-11.5 in. lbs.	DS-T08W (Tx-08)	-	
.500	SF050-01	53-58 in. lbs.	DS-T15T (Tx-15)	RR03-01	
.625	SF060-01	65-70 in. lbs.	DS-T20T (Tx-20)	RR03-02	
.750	SF080-01	105-110 in. lbs.	DS-T25T (Tx-25)	RR04-01	
1.000	SF080-02	105-110 in. lbs.	DS-T25T (Tx-25)	RR04-01	

For technical information, see page M496.

Coolant Thru

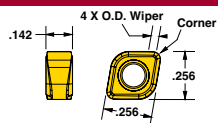
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See pages M390-M399 for TopOn System Components.

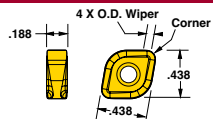
INSERTS



CNHU0603



CNHU1104



Cutter Series	Insert Number	Corner	Application	Indexes per Insert	Grades			
					IN	1030	2005	2040
15V1D	CNHU060310N	1 mmR (.039)	Finishing	4	■	■	■	■
15V1G	CNHU110420N	2 mmR (.078)	Finishing	4			■	

HARDWARE

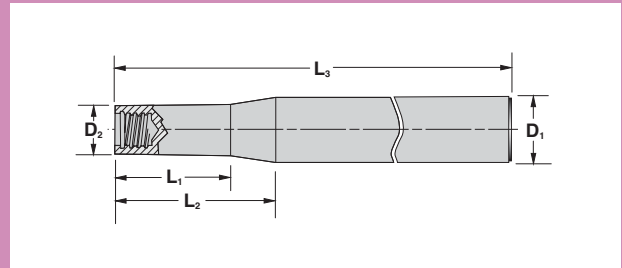
Insert Series	Side Insert Screw		Driver
	Part No.	Torque	
15V1D	SM25-075-20	7-10 in. lbs.	DS-T08V (Tx-08)
15V1G	SM35-088-10	25-30 in. lbs.	DS-T10T (Tx-10)

For technical information, see page M497.

TOPCON™ STRAIGHT SHANKS STEEL

Thread Connections
M8, M10, M12, and M16

Shank Diameters
.625" to 1.25"

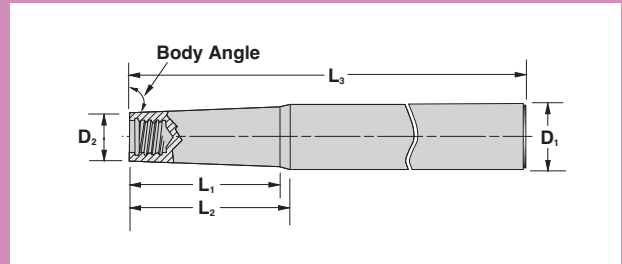


T ₁ Internal Thread	Part Number	D ₁ Shank Diameter	D ₂ Mating Diameter	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length
M6	W050MOD06SA-22	.500 Weldon	.46	2.20	2.25	4.00
M8	S062MOD08SK-30	.625 Cylindrical	.51	1.00	1.09	3.00
M8	WB062MOD08SK-50	.625 Weldon	.51	3.00	3.09	5.00
M10	S075MOD10SK-30	.750 Cylindrical	.71	1.00	1.09	3.00
M10	WB075MOD10SK-50	.750 Weldon	.71	3.00	3.09	5.00
M12	S100MOD12SA-80	1.000 Cylindrical	.82	2.80	5.75	8.00
M12	WB100MOD12SK-35	1.000 Weldon	.82	1.00	1.25	3.50
M16	WB125MOD16SK-40	1.250 Weldon	1.14	1.37	1.75	4.00
M16	S125MOD16SK-90	1.250 Cylindrical	1.14	2.00	6.75	9.00

TOPCON™ CONICAL SHANKS STEEL

Thread Connections
M8, M10 and M12

Shank Diameters
.625" to 1.25"



T ₁ Internal Thread	Part Number	D ₁ Shank Diameter	D ₂ Mating Diameter	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length	Angle
M6	W050MOD06SK-24	.500 Cylindrical	.39	2.36	-	4.00	1.2
M8	S075MOD08SK-65	.750 Cylindrical	.51	2.62	4.50	6.50	3.0
M10	S100MOD10SK-80	1.000 Cylindrical	.71	2.25	5.75	8.00	3.5
M12	WB100MOD12SK-35	1.000 Weldon	.82	1.18	1.25	3.50	2.0
M12	S125MOD12SK-80	1.250 Cylindrical	.82	3.00	5.75	8.00	4.0

M390

CHASEline



Thread Connections

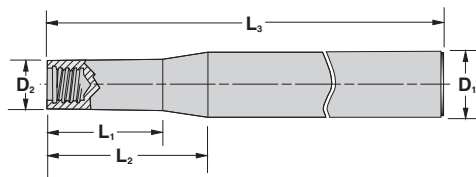
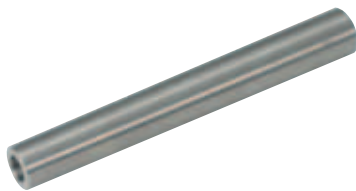
M8, M10, M12, and M16

Shank Diameters

.625" to 1.25"



Coolant

[illegible]

TOPCON™ 40-TAPER HOLDERS SCREW-IN TOOL CONNECTION

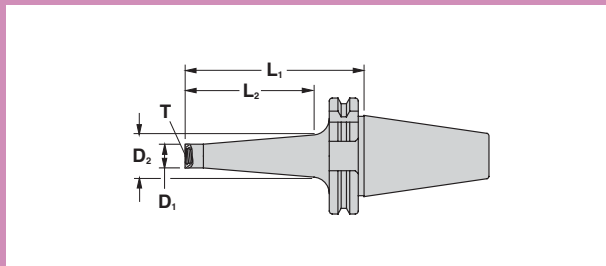
ANSI Standard
40-Taper CAT 40

Internal Threads
M8, M10, M12, and M16

Coolant
Through-the-tool



Coolant



T ₁ Internal Thread	Part Number	D ₁ Connection Diameter	D ₂ Projection Diameter	L ₁ Extension Length	L ₂ Projection Length	Retention Knob
M8	CA40MOD08SK-020	.510	.580	2.00	.63	Not furnished
M8	CA40MOD08SK-040	.510	.790	4.00	2.63	Not furnished
M10	CA40MOD10SK-020	.710	.780	2.00	.63	Not furnished
M10	CA40MOD10SK-040	.710	.990	4.00	2.63	Not furnished
M12	CA40MOD12SK-040	.830	1.110	4.00	2.63	Not furnished
M12	CA40MOD12SK-060	.830	1.310	6.00	4.63	Not furnished
M16	CA40MOD16SK-040	1.140	1.420	4.00	2.63	Not furnished
M16	CA40MOD16SK-060	1.140	1.620	6.00	4.63	Not furnished

TOPCON™ 50-TAPER HOLDERS SCREW-IN TOOL CONNECTION

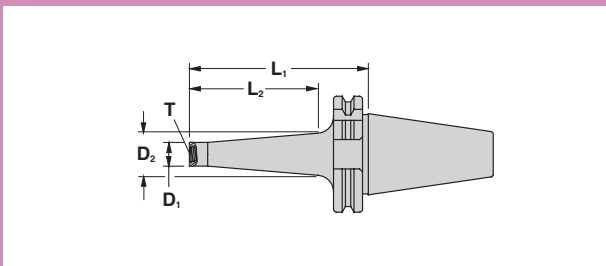
ANSI Standard
50-Taper CAT 40

Internal Threads
M8, M10, M12, and M16

Coolant
Through-the-tool



Coolant



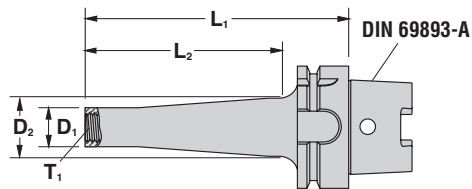
T ₁ Internal Thread	Part Number	D ₁ Connection Diameter	D ₂ Projection Diameter	L ₁ Extension Length	L ₂ Projection Length	Retention Knob
M8	CAT500DPM8X5.000	.510	.910	5.00	3.56	Not furnished
M10	CAT500DPM10X3.000	.710	.710	3.00	1.56	Not furnished
M10	CAT500DPM10X7.000	.710	1.100	7.00	5.56	Not furnished
M12	CAT500DPM12X3.000	.830	.830	3.00	1.56	Not furnished
M12	CAT500DPM12X7.000	.830	1.220	7.00	5.56	Not furnished
M16	CAT500DPM16X3.000	1.140	1.140	3.00	1.56	Not furnished
M16	CAT500DPM16X7.000	1.140	1.340	7.00	5.56	Not furnished

CHASEline

HSK Standard
HSK-A63

Internal Threads

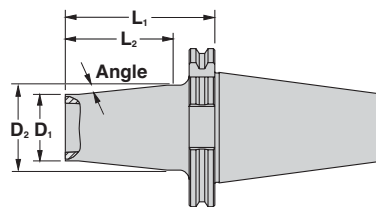
M8, M10, M12, and M16

[illegible]

TOP•ON™ 50-TAPER HOLDERS SLOW TAPER INTEGRAL SHANK

CAT/ANSI Standard
50-Taper V-Flange

Internal Tapers
2, 3, 4, and 5

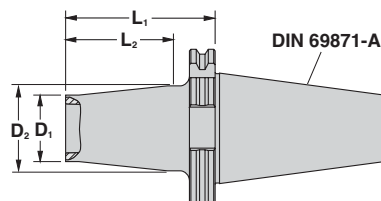


T ₁ Internal Taper	Part Number	D ₁ Mating Diameter	Angle	L ₁ Extension Length	L ₂ Projection Length	Minimum Ext. w/ Slow-Taper Shank	Maximum Ext. w/ Slow-Taper Shank
2	CA50MT2SK-40	1.100	2.50	4.000	3.25	4.8	6.4
2	CA50MT2SK-70	1.100	2.50	7.000	6.25	7.8	9.4
2	CA50MT2SK-90	1.100	2.50	9.000	8.25	9.8	11.4
3	CA50MT3SK-50	1.338	2.50	5.000	4.25	5.6	8.7
3	CA50MT3SK-90	1.338	2.50	9.000	8.25	9.6	12.7
4	CA50MT4SK-50	1.653	2.50	5.000	4.25	5.7	8.7
4	CA50MT4SK-90	1.653	2.50	9.000	8.25	9.7	12.7
5	CA50MT5SK-50	2.165	2.50	5.000	4.25	8.9	12.1
5	CA50MT5SK-90	2.165	2.50	9.000	8.25	12.9	16.1

TOP•ON™ DIN 50-TAPER HOLDERS SLOW TAPER INTEGRAL SHANK

DIN Standard
50-Taper DIN 69871-A

Internal Tapers
2, 3, 4, and 5



Internal Taper	Part Number	D ₁ Connection Diameter	D ₂ Projection Diameter	L ₁ Extension Length	L ₂ Projection Length	Retention Knob*
2	69871A50MT2SK062	1.100	1.260	2.440	1.375	Not furnished
2	69871A50MT2SK112	1.100	1.338	4.410	3.346	Not furnished
2	69871A50MT2SK162	1.100	1.575	6.375	5.315	Not furnished
3	69871A50MT3SK072	1.338	1.575	2.835	1.771	Not furnished
3	69871A50MT3SK122	1.338	1.614	4.803	3.740	Not furnished
3	69871A50MT3SK172	1.338	1.850	6.771	5.710	Not furnished
4	69871A50MT4SK102	1.653	2.087	4.015	2.952	Not furnished
4	69871A50MT4SK152	1.653	2.08	5.984	4.921	Not furnished
4	69871A50MT4SK202	1.653	2.283	7.950	6.890	Not furnished
5	69871A50MT5SK127	2.165	2.720	5.000	3.940	Not furnished
5	69871A50MT5SK177	2.165	2.720	6.970	5.900	Not furnished
5	69871A50MT5SK227	2.165	2.750	8.940	7.874	Not furnished

CHASEline

TOPON™

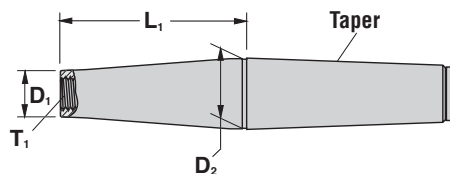
SLOW TAPER SHANKS

Thread Connections

M8, M10, M12, and M16

2, 3, 4, and 5

Extensions
20mm (0.787")
to 180mm (7.086")

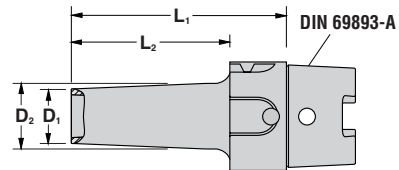




TOP-ON™ HSK STANDARD HOLDERS SLOW TAPER INTEGRAL SHANK

HSK Standard
HSK-A63

Internal Tapers

[illegible]

CHASE*line*

M396

TOP•ON™

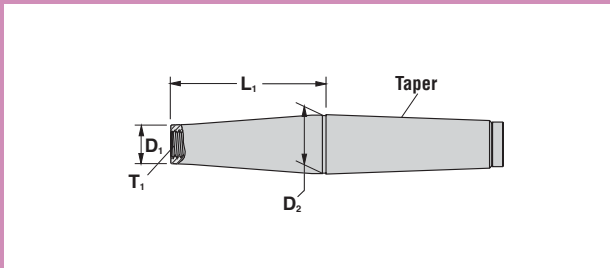
SLOW TAPER SHANKS

Thread Connections

M8, M10, M12, and M16

2, 3, 4, and 5

Extensions
20mm (0.787")
to 180mm (7.086")

[illegible]





SOLID CARBIDE SERRATED ROUGHING TIP

SERIES 47C, 47D, 48C, 48D

(0° LEAD, 45° HELIX, CENTER CUTTING)

Diameters
.312" to .750"

Grade
IN2005

Corner
Chamfer & Radius



Shoulder



Channeling



Ramping



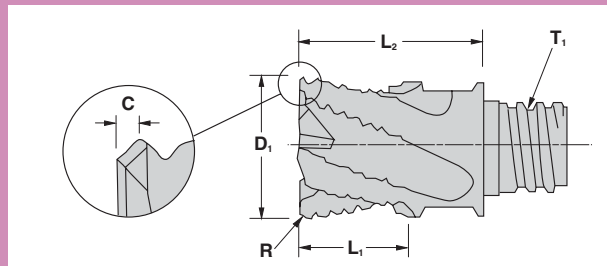
Corkscrew



Pocketing



Facing

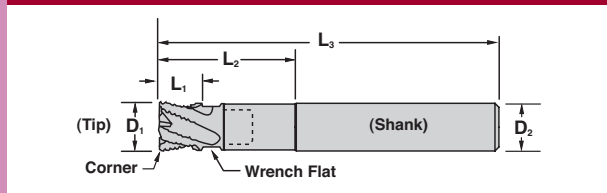


Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	C Corner
47C-3120TQRN01	4	.312	.20	T05	.39	.010 x 45
47C-3727T6RN01	4	.375	.27	T06	.50	.013 x 45
47D-3727T6RN03	4	.375	.27	T06	.50	.031
47C-5037T8RN01	4	.500	.37	T08	.65	.012 x 45
47D-5037T8RN03	4	.500	.37	T08	.65	.031
47D-5037T8RN06	4	.500	.37	T08	.65	.062
47C-6247TRRN01	5	.625	.47	T10	.80	.014 x 45
48C-7562TSRN01	6	.750	.62	T12	1.00	.016 x 45
48D-7562TSRN06	6	.750	.62	T12	1.00	.062

Chip•Surfer Paks



Tip and Shank



Order This Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Diameter	End Mill Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assm Length	Wrench
S050T08KA-06-02	(2) 47C-5037T8RN01	S050T08SA-06 (Steel)	.500	.012 x 45	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-02	(2) 47C-5037T8RN01	S050T08CA-25 (Carbide)	.500	.012 x 45	.500 Cyl	.37	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

Diameters
.312" to .750"

Grade
IN2005

Corner Chamfer & Radius



Shoulder



Channeling



Ramping



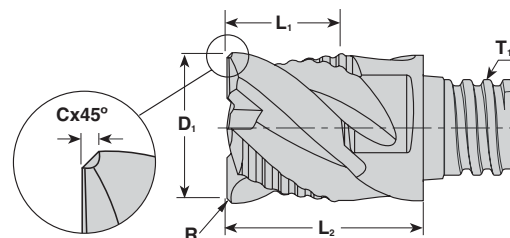
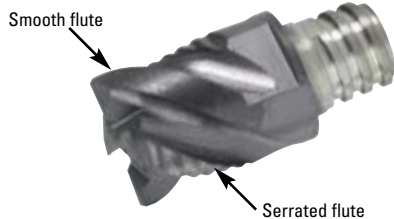
Corkscrew



Pocketing



Facing

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.



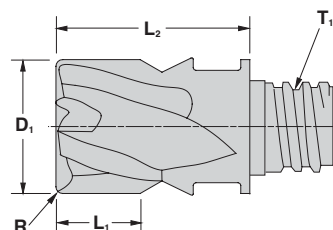
SOLID CARBIDE CENTER CUTTING END MILL TIP

SERIES 46J, 46D

Corner
Sharp, .015", .031" and
.062"_R



Facing



3-FLUTE END MILL HEADS

[illegible]

Wrench (Not included with carbide tip or shank purchase).

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASE*line*

M402

CHIP SURFER™ SOLID CARBIDE CENTER CUTTING END MILL TIP SERIES 47J, 47D
(0° LEAD, 45° HELIX, HIGH PRECISION)

Diameters
.312" to .750"

Grade
IN2005, IN3005

Corner
Sharp, .015", .031" and
.062"R



Shoulder



Channeling



Ramping



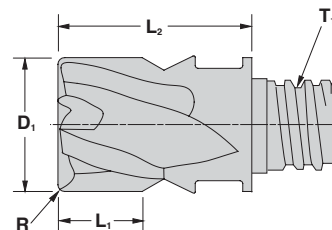
Corkscrew



Pocketing



Facing



Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
4-FLUTE END MILL HEADS						
47J-3120TQRD04	4	.312	.20	T05	.39	SHARP
47D-3120TQRD01	4	.312	.20	T05	.39	.015
47D-3120TQRD03	4	.312	.20	T05	.39	.031
47D-3120TQRD06	4	.312	.20	T05	.39	.062
47J-3727T6RD05	4	.375	.27	T06	.50	SHARP
47D-3727T6RD01	4	.375	.27	T06	.50	.015
47D-3727T6RD03*	4	.375	.27	T06	.50	.031
47D-3727T6RD06	4	.375	.27	T06	.50	.062
47J-5037T8RD06	4	.500	.37	T08	.65	SHARP
47D-5037T8RD01	4	.500	.37	T08	.65	.015
47D-5037T8RD03	4	.500	.37	T08	.65	.031
47D-5037T8RD06	4	.500	.37	T08	.65	.062
47J-6247TRRD08	4	.625	.47	T10	.80	SHARP
47D-6247TRRD03	4	.625	.47	T10	.80	.031
47D-7562TSRD03	4	.750	.62	T12	1.00	.031

* Also offered in Grade IN3005- diamond coated for milling graphite.

Order This Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Diameter	R End Mill Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assm Length	Wrench
S037T06KA-06-11	(2) 47D-3727T6RD03	S037T06SA-06 (Steel)	.375	.031	.375 Cyl	.27	1.00	3.50	WS-0029
S050T08KA-06-11	(2) 47D-5037T8RD03	S050T08SA-06 (Steel)	.500	.031	.500 Cyl	.37	1.18	4.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

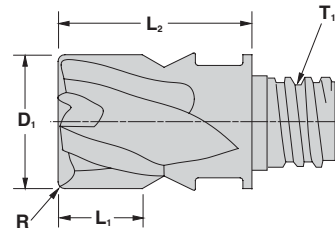
For technical information, see page M482.

CHASEline



SERIES 48D, 48J, 49D, 49J

Corner
Sharp, .015", .031" and .062"R



Wrench (Not included with carbide tip or shank purchase).

When assembling, be sure carbide tip is seated firmly on shank with no gap.

CHASE*line*

M404

CHIP•SURFER™ 0° LEAD, 45° HELIX, POLISHED, SHARP, FOR ALUMINUM SERIES 45D, 45J, 46D, 46J
(CENTER CUTTING)

Diameters
.312" to .750"

Grade
IN05S

Corner
Sharp and .020"r



Shoulder



Channeling



Ramping



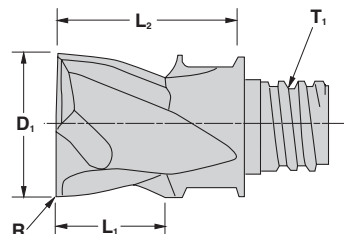
Corkscrew



Pocketing



Facing

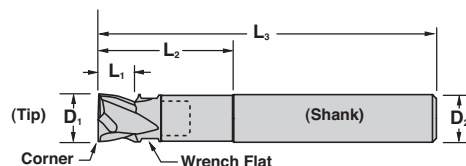


Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius
46D-3120TQRD02-P	3	.312	.20	T05	.39	.020
45J-3727T6RD05-P	2	.375	.27	T06	.50	SHARP
45D-3727T6RD02-P	2	.375	.27	T06	.50	.020
46D-3727T6RD02-P	3	.375	.27	T06	.50	.020
45J-5037T8RD06-P	2	.500	.37	T08	.65	SHARP
45D-5037T8RD02-P	2	.500	.37	T08	.65	.020
46D-5037T8RD02-P	3	.500	.37	T08	.65	.020
46J-6239TRRD08-P	3	.625	.39	T10	.80	SHARP
46D-7550TSRD02-P	3	.750	.50	T12	1.00	.020

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-04	(2) 45J-3727T6RD05-P	S037T06SA-06 (Steel)	.375	Sharp	.375 Cylindrical	.27	.98	3.48	WS-0029
S050T08KA-06-04	(2) 45J-5037T8RD06-P	S050T08SA-06 (Steel)	.500	Sharp	.500 Cylindrical	.37	1.16	4.13	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-14	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

CHIP SURFER™ DRILL-MILL TIP SERIES 45D

Diameters
 .375" to .625"
Grade
 IN2005
Corner
 .015"R



Drill



Std. Bottom



Shoulder



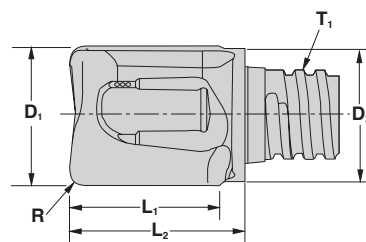
Pocketing



Ramping



Channeling



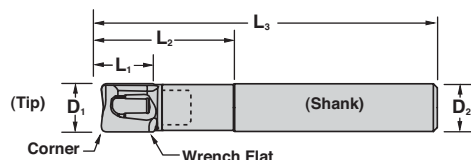
Cutter Number	Eff.	D ₁ Nominal Diameter	D ₂ Flange Diameter	T ₁ Thread Size	L ₁ Edge Length	L ₂ Extension Length	R Corner Radius
45D-3738T6RA01	2	.375	.35	T06	.38	.48	.015
45D-5045T8RA01	2	.500	.48	T08	.45	.60	.015
45D-6263T10RA01	2	.625	.60	T10	.60	.75	.015

*Drill depth not to exceed 2/3 edge length.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-D1	(2) 45D-3738T6RA01	S037T06SA-06 (Steel)	.375	.015	.375 Cylindrical	.38	.98	3.48	WS-0029
S050T08KA-06-D1	(2) 45D-5045T8RA01	S050T08SA-06 (Steel)	.500	.015	.500 Cylindrical	.45	1.13	4.10	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline

FLAT BOTTOM PLUNGE CUTTER SERIES 45V

Diameters
 .375" - .625"
Grade
 IN2005
Corner
 .031"R



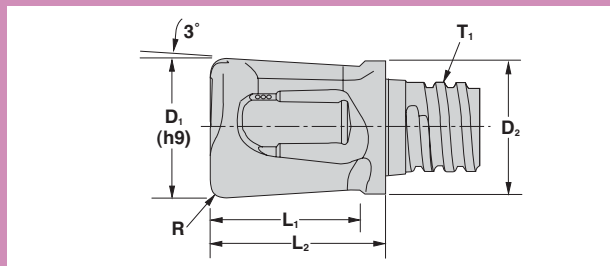
Drill



Flat Bottom



Plunge



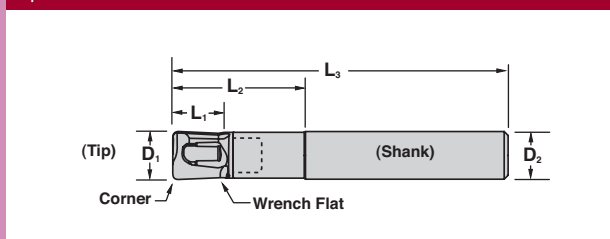
Cutter Number	Eff.	D ₁ Nominal Diameter	D ₂ Flange Diameter	T ₁ Thread Size	L ₃ Edge Length	L ₂ Extension Length	R Corner Radius
45V-3738T6RA03	2	.375	.35	T06	.38	.48	.031
45V-5045T8RA03	2	.500	.48	T08	.45	.60	.031
45V-6260T8RA03	2	.625	.60	T10	.60	.75	.031

*Drill depth not to exceed 2/3 edge length.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D1 End Mill Dia.	End Mill Corner	D2 Shank Adaption	L1 Length of Cut	L2 Projection Length	L3 Assem. Length	Wrench
S037T06KA-06-P1	(2) 45V-3738T6RA03	S037T06SA-06 (Steel)	.375	.030	.375 Cylindrical	.38	.98	3.48	WS-0029
S050T08KA-06-P1	(2) 45V-5045T8RA03	S050T08SA-06 (Steel)	.500	.030	.500 Cylindrical	.45	1.13	4.10	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

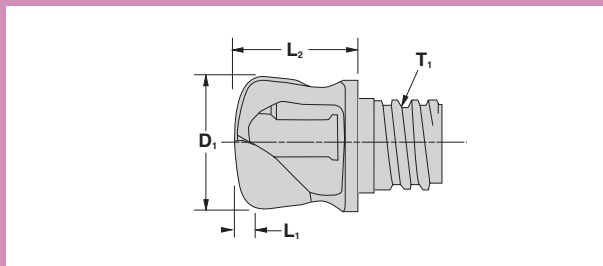
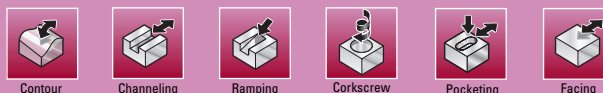
CHASEline

SOLID CARBIDE ULTRA HIGH-FEED TIP SERIES 45A

Diameters
 .375" to .629"

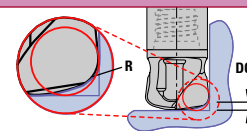
Grade
 IN2005

Corner
 .080", .100" and .120"R



Cutter Number	D ₁ Nominal Diameter	Eff.	L ₁ Depth of Cut	T Thread Size	L ₂ Extension Length	R Corner Radius	Ramp Angle
45A-3703T6RA06	.375	2	.02	T06	.47	.080	10°
45A10001T6RA20	.394 (10mm)	2	.02	T06	.49	.080	10°
45A12001T8RA25	.472 (12mm)	2	.04	T08	.44	.100	10°
45A-5004T8RA08	.500	2	.04	T08	.49	.100	10°
45A16001T8RA30	.629 (16mm)	2	.04	T10	.80	.120	10°

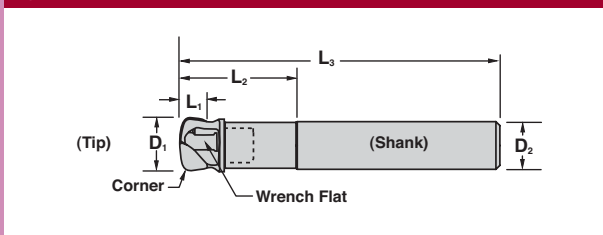
Program as though they are a square bottom end mill with noted corner radius.
 This method will ensure and minimize remaining stock for secondary passes.



Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) End Mill Tip	Straight Shank	D ₁ End Mill Dia.	D ₂ End Mill Corner	L ₁ Shank Adaption	L ₂ Length of Cut	L ₃ Projection Length	Assem. Length	Wrench
S037T06KA-06-F2	(2) 45A-3703T6RA06	S037T06SA-06 (stl)	.375	.08	.375 Cyl	.02	.98	3.48	WS-0029
S037T06KA-20-F2	(2) 45A-3703T6RA06	S037T06CA-20 (carb)	.375	.08	.375 Cyl	.02	2.43	5.23	WS-0029
S050T08KA-06-F1	(2) 45A12001T8RA25	S050T08SA-061(stl)	.472 (12mm)	.10	.500 Cyl	.04	1.07	3.94	WS-0030
S050T08KA-25-F1	(2) 45A12001T8RA25	S050T08CA-251(carb)	.472 (12mm)	.10	.500 Cyl	.04	2.90	5.94	WS-0030
S050T08KA-06-F2	(2) 45A-5004T8RA08	S050T08SA-06 (stl)	.500	.10	.500 Cyl	.04	1.33	4.30	WS-0030
S050T08KA-25-F2	(2) 45A-5004T8RA08	S050T08CA-25 (carb)	.500	.10	.500 Cyl	.04	3.25	6.30	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

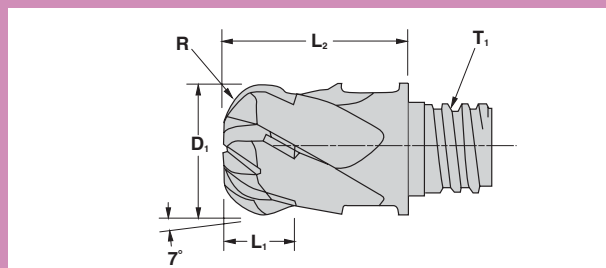
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M483.

