



# Scientific Cutting Tools Product Catalog

**THE CUTTING EDGE**



**FEATURING  
NEW ITEMS  
ADVANTAGE TOOLS  
AND GUIDES**

# 50 Years of Excellence

## People Making the Difference

Scientific Cutting Tools, Inc. was established as an innovative cutting tool manufacturer based upon the simple marketing concept of providing customers with superior products, competitive prices and uncompromising service. The owners and employees started SCT with an innovative cutting tool design and an inspired ambition to succeed. SCT entered the cutting tool manufacturing business with one product, one customer, and one driving goal – to deliver unprecedented value to our customers.

Over the years, SCT has developed new tool lines and refined the existing ones. SCT's aggressive research and development department also has the capability of developing specialized cutting tools for specific customer projects. SCT tool designers can also modify existing stock tools to meet individual customer needs.

Although 50 years have passed since SCT first opened its doors, the company's fundamental reasons for being in business have not changed from those that were first established by company founder Stan Christopher. Today's commitment to quality control, unparalleled craftsmanship, and customer satisfaction are the attributes that set the people of Scientific Cutting Tools above the competition.

Adopting a company philosophy of "pride in our people means pride in workmanship," has proven to be the spark that has ignited Scientific Cutting Tools' ability to provide the best value in the industry. By continually out-pacing the competition, responding to rapidly changing cutting tool design technology, and meeting customer demand for high quality cutting tools, SCT has been able to keep this pledge to its customers.

SCT has an excellent reputation as a manufacturer of an extensive line of cutting tools including thread mills, port tools, cavity tools, indexable and solid carbide boring bars, threading tools, groove tools, and more. All tools are stocked in both uncoated and coated (ALTiN+) versions. All carbide used must pass stringent quality tests. SCT only purchases premium grade submicron carbide because it produces a tough, long-lasting surface that resists chipping and cracking, while maintaining superior abrasion resistance. This assures precise, quality performance each time a SCT tool is used. While premium submicron carbide is more expensive than inferior grades, SCT's cutting edge technology in cutting tool manufacturing has allowed the forward-thinking company to produce top-end cutting tools at competitive market prices.

SCT has consistently invested in the latest CNC tool and cutter grinders, CNC vertical machining centers and CNC turning centers. Laser marking, video inspection equipment, CNC cylindrical grinders and highly trained employees also play a part in the SCT strategy of providing "best value" in the industry. Continual, on-going research in cutting tool design and testing will continue to be part of our culture.

Scientific Cutting Tools will continue to position itself to be the cutting edge of tomorrow's product design while still offering competitively priced products. The goal of delivering superior quality tools backed by a 100% customer satisfaction guarantee is SCT's commitment. SCT extends this challenge to any manufacturer who uses thread mills, port tools, cavity tools, indexable boring bars, solid carbide boring, grooving or threading tools: "Just try any one of SCT's quality crafted cutting tools on your next job and see what a difference it will make."





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Our tool sections are color coded for your convenience.

**Our new and improved catalog features brand new products, extended sizes, and helpful technical charts.**

**See next page for new products.**

# NEW PRODUCT AND SIZES OVERVIEW

New Category:  
Indexable Tools



## Indexable Boring Bars: (Pages 81-99)

- Carbide shanks from 3/16" to 1/2"
- Stocked with and without flat on shank
- Carbide inserts available in both flat top and chip control
- Proprietary design is significantly stronger
- Sets available

New Product



## ACME Single Profile Thread Mills (Pages 28-29)

- Available in both acme and stub acme
- Internal and external tools

New Sizes



## 15° Helical Thread Mills (Pages 16, 27)

- Many new sizes added
- Now available in both uncoated and ALTiN+

New Sizes



## Thread Mill Long Reach (TMLR) (Pages 10-11, 24-25)

- New sizes added in both UN and Metric
- Now available in both uncoated and ALTiN+

New Product



## Coolant through Thread Mills (Pages 15, 26)

- Carbide tipped thread mills now have coolant holes to each flute
- Available in both UN and Metric sizes

New Sizes



## Single Profile Thread Mills (SPTM) (Pages 8-9, 22-23)

- New sizes added
- Cuts both UN and Metric sizes
- Additional lengths added to existing sizes for more rigidity

New Product



## Cartridge Valve Tools (Pages 119-123)

- Sun Hydraulic HSS roughing step drills
- Sun Hydraulic carbide tipped finishers
- Hydraforce carbide tipped roughing tools



# THREADMILLS



**Helical Flute  
Valueline Helical Flute  
TMLR  
SPTM  
Straight Flute  
Staggered Tooth  
T15 Powdered Metal**

# THREAD MILLS - PRODUCT OVERVIEW

Thread mills cut a thread using helical interpolation. Helical interpolation involves moving three axes simultaneously. The X and Y axes move in a circular motion while the Z axis moves in a linear motion. This allows the same thread mill to cut both right and left-hand threads and to produce a variety of thread sizes (of the same pitch). All thread mills are made from premium submicron carbide and are stocked with and without an ALTiN+ coating. They are ground on state-of-the-art CNC tool-and-cutter grinders and have been engineered for high performance. Programming assistance is available. Technical information available on pages 36-38.



p.7



p.8-9



p.10-11

## EXTERNAL - UNJ

These straight flute thread mills have the root radius that is required for the external "UNJ" thread.

## SPTM - UN

Single profile thread mills will cut internal and external threads in a range of thread sizes with minimum side cutting pressure.

## TMLR - UN

Long reach thread mills have three teeth and a helical flute that excel in internal deep threads and hard-to-cut materials.



p.12-14



p.15



p.16

## STRAIGHT FLUTE - UN

Straight flute thread mills come in a large variety of sizes and are crest cutting for internal threads only.

## STAGGERED TOOTH - UN

Staggered tooth thread mills will cut internal and external threads. Every other tooth removed in a staggered pattern for reduced side cutting pressure.

## 15° HELICAL FLUTE - UN

The 15° helical flute thread mills are non-crest cutting for internal threads only. The helical flutes distribute the side cutting pressure.



p.17



p.18-20



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## 30° HELICAL FLUTE - UN

The 30° helical flute thread mills will cut internal and external threads. The helical flutes distribute the side cutting pressure.

## NPT / NPTF

NPT thread mills come in straight, helical and staggered tooth design. They will cut both internal and external threads. NPTF are for dryseal applications.

## BSPP / BSPT

These straight flute thread mills have a 55° thread profile and cut the British Standard Pipe Parallel (BSPP) and the British Standard Pipe Taper (BSPT).



p.22-23



p.24-25



p.26

## SPTM - METRIC

Single profile thread mills will cut internal and external threads in a range of thread sizes with minimum side cutting pressure.

## TMLR - METRIC

Long reach thread mills have three teeth and a helical flute that excel in internal deep threads and hard to cut materials.

## STRAIGHT FLUTE - METRIC

Straight flute thread mills come in a large variety of sizes and are crest cutting for internal threads only.



p.27



p.27



p.28-29

## 15° HELICAL FLUTE - METRIC

The 15° helical flute thread mills are non-crest cutting for internal threads only. The helical flute distributes the side cutting pressure.

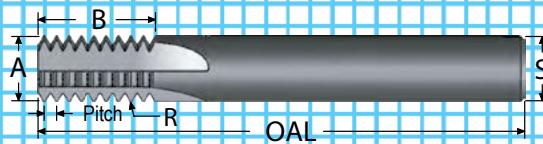
## 30° HELICAL FLUTE - METRIC

The 30° helical flute thread mills will cut internal and external threads. The helical flute distributes side cutting pressure.

## SPTM - ACME / STUB ACME

Acme thread mills come in both acme and stub acme configurations. Different tools are available to cut the internal and external thread.

# THREAD MILLS - EXJ - SOLID CARBIDE (EXTERNAL UNJ THREAD)



- ALTiN+ coating extends tool life
- Precision ground for maximum concentricity
- Made with premium submicron carbide

EXT. THREAD / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"R" ROOT RADIUS	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							EXTERNAL THREADS ONLY	
UNJ-32	0.245	0.668	0.0051	0.250	2.50	4	TM245-32EXJ	TM245-32EXJ-A
UNJ-28	0.245	0.657	0.0059	0.250	2.50	4	TM245-28EXJ	TM245-28EXJ-A
UNJ-24	0.245	0.683	0.0069	0.250	2.50	4	TM245-24EXJ	TM245-24EXJ-A
UNJ-20	0.370	0.773	0.0082	0.375	3.50	5	TM370-20EXJ	TM370-20EXJ-A
UNJ-18	0.370	0.800	0.0091	0.375	3.50	5	TM370-18EXJ	TM370-18EXJ-A
UNJ-16	0.370	0.774	0.0103	0.375	3.50	5	TM370-16EXJ	TM370-16EXJ-A
UNJ-14	0.495	1.027	0.0118	0.500	3.50	6	TM495-14EXJ	TM495-14EXJ-A
UNJ-12	0.495	1.031	0.0137	0.500	3.50	6	TM495-12EXJ	TM495-12EXJ-A
UNJ-10	0.495	1.037	0.0165	0.500	3.50	6	TM495-10EXJ	TM495-10EXJ-A
UNJ-8	0.495	1.046	0.0207	0.500	3.50	6	TM495-8EXJ	TM495-8EXJ-A

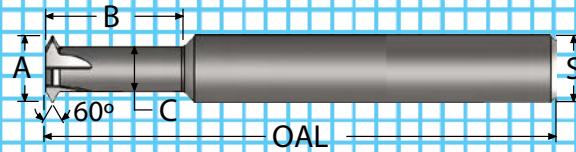
## NEW AND UPDATED TECHNICAL INFORMATION LOCATED IN THE BACK OF EACH PRODUCT CATEGORY

MATERIAL	HB/Rc	SPEED SFM UNCOATED	SPEED SFM ALTiN+	FEED (INCHES PER TOOTH)					
				TOOL DIAMETER					
CAST IRON	160 HB	100-220	200-425	.032 -.056	.059 -.090	.100 -.190	.200 -.350	.370 -.595	.600 +
CARBON STEEL	18 Rc	100-200	190-425	.0004-.001	.0004-.006	.0004-.014	.0004-.002	.0004-.0035	.0004-.005
PROBLEM				CAUSE				SOLUTION	
TAPERED THREADED HOLE				TOOL PRESSURE				Reduce the chip load and/or make more radial passes.	
NO-GO GAGE GOES & GO GAGE DOES NOT GO				THREAD OVERCUTTING				Use a tool of smaller diameter with correct pitch. Make sure helical "ramp in" is used.	
ALLOY STEEL	TEETH ARE CHIPPING				TOOL PRESSURE				Reduce feed rate per tooth.
	BUILT-UP EDGE				TOOL RUBBING NOT CUTTING				Use a coated tool to help reduce built-up edge.
RAPID WEAR				TOO MUCH HEAT				Increase chip load per tooth.	
TEETH ARE BURNING				TOO MUCH TOOL PRESSURE				Reduce speed. Use a coated tool. Increase coolant.	
TOOL BREAKS				Helical "arc in" must be used. Reduce feed rate and/or use more radial passes. Adjusted Feed Rate (AFR) must be used. (See Thread Mill Feed and Speed Chart)					



# UN THREAD MILLS

## SINGLE PROFILE (SPTM) - SOLID CARBIDE



With just 19 varieties of Thread Mills, fine and coarse threads ranging from #00 to 1¼ + can be milled

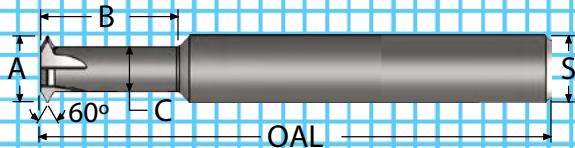
Min ID THREAD*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	RECOM- MENDED TPI	FLUTES	ORDER NUMBERS	
								UNCOATED	ALTIN+
								INTERNAL OR EXTERNAL THREADS	
#00	0.032	0.060	0.018	0.125	1.50	85 to 120	2	SPTM032	SPTM032A
#00	0.032	0.100	0.018	0.125	1.50	85 to 120	2	SPTM032L	SPTM032LA
#0	0.040	0.090	0.022	0.125	1.50	72 to 90	2	SPTM040	SPTM040A
#0	0.040	0.109	0.022	0.125	1.50	72 to 90	2	SPTM040ML	SPTM040MLA
#0	0.040	0.125	0.022	0.125	1.50	72 to 90	2	SPTM040L	SPTM040LA
#1	0.050	0.100	0.028	0.125	1.50	64 to 80	3	SPTM050	SPTM050A
#1	0.050	0.125	0.028	0.125	1.50	64 to 80	3	SPTM050ML	SPTM050MLA
#1	0.050	0.150	0.028	0.125	1.50	64 to 80	3	SPTM050L	SPTM050LA
#2	0.059	0.125	0.034	0.125	1.50	56 to 80	3	SPTM059	SPTM059A
#2	0.059	0.165	0.034	0.125	1.50	56 to 80	3	SPTM059ML	SPTM059MLA
#2	0.059	0.200	0.034	0.125	1.50	56 to 80	3	SPTM059L	SPTM059LA
#2	0.060	0.125	0.034	0.1875	2.00	56 to 80	3	SPTM060	SPTM060A
#2	0.060	0.165	0.034	0.1875	2.00	56 to 80	3	SPTM060ML	SPTM060MLA
#2	0.060	0.200	0.034	0.1875	2.00	56 to 80	3	SPTM060L	SPTM060LA
#3	0.072	0.150	0.040	0.1875	2.00	48 to 72	3	SPTM072	SPTM072A
#3	0.072	0.250	0.040	0.1875	2.00	48 to 72	3	SPTM072L	SPTM072LA
#4	0.080	0.190	0.045	0.1875	2.00	40 to 64	3	SPTM080	SPTM080A
#4	0.080	0.250	0.045	0.1875	2.00	40 to 64	3	SPTM080ML	SPTM080MLA
#4	0.080	0.300	0.045	0.1875	2.00	40 to 64	3	SPTM080L	SPTM080LA
#6	0.098	0.250	0.049	0.1875	2.00	32 to 64	3	SPTM098	SPTM098A
#6	0.098	0.330	0.049	0.1875	2.00	32 to 64	3	SPTM098ML	SPTM098MLA
#6	0.098	0.400	0.049	0.1875	2.00	32 to 64	3	SPTM098L	SPTM098LA
#8	0.120	0.300	0.070	0.1875	2.00	32 to 56	3	SPTM120	SPTM120A
#8	0.120	0.400	0.070	0.1875	2.00	32 to 56	3	SPTM120ML	SPTM120MLA
#8	0.120	0.500	0.070	0.1875	2.00	32 to 56	3	SPTM120L	SPTM120LA
#10	0.138	0.400	0.075	0.1875	2.00	24 to 56	3	SPTM138	SPTM138A
#10	0.138	0.500	0.075	0.1875	2.00	24 to 56	3	SPTM138ML	SPTM138MLA
#10	0.138	0.600	0.075	0.1875	2.00	24 to 56	3	SPTM138L	SPTM138LA
#12	0.160	0.400	0.088	0.1875	2.00	24 to 56	3	SPTM160	SPTM160A
#12	0.160	0.650	0.088	0.1875	2.00	24 to 56	3	SPTM160L	SPTM160LA

TPI = Threads Per Inch

\*Single profile thread mills can cut any larger size internal thread within the recommended TPI

# UN THREAD MILLS

## SINGLE PROFILE (SPTM) - SOLID CARBIDE



- Solid carbide provides maximum tool rigidity
- Long reach tools are available from stock
- Cuts UNC, UNF, UNEF, and UNS threads
- Cuts UNJ threads (internal only)

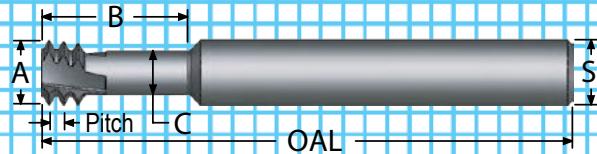
Min ID THREAD*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	RECOM- MENDED TPI	FLUTES	ORDER NUMBERS	
								UNCOATED	ALTiN+
								INTERNAL OR EXTERNAL THREADS	
1/4	0.182	0.400	0.104	0.250	2.50	18 to 56	4	SPTM182	SPTM182A
1/4	0.182	0.530	0.104	0.250	2.50	18 to 56	4	SPTM182ML	SPTM182MLA
1/4	0.182	0.650	0.104	0.250	2.50	18 to 56	4	SPTM182L	SPTM182LA
5/16	0.240	0.500	0.153	0.250	2.50	16 to 48	4	SPTM240	SPTM240A
5/16	0.240	0.800	0.153	0.250	2.50	16 to 48	4	SPTM240L	SPTM240LA
3/8	0.290	0.600	0.192	0.375	3.00	14 to 40	4	SPTM290	SPTM290A
3/8	0.290	1.000	0.192	0.375	3.00	14 to 40	4	SPTM290L	SPTM290LA
1/2	0.372	0.750	0.240	0.375	3.00	12 to 32	4	SPTM372	SPTM372A
1/2	0.372	1.200	0.240	0.375	3.00	12 to 32	4	SPTM372L	SPTM372LA
5/8	0.488	0.850	0.340	0.500	3.50	11 to 32	5	SPTM488	SPTM488A
5/8	0.488	1.350	0.340	0.500	3.50	11 to 32	5	SPTM488L	SPTM488LA
3/4	0.595	1.250	0.430	0.625	4.00	10 to 32	6	SPTM595	SPTM595A
3/4	0.595	2.000	0.430	0.625	4.00	10 to 32	6	SPTM595L	SPTM595LA
7/8	0.695	1.500	0.490	0.750	5.00	8 to 24	6	SPTM695	SPTM695A
7/8	0.695	2.500	0.490	0.750	5.00	8 to 24	6	SPTM695L	SPTM695LA
1 1/4	0.745	1.500	0.400	0.750	5.00	4 to 8	6	SPTM745	SPTM745A
1 1/4	0.745	2.500	0.400	0.750	5.00	4 to 8	6	SPTM745L	SPTM745LA

TPI = Threads Per Inch

\*Single profile thread mills can cut any larger size internal thread within the recommended TPI

# UN THREAD MILLS

## LONG REACH (TMLR) - SOLID CARBIDE



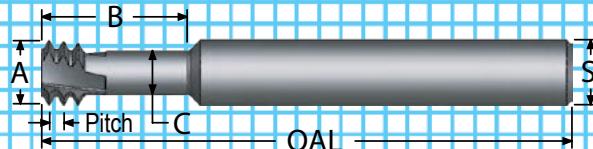
- Small thread milling is made easy with TMLR tools
- Economical cost per hole
- Minimal cutting pressure
- ALTiN+ coating for higher Surface Feet per Minute

MIN ID THREAD /PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBER	
							UNCOATED	ALTiN+
							INTERNAL THREADS ONLY	
2-56	0.065	0.150	0.039	0.250	2.50	3	TMLR065-56	TMLR065-56A
2-56	0.065	0.200	0.039	0.250	2.50	3	TMLR065-56EL	TMLR065-56ELA
4-40	0.082	0.225	0.046	0.250	2.50	3	TMLR082-40	TMLR082-40A
4-40	0.082	0.300	0.046	0.250	2.50	3	TMLR082-40EL	TMLR082-40ELA
6-32	0.100	0.260	0.056	0.250	2.50	3	TMLR100-32	TMLR100-32A
6-32	0.100	0.400	0.056	0.250	2.50	3	TMLR100-32EL	TMLR100-32ELA
6-40	0.100	0.260	0.065	0.250	2.50	3	TMLR100-40	TMLR100-40A
6-40	0.100	0.400	0.065	0.250	2.50	3	TMLR100-40EL	TMLR100-40ELA
8-32	0.126	0.300	0.080	0.250	2.50	3	TMLR126-32	TMLR126-32A
8-32	0.126	0.500	0.080	0.250	2.50	3	TMLR126-32EL	TMLR126-32ELA
8-36	0.126	0.300	0.085	0.250	2.50	3	TMLR126-36	TMLR126-36A
8-36	0.126	0.500	0.085	0.250	2.50	3	TMLR126-36EL	TMLR126-36ELA
10-24	0.139	0.400	0.080	0.250	2.50	3	TMLR139-24	TMLR139-24A
10-24	0.139	0.600	0.080	0.250	2.50	3	TMLR139-24EL	TMLR139-24ELA
10-32	0.139	0.400	0.093	0.250	2.50	3	TMLR139-32	TMLR139-32A
10-32	0.139	0.600	0.093	0.250	2.50	3	TMLR139-32EL	TMLR139-32ELA
10-48	0.139	0.400	0.106	0.250	2.50	3	TMLR139-48	TMLR139-48A
10-48	0.139	0.600	0.106	0.250	2.50	3	TMLR139-48EL	TMLR139-48ELA
1/4-20	0.186	0.500	0.112	0.250	2.50	3	TMLR186-20	TMLR186-20A
1/4-20	0.186	0.700	0.112	0.250	2.50	3	TMLR186-20EL	TMLR186-20ELA
1/4-28	0.186	0.500	0.130	0.250	2.50	3	TMLR186-28	TMLR186-28A
1/4-28	0.186	0.700	0.130	0.250	2.50	3	TMLR186-28EL	TMLR186-28ELA
1/4-32	0.186	0.500	0.140	0.250	2.50	3	TMLR186-32	TMLR186-32A
1/4-32	0.186	0.700	0.140	0.250	2.50	3	TMLR186-32EL	TMLR186-32ELA
5/16-18	0.234	0.600	0.156	0.250	2.50	3	TMLR234-18	TMLR234-18A
5/16-18	0.234	0.850	0.156	0.250	2.50	3	TMLR234-18EL	TMLR234-18ELA
5/16-24	0.234	0.600	0.176	0.250	2.50	3	TMLR234-24	TMLR234-24A
5/16-24	0.234	0.850	0.176	0.250	2.50	3	TMLR234-24EL	TMLR234-24ELA
5/16-28	0.234	0.600	0.180	0.250	2.50	3	TMLR234-28	TMLR234-28A
5/16-28	0.234	0.850	0.180	0.250	2.50	3	TMLR234-28EL	TMLR234-28ELA
5/16-32	0.234	0.600	0.188	0.250	2.50	3	TMLR234-32	TMLR234-32A
5/16-32	0.234	0.850	0.188	0.250	2.50	3	TMLR234-32EL	TMLR234-32ELA
5/16-40	0.234	0.600	0.194	0.250	2.50	3	TMLR234-40	TMLR234-40A
5/16-40	0.234	0.850	0.194	0.250	2.50	3	TMLR234-40EL	TMLR234-40ELA

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS

## LONG REACH (TMLR) - SOLID CARBIDE



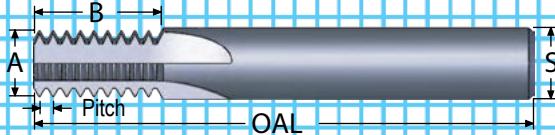
- Cuts UNC, UNF, UNEF, and UNS threads
- Cuts UNJ threads (internal only)
- Excels in difficult-to-thread materials
- ALTiN+ coating extends tool life

MIN ID THREAD /PITCH *	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBER	
							UNCOATED	ALTiN+
							INTERNAL THREADS ONLY	
3/8-16	0.285	0.750	0.191	0.375	3.50	3	TMLR285-16	TMLR285-16A
3/8-16	0.285	1.000	0.191	0.375	3.50	3	TMLR285-16EL	TMLR285-16ELA
3/8-24	0.285	0.750	0.222	0.375	3.50	3	TMLR285-24	TMLR285-24A
3/8-24	0.285	1.000	0.222	0.375	3.50	3	TMLR285-24EL	TMLR285-24ELA
3/8-32	0.285	0.750	0.235	0.375	3.50	3	TMLR285-32	TMLR285-32A
3/8-32	0.285	1.000	0.235	0.375	3.50	3	TMLR285-32EL	TMLR285-32ELA
7/16-14	0.340	0.800	0.235	0.375	3.50	3	TMLR340-14	TMLR340-14A
7/16-14	0.340	1.200	0.235	0.375	3.50	3	TMLR340-14EL	TMLR340-14ELA
7/16-18	0.340	0.800	0.258	0.375	3.50	3	TMLR340-18	TMLR340-18A
7/16-18	0.340	1.200	0.258	0.375	3.50	3	TMLR340-18EL	TMLR340-18ELA
7/16-20	0.340	0.800	0.265	0.375	3.50	3	TMLR340-20	TMLR340-20A
7/16-20	0.340	1.200	0.265	0.375	3.50	3	TMLR340-20EL	TMLR340-20ELA
1/2-12	0.370	0.800	0.245	0.375	3.50	3	TMLR370-12	TMLR370-12A
1/2-12	0.370	1.200	0.245	0.375	3.50	3	TMLR370-12EL	TMLR370-12ELA
1/2-13	0.370	0.800	0.255	0.375	3.50	3	TMLR370-13	TMLR370-13A
1/2-13	0.370	1.200	0.255	0.375	3.50	3	TMLR370-13EL	TMLR370-13ELA
1/2-18	0.370	0.800	0.287	0.375	3.50	3	TMLR370-18	TMLR370-18A
1/2-18	0.370	1.200	0.287	0.375	3.50	3	TMLR370-18EL	TMLR370-18ELA
1/2-20	0.370	0.800	0.295	0.375	3.50	3	TMLR370-20	TMLR370-20A
1/2-20	0.370	1.200	0.295	0.375	3.50	3	TMLR370-20EL	TMLR370-20ELA
1/2-32	0.370	0.800	0.315	0.375	3.50	3	TMLR370-32	TMLR370-32A
1/2-32	0.370	1.200	0.315	0.375	3.50	3	TMLR370-32EL	TMLR370-32ELA
5/8-11	0.470	1.200	0.335	0.500	4.00	4	TMLR470-11	TMLR470-11A
5/8-11	0.470	1.750	0.335	0.500	4.00	4	TMLR470-11EL	TMLR470-11ELA
3/4-10	0.495	1.200	0.345	0.500	4.00	4	TMLR495-10	TMLR495-10A
3/4-10	0.495	1.750	0.345	0.500	4.00	4	TMLR495-10EL	TMLR495-10ELA
3/4-12	0.495	1.200	0.370	0.500	4.00	4	TMLR495-12	TMLR495-12A
3/4-12	0.495	1.750	0.370	0.500	4.00	4	TMLR495-12EL	TMLR495-12ELA
3/4-16	0.495	1.200	0.395	0.500	4.00	4	TMLR495-16	TMLR495-16A
3/4-16	0.495	1.750	0.395	0.500	4.00	4	TMLR495-16EL	TMLR495-16ELA

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS

## STRAIGHT FLUTE SOLID CARBIDE



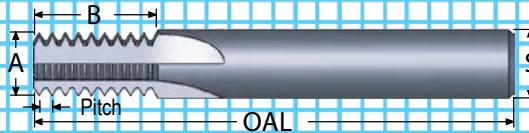
- Optional short length-of-cut for ideal length-to-diameter ratio
- Cuts UNC, UNF, UNEF, UNS, and UNJ (internal only)
- Internal crest cutting design provides strongest possible tool