CHASEline

SOLID CARBIDE BACKDRAFT TOROIDAL TIP SERIES 48U

Diameters .375" to .500"	Grades IN2005, IN3005	Corner .031", .062" and .125"R
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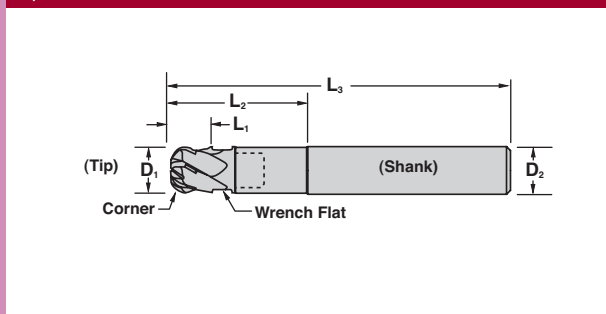
Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius	Ramp Angle
*48U-3719T6RB03	6	.375	.19	T06	.50	.031	9°
48U-3719T6RB06	6	.375	.19	T06	.50	.062	9°
48U-5027T8RB03	6	.500	.27	T08	.65	.031	9°
48U-5027T8RB06	6	.500	.27	T08	.65	.062	9°
48U-5027T8RB12	6	.500	.27	T08	.65	.125	9°

*Also offered in grade IN3005- diamond coated for milling graphite.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) Chamfer/Spotter Tip	Straight Shank	D ₁ Dia.	Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-B1	(2) 48U-3719T6RB06	S037T06SA-06 (stl)	.375	.06	.375 Cyl	.19	1.00	3.50	WS-0029
S037T06KA-20-B1	(2) 48U-3719T6RB06	S037T06CA-20 (car)	.375	.06	.375 Cyl	.19	2.95	5.25	WS-0029
S050T08KA-06-B1	(2) 48U-5027T8RB06	S050T08SA-06 (stl)	.500	.06	.500 Cyl	.27	1.18	4.15	WS-0030
S050T08KA-25-B1	(2) 48U-5027T8RB06	S050T08CA-25 (car)	.500	.06	.500 Cyl	.27	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

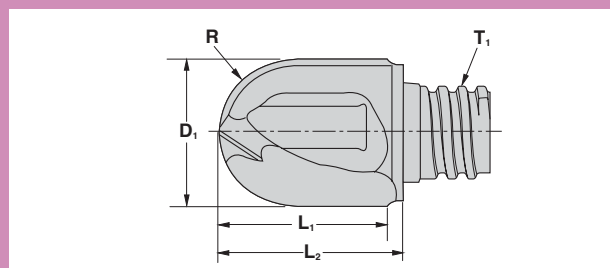
CHASEline



Diameters
.312" to .625"

Grade
IN2005

Corner
.156", .187", .250" and .312"R

[illegible]

Wrench (Not included with carbide tip or shank purchase).

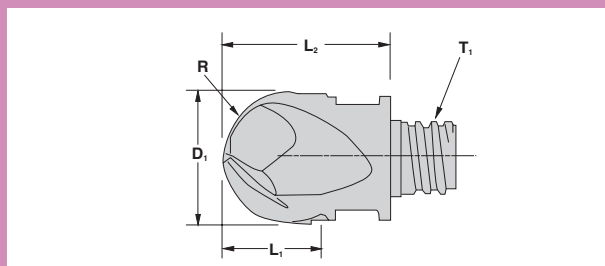
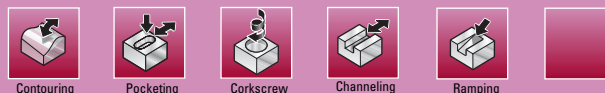
Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-04	60
T06	WS-0029	DT-90-05	90
T08	WS-0030	DT-130-07	130
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

HIGH PRECISION HELICAL BALL NOSE TIP SERIES 45B, 47B

Diameters .312" to .625"	Grade IN2005, IN3005	Corner .156", .187", .250", .312" and .374"R
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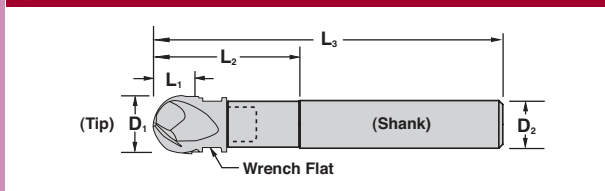
Cutter Number	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Extension Length	R Corner Radius	Tolerance
45B-3120TQRB03	2	.312	.20	T05	.39	.156	.0004
47B-3120TQRB03	4	.312	.20	T05	.39	.156	.0004
45B-3727T6RB05	2	.375	.27	T06	.51	.187	.0004
47B-3727T6RB05*	4	.375	.27	T06	.51	.187	.0004
45B-5037T8RB06	2	.500	.37	T08	.65	.250	.0004
47B-5037T8RB06	4	.500	.37	T08	.65	.250	.0004
45B-6235TRRB08	2	.625	.35	T10	.80	.312	.0004
47B-6247TRRB08	4	.625	.47	T10	.80	.312	.0004
45B-7550TSRB10	2	.750	.50	T12	1.00	.374	.0004
47B-7562TSRB10	4	.750	.62	T12	1.00	.374	.0004

*Also offered in grade IN3005- diamond coated for milling graphite.

Chip•Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) Ball Nose Tip	Straight Shank	D ₁ Ball Nose Dia.	Ball Nose Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-05	(4) 47B-3727T6RB05	S037T06SA-06 (Steel)	.375	.187	.375 Cyl	.27	1.00	3.50	WS-0029
S037T06KA-20-05	(4) 47B-3727T6RB05	S037T06CA-20 (Carbide)	.375	.187	.375 Cyl	.27	2.45	5.25	WS-0029
S050T08KA-06-05	(4) 47B-5037T8RB06	S050T08SA-06 (Steel)	.500	.250	.500 Cyl	.37	1.18	4.15	WS-0030
S050T08KA-25-05	(4) 47B-5037T8RB06	S050T08CA-25 (Carbide)	.500	.250	.500 Cyl	.37	3.10	6.15	WS-0030

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T05	WS-0043	DT-60-06	60
T06	WS-0029	DT-90-08	90
T08	WS-0030	DT-130-10	130
T10	WS-0044	DT-250-13	250
T12	WS-0059	DT-250-16	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

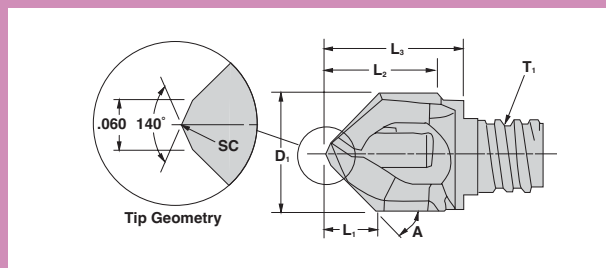
CHASEline

CHAMFER AND SPOTTING TIP SERIES 45N, 45M, 45P

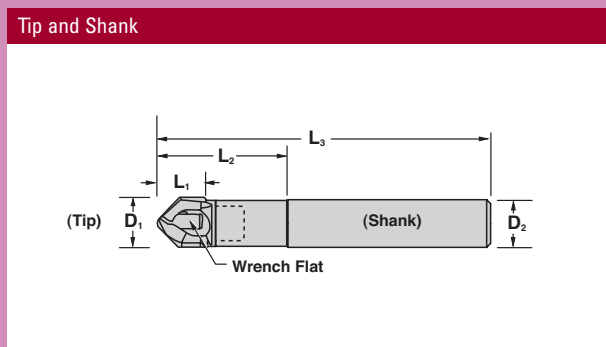
Diameter
 .390" and .625"

Grades
 IN2005

Nominal Chamfer Angle
 30°, 45°, 60° and 72°



Cutter Number	A Nominal Chamfer Angle	Eff.	D ₁ Nominal Diameter	L ₁ Cutting Edge Length	T ₁ Thread Size	L ₂ Depth	L ₃ Extension Length
45N10009T6RA45	45°	2	.390	.18	T06	.35	.50
45N10009T6RA72	72°	2	.390	.06	T06	.35	.50
45N16015TRRA45	45°	2	.625	.29	T10	.59	.75
45M10009T6RA30	30°	2	.390	.26	T06	.37	.50
45P10009T6RA60	60°	2	.390	.10	T06	.39	.50



ORDER THIS Pak Number	(QTY) Chamfer/Spotter Tip	Straight Shank	D ₁ Dia.	Included Angle	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-07	(2) 45N10009T6RA45	S037T06SA-06 (Steel)	.400	90°	.375 Cylindrical	.46	.96	3.50	WS-0029

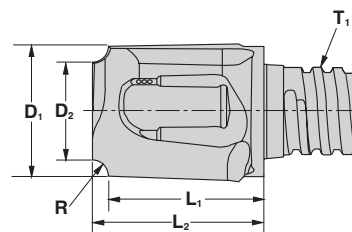
Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	WS-0029	DT-90-05	90
T10	WS-0044	DT-250-08	250

When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

CHASEline



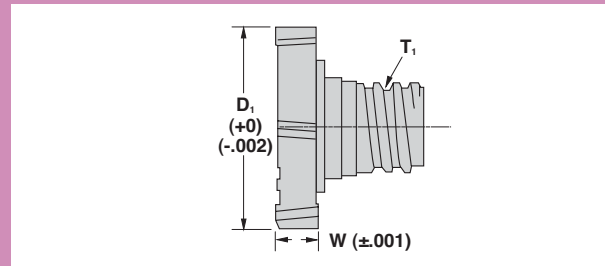
For technical information, see page M482.

PRECISION T-SLOT MILLING TIP SERIES 18T

Diameters
 .056" to .375"

Grade
 IN1030

Corner
 .015"r and .006" x 45° chamfer



Cutter Number	Eff.	D ₁ Nominal Diameter	W Width	Max. Radial Depth of Cut	T ₁ Thread Size	Corner Radius	Torque Driver (Value)
18T-5006TQRN00	6	.500	.062	.12	T05	.006 x 45°	1 / 60
18T-5012TQRN00	6	.500	.125	.12	T05	.006 x 45°	1 / 60
18T-6205T6RN02	6	.625	.056	.13	T06	.015	1 / 90
18T-6206T6RN01	6	.625	.062	.13	T06	.015	1 / 90
18T-6206T6RN02	6	.625	.068	.13	T06	.015	1 / 90
18T-6208T6RN01	6	.625	.078	.13	T06	.015	1 / 90
18T-6208T6RN02	6	.625	.086	.13	T06	.015	1 / 90
18T-6210T6RN01	6	.625	.105	.13	T06	.015	1 / 90
18T-6212T6RN01	6	.625	.125	.13	T06	.015	2 / 90
18T-6216T6RN01	6	.625	.156	.13	T06	.015	2 / 90
18T-7516T8RN01	6	.750	.156	.13	T08	.015	3 / 130
18T-7519T8RN01	6	.750	.187	.13	T08	.015	3 / 130
18T-7525T8RN01	6	.750	.250	.13	T08	.015	3 / 130
18T-8718T8RN01	6	.875	.187	.19	T08	.015	4 / 130
18T-8725T8RN01	6	.875	.250	.19	T08	.015	4 / 130
18T-8731T8RN01	6	.875	.312	.19	T08	.015	4 / 130
18T-10037TRRN02	6	1.00	.375	.19	T10	.015	5 / 250

Wrench (Not included with carbide tip or shank purchase).

Torx Driver	Torx Driver Part No.	Optional Torque Bit / Hex Drive
1	DS-T20T	DS-T20B / .250"
2	DS-T25T	DS-T25B / .250"
3	DS-T30T	DS-T30B / .250"
4	DS-T40T	DS-T40B / .250"
5	DS-T50L	DS-T50B / .312"

For technical information, see page M482.

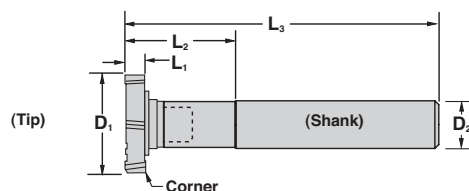
CHASEline

PAKS FOR PRECISION T-SLOT MILLING TIP SERIES 18T

Chip-Surfer Paks



Tip and Shank



ORDER THIS Pak Number	(QTY) T-Slot Tip	Straight Shank	D ₁ T-Slot Dia.	T-Slot Corner	D ₂ Shank Adaption	L ₁ Length of Cut	L ₂ Projection Length	L ₃ Assem. Length	Wrench
S037T06KA-06-08	(2) 18T-6208T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.078	.70	3.10	DS-T20T
S037T06KA-06-18	(2) 18T-6212T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.125	.75	3.15	DS-T20T
S037T06KA-06-28	(2) 18T-6216T6RN01	S037T06SA-06 (Steel)	.625	.015	.375 Cylindrical	.156	.80	3.19	DS-T20T
S050T08KA-06-38	(2) 18T-7519T8RN01	S050T08SA-06 (Steel)	.750	.015	.500 Cylindrical	.187	.85	3.72	DS-T30T
S050T08KA-06-48	(2) 18T-7525T8RN01	S050T08SA-06 (Steel)	.750	.015	.500 Cylindrical	.250	.91	3.78	DS-T30T

PAKS FOR SNAP RING GROOVES SERIES 18T

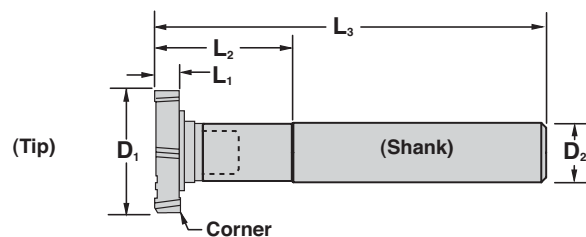
Contents

4 Different Tips, 1 Shank, 1 Wrench

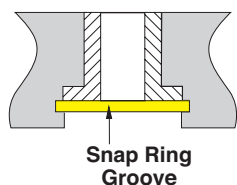


T-Slot Pak

(6 Flutes) Multi-Purpose, PVD - TiAlN-Coated IN1030



Order This Pak Number	Shank	(Qty) T-Slot Tips	L ₁ Width of Cut	D ₁ Nominal Diameter	L ₂ Projection Length	L ₃ Assm Length	D ₂ Shank Adaption	Wrench
S037T06KA-12-98	S037T06CA-12(Carbide)	(1) 18T-6205T6RN02	.056	.625	1.45	4.190	.015R .375 Cyl	DS-T20T
		(1) 18T-6206T6RN02	.068					
		(1) 18T-6208T6RN02	.086					
		(1) 18T-6212T6RN01	.125					



For technical information, see page M482.

CHASEline



Diameter
.625"

Grade
IN1030

Corner
.062" x 45° Chamfer



Chamfering



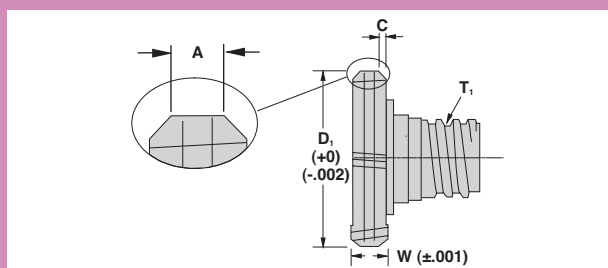
Slotting



T-Slotting



Counter-Sink

[illegible]

Wrench (Not included with carbide tip or shank purchase).

Thread Size	Wrench Part No.	Optional Torque Wrench	Torque Value (in. lbs.)
T06	DS-T20T	DS-T20B	90

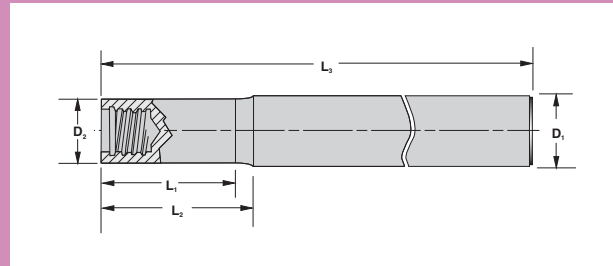
When assembling, be sure carbide tip is seated firmly on shank with no gap.

For technical information, see page M482.

NECKED DOWN STRAIGHT SHANKS

Thread Connections
T05, T06, T08, T10 and T12

Shank Materials
Steel or Carbide



T ₁ Thread Size	Part Number	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length	D ₁ Shank Diameter	D ₂ Mating Diameter
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STEEL SHANKS

T05	S031T05SA-05	.51	.59	2.50	.312	.300
T06	S037T06SA-06	.50	.60	3.00	.375	.364
T08	S050T08SA-06	.53	.63	3.50	.500	.480
T08	*S050T08SA-061	.53	.63	3.50	.500	.455
T10	S075T10SA-00	-	.13	2.75	.750	.750
T10	S062T10SA-06	.68	.78	4.00	.625	.600
T12	S075T12SA-08	.88	1.00	5.00	.750	.720
T12	WB100T12SA-00	-	.24	3.00	1.000	.720

CARBIDE SHANKS

T05	S031T05CA-09	.95	1.00	3.00	.312	.300
T05	S031T05CA-19	1.95	2.00	4.00	.312	.300
T06	S037T06CA-12	1.20	1.25	4.00	.375	.364
T06	S037T06CA-20	1.95	2.00	4.75	.375	.364
T08	S050T08CA-15	1.45	1.50	4.00	.500	.480
T08	*S050T08CA-151	1.45	1.50	4.00	.500	.455
T08	S050T08CA-25	2.45	2.50	5.50	.500	.480
T08	*S050T08CA-251	2.45	2.50	5.50	.500	.455
T10	S062T10CA-34	3.43	3.50	5.50	.625	.600
T10	S062T10CA-49	4.93	5.00	7.00	.625	.600
T12	S075T12CA-14	1.43	1.50	4.00	.750	.720
T12	S075T12CA-29	2.93	3.00	5.50	.750	.720
T12	S075T12CA-44	4.43	4.50	8.00	.750	.720

*Necked down shanks for 12mm tips.

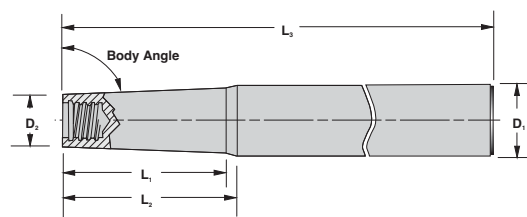
 CHIP SURFER™ CONICAL SHANKS

Thread Connections

T05, T06, T08, T10 and T12

Shank Materials

Steel or Carbide



T ₁ Thread Size	α Body Angle	Part Number	L ₁ Projection Length	L ₂ Extension Length	L ₃ Overall Length	D ₁ Shank Diameter	D ₂ Mating Diameter
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STEEL SHANKS

T06	85°	S062T06SK-13	1.25	1.37	5.00	.625	.364
T06	89°	S062T06SK-21	1.75	2.15	6.30	.625	.364
T08	85°	S062T08SK-08	.75	.85	5.50	.625	.480
T08	89°	S075T08SK-31	2.75	3.15	6.50	.750	.480
T12	85°	S100T12SK-16	-	1.60	6.30	1.000	.720
T12	89°	S100T12SK-34	3.40	3.75	8.00	1.000	.720
T12	85°	S125T12SK-31	-	3.15	7.50	1.250	.720

CARBIDE SHANKS

T05	89°	S037T05CK-15	-	1.50	3.50	.375	.300
T05	89°	S062T05CK-39	3.90	4.00	6.00	.625	.300
T06	88.5°	S050T06CK-25	2.50	2.50	5.50	.500	.364
T06	88.5°	S062T06CK-35	3.37	3.50	6.50	.625	.364
T08	89°	S062T08CK-35	3.45	3.50	6.50	.625	.480
T08	88.5°	S075T08CK-40	3.90	4.00	7.00	.750	.480
T10	89°	S075T10CK-40	-	4.00	6.50	.750	.600
T10	89°	S075T10CK-62	6.24	6.30	8.80	.750	.600
T12	89°	S100T12CK-55	-	5.50	10.00	1.000	.720



M420

CHASEline



A SERIES S0

Thread Connections

T05, T06, T08, T10 and T12

Shank Materials

Carbide and Steel



Due to tolerance, Shank Diameter will be slightly larger than tip diameter.

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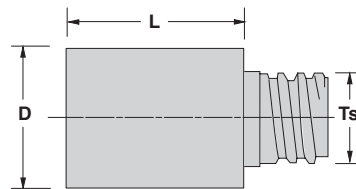
BLANKS

.315" to .787"

.315" to .787"

T05, T06, T08, T10 and T12

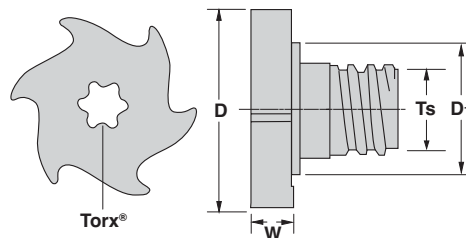
T05, T06, T08, T10 and T12

[illegible]

T-SLOT PREFORM BLANKS

Dimensions
.551" to 1.125"

T05, T06, T08 and T10

[illegible]

DRAW-IN™ HEATING UNIT

Available Toolholders

CAT 40, CAT 50, and HSK-63A

Fits any ER32 collet chuck

Collets

ER32 Adaptors

Tool Diameters

.125" to .500"

4mm to 12mm

Tool Extension Lengths

1.500" to 3.500"

35mm to 85mm

Cycle Time

60 to 90 seconds, plus cool-down

Power

110 volts, 15 amps, 1600 watts

Part
Number

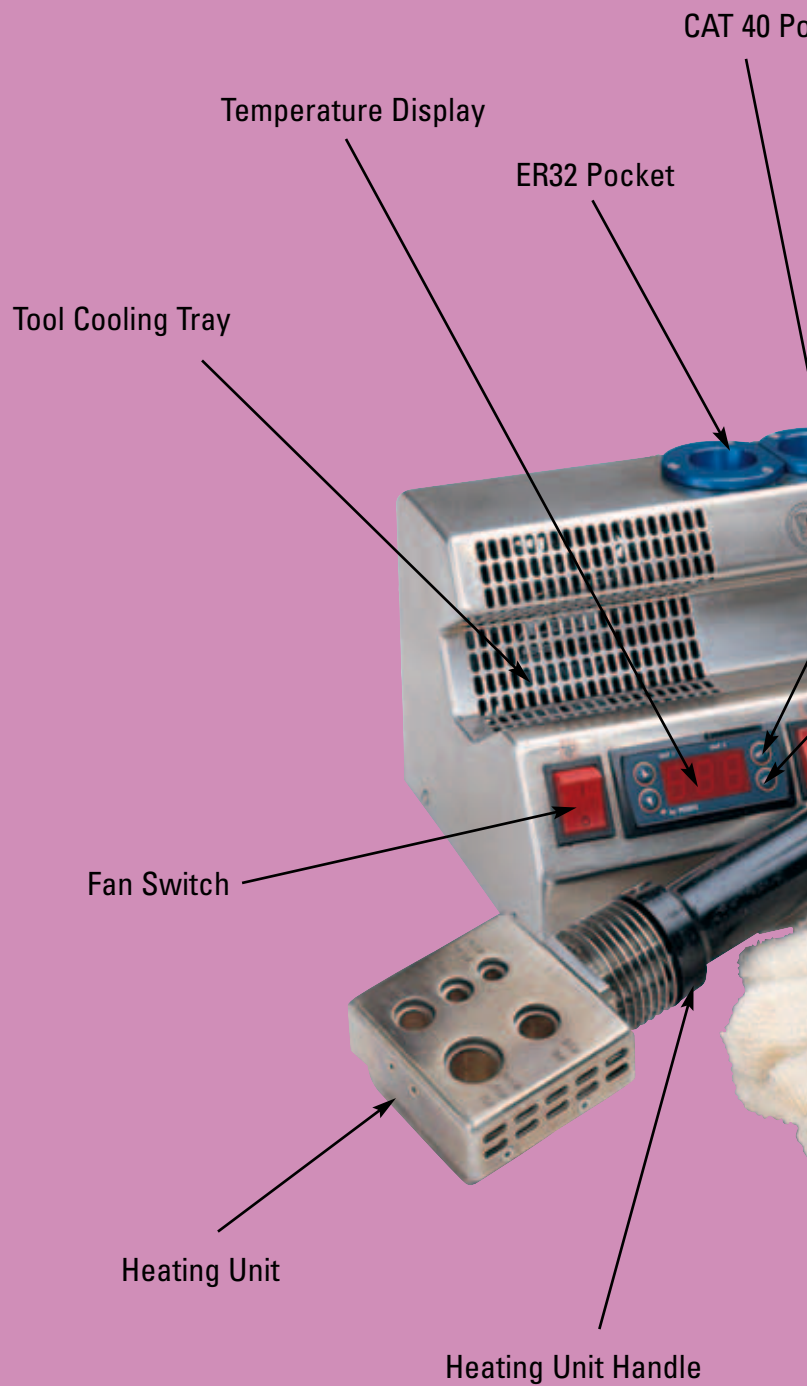
SRI-5000-110

REPLACEMENT PART

HEATING UNIT HANDLE

Part
Number

HEATING HANDL



ocket

Temperature Setting #2

Temperature Setting #1

Power Switch (on/off)

Start Heating Button

Heating Unit Cradle

FEATURES & ADVANTAGES

Thermal Shank Collets

- Collets with slim design and different projections
- Draw•In collets fit into standard ER collet chucks
- High torque transfer due to 360° clamping
- Precision runout
- Excellent repeatability

Heat Shrink Unit

- Compact design
- Flexible use with the portable heating handle
- Heating and cooling with the same unit
- Automatic temperature control
- Quick operating time, 15-45 seconds
- Ready for use in one minute
- Auto safety shutoff of heating unit after 10 minutes

Heat Shrink Chucking System

- Coolant through for oil hole tools*
- Coolant Jet II available
- Symmetrical design for high speed machining
- Quick and easy tool changing
- Unique Draw•In heating unit with portable handle

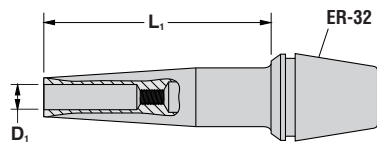
*Special preset screw ordered separately.



Diameters
4, 5, 6, 8, 10, and 12mm

Extension Lengths

35, 60, and 85mm

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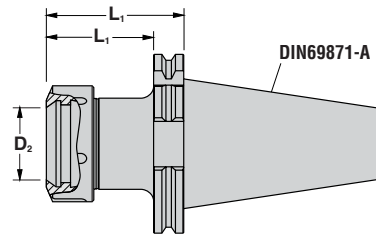
Draw•In is designed for use with solid carbide only.