MIN ID THREAD/ PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL THREADS ONLY	
4-40	0.080	0.210	0.250	2.50	3	TM080-40	TM080-40A
4-40	0.080	0.136	0.250	2.50	3	TM080-40S	TM080-40SA
6-32	0.098	0.263	0.250	2.50	3	TM098-32	TM098-32A
6-32	0.098	0.201	0.250	2.50	3	TM098-32S	TM098-32SA
6-40	0.098	0.260	0.250	2.50	3	TM098-40	TM098-40A
6-40	0.098	0.186	0.250	2.50	3	TM098-40S	TM098-40SA
8-32	0.110	0.325	0.250	2.50	3	TM110-32	TM110-32A
8-32	0.110	0.232	0.250	2.50	3	TM110-32S	TM110-32SA
8-36	0.110	0.345	0.250	2.50	3	TM110-36	TM110-36A
8-36	0.110	0.234	0.250	2.50	3	TM110-36S	TM110-36SA
8-24	0.125	0.350	0.250	2.50	3	TM125-24	TM125-24A
8-24	0.125	0.226	0.250	2.50	3	TM125-24S	TM125-24SA
8-32	0.125	0.355	0.250	2.50	3	TM125-32	TM125-32A
8-32	0.125	0.232	0.250	2.50	3	TM125-32S	TM125-32SA
10-24	0.140	0.392	0.250	2.50	3	TM140-24	TM140-24A
10-24	0.140	0.268	0.250	2.50	3	TM140-24S	TM140-24SA
10-28	0.140	0.409	0.250	2.50	3	TM140-28	TM140-28A
10-28	0.140	0.265	0.250	2.50	3	TM140-28S	TM140-28SA
10-32	0.140	0.388	0.250	2.50	3	TM140-32	TM140-32A
10-32	0.140	0.263	0.250	2.50	3	TM140-32S	TM140-32SA
10-48	0.140	0.383	0.250	2.50	3	TM140-48	TM140-48A
10-48	0.140	0.259	0.250	2.50	3	TM140-48S	TM140-48SA
1/4-20	0.170	0.570	0.250	2.50	3	TM170-20	TM170-20A
1/4-20	0.170	0.371	0.250	2.50	3	TM170-20S	TM170-20SA
1/4-24	0.170	0.559	0.250	2.50	3	TM170-24	TM170-24A
1/4-24	0.170	0.393	0.250	2.50	3	TM170-24S	TM170-24SA
1/4-28	0.170	0.552	0.250	2.50	3	TM170-28	TM170-28A
1/4-28	0.170	0.372	0.250	2.50	3	TM170-28S	TM170-28SA
1/4-32	0.170	0.545	0.250	2.50	3	TM170-32	TM170-32A
1/4-32	0.170	0.388	0.250	2.50	3	TM170-32S	TM170-32SA
1/4-36	0.170	0.540	0.250	2.50	3	TM170-36	TM170-36A
1/4-36	0.170	0.373	0.250	2.50	3	TM170-36S	TM170-36SA
1/4-20	0.187	0.570	0.250	2.50	3	TM187-20	TM187-20A
1/4-20	0.187	0.371	0.250	2.50	3	TM187-20S	TM187-20SA
1/4-24	0.187	0.559	0.250	2.50	3	TM187-24	TM187-24A
1/4-24	0.187	0.393	0.250	2.50	3	TM187-24S	TM187-24SA
1/4-28	0.187	0.551	0.250	2.50	3	TM187-28	TM187-28A
1/4-28	0.187	0.372	0.250	2.50	3	TM187-28S	TM187-28SA

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS

## STRAIGHT FLUTE SOLID CARBIDE



- ALTiN+ coating extends tool life
- Internal threads only

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL THREADS ONLY	
1/4-32	0.187	0.545	0.250	2.50	3	TM187-32	TM187-32A
1/4-32	0.187	0.388	0.250	2.50	3	TM187-32S	TM187-32SA
1/4-36	0.187	0.540	0.250	2.50	3	TM187-36	TM187-36A
1/4-36	0.187	0.373	0.250	2.50	3	TM187-36S	TM187-36SA
1/4-40	0.187	0.560	0.250	2.50	3	TM187-40	TM187-40A
1/4-40	0.187	0.386	0.250	2.50	3	TM187-40S	TM187-40SA
1/4-48	0.187	0.551	0.250	2.50	3	TM187-48	TM187-48A
1/4-48	0.187	0.384	0.250	2.50	3	TM187-48S	TM187-48SA
5/16-18	0.235	0.689	0.250	2.50	3	TM235-18	TM235-18A
5/16-20	0.235	0.670	0.250	2.50	3	TM235-20	TM235-20A
5/16-24	0.235	0.684	0.250	2.50	3	TM235-24	TM235-24A
5/16-28	0.235	0.657	0.250	2.50	3	TM235-28	TM235-28A
5/16-32	0.235	0.669	0.250	2.50	3	TM235-32	TM235-32A
5/16-40	0.235	0.660	0.250	2.50	3	TM235-40	TM235-40A
3/8-16	0.290	0.775	0.312	3.50	4	TM290-16	TM290-16A
3/8-20	0.290	0.820	0.312	3.50	4	TM290-20	TM290-20A
3/8-24	0.290	0.809	0.312	3.50	4	TM290-24	TM290-24A
3/8-27	0.290	0.794	0.312	3.50	4	TM290-27	TM290-27A
3/8-32	0.290	0.794	0.312	3.50	4	TM290-32	TM290-32A
7/16-14	0.345	0.816	0.375	3.50	4	TM345-14	TM345-14A
7/16-18	0.345	0.800	0.375	3.50	4	TM345-18	TM345-18A
7/16-20	0.345	0.821	0.375	3.50	4	TM345-20	TM345-20A
7/16-24	0.345	0.809	0.375	3.50	4	TM345-24	TM345-24A
7/16-28	0.345	0.800	0.375	3.50	4	TM345-28	TM345-28A
9/16-12	0.400	1.117	0.500	3.50	4	TM400-12	TM400-12A
1/2-13	0.400	1.108	0.500	3.50	4	TM400-13	TM400-13A
1/2-16	0.400	1.087	0.500	3.50	4	TM400-16	TM400-16A
1/2-20	0.400	1.120	0.500	3.50	4	TM400-20	TM400-20A
1/2-24	0.400	1.100	0.500	3.50	4	TM400-24	TM400-24A
1/2-28	0.400	1.087	0.500	3.50	4	TM400-28	TM400-28A
1/2-32	0.400	1.106	0.500	3.50	4	TM400-32	TM400-32A
3/4-10	0.450	1.140	0.500	3.50	4	TM450-10	TM450-10A
5/8-11	0.450	1.127	0.500	3.50	4	TM450-11	TM450-11A
5/8-12	0.450	1.117	0.500	3.50	4	TM450-12	TM450-12A
9/16-16	0.450	1.087	0.500	3.50	4	TM450-16	TM450-16A
9/16-18	0.450	1.134	0.500	3.50	4	TM450-18	TM450-18A
9/16-20	0.450	1.120	0.500	3.50	4	TM450-20	TM450-20A
3/4-12	0.490	1.117	0.500	3.50	6	TM490-12	TM490-12A
5/8-14	0.490	1.100	0.500	3.50	6	TM490-14	TM490-14A
5/8-16	0.490	1.087	0.500	3.50	6	TM490-16	TM490-16A
1.0-8	0.620	1.177	0.625	3.50	6	TM620-8	TM620-8A
7/8-9	0.620	1.157	0.625	3.50	6	TM620-9	TM620-9A
7/8-12	0.620	1.117	0.625	3.50	6	TM620-12	TM620-12A
7/8-14	0.620	1.100	0.625	3.50	6	TM620-14	TM620-14A
7/8-16	0.620	1.087	0.625	3.50	6	TM620-16	TM620-16A

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS

## STRAIGHT FLUTE CARBIDE TIPPED COOLANT-THROUGH

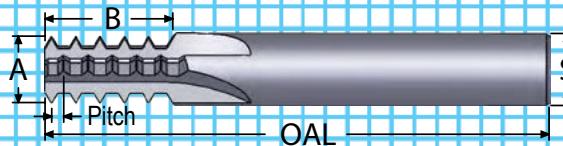


- ALTiN+ coating for higher cutting speed
- Coolant to each flute
- Cuts UNO, UNF, UNEF, and UNS threads
- Cuts UNJ threads (internal only)

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" TOOL REACH	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							INTERNAL OR EXTERNAL THREADS	
1 1/4-7	0.740	1.130	1.370	0.750	6.00	4	TMC740-7	TMC740-7A
1-8	0.740	1.122	1.370	0.750	6.00	4	TMC740-8	TMC740-8A
1-12	0.740	1.076	1.370	0.750	6.00	4	TMC740-12	TMC740-12A
1-14	0.740	1.135	1.370	0.750	6.00	4	TMC740-14	TMC740-14A
1-16	0.740	1.119	1.370	0.750	6.00	4	TMC740-16	TMC740-16A
1-20	0.740	1.096	1.370	0.750	6.00	4	TMC740-20	TMC740-20A
1 1/2-6	0.990	1.152	2.000	1.000	6.00	6	TMC990-6	TMC990-6A
1 1/2-8	0.990	1.122	2.000	1.000	6.00	6	TMC990-8	TMC990-8A
1 1/2-12	0.990	1.166	2.000	1.000	6.00	6	TMC990-12	TMC990-12A
1 1/2-16	0.990	1.122	2.000	1.000	6.00	6	TMC990-16	TMC990-16A

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS - STAGGERED TOOTH



- Staggered tooth design reduces tool pressure
- Non-crest cutting for max thread size adjustability

## STRAIGHT FLUTE - STAGGERED TOOTH - SOLID CARBIDE

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTIN+
3/8-20	0.250	0.675	0.250	2.50	4	TM250-20	TM250-20A
3/8-24	0.250	0.687	0.250	2.50	4	TM250-24	TM250-24A
3/8-28	0.250	0.661	0.250	2.50	4	TM250-28	TM250-28A
3/8-32	0.250	0.672	0.250	2.50	4	TM250-32	TM250-32A
3/8-36	0.250	0.682	0.250	2.50	4	TM250-36	TM250-36A
3/8-40	0.250	0.662	0.250	2.50	4	TM250-40	TM250-40A

\*Thread mills can cut any larger size internal thread of the same pitch

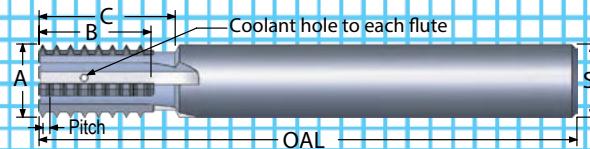


- Cuts UNC, UNF, UNEF, and UNS threads
- Cuts UNJ threads (internal only)
- Non-crest cutting design cuts internal and external threads

## STRAIGHT FLUTE - STAGGERED TOOTH - CARBIDE HEAD

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTIN+
7/16-16	0.350	0.783	0.750	6.00	4	TM350-16	TM350-16A
7/16-18	0.350	0.807	0.750	6.00	4	TM350-18	TM350-18A
7/16-20	0.350	0.823	0.750	6.00	4	TM350-20	TM350-20A
7/16-24	0.350	0.856	0.750	6.00	4	TM350-24	TM350-24A
5/8-12	0.500	1.042	0.750	6.00	4	TM500-12	TM500-12A
5/8-14	0.500	1.037	0.750	6.00	4	TM500-14	TM500-14A
5/8-16	0.500	1.033	0.750	6.00	4	TM500-16	TM500-16A

\*Thread mills can cut any larger size internal thread of the same pitch



- ALTIN+ coating extends tool life
- Ideal for plated thread applications

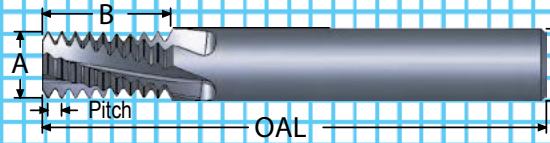
## COOLANT THROUGH THREAD MILLS STRAIGHT FLUTE - STAGGERED TOOTH - CARBIDE TIPPED

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" TOOL REACH	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTIN+
1-12	0.750	1.176	1.370	0.750	6.00	4	TMC750-12	TMC750-12A
1-14	0.750	1.152	1.370	0.750	6.00	4	TMC750-14	TMC750-14A
1-18	0.750	1.117	1.370	0.750	6.00	4	TMC750-18	TMC750-18A
1-20	0.750	1.106	1.370	0.750	6.00	4	TMC750-20	TMC750-20A
1 1/2-12	1.000	1.176	2.000	1.000	6.00	6	TMC1000-12	TMC1000-12A
1 1/2-16	1.000	1.196	2.000	1.000	6.00	6	TMC1000-16	TMC1000-16A

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS

## 15° HELICAL FLUTE SOLID CARBIDE



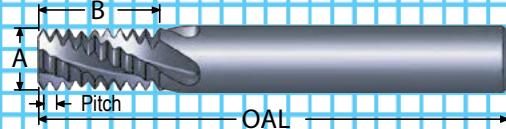
- Cuts UNC, UNF, UNEF, UNS and UNJ (internal only)
- Non-crest cutting allows maximum flexibility for plated and non-standard threads
- Long length-of-cut

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBER	
						UNCOATED	ALTiN+
						INTERNAL THREADS ONLY	
4-40	0.079	0.185	0.250	2.50	2	TMI079-40H	TMI079-40HA
6-32	0.100	0.263	0.250	2.50	3	TMI100-32H	TMI100-32HA
8-32	0.115	0.263	0.250	2.50	3	TMI115-32H	TMI115-32HA
10-24	0.120	0.351	0.250	2.50	3	TMI120-24H	TMI120-24HA
10-28	0.120	0.336	0.250	2.50	3	TMI120-28H	TMI120-28HA
10-32	0.120	0.326	0.250	2.50	3	TMI120-32H	TMI120-32HA
1/4-20	0.180	0.521	0.250	2.50	3	TMI180-20H	TMI180-20HA
1/4-28	0.180	0.515	0.250	2.50	3	TMI180-28H	TMI180-28HA
5/16-18	0.234	0.632	0.250	2.50	3	TMI234-18H	TMI234-18HA
5/16-24	0.234	0.641	0.250	2.50	3	TMI234-24H	TMI234-24HA
5/16-32	0.234	0.638	0.250	2.50	3	TMI234-32H	TMI234-32HA
5/16-40	0.234	0.635	0.250	2.50	3	TMI234-40H	TMI234-40HA
3/8-16	0.285	0.775	0.3125	3.00	4	TMI285-16H	TMI285-16HA
3/8-20	0.285	0.770	0.3125	3.00	4	TMI285-20H	TMI285-20HA
3/8-24	0.285	0.766	0.3125	3.00	4	TMI285-24H	TMI285-24HA
3/8-32	0.285	0.763	0.3125	3.00	4	TMI285-32H	TMI285-32HA
7/16-14	0.305	0.886	0.3125	3.00	4	TMI305-14H	TMI305-14HA
7/16-18	0.335	0.888	0.375	3.00	4	TMI335-18H	TMI335-18HA
7/16-20	0.335	0.870	0.375	3.00	4	TMI335-20H	TMI335-20HA
1/2-13	0.350	0.877	0.375	3.00	4	TMI350-13H	TMI350-13HA
9/16-12	0.370	0.867	0.375	3.00	4	TMI370-12H	TMI370-12HA
9/16-18	0.370	0.911	0.375	3.00	4	TMI370-18H	TMI370-18HA
9/16-32	0.370	0.888	0.375	3.00	4	TMI370-32H	TMI370-32HA
5/8-11	0.470	1.309	0.500	4.00	4	TMI470-11H	TMI470-11HA
3/4-10	0.495	1.340	0.500	4.00	4	TMI495-10H	TMI495-10HA
3/4-12	0.495	1.283	0.500	4.00	4	TMI495-12H	TMI495-12HA
3/4-14	0.495	1.314	0.500	4.00	4	TMI495-14H	TMI495-14HA
3/4-16	0.495	1.338	0.500	4.00	4	TMI495-16H	TMI495-16HA
3/4-18	0.495	1.300	0.500	4.00	4	TMI495-18H	TMI495-18HA
3/4-20	0.495	1.320	0.500	4.00	4	TMI495-20H	TMI495-20HA
3/4-32	0.495	1.325	0.500	4.00	4	TMI495-32H	TMI495-32HA
7/8-9	0.620	1.489	0.625	4.00	4	TMI620-9H	TMI620-9HA
1.0-8	0.620	1.550	0.625	4.00	4	TMI620-8H	TMI620-8HA
1.0-12	0.620	1.534	0.625	4.00	4	TMI620-12H	TMI620-12HA
1.0-14	0.620	1.529	0.625	4.00	4	TMI620-14H	TMI620-14HA
1.0-16	0.620	1.525	0.625	4.00	4	TMI620-16H	TMI620-16HA

\*Thread mills can cut any larger size internal thread of the same pitch

# UN THREAD MILLS

## 30° HELICAL FLUTE SOLID CARBIDE



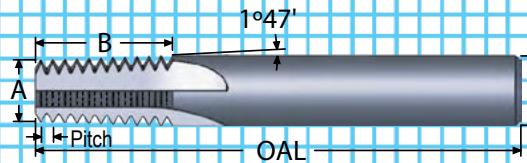
- Helical flute for reduced side cutting pressure
- Non-crest cutting on the internal thread allows maximum flexibility for plated and non-standard threads

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTIN+
						INTERNAL OR EXTERNAL THREADS	
10-24	0.125	0.350	0.250	2.50	3	TM125-24H	TM125-24HA
10-24	0.140	0.392	0.250	2.50	3	TM140-24H	TM140-24HA
10-28	0.140	0.407	0.250	2.50	3	TM140-28H	TM140-28HA
10-32	0.140	0.388	0.250	2.50	3	TM140-32H	TM140-32HA
10-48	0.140	0.383	0.250	2.50	3	TM140-48H	TM140-48HA
1/4-20	0.170	0.520	0.250	2.50	3	TM170-20H	TM170-20HA
1/4-24	0.170	0.517	0.250	2.50	3	TM170-24H	TM170-24HA
1/4-28	0.170	0.514	0.250	2.50	3	TM170-28H	TM170-28HA
1/4-32	0.170	0.513	0.250	2.50	3	TM170-32H	TM170-32HA
1/4-36	0.170	0.511	0.250	2.50	3	TM170-36H	TM170-36HA
1/4-20	0.187	0.520	0.250	2.50	3	TM187-20H	TM187-20HA
1/4-24	0.187	0.517	0.250	2.50	3	TM187-24H	TM187-24HA
1/4-28	0.187	0.514	0.250	2.50	3	TM187-28H	TM187-28HA
1/4-32	0.187	0.513	0.250	2.50	3	TM187-32H	TM187-32HA
1/4-36	0.187	0.511	0.250	2.50	3	TM187-36H	TM187-36HA
1/4-40	0.187	0.511	0.250	2.50	3	TM187-40H	TM187-40HA
5/16-18	0.235	0.689	0.250	2.50	3	TM235-18H	TM235-18HA
5/16-20	0.235	0.670	0.250	2.50	3	TM235-20H	TM235-20HA
5/16-24	0.235	0.684	0.250	2.50	3	TM235-24H	TM235-24HA
5/16-28	0.235	0.657	0.250	2.50	3	TM235-28H	TM235-28HA
5/16-32	0.235	0.669	0.250	2.50	3	TM235-32H	TM235-32HA
5/16-40	0.235	0.660	0.250	2.50	3	TM235-40H	TM235-40HA
3/8-16	0.290	0.775	0.3125	3.50	4	TM290-16H	TM290-16HA
3/8-20	0.290	0.820	0.3125	3.50	4	TM290-20H	TM290-20HA
3/8-24	0.290	0.808	0.3125	3.50	4	TM290-24H	TM290-24HA
3/8-27	0.290	0.793	0.3125	3.50	4	TM290-27H	TM290-27HA
3/8-32	0.290	0.794	0.3125	3.50	4	TM290-32H	TM290-32HA
7/16-14	0.345	0.814	0.375	3.50	4	TM345-14H	TM345-14HA
7/16-18	0.345	0.800	0.375	3.50	4	TM345-18H	TM345-18HA
7/16-20	0.345	0.820	0.375	3.50	4	TM345-20H	TM345-20HA
7/16-24	0.345	0.808	0.375	3.50	4	TM345-24H	TM345-24HA
7/16-28	0.345	0.800	0.375	3.50	4	TM345-28H	TM345-28HA
9/16-12	0.400	1.117	0.500	3.50	4	TM400-12H	TM400-12HA
1/2-13	0.400	1.108	0.500	3.50	4	TM400-13H	TM400-13HA
1/2-16	0.400	1.088	0.500	3.50	4	TM400-16H	TM400-16HA
1/2-20	0.400	1.120	0.500	3.50	4	TM400-20H	TM400-20HA
1/2-24	0.400	1.100	0.500	3.50	4	TM400-24H	TM400-24HA
1/2-28	0.400	1.086	0.500	3.50	4	TM400-28H	TM400-28HA
1/2-32	0.400	1.106	0.500	3.50	4	TM400-32H	TM400-32HA
3/4-10	0.450	1.140	0.500	3.50	4	TM450-10H	TM450-10HA
5/8-11	0.450	1.127	0.500	3.50	4	TM450-11H	TM450-11HA
5/8-12	0.450	1.117	0.500	3.50	4	TM450-12H	TM450-12HA
9/16-16	0.450	1.088	0.500	3.50	4	TM450-16H	TM450-16HA
9/16-18	0.450	1.078	0.500	3.50	4	TM450-18H	TM450-18HA
9/16-20	0.450	1.120	0.500	3.50	4	TM450-20H	TM450-20HA

\*Thread mills can cut any larger size internal thread of the same pitch

# THREAD MILLS - NPT - STRAIGHT FLUTE SOLID CARBIDE

(NATIONAL PIPE TAPER)

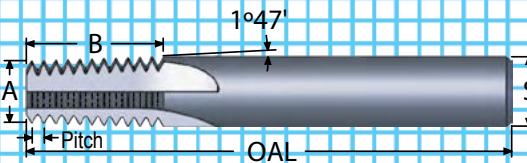


- Made with premium submicron grade carbide
- ALTiN+ coated for higher cutting speed

## STRAIGHT FLUTE - NPT

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
1/16, 1/8-27	0.218	0.534	0.250	2.50	4	TM218-27NPT	TM218-27NPT-A
1/8-27	0.280	0.758	0.375	3.50	4	TM280-27NPT	TM280-27NPT-A
1/4, 3/8-18	0.330	0.693	0.375	3.50	4	TM330-18NPT	TM330-18NPT-A
1/4, 3/8-18	0.382	0.800	0.4375	3.50	4	TM382-18NPT	TM382-18NPT-A
1/2, 3/4-14	0.430	1.105	0.500	3.50	4	TM430-14NPT	TM430-14NPT-A
1 to 2-11 1/2	0.650	1.605	0.750	4.00	5	TM650-11.5NPT	TM650-11.5NPT-A
2 1/2 up-8	0.650	1.560	0.750	4.00	5	TM650-8NPT	TM650-8NPT-A

For increased performance, use with tapered pipe reamer on page 114.



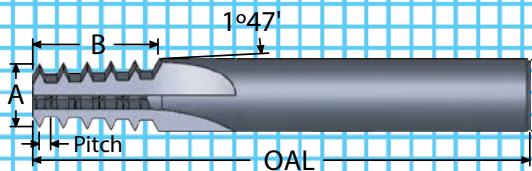
- ALTiN+ coating for improved surface finish
- Polished flute face for optimum performance

## STRAIGHT FLUTE - DRYSEAL - NPTF

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
1/16, 1/8-27	0.218	0.534	0.250	2.50	4	TM218-27NPTF	TM218-27NPTF-A
1/8-27	0.280	0.758	0.375	3.50	4	TM280-27NPTF	TM280-27NPTF-A
1/4, 3/8-18	0.330	0.693	0.375	3.50	4	TM330-18NPTF	TM330-18NPTF-A
1/4, 3/8-18	0.382	0.800	0.4375	3.50	4	TM382-18NPTF	TM382-18NPTF-A
1/2, 3/4-14	0.430	1.105	0.500	3.50	4	TM430-14NPTF	TM430-14NPTF-A
1 to 2-11 1/2	0.650	1.605	0.750	4.00	5	TM650-11.5NPTF	TM650-11.5NPTF-A
2 1/2 up-8	0.650	1.560	0.750	4.00	5	TM650-8NPTF	TM650-8NPTF-A

All NPT thread mills are crest cutting

# THREAD MILLS - NPT - STRAIGHT FLUTE STAGGERED TOOTH - SOLID CARBIDE (NATIONAL PIPE TAPER)



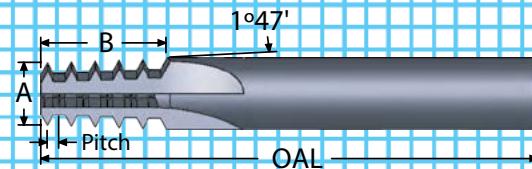
- Staggered tooth design reduces tool pressure
- ALTiN+ coating extends tool life

## STRAIGHT FLUTE - STAGGERED TOOTH - NPT

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
1/16, 1/8-27	0.220	0.534	0.250	2.50	4	TM220-27NPT	TM220-27NPT-A
1/8-27	0.275	0.758	0.375	3.50	4	TM275-27NPT	TM275-27NPT-A
1/4, 3/8-18	0.335	0.693	0.375	3.50	4	TM335-18NPT	TM335-18NPT-A
1/4, 3/8-18	0.387	0.805	0.4375	3.50	4	TM387-18NPT	TM387-18NPT-A
1/2, 3/4-14	0.435	1.034	0.500	3.50	4	TM435-14NPT	TM435-14NPT-A
1/2, 3/4-14	0.440	1.034	0.750	6.00	4	◆ TM440-14NPT	◆ TM440-14NPT-A
1 1/4 to 2-11 1/2	1.000	1.742	1.000	6.00	6	▲ TM1.0-11.5NPT	▲ TM1.0-11.5NPT-A

For increased performance, use with tapered pipe reamer on page 114.

- ◆ Tool is steel shank with a solid carbide head
- ▲ Tool is carbide tipped



- Made from premium submicron carbide
- ALTiN+ coated tool for higher cutting speed

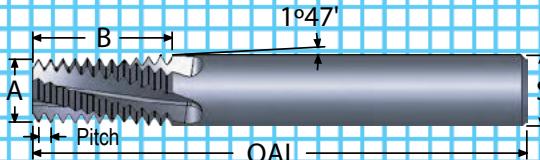
## STRAIGHT FLUTE - STAGGERED TOOTH- DRYSEAL - NPTF

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
1/16, 1/8-27	0.220	0.534	0.250	2.50	4	TM220-27NPTF	TM220-27NPTF-A
1/8-27	0.275	0.758	0.375	3.50	4	TM275-27NPTF	TM275-27NPTF-A
1/4, 3/8-18	0.335	0.693	0.375	3.50	4	TM335-18NPTF	TM335-18NPTF-A
1/4, 3/8-18	0.387	0.805	0.4375	3.50	4	TM387-18NPTF	TM387-18NPTF-A
1/2, 3/4-14	0.435	1.034	0.500	3.50	4	TM435-14NPTF	TM435-14NPTF-A
1/2, 3/4-14	0.440	1.034	0.750	6.00	4	◆ TM440-14NPTF	◆ TM440-14NPTF-A
1 1/4 to 2-11 1/2	1.000	1.700	1.00	6.00	6	▲ TM1.0-11.5NPTF	▲ TM1.0-11.5NPTF-A

- ◆ Tool is steel shank with a solid carbide head
- ▲ Tool is carbide tipped

All NPT thread mills are crest cutting

# THREAD MILLS - NPT - HELICAL - CARBIDE (NATIONAL PIPE TAPER)



- Made with premium submicron grade carbide
- ALTiN+ coating for improved surface finish

## 15° HELICAL FLUTE- NPT

THREAD DIA./PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
<b>INTERNAL OR EXTERNAL THREADS</b>							
1/6,1/8-27	0.222	0.461	0.250	2.50	3	TMX222-27-H	TMX222-27-HA
1/4,3/8-18	0.270	0.636	0.312	2.50	4	TMX270-18-H	TMX270-18-HA
1/2,3/4-14	0.440	0.890	0.500	4.00	4	TMX440-14-H	TMX440-14-HA
1" to 2"-11.5	0.550	1.171	0.625	4.00	4	TMX550-11.5-H	TMX550-11.5-HA

For increased performance, use with tapered pipe reamer on page 114.