CAT 50 COLLET CHUCKS

SERIES CAT 50

CAT Standard
CAT 50 ER32



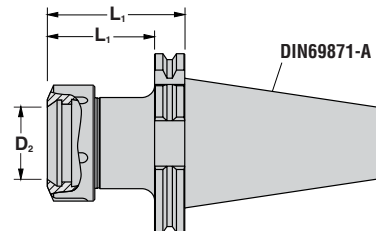
D ₁ Diameter	Part Number	L ₁ Extension Length
1.968"	CAT50ER32X4.000	4.000"
1.968"	CAT50ER32X6.000	6.000"
1.968"	CAT50ER32X8.000	8.000"

**DRAW•IN™**

M CAT 40 COLLET CHUCKS

SERIES CAT 40

CAT Standard
CAT 40 ER32

[illegible]

Ingersoll



CUTTING TOOLS
CUTTING TOOLS

INSERTS, SCREWS & DRIVERS

Cutting Tools

STANDARD GRADE DESCRIPTIONS

	Grade Number	Industry Class	ISO Rating	Coating	Workpiece Materials	Grade Characteristics*				Comments
						Mech. Shock	Thermal Shock	Wear Resist.	Crater Resist.	
UNCOATED	IN05S	C-3	K10-K20	None	Cast iron, aluminum, non-ferrous alloys	VL	VL	EH	VL	Sub-micron
	IN10K	C-1/C-2	K20-K40	None	Cast iron, aluminum, non-ferrous alloys	L	L	H	VL	
	IN15K	C-1/C-2	K20-K40	None	Cast iron, aluminum, non-ferrous alloys	H	L	M	VL	
	IN30M	C-1/C-2	M20-M40 K20-K50	None	Cast iron, aluminum, non-ferrous materials, high-temp alloys	H	L	M	VL	
CVD	IN40P	C-5/C-6	P20-P35	None	Steels	M-H	H	M-H	H	
	IN5015	C-2/C-6	P10-P30 K10-K30	CVD TiN-TiCN	Cast iron steels, stainless	M	M	M	M	High speed in cast iron
	IN6510	C-2	K15-K20	MT-CVD Al ₂ O ₃	Cast iron	L	H	EH	M	
	IN6515	C-2/C-3	K15-K35 P20-P30	MT-CVD Al ₂ O ₃	Cast iron, steels	M	H	M-H	M	
PVD	IN6530	C-1/C-5/C-6	P25-P45 M25-M40 K20-K50	MT-CVD Al ₂ O ₃	Cast iron, steels, stainless, high-temp alloys	H	M-H	M-H	M-H	
	IN1030	C-1/C-2/C-6	M20-M40 K20-K30 P15-P35	PVD TiCN	Cast iron, aluminum, stainless, titanium, steels	H	L	H	L	
	IN1040	C-5/C-6	P20-P40	PVD TiCN	Steels, stainless	H	H	H	H	
	IN1510	C-1/C-2/C-3	K20-K40	PVD TiCN-TiN	Gray cast iron, aluminum, non-ferrous alloys	L	L	EH	L	
	IN1515	C-1/C-2	M20-M40 K20-K30	PVD TiCN-TiN	Cast iron, aluminum, stainless, titanium	H	L	H	L	
	IN1530	C-1/C-5	M30 K25-K40	PVD TiCN-TiN	Steels, stainless, titanium, high-temp alloys	EH	M	M	M	
	IN1540	C-5/C-6	P20-P40	PVD TiCN-TiN	Steels	H	H	H	H	Low SFM Roughing
	IN2004	C-3/C-7	P15 K10	PVD TiAlN	Steels, cast iron	M-H	H	H	H	
	IN2005	C-2	M20-M40	PVD TiAlN	Titanium plate, stainless, alloyed steels, cast iron	H	M	H	M	Sub-micron
	IN2505	C-2	M20-M40	PVD TiAlN	Titanium plate, stainless, alloyed steels, cast iron	H	M	H	M	Sub-micron
	IN2010	C-1/C-2	K10-K40	PVD TiAlN	Cast iron	L	L-M	EH	L-M	
	IN2015	C-1/C-2	K10-K40	PVD TiAlN	Cast iron, steels, stainless, titanium, high temp alloys	H	M	H	M	
	IN2030	C-1/C-5/C-6	K25-K40 M30-M40 P15-P35	PVD TiAlN	Steels, stainless, titanium, high-temperature alloys	EH	H	M	M-H	
	IN2040	C-5/C-6	P20-P40	PVD TiAlN	Steels	H	H-EH	H	H-EH	
	IN2060	C7/C-8	P10-P30	None	Steels, stainless	VL	EH	H	EH	Cermet
	INDD15	C-2/C-3	K20-K40	MT-CVD Al ₂ O ₃ + TiAlN	Cast iron, steels	M	H	M-H	M	
Non-Carbide	CT5000	C7/C-8	P10-P30	None	Steels, stainless	VL	EH	H	EH	Cermet
	IN70N	C-1/C-2	K10-K20	None	Cast irons	VL	VL	EH	EH	SiN
	IN90D	PCD Diamond	PCD Diamond	None	Aluminum, non-ferrous alloys	VL	L	EH	L	PCD

*Degree of resistance to specified types of failure: EH=Extremely High H=High M=Moderate L=Low VL=Very Low

CARBIDE SELECTION GUIDE

Direction of Use		Wear Resistance →										Wear Resistance →					Wear Resistance →																						
		← Toughness										← Toughness					← Toughness																						
		← Increase Feed										← Increase Feed					← Increase Feed																						
		Increase Speed →										Increase Speed →					Increase Speed →																						
Material		Short Chipping Malleable Iron, Non-Ferrous Metal, Hardened Iron, Chilled Iron, Cast Iron										High-Temp Alloys, Alloy Iron, Steel Casting, Manganese					Free Cutting Steels, Malleable Iron, Steel Casting, Steel																						
New CL	Coating	C1					C2		C3		C4							C5					C6		C7		C8												
		K50	K45	K40	K35	K30	K25	K20	K15	K10	K05	K01	M50	M40	M30	M20	M10	P50	P45	P40	P35	P30	P25	P20	P15	P10	P05	P01											
IN05S	Uncoated								IN05S																														
IN10K									IN10K																														
IN15K									IN15K																														
IN30M									IN30M							IN30M																							
IN40P																							IN40P																
IN5015	CVD								IN5015																IN5015														
IN6510									IN6510																														
IN6515									IN6515																IN6515														
IN6530									IN6530							IN6530								IN6530															
IN1030									IN1030							IN1030										IN1030													
IN1040	PVD																									IN1040													
IN1510									IN1510																														
IN1515									IN1515							IN1515																							
IN1530									IN1530							IN1530																							
IN1540																										IN1540													
IN2004																																							
IN2005																IN2005																							
IN2505																IN2505																							
IN2010																																							
IN2015																																							
IN2030																												IN2030											
IN2040																													IN2040										
IN2060																																							
INDD15																																							
CT5000	Non-Carbide																																						
IN70N																																							
IN90D																																							

■ INSERT NOMENCLATURE ISO STANDARD INSERTS

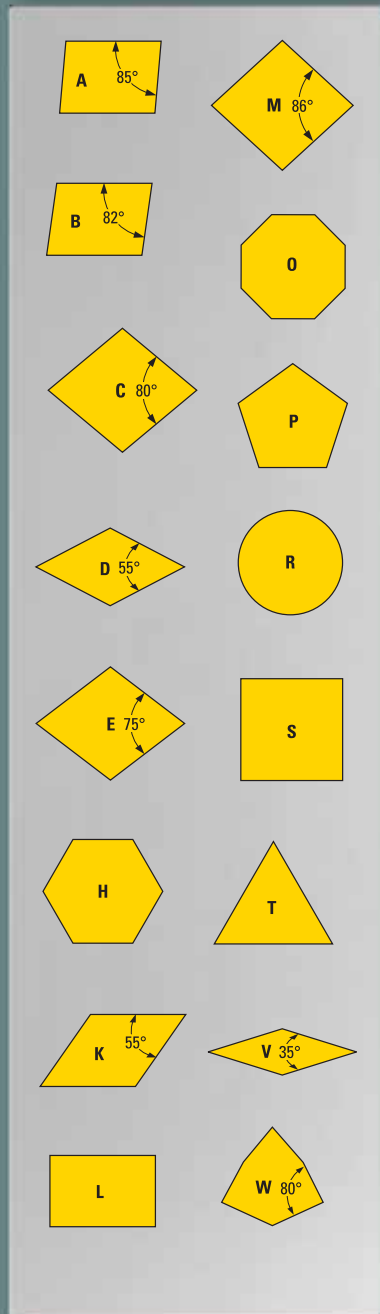
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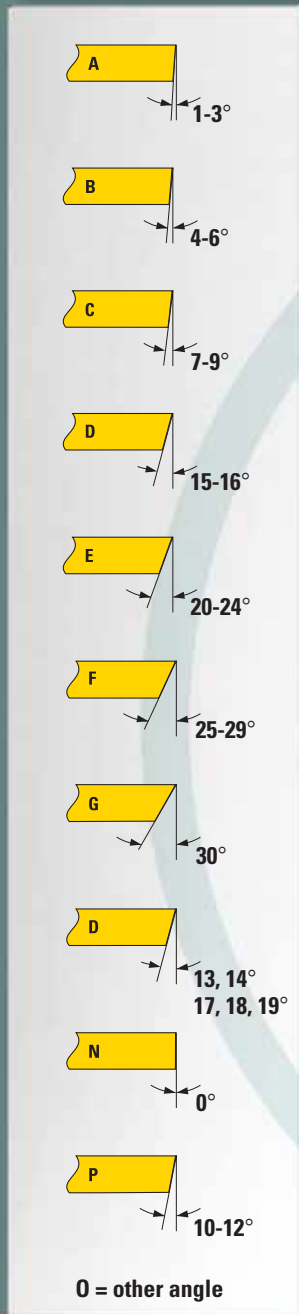
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INSERT SHAPE



RELIEF ANGLE



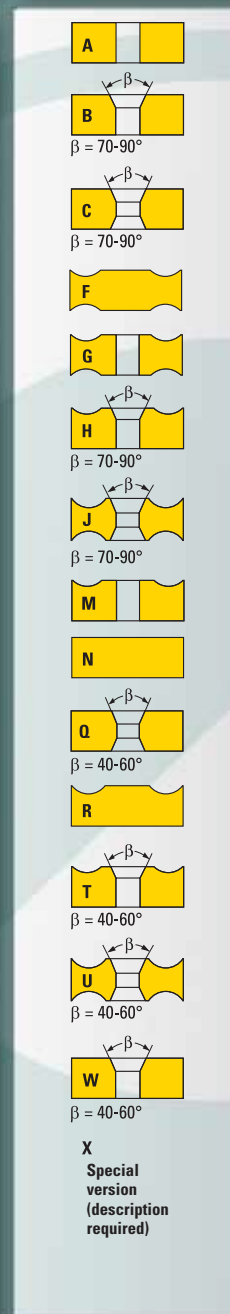
TOLERANCE

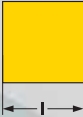
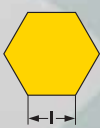
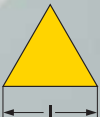
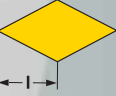
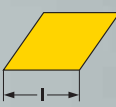
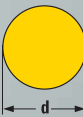
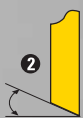
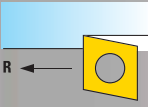
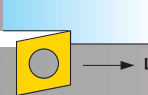
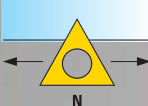
Allowable tolerance in mm:

	d	m	s
A	± 0,025	± 0,005	± 0,025
C	± 0,025	± 0,013	± 0,025
E	± 0,025	± 0,025	± 0,025
F	± 0,013	± 0,005	± 0,025
G	± 0,025	± 0,025	± 0,05-0,13
H	± 0,013	± 0,013	± 0,025
J ¹	± 0,05-0,15 ²	± 0,005	± 0,025
K ¹	± 0,05-0,15 ²	± 0,013	± 0,025
L ¹	± 0,05-0,15 ²	± 0,013	± 0,025
M	± 0,05-0,15 ²	± 0,08-0,20 ²	± 0,013
N	± 0,05-0,15 ²	± 0,08-0,20 ²	± 0,025
U	± 0,05-0,25 ²	± 0,13-0,38 ²	± 0,05-0,13

¹ Inserts with ground surfaces
² Dependant on insert size (see ISO standard 132)

INSERT TYPE



08	03	04	F	R		P
CUTTING LENGTH	THICKNESS	RADIUS	HONE	HAND	MODIFIER	
       	    01 s = .062 T1 s = .078 02 s = .093 T2 s = .109 03 s = .125 T3 s = .156 04 s = .187 05 s = .219 06 s = .250 07 s = .312 09 s = .375	 04 r = .015 08 r = .031 16 r = .062 24 r = .093 32 r = .125 48 r = .187 64 r = .250  "00" for diameters converted from inch to mm. "M0" for diameters in metric dimensions.   1 Bevel Angle A = 45° D = 60° E = 75° F = 85° P = 90° Z = other M = multiple 2 Clearance Angle A = 3° B = 5° C = 7° D = 15° E = 20° F = 25° G = 30° J = 23° N = 0° P = 11° Z = other clearance angle	 	  	P = Polished W = Wiper PW = Polished Wiper VL = Variable Land FS = Flat Step Chip Breaker PS = Hooked Step Chip Breaker DM = Dimpled Chip Breaker DK = Double Wave Breaker with K-Land SK = Single Wave Breaker with K-Land DW = Double Wave Breaker, no K-Land SW = Single Wave Breaker, no K-Land HS = High Shear Geometry HR = "Rill"-Type Chip Breaker GB = Groove-Type Chip Breaker PH = Positive Hook RW = "Rills" and Wiper CR = Corner Rounding	

INSERTS

Insert Number	Corner Radius	Grade	Cutter Series
AOCT060204FR-P	.015"R	05S	12J1D, 22J3D
AOCT110304FR-P	.015"R	30M	12J1F, 22J3F
AOCT110308FR-P	.031"R	30M	12J1F, 22J3F, 2J1F
AOCT060204FR-P	.015"R	05S, 30M	12J1D, 12P1D, 12N1D, 12M1D, 22J3D
AOMT060202R	.008"R	1030, 2030, 2005	12J1D, 12P1D, 12N1D, 12M1D, 22J3D
AOMT060204R	.015"R	2030, 2005	12J1D, 12P1D, 12N1D, 12M1D, 22J3D
AOMT060208R	.031"R	2030, 2005	12J1D, 12P1D, 12N1D, 12M1D, 22J3D
AOMT060216R	.062"R	2030, 2005	12J1D, 12P1D, 12N1D, 12M1D, 22J3D
AOMT110304R	.015"R	2005, 2030, 2015, 2040, 1030	12J1F, 22J3F, 2J1F
AOMT110308R	.031"R	2005, 2030, 2015, 2040, 1030	12J1F, 22J3F, 2J1F
AOMT110316R	.062"R	2005, 2030, 2015, 2040, 1030	12J1F, 22J3F, 2J1F
AOMT110332R	.125"R	2005, 2030, 2015, 2040, 1030	12J1F, 22J3F, 2J1F
AOMT120408R	.031"R	1030, 2030, 2005, 2015, 2040	12J1X, 12V1X, 12R1X, 2J1X, 22J3X, 2L1X
AOMT120408FR	.031"R	2030, 2005	12J1X, 12V1X, 12R1X, 2J1X, 22J3X, 2L1X
AOMT120416R	.062"R	2030, 2005, 2015, 2040	12J1X, 12V1X, 12R1X, 2J1X, 22J3X, 2L1X
AOMT120432R	.125"R	2030, 2005, 2015, 2040	12J1X, 12V1X, 12R1X, 2J1X, 22J3X, 2L1X
AOMT120408FR-HS	.031"R	10K	12J1X, 12V1X, 12R1X, 2J1X, 22J3X, 2L1X
AOMT180508R	.031"R	2005, 2030, 2015, 2040, 1030	12J1E, 2J1E
AOMT180516R	.062"R	2005, 2030, 2015, 2040, 1030	12J1E, 2J1E
AOMT180532R	.125"R	2005, 2030, 2015, 2040, 1030	12J1E, 2J1E
APCT160408FR-HS	.031"R	40P	12J1B, 12J4B, 12R1B, 22J5B, 22J3B, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT080304R	.015"R	2030, 2005, 1030	12J1M, 22J3M
APKT080308R	.031"R	2005, 1030	12J1M
APKT120304R-HS	.015"R	30M, 1030	12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q
APKT120308R	.031"R	40P, 2030, 2015, 2040, 1030, 5015, 5015	12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q
APKT120308R	.031"R	2005	12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q

Insert Number	Corner Radius	New Grade	Cutter Series
APKT120308R-001	.031"R	40P	12J1Q
APKT120308R-HS	.031"R	30M 1030	12J1Q 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q
APKT120308FR-HS	.031"R	30M	12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q
APKT120316R	.062"R	40P 2030 2015 2040 1030 2005	12J1Q 12R1Q 22J3Q 22J7Q 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q 12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 2J1Q, 2L1Q
APKT120324R	.093"R	40P	12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12S1Q, 2J1Q, 2L1Q
APKT120332R	.125"R	30M 40P 2030 2015 2040 1030 5015	12J1Q 12R1Q 22J3Q 22J7Q 22J3Q 12S1Q 2J1Q, 2L1Q
APKT120332R	.125"R	2005	12J1Q, 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12S1Q, 2J1Q, 2L1Q
APKT120364R	.250"R	40P 1030	12J1Q 12R1Q, 22J3Q, 22J7Q, 22J3Q, 12S1Q, 2J1Q, 2L1Q
APKT160404R-HS	.015"R	40P 1030	12J1B 12J4B, 12R1B, 22J5B, 22J3B, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT160408R	.031"R	6530 6035 2030 2015 2040 1030 5015	12J1B 12J4B 12R1B 22J5B 22J3B 23J6G 23J2G, 23W2G, 22J3B, 12N1B, 12S1B, 12T1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT160408R	.031"R	2005	12J1B, 12J4B, 12R1B, 22J5B, 22J3B, 23J6G, 23J2G, 23W2G, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A

INSERTS

Insert Number	Corner Radius	New Grade	Cutter Series
APKT160408L	.031"R	1030, 5015	12T1B
APKT160408R-001	.031"R	40P	12J1B
APKT160408R-HR	.031"R	6530 1030	12J1B 12J4B, 12R1B, 22J5B, 22J3B, 23J6G, 23J2G, 23W2G, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT160408R-HS	.031"R	40P 1030	12J1B 12J4B, 12R1B, 22J5B, 22J3B, 23J6G, 23J2G, 23W2G, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT160408R-WV	.031"R	1030 5015	12J1B 12J4B, 2J1B, 2J4B, 2L1B
APKT160416R	.062"R	6530 2030 2015 2040 1030 5015	12J1B 12J4B 12R1B 22J5B 22J3B 23J6G, 23J2G, 23W2G, 22J3B, 12N1B, 12S1B, 23S2G, 2J1B, 2J4B, 2L1B, 4W2A
APKT160416R	.062"R	2005	12J1B, 12J4B, 12R1B, 22J5B, 22J3B, 23J6G, 23J2G, 23W2G, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT160416R-HS	.062"R	40P 1030	12J1B 12J4B, 12R1B, 22J5B, 22J3B, 22J3B, 12N1B, 12S1B, 2J1B, 2J4B, 2L1B, 4W2A
APKT160424R	.093"R	6530 2030 1030 5015	12J1B 12J4B 12R1B 22J5B, 22J3B, 23J6G, 23J2G, 23W2G, 22J3B, 12S1B, 2J1B, 2J4B, 2L1B
APKT160432R	.125"R	40P 6530 2030 2015 2040 1030 5015	12J1B 12J4B 12R1B 22J5B 22J3B 23J6G 23J2G, 23W2G, 22J3B, 12S1B, 2J1B, 2J4B, 2L1B
APKT160432R	.125"R	2005	12J1B, 12J4B, 12R1B, 22J5B, 22J3B, 23J6G, 23J2G, 23W2G, 22J3B, 12S1B, 23S2G, 2J1B, 2J4B, 2L1B, 4W2A

Insert Number	Corner Radius	Grade	Cutter Series
APKT160448R	.187"R	40P 6530 1030	12J1B 12J4B 12R1B, 22J5B, 22J3B, 22J3B, 12S1B, 2J1B, 2J4B, 2L1B
APKT160464R	.250"R	40P 6530 1030 5015	12J1B 12J4B 12R1B 22J5B, 22J3B, 22J3B, 12S1B, 2J1B, 2J4B, 2L1B
APKT1705PER-M	.031"R	TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT1705PER-EM	.031"R	TT9030, TT8030, TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT1705PER-EL	.031"R	TT9030, TT8030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT170504R-EM	.015"R	TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT170516R-EM	.062"R	TT9030, TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT170532R-EM	.125"R	TT9030, TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT170548R-EM	.187"R	TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
APKT170564R-EM	.250"R	TT8020, TT7030, TT6030	12J1G, 12V1G, 22J1G, 2J1G, TE90AX, TFM90AX, TEFD
AXMT0903PER-EML	.020"R	TT9030, TT8030, TT8020, TT7030, TT6030, K10	TE90AX, TFM90AX
AXMT0903PER-ML	.020"R	TT8020, TT7030, TT6030	TE90AX, TFM90AX
AXMT090308R-EML	.031"R	TT9030, TT8030, TT8020, TT7030, TT6030	TE90AX, TFM90AX
AXMT090316R-EML	.062"R	TT9030, TT8020, TT7030, TT6030	TE90AX, TFM90AX
AXMT0903PER-AL	.020"R	K10	TE90AX, TFM90AX
BDE223R001	.375"R	15K, 2030	16W
BDE223R060	.375"R	1515	16W, 26W
BDE323R001	.500"R	15K 40P, 1515, 1530, 2030	16W 26W
BDE323R003	.625"R	15K 1530, 2030	16W 26W
BDE323R004	.750"R	40P, 1530, 2030	16W
BDE323R005	1.000"R	2030	16W
BDE323R034	.625"R	1530, 6530	23W1X
BDE323R038	.625"R	1540	23W1X
BDE323R048	.500"R	1530, 1540	13W7X
BDE324R002	.750"R	15K, 40P, 1530	16W
BDE433R001	.750"R	1530, 6530	23W1X
BDE433R002	.750"R	1540	23W1X
BDE434R001	1.000"R	30M 40P, 1515	16W7J 23W2G
BDE434R002	1.500"R	1530	26W1L
BDE445R002	1.000"R	1540	23W1X
BDE445R003	1.000"R	1530	23W1X

■ INSERTS

Insert Number	Corner Radius	Grade	Cutter Series
BEEW120308R-CR	.031"R	2030	15R1V
BEEW120316R-CR	.062"R	2030	15R1V
BEEW120325R-CR	.094R	2030	15R1V
BEEW120332R-CR	.125"R	2030	15R1V
BEHW250304R	.015"R	1540	15M1H, 15N1H, 15J1H
BEHW250304R-P	.015"R	15K	15M1H, 15N1H, 15J1H
BEHW250308R	.031"R	1540	15M1H, 15N1H, 15J1H
BEHW250308R-P	.031"R	15K	15M1H, 15N1H, 15J1H
BEHW250316R	.062"R	1540	15M1H, 15N1H, 15J1H
BEHW250316R-P	.062"R	15K	15M1H, 15N1H, 15J1H
BEHW250332R	.125"R	1540	15J1H
BEHW250332R-P	.125"R	15K	15J1H
CDE313L040	.015"R	10K, 15K, 1530	36J5F
CDE313L041	.031"R	10K, 15K, 1530	36J5F
CDE313L042	.062"R	10K, 15K, 1530	36J5F
CDE313L043	.093"R	10K, 15K, 1530	36J5F
CDE313L044	.125"R	10K, 15K, 1530	36J5F
CDE313L050	.015"R	10K, 15K, 1530	36J5F
CDE313L051	.031"R	10K, 15K, 1530	36J5F
CDE313L052	.062"R	10K, 15K, 1530	36J5F
CDE313L053	.093"R	10K, 15K, 1530	36J5F
CDE313L054	.125"R	10K, 15K, 1530	36J5F
CDE313L020	.015"R	10K, 15K, 1530	36J6F
CDE313L021	.031"R	10K, 15K, 1530	36J6F
CDE313L022	.062"R	10K, 15K, 1530	36J6F
CDE313L023	.093"R	10K, 15K, 1530	36J6F
CDE313L024	.125"R	10K, 15K, 1530	36J6F
CDE313R040	.015"R	10K, 15K, 1530	36J5F
CDE313R041	.031"R	10K, 15K, 1530	36J5F
CDE313R042	.062"R	10K, 15K, 1530	36J5F
CDE313R043	.093"R	10K, 15K, 1530	36J5F
CDE313R044	.125"R	10K, 15K, 1530	36J5F
CDE313R050	.015"R	10K, 15K, 1530	36J5F
CDE313R051	.031"R	10K, 15K, 1530	36J5F
CDE313R052	.062"R	10K, 15K, 1530	36J5F
CDE313R053	.093"R	10K, 15K, 1530	36J5F
CDE313R054	.125"R	10K, 15K, 1530	36J5F
CDE313R020	.015"R	10K, 15K, 1530	36J6F
CDE313R021	.031"R	10K, 15K, 1530	36J6F
CDE313R022	.062"R	10K, 15K, 1530	36J6F
CDE313R023	.093"R	10K, 15K, 1530	36J6F
CDE313R024	.125"R	10K, 15K, 1530	36J6F
CDE322R005	-	10K 15K, 40P, 1510, 1515, 1530, 6530	16W7B 26W1B
CDE322R019	-	1530	13W7X
CDE323L009	.015"R	10K, 15K, 1530	36J6B
CDE323L005	.031"R	10K, 15K, 1530	36J6B
CDE323L022	.062"R	10K, 15K, 1530	36J6B
CDE323L023	.093"R	10K, 15K, 1530	36J6B
CDE323L024	.125"R	10K, 15K, 1530	36J6B
CDE323R009	.015"R	10K, 15K, 1530	36J6B
CDE323R005	.031"R	10K, 15K, 1530	36J6B
CDE323R022	.062"R	10K, 15K, 1530	36J6B
CDE323R023	.093"R	10K, 15K, 1530	36J6B
CDE323R024	.125"R	10K, 15K, 1530	36J6B

Insert Number	Corner Radius	Grade	Cutter Series
CDE324L020	.015"R	10K, 15K, 1530	36J6B
CDE324L021	.031"R	10K, 15K, 1530	36J6B
CDE324L022	.062"R	10K, 15K, 1530	36J6B
CDE324L023	.093"R	10K, 15K, 1530	36J6B
CDE324L024	.125"R	10K, 15K, 1530	36J6B
CDE324L025	.187"R	10K, 15K, 1530	36J6B
CDE324L026	.230"R	10K, 15K, 1530	36J6B
CDE324R020	.015"R	10K, 15K, 1530	36J6B
CDE324R021	.031"R	10K, 15K, 1530	36J6B
CDE324R022	.062"R	10K, 15K, 1530	36J6B
CDE324R023	.093"R	10K, 15K, 1530	36J6B
CDE324R024	.125"R	10K, 15K, 1530	36J6B
CDE324R025	.187"R	10K, 15K, 1530	36J6B
CDE324R026	.230"R	10K, 15K, 1530	36J6B
CDE334L009	.031"R	6530	23S2G
CDE434R082	.125"R	1530	26J2L
CNHU060310N	1mm (.039"R)	1030, 2005, 2040	15V1D
CNHU110420N	2mm (.078"R)	1030	15V1G
		2005, 2040	5V6G
DNE314-003	.031"R	10K, 45P, 1530, 1540	39J6S
DNE314-004	.062"R	45P, 1530, 1540	39J6S
DNE314-005	.093"R	1530, 1540	39J6S
DNE314-006	.125"R	45P, 1530, 1540	39J6S
DNE314-007	.031"R	10K, 45P, 1530, 1540	39J6S
DNE314-008	.062"R	45P, 1530, 1540	39J6S
DNE314-009	.093"R	10K, 45P, 1530, 1540	39J6S
DNE314-010	.125"R	45P, 1530, 1540	39J6S
DNE324-003	.031"R	10K, 45P, 1530, 1540	39J6V
DNE324-004	.062"R	10K, 45P, 1530, 1540	39J6V
DNE324-005	.093"R	10K, 45P, 1530, 1540	39J6V
DNE324-006	.125"R	45P, 1530, 1540	39J6V
DNE324-007	.031"R	10K, 45P, 1530, 1540	39J6A
DNE324-008	.062"R	10K, 1540	39J6A
DNE324-010	.125"R	1530, 1540	39J6A
DPD324-114E01	-	2010	6JDR
DXE314-003	.031"R	10K, 1530	39J6S
DXE314-004	.062"R	1530	39J6S
DXE314-007	.031"R	10K, 1530	39J6S
DXE314-008	.062"R	1530	39J6S
DXE324-003	.031"R	1530	39J6V
DXE324-004	.062"R	1530	39J6V
DXE324-007	.031"R	1530	39J6A
DXE324-008	.062"R	10K, 1530, 1540	39J6A
FEEW250348R-CR	.187"R	2030	15R4H
FEEW250364R-CR	.250"R	2030	15R4H
GCFX071601N-E	.006"R	1030	31J
GCFX071616N-E	.031"R	1030	31J
GCFX113102N-E	.008"R	1030	31J
GCFX113131N-E	.061"R	1030	31J
GCFX114803N-E	.011"R	1030	31J
GCFX114848N-E	.093"R	1030	31J
GCFX126403N-E	.014"R	1030	31J
GCFX126464N-E	.125"R	1030	31J
GDE323R001	.031"R	04S, 1510, 1515, 2010, 6530	6K2B
GDE323R007	.031"R	90D	6K2B

■ INSERTS

Insert Number	Corner Radius	Grade	Cutter Series
HNCF0905ANN	-	2010, 6510	5N2K
JPE-33R001	.020"R	04S 15K, 1515, 1510, 1530, 6530	6M2S 6M1S
JPE-33R002	.020"R	90D	6M2S, 6M1S
JPE-33R010	.030"R	15K 1515, 6530	6M2S 6M1S
LNE323-056	.015"R	40P	23W1X
LNE424-004	.060"R	40P	23W1X
LPE324-003	.031"R	1510 1530, 1540, 2010, 6515	8K2A 8K1A
LPM324-003	.031"R	1510 1530, 1540, 2010, 6515	8K2A 8K1A
LPE434-004	.062"R	10K, 40P, 1530, 1540, 6510	7K2K
LPE435R100	.07" x 60°	2015, 6530	9C2K
LPE446R100	.07" x 60°	2015 6530	9J2L 9C2L
LSE323R002	.037" x 45°	10K, 15K, 40P, 1540	19N1B
LSE424R001	.100" x 45°	1530, 1540	9D2C
LSE424R002	.100" x 45°	1540	9D2C
LSE424R005	.100" x 45°	1530, 1540	9D2C
LSE435R100	-	2015 6530	9J2N 9C2K
LSE444R001	.100" x 45°	1530 1540	9D2G 9DKG
LSE444R002	.100" x 45°	1540	9D2G, 9DKG
LSE444R005	.100" x 45°	1530, 1540	9D2G
LSE446R001	-	2015 6530	9J2L 9C2L
LSM424R001	.100" x 45°	1530, 1540, 6530, 2030	9D2C
LSM444R001	.100" x 45°	1540, 2030, 6530	9D2G
LXD323-100	.047"R	10K, 2010	6K5B
LXD323-110	.031"R	2010, 2040	6L7B
NCET090200R	.187"R	1030	12W
NCET1002M0R	5mm R	1030	12W
NCEX120300R	.250"R	1030	12W
NCEX1203M0R	6mm R	1030	12W
NCEX150500R	.312"R	1030	12W
NCEX1605M0R	8mm R	1030	12W
NCEX190500R	.375"R	1030	12W
NCEX2005M0R	10mm R	1030	12W
NCEX250600R	.500"R	1030	12W
NCEX2506M0R	12.5mm R	1030	12W
NCHX120300R	.250"R	1030	12W
NCHX1203M0R	6mm R	1030	12W
NCHX150500R	.312"R	1030	12W
NCHX190500R	.375"R	1030	12W
NCHX2506M0R	12.5mm R	1030	12W
NCHX250600R	.500"R	1030	12W
NHET250300	.500"R	30M, 1030	15W7V
NHET310300	.625"R	30M, 1030	25W1V
NHET380400	.750"R	30M, 1030	25W1V
NHET500400	1.000"R	30M, 1030	25W1V
NHET250300R-FL	.500"R	30M, 1030	15W7V

Insert Number	Corner Radius	Grade	Cutter Series
NHET310300R-FL	.625"R	30M, 1030	25W1V
NHET380400R-FL	.750"R	1030	25W1V
NHET500400R-FL	1.000"R	1030	25W1V
NPEB250600R	.500"R	1530, 1540	13W7X
NPEB310600R	.625"R	1530, 6530	23W1X
NPEB310600TR	.625"R	1540	23W1X
NPEB380700R	.750"R	1530, 6530	23W1X
NPEB380700TR	.750"R	1540	23W1X
NPEB500700R	1.000"R	1530	23W1X
NPEB500700TR	1.000"R	1540	23W1X
OELB060416N	-	40P, 1530, 1540, 2030	5N6K
OELB060416FN	-	2030, 2040	5N6K
OELH060416N	-	1530, 2030	5N6K
OFCN0704TN-EMR	.031	1030, 2010, 2040	5N2L
OFCR0704TN-EML	.031	1030, 2005, 2010, 2040	5N2L
OFCT05T3TN-AL	.024	10K	5N6H
OFCT05T3TN-EM	.024	1030, 2005, 2010, 2040	5N6H
OFMR0704AER-M	.024	1030, 2005, 2040	5N2L
OFMR0704TN-AL	.031	10K	5N2L
OFMT05T3AFN-HR	.024	2005, 2040, 1030	5N6H
PNCU0805GNTR	.030	1030, 2005, 2015, 2030	DM5G, DM6G
PNCU0805GNTR-001	.030	2005, 2505	DM5G, DM6G
PYE-43R001	.093"R	90D	6X1V, 6X2V
PYE-43R002	.015"R	90D	6X1V, 6X2V
PYE-43R003	.031"R	90D	6X1V, 6X2V
RCFA090100R	.187"R	1004, 1515, 2015, 2030	15W9
RCFA120200R	.250"R	1004, 1515, 2015, 2030	15W9
RCFA150200R	.312"R	2030	15W9
RCFA190300R	.375"R	1515, 2015, 2030	15W9
RCFA250300R	.500"R	1515, 2015, 2030	15W9
RCFA310400R	.625"R	1004	15W9
RCKX43TN-M	.250"R	2005	TFMRC
RCKX64TN-M	.375"R	2005, 2030	5W6N
RFMT1404ML	.275	1030	5N6H
RFMR1904-M	.375	1030, 2005, 2010, 2040	5N2L
RHHW0602MOTN	3mm R	2004, 2005	15B1D
RHHW0802MOTN	4mm R	2004, 2005, 2015	15B1D
RHHW1003MOTN	5mm R	2004, 2005, 2015, 2040	15B1D
RHHW1204MOTN	6mm R	2004, 2005, 2015, 2040	15B1D
RHHW1605MOTN	8mm R	2004, 2005, 2015, 2040	15B1D
RHKW1003MOTN	5mm R	2005	5W7
RHKW1204MOTN	6mm R	2005, 2040	5W7
RHKW1605MOTN	8mm R	2005, 2015	5W7
RHKW2006MOTN	10mm R	2015, 2040	5W7
RNLM250600TN	.500"R	40P, 1530, 1540, 2030, 6530	5W6R
RNMA250600TN	.500"R	40P, 1540	5W6R
RPCW120400N	.250"R	2030	5W6H
RPLB190500TN	.375"R	1530	4W2A
		2030, 6530	5W6M
RPLB190500FN	.375"R	2030	4W2A, 5W6M
RPLB250700FN	.500"R	2030, 2040	5W6S
RPLB250700TN-VL	.500"R	2030, 2040, 6530	5W6S
RPLB250700TN	.500"R	6530	5W6S

■ INSERTS

Insert Number	Corner Radius	Grade	Cutter Series
RPLH190500TN	.375"R	40P 1530, 1540, 2030, 6530	4W2A 5W6M
RPLT120400TN	.250"R	40P 1530 1540, 2030, 6530	4W2A 15B1H 5W6H
RPLW120400TN	.250"R	1530 1540 2030, 6530	4W2A 15B1H 5W6H
RPLW120400FN	.250"R	2030	4W2A, 15B1H, 5W6H
SDE-31-001	-	15K, 1030	38L5G
SDE-31-002	-	15K, 1030	38L5G
SDE-42-002	-	15K, 1030	38L5H
SDMT080305N	.020"R	2005 2030 2015 2040 1030	15J1E 25J3E 15N1E 15P1E 5J1E, 35J6E, 25J3E
SDMW080305TN	.020"R	2005 2030 2015 2040 1030	15J1E 25J3E 15N1E 15P1E 5J1E, 35J6E, 25J3E
SDCT080305FN-P	.020"R	30M	15J1E, 25J3E, 15N1E, 15P1E, 5J1E, 35J6E, 25J3E
SDLT120608TR	.031"R	1030, 2005, 5015	2J1H
SECT09T3AFFN-P	.045" x 45°	30M 2005, 2030, 2040, 1030	15N1F 5N1F
SEHT130408FR-P	.030"R	10K	5J2H
SEKT09T3AFN	.045" x 45°	30M 2005, 2030, 2040, 1030	15N1F 5N1F
SEKT12T3AFTN-M	.043"R	Cermet, 1030, 2005, 2010, 2040	15N1H, 5N2H
SEKT12T3AFTR-WC	.047"R	2010, 2040, 1030	15N1H, 5N2H
SEMT1304PETR-M	.030"R	1030, 2005, 2010, 2040	5J2H
SHEH1504AEN-P	.055" x 45°	15K	5N6R
SHEH1504AETN1-P	.055" x 45°	2005	5N6R
SHET110505FR-P	.020"R	15K	5H6G, 15U1G
SHET110508FR-P	.031"R	15K	5H6G, 15U1G
SHET110516FR-P	.062"R	15K	5H6G, 15U1G
SHET110524FN-P	.093"R	15K	5H6G, 15U1G
SHET110532FN-P	.125"R	15K	5H6G, 15U1G
SHET1504AJTN	.055" x 45°	1030, 2010, 2040	5N6R
SHEW1504AJTN	.055" x 45°	2040	5N6R
SHLH1405APTN-HR	.125" x 45°	30M 40P, 6530, 1030	5N6R 4W2A
SHLH140508TN-HR	.031"R	30M 40P 6530, 2005, 1030	25J3J 25J3J 5J6J
SHLT090308N-HR	.031"R	30M 2005 1030	25J3F 15N1F 15W7V, 25W1V
SHLT090408N-FS	.031"R	6515, 2005, 1030	15T1F

Insert Number	Corner Radius	Grade	Cutter Series
SHLT110408TN-HR	.031"R	30M, 1030 40P 6530 2005	25J3G 23J6G 23J2G 23W2G, 15L1G, 15M1G, 15N1G, 23S2G, 25W1V
SPE-33R001	-	10K, 40P, 2030	16W7J
SPE-33R101	-	2010	6MDK
SPE-55L080	.020" x 45°	1530	26J2L
SPE-55R002	-	10K, 15K, 40P, 1530	26W1L
SPEN1206MPTN	-	70N	5L2H, 5N2H
SPEN1206MPTR-W	-	70N	5L2H, 5N2H
SPEN120608TN	.031"R	70N	5L2H, 5N2H
SPEN120611TR-W	.031"R	70N	5L2H, 5N2H
SPLT060204R	.015"R	30M, 1030, 1040	15T1D
SPLT060204R-DM4	.015"R	1030	15T1D
VHLD08T310RM	.040"R	2005, 2030	15V1F, 5V6E
VHLD130515R-MM	.060"R	2005, 2030, 2040	15V1H, 5V6H
XEET250408R-P	.031"R	15K	5X6X
XEET250416R-P	.062"R	15K	15X1X
XEET250424R-P	.090"R	15K	15X1X
XEET250432R-P	.125"R	15K	5X6X
XEEW250308R-P	.031"R	15K	15X1W
XEEW250332R-P	.125"R	15K	15X1W
XFEB330504R-P	.020"R	15K	15X1Z, 5X6Z
XFEB330508R-P	.031"R	15K	15X1Z, 5X6Z
XFEB330516R-P	.062"R	15K	15X1Z, 5X6Z
XFEB330534R-P	.125"R	15K	15X1Z, 5X6Z
XFEB330552R-P	.196"R	15K	15X1Z, 5X6Z
XFEB330566R-P	.250"R	15K	15X1Z, 5X6Z
YCE434-001	wiper	10K 40P, 1510, 1540	9DKG 7F2K
YDA323L101	wiper	10K, 0560, 2040	6F2B
YDA323L104	wiper	10K, 0560, 2040	6F2B
YDA334L102	wiper	2010	6MDK, 6JDR
YPE324-003	wiper	1510 1530, 2010, 6515	8K2A 8K1A
YSE424R003	wiper	1530, 1540	9D2C
ZEE324-003	.020" x 60°	30M, 6530, 1530	27E2V

STANDARD PRODUCT SCREW DATA

New Screw Number	Old Screw Number	Drive Size/Style	Thread	Overall Length	Torque Setting in. lbs.	Standard Driver	Torx® Drivers with Interchangeable Bits		
							Manual Handle	Preset Torque	Torx Bit
SA04-42	SA04-42	3mm hex	M6 x 1.0	.394	n/a	DS-H03T	—	—	—
SA06-37	SA06-37	3/16 hex	3/8-24 UNF	.500	n/a	—	—	—	—
SB080-01	—	5mm hex	—	—	n/a	DS-H05T	—	—	—
SB080-02	—	5mm hex	—	—	n/a	DS-H05T	—	—	—
SC04-17	SC04-17	1/8 hex	1/4-28 UNF	.875	40-45	—	—	—	—
SE03-26	SE03-26	1/8 hex	10-32 UNF	.625	n/a	—	—	—	—
SE03-65	SE03-65	3mm hex	M5 x .8	.630	n/a	DS-H03T	—	—	—
SE04-09	SE04-09	5/32 hex	1/4-28 UNF	1.000	n/a	—	—	—	—
SE05-031-00	SE02-45	Tx-10	5-40 UNC	.322	20-25	DS-T10T	DS-A00S	—	DS-T10B
SE06-024-00	SE02-05	Tx-15	6-32 UNC	.241	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE06-028-00	SE02-02	Tx-15	6-32 UNC	.280	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE06-030-00	SE02-18	Tx-15	6-32 UNC	.300	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE06-037-00	SE02-04	Tx-15	6-32 UNC	.360	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE06-038-10	SE02-23	3/32 hex	6-32 UNC	.375	n/a	—	—	—	—
SE06-042-00	SE02-11	Tx-15	6-32 UNC	.430	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE08-051-00	SE02-65	Tx-15	8-32 UNC	.522	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SE10-061-00	SE03-10	Tx-15	10-32 UNF	.610	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE10-046-00	SE03-12	Tx-15	10-32 UNF	.460	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SE10-049-00	SE03-23	Tx-15	10-32 UNF	.500	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SF050-01	SF03-11	Tx-15	M5 x .8	.417	53-58	DS-T15T	DS-A00S	—	DS-T15B
SF060-01	SF03-12	Tx-20	M6 x 1.0	.535	65-70	DS-T20T	DS-A00S	—	DS-T20B
SF080-01	SF05-15	Tx-25	M8 x 1.25	.661	105-110	DS-T25T	DS-A00S	—	DS-T25B
SF080-02	SF05-16	Tx-25	M8 x 1.25	.820	105-110	DS-T25T	DS-A00S	—	DS-T25B
SM22-052-00	SE01-16	Tx-07	M2.2 x .45	.205	7-11	DS-T07F	DS-A00S	—	DS-T07B
SM25-049-00	SM25-05	Tx-08			10-15	DS-T08W	DS-A00S	—	DS-T08B
SM25-054-00	SE01-17	Tx-08	M2.5 x .45	.211	10-15	DS-T08W	DS-A00S	—	DS-T08B
SM25-055-10	SE01-18	Tx-08	M2.5 x .45	.217	9-11.5	DS-T08W	DS-A00S	—	DS-T08B
SM25-063-10	SE04-13	Tx-25	1/4 x 28 NF	.610	40-45	DS-T25T	DS-A00S	—	DS-T25B
SM25-064-00	HZT.0001	Tx-08	M2.5 x .45		10-15	DS-T08W	DS-A00S	—	DS-T08B
SM25-072-30	SE01-21	Tx-07	M2.5 x .45	.287	7-11	DS-T07F	DS-A00S	—	DS-T07B
SM30-053-00	SM31-06	Tx-09	M3 x .5	.209	13-18	DS-T09W	DS-A00S	—	DS-T09B
SM30-065-00	SE02-79	Tx-09	M3 x .5	.256	13-18	DS-T09W	DS-A00S	—	DS-T09B
SM30-082-00	HZT.0028	Tx-09	M3 x .5		13-18	DS-T09W	DS-A00S	—	DS-T09B
SM35-034-50	HZT.0021	Tx-09	M3.5 x .6		25-30	DS-T09W	DS-A00S	—	DS-T09B
SM35-042-50	HZT.0022	Tx-09	M3.5 x .6		25-30	DS-T09W	DS-A00S	—	DS-T09B
SM35-088-10	HZT.0003	Tx-10	M3.5 x .6		25-30	DS-T10T	DS-A00S	DT-29-01	DS-T10B
SM35-090-40	SE02-A8	Tx-10	M3.5 x .6	.354	18-22	DS-T10T	DS-A00S	—	DS-T10B
SM35-110-00	SE02-63	Tx-15	M3.5 x .6	.433	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SM40-050-50	HZT.0023	Tx-15			30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-060-50	HZT.0024	Tx-15			30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-070-00	SM40-07	Tx-15	M4 x .7	.276	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-080-00	SM40-08D	Tx-15			25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SM40-080-10	SM41-09	Tx-15	M4 x .7	.315	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-080-30	SE02-B3	Tx-15	M4 x .7	.315	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-090-00	SE02-55	Tx-15	M4 x .7	.354	25-30	DS-T15T	DS-A00S	DT-29-01	DS-T15B
SM40-093-20	SE02-82	Tx-15	M4 x .7	.354	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-100-10	—	Tx-15	M4 x .7	.394	40	DS-T15T	—	—	—
SM50-100-10	SM51-12	Tx-20			40-45	DS-T20T	DS-A00S	—	DS-T20B

New Screw Number	Old Screw Number	Drive Size/Style	Thread	Overall Length	TorqueTorx® Drivers with Interchangeable Bits				
					Setting in. lbs.	Standard Driver	Manual Handle	Preset Torque	Torx Bit
SM40-110-00	SE02-78	Tx-15	M4 x .7	.433	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-120-20	SE02-81	Tx-15	M4 x .7	.472	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-120-40	SE02-A9	Tx-15	M4.0 x .70	.472	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM40-130-00	SM40-13	Tx-20			40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-096-20	SE03-68	Tx-20	M5 x .8	.377	40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-100-00	SM50-10B	Tx-20	M5 x .8	.393	35-40	DS-T20T	DS-A00S	—	DS-T20B
SM50-100-10	SE03-79	Tx-20	M5 x .8	.393	40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-120-00	SE03-58	Tx-15	M5 x .8	.472	30-35	DS-T15T	DS-A00S	DT-35-01	DS-T15B
SM50-120-30	HZT.0026	Tx-20			40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-127-10	SE03-72	Tx-20	M5 x .8	.500	40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-150-40	SE03-80	Tx-20	M5 x .8	.591	40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-160-10	SE03-70	Tx-20	M5 x .8	.625	40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-190-00	SM50-19	Tx-20			40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-190-10	-	Tx-20			40-45	DS-T20T	DS-A00S	—	DS-T20B
SM50-200-40	SE03-81	Tx-20	M5 x .8	.787	40-45	DS-T20T	DS-A00S	—	DS-T20B
SM60-093-50	TS60400935	4mm hex				DS-H40T	DS-A00S	—	DS-T20B
SM60-150-00	-	Tx-25	M6 x 1.0	.591	72-77	DS-T25T	DS-A00S	—	DS-T25B
SM60-220-40	SE03-88	4mm hex	M6 x 1.0	.866	72-77	DS-H04T	—	—	—
STC-35	STC-35	1/8 hex	(2) 1/4-28 UNF	.781	75	—	—	—	—

STANDARD RETENTION BOLT DATA CHART

New Bolt Number	Old Bolt Number	Drive Size/Style	Thread	Standard Length	Torque Setting in. lbs.	Products Using Retention Bolts
SD04-85	SD04-85	3/16 hex	1/4-28 UNF	.875	n/a	2J1Q
SD06-46	SD06-46	5/16 hex	3/8-24 UNF	1.00	n/a	5W6H, 2J6B, 2J4B, 3J6B, 2J6Q, 2H1H, 2L1Q, 2L6B, CHA, DHU, 5J1H
SD06-47	SD06-47	5/16 hex	3/8-24 UNF	1.25	n/a	24J1Q, 24J1B, 2N6K, 2J1E
SD06-48	SD06-48	5/16 hex	3/8-24 UNF	1.50	n/a	23J3G
SD06-49	SD06-49	5/16 hex	3/8-24 UNF	1.75	n/a	23J3G
*SD06-89	-	5/16 hex	3/8-24 UNF	1.00	n/a	DHU, DM5G, DM6G, 5J1H
SD07-13	SD07-13	10mm hex	M12 x 1.75	2.17	105 ft. lbs.	23J5J, 23J4J
SD08-21	SD08-21	10mm hex	M12 x 1.75	1.57	105 ft. lbs.	23J5B, 23J5G
SD08-46	SD08-46	3/8 hex	1/2-20 UNF	1.00	n/a	5W6H, 5W6M, CHA, DHU, DM5G, DM6G, 5J1H
SD08-47	SD08-47	3/8 hex	1/2-20 UNF	1.25	n/a	2J6B, 2J4B, 2J1Q, 2H1H
SD08-48	SD08-48	3/8 hex	1/2-20 UNF	1.50	n/a	5L2V
SD08-52	SD08-52	3/8 hex	1/2-20 UNF	2.50	n/a	23J3J
*SD08-92	-	3/8 hex	1/2-20 UNF	1.00	n/a	DHU, DM5G, DM6G, 5J1H
SD08LA2	SD08LA2	1/2 hex	1/2-13 UNC-LH	5.75	105 ft. lbs.	23J5G, 23J4B, 23S4B, 23W4B
SD10-46	SD10-46	1/2 hex	5/8-18 UNF	1.00	n/a	6F2K, 3J6B
SD10-47	SD10-47	1/2 hex	5/8-18 UNF	1.25	n/a	5W6H, 5W6M, DHU
SD10-48	SD10-48	1/2 hex	5/8-18 UNF	1.50	n/a	5J2Z
SD10-51	SD10-51	1/2 hex	5/8-18 UNF	2.25	n/a	26J1L, 27J2V, 5J2Z
SD10-54	SD10-54	1/2 hex	5/8-18 UNF	3.00	n/a	23J3J
*SD10-99	-	1/2 hex	5/8-18 UNF	1.25	n/a	DHU
SD12-54	SD12-54	5/8 hex	3/4-16 UNF	3.00	n/a	26J1L
SD12-79	SD12-79	5/8 hex	3/4-16 UNF	4.00	n/a	23J3J
SD12-82	SD12-82	5/8 hex	3/4-16 UNF	1.50	n/a	5W6R, 5W6M, 5N2V, PHA, 5L2V, DM5G, DM6G
SD12-89	SD12-89	5/8 hex	3/4-16 UNF	1.75	n/a	5J2Z
*SD12-99	-	5/8 hex	3/4-16 UNF	1.50	n/a	DM5G, DM6G

*Equipped with coolant through.

STANDARD SCREW DRIVER DATA CHART

Drive Size/Style	Standard Driver		Manual Handle		Torx Bit	
	New Part No.	Old Part No.	New Part No.	Old Part No.	New Part No.	Old Part No.
Tx-06	DS-T06F	DS-0038	DS-A00S	DS-0017	-	-
Tx-07	DS-T07F	DS-0036	DS-A00S	DS-0017	DS-T07B	DS-0028
Tx-08	DS-T08W	DS-0020	DS-A00S	DS-0017	DS-T08B	DS-0021
Tx-09	DS-T09W	DS-0022	DS-A00S	DS-0017	DS-T09B	DS-0029
Tx-10	DS-T10T	DS-0013	DS-A00S	DS-0017	DS-T10B	DS-0004
Tx-15	DS-T15T	DS-0010	DS-A00S	DS-0017	DS-T15B	DS-0003
Tx-20	DS-T20T	DS-0034	DS-A00S	DS-0017	DS-T20B	DS-0035
Tx-25	DS-T25T	DS-0037	DS-A00S	DS-0017	DS-T25B	DS-0030
Tx-30	DS-T30T	-	-	-	DS-T30B	-
Tx-40	DS-T40T	-	-	-	DS-T40B	-
Tx-50	DS-T50L	-	-	-	DS-T50B	-
2mm hex	-	WS-0014	-	-	-	-
3mm hex	DS-H03T	DS-0033	-	-	-	-
4mm hex	DS-H04T	DS-0039	-	-	-	-
5mm hex	DS-H05T	WS-0023	-	-	-	-
6mm hex	-	WS-0024	-	-	-	-
1/8 hex	-	WS-0022	-	-	-	-

Ingersoll



M451

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■ GENERAL APPLICATION INFORMATION

APPLYING BASIC PRINCIPLES OF MACHINING WITH INDEXABLES CAN IMPROVE PERFORMANCE

The following information is directed toward indexable carbide tools but it can be applied to many other cutting tools, as well. It provides some basic guidelines designed to serve as a starting point for safe and reliable performance. Contact your Ingersoll Cutting Tool Company sales engineer for specific application assistance.

Rigidity. Use the most rigid cutter possible. This usually means the cutter with the largest diameter and shortest length. Use the best adaption possible. Integral tapers, such as a 50 V-flange, are better than straight shanks. When selecting straight shank tools, use a cutter with the largest diameter shank possible and a holder with the shortest length possible. For a more complete review, see "Rigidity Analysis" on page M460.

Effective cutting edges. When calculating feed rate, use the effective number of inserts. In extended flute cutters, the effective number of inserts is not the number of rows. Use the effective number listed with the specifications for each series of tools.

Chip load. Carbide cutting tools have to take a "bite" to cut. Be sure to cut with an adequate chip load. Light chip loads can contribute to chatter, causing a cutter to "rub" instead of "bite." This can also result in poor tool life. As a general rule, chip loads should not be less than .004". Also, be sure to use Radial Chip Thinning Factors (RCTF) when calculating feed rates. Refer to "Radial Chip Thinning" located on page M462.

Chip recutting. Unlike HSS, carbide cutting tools cannot recut chips. Recutting chips will damage carbide. To evacuate chips, use air or coolant depending on the material being cut. Refer to "General Operating Guidelines" on pages M472-M509 for coolant or air chip evacuation recommendations.

Coolant. Generous amounts of coolant are required when low thermal conductivity, work hardening, and chip welding tendencies are evident.

Use coolant only when necessary. Some materials cut better dry. In some applications, coolant causes thermal cracking of inserts and poor tool life.

Refer to "General Operating Guidelines" on pages M472-M509 to find coolant requirements.

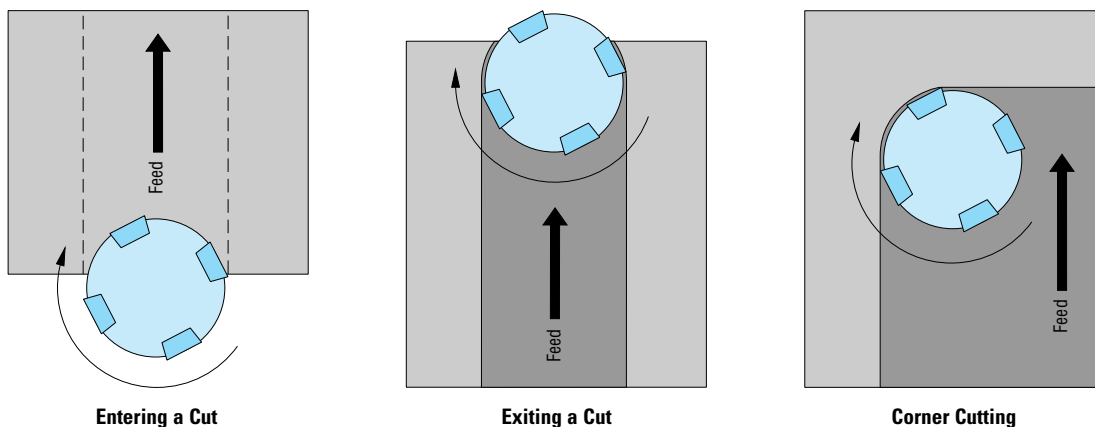
Feed rates. Reduce feed rates by 50 percent when entering or exiting a cut. Since fewer inserts are engaged in the work, pounding can occur. Reducing feed rates will reduce the shock of the interrupted cut and contribute to longer tool life.

When entering a corner during pocket milling, a larger portion of the cutter's diameter is engaged. Power requirements and tool deflection increase. To compensate, program a reduced interpolated feed rate. Alternately, drill or plunge the corner prior to milling.

Cutter rotation. Climb cut whenever possible. Carbide is designed for climb milling and will not generally perform as well when conventional cutting.

Conventional cutting may be employed on older machines to minimize backlash. It can also extend tool life in sandy, scaly, or torch-cut surfaces as the cutting edge enters into cleaner, softer material.

Fig. 1



Reduce feed rates by 50% when entering a cut, exiting a cut, or entering a corner. This reduces pounding and cutting forces and can extend the life of your indexable carbide tool.

Hardness. generally, harder materials should be machined at the lowest speed in Surface Feet per Minute (SFM) in the recommended range and softer materials at the higher recommended speed.

At 375 Brinell hardness, steel becomes very difficult to machine. Use the slowest recommended speed and the toughest carbide insert available. An edge hone may also be necessary to machine such hard material effectively.

Chip color. The color of the chips can also indicate how well your operation is performing. For example, carbon steel chips are blue. Stainless steel chips should be silver to straw colored, not blue. Titanium and nickel-based material chips should never change color.

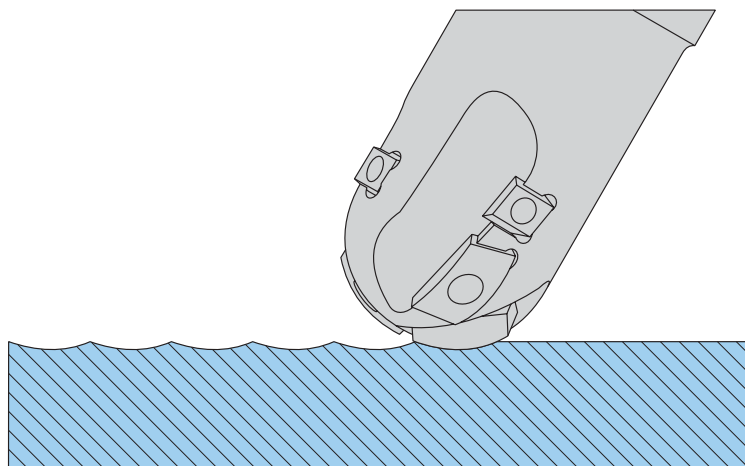
Ball Nose Milling. Ball nose end milling is a unique application that presents unique challenges. The nose inserts on a ball nose end mill are subjected to extreme abnormal and inconsistent work stresses. This is due, in part, to the wide variance in SFM and chip load from the radial to the axial end of the insert.

In order to minimize the stresses generated by this condition, the spindle axis can be tilted to raise the center point of the tool out of the cut (Figure 2). This "sturz" milling greatly reduces the force variance on the insert and helps to equalize the chip load.

To utilize this technique in optimizing your ball nose milling application, you must be able to tilt your machine spindle relative to the workpiece

Indexing Ingersoll inserts. Ingersoll's bent screw design used with on-edge inserts forces the insert into the corner of the pocket. The screw actually bends, locking the insert in place.

Fig. 2



"Sturz" milling, or tilting the axis of the spindle to move the axial center of a ball nose end mill out of the cut, greatly reduces the cutting forces inflicted on the nose insert.

Conventional insert mounting is also common on Ingersoll products. In this case, the screw does not force the insert toward the corner of the pocket. Be sure to apply pressure into the pocket while tightening the insert screws.

Care should always be taken not to over-tighten insert screws. Over-tightened screws can become difficult to remove. Torque requirements are given for each cutter.

Indexing Ingersoll cutters is simple due to their design. However, care must be taken to make sure that the insert pocket is clean and the insert is properly seated.

After the used insert has been removed, clean the pocket. Visually inspect the cutter to see that no damage has been sustained from use. Place the insert into the pocket and start the screw. While tightening the screw, apply downward pressure on the insert toward the corner of the pocket.

A snugness will be felt on the screw as the insert seats. Do not over-tighten the insert screw. Be sure to apply the proper amount of torque listed in Ingersoll's catalogs.

If there is any doubt about the insert seating, check the seating surfaces with a .001" feeler gauge.

If the feeler gauge fits between the insert and the wall of the cutter pocket, the insert is not properly seated. Inspect the pocket for cleanliness or burrs and repeat the seating procedure. Cutters that have been damaged may have insert pockets that will no longer allow proper seating. Such tools should be replaced or returned to Ingersoll for repair.

FACE MILL SELECTION

GOING BACK TO THE BASICS OF FACE MILL DESIGN TO SELECT A TOOL TO MATCH YOUR APPLICATION

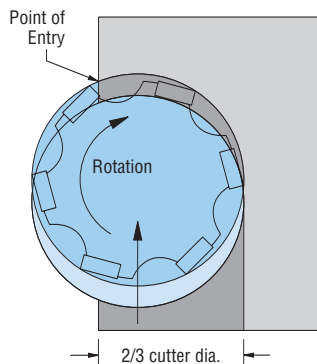
When milling with an indexable face mill, the workpiece, machine, and fixturing must all be as rigid as possible. This will help ensure efficient use of this type of tool and produce the results required. Only cutters using indexable carbide inserts will be discussed here.

Proper cutter diameter. For maximum efficiency, two-thirds of the cutter diameter should engage the workpiece. In other words, the cutter diameter should be 1-1/2 times the width of cut desired.

Climb milling using this cutter diameter to width of cut ratio will ensure a favorable entry angle into the workpiece (Fig. 1).

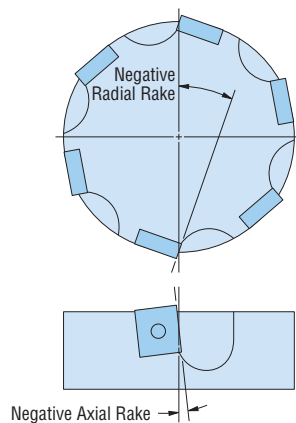
If uncertain as to whether the machine has enough horsepower to operate the cutter under this ratio, it may be best to divide the axial depth of cut into two passes (or more) to maintain as closely as possible this cutter diameter to width of cut ratio.

Fig. 1



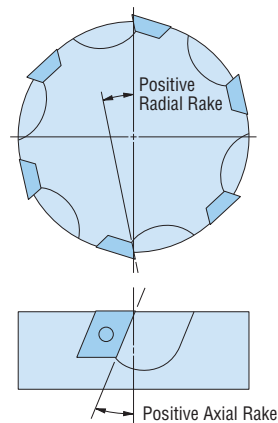
Climb Milling

Fig. 2



Negative Geometry

Fig. 3



Positive Geometry

Applying cutter geometry. Insert cutting edges may be positioned relative to both radial and axial planes in positive, neutral, or negative rakes. Neutral rake is generally not used due to the shock of the entire cutting edge impacting the workpiece simultaneously.

The combination of radial and axial rakes determines the shear angle. Three basic combinations are available: negative radial and axial, positive radial and axial, negative radial/positive axial, and positive radial/negative axial.

Double negative geometry is the traditional starting point for rough milling cast iron and steels when horsepower and rigidity are adequate. The double negative insert design provides the strongest possible cutting edge and can withstand heavier chip loads and considerable cutting forces (Fig. 2).

The increased cutting forces generated by this geometry will consume more horsepower. Double negative cutters also require greater machine, workpiece, and fixture rigidity.

Double positive geometry provides the most efficient cutting action due to its increased shearing angle. Although not as strong as double negative, entry impact and cutting forces are greatly reduced, making it a good choice for older, less rigid machines or where horsepower is limited.

With double positive geometry, the peripheral edge, in both the radial and axial planes, leads the insert through the workpiece creating a true shearing action. This makes it the best choice for non-ferrous materials and many soft, gummy stainless steels (Fig. 3).

Negative radial/positive axial geometry combines some of the advantages of both double negative and double positive. Negative radial rake provides strong cutting edges, while positive axial rake creates a shearing action. A positive axial rake directs chips up and away from the workpiece. This prevents chip recutting and takes heat away from the work surface and the cutting edge.

Positive radial/negative axial geometry reduces power consumption while still providing a strong corner cross-section.