- ALTiN+ coating extends tool life
- Helical flute for reduced side cutting pressure

## 30° HELICAL FLUTE - NPT

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
<b>INTERNAL OR EXTERNAL THREADS</b>							
1/16,1/8-27	0.218	0.534	0.250	2.50	4	TM218-27NPT-H	TM218-27NPT-HA
1/8-27	0.280	0.758	0.375	3.50	4	TM280-27NPT-H	TM280-27NPT-HA
1/4, 3/8-18	0.330	0.693	0.375	3.50	4	TM330-18NPT-H	TM330-18NPT-HA
1/4, 3/8-18	0.382	0.800	0.4375	3.50	4	TM382-18NPT-H	TM382-18NPT-HA
1/2, 3/4-14	0.430	1.105	0.500	3.50	4	TM430-14NPT-H	TM430-14NPT-HA

For increased performance, use with tapered pipe reamer on page 114.



- Polished flute face for optimum performance
- ALTiN+ coated tool for higher cutting speed

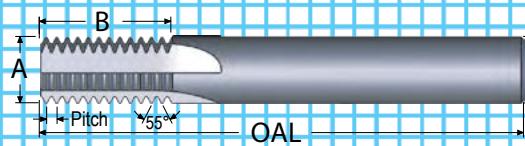
## 30° HELICAL FLUTE - NPTF - DRYSEAL

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
<b>INTERNAL OR EXTERNAL THREADS</b>							
1/16, 1/8-27	0.218	0.534	0.250	2.50	4	TM218-27NPTF-H	TM218-27NPTF-HA
1/8-27	0.280	0.758	0.375	3.50	4	TM280-27NPTF-H	TM280-27NPTF-HA
1/4, 3/8-18	0.330	0.693	0.375	3.50	4	TM330-18NPTF-H	TM330-18NPTF-HA
1/4, 3/8-18	0.382	0.800	0.4375	3.50	4	TM382-18NPTF-H	TM382-18NPTF-HA
1/2, 3/4-14	0.430	1.105	0.500	3.50	4	TM430-14NPTF-H	TM430-14NPTF-HA

All NPT thread mills are crest cutting

# THREAD MILLS - BSPP - SOLID CARBIDE

## (BRITISH STANDARD PIPE PARALLEL)

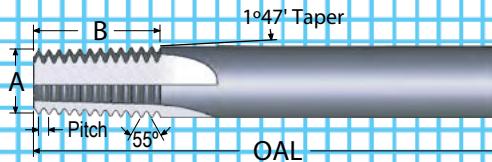


- BSPP and BSPT thread mills can cut any larger size internal thread of the same pitch
- Polished flute face for optimum performance

THREAD DIA / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
1/16, 1/8-28	0.245	0.657	0.250	2.50	4	TM245-28BSPP	TM245-28BSPP-A
1/4, 3/8-19	0.345	0.811	0.375	3.50	4	TM345-19BSPP	TM345-19BSPP-A
1/2, 3/4-14	0.450	1.100	0.500	3.50	4	TM450-14BSPP	TM450-14BSPP-A
1.0 up-8	0.620	1.125	0.625	3.50	5	TM620-11BSPP	TM620-11BSPP-A

# THREAD MILLS - BSPT - SOLID CARBIDE

## (BRITISH STANDARD PIPE TAPER)

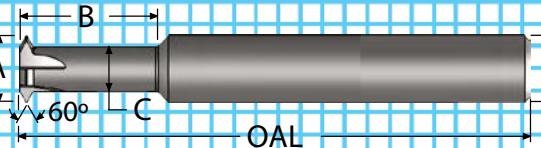


- ALTiN+ coated for improved surface finish
- Made with premium submicron grade carbide

THREAD DIA. / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
1/16, 1/8-28	0.215	0.550	0.250	2.50	4	TM215-28BSPT	TM215-28BSPT-A
1/4, 3/8-19	0.335	0.650	0.375	3.50	4	TM335-19BSPT	TM335-19BSPT-A
1/2, 3/4-14	0.430	1.100	0.500	3.50	4	TM430-14BSPT	TM430-14BSPT-A
1.0 up-8	0.550	1.127	0.625	3.50	5	TM550-11BSPT	TM550-11BSPT-A

# METRIC THREAD MILLS

## SINGLE PROFILE (SPTM) - SOLID CARBIDE



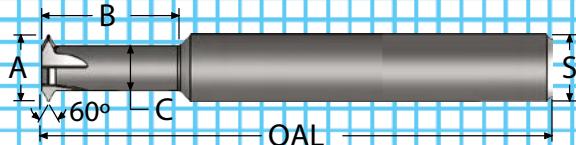
With just 19 varieties of Thread Mills, fine and coarse threads ranging from M1.2 to M30+ can be milled.

Min ID THREAD*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	RECOM- MENDED PITCH-MM	FLUTES	ORDER NUMBERS	
								UNCOATED	ALTIN+
								INTERNAL OR EXTERNAL THREADS	
M1.2	0.032	0.060	0.018	0.125	1.50	0.20 to 0.25	2	SPTM032	SPTM032A
M1.2	0.032	0.100	0.018	0.125	1.50	0.20 to 0.25	2	SPTM032L	SPTM032LA
M1.4	0.040	0.090	0.022	0.125	1.50	0.25 to 0.30	2	SPTM040	SPTM040A
M1.4	0.040	0.109	0.022	0.125	1.50	0.25 to 0.30	2	SPTM040ML	SPTM040MLA
M1.4	0.040	0.125	0.022	0.125	1.50	0.25 to 0.30	2	SPTM040L	SPTM040LA
M1.8	0.050	0.100	0.028	0.125	1.50	0.30 to 0.40	3	SPTM050	SPTM050A
M1.8	0.050	0.125	0.028	0.125	1.50	0.30 to 0.40	3	SPTM050ML	SPTM050MLA
M1.8	0.050	0.150	0.028	0.125	1.50	0.30 to 0.40	3	SPTM050L	SPTM050LA
M2.0	0.059	0.125	0.034	0.125	1.50	0.30 to 0.45	3	SPTM059	SPTM059A
M2.0	0.059	0.165	0.034	0.125	1.50	0.30 to 0.45	3	SPTM059ML	SPTM059MLA
M2.0	0.059	0.200	0.034	0.125	1.50	0.30 to 0.45	3	SPTM059L	SPTM059LA
M2.0	0.060	0.125	0.034	0.1875	2.00	0.30 to 0.45	3	SPTM060	SPTM060A
M2.0	0.060	0.165	0.034	0.1875	2.00	0.30 to 0.45	3	SPTM060ML	SPTM060MLA
M2.0	0.060	0.200	0.034	0.1875	2.00	0.30 to 0.45	3	SPTM060L	SPTM060LA
M2.5	0.072	0.150	0.040	0.1875	2.00	0.35 to 0.50	3	SPTM072	SPTM072A
M2.5	0.072	0.250	0.040	0.1875	2.00	0.35 to 0.50	3	SPTM072L	SPTM072LA
M3.0	0.080	0.190	0.045	0.1875	2.00	0.40 to 0.60	3	SPTM080	SPTM080A
M3.0	0.080	0.250	0.045	0.1875	2.00	0.40 to 0.60	3	SPTM080ML	SPTM080MLA
M3.0	0.080	0.300	0.045	0.1875	2.00	0.40 to 0.60	3	SPTM080L	SPTM080LA
M3.5	0.098	0.250	0.049	0.1875	2.00	0.40 to 0.80	3	SPTM098	SPTM098A
M3.5	0.098	0.330	0.049	0.1875	2.00	0.40 to 0.80	3	SPTM098ML	SPTM098MLA
M3.5	0.098	0.400	0.049	0.1875	2.00	0.40 to 0.80	3	SPTM098L	SPTM098LA
M4.0	0.120	0.300	0.070	0.1875	2.00	0.45 to 0.80	3	SPTM120	SPTM120A
M4.0	0.120	0.400	0.070	0.1875	2.00	0.45 to 0.80	3	SPTM120ML	SPTM120MLA
M4.0	0.120	0.500	0.070	0.1875	2.00	0.45 to 0.80	3	SPTM120L	SPTM120LA
M5.0	0.138	0.400	0.075	0.1875	2.00	0.45 to 1.00	3	SPTM138	SPTM138A
M5.0	0.138	0.500	0.075	0.1875	2.00	0.45 to 1.00	3	SPTM138ML	SPTM138MLA
M5.0	0.138	0.600	0.075	0.1875	2.00	0.45 to 1.00	3	SPTM138L	SPTM138LA
M6.0	0.160	0.400	0.088	0.1875	2.00	0.45 to 1.00	3	SPTM160	SPTM160A
M6.0	0.160	0.650	0.088	0.1875	2.00	0.45 to 1.00	3	SPTM160L	SPTM160LA

\*Single profile thread mills can cut any larger size internal thread within the recommended pitch-mm

# METRIC THREAD MILLS

## SINGLE PROFILE (SPTM) - SOLID CARBIDE



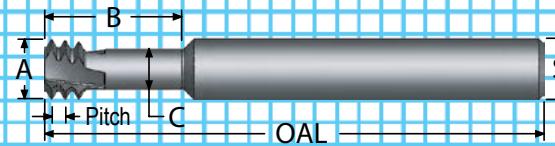
- Solid carbide provides maximum tool rigidity
- Long reach tools are available from stock
- ALTiN+ coating extends tool life

Min ID THREAD*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	RECOM- MENDED PITCH-MM	FLUTES	ORDER NUMBERS	
								UNCOATED	ALTiN+
								INTERNAL OR EXTERNAL THREADS	
M7.0	0.182	0.400	0.104	0.250	2.50	0.50 to 1.25	4	SPTM182	SPTM182A
M7.0	0.182	0.530	0.104	0.250	2.50	0.50 to 1.25	4	SPTM182ML	SPTM182MLA
M7.0	0.182	0.650	0.104	0.250	2.50	0.50 to 1.25	4	SPTM182L	SPTM182LA
M8.0	0.240	0.500	0.153	0.250	2.50	0.50 to 1.50	4	SPTM240	SPTM240A
M8.0	0.240	0.800	0.153	0.250	2.50	0.50 to 1.50	4	SPTM240L	SPTM240LA
M10	0.290	0.600	0.192	0.375	3.00	0.75 to 1.75	4	SPTM290	SPTM290A
M10	0.290	1.000	0.192	0.375	3.00	0.75 to 1.75	4	SPTM290L	SPTM290LA
M12	0.372	0.750	0.240	0.375	3.00	0.80 to 2.00	4	SPTM372	SPTM372A
M12	0.372	1.200	0.240	0.375	3.00	0.80 to 2.00	4	SPTM372L	SPTM372LA
M16	0.488	0.850	0.340	0.500	3.50	0.80 to 2.50	5	SPTM488	SPTM488A
M16	0.488	1.350	0.340	0.500	3.50	0.80 to 2.50	5	SPTM488L	SPTM488LA
M20	0.595	1.250	0.430	0.625	4.00	1.00 to 2.50	6	SPTM595	SPTM595A
M20	0.595	2.000	0.430	0.625	4.00	1.00 to 2.50	6	SPTM595L	SPTM595LA
M24	0.695	1.500	0.490	0.750	5.00	1.00 to 3.00	6	SPTM695	SPTM695A
M24	0.695	2.500	0.490	0.750	5.00	1.00 to 3.00	6	SPTM695L	SPTM695LA
M30	0.745	1.500	0.400	0.750	5.00	3.00 to 6.00	6	SPTM745	SPTM745A
M30	0.745	2.500	0.400	0.750	5.00	3.00 to 6.00	6	SPTM745L	SPTM745LA

\*Single profile thread mills can cut any larger size internal thread within the recommended pitch-mm

# METRIC THREAD MILLS

## LONG REACH (TMLR) - SOLID CARBIDE



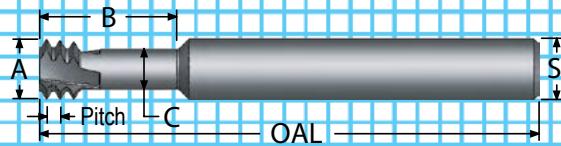
- Small thread milling is made easy with TMLR tools
- Minimal cutting pressure
- Thread sizes starting from M1.4-.3mm