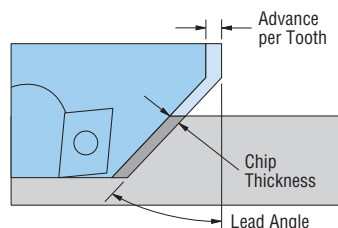
Effective lead angles. Cutter lead angles also affect performance. A 45° lead tool reduces chip thickness about 30 percent as compared to a 0° lead tool (Fig. 4). This allows you to maintain a given chip load at a higher feed rate, increasing the metal removal rate.

A proper lead angle allows a cutter to enter and exit the cut more smoothly, minimizing shock to the cutting edges. Workpiece edge break-out, a common problem when machining cast iron, can be significantly reduced or eliminated by use of increased lead angle. The lead angle allows the cutting edge to exit the workpiece gradually. This reduces radial pressure and minimizes breakout.

Remember that increasing the lead angle to reduce radial pressure does increase axial pressure. This can cause deflection of the machined surface when the workpiece has a thin cross-section.

Choosing cutter density. The cutter density must allow chips to form properly and clear the cut. Inadequate chip space can cause chips to plug the gullet, breaking the cutting edge and possibly damaging the workpiece.

Fig. 4



Lead Angles

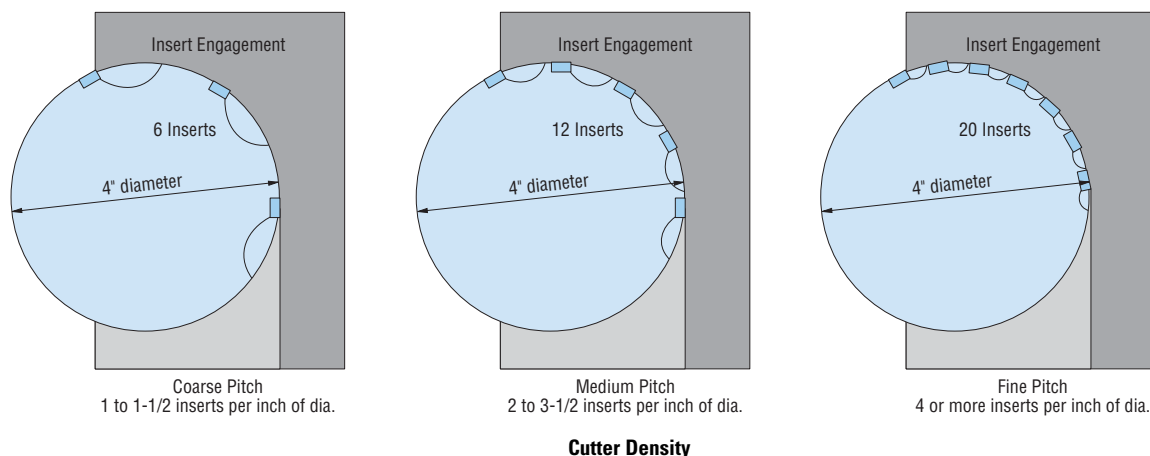
However, the cutter must have sufficient density to keep at least one insert in the cut at all times. Failure to do this could cause severe pounding which can lead to chipped cutting edges, a damaged cutter, and excess wear to the machine (Fig. 5).

Coarse pitch tools, with 1 to 1-1/2 inserts per inch of diameter, allow for greater chip gullet space. These tools are recommended for soft materials that produce continuous chips, and in wide cuts with a long insert engagement.

It is desirable to have at least one insert in contact with the workpiece at all times. Fine pitch tools, though primarily for cast iron, are also good for shallow or narrow cuts in high-temperature alloys where light chip loads are taken. Small chips require less gullet, allowing more inserts per inch.

Although selecting a face mill can be a complicated and somewhat subjective process, these guidelines can give you a good starting point. By using and expanding on these principles, you will be able to select a face mill for any operation in your plant.

Fig. 5



BETTER SURFACE FINISHES

GOING BEYOND THE BASICS OF FINISH MILLING TO HELP YOU ATTAIN BETTER SURFACE FINISHES

Surface finish is the result of tool marks or irregularities left by the cutting edges of a milling cutter. These irregularities are:

Roughness: the measurement of tool marks in terms of RMS (Root Mean Square); measured with a relatively short sampling length and suppresses waviness.

Waviness: widely spaced irregularities that underlie the roughness (Fig. 1).

Flatness: the overall condition of the entire milled plane; measured by large straightedges or feelers.

Laps: blending of successive passes; normally a function of how well the milling head is squared to the table and how rigidly it is held in position.

Bearing: the supporting quality of a milled surface; a combination of all these irregularities.

How the machine affects finish. The entire machine setup must be rigid since any type of looseness or lack of rigidity will affect a milled surface finish. The "heel" or trailing edge of the cutter should clear the workpiece. Therefore, the spindle should be tilted very slightly in the direction of feed.

If the cutter is flat to the workpiece, (1) the finished surface is recut by the back side of the cutter, (2) the cutting edges can carry small chips that scratch the surface, (3) more friction creates heat build-up in the workpiece and cutting edges, and (4) increased cutter contact can induce chatter.

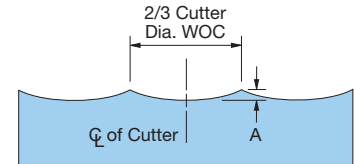
Too much spindle tilt creates excessive "dish" or scallops. The effect is magnified as cutter diameter increases (Fig. 2).

Cutter geometry. Axial rake has a significant effect on axial force and the thrust applied to the spindle and the workpiece. The more positive the axial rake, the less axial force. Negative axial rake increases axial force. Positive axial rake lifts the chip away from the milled surface while a negative rake forces the chip back toward the surface.

Radial rake has a major effect on tangential and radial forces. Positive axial rake reduces these forces, minimizing burrs and break-out.

Double negative cutters provide economy and the edge strength required for hard materials and interrupted cuts. But strength is often not required on light finishing cuts and economic gains may

Fig. 2: Effect of Spindle Tilt on Various Cutter Diameters



Spindle Tilt	Cutter Dia.	A
.001" per foot	6"	.00006"
	12"	.00013"
	18"	.00019"
.003" per foot	6"	.00019"
	12"	.00038"
	18"	.00057"
.005" per foot	6"	.00032"
	12"	.00064"
	18"	.00095"
.008" per foot	6"	.00051"
	12"	.00102"
	18"	.00153"

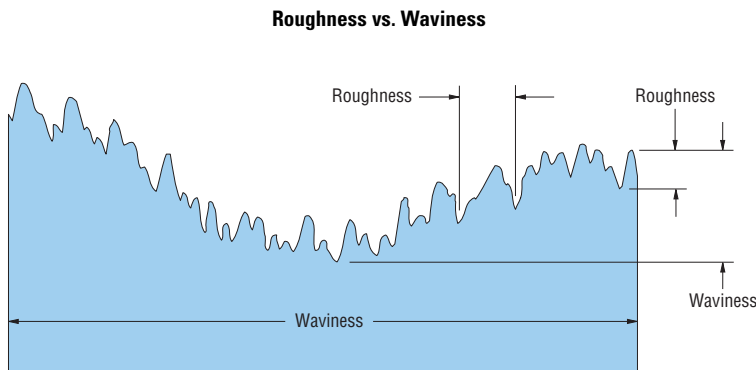
be offset by the time spent trying to attain a desired finish. Double negative geometry "pushes" rather than cuts. These higher forces consume more horsepower and create more pressure and heat.

Double positive cutters offer freer cutting action and consume less horsepower but have weaker cutting edges. Lower cutting forces direct less force against the workpiece and machine, so there is less tendency to chatter or deflect.

Remember, however, that too high a positive angle can tend to reverse the force and lift the workpiece into the cutter.

Negative/positive cutters provide the best cutting geometry for finish milling. Positive axial rake, negative radial rake, and the proper lead angle cause chips to be lifted up and out from the finished surface to clear the cutter and workpiece. This type of cutter combines the best

Fig. 1



aspects of negative and positive geometries and provide extremely free cutting action. Excellent chip evacuation leaves the finish-milled surface free of scratches and scoring.

Lead angle also affects cutting forces. Increasing the lead angle from 0° lessens radial force slightly and increases axial force significantly. Generally, chip evacuation is easier with a higher lead angle.

Insert design. One common insert design has a wiping flat on the face of the insert. The width of this flat must be greater than the advance per revolution to allow the cutting edges to overlap. Spindle tilt is critical when using wipers. Due to the sharp ends on the insert, excessive spindle tilt can cause dig-in (Fig. 3).

The MICRO MILL insert has four radiused cutting edges which project a very shallow ellipse in the plane of the cut. The large elliptical radius aligns to the surface regardless of spindle tilt. This ensures that the ends of the cutting edge do not dig-in the surface as can occur when inserts with conventional flats are

used.

The cutting edge is ground with a hook as well as a radius so that the axial rake is positive. This creates a shearing action which eases entry into the cut and directs chips up and away so they do not cause scratches. With this type of insert, however, if the advance per revolution is too great, the elliptical cutting edges will not overlap enough to form a smooth surface finish.

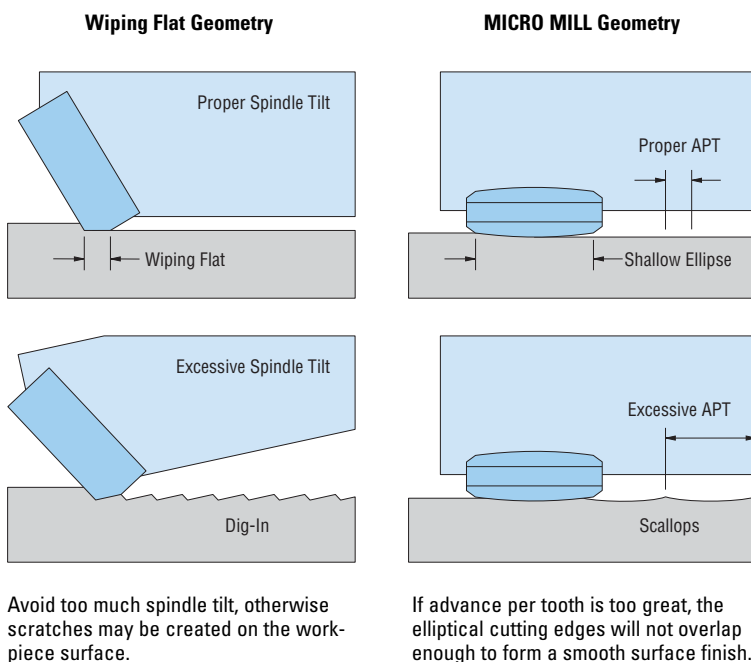
Other recommendations. Climb milling is generally best for finish milling because the cutter takes the thick part of the chip when it enters the cut. In conventional milling, the chip thickness starts at zero, causing rubbing or burnishing before the chip can reach its full thickness. Pressure and heat build up at the finished surface. The thin section will then weld to the cutting edge and be carried around to scratch the surface.

Avoid cutting with the full diameter of the tool. This also results in zero chip thickness at the point of cutting edge entry just as in conventional milling. Two-thirds

of the tool diameter is best when finish milling. It is also important to cut in the same direction when consecutive passes are required.

Finish milling depths are usually light (.003"-.010"). Greater Advance Per Tooth (APT) can be used, sometimes as high as .125". Finish milling cutters should be less dense than rough or semi-finish cutters, although high-density cutters may be required for some high production cast iron applications.

Fig. 3



RIGIDITY ANALYSIS

MAXIMIZING RIGIDITY WILL IMPROVE END MILL PERFORMANCE

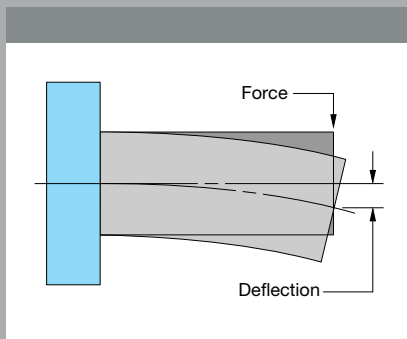
Rigidity

Among the many variables in milling, rigidity is one of the most important. Quite often, it is the primary factor determining end mill performance. Due to their length-to-diameter ratio, end mills are the least rigid of all cutting tools. Understanding rigidity and maximizing it can dramatically increase end milling productivity.

Some of the primary factors that affect rigidity are basic machine design, drive mechanism, bearing placement, spindle size, tool diameter and length, overhang, workpiece, and fixturing. This discussion will focus on how end mill selection affects rigidity.

Rigidity: is affected by cutting force. Cutting force produces deflection.

Force: is produced by a combination of cutting speed in Surface Feet per Minute (SFM) and power. Power is a function of the width and depth of cut, feed rate, and the material being cut. Soft materials require less power and hard materials require more.



Deflection: is produced by the cutting force on the tool. The tool's length-to-diameter ratio determines the degree of effect cutting force has on the tool.

Deflection is directly proportional to L^3 (length to the third power) and inversely proportional to D^4 (diameter to the fourth power). In other words, deflection is radically reduced as diameter is increased and/or length is reduced.

Ingersoll has designed computer software to perform the many calculations required to determine the amount of deflection on the tool. Using Ingersoll's "Rigidity Analysis" software, deflection for the following example can easily be determined:

Cutter: 2.000" diameter, 4.00" flute length,
No. 50 V-Flange adaption
Material: Low carbon steel
Speed: 400 SFM
Radial DOC: 1.00"
Axial DOC: 2.00"
Feed 12 IPM (.008 IPT)

The calculated theoretical deflection is .007".

Deflection of .001" or less is recommended for end milling operations. This example exceeds the desired maximum deflection of .001". A cutter running under these conditions is likely to chatter, produce a poor surface finish, and exhibit reduced tool life.

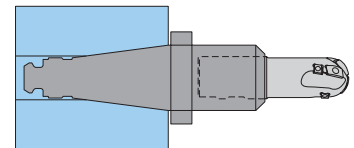
The same example was recalculated after reducing the flute length from 4.00" to 3.00". Without making any other changes, the rigidity of the end mill improved dramatically. The theoretical deflection was reduced to .0009".

By reducing the overall length-to-diameter ratio by 25 percent, deflection was reduced to less than half of the original example.

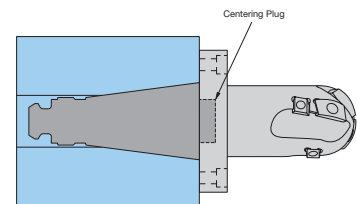
Many operational variables require additional rigidity. Among these are brittle cutting edge materials and any factor causing an increase in cutting forces such as negative cutting angles or tougher workpiece materials.

Tool Adaption

Rotary Toolholder: Most end mills are run in rotary toolholders which connect the tool to the spindle. Ironically, due to the added length and extra joint, this is the least rigid of all end mill adaptations. To maximize rigidity with this adaption, an end mill with the largest diameter shank and the shortest adaptor possible should be used.



Poor: Straight shank end mill and rotary toolholder



Better: Integral Shank

Integral Shank: An improvement over the straight shank adaption is an integral shank. This eliminates the joints required with rotary tool holders and greatly improves length-to-diameter ratios. Many standard Ingersoll end mills are available with No. 50 taper adaptors. Other tapers are available upon request.

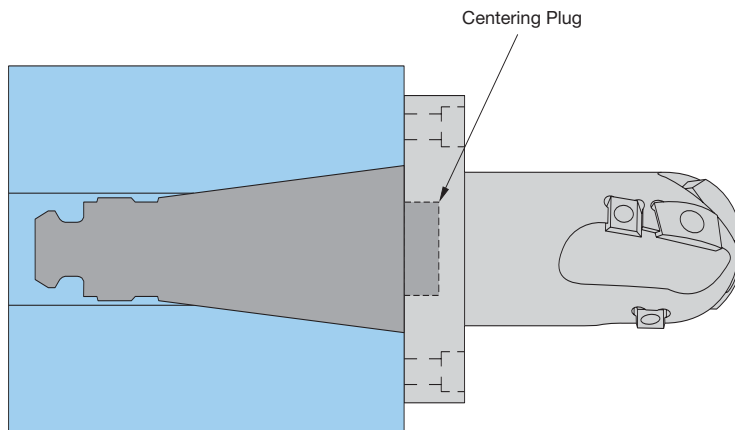
No. 50 tapers have a standard .125" gap between the flange and spindle face. To eliminate the gap, many Ingersoll machines have a simultaneous fit adaptor designed to be used in conjunction with a precision spindle face. Because the adaptor flange has bearing on the spindle face, the joint is more rigid.

Flat Back Drive: Another way to eliminate the .125" gap is to use a flat back drive system. It consists of a centering plug with a pilot diameter on the spindle. The end mill is bolted directly to the spindle face. This adaption is often used for large, heavy-duty end mill operations requiring maximum rigidity.

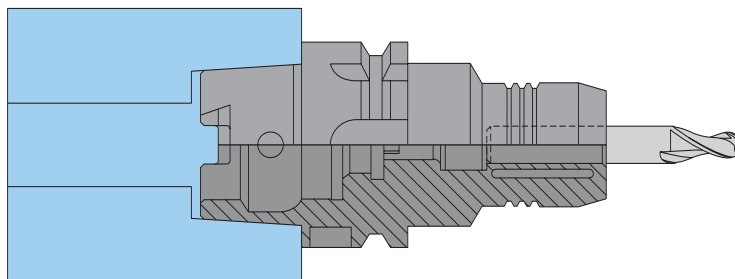
HSK Adaption: The HSK tool holder is designed to provide simultaneous fit on both the spindle face and the spindle taper.

At high speeds, centrifugal force causes the spindle to grow slightly. The face contact prevents the tool from moving up the bore. The hollow shank design is also susceptible to centrifugal force but is designed to grow with the spindle bore at very high speeds. I.D. clamping actually tightens its grip as spindle speed increases.

Supporting the cutting tool and holder in both the axial and radial planes creates a significantly more rigid connection between the tool and spindle.



Best: Flat Back Drive



Best: HSK Adaption

Moreover, HSK end mill holders are available in a variety of clamping styles including shrink fit for solid carbide shanks; hydraulic for steel shanks, collet, and Weldon styles. Choose the most rigid and accurate assembly possible.

Other HSK advantages include lighter weight, lower deflection under load, extremely accurate repeatability, increased torque transfer capabilities, and significantly improved dynamic runout over 50-taper adaptions at high speeds.

RADIAL CHIP THINNING

INCREASE FEED RATES BY UNDERSTANDING AND APPLYING RADIAL CHIP THINNING FACTORS

Radial Chip Thickness

Limitations on a cutting tool's performance are generally established in terms of maximum chip load. Since commonly used speed and feed calculators show only Advance Per Tooth (APT), chip load and APT tend to be used interchangeably. This is an area of misunderstanding which can be significant. Chip load actually refers to chip thickness, not APT.

APT is defined as the increment of feed that takes place in the time necessary for the cutter to rotate the distance between cutting edges. Mathematically, it is:

$$APT = \frac{IPM}{RPM \times T}$$

where:

IPM = Feed rate (inches/min)
RPM = Spindle speed (rev/min)
T = Teeth

The chip thickness is the "bite" taken by each cutting edge as it performs its work. For a typical end mill in a radial

Depth Of Cut (DOC) exceeding two-thirds the diameter of the cutter, the chip thickness increases until it equals the APT at the centerline of the cutter. The chip thickness then decreases to nothing as the cutting edge exits the cut (Figure 1).

Thus, APT is a constant for a given operation and the chip thickness is variable, changing cyclically.

Peripheral cutting: When end mill cuts are shallow in relation to the cutter diameter, the Actual Chip Thickness (ACT) is less than the APT. This chip thinning effect allows much higher feed rates (Figure 2).

For example, assume the following parameters:

2.000" diameter end mill
Two-effective
500 Surface Feet per Minute (SFM)
.12" radial Width Of Cut (WOC)
.005" chip thickness
955 effective RPM

Even though the APT in this case is .0105", the ACT (or chip load) is only .005".

A two-effective, 2.000" diameter end mill had an APT of .0105" and a chip thickness of only .005". The Radial Chip Thinning Factor (RCTF) is the ratio of chip thickness to APT or, in this example, .48.

Mathematically, the RCTF can be expressed as:

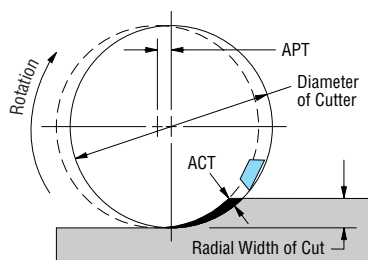
$$RCTF = \sqrt{1 - \left[1 - \frac{2 \times WOC}{Eff. Dia.} \right]^2}$$

where:

D = Diameter of cutter
WOC = Radial Width Of Cut

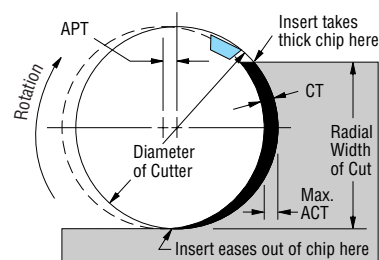
Whenever the radial DOC is equal to or greater than the effective cutter radius, the RCTF is equal to 1.

Fig. 1



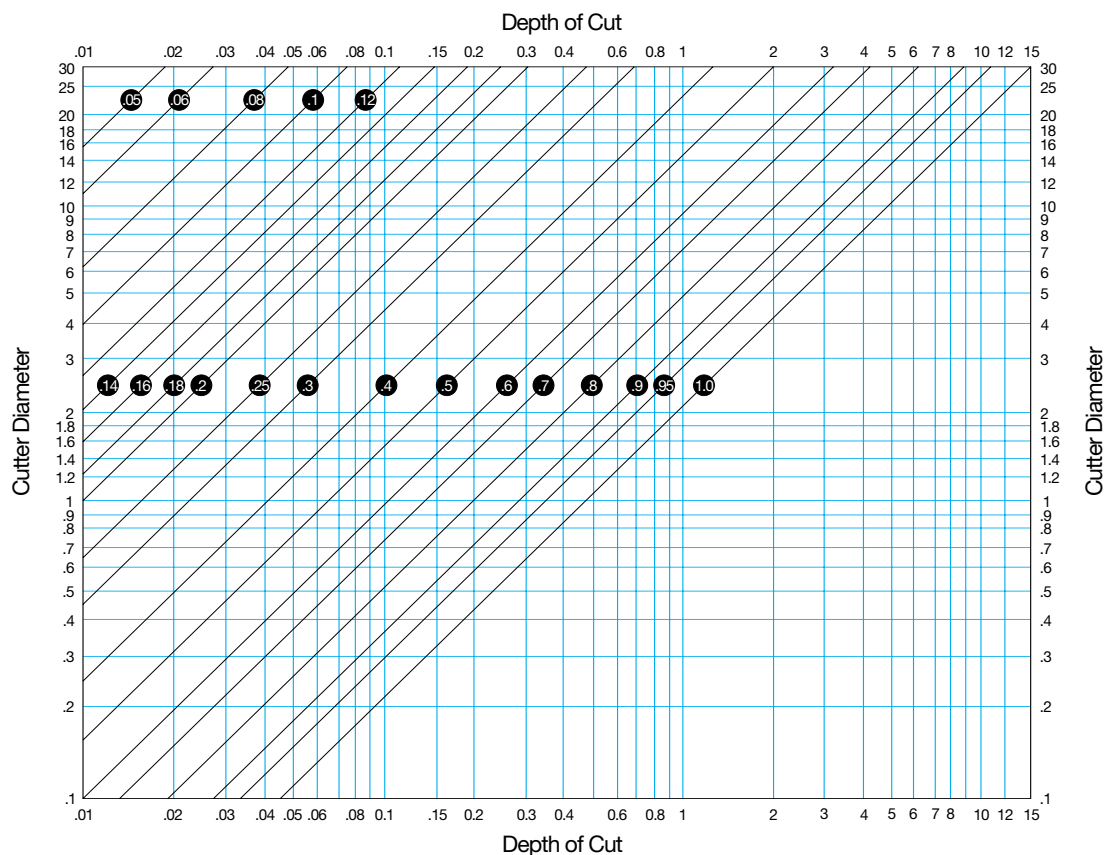
Chip thickness equals the Advance Per Tooth at the centerline of the cutter.

Fig. 2



Chip thickness is less than the Advance Per Tooth.

Fig. 3: Radial Chip Thinning Factors for Peripheral Milling



To find the Radial Chip Thinning Factor for a slabbing cut:

1. Find the Depth of Cut on the horizontal scale.
2. Locate the nominal diameter of the cutter on the vertical axis.
3. Cross-reference the two figures.
4. Locate the diagonal line closest to the intersection of the vertical and horizontal axes.
The value of this diagonal is the Radial Chip Thinning Factor for your specific application.

The RCTF can also be found with the help of the graph in Figure 3.

A thorough understanding of the relationship between APT and chip thickness enables the tool engineer to establish optimum feed rates for a cutting tool. After determining the RCTF, the maximum permissible chip load is divided by the RCTF to arrive at the optimum APT.

Again, referring to the example, the chip load of .005" is divided by the RCTF of .48 to arrive at the optimum APT of .0105". This APT should be used in calculating the feed rate, in this case, 20.1 IPM.

In addition to increasing productivity, applying the RCTF can improve a cutter's performance. At the higher feed rate, the insert will be taking a true bite. At lower feed rates without applying the RCTF, the insert may rub instead of cut and produce chatter, building heat and compromising tool life.

BALL NOSE CHIP THINNING

Axial Chip Thickness

Effective Diameter: When applying ball nose end mills, quite often the full diameter of the cutter is not engaged in the work. Since ball nose end mills cut to center, the speed in SFM is reduced to 0 as the centerline of the cutter is reached (see Figure 1 below).

To determine the Axial Chip Thinning Factor (ACTF), first determine the *effective cutting diameter*.

As the DOC varies, so does the effective cutting diameter. Since SFM calculations are based on the diameter of the cutter engaged in the cut, they must be made at the effective cutting diameter, not the nominal diameter of the tool.

The effective cutting diameter can be found in Chart A on pages M466-M467 by using the nominal tool diameter at the top and the DOC on the side. The SFM is calculated using the resulting effective cutting diameter at DOC.

The effective cutting diameter can also be calculated by using the following formula:

$$D_t = 2 \times \sqrt{R^2 - (R - D)^2}$$

Where:

D_t = True cutting Diameter (in.)

R = Radius (in.)

D = Depth of cut (in.)

In order to achieve the best productivity possible, be sure to consider the effective cutting diameter when setting RPM for a profiling ball nose application.

Chip Thickness

Due to the spherical form presented to the workpiece, axial chip thinning can affect chip thickness the same way as a lead angle on a face mill. This can have an adverse effect on the performance of a ball nose end mill. The ACTF must be applied when calculating the desired chip thickness and resulting feed rate.

The ACTF is determined by the radius of the ball nose at a given DOC. Figure 2 illustrates the concept of axial chip thinning. Notice as the axial DOC increases, so does the axial chip thickness. To calculate axial chip thickness:

$$ACTF = \sqrt{1 - \left[1 - \frac{2 \times DOC}{Ctr. Dia.}\right]^2}$$

Whenever the axial DOC is equal to or greater than the radius of the ball nose, the ACTF is equal to 1.

Next, determine the RCTF by the chart on pages M466-M467 or the formula. As Figure 3 shows, the RCTF is determined by the radius of the cutter at a given radial DOC. When determining the RCTF, use the *effective diameter* of the ball nose rather than the cutter diameter. Radial DOC is the same as the radial "step over." The formula used to calculate axial chip thinning is the same as that used for radial chip thinning.

Ultimately, the purpose of determining the chip thinning factor is to optimize the feed rate. To calculate the proper feed rate, first multiply the ACTF by the RCTF. This result is the Feed Correction Factor (FCF):

$$FCF = RCTF \times ACTF$$

Divide the desired chip thickness by the FCF. This result is the desired APT to maintain proper chip thickness:

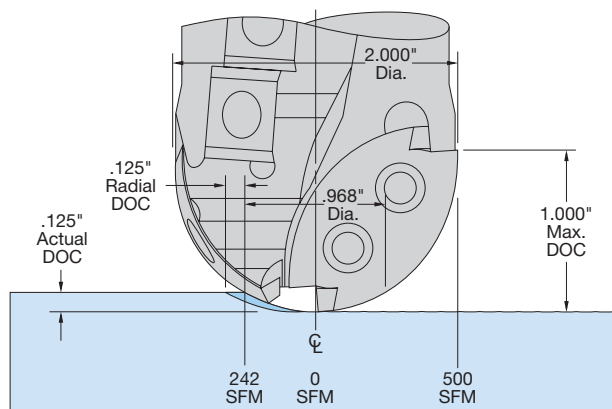
$$APT = \frac{CT}{FCF}$$

Finally, to arrive at the feed rate in Inches Per Minute (IPM), multiply the APT by the number of effective flutes and the RPM:

$$IPM = RPM \times (\text{No. of Flutes})$$

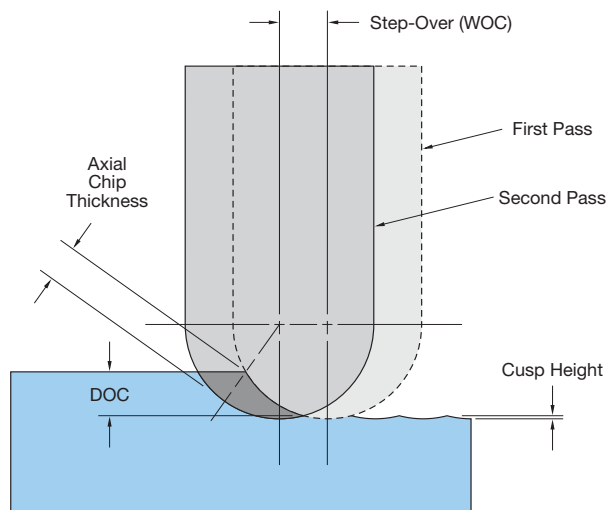
Overall performance would also improve since the cutter would be taking a true "bite" at the new feed rate. At the lower feed rate, the carbide may rub rather than cut.

Fig. 1: Effective Diameter



In this example, the SFM is 500 at a 2.000 inch diameter. The effective cutting diameter is .968 inch, at which point, the SFM is 242. The RPM must be increased to 1973 in order to achieve 500 SFM at the .968 inch effective cutting diameter.

Fig. 2: Axial Chip Thinning



Example

Figure 1 shows a 2.000" diameter ball nose end mill running at .125" DOC and a .125" radial DOC (step over). the effective diameter at this DOC is .968" (see chart on page M463). If the desired SFM is 500, the RPM would normally be set at 955 RPM for a 2.000" diameter cutter. However, since the effective diameter is .968", the RPM should be set at 1973 to achieve 500 SFM. This is an increase of more than 100 percent.

The DOC also affects the feed rate due to axial chip thinning. At .125" DOC, a 2.000" diameter has a chip thinning factor of .48 (see chart on M463). If the desired chip thickness is .010", the feed rate will need to be increased more than 100 percent. Without chip thinning, the feed

rate would be set at 19.7 IPM (1973 x .010"). However, at this DOC, the ACT would be only .0048" (.010 x .48). To achieve the proper chip thickness (APT or ACT), divide the desired chip thickness by the chip thinning factor.

$$\frac{.010"}{.48} = .021" \text{ APT}$$

The feed rate would be:

$$1973 \text{ RPM} \times .021 = 41.4 \text{ IPM}$$

In the same manner, the radial DOC (step over) has the same effect on feed rate. The radial DOC on a ball nose end mill is the same as the radial WOC on an end mill or face mill. In this example, the radial DOC of .125" has an RCTF of .67 (see chart on page M463).

To achieve the desired chip thickness of .010", multiply the ACTF by the RCTF resulting in the FCF.

$$.48 \text{ ACTF} \times .67 \text{ RCTF} = .32 \text{ FCF}$$

The APT is:

$$\frac{.010"}{.32} = .021" \text{ APT}$$

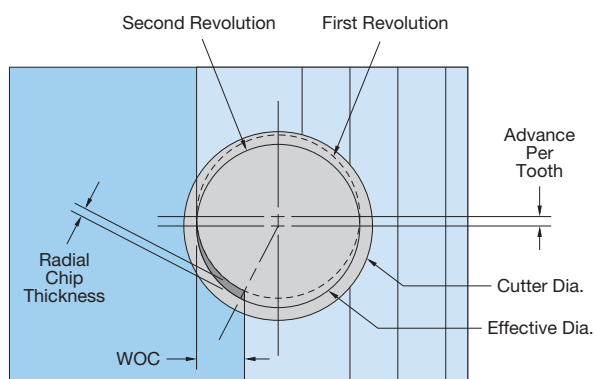
Productivity in this example is three times greater by using the correct chip thinning factors. On a single flute, one-effective tool using this example, the feed rate should be set at:

$$1973 \text{ RPM} \times .031" \text{ APT} = 61.3 \text{ IPM}$$

At this feed rate, productivity is increased over 200 percent by using the proper chip thinning factors.

Ingersoll Cutting Tool Company provides speed and feed selectors which are designed to help obtain optimum speed, feed, and ACT multipliers. Ask your Ingersoll sales engineer for a complimentary selector.

Fig. 3: Radial Chip Thinning at Effective Diameter



BALL NOSE CHIP THINNING CONTINUED

This chart provides information on effective cutting diameter, ACTFs, and cusp height for a ball nose cutter at a given DOC or step over.

Effective Diameter and Axial Chip

Thinning Factor. Axial DOC will affect the effective cutting diameter and, consequently, the ACTF. Note that as the axial DOC increases, the effective diameter

and ACTF also increase. A lower DOC results in a smaller effective diameter and, therefore, a lower ACTF; i.e., the spindle RPM and feed rate need to be increased to maintain a proper surface speed and chip load.

Cusp Height. Step over, or radial DOC, affects the cusp height. Cusp height is the theoretical surface finish produced

by successive tool paths made by a radius tool. Larger step over or a smaller cutter diameter produces a larger cusp height; i.e. a rougher finish.

For the best surface finish, use the largest diameter tool possible at the lowest practical radial DOC.

CHART A – EFFECTIVE BALL NOSE CUTTING DIAMETER, AXIAL CHIP THINNING FACTORS, AND CUSP HEIGHT (.375"–1.000" DIA.)

DOC/ Step Over	Cutter Diameter														
	0.375			0.500			0.625			0.750			1.000		
	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp
0.004	0.08	0.21	0.0000107	0.09	0.18	0.0000080	0.10	0.16	0.0000064	0.11	0.15	0.0000053	0.13	0.13	0.0000040
0.008	0.11	0.29	0.0000427	0.13	0.25	0.0000320	0.14	0.22	0.0000256	0.15	0.21	0.0000213	0.18	0.18	0.0000160
0.016	0.15	0.40	0.0001707	0.18	0.35	0.0001280	0.20	0.32	0.0001024	0.22	0.29	0.0000853	0.25	0.25	0.0000640
0.031	0.21	0.55	0.0006522	0.24	0.48	0.0004888	0.27	0.44	0.0003909	0.30	0.40	0.0003257	0.35	0.35	0.0002442
0.063	0.28	0.75	0.0026225	0.33	0.66	0.0019608	0.38	0.60	0.0015664	0.41	0.55	0.0013044	0.48	0.48	0.0009775
0.094	0.32	0.87	0.0059539	0.39	0.78	0.0044338	0.45	0.71	0.0035356	0.50	0.66	0.0029412	0.58	0.58	0.0022021
0.125	0.35	0.94	0.0107233	0.43	0.87	0.0079385	0.50	0.80	0.0063138	0.56	0.75	0.0052450	0.66	0.66	0.0039216
0.156	0.35	0.99	0.0170514	0.46	0.93	0.0125206	0.54	0.87	0.0099232	0.61	0.81	0.0082283	0.73	0.73	0.0061412
0.188	0.38	1.00	0.0251202	0.48	0.97	0.0182438	0.57	0.92	0.0143940	0.65	0.87	0.0119078	0.78	0.78	0.0088677
0.219				0.50	0.99	0.0251954	0.60	0.95	0.0197657	0.68	0.91	0.0163050	0.83	0.83	0.0121095
0.250							0.61	0.98	0.0260890	0.71	0.94	0.0214466	0.87	0.87	0.0158771
0.281							0.62	0.99	0.0334286	0.73	0.97	0.0273657	0.90	0.90	0.0201827
0.313							0.63	1.00	0.0418671	0.74	0.99	0.0341027	0.93	0.93	0.0250411
0.344										0.75	1.00	0.0417074	0.95	0.95	0.0304694
0.375										0.75	1.00	0.0502405	0.97	0.97	0.0364876
0.406													0.98	0.98	0.0431190
0.438													0.99	0.99	0.0503908
0.469													1.00	1.00	0.0583346
0.500													1.00	1.00	0.0669873

CHART A – EFFECTIVE BALL NOSE CUTTING DIAMETER, AXIAL CHIP THINNING FACTORS, AND CUSP HEIGHT (1.250"–3.000" DIA.)

DOC/ Step Over	Cutter Diameter														
	1.250			1.500			2.000			2.500			3.000		
	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp	Dia.	ACTF	Cusp
0.004	0.14	0.11	0.0000032	0.15	0.10	0.0000027	0.18	0.09	0.0000020	0.20	0.08	0.0000016	0.22	0.07	0.0000013
0.008	0.20	0.16	0.0000128	0.22	0.15	0.0000107	0.25	0.13	0.0000080	0.28	0.11	0.0000064	0.31	0.10	0.0000053
0.016	0.28	0.22	0.0000512	0.31	0.21	0.0000427	0.36	0.18	0.0000320	0.40	0.16	0.0000256	0.44	0.15	0.0000213
0.031	0.39	0.31	0.0001953	0.43	0.29	0.0001628	0.50	0.25	0.0001221	0.56	0.22	0.0000977	0.61	0.20	0.0000814
0.063	0.54	0.44	0.0007817	0.60	0.40	0.0006513	0.70	0.35	0.0004884	0.78	0.31	0.0003907	0.86	0.29	0.0003256
0.094	0.66	0.53	0.0017603	0.73	0.48	0.0014663	0.85	0.42	0.0010992	0.95	0.38	0.0008792	1.04	0.35	0.0007326
0.125	0.75	0.60	0.0031329	0.83	0.55	0.0026087	0.97	0.48	0.0019550	1.09	0.44	0.0015635	1.20	0.40	0.0013026
0.156	0.83	0.66	0.0049020	0.92	0.61	0.0040801	1.07	0.54	0.0030564	1.21	0.48	0.0024438	1.33	0.44	0.0020359
0.188	0.89	0.71	0.0070713	0.99	0.66	0.0058824	1.17	0.58	0.0044042	1.32	0.53	0.0035206	1.45	0.48	0.0029326
0.219	0.95	0.76	0.0096447	1.06	0.71	0.0080181	1.25	0.62	0.0059994	1.41	0.57	0.0047944	1.56	0.52	0.0039929
0.250	1.00	0.80	0.0126276	1.12	0.75	0.0104900	1.32	0.66	0.0078433	1.50	0.60	0.0062657	1.66	0.55	0.0052174
0.281	1.04	0.84	0.0160258	1.17	0.78	0.0133015	1.39	0.70	0.0099371	1.58	0.63	0.0079353	1.75	0.58	0.0066063
0.313	1.08	0.87	0.0198464	1.22	0.81	0.0164566	1.45	0.73	0.0122825	1.65	0.66	0.0098041	1.83	0.61	0.0081602
0.344	1.12	0.89	0.0240974	1.26	0.84	0.0199596	1.51	0.75	0.0148812	1.72	0.69	0.0118728	1.91	0.64	0.0098795
0.375	1.15	0.92	0.0287880	1.30	0.87	0.0238156	1.56	0.78	0.0177354	1.79	0.71	0.0141425	1.98	0.66	0.0117649
0.406	1.17	0.94	0.0339287	1.33	0.89	0.0280303	1.61	0.80	0.0208472	1.84	0.74	0.0166143	2.05	0.68	0.0138169
0.438	1.19	0.95	0.0395314	1.36	0.91	0.0326100	1.65	0.83	0.0242191	1.90	0.76	0.0192895	2.12	0.71	0.0160362
0.469	1.21	0.97	0.0456095	1.39	0.93	0.0375617	1.69	0.85	0.0278537	1.95	0.78	0.0221692	2.18	0.73	0.0184237
0.500	1.22	0.98	0.0521780	1.41	0.94	0.0428932	1.73	0.87	0.0317542	2.00	0.80	0.0252551	2.24	0.75	0.0209801
0.531	1.24	0.99	0.0592542	1.43	0.96	0.0486133	1.77	0.88	0.0359236	2.05	0.82	0.0285487	2.29	0.76	0.0237062
0.563	1.24	0.99	0.0668572	1.45	0.97	0.0547314	1.80	0.90	0.0403655	2.09	0.84	0.0320515	2.34	0.78	0.0266031
0.594	1.25	1.00	0.0750089	1.47	0.98	0.0612582	1.83	0.91	0.0450837	2.13	0.85	0.0357656	2.39	0.80	0.0296717
0.625	1.25	1.00	0.0837341	1.48	0.99	0.0682055	1.85	0.93	0.0500822	2.17	0.87	0.0396927	2.44	0.81	0.0329132
0.656				1.49	0.99	0.0755862	1.88	0.94	0.0553657	2.20	0.88	0.0438350	2.48	0.83	0.0363286
0.688				1.49	1.00	0.0834147	1.90	0.95	0.0609388	2.23	0.89	0.0481947	2.52	0.84	0.0399192
0.719				1.50	1.00	0.0917070	1.92	0.96	0.0668068	2.26	0.91	0.0527742	2.56	0.85	0.0436863
0.750				1.50	1.00	0.1004809	1.94	0.97	0.0729752	2.29	0.92	0.0575760	2.60	0.87	0.0476312
0.781							1.95	0.98	0.0794501	2.32	0.93	0.0626028	2.63	0.88	0.0517555
0.813							1.96	0.98	0.0862380	2.34	0.94	0.0678575	2.67	0.89	0.0560606
0.844							1.98	0.99	0.0933460	2.36	0.95	0.0733431	2.70	0.90	0.0605482
0.875							1.98	0.99	0.1007816	2.38	0.95	0.0790629	2.73	0.91	0.0652200
0.906							1.99	1.00	0.1085530	2.40	0.96	0.0850203	2.75	0.92	0.0700777
0.938							2.00	1.00	0.1166691	2.42	0.97	0.0912190	2.78	0.93	0.0751234
0.969							2.00	1.00	0.1251395	2.44	0.97	0.0976629	2.81	0.94	0.0803589
1.000							2.00	1.00	0.1339746	2.45	0.98	0.1043561	2.83	0.94	0.0857864
1.031										2.46	0.98	0.1113030	2.85	0.95	0.0914082
1.063										2.47	0.99	0.1185083	2.87	0.96	0.0972265
1.094										2.48	0.99	0.1259770	2.89	0.96	0.1032439
1.125										2.49	0.99	0.1337143	2.90	0.97	0.1094628
1.156										2.49	1.00	0.1417259	2.92	0.97	0.1158860
1.188										2.50	1.00	0.1500178	2.93	0.98	0.1225164
1.219										2.50	1.00	0.1585963	2.95	0.98	0.1293570
1.250										2.50	1.00	0.1674682	2.96	0.99	0.1364110
1.281													2.97	0.99	0.1436816
1.313													2.98	0.99	0.1511724
1.344													2.98	0.99	0.1588870
1.375													2.99	1.00	0.1668294
1.406													2.99	1.00	0.1750037
1.438													3.00	1.00	0.1834141
1.469													3.00	1.00	0.1920652
1.500													3.00	1.00	0.2009619

INDEXING CHIPSURFER TIPS

INDEXING CHIPSURFER TIP GUIDELINES

- Step 1: Screw tip into shank until finger tight (Fig. 1a). Note a .010" gap (Fig. 1b).
- Step 2: Use wrench to torque approximately 1/4 turn, creating a simultaneous fit (Fig. 2).
- Step 3: Use .001" shim stock to check the simultaneous fit at the intersection of the tip and the shank. The shim should not be able to enter the intersection (Fig. 3a). If it does, tighten further with the wrench until there is no gap (Fig. 3b).

Note: Pre-set torque wrenches (series NCH-200) can be purchased.

Fig. 1a



Fig. 1b



Fig. 2



Fig. 3a



Fig. 3b



TROUBLESHOOTING CHART

Solution	Problem										
	Chipping Fracturing	Excessive Abrasive Wear	Cratering Chemical Wear	Built Up Edge	Deformation	Thermal Cracking	"Bad Surface Finish"	Vibration/Chatter	"Chip Built Up (Chip Tangled Up"	"Edge of Material Breaks"	"Cutting Forces too high"
IPM	1	2	2	1	2		1	3			2
APT	2	1	2	1	2	2	2	3		2	2
Toughness of Cutting Material	1					1					
Wear Resistance		1	1		1, 3						
Entering Angle				3				2	3	2	2
Rake Angle	2			1, 3	1, 3	3		1	3		
Chamfer	1			3			2			2	
Stabilize Fixture	1					1	1	1			
Tool Position						3	3	3		3	
Coolant, Chip Removal			1	1	3		3		3		
DOC	3					3	3	3		2	2

1-Increase
2-Decrease
3-Optimize

FORMMASTER SPEED OPERATING GUIDELINES SERIES 15V1E, 15VIH

EXAMPLE CALCULATION

GIVEN	STEP 1	STEP 2	STEP 3	STEP 4	OPERATING PARAMETERS
- CUTTER = 5V6E-20R01 - INSERT = UHLD08T310R-M - NUMBER OF INSERTS = 5 - MATERIAL = H13 PRE-HARD - HARDNESS = 38-42 HRC - EXTENSION LENGTH = 6.00"	CONVERT 38-42 HRC TO BRINELL THEN SELECT SURFACE FEET PER MINUTE (SFM). CALCULATE RPM FOR A 2.00" DIA. CUTTER	SELECT DEPTH OF CUT AND FEEDRATE MULTIPLIER FROM THE APPLICATION TABLE FOR RATIO OF 3:1	SELECT CHIP THICKNESS (CT) FOR THE UHLD08T310R-M INSERT IN H13	CALCULATE FEEDRATE (FULL WIDTH OF CUTTER)	- RPM - 860 - DEPTH OF CUT = .04" - FEEDRATE = 172 IPM - WIDTH OF CUT = 2.00"
	*RPM = 860 (450 SFM)	DOC = .04" FRM MULTIPLIER = 4	0.010"	**FEEDRATE = 172 IPM	

*RPM = SFM x 3.82 / Cutter Diameter **Feedrate = RPM x # of inserts x CT x FRM

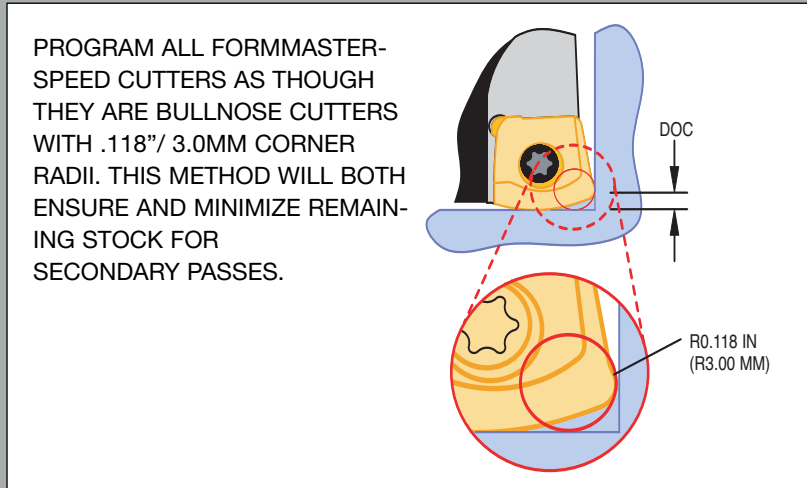
APPLICATION TABLE

RATIO OF EXTENSION LENGTH TO CUTTER DIAMETER	GREATER THAN 8:1	FROM 3:1 TO 8:1	LESS THAN 3:1
DEPTH OF CUT (DOC)	FROM .01" TO .03"	FROM .02" TO .06"	FROM .04" TO .08"
FEEDRATE MULTIPLIER (FRM)	3	4	5

MATERIAL HARDNESS

BRINELL (HB)	ROCKWELL (HRC)
200	15
225	20
250	24
275	29
300	32
325	34
350	38
375	40
400	43
425	46

FIGURE 1



RAMP ANGLES

CUTTER DIA.	.750"	1.000"	1.250"	1.500"	2.000"	NA	3.000"	4.000"
INCHES								
MM	20.00 MM	25.00 MM	32.00 MM	42.00 MM	52.00 MM	66.00 MM	80.00 MM	NA
RAMP ANGLE (MAX)	3.5 DEG	3.0 DEG	2.5 DEG	1.6 DEG	1.2 DEG	0.7 DEG	0.5 DEG	0.2 DEG



■ GENERAL OPERATING GUIDELINES

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End Mills

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Series 15L1G, 15M1G, 15N1F,
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Series 12J1D, 22J3D, 12P1D, 12N1D,
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22J7QM476

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Series 12J1E, 22J3EM480

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15J1EM481

Series 15N1F, 15N1HM481

ChipSurfer Series 46J, 46D, 47J, 47D,
48J, 48D, 48C, 48U, 45J, 45D,
45V, 45M, 45P, 47C, 45B, 47B,
45X, 45N, 45R, 49J, 49D, 47N,
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Series 2SJ1HM484

Series 1SJ1VM485

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Series 4W2AM488

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Series 5N6F, 5N2HM489

Series 5N6RM490

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Series 16W, 26WM496

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Series 5WM500

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Series VHUM501

Series SHUM501

Series DHUM502

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Series 35J, 38LM504

Series 3SJ6E, 3SJ6HM505

Series 3SJ6LM505

Series 15T, 12TM506

Series 5VK6V, 3VL5VM506

THESE OPERATING GUIDELINES ARE RECOMMENDED STARTING POINTS FOR SAFE, EFFECTIVE PERFORMANCE IN A VARIETY OF MATERIALS

The parameters outlined on the following pages represent recommended general operating guidelines. They are intended to act as starting points as you look for the optimum operating parameters for a specific application.

Optimum parameters for any application are bound to vary according to the unique combination of variables which may be present in that particular application. Such variables might include the machine tool condition, rigidity of the workpiece and fixturing, the work material condition, the precise hardness and machinability of the material, and the shape and finish requirements of the workpiece, to name a few.

Once the application is operating reasonably well and safely, adjustments to these guidelines can be made based on variables present and the performance of the tool.

Extended length end mills require special operating parameters. They are NOT intended for channel cutting. Feed rates must generally be reduced due to their length-to-diameter ratios. Always use the shortest extension possible for best performance. Refer to "Rigidity Analysis" on page M460.

When ball nose end milling, two critical parameters are directly affected by the Depth of Cut (DOC): cutting speed in Surface Feet per Minute (SFM) and chip thickness. It is necessary to recognize these factors and to follow the guidelines relating to them. Refer to "Ball Nose Chip Thinning" on page M464.

For additional information regarding specific grades, refer to the grade chart on page M434. If you have questions regarding a specific application, contact your Ingersoll Cutting Tool Company sales engineer for assistance.

Grade Usage				Preferred Milling Grades																
				IN05S	IN10K	IN15K	IN30M	IN40P	IN1004/IN2004	IN2005	IN2015/IN2010	IN1030	IN1530	IN2030	IN2040/IN1540	INDD15	IN5015	IN6515/IN6510	IN6330	IN70N
Material		Brinell Hardness	SFM																	
Aluminum	6061-T6, 7075-T6, 2024	-	1000-3000	1	1	1	1			3	2									
Non-Ferrous	Copper, Plastics	-		1	1	1	1			3	2									
Cast Iron	Gray	150-250	250-400							4	1				2	2	3		3	
	Nodular		200-350																	
Steel	Low Carbon 1018-8620	150-250	250-500					5		3		1	1	1*	2		4		4	
	High Carbon F-6180, Nitalloy 52100	250-400	200-350																	
	Alloyed Steel 4140, 4340, 6150	150-300	250-400					5		2		1	1	1*	3		4		4	
	Tool Steel A-6, D-1, D-2, P-20	Up to 300	250-400																	
		300 to 500	150-250																	
Stainless Steel	300 Series, 304, 316	-	250-400																	
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-600							2	3	1	1	1*	5		3		4	
	13-8 PH	-	200-250																	
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120							2	3	1	1	1						
Titanium	6AL-4V	-	100-150			4				1	3	2	2	2						

*Preferred for higher SFM (surface feet/minute).

END MILL OPERATING GUIDELINES

Series 12J1X, 12V1X, 12R1X, 22J3X, 12J1G, 12V1G, 12J1B, 12J4B, 12R1B, 12N1B, 12S1B, 22J5B, 22J3B, 22J3Q					Grades									Coolant
					IN30M	IN40P	IN2005	IN2015	IN1030	IN2030	IN2040	IN5015	IN6330	
Material		Brinell Hardness	SFM	Feed per Insert										
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.004-.010	1	3	2							Yes
Cast Iron	Gray	150-250	300-1000	.004-.010		3	1	4	4		2	4		No
	Nodular		300-600											
Steel	Low Carbon 1018-8620	100-250	400-1000	.004-.010	5	2		1	1*	3		4		No
	High Carbon F-6180	250-400	350-500	.004-.008										
	Alloyed Steel 4140, 4340	150-300	300-700	.004-.010	5	3		1	1*	2		4		
	Tool Steel A-6, D-1, D-2	Up to 300												
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.010		2	4	1	1*	5	4	3		May not be required at high speeds
	400 Series 15-5 PH	-	400-900											Yes
	13-8 PH	-	200-400											
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2	3	1	1*					Yes
Titanium	6AL-4V	-	100-150	.005-.008	4	1	3	2	2					Yes

*Preferred for higher SFM.

Series 15L1G, 15M1G, 15N1F, 15N1G					Grades										Coolant
					SHLT11						SHLT09				
					IN30M	IN40P	IN2005	IN1030	IN6330	IN2005	IN1030	IN6515			
Material		Brinell Hardness	SFM	Feed per Insert											
Aluminum	7075-T6, 6061-T6, 2024	-	1000-3000	.010-.020	1			2				1		Yes	
Cast Iron	Gray	150-250	250-400	.006-.010			2	1	1		2	3	1	No	
	Nodular		200-350												
Steel	Low Carbon 1018, 8620	100-250	250-500	.006-.010		3	2	1	4		2	1		No	
	High Carbon F-6180	250-400	200-350	.005-.008											
	Alloyed Steel 4140, 4340	150-300	250-400	.006-.010	3	2	1	4		2	1				
	Tool Steel A-6, D-1, D-2	Up to 300													
Stainless Steel	300 Series, 304, 316	-	250-400	.005-.008	3		2	1	3		2	1	3	May not be required at high speeds	
	400 Series 15-5 PH	Up to 320	300-600												
	13-8 PH	-	200-250												
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.004-.006	3		2	1	3		2	1		Yes	
Titanium	6AL-4V	-	100-150	.004-.006	3		1	2			1	2		Yes	

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

Series 12J1D, 22J3D, 12P1D, 12N1D, 12M1D										Grades			
Material		Brinell Hardness	SFM	Feed per Insert	IN30M		IN2005		IN1030	IN2030	Coolant		
Aluminum	6061 T-6, 7075 T-6, 2024	-	1000-8000	.003-.008	1	2					Yes		
Cast Iron	Gray	150-250	500-1200	.002-.004		1	2	1			No		
	Nodular		400-800										
Steel	Low Carbon 1018-8620	150-250	600-1200	.002-.004		3	1	2			No		
	High Carbon F-6180, Nitr alloy 52100	250-400	400-600										
	Alloyed Steel 4140, 4340, 6150	150-300	400-800			3	2	1					
	Tool Steel A-6, D-1, D-2, P-20	Up to 300											
Stainless Steel	300 Series, 304, 316	-	400-800	.002-.004		3	1	2			May not be required at high speeds Yes		
	400 Series 15-5 PH, 17-4 PH	Up to 320	500-1000										
	13-8 PH	-	200-400										
Nickel Alloys	Inconel, Hastelloy, Waspalloy	-	75-120	.002-.003		2	3	1			Yes		
Titanium	6AL-4V	-	80-150	.002-.003		1	3	2			Yes		

Series 15J1H					Grades		Coolant
Material	Brinell Hardness	SFM	Feed per Insert	IN15K	IN1540		
Aluminum	6061 T-6, 7075 T-6	-	1000-2000	.003-.005	1		Yes
Steel	Low Carbon 1018-8620	100-250	400-1000	.003-.006	1		Yes
	High Carbon F-6180, Nitr alloy 52100	250-400	300-500				
	Alloyed Steel 4140, 4340, 6150	150-300	300-700				
	Tool Steel A-6, D-1, D-2, P-20	Up to 300					
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006		1	May not be required at high speeds
	400 Series 15-5 PH, 17-4 PH	-	400-900				
	13-8 PH	-	200-400				

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

END MILL OPERATING GUIDELINES

Series 12J1Q, 12R1Q, 12M1Q, 12N1Q, 12P1Q, 12S1Q, 22J3Q, 22J7Q					Grades									Coolant
					IN30M	IN40P	IN2005	IN2015	IN1030	IN2030	IN2040	IN5015	IN6330	
Material		Brinell Hardness	SFM	Feed per Insert										
Aluminum	6061 T-6, 7075 T-6, 2024	-	1500-3000	.003-.008	1		3	2						Yes
Cast Iron	Gray	150-250	300-1000	.003-.008			3	1				2	4	No
	Nodular		300-600											
Steel	Low Carbon 1018-8620	100-250	400-1000	.003-.008	6	3		1	1*	2	4	4		No
	High Carbon F-6180, Nitalloy 52100	250-400	350-500	.003-.006										
	Alloyed Steel 4140, 4340, 6150	150-300	300-700	.003-.007										
	Tool Steel A-6, D-1, D-2, P-20	Up to 300												
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006	5	2	3	1	1*	5	4		May not be required at high speeds	
	400 Series 15-5 PH, 17-4 PH	-	400-900											
	13-8 PH	-	200-400										Yes	
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	4		2		1	3				Yes
Titanium	6AL-4V	-	100-150	.003-.006	4		1	3	2	2				Yes

*Preferred for higher SFM.

Series 19N1B					Grades			Coolant
					IN10K	IN40P	IN1540	
Material		Brinell Hardness	SFM	Feed per Insert				
Aluminum	6061 T-6, 7075 T-6, 2024	-	1500-3000	.005-.020	1			Yes
Cast Iron	Gray	150-250	250-400	.005-.010	1			No
	Nodular		200-350					
Steel	Low Carbon 1018-8620	100-250	250-500	.005-.010		2	1	No
	High Carbon F-6180, Nitr alloy 52100	250-400	200-350	.005-.010	3	2	1	
	Alloyed Steel 4140, 4340, 6150	150-300	250-400	.005-.010		2	1	
	Tool Steel A-6, D-1, D-2, P-20	Up to 300						
Stainless Steel	400 Series 15-5 PH, 17-4 PH	Up to 320	300-600	.005-.010		2	1	May not be required at high speeds

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

							Grades
Series 15M1H, 15N1H					IN30M	IN1540	Coolant
Material		Brinell Hardness	SFM	Feed per Insert			
Aluminum	6061 T-6, 7075-T6	-	1000-2000	.003-.006	1	2	Yes
Cast Iron	Gray	150-250	300-1000	.003-.006		1	No
	Nodular		300-600				
Steel	Low Carbon 1018-8620	100-250	400-1000	.003-.006		1	No
	High Carbon F-6180, Nitralloy 52100	250-400	300-500				
	Alloyed Steel 4140, 4340, 6150	150-300	300-700				
	Tool Steel A-6, D-1, D-2, P-20	Up to 300					
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006		1	May not be required at high speeds
	400 Series 15-5 PH, 17-4 PH	-	400-900				
	13-8 PH	-	200-400				Yes

Series 12J1M, 22J3M, TE90AX								Grades		
								IN2005	IN2030	IN5530
Material		Brinell Hardness	SFM	Feed per Insert						
Aluminum	6061 T-6, 7075 T-6, 2024	-	1000-3000	.003-.006	1	2		Yes		
Cast Iron	Gray	150-250	500-1200	.002-.006	1	1	2	No		
	Nodular		400-800							
Steel	Low Carbon 1018-8620	150-250	600-1200	.002-.006	2	1		No		
	High Carbon F-6180, Nitalloy 52100	250-400	400-600	.002-.005	2	1				
	Alloyed Steel 4140, 4340, 6150	150-300	400-800							
	Tool Steel A-6, D-1, D-2, P-20	Up to 300								
Stainless Steel	300 Series, 304, 316	-	400-800	.002-.005	2	1		May not be required at high speeds Yes		
	400 Series 15-5 PH, 17-4 PH	Up to 320	500-1000							
	13-8 PH	-	200-400							
Nickel Alloys	Inconel, Hastelloy, Waspalloy	-	75-120	.002-.004	2	1		Yes		
Titanium	6AL-4V	-	80-150	.002-.005	1	2		Yes		

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

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END MILL OPERATING GUIDELINES

Series 15R1V, 15R4H					Grades	
Material	Brinell Hardness	SFM	Feed per Insert	IN2030		Coolant
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.004-.006	1	Yes
Cast Iron	Gray	150-250	700-1500	.004-.006	1	No
	Nodular					
Steel	Low Carbon 1018, 8620	100-250	600-1500	.004-.006	1	No
	High Carbon F-6180	250-400				
	Alloyed Steel 4140, 4340	150-300				
	Tool Steel A-6, D-1, D-2	Up to 300				
Stainless Steel	300 Series, 304, 316	-	350-1000	.004-.006	1	May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	-				Yes
	13-8 PH	-				
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.004-.006	1	Yes
Titanium	6AL-4V	-	100-150	.004-.006	1	Yes

Series 22J3F, 12J1F					Grades*						Coolant
					IN30M	IN2005	IN2015	IN1030	IN2030	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert							
Aluminum	6061 T-6, 7075 T-6, 2024	-	1500-3000	.004-.010	1	3	2				Yes
Cast Iron	Gray	150-250	300-1000	.004-.010		2	1	3	3		No
	Nodular		300-600								
Steel	Low Carbon 1018, 8620	100-250	400-1000	.004-.010		2		1	1*	3	No
	High Carbon F-6180, Nitr alloy 52100	250-400	350-500	.004-.008							
	Alloyed Steel 4140, 4340, 6150	150-300	300-700	.004-.010							
	Tool Steel A-6, D-1, D-2, P-20	Up to 300									
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.010		2	3	1	1*	4	May not be required at high speeds
	400 Series 15-5 PH, 17-4 PH	Up to 320	400-900								Yes
	13-8 PH	-	200-400								
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2	3	1	1		Yes
Titanium	6AL-4V	-	100-150	.003-.006	4	1	3	2	2		Yes

*Preferred for higher SFM.