MIN ID THREAD /PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBER	
							UNCOATED	ALTiN+
							INTERNAL THREADS ONLY	
M1.4-.3	0.039	0.115	0.021	0.125	1.50	3	TMLR1.4-.3MM	TMLR1.4-.3MMA
M1.4-.3	0.039	0.150	0.021	0.125	1.50	3	TMLR1.4-.3MMEL	TMLR1.4-.3MMELA
M1.6-.35	0.045	0.135	0.023	0.125	1.50	3	TMLR1.6-.35MM	TMLR1.6-.35MMA
M1.6-.35	0.045	0.180	0.023	0.125	1.50	3	TMLR1.6-.35MMEL	TMLR1.6-.35MMELA
M2-.4	0.056	0.150	0.030	0.125	1.50	3	TMLRS2-.4MM	TMLRS2-.4MMA
M2-.4	0.056	0.200	0.030	0.125	1.50	3	TMLRS2-.4MMEL	TMLRS2-.4MMELA
M2-.4	0.056	0.150	0.030	0.250	2.50	3	TMLR2-.4MM	TMLR2-.4MMA
M2-.4	0.056	0.200	0.030	0.250	2.50	3	TMLR2-.4MMEL	TMLR2-.4MMELA
M2.5-.45	0.073	0.190	0.046	0.250	2.50	3	TMLR2.5-.45MM	TMLR2.5-.45MMA
M2.5-.45	0.073	0.250	0.046	0.250	2.50	3	TMLR2.5-.45MMEL	TMLR2.5-.45MMELA
M3-.5	0.090	0.225	0.059	0.250	2.50	3	TMLR3-.5MM	TMLR3-.5MMA
M3-.5	0.090	0.300	0.059	0.250	2.50	3	TMLR3-.5MMEL	TMLR3-.5MMELA
M4-.5	0.120	0.300	0.089	0.250	2.50	3	TMLR4-.5MM	TMLR4-.5MMA
M4-.5	0.120	0.500	0.089	0.250	2.50	3	TMLR4-.5MMEL	TMLR4-.5MMELA
M4-.7	0.120	0.300	0.079	0.250	2.50	3	TMLR4-.7MM	TMLR4-.7MMA
M4-.7	0.120	0.500	0.079	0.250	2.50	3	TMLR4-.7MMEL	TMLR4-.7MMELA
M5-.8	0.150	0.400	0.103	0.250	2.50	3	TMLR5-.8MM	TMLR5-.8MMA
M5-.8	0.150	0.600	0.103	0.250	2.50	3	TMLR5-.8MMEL	TMLR5-.8MMELA
M6-1	0.180	0.500	0.120	0.250	2.50	3	TMLR6-1MM	TMLR6-1MMA
M6-1	0.180	0.700	0.120	0.250	2.50	3	TMLR6-1MMEL	TMLR6-1MMELA

\*Thread mills can cut any larger size internal thread of the same pitch

# METRIC THREAD MILLS

## LONG REACH (TMLR) - SOLID CARBIDE



- Economical cost per hole
- Excels in difficult-to-thread materials
- ALTiN+ coating for higher Surface Feet per Minute

THREAD MILLS  
METRIC

MIN ID THREAD/ PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBER	
							UNCOATED	ALTiN+
							INTERNAL THREADS ONLY	
M8-.75	0.234	0.600	0.190	0.250	2.50	3	TMLR8-.75MM	TMLR8-.75MMA
M8-.75	0.234	0.850	0.190	0.250	2.50	3	TMLR8-.75MMEL	TMLR8-.75MMELA
M8-1	0.234	0.600	0.175	0.250	2.50	3	TMLR8-1MM	TMLR8-1MMA
M8-1	0.234	0.850	0.175	0.250	2.50	3	TMLR8-1MMEL	TMLR8-1MMELA
M8-1.25	0.234	0.600	0.162	0.250	2.50	3	TMLR8-1.25MM	TMLR8-1.25MMA
M8-1.25	0.234	0.850	0.162	0.250	2.50	3	TMLR8-1.25MMEL	TMLR8-1.25MMELA
M10-1	0.310	0.750	0.250	0.375	3.50	3	TMLR10-1MM	TMLR10-1MMA
M10-1	0.310	1.000	0.250	0.375	3.50	3	TMLR10-1MMEL	TMLR10-1MMELA
M10-1.5	0.310	0.750	0.223	0.375	3.50	3	TMLR10-1.MM	TMLR10-1.5MMA
M10-1.5	0.310	1.000	0.223	0.375	3.50	3	TMLR10-1.5MMEL	TMLR10-1.5MMELA
M12-1	0.370	0.800	0.310	0.375	3.50	3	TMLR12-1MM	TMLR12-1MMA
M12-1	0.370	1.200	0.310	0.375	3.50	3	TMLR12-1MMEL	TMLR12-1MMELA
M12-1.25	0.370	0.800	0.295	0.375	3.50	3	TMLR12-1.25MM	TMLR12-1.25MMA
M12-1.25	0.370	1.200	0.295	0.375	3.50	3	TMLR12-1.25MMEL	TMLR12-1.25MMELA
M14-1.5	0.450	1.200	0.360	0.500	4.00	4	TMLR14-1.5MM	TMLR14-1.5MMA
M14-1.5	0.450	1.650	0.360	0.500	4.00	4	TMLR14-1.5MMEL	TMLR14-1.5MMELA
M14-2	0.450	1.200	0.330	0.500	4.00	4	TMLR14-2MM	TMLR14-2MMA
M14-2	0.450	1.650	0.330	0.500	4.00	4	TMLR14-2MMEL	TMLR14-2MMELA

\*Thread mills can cut any larger size internal thread of the same pitch

# THREAD MILLS - METRIC

## STRAIGHT FLUTE - CARBIDE



➤ All thread mills featured on this page can cut any larger size internal thread of same pitch

### 3 FLUTE

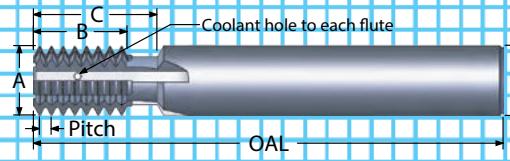
MIN ID THREAD / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	ORDER NUMBERS	
					UNCOATED	ALTiN+
					INTERNAL THREADS ONLY	
3-.5	0.090	0.264	0.250	2.50	TM3-.5MM	TM3-.5MM-A
3-.5	0.090	0.185	0.250	2.50	TM3-.5MM-S	TM3-.5MM-SA
3.5-.6	0.090	0.269	0.250	2.50	TM3.5-.6MM	TM3.5-.6MM-A
3.5-.6	0.090	0.175	0.250	2.50	TM3.5-.6MM-S	TM3.5-.6MM-SA
4-.5	0.110	0.323	0.250	2.50	TM4-.5MM	TM4-.5MM-A
4-.5	0.110	0.224	0.250	2.50	TM4-.5MM-S	TM4-.5MM-SA
4-.7	0.110	0.342	0.250	2.50	TM4-.7MM	TM4-.7MM-A
4-.7	0.110	0.231	0.250	2.50	TM4-.7MM-S	TM4-.7MM-SA
4.5-.75	0.125	0.337	0.250	2.50	TM4.5-.75MM	TM4.5-.75MM-A
4.5-.75	0.125	0.219	0.250	2.50	TM4.5-.75MM-S	TM4.5-.75MM-SA
5-.7	0.140	0.397	0.250	2.50	TM5-.7MM	TM5-.7MM-A
5-.7	0.140	0.259	0.250	2.50	TM5-.7MM-S	TM5-.7MM-SA
5-.8	0.140	0.391	0.250	2.50	TM5-.8MM	TM5-.8MM-A
5-.8	0.140	0.265	0.250	2.50	TM5-.8MM-S	TM5-.8MM-SA
6-.5	0.170	0.520	0.250	2.50	TM6-.5MM	TM6-.5MM-A
6-.5	0.170	0.382	0.250	2.50	TM6-.5MM-S	TM6-.5MM-SA
6-.75	0.170	0.543	0.250	2.50	TM6-.75MM	TM6-.75MM-A
6-.75	0.170	0.366	0.250	2.50	TM6-.75MM-S	TM6-.75MM-SA
6-1	0.170	0.528	0.250	2.50	TM6-1MM	TM6-1MM-A
6-1	0.170	0.370	0.250	2.50	TM6-1MM-S	TM6-1MM-SA
6-1.25	0.170	0.561	0.250	2.50	TM6-1.25MM	TM6-1.25MM-A
6-1.25	0.170	0.364	0.250	2.50	TM6-1.25MM-S	TM6-1.25MM-SA
8-.75	0.235	0.662	0.250	2.50	TM8-.75MM	TM8-.75MM-A
8-1	0.235	0.685	0.250	2.50	TM8-1MM	TM8-1MM-A
8-1.25	0.235	0.660	0.250	2.50	TM8-1.25MM	TM8-1.25MM-A

### 4 FLUTE

MIN ID THREAD / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	ORDER NUMBERS	
					UNCOATED	ALTiN+
					INTERNAL THREADS ONLY	
10-1	0.290	0.803	0.3125	3.50	TM10-1MM	TM10-1MM-A
10-1.5	0.290	0.792	0.3125	3.50	TM10-1.5MM	TM10-1.5MM-A
12-1.25	0.345	0.807	0.375	3.50	TM12-1.25MM	TM12-1.25MM-A
12-1.5	0.345	0.792	0.375	3.50	TM12-1.5MM	TM12-1.5MM-A
12-1.75	0.345	0.787	0.375	3.50	TM12-1.75MM	TM12-1.75MM-A
12-1	0.400	1.079	0.500	3.50	TM12-1MM	TM12-1MM-A
14-1.25	0.450	1.103	0.500	3.50	TM14-1.25MM	TM14-1.25MM-A
14-1.5	0.450	1.087	0.500	3.50	TM14-1.5MM	TM14-1.5MM-A
14-1.75	0.450	1.134	0.500	3.50	TM14-1.75MM	TM14-1.75MM-A
14-2	0.450	1.134	0.500	3.50	TM14-2MM	TM14-2MM-A
16-2.5	0.450	1.122	0.500	3.50	TM16-2.5MM	TM16-2.5MM-A

- Optional short length-of-cut for ideal length-to-diameter ratio
- Polished flute face for optimum performance
- Made with premium submicron grade carbide
- Internal crest cutting design provides strongest possible tool

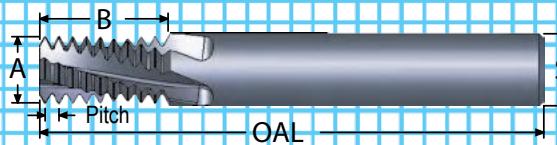
## METRIC THREAD MILL - STRAIGHT FLUTE CARBIDE TIPPED COOLANT THROUGH THREAD MILLS



- Non-crest cutting on the internal thread allows maximum flexibility for plated and non-standard threads

MIN ID THREAD / PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" TOOL REACH	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							INTERNAL OR EXTERNAL THREADS	
24-1.5	0.740	1.058	1.370	0.750	6.00	4	TMC24-1.5MM	TMC24-1.5MM-A
24-2	0.740	1.100	1.370	0.750	6.00	4	TMC24-2MM	TMC24-2MM-A
24-2.5	0.740	1.076	1.370	0.750	6.00	4	TMC24-2.5MM	TMC24-2.5MM-A
24-3	0.740	1.058	1.370	0.750	6.00	4	TMC24-3MM	TMC24-3MM-A
36-4	0.990	1.095	1.370	1.00	6.00	6	TMC36-4MM	TMC36-4MM-A

# METRIC - 15° HELICAL FLUTE - CARBIDE

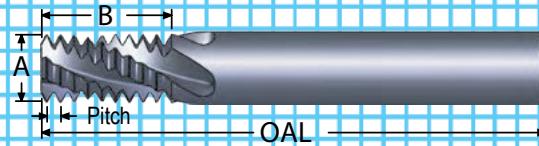


- Helical flute for reduced side cutting pressure
- ALTiN+ coating extends tool life

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBER	
						UNCOATED	ALTiN+
						INTERNAL THREADS ONLY	
M4.5-.75	0.118	0.248	6mm	58mm	3	TMI4.5-0.75-H	TM14.5-0.75-HA
M5.0-.80	0.118	0.328	6mm	58mm	3	TMI5.0-0.80-H	TM15.0-0.80-HA
M6.0-1	0.169	0.488	6mm	58mm	3	TMI6.0-1.00-H	TM16.0-1.00-HA
M8.0-.75	0.234	0.632	6mm	58mm	3	TMI8.0-0.75-H	TM18.0-0.75-HA
M8.0-1	0.234	0.646	6mm	58mm	3	TMI8.0-1.00-H	TM18.0-1.00-HA
M8.0-1.25	0.234	0.659	6mm	58mm	3	TMI8.0-1.25-H	TM18.0-1.25-HA
M10-1.5	0.300	0.790	8mm	75mm	4	TMI10-1.50-H	TM110-1.50-HA
M12-1	0.360	0.881	10mm	100mm	4	TMI12-1.00-H	TM112-1.00-HA
M12-1.75	0.360	0.923	10mm	100mm	4	TMI12-1.75-H	TM112-1.75-HA
M14-1.5	0.370	0.909	10mm	100mm	4	TMI14-1.50-H	TM114-1.50-HA
M16-2	0.470	1.290	12mm	100mm	4	TMI16-2.00-H	TM116-2.00-HA
M18-1.5	0.470	1.263	12mm	100mm	4	TMI18-1.50-H	TM118-1.50-HA
M20-2.5	0.470	1.318	12mm	100mm	4	TMI20-2.50-H	TM120-2.50-HA

\*Thread mills can cut any larger size internal thread of the same pitch

# THREAD MILL - METRIC - 30° HELICAL FLUTE - CARBIDE

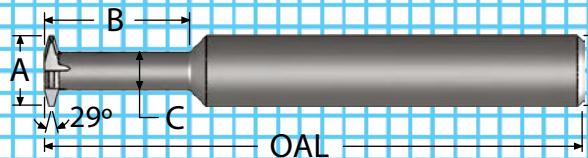


- Optional short length-of-cut for ideal length-to-diameter ratio
- Internal and external threads

MIN ID THREAD / PITCH*	"A" TOOL DIA.	"B" LENGTH OF CUT	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
						INTERNAL OR EXTERNAL THREADS	
6-.5	0.170	0.520	0.250	2.50	3	TM6-.5MM-H	TM6-.5MM-HA
6-.5	0.170	0.382	0.250	2.50	3	TM6-.5MM-SH	TM6-.5MM-SHA
6-.75	0.170	0.543	0.250	2.50	3	TM6-.75MM-H	TM6-.75MM-HA
6-.75	0.170	0.366	0.250	2.50	3	TM6-.75MM-SH	TM6-.75MM-SHA
6-1	0.170	0.528	0.250	2.50	3	TM6-1MM-H	TM6-1MM-HA
6-1	0.170	0.370	0.250	2.50	3	TM6-1MM-SH	TM6-1MM-SHA
6-1.25	0.170	0.561	0.250	2.50	3	TM6-1.25MM-H	TM6-1.25MM-HA
6-1.25	0.170	0.364	0.250	2.50	3	TM6-1.25MM-SH	TM6-1.25MM-SHA
8-.75	0.235	0.662	0.250	2.50	3	TM8-.75MM-H	TM8-.75MM-HA
8-1	0.235	0.685	0.250	2.50	3	TM8-1MM-H	TM8-1MM-HA
8-1.25	0.235	0.660	0.250	2.50	3	TM8-1.25MM-H	TM8-1.25MM-HA
10-1	0.290	0.803	0.3125	3.50	4	TM10-1MM-H	TM10-1MM-HA
10-1.5	0.290	0.792	0.3125	3.50	4	TM10-1.5MM-H	TM10-1.5MM-HA
12-1.25	0.345	0.807	0.375	3.50	4	TM12-1.25MM-H	TM12-1.25MM-HA
12-1.5	0.345	0.792	0.375	3.50	4	TM12-1.5MM-H	TM12-1.5MM-HA
12-1.75	0.345	0.787	0.375	3.50	4	TM12-1.75MM-H	TM12-1.75MM-HA
12-1	0.400	1.079	0.500	3.50	4	TM12-1MM-H	TM12-1MM-HA
14-1.25	0.450	1.103	0.500	3.50	4	TM14-1.25MM-H	TM14-1.25MM-HA
14-1.5	0.450	1.087	0.500	3.50	4	TM14-1.5MM-H	TM14-1.5MM-HA
14-1.75	0.450	1.134	0.500	3.50	4	TM14-1.75MM-H	TM14-1.75MM-HA
14-2	0.450	1.134	0.500	3.50	4	TM14-2MM-H	TM14-2MM-HA
16-2.5	0.450	1.122	0.500	3.50	4	TM16-2.5MM-H	TM16-2.5MM-HA

\*Thread mills can cut any larger size internal thread of the same pitch

# STUB ACME - INTERNAL AND EXTERNAL SOLID CARBIDE SINGLE PROFILE THREAD MILLS



- Solid carbide for maximum tool rigidity
- ALTiN+ coating for increased performance

## INTERNAL ONLY

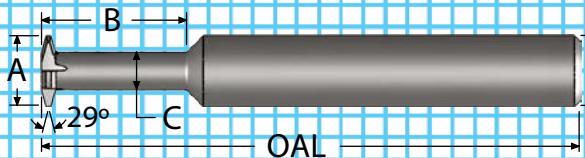
* THREAD/ PITCH	"A" CUTTER DIA.	"B" NECK LENGTH	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							INTERNAL THREADS ONLY	
1/4-16	0.170	0.350	0.080	0.250	2.50	4	SPTM170SA-16	SPTM170SA-16A
1/4-16	0.170	0.500	0.080	0.250	2.50	4	SPTM170SA-16L	SPTM170SA-16LA
5/16-14	0.200	0.500	0.105	0.250	2.50	4	SPTM200SA-14	SPTM200SA-14A
5/16-14	0.200	0.750	0.105	0.250	2.50	4	SPTM200SA-14L	SPTM200SA-14LA
3/8-12, 7/16-12	0.235	0.600	0.130	0.250	2.50	4	SPTM235SA-12	SPTM235SA-12A
3/8-12, 7/16-12	0.235	0.900	0.130	0.250	2.50	4	SPTM235SA-12L	SPTM235SA-12LA
1/2-10	0.320	0.750	0.170	0.375	3.00	4	SPTM320SA-10	SPTM320SA-10A
1/2-10	0.320	1.200	0.170	0.375	3.00	4	SPTM320SA-10L	SPTM320SA-10LA
5/8-8	0.400	0.800	0.230	0.500	3.50	4	SPTM400SA-8	SPTM400SA-8A
5/8-8	0.400	1.300	0.230	0.500	3.50	4	SPTM400SA-8L	SPTM400SA-8LA
3/4-6, 7/8-6	0.490	0.800	0.260	0.500	3.50	4	SPTM490SA-6	SPTM490SA-6A
3/4-6, 7/8-6	0.490	1.300	0.260	0.500	3.50	4	SPTM490SA-6L	SPTM490SA-6LA
1-5 to 1-1/4-5	0.620	1.250	0.350	0.625	4.00	5	SPTM620SA-5	SPTM620SA-5A
1-5 to 1-1/4-5	0.620	1.750	0.350	0.625	4.00	5	SPTM620SA-5L	SPTM620SA-5LA
1-3/8-4 to 1-3/4-4	0.745	1.500	0.425	0.750	5.00	5	SPTM745SA-4	SPTM745SA-4A
1-3/8-4 to 1-3/4-4	0.745	2.500	0.425	0.750	5.00	5	SPTM745SA-4L	SPTM745SA-4LA

\* Internal Stub Acme thread mills will only cut the thread size listed.  
For other thread sizes, please call for availability.

## EXTERNAL ONLY

THREAD PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							EXTERNAL THREADS ONLY	
-16	0.240	0.750	0.145	0.250	2.50	4	SPTM240SA-16EX	SPTM240SA-16EXA
-14	0.240	0.750	0.145	0.250	2.50	4	SPTM240SA-14EX	SPTM240SA-14EXA
-12	0.370	1.375	0.260	0.375	3.00	4	SPTM370SA-12EX	SPTM370SA-12EXA
-10	0.495	1.750	0.345	0.500	3.50	4	SPTM495SA-10EX	SPTM495SA-10EXA
-8	0.495	1.750	0.325	0.500	3.50	4	SPTM495SA-8EX	SPTM495SA-8EXA
-6	0.620	2.000	0.390	0.625	4.00	5	SPTM620SA-6EX	SPTM620SA-6EXA
-5	0.745	2.250	0.475	0.750	5.00	5	SPTM745SA-5EX	SPTM745SA-5EXA
-4	0.745	2.250	0.425	0.750	5.00	5	SPTM745SA-4EX	SPTM745SA-4EXA

# ACME - INTERNAL AND EXTERNAL SOLID CARBIDE SINGLE PROFILE THREAD MILLS



- Solid carbide for maximum tool rigidity
- ALTiN+ coating extends tool life

## INTERNAL ONLY

★ THREAD/ PITCH	"A" CUTTER DIA.	"B" NECK LENGTH	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							INTERNAL THREADS ONLY	
1/4-16	0.170	0.350	0.080	0.250	2.50	4	SPTM170FA-16	SPTM170FA-16A
1/4-16	0.170	0.500	0.080	0.250	2.50	4	SPTM170FA-16L	SPTM170FA-16LA
5/16-14	0.200	0.500	0.105	0.250	2.50	4	SPTM200FA-14	SPTM200FA-14A
5/16-14	0.200	0.750	0.105	0.250	2.50	4	SPTM200FA-14L	SPTM200FA-14LA
3/8-12, 7/16-12	0.235	0.600	0.130	0.250	2.50	4	SPTM235FA-12	SPTM235FA-12A
3/8-12, 7/16-12	0.235	0.900	0.130	0.250	2.50	4	SPTM235FA-12L	SPTM235FA-12LA
1/2-10	0.320	0.750	0.170	0.375	3.00	4	SPTM320FA-10	SPTM320FA-10A
1/2-10	0.320	1.200	0.170	0.375	3.00	4	SPTM320FA-10L	SPTM320FA-10LA
5/8-8	0.400	0.800	0.230	0.500	3.50	4	SPTM400FA-8	SPTM400FA-8A
5/8-8	0.400	1.300	0.230	0.500	3.50	4	SPTM400FA-8L	SPTM400FA-8LA
3/4-6, 7/8-6	0.490	0.800	0.260	0.500	3.50	4	SPTM490FA-6	SPTM490FA-6A
3/4-6, 7/8-6	0.490	1.300	0.260	0.500	3.50	4	SPTM490FA-6L	SPTM490FA-6LA
1-5 to 1-1/4-5	0.620	1.250	0.350	0.625	4.00	5	SPTM620FA-5	SPTM620FA-5A
1-5 to 1-1/4-5	0.620	1.750	0.350	0.625	4.00	5	SPTM620FA-5L	SPTM620FA-5LA
1-3/8-4 to 1-3/4-4	0.745	1.500	0.425	0.750	5.00	5	SPTM745FA-4	SPTM745FA-4A
1-3/8-4 to 1-3/4-4	0.745	2.500	0.425	0.750	5.00	5	SPTM745FA-4L	SPTM745FA-4LA

\* Internal Acme thread mills will only cut the thread size listed.  
For other thread sizes, please call for availability.

## EXTERNAL ONLY

THREAD PITCH	"A" TOOL DIA.	"B" LENGTH OF CUT	"C" NECK DIA.	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
							UNCOATED	ALTiN+
							EXTERNAL THREADS ONLY	
-16	0.240	0.750	0.145	0.250	2.50	4	SPTM240FA-16EX	SPTM240FA-16EXA
-14	0.240	0.750	0.145	0.250	2.50	4	SPTM240FA-14EX	SPTM240FA-14EXA
-12	0.370	1.375	0.260	0.375	3.00	4	SPTM370FA-12EX	SPTM370FA-12EXA
-10	0.495	1.750	0.345	0.500	3.50	4	SPTM495FA-10EX	SPTM495FA-10EXA
-8	0.495	1.750	0.325	0.500	3.50	4	SPTM495FA-8EX	SPTM495FA-8EXA
-6	0.620	2.000	0.390	0.625	4.00	5	SPTM620FA-6EX	SPTM620FA-6EXA
-5	0.745	2.250	0.475	0.750	5.00	5	SPTM745FA-5EX	SPTM745FA-5EXA
-4	0.745	2.250	0.425	0.750	5.00	5	SPTM745FA-4EX	SPTM745FA-4EXA

# INTERNAL UN THREAD MILL LOCATER CHART

This chart is designed to help select the proper thread mill for a given thread size. ALTiN+ thread mills are highly recommended for ferrous material.

THREAD/PITCH	EX SPTM PAGE# 8,9	STRAIGHT FLUTE PAGE# 12,13	30° HELICAL FLUTE PAGE# 17	15° HELICAL FLUTE PAGE# 16	TMLR PAGE# 10	EX STAGGERED
00-90	SPTM032	—	—	—	—	—
0-80	SPTM040	—	—	—	—	—
1-64	SPTM050	—	—	—	—	—
1-72	SPTM050	—	—	—	—	—
2-56	SPTM060	—	—	—	TMLR065-56	—
2-64	SPTM060	—	—	—	—	—
3-48	SPTM072	—	—	—	—	—
3-56	SPTM072	—	—	—	TMLR065-56	—
4-40	SPTM080	TM080-40	—	TMI079-40H	TMLR082-40	—
4-48	SPTM080	—	—	—	—	—
5-40	SPTM080	TM080-40	—	TMI079-40H	TMLR082-40	—
5-44	SPTM080	—	—	—	—	—
6-32	SPTM098	TM098-32	—	TMI100-32H	TMLR100-32	—
6-40	SPTM098	TM098-40	—	—	TMLR082-40	—
8-32	SPTM120	TM125-32	—	TMI115-32H	TMLR126-32	—
8-36	SPTM120	TM110-36	—	—	TMLR126-36	—
10-24	SPTM138	TM140-24	TM140-24H	TMI120-24H	TMLR139-24	—
10-28	SPTM138	TM140-28	TM140-28H	TMI120-28H	—	—
10-32	SPTM138	TM140-32	TM140-32H	TMI120-32H	TMLR139-32	—
10-36	SPTM138	TM110-36	—	—	TMLR126-36	—
10-40	SPTM138	TM098-40	—	—	TMLR100-40	—
10-48	SPTM138	TM140-48	TM140-48H	—	TMLR139-48	—
10-56	SPTM138	—	—	—	—	—
12-24	SPTM160	TM140-24	TM140-24H	TMI120-24H	TMLR139-24	—
12-28	SPTM160	TM140-28	TM140-28H	TMI120-28H	—	—
12-32	SPTM160	TM140-32	TM140-32H	TMI120-32H	TMLR139-32	—
12-36	SPTM160	TM170-36	TM170-36H	—	TMLR126-36	—
12-40	SPTM160	TM098-40	—	—	TMLR100-40	—
12-48	SPTM160	TM140-48	TM140-48H	—	TMLR139-48	—
12-56	SPTM160	—	—	—	—	—
1/4-20	SPTM182	TM187-20	TM187-20H	TMI180-20H	TMLR186-20	—
1/4-24	SPTM182	TM187-24	TM187-24H	—	TMLR139-24	—
1/4-27	SPTM182	—	—	—	—	—
1/4-28	SPTM182	TM187-28	TM187-28H	TMI180-28H	TMLR186-28	—
1/4-32	SPTM182	TM187-32	TM187-32H	—	TMLR186-32	—
1/4-36	SPTM182	TM187-36	TM187-36H	—	—	—
1/4-40	SPTM182	TM187-40	TM187-40H	—	—	—
1/4-48	SPTM182	TM187-48	—	—	—	—
1/4-56	SPTM182	—	—	—	—	—