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

Series 27E2V								Grades	
Material		Brinell Hardness	SFM	Feed per Insert	IN30M	IN1530	IN5530	Coolant	
Cast Iron	Gray	150-250	250-400	.006-.010	2	1	3	No	
	Nodular		200-350						
Steel	Low Carbon 1018-8620	150-250	250-500	.006-.010	2	1	3	No	
	High Carbon F-6180, Nitr alloy 52100	250-400	200-350	.005-.008					
	Alloyed Steel 4140, 4340, 6150	150-300	250-400	.006-.010					
	Tool Steel A-6, D-1, D-2, P-20	Up to 300							
Stainless Steel	300 Series, 304, 316	-	250-400	.005-.008	2	1	3	May not be required at high speeds	
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-600					Yes	
	13-8 PH	-	200-250						
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.004-.006	2	1	3	Yes	
Titanium	6AL-4V	-	100-150	.004-.006	2	1		Yes	

Series 25J, 23J						Grades										Coolant
						Side					End [†]		C			
						IN30M	IN40P	IN2005	IN1030	IN6530	IN2005	IN1030		IN5530		
Material		Brinell Hardness	SFM	Feed per Insert SHLT, (SHLP-32, 33)	SHLH, (SHLP-44)											
Aluminum	6061-T6, 7075 T-6	-	1000-3000	.003-.006	.010-.020	1		2	3			1	2		Yes	
Cast Iron	Gray	150-250	250-400	.003-.006	.006-.010			2	3	1		1	2		No	
	Nodular		200-350													
Steel	Low Carbon 1018-8620	150-250	250-500	.003-.006	.006-.010			3	2	1		2	1		No	
	High Carbon F-6180, Nitralloy 52100	250-400	200-350	.003-.006	.005-.008			3	2	1						
	Alloyed Steel 4140, 4340, 6150	150-300	250-400	.003-.006	.006-.010			3	2	1						
	Tool Steel A-6, D-1, D-2, P-20	Up to 300	250-400													
		300 to 500	150-250													
Stainless Steel	300 Series, 304, 316	-	250-400	.003-.006	.005-.008	3		2	1	1		2	1		May not be required at high speeds	
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-600													
	13-8 PH	-	200-250													
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	.004-.006	3		2	1	1		2	1		Yes	
Titanium	6AL-4V	-	100-150	.003-.006	.003-.006	3		1	2	1		1	2		Yes	

¹For Series 23J6G and 23S2G only.

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

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END MILL OPERATING GUIDELINES

					Grade	Coolant
Series 15X1W, 15X1X, 15U1G					IN15K	
Material		Brinell Hardness	SFM	Feed per Insert		
Aluminum	7075-T6, 6061-T6, 2024	-	1000-10000	.008-.020	1	Yes

Series 15X1Z					IN15K	Grade
Material		Brinell Hardness	SFM	Feed per Insert		Coolant
Aluminum	7075-T6, 6061-T2, 2024	-	1000-10000	.008-.020	1	Yes

Series 12J1E, 22J3E					Grades						Coolant
					IN30M	IN2005	IN2015	IN1030	IN2030	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert							
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.004-.018	1	3	2				Yes
Cast Iron	Gray	150-250	300-1000	.004-.018		2	1				No
	Nodular		300-600								
Steel	Low Carbon 1018-8620	100-250	400-1000	.004-.018		2		1	1*	3	No
	High Carbon F-6180	250-400	350-500	.004-.015							
	Alloyed Steel 4140, 4340	150-300	300-700	.004-.018							
	Tool Steel A-6, D-1, D-2	Up to 300									
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.018		2	3	1	1*	4	May not be required at high speeds
	400 Series, 15-5 PH	-	400-900								
	13-8 PH	-	200-400								Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2	3	1	1		Yes
Titanium	6AL-4V	-	100-150	.005-.008		1	3	2	2		Yes

*Preferred for higher SFM.

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

Series 25J3E, 15N1E, 15P1E, 15J1E										Grades					Coolant
										IN2005	IN2015	IN1030	IN2030	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert											
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.003-.008	2	1	3			Yes					
Cast Iron	Gray	150-250	300-1000	.003-.008	2	1	3	3*		No					
	Nodular		300-600												
Steel	Low Carbon	100-250	400-1000	.003-.008	2	4	1	1*	3	No					
	High Carbon	250-400	350-500	.003-.006											
	Alloyed Steel	150-300	300-700	.003-.007	3	4	1	1*	2						
	Tool Steel	Up to 300													
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006	2		1	1*	3	May not be required at high speeds					
	400 Series, 15-5 PH, 17-4 PH	-	400-900												
	13-8 PH	-	200-400							Yes					
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	2		1	1*		Yes					
Titanium	6AL-4V	-	100-150	.003-.006	1		2	2*		Yes					

*Preferred for higher SFM.

Series 15N1F, 15N1H					Grades						Coolant
					IN30M	IN2005	IN2015/IN2010	IN1030	IN2030	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert							
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.004-.010	1	2				Yes	
Cast Iron	Gray	150-250	300-1000	.004-.010		1	2	2*		No	
	Nodular		300-600								
Steel	Low Carbon	100-250	400-1000	.004-.010		3	1	1*	2	No	
	High Carbon	250-400	350-500	.004-.008							
	Alloyed Steel	150-300	300-700	.004-.010							
	Tool Steel	Up to 300									
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.010	2	1	1*		May not be required at high speeds		
	400 Series, 15-5 PH, 17-4 PH	-	400-900								
	13-8 PH	-	200-400							Yes	
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	2	1	1*		Yes		
Titanium	6AL-4V	-	100-150	.003-.006	1	2	2*		Yes		

*Preferred for higher SFM.

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

M481

END MILL OPERATING GUIDELINES

ChipSurfer Series 46J, 46D, 47J, 47D, 48J, 48C, 48D, 48U, 45J, 45D, 45V, 45M, 45P, 47C, 45B, 47B, 45X, 45N, 45R, 49J, 49D, 47N, 48N								
Material		Brinell Hardness	SFM Shoulder Milling	SFM Channeling	Diameter	Feed per Flute Shoulder Milling	Feed per Flute Channeling	Coolant
Aluminum	6061 T-6, 7075 T-6, 2024	-	1650-6000	1300-6000	.312-.375	.0025-.0035	.0015-.0020	Yes
					.500-.625	.0030-.0040	.0020-.0025	
Cast Iron	Gray	150-250	350-550	250-400	.312-.375	.0025-.0035	.0015-.0020	No
	Nodular	150-250	425-650	325-450	.500-.625	.0030-.0040	.0020-.0025	
Graphite		-	400-650	325-525	.312-.375	.0025-.0035	.0015-.0020	No
					.500-.625	.0030-.0040	.0020-.0025	
Steel	Low Carbon 1018, 8620	150-250	450-750	300-500	.312-.375	.0025-.0035	.0015-.0020	No
	High Carbon F-6180	250-400	250-450	150-300	.500-.625	.0030-.0040	.0020-.0025	
	Alloyed Steel 4140, 4340	150-300	350-550	200-400				
	Tool Steel A-6, D-1, D-2	Up to 300	350-450	200-350				
Stainless Steel	300 Series, 304, 316	-	300-500	150-350	.312-.375	.0025-.0035	.0015-.0020	May not be required at high speeds
	400 Series 15-5 PH	Up to 320	250-400	125-300	.500-.625	.0030-.0040	.0020-.0025	May not be required at high speeds
	13-8 PH	-	200-350	125-250				Yes
Nickel Alloys	Inconel, Hastelloy, Waspalloy	-	100-200	50-125	.312-.375	.0025-.0035	.0015-.0020	Yes
					.500-.625	.0030-.0040	.0020-.0025	
Titanium	6AL-4V	-	150-200	100-150	.312-.375	.0025-.0035	.0015-.0020	Yes
					.500-.625	.0030-.0040	.0020-.0025	

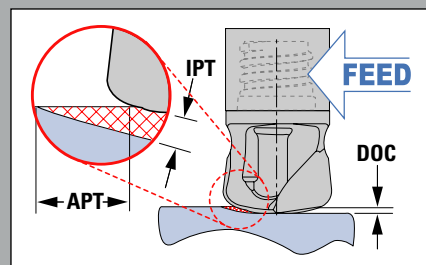
ChipSurfer Series 18T					
Material		Brinell Hardness	SFM	Feed per Tooth	Coolant
Aluminum	6061-T6, 7075-T6, 2024	-	1650-2500	.0025-.0035	Yes
Cast Iron	Gray	150-250	350-550	.0025-.0035	No
	Nodular		425-650	.0030-.0040	
Steel	Low Carbon 1018, 8620	150-250	450-750	.0025-.0035	No
	High Carbon F-6180	250-400	250-450	.0030-.0040	
	Alloyed Steel 4140, 4340	150-300	350-550		
	Tool Steel A-6, D-1, D-2	Up to 300	350-450		
Stainless Steel	300 Series, 304, 316	-	300-500	.0025-.0035	May not be required at high speeds
	400 Series 15-5 PH	Up to 320	250-400	.0030-.0040	
	13-8 PH	-	200-350		Yes
Nickel Alloys	Inconel, Hastelloy, Waspalloy	-	100-200	.0025-.0035	Yes
Titanium	6AL-4V	-	150-200	.0025-.0035	Yes

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

ChipSurfer Series 45A					
Material		Brinell Hardness	SFM	Feed per Tooth	Coolant
Cast Iron	Gray	150-250	600-650	.006-.016	No
	Nodular		600-650	.005-.015	
Steel	Low Carbon 1018, 8620	100-250	600-800	.010-.020	No
	High Carbon F-6180	250-400	500-750	.008-.018	
	Alloyed Steel 4140, 4340	150-300	600-800	.008-.018	
	Tool Steel A-6, D-1, D-2	Up to 300	500-650	.008-.018	
	Hardened Steel	Rc 42-52	300-450	.002-.004	
	Hardened Steel	Rc 52-58	200-350	.001-.003	
	Hardened Steel	Rc 58-62	100-200	.001-.003	
Stainless Steel	300 Series, 304, 316	-	225-300	.008-.018	May not be required at high speeds
	400 Series 15-5 PH	Up to 320	250-325	.008-.018	
	13-8 PH	-	200-275	.003-.013	Yes
Hi-Temp Alloys	Nickel-Based: Inconel, Monel, Incoloy 600-800	-	100-200	.003-.005	Yes
	Cobalt-Based: Stellite, HS-21, X-40, L-605	-	100-200	.002-.004	Yes
	Iron-Based: Timkin 16-26-6, Multimet N-155, Incoloy 800-802	-	125-225	.003-.005	Yes
Titanium	6AL-4V	-	100-250	.003-.005	Yes

FEED RATE CALCULATION

Hardened Steel Applications	Extended Cutter Applications (Length/Dia > 8:1)	Typical Applications (Length/Dia < 8:1)
.005 < DOC < .010 APT = 3 X IPT	.005 < DOC < .015 APT = 3 X IPT	.015 < DOC < .030 APT = 4 X IPT



EXAMPLE CALCULATION

Given	Step 1	Step 2	Step 3	Step 4	Operating Parameters
- Tip = 45A12001T8RA25 - Number of Flutes = 2 - Material = H13 Pre Hard - Hardness = 38-42 - Extension = 2.0	Convert 38-42 HRC to Brinell & then select SFM. Calculate RPM for .472" diameter tip	Select DOC and FeedRate Multiplier from the application table for a ratio of < 8:1	Select appropriate Chip Thickness	Calculate FeedRate (full width)	- RPM = 4855 - DOC = .025 - Fede Rate = 388 IPM - WOC = .472
	*RPM = 4855	DOC = .025	CT = .010"	**FeedRate = 388 IPM	

*RPM = SFM x 3.82 / Diameter

** FeedRate = RPM x Number of Flutes x CT x Multiplier

■ END MILL OPERATING GUIDELINES

Series 2SJ1L										Grades					Coolant
										IN2005	IN2015/IN2010	IN1530	IN2040	IN6515	
Material		Brinell Hardness	SFM	Feed per Insert											
Cast Iron	Gray	150-280	400-750	.007-.018	3	1			2	No					
	Nodular		300-650												
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.015	1		3	2		No					
	High Carbon F-6180	250-400	200-350								.006-.013				
	Alloyed Steel 4140, 4340	150-300	250-400												
	Tool Steel A-6, D-1, D-2	Up to 300													
Stainless Steel	300 Series, 304, 316	-	250-400	.005-.010	2		1			May not be required at high speeds					
	400 Series, 15-5 PH	Up to 300	300-600							.006-.012					
	13-8 PH	-	200-250								Yes				
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.004-.007	2		1			Yes					
Titanium	6AL-4V	-	100-150	.004-.007	1		2			Yes					

Series 2SJ1H					Grades				Coolant
					IN2005	IN2015/IN2010	IN1530	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert					
Cast Iron	Gray	150-280	400-750	.003-.006			1		No
	Nodular		300-650						
Steel	Low Carbon 1018, 8620	100-250	250-500	.003-.006	1		2		No
	High Carbon F-6180	250-400	200-350	.003-.005					
	Alloyed Steel 4140, 4340	150-300	250-400						
	Tool Steel A-6, D-1, D-2	Up to 300							
Stainless Steel	300 Series, 304, 316	-	400-600	.003-.006	2		1		May not be required at high speeds
	400 Series, 15-5 PH	Up to 320	300-600						Yes
	13-8 PH	-	200-600						
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.003-.005	2		1		Yes
Titanium	6AL-4V	-	100-200	.003-.005	1		2		Yes

Series 1SJ1V								Grades		
Material		Brinell Hardness	SFM	Feed per Insert		IN2005	IN2015	IN2030	Coolant	
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.003-.007	1		2		Yes	
Cast Iron	Gray	150-280	400-750	.003-.006		1			No	
	Nodular		300-650							
Steel	Low Carbon 1018, 8620	100-250	250-500	.003-.006	1		2		No	
	High Carbon F-6180	250-400	200-350	.003-.005						
	Alloyed Steel 4140, 4340	150-300	250-400							
	Tool Steel A-6, D-1, D-2	Up to 300								
Stainless Steel	300 Series, 304, 316	-	400-600	.003-.006	2		1		May not be required at high speeds Yes	
	400 Series, 15-5 PH	Up to 320	300-600							
	13-8 PH	-	200-600							
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.003-.005	2		1		Yes	
Titanium	6AL-4V	-	100-200	.003-.005	1		2		Yes	

■ FACE MILL OPERATING GUIDELINES

Series 2L1Q, 2J1Q, 2J1D					Grades								Coolant
Material	Brinell Hardness	SFM	Feed per Insert		IN30M	IN40P	IN2005	IN2015	IN1030	IN2030	IN2040	IN5015	
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.003-.008	1	3	2						Yes
Cast Iron	Gray	150-250	300-1000	.003-.008			1	4		3	2		No
	Nodular		300-600										
Steel	Low Carbon 1018, 8620	100-250	400-1000	.003-.008		5	2		1	1*	3	4	No
	High Carbon F-6180, Nitralloy 52100	250-400	350-500	.003-.006									
	Alloyed Steel 4140, 4340, 6150	150-300	300-700	.003-.007		5	3		1	1*	2	4	
	Tool Steel A-6, D-1, D-2, P-20	Up to 300											
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006									May not be required at high speeds Yes
	400 Series, 15-5 PH, 17-4 PH	-	400-900			5	2	3	1	1*	5		
	13-8 PH	-	200-400										
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	4		2		1	3			Yes
Titanium	6AL-4V	-	100-150	.003-.006	4		1	3	2	2			Yes

*Preferred for higher SFM.

Series 2J1E, 2J4E					Grades								Coolant
Material	Brinell Hardness	SFM	Feed per Insert		IN30M	IN2005	IN2015	IN1030	IN2030	IN2040			
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.004-.018	1	3	2						Yes
Cast Iron	Gray	150-250	300-1000	.004-.018		2	1						No
	Nodular		300-600										
Steel	Low Carbon 1018-8620	100-250	400-1000	.004-.018									No
	High Carbon F-6180	250-400	350-500	.004-.015									
	Alloyed Steel 4140, 4340	150-300	300-700	.004-.018		3		1	1*	2			
	Tool Steel A-6, D-1, D-2	Up to 300											
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.018									Yes
	400 Series, 15-5 PH	-	400-900			2	3	1	1*	4			
	13-8 PH	-	200-400										
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2	3	1	1				Yes
Titanium	6AL-4V	-	100-150	.005-.008	1	3	2	2					Yes

*Preferred for higher SFM.

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Series 2J1X, 2J1G, TFM90, 2J1B, 2J4B, 2L6B					Grades										
					IN30M	IN40P	IN2005	IN2015	IN1030	IN2030	IN2040	IN5015	IN6330	Coolant	
Material		Brinell Hardness	SFM	Feed per Insert											
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.004-.010	1		3	2						Yes	
Cast Iron	Gray	150-250	300-1000	.004-.010			3	1	4	4		2	4	No	
	Nodular		300-600												
Steel	Low Carbon 1018, 8620	100-250	400-1000	.004-.010		5	2		1	1*	3		4	No	
	High Carbon F-6180, Nitralloy 52100	250-400	350-500	.004-.008											
	Alloyed Steel 4140, 4340, 6150	150-300	300-700	.004-.010	5	3		1	1*	2		4			
	Tool Steel A-6, D-1, D-2, P-20	Up to 300													
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.010				2	4	1	1*	5	4	3	May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	-	400-900												
	13-8 PH	-	200-400												Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006			2	3	1	1*					Yes
Titanium	6AL-4V	-	100-150	.005-.008	4		1	3	2	2					Yes

*Preferred for higher SFM.

Series 5J1E, 2J1F					Grades								Coolant
Material	Brinell Hardness	SFM	Feed per Insert		IN30M	IN2005	IN2015	IN1030	IN2030	IN2040			
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.003-.008	1	3	2						Yes
Cast Iron	Gray	150-250	300-1000	.003-.008		2	1	3	3				No
	Nodular		300-600										
Steel	Low Carbon 1018-8620	100-250	400-1000	.003-.008		3	4	1	1*	2			No
	High Carbon F-6180	250-400	350-500	.003-.006									
	Alloyed Steel 4140, 4340	150-300	300-700	.003-.007	2	4	1	1*	3				
	Tool Steel A-6, D-1, D-2	Up to 300											
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006		2		1	1*				May not be required at high speeds
	400 Series, 15-5 PH	-	400-900										Yes
	13-8 PH	-	200-400										
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2		1	1*				Yes
Titanium	6AL-4V	-	100-150	.003-.006	1		2	2*					Yes

*Preferred for higher SFM.

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FACE MILL OPERATING GUIDELINES

					Grades										Coolant
Series 4W2A SERIES APLH, AOMT, APXX, APXH, APLV, APLS, APEB, APXB, NNE, SPLH, SHET, SHEW, YPLH INSERTS					IN30M	IN40P	IN2005	IN2015	IN1030	IN1530	IN2030	IN2040	IN5015	IN6530	
Material		Brinell Hardness	SFM	Feed per Insert											
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.004-.010	1	3	2								Yes
Cast Iron	Gray	150-250	300-1000	.004-.010		3	1					2	4		No
	Nodular		300-600												
Steel	Low Carbon 1018, 8620	100-250	400-1000	.004-.010		5	2		1	1	1*	3	4	4	No
	High Carbon F-6180, Nitralloy 52100	250-400	350-500	.004-.008											
	Alloyed Steel 4140, 4340, 6150	150-300	300-700	.004-.010		5	3		1	1	1*	2	4	4	
	Tool Steel A-6, D-1, D-2, P-20	Up to 300													
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.010											May not be required at high speeds Yes
	400 Series, 15-5 PH, 17-4 PH	-	400-900		5	6	2	3	1	1	1*	5		4	
	13-8 PH	-	200-400												
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006			2	3	1	1	1				Yes
Titanium	6AL-4V	-	100-150	.005-.008	4		1		2	2	2				Yes

*Preferred for higher SFM.

Series 4W2A SERIES RPLP, RPLB, RPCB, RPLS, SHLP BUTTON INSERTS AND PNCU INSERTS											Grades					Coolant
											IN40P	IN1530	IN2030	IN2040/1540	IN6530	
Material		Brinell Hardness	SFM	Feed per Insert RPLT, RPLH, RPLP, PNCU RPLW, RPCW, RPLB, RPLS, RPCB												
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.005-.015	-	1					Yes					
Cast Iron	Gray	150-250	250-800	.005-.015	.008-.020		3	2		1	No					
	Nodular		200-800													
Steel	Low Carbon 1018, 8620	150-250	250-1000	.005-.015	.008-.020	1	2	2*	1	4	No					
	High Carbon F-6180, Nitr alloy 52100	250-400	200-750	.005-.015	.008-.020	1	2	2*	1	4						
	Alloyed Steel 4140, 4340, 6150	150-300	250-750													
	Tool Steel A-6, D-1, D-2, P-20	Up to 300														
Stainless Steel	300 Series, 304, 316	-	250-750	.005-.015	.005-.015		2	1		3	May not be required at high speeds Yes					
	400 Series, 15-5 PH, 17-4 PH	Up to 320	300-800													
	13-8 PH	-	200-600													
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Wasp alloy	-	75-120	.005-.008	-		1	2		3	Yes					
Titanium	6AL-4V	-	100-150	.005-.010	-		2	1		3	Yes					

*Preferred for higher SFM.

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Series 5J1H, 5J2H (See page M495 for TT Grades)					Grades								Coolant
					IN10K	IN2005	IN1030	IN2010	IN2030	IN2040	IN5015	IN6330	
Material	Brinell Hardness	SFM	Feed per Insert										
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.003-.008	1	2	3						Yes
Cast Iron	Gray	150-250	300-1000	.003-.008		2	3	1	3		1	3	No
	Nodular		300-600										
Steel	Low Carbon 1018, 8620	100-250	400-1000	.003-.008			1	1*	2		1		No
	High Carbon F-6180, Nitralloy 52100	250-400	350-500	.003-.006									
	Alloyed Steel 4140, 4340, 6150	150-300	300-700	.003-.007	2	1		1*	3		1		
	Tool Steel A-6, D-1, D-2, P-20	Up to 300											
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006				1*					May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	-	400-900		2	1							
	13-8 PH	-	200-400										Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2	1	1*					Yes
Titanium	6AL-4V	-	100-150	.003-.006		1	2	2*					Yes

*Preferred for higher SFM.

Series 5N6F, 5N2H					Grades						Coolant
					IN30M	IN2005	IN2015/IN2010	IN1030	IN2030	IN2040	
Material	Brinell Hardness	SFM	Feed per Insert								
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.004-.010	1	2					Yes
Cast Iron	Gray	150-250	300-1000	.004-.010		2	1	3	3*		No
	Nodular		300-600								
Steel	Low Carbon 1018-8620	100-250	400-1000	.004-.010		3		1	1*	2	No
	High Carbon F-6180	250-400	350-500	.004-.008							
	Alloyed Steel 4140, 4340	150-300	300-700	.004-.010	2	1		1*	3		
	Tool Steel A-6, D-1, D-2	Up to 300									
Stainless Steel	300 Series, 304, 316	-	300-700	.004-.010				1	1*		May not be required at high speeds
	400 Series, 15-5 PH	-	400-900		2						
	13-8 PH	-	200-400								Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2		1	1*		Yes
Titanium	6AL-4V	-	100-150	.003-.006		1		2	2*		Yes

*Preferred for higher SFM.

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FACE MILL OPERATING GUIDELINES

Series 5N6R										Grades					Coolant
										IN15K	IN2005	IN2010	IN1030	IN2040	
Material		Brinell Hardness		SFM		Feed per Insert									
Aluminum	6061 T-6, 7075 T-6, 2024	-		1500-3500		.006-.020		1		2			Yes		
Cast Iron	Gray	150-250		300-1000		.006-.015		2	1	3			No		
	Nodular			300-600											
Steel	Low Carbon 1018, 8620	100-250		400-1000		.006-.015		3		1	2	No			
	High Carbon F-6180, Nitr alloy 52100	250-400		350-600											
	Alloyed Steel 4140, 4340, 6150	150-300		300-800											
	Tool Steel A-6, D-1, D-2, P-20	Up to 300													
Stainless Steel	300 Series, 304, 316	-		300-700		.006-.015		2		1			Yes		
	400 Series, 15-5 PH, 17-4 PH	Up to 320		400-900											
	13-8 PH	-		200-400											
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-		75-120		.003-.010		2		1			Yes		
Titanium	6AL-4V	-		100-150		.003-.010		1		2			Yes		

Series 5N6H, 5N6K, 5N2L					Grades										Coolant
					IN10K	IN30M	IN40P	IN2005	IN2010	IN1030	IN2030	IN2040	IN1530	IN1540	
Material		Brinell Hardness	SFM	Feed per Insert											
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3500	.003-.007	1	1	2								Yes
Cast Iron	Gray	150-250	400-600	.003-.006	4			2	1	3	3		3		No
	Nodular		300-500												
Steel	Low Carbon 1018, 8620	100-250	400-1000	.003-.008				3		1	1*	2*	1	2	No
	High Carbon F-6180, Nitralloy 52100	250-400	400-600	.003-.007											
	Alloyed Steel 4140, 4340, 6150	150-300	350-600				2		1	1*	3	1	3		
	Tool Steel A-6, D-1, D-2, P-20	Up to 300													
Stainless Steel	300 Series, 304, 316	-	300-600	.003-.006				2	1	1*	5	1			May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	Up to 320													
	13-8 PH	-													Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	70-100	.002-.004				2		1	1*		1		Yes
Titanium	6AL-4V	-	100-150	.003-.005				1		2	2*		2		Yes

*Preferred for higher SFM.

The success of any cutter application is a function of many variables. Our initial preference of grade is based on applying a more tough grade.

Series 5H6G, 5X6Z, 5X6X					Grade	
Material		Brinell Hardness	SFM	Feed per Insert	IN15K	Coolant
Aluminum	7075-T6, 6061-T2, 2024	-	5000-10000	.008-.020	1	Yes

Series 6K8B *							Grades	
Material		Brinell Hardness	SFM	Feed per Insert	IN2010	IN2040		Coolant
Cast Iron	Gray	150-250	250-400	.005-.010	1	2		Yes
	Nodular		200-350					

* Not recommended for channel milling or large radial depths of cut milling applications.

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■ FACE MILL OPERATING GUIDELINES

Series 6X1V, 6X2V, 6X3V, 6X4V					Grades		Coolant
Material	Brinell Hardness	SFM	Feed per Insert		IN10K	IN600	
Aluminum	6061 T-6, 7075 T-6	-	1500-3000	.004-.015	2	1	Yes
Cast Iron	Gray	150-250	300-1000	.004-.012	1	2	Yes
	Nodular		300-600				

Series DM5G, DM6G					Grades					Coolant	
					IN2005	IN2015	IN1030	IN2030	IN2305		
Material		Brinell Hardness	SFM	Feed per Insert							
Aluminum	7075-T6, 6061-T6, 2024	-	1650-2500	.005-.020		2	1			Yes	
Cast Iron	Gray	150-250	300-1000	.008-.020		2	1		2	No	
	Nodular		300-600	.008-.015							
Steel	Low Carbon	100-250	400-1000	.008-.020	1	2		1*	2	No	
	High Carbon	250-400	350-500	.003-.015							
	Alloyed Steel	150-300	300-700	.008-.020							
	Tool Steel	Up to 300									
Stainless Steel	300 Series, 304, 316	-	300-700	.007-.015		1	2		1*	2	May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	-	400-900								
	13-8 PH	-	200-400								Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.004-.012	1	2		1*	2	Yes	
Titanium	6AL-4V	-	100-150	.005-.014	2	1		2*	1	Yes	

*Preferred for higher SFM.

Series SN2R					Grades				Coolant					
					IN2005	IN2015	IN1530	IN2040						
Material		Brinell Hardness	SFM	Feed per Insert										
Cast Iron	Gray	150-280	400-750	.010-.030	2	1			No					
	Nodular		300-650											
Steel	Low Carbon 1018, 8620	100-250	250-500	.010-.025	1		3	2	No					
	High Carbon F-6180	250-400	200-350	.010-.020										
	Alloyed Steel 4140, 4340	150-300	250-400	.010-.025										
	Tool Steel A-6, D-1, D-2	Up to 300												
Stainless Steel	300 Series, 304, 316	-	250-400	.010-.025	2		1		May not be required at high speeds					
	400 Series, 15-5 PH	Up to 300	300-600											
	13-8 PH	-	200-250						Yes					
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.008-.012	2		1		Yes					

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Series SF6H, SF6N								Grades		
								IN1505	IN1510	IN1540
Material		Brinell Hardness	SFM	Feed per Insert						
Aluminum	7075-T6, 6061-T6, 2024	-	1000+	.020-.050		1	2	Yes		
Cast Iron	Gray	150-250	1000-1500	.010-.050			1	No		
	Nodular									
Steel	Low Carbon 1018, 8620	100-250	800-1200	.010-.050		2	1	No		
	High Carbon F-6180	250-400	500-800							
	Alloyed Steel 4140, 4340	150-300	600-1000							
	Tool Steel A-6, D-1, D-2	Up to 300								
Stainless Steel	300 Series, 304, 316	-	400-600	.010-.050		1		2	No	
	400 Series, 15-5 PH	Up to 320	500-800							
	13-8 PH	-	400-600							
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.010-.030		1		2	Yes	
Titanium	6AL-4V	-	100-200	.010-.030		1		2	Yes	

Series SJ6N, SN6N					Grades					Coolant
					IN2005	IN2015/IN2010	IN1530	IN2040	IN6515	
Material		Brinell Hardness	SFM	Feed per Insert						
Cast Iron	Gray	150-280	400-750	.007-.018	3	1			2	No
	Nodular		300-650							
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.015	1		3	2		No
	High Carbon F-6180	250-400	200-350	.006-.013						
	Alloyed Steel 4140, 4340	150-300	250-400	.006-.015						
	Tool Steel A-6, D-1, D-2	Up to 300								
Stainless Steel	300 Series, 304, 316	-	250-400	.005-.010	2		1			May not be required at high speeds
	400 Series, 15-5 PH	Up to 300	300-600							Yes
	13-8 PH	-	200-250							
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.004-.007	2		1			Yes
Titanium	6AL-4V	-	100-150	.004-.007	1		2			Yes

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■ FACE MILL OPERATING GUIDELINES

Series SJ6H, SJ5E, SJ6H										Grades				Coolant
Material		Brinell Hardness	SFM	Feed per Insert		IN2005	IN2015/IN2010	IN1530	IN2040					
Cast Iron	Gray	150-280	400-750	.003-.006				1		No				
	Nodular		300-650											
Steel	Low Carbon 1018, 8620	100-250	250-500	.003-.006	1	2		2	1	No				
	High Carbon F-6180	250-400	200-350	.003-.005										
	Alloyed Steel 4140, 4340	150-300	250-400											
	Tool Steel A-6, D-1, D-2	Up to 300												
Stainless Steel	300 Series, 304, 316	-	400-600	.003-.006	2	1	1		Yes					
	400 Series, 15-5 PH	Up to 320	300-600											
	13-8 PH	-	200-600											
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.003-.005	2		1		Yes					
Titanium	6AL-4V	-	100-200	.003-.005	1		2		Yes					

Series SJ5V, SJ6V									Grades		
Material		Brinell Hardness	SFM	Feed per Insert	IN2005	IN2015	IN2030	Coolant			
Aluminum	7075-T6, 6061-T6, 2024	-	1500-3000	.003-.007	1		2	Yes			
Cast Iron	Gray	150-280	400-750	.003-.006		1		No			
	Nodular		300-650								
Steel	Low Carbon 1018, 8620	100-250	250-500	.003-.006	1		2	No			
	High Carbon F-6180	250-400	200-350	.003-.005							
	Alloyed Steel 4140, 4340	150-300	250-400								
	Tool Steel A-6, D-1, D-2	Up to 300									
Stainless Steel	300 Series, 304, 316	-	400-600	.003-.006	2		1	May not be required at high speeds			
	400 Series, 15-5 PH	Up to 320	300-600								
	13-8 PH	-	200-600					Yes			
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.003-.005	2		1	Yes			
Titanium	6AL-4V	-	100-200	.003-.005	1		2	Yes			

Series TFM90AX											Grades						Coolant
Material		Brinell Hardness	SFM	Feed per Insert	TTK10	TT6030	TT9030	TT8020	TT8030	TT7030							
Aluminum	7075-T6, 6061-T6, 2024	-	1000-3000	.003-.006	1	2					Yes						
Cast Iron	Gray	150-250	500-1200	.002-.006	1	2	3				No						
	Nodular		400-800														
Steel	Low Carbon	100-250	600-1200	.002-.006		3	1	1	2		No						
	High Carbon	250-400	400-600	.002-.005													
	Alloyed Steel	150-300	400-800														
	Tool Steel	Up to 300															
Stainless Steel	300 Series, 304, 316	-	400-800	.002-.005	3	2	1	1	4	May not be required at high speeds							
	400 Series, 15-5 PH, 17-4 PH	-	500-1000														
	13-8 PH	-	200-400							Yes							
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.002-.004	3	1	2	2		Yes							
Titanium	6AL-4V	-	80-150	.002-.005	3	1	2	2		Yes							

*Preferred for higher SFM.

Series VM6V, VL6V, VK6V, VK5V					Grades								Coolant
					IN15K	IN2005	IN2015/IN2010	IN1530	IN2030	IN2040	IN6515/IN6510	IN70N	
Material		Brinell Hardness	SFM	Feed per Insert									
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.004-.015	1								Yes
Cast Iron	Gray	150-280	400-750	.005-.012			1			2			No
	Nodular		300-650										
			1500+							1			
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.010	3					2	1		No
	High Carbon F-6180, Nitralloy 52100	250-400	200-350	.005-.008									
	Alloyed Steel 4140, 4340, 6150	150-300	250-400	.005-.010									
	Tool Steel A-6, D-1, D-2, P-20	Up to 300											
Stainless Steel	300 Series, 304, 316	-	250-400	.003-.006	3			1	2				May not be required at high speeds Yes
	400 Series, 15-5 PH, 17-4 PH	Up to 320	300-600										
	13-8 PH	-	200-250			.004-.008							
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2		1	3				Yes
Titanium	6AL-4V	-	100-150	.003-.006		1		2	3				Yes

*Preferred for higher SFM.

CONTOUR MILLING OPERATING GUIDELINES

								Grades	
Series 12W					IN1030	IN1530			
Material		Brinell Hardness	SFM	Feed per Insert				Coolant	
Aluminum	6061 T-6, 7075-T6	-	1000-3000	.003-.006	2	1	Yes		
Cast Iron	Gray	150-250	500-1200	.002-.006	2	1	No		
	Nodular		400-800						
Steel	Low Carbon 1018-8620	150-250	600-1200	.002-.006	1	2	No		
	High Carbon F-6180, Nitr alloy 52100	250-400	400-600						
	Alloyed Steel 4140, 4340, 6150	150-300	400-800						
	Tool Steel A-6, D-1, D-2, P-20	Up to 300							
Stainless Steel	300 Series, 304, 316	-	400-800	.002-.005	2	1	No		
	400 Series 15-5 PH, 17-4 PH	Up to 320	500-1000						
	13-8 PH	-	200-400				Yes		
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.002-.004	2	1	Yes		
Titanium	6AL-4V	-	80-150	.002-.005	2	1	Yes		

Series 16W, 26W					Grades					Coolant
					IN110K	IN30M	IN40P	IN1530	IN2030	
Material		Brinell Hardness	SFM	Feed per Insert						
Aluminum	6061 T-6, 7075 T-6	-	1500-3000	.004-.010	3	2		1		No
Cast Iron	Gray	150-250	250-400	.003-.008	3	1				No
	Nodular		200-350							
Steel	Low Carbon 1018-8620	150-250	250-500	.003-.006			2		4	No
	High Carbon F-6180, Nitr alloy 52100	250-400	200-350							
	Alloyed Steel 4140, 4340, 6150	150-300	250-400							
	Tool Steel A-6, D-1, D-2, P-20	Up to 300								
Stainless Steel	300 Series, 304, 316	-	250-400	.003-.006		3		2	5	Yes
	13-8 PH	-	200-250							
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-600			3		1	5	
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2			4	Yes
Cobalt Alloys	Stellite #6, #31	-	60-100	.003-.006	3	1			5	Yes
Titanium	6AL-4V	-	100-150	.003-.006		1			3	Yes

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Series 15V1Z, 5V6G, 15V1D, 15V1G					Grade			Coolant
Material	Brinell Hardness	SFM	Feed per Insert		IN2005	IN1030	IN2040	
Steel	Alloyed Steel 4140, 4340	150-300	500-1000	.003-.006	1	3	2	No
	Tool Steel A-6, D-1, D-2	Up to 300						
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006	1	2	3	No
	400 Series, 15-5 PH	Up to 320	400-900	.003-.006	1	2	3	Yes
	13-8 PH	-	200-400	.003-.006	1	2	3	No

Series 15V1H, 5V6H					Grades			
					IN2005	IN2030	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert				
Steel	Mild 1018-1045	125-425	500-1100	.015-.035				No
	Low Alloy 4140, 8620, 4340	150-425	400-1000	.010-.025	1	3	2	
	Med Alloy P20, S7, H13, O1, A2	150-425	300-900					
	High Alloy A7-D2	200-425	300-600	.005-.020	1	2		
Steel	Free Machining 303, 416	150-425	300-800	.010-.030	1	2		No
	300 Series 304, 310, 316	150-425	200-600	.005-.030				
	400 Series 410, 420, 15-5PH, 17-4 PH	150-425	200-600					
	PH Series 13-8	150-425	200-500					
Hardened Steel	ALL		200-400	.002-.010	1		2	No

Series 15V1E, 5V6E					Grades			Coolant
					IN2005	IN2030	IN2040	
Material		Brinell Hardness	SFM	Feed per Insert				
Steel	Mild 1018-1045	125-425	500-1100	.010-.035				No
	Low Alloy 4140, 8620, 4340	150-425	400-1000	.08-.018	1	3	2	
	Med Alloy P20, S7, H13, O1, A2	150-425	300-900					
	High Alloy A7-D2	200-425	300-600	.005-.015	1	2		
Steel	Free Machining 303, 416	150-425	300-800	.010-.030	1	2		No
	300 Series 304, 310, 316	150-425	200-600	.005-.015				
	400 Series 410, 420, 15-5PH, 17-4 PH	150-425	200-600					
	PH Series 13-8	150-425	200-500					
Hardened Steel	ALL		200-400	.002-.010	1		2	No

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CONTOUR MILLING OPERATING GUIDELINES

Series 15W7V, 25W1V		Brinell Hardness	SFM	Feed per Insert	Grades			Coolant
Material					IN30M	IN1030		
Aluminum	7075-T6, 6061-T2, 2024	-	1500-3000	.003-.008	2	1		Yes
Cast Iron	Gray	150-250	300-1000	.003-.008		1		No
	Nodular		300-600					
Steel	Low Carbon 1018, 8620	150-250	400-1000	.003-.008		1		No
	High Carbon F-6180	250-400	350-500	.003-.006		1		
	Alloyed Steel 4140, 4340	150-300	300-700	.003-.008		1		
	Tool Steel A-6, D-1, D-2, P-20	Up to 300						
Stainless Steel	300 Series, 304, 316	-	300-700	.003-.006		1		Yes
	400 Series 15-5 PH	Up to 320	400-900					
	13-8 PH	-	200-400					
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	2	1		Yes
Titanium	6AL-4V	-	100-150	.003-.006	2	1		Yes

Series 13W7X, 23W1X		Brinell Hardness	SFM	Feed per Insert	Grades			Coolant
Material					IN40P	IN1530	IN1540	
Cast Iron	Gray GM-241M, M3A71-A G2500	150-250	600-900	.015-.025	3	1	2	No
	Nodular GM-245M		500-800					
Steel	Low Carbon 1018-8620	150-250	500-800	.010-.020	3	2	1	No
	Cast Steel GM-190M, M3A76-A							
	Alloyed Steel 4140, 4340, 6150	150-300						
	Tool Steel A-6, D-1, D-2, P-20, W2	Up to 300						
Stainless Steel	300 Series, 304, 316	-	300-500	.008-.015	2	1		Yes
	400 Series 15-5 PH, 17-4 PH	Up to 320						
	13-8 PH	-	250-350					

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Series 15B								Grades						Coolant
								IN40P	IN1530	IN2030	IN2040	IN1540	IN6330	
Material		Brinell Hardness	SFM	RPLT, RPLH, (RPLP)	RPLW, (RPLB)	RPLW, RPLB, (RPLS)	RPCW, (RPCB)							
Aluminum	6061 T-6, 7075 T-6	-	1500-3000	.005-.015	-	-	.005-.015	1	3	4	2			Yes
Cast Iron	Gray	150-250	250-800	.005-.015	.008-.020	-	.005-.015	2	3			1		No
	Nodular		200-800											
Steel	Low Carbon 1018-8620	100-250	250-1000					6	1	2	3	5	4	No
	High Carbon F-6180, Nitr alloy 52100	250-400	200-750					6	1	3	2	4	5	
	Alloyed Steel 4140, 4340, 6150	150-300	250-750											
	Tool Steel A-6, D-1, D-2, P-20	Up to 300	250-750											
Stainless Steel	300 Series, 304, 316	-	250-750	.005-.015	.005-.015	.005-.015	.005-.015	2	1	4	5	3		Yes
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-800											
	13-8 PH	-	200-600											
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.005-.008	-	.003-.006	.003-.006	1	2			3		Yes
Titanium	6AL-4V	-	100-150	.005-.010	-	.005-.008	.005-.008	2	1			3		Yes

Series 5W7								Grades					Coolant
Material	Brinell Hardness	SFM	Feed per Insert					IN2004	IN2005	IN2015	IN2030	IN2040	
Aluminum	6061-T6, 7075-T6	-	1500-3000	.010-.025				2	1				Yes
Cast Iron	Gray	150-250	250-800	.008-.025				2	1	3			No
	Nodular		200-800										
Steel	Low Carbon 1018-8620	150-250	250-1000	.008-.025				3	1		2		No
	High Carbon F-6180	250-400	200-750	2					1	3			
	Alloyed Steel 4140	150-300	150-300										
	Tool Steel P20-H13	Up to 300	Up to 300										
Stainless Steel	300 Series, 304, 316	-	250-750	.007-.018				2	3	1	4		Yes
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-800										
	13-8 PH	-	200-600										
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy	-	75-120	.005-.015				2		1			Yes
Titanium	6AL-4V	-	100-150	.004-.015				1		2			Yes

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CONTOUR MILLING OPERATING GUIDELINES

						Grades						
Series 5W		Brinell Hardness	SFM	Feed per Insert		IN40P	IN1530	IN2030	IN2040	IN1540	IN6530	Coolant
Material				RPLT, RPLH, (RNLM, RPLP)	RPLW, (RPLB)							
Aluminum	6061 T-6, 7075 T-6	-	1500-3000	.005-.015	-		1				2	Yes
Cast Iron	Gray	150-250	250-800	.005-.015	.008-.020		2	3	4		1	No
	Nodular		200-800									
Steel	Low Carbon 1018, 8620	100-250	250-1000	.005-.015	.008-.020	6	1	2	3	5	4	No
	High Carbon F-6180, Nitr alloy 52100	250-400	200-750	.005-.015	.008-.020	6	5	3	2	4	1	
	Alloyed Steel 4140, 4340, 6150	150-300	250-750									
	Tool Steel A-6, D-1, D-2, P-20	Up to 300										
Stainless Steel	300 Series, 304, 316	-	250-750	.005-.015	.005-.015		2	1	4		3	May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	Up to 320	300-800									Yes
	13-8 PH	-	200-600									
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.005-.008	-		1	2			3	Yes
Titanium	6AL-4V	-	100-150	.005-.010	-		2	1			3	Yes

Series 5W6S		Brinell Hardness	SFM	Feed per Insert	Grades			Coolant
Material					IN2030	IN2040	IN6530	
Aluminum	6061-T6, 7075-T6	-	1500-3000	.012-.035	1	3	2	Yes
Cast Iron	Gray	150-250	250-800	.010-.025	1	2	3	No
	Nodular		200-800					
Steel	Low Carbon 1018-8620	150-250	250-1000	.010-.025	3	2	1	No
	High Carbon F-6180	250-400	200-750					
	Alloyed Steel 4140	150-300	150-300					
	Tool Steel P20-H13	Up to 300	Up to 300					
Stainless Steel	300 Series, 304, 316	-	250-750	.005-.015	1		2	Yes
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-800					
	13-8 PH	-	200-600					
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy	-	75-120	.005-.008	1		2	Yes
Titanium	6AL-4V	-	100-150	.005-.010	1			Yes

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Series VHU					Grades								Coolant
					IN15K	IN2005	IN2015/IN2010	IN1530	IN2030	IN2040	IN6515/IN6510	IN70N	
Material		Brinell Hardness	SFM	Feed per Insert									
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.004-.015	1							Yes	
Cast Iron	Gray	150-280	400-750	.005-.012		1			2		1	No	
	Nodular		300-650										
			1500+	.004-.007									
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.010	3			2	1			No	
	High Carbon F-6180, Nitralloy 52100	250-400	200-350	.005-.008									
	Alloyed Steel 4140, 4340, 6150	150-300	250-400	.005-.010									
	Tool Steel A-6, D-1, D-2, P-20	Up to 300											
Stainless Steel	300 Series, 304, 316	-	250-400	.003-.006	3		1	2				May not be required at high speeds	
	400 Series, 15-5 PH, 17-4 PH	Up to 320	300-600									Yes	
	13-8 PH	-	200-250	.004-.008									
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006	2		1	3				Yes	
Titanium	6AL-4V	-	100-150	.003-.006	1		2	3				Yes	

*Preferred for higher SFM.

Series SHU					Grades					Coolant	
					IN2005	IN2015/IN2010	IN1530	IN2040	IN6515		
Material		Brinell Hardness	SFM	Feed per Insert							
Cast Iron	Gray	150-280	400-750	.007-.018	3	1			2	No	
	Nodular		300-650								
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.015	1		3	2		No	
	High Carbon F-6180	250-400	200-350	.006-.013							
	Alloyed Steel 4140, 4340	150-300	250-400	.006-.015							
	Tool Steel A-6, D-1, D-2	Up to 300									
Stainless Steel	300 Series, 304, 316	-	250-400	.005-.010	2		1			May not be required at high speeds	
	400 Series, 15-5 PH	Up to 300	300-600							Yes	
	13-8 PH	-	200-250								.006-.012
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.004-.007	2		1			Yes	
Titanium	6AL-4V	-	100-150	.004-.007	1		2			Yes	

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CONTOUR MILLING OPERATING GUIDELINES

										Grades				
Series DHU		Material	Brinell Hardness	SFM	Feed per Insert					Coolant				
						IN1030	IN2005	IN6515	IN6530					
Aluminum	6061 T-6, 7075 T-6	-	1500-3000	.004-.010			1		No					
Cast Iron	Gray	150-250	250-800	.005-.012	3	1	2	No						
	Nodular		200-800											
Steel	Low Carbon 1018-8620	100-250	250-800	.004-.012	1	2		No						
	High Carbon F-6180, Nitr alloy 52100	250-400	200-700	.005-.012	1	2	2							
	Alloyed Steel 4140, 4340, 6150	150-300	250-700											
	Tool Steel A-6, D-1, D-2, P-20	Up to 300												
Stainless Steel	300 Series, 304, 316	-	250-600	.004-.008	1	2	1	3	Yes					
	400 Series 15-5 PH, 17-4 PH	Up to 320	300-700	.005-.010										
	13-8 PH	Up to 320	200-250	.004-.008										
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.004-.008	1	2	1	Yes						
Titanium	6AL-4V	-	100-150	.004-.008	2	1	1	Yes						

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SLOTTER OPERATING GUIDELINES

Series 31J		Brinell Hardness	SFM	Feed per Insert by Width				Coolant
Material				.063	.122	.188	.250	
Aluminum	7075-T6, 6061-T2, 2024	-	1300-3300	.001-.004	.0015-.007	.0025-.009	.0025-.010	1 Yes
Cast Iron	Gray	150-250	200-400	.001-.004	.0015-.007	.0025-.009	.0025-.010	1 No
	Nodular		200-330					
Steel	Low Carbon 1018-8620	150-250	600-1200	.001-.004	.0015-.007	.0025-.009	.0025-.010	1 No
	High Carbon F-6180	250-400	400-600					
	Alloyed Steel 4140, 4340	150-300	350-800					
	Tool Steel A-6, D-1, D-2	Up to 300	350-800					
Stainless Steel	300 Series, 304, 316	-	400-850	.001-.004	.0015-.007	.0025-.009	.0025-.010	1 Yes
	400 Series, 15-5 PH	Up to 320	460-800					
	13-8 PH	-	115-330					
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	70-200	.001-.004	.0015-.007	.0025-.009	.0025-.010	1 Yes
Titanium	6AL-4V	-	115-200	.001-.004	.0015-.007	.0025-.009	.0025-.010	1 Yes

Series 35J, 38L		Brinell Hardness	SFM	Feed per Insert	Grades						Coolant
Material					IN30M	IN2005	IN2015	IN1030	IN2030	IN2040	
Aluminum	6061 T-6, 7075 T-6	-	1500-3000	.004-.015	1	3			2		Yes
Cast Iron	Gray	150-250	250-400	.003-.008			1	2	3		No
	Nodular		200-350								
Steel	Low Carbon 1018-8620	100-250	250-600	.003-.008							No
	High Carbon F-6180, Nitralloy 52100	250-400	200-350	.005-.010							
	Alloyed Steel 4140, 4340, 6150	150-320	250-400				1	1	3		
	Tool Steel A-6, D-1, D-2, P-20	Up to 320									
Stainless Steel	300 Series, 304, 316	Up to 320	200-350	.005-.010							Yes
	400 Series 15-5 PH, 17-4 PH	Up to 320	200-500		3	2		1			
	13-8 PH	Up to 320	120-250								
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	Up to 320	75-180	.003-.006	4	3		1	2		Yes
Titanium	6AL-4V	Up to 320	100-150	.004-.008	3	1		2			Yes

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Series 3SJ6E, 3SJ6H										Grades				Coolant
Material		Brinell Hardness	SFM	Feed per Insert			IN2005	IN2015/IN2010	IN1530	IN2040				
Cast Iron	Gray	150-280	400-750	.003-.006					1		No			
	Nodular		300-650											
Steel	Low Carbon 1018, 8620	100-250	250-500	.003-.006	1		2		No					
	High Carbon F-6180	250-400	200-350	.003-.005										
	Alloyed Steel 4140, 4340	150-300	250-400											
	Tool Steel A-6, D-1, D-2	Up to 300												
Stainless Steel	300 Series, 304, 316	-	400-600	.003-.006	2		1		May not be required at high speeds					
	400 Series, 15-5 PH	Up to 320	300-600						Yes					
	13-8 PH	-	200-600											
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.003-.005	2		1		Yes					
Titanium	6AL-4V	-	100-200	.003-.005	1		2		Yes					

Series 3SJ6L					Grades					Coolant	
					IN2005	IN2015/IN2010	IN1530	IN2040	IN6515		
Material		Brinell Hardness	SFM	Feed per Insert							
Cast Iron	Gray	150-280	400-750	.007-.018	3	1			2	No	
	Nodular		300-650								
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.015	1		3	2		No	
	High Carbon F-6180	250-400	200-350	.006-.013							
	Alloyed Steel 4140, 4340	150-300	250-400	.006-.015							
	Tool Steel A-6, D-1, D-2	Up to 300									
Stainless Steel	300 Series, 304, 316	-	250-400	.005-.010	2		1			May not be required at high speeds	
	400 Series, 15-5 PH	Up to 300	300-600							Yes	
	13-8 PH	-	200-250								
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-150	.004-.007	2		1			Yes	
Titanium	6AL-4V	-	100-150	.004-.007	1		2			Yes	

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SLOTTER OPERATING GUIDELINES

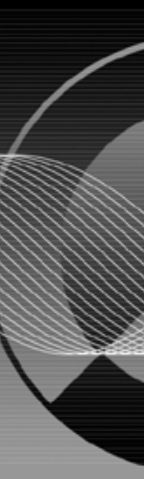
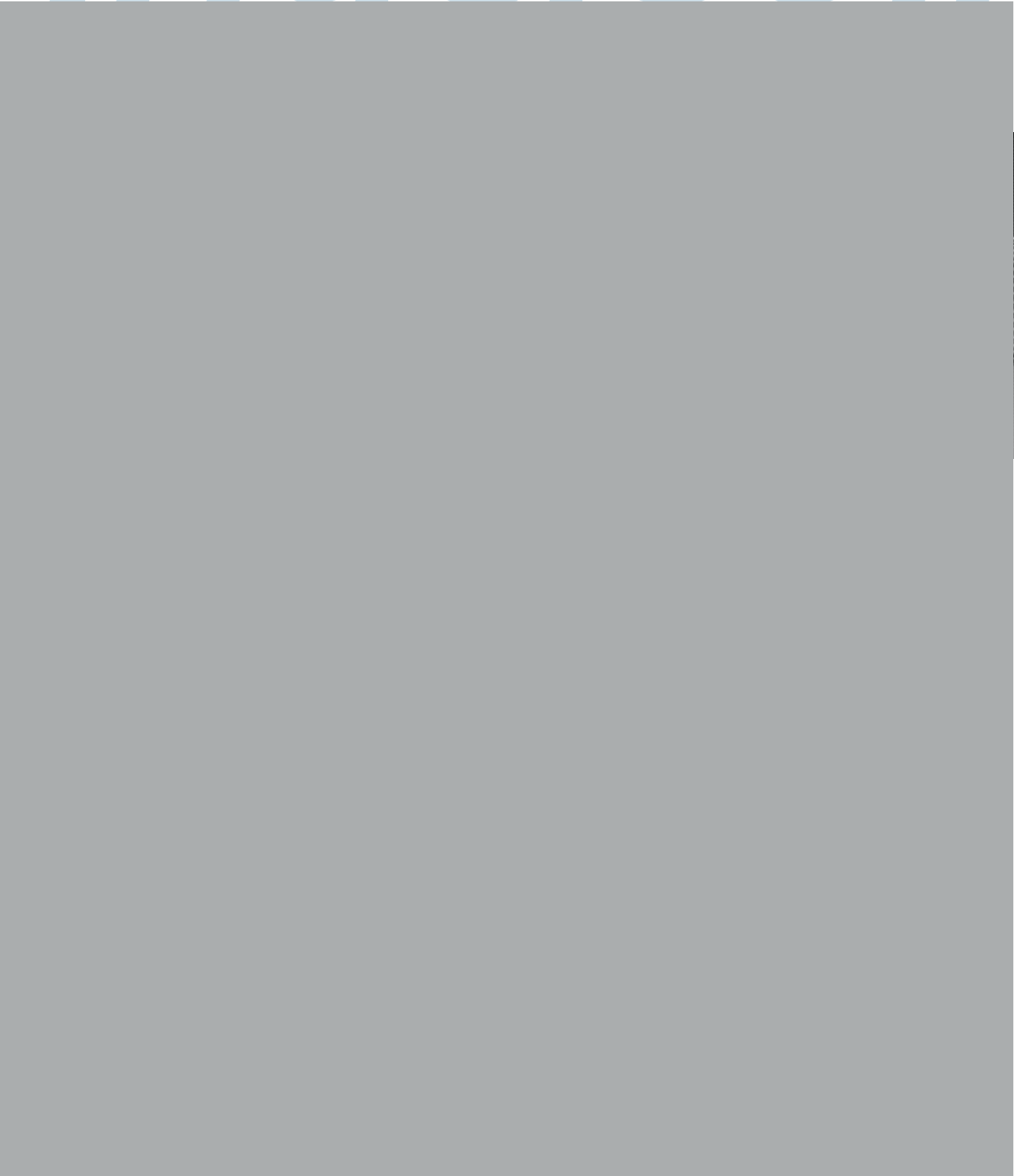
Series 15T, 12T						Grades					Coolant	
Material	Brinell Hardness	SFM	SPLT06	SHLT09, APKT	Feed per Insert	IN30M	IN2005	IN1030	IN5015	IN6515	12T1B, 15T	15T1D
Aluminum	6061 T-6, 7075 T-6	-	1000-3000	.003-.006	.004-.008	3	1	2			Yes	Yes
Cast Iron	Gray	150-250	350-1000	.002-.005	.003-.007			3	1	2	Optional	Yes
	Nodular											
Steel	Low Carbon 1018, 8620	100-250	450-800	.003-.008	.004-.009	4	3	1	5		Optional	Yes
	High Carbon F-6180, Nitralloy 52100	250-400	200-600	.003-.008	.004-.009							
	Alloyed Steel 4140, 4340, 6150	150-300	400-800	.003-.008	.004-.008	4	2	1	5			
	Tool Steel A-6, D-1, D-2, P-20	Up to 300	250-600	.002-.005	.003-.006							
Stainless Steel	300 Series, 304, 316	150-270	350-800	.003-.006	.004-.009						Yes	Yes
	400 Series 15-5 PH, 17-4 PH	Up to 320	275-600	.002-.005	.003-.006	4	3	1				
	13-8 PH	150-270										
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	180-475	150-475	.002-.004	.003-.005	3	2	1			Yes	Yes
Titanium	6AL-4V	110-400	90-250	.002-.005	.003-.006	3	1	2			Yes	Yes

Series 5VK6V, 3VL5V					Grades								Coolant
Material	Brinell Hardness	SFM	Feed per Insert		IN15K	IN2005	IN2015/IN2010	IN1530	IN2030	IN2040	IN6515/IN6510	IN70N	
Aluminum	6061-T6, 7075-T6, 2024	-	1500-3000	.004-.015	1								Yes
Cast Iron	Gray	150-280	400-750	.005-.012			1			2			No
	Nodular		300-650										
			1500+	.004-.007							1		
Steel	Low Carbon 1018, 8620	100-250	250-500	.005-.010									No
	High Carbon F-6180, Nitralloy 52100	250-400	200-350	.005-.008									
	Alloyed Steel 4140, 4340, 6150	150-300	250-400	.005-.010		3			2	1			
	Tool Steel A-6, D-1, D-2, P-20	Up to 300											
Stainless Steel	300 Series, 304, 316	-	250-400	.003-.006									May not be required at high speeds
	400 Series, 15-5 PH, 17-4 PH	Up to 320	300-600		3		1	2					
	13-8 PH	-	200-250	.004-.008									Yes
Nickel Alloys	Inconel 600, 706, 718, 903, Hastelloy, Waspalloy	-	75-120	.003-.006		2		1	3				Yes
Titanium	6AL-4V	-	100-150	.003-.006		1		2	3				Yes

*Preferred for higher SFM.

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