**EX** Tools in column will also cut external threads

**Thread mills can cut any larger size internal thread of the same pitch**

# INTERNAL UN THREAD MILL LOCATER CHART

THREAD/ PITCH	EX SPTM PAGE# 9	STRAIGHT FLUTE PAGE# 13	EX 30° HELICAL FLUTE PAGE# 17	15° HELICAL FLUTE PAGE# 16	TMLR PAGE# 10,11	EX STAGGERED PAGE # 15
5/16-18	SPTM240	TM235-18	TM235-18H	TMI234-18H	TMLR234-18	—
5/16-20	SPTM240	TM235-20	TM235-20H	TMI180-20H	TMLR186-20	—
5/16-24	SPTM240	TM235-24	TM235-24H	TMI234-24H	TMLR234-24	—
5/16-27	SPTM240	—	—	TMI285-20H	—	—
5/16-28	SPTM240	TM235-28	TM235-28H	TMI180-28H	TMLR234-28	—
5/16-32	SPTM240	TM235-32	TM235-32H	TMI234-32H	TMLR234-32	—
5/16-36	SPTM240	TM187-36	TM187-36H	—	—	—
5/16-40	SPTM240	TM235-40	TM235-40H	TMI234-40H	TMLR234-40	—
5/16-48	SPTM240	TM187-48	—	—	—	—
3/8-16	SPTM290	TM290-16	TM290-16H	TMI285-16H	TMLR285-16	—
3/8-18	SPTM240	TM235-18	TM235-18H	TMI234-18H	TMLR234-18	—
3/8-20	SPTM290	TM290-20	TM290-20H	TMI285-20H	TMLR186-20	TM250-20
3/8-24	SPTM290	TM290-24	TM290-24H	TMI285-24H	TMLR285-24	TM250-24
3/8-27	SPTM290	TM290-27	TM290-27H	—	—	—
3/8-28	SPTM290	TM235-28	TM235-28H	—	TMLR234-28	TM250-28
3/8-32	SPTM290	TM290-32	TM290-32H	TMI234-32H	TMLR285-32	TM250-32
3/8-36	SPTM290	TM187-36	TM187-36H	TMI285-32H	—	TM250-36
3/8-40	SPTM290	TM187-40	TM187-40H	TMI234-40H	TMLR234-40	TM250-40
7/16-14	SPTM290	TM345-14	TM345-14H	TMI305-14H	TMLR340-14	—
7/16-16	SPTM290	TM290-16	TM290-16H	TMI285-16H	TMLR285-16	TM350-16
7/16-18	SPTM290	TM345-18	TM345-18H	TMI335-18H	TMLR340-18	TM350-18
7/16-20	SPTM290	TM345-20	TM345-20H	TMI335-20H	TMLR340-20	TM350-20
7/16-24	SPTM290	TM345-24	TM345-24H	TMI285-24H	TMLR285-24	TM350-24
7/16-27	SPTM290	TM290-27	TM290-27H	—	—	—
7/16-28	SPTM290	TM345-28	TM345-28H	—	TMLR234-28	TM250-28
7/16-32	SPTM290	TM290-32	TM290-32H	TMI285-32H	TMLR285-32	TM250-32
1/2-12	SPTM372	—	—	—	TMLR370-12	—
1/2-13	SPTM372	TM400-13	TM400-13H	TMI350-13H	TMLR370-13	—
1/2-14	SPTM372	TM345-14	TM345-14H	TMI305-14H	TMLR340-14	—
1/2-16	SPTM372	TM400-16	TM400-16H	TMI285-16H	TMLR285-16	TM350-16
1/2-18	SPTM372	TM345-18	TM345-18H	—	TMLR370-18	TM350-18
1/2-20	SPTM372	TM400-20	TM400-20H	TMI335-20H	TMLR370-20	TM350-20
1/2-24	SPTM372	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
1/2-27	SPTM372	TM290-27	TM290-27H	—	—	—
1/2-28	SPTM372	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
1/2-32	SPTM372	TM400-32	TM400-32H	TMI285-32H	TMLR370-32	TM250-32
9/16-12	SPTM372	TM400-12	TM400-12H	TMI370-12H	TMLR370-12	—
9/16-14	SPTM372	TM345-14	TM345-14H	TMI305-14H	TMLR340-14	—
9/16-16	SPTM372	TM450-16	TM450-16H	TMI285-16H	TMLR285-16	TM350-16
9/16-18	SPTM372	TM450-18	TM450-18H	TMI370-18H	TMLR370-18	TM350-18
9/16-20	SPTM372	TM450-20	TM450-20H	TMI335-20H	TMLR370-20	TM350-20
9/16-24	SPTM372	TM400-24	TM400-24H	TMI285-24	TMLR285-24	TM350-24
9/16-27	SPTM372	TM290-27	TM290-27H	—	—	—
9/16-28	SPTM372	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
9/16-32	SPTM372	TM400-32	TM400-32H	TMI370-32H	TMLR370-32	TM250-32

**EX** Tools in column will also cut external threads

# INTERNAL UN THREAD MILL LOCATER CHART

This chart is designed to help select the proper thread mill for a given thread size. ALTIN+ thread mills are highly recommended for ferrous material.

THREAD/PITCH	EX SPTM PAGE# 9	STRAIGHT FLUTE PAGE# 13	EX 30° HELICAL FLUTE PAGE# 17	15° HELICAL FLUTE PAGE# 16	TMLR PAGE# 11	EX STAGGERED PAGE # 15
5/8-11	SPTM488	TM450-11	TM450-11H	TMI470-11H	TMLR470-11	—
5/8-12	SPTM488	TM450-12	TM450-12H	TMI370-12H	TMLR370-12	TM500-12
5/8-14	SPTM488	TM490-14	TM345-14H	TMI305-14H	TMLR340-14	TM500-14
5/8-16	SPTM488	TM490-16	TM450-16H	TMI285-16H	TMLR285-16	TM500-16
5/8-18	SPTM488	TM450-18	TM450-18H	TMI370-18H	TMIR370-18	TM350-18
5/8-20	SPTM488	TM450-20	TM450-20H	TMI335-20H	TMLR370-20	TM350-20
5/8-24	SPTM488	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
5/8-27	SPTM488	TM290-27	TM290-27H	—	—	—
5/8-28	SPTM488	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
5/8-32	SPTM488	TM400-32	TM400-32H	TMI370-32H	TMLR370-32	TM250-32
11/16-12	SPTM488	TM490-12	TM450-12H	TMI370-12H	TMLR370-12	TM500-12
11/16-16	SPTM488	TM490-16	TM450-16H	TMI285-16H	TMLR285-16	TM500-16
11/16-20	SPTM488	TM450-20	TM450-20H	TMI335-20H	TMLR370-20	TM350-20
11/16-24	SPTM488	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
11/16-28	SPTM488	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
11/16-32	SPTM488	TM400-32	TM400-32H	TMI370-32H	TMLR370-32	TM250-32
3/4-10	SPTM595	TM450-10	TM450-10H	TMI495-10H	TMLR495-10	—
3/4-12	SPTM595	TM490-12	TM450-12H	TMI495-12H	TMLR495-12	TM500-12
3/4-14	SPTM595	TM490-14	TM345-14H	TMI495-14H	TMLR340-14	TM500-14
3/4-16	SPTM595	TM490-16	TM450-16H	TMI495-16H	TMLR495-16	TM500-16
3/4-18	SPTM595	TM450-18	TM450-18H	TMI495-18H	TMLR370-18	TM350-18
3/4-20	SPTM595	TM450-20	TM450-20H	TMI495-20H	TMLR370-20	TM350-20
3/4-24	SPTM595	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
3/4-27	SPTM595	TM290-27	TM290-27H	—	—	—
3/4-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
3/4-32	SPTM595	TM400-32	TM400-32H	TMI495-32H	TMLR370-32	TM250-32
13/16-12	SPTM595	TM490-12	TM450-12H	TMI495-12H	TMLR495-12	TM500-12
13/16-16	SPTM595	TM490-16	TM450-16H	TMI495-16H	TMLR495-16	TM500-16
13/16-20	SPTM595	TM450-20	TM450-20H	TMI495-20H	TMLR370-40	TM350-20
13/16-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
13/16-32	SPTM595	TM400-32	TM400-32H	TMI495-32H	TMLR370-32	TM250-32
7/8-9	SPTM695	TM620-9	—	TMI620-9H	—	—
7/8-10	SPTM695	TM450-10	TM450-10H	TMI495-10H	TMLR495-10	—
7/8-12	SPTM695	TM490-12	TM450-12H	TMI495-12H	TMLR495-12	TM500-12
7/8-14	SPTM695	TM490-14	TM345-14H	TMI495-14H	TMLR370-14	TM500-14
7/8-16	SPTM695	TM490-16	Tm450-16H	TMI495-16H	TMLR495-16	TM500-16
7/8-18	SPTM695	TM450-18	TM450-18H	TMI495-18H	TMLR370-18	TM350-18
7/8-20	SPTM695	TM450-20	TM450-20H	TMI495-20H	TMLR370-20	TM350-20
7/8-24	SPTM695	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
7/8-27	SPTM595	TM290-27	TM290-27H	—	—	—
7/8-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
7/8-32	SPTM595	TM400-32	TM400-32H	TMI495-32H	TMLR370-32	TM250-32

**EX** Tools in column will also cut external threads

# INTERNAL UN THREAD MILL LOCATER CHART

THREAD/ PITCH	EX SPTM PAGE# 9	STRAIGHT FLUTE PAGE# 13	EX 30° HELICAL FLUTE PAGE# 17	15° HELICAL FLUTE PAGE# 16	TMLR PAGE# 11	EX STAGGERED PAGE # 15
15/16-12	SPTM695	TM490-12	TM450-12H	TMI495-12H	TMLR495-12	TM500-12
15/16-16	SPTM695	TM490-16	TM450-16H	TMI495-16H	TMLR495-16	TM500-16
15/16-20	SPTM695	TM450-20	TM450-20H	TMI495-20H	TMLR370-20	TM350-20
15/16-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
15/16-32	SPTM595	TM400-32	TM400-32H	TMI495-32H	TMLR370-32	TM250-32
1-8	SPTM695	TM620-8	—	TMI620-8H	—	—
1-10	SPTM695	TM450-10	TM450-10H	TMI495-10H	TMLR495-10	—
1-12	SPTM695	TM620-12	TM450-12H	TMI620-12H	TMLR495-12	TMC750-12
1-14	SPTM695	TM620-14	TM345-14H	TMI620-14H	TMLR340-14	TMC750-14
1-16	SPTM695	TM620-16	TM450-16H	TMI620-16H	TMLR495-16	TM500-16
1-18	SPTM695	TM450-18	TM450-18H	TMI495-18H	TMLR370-18	TMC750-18
1-20	SPTM695	TM450-20	TM450-20H	TMI495-20H	TMLR370-20	TMC750-20
1-24	SPTM695	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
1-27	SPTM595	TM290-27	TM290-27H	—	—	—
1-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
1-32	SPTM595	TM400-32	TM400-32H	TMI495-32H	TMLR370-32	TM250-32
1-1/4-7	SPTM745	E TMC740-7	—	—	—	—
1-1/4-8	SPTM745	E TMC740-8	—	TMI620-8H	—	—
1-1/4-10	SPTM695	TM450-10	TM450-10H	TMI495-10H	TMLR495-10	—
1-1/4-12	SPTM695	E TMC740-12	TM450-12H	TMI620-12H	TMLR495-12	TMC750-12
1-1/4-14	SPTM695	E TMC740-14	TM345-14H	TMI620-14H	TMLR340-14	TMC750-14
1-1/4-16	SPTM695	E TMC740-16	TM450-16H	TMI620-16H	TMLR495-16	TM500-16
1-1/4-18	SPTM695	TM450-18	TM450-18H	TMI495-18H	TMLR370-18	TMC750-18
1-1/4-20	SPTM695	E TMC740-20	TM450-20H	TMI495-20H	TMLR370-20	TMC750-20
1-1/4-24	SPTM695	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
1-1/4-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
1-3/8-8	SPTM745	E TMC740-8	—	TMI620-8H	—	—
1-3/8-10	SPTM695	TM450-10	TM450-10H	TMI495-10H	TMLR495-10	—
1-3/8-12	SPTM695	E TMC740-12	TM450-12H	TMI620-12H	TMLR495-12	TMC750-12
1-3/8-14	SPTM695	E TMC740-14	TM345-14H	TMI620-14H	TMLR340-14	TMC750-14
1-3/8-16	SPTM695	E TMC740-16	TM450-16H	TMI620-16H	TMLR495-16	—
1-3/8-18	SPTM695	TM450-18	TM450-18H	TMI495-18H	TMLR370-18	TMC750-18
1-3/8-20	SPTM695	E TMC740-20	TM450-20H	TMI495-20H	TMLR370-20	TMC750-20
1-3/8-24	SPTM695	TM400-24	TM400-24H	TMI285-24H	TMLR285-24	TM350-24
1-3/8-28	SPTM595	TM400-28	TM400-28H	—	TMLR234-28	TM250-28
1-1/2-6	SPTM745	E TMC990-6	—	—	—	—
1-1/2-8	SPTM745	E TMC990-8	—	TMI620-8H	—	—
1-1/2-10	SPTM695	TM450-10	TM450-10H	TMI495-10H	TMLR495-10	—
1-1/2-12	SPTM695	E TMC990-12	TM450-12H	TMI620-12H	TMLR495-12	TMC1000-12
1-1/2-14	SPTM695	E TMC740-14	TM345-14H	TMI620-14H	TMLR340-14	TMC750-14
1-1/2-16	SPTM695	E TMC990-16	TM450-16H	TMI620-16H	TMLR495-16	TMC1000-16
1-1/2-18	SPTM695	TM450-18	TM450-18H	TMI495-18H	TMLR370-18	TMC750-18
1-1/2-20	SPTM695	E TMC740-20	TM450-20H	TMI495-20H	TMLR370-20	TMC750-20

**EX** Tools in column will also cut external threads    **E** Tools in this series will also cut external threads

**Thread mills can cut any larger size internal thread of the same pitch**

# INTERNAL METRIC THREAD MILL LOCATER CHART

This chart is designed to help select the proper thread mill for a given thread size. ALTiN+ thread mills are highly recommended for ferrous material.

THREAD/ PITCH	<b>EX</b> SPTM PAGE# 22,23	STRAIGHT FLUTE PAGE# 26	<b>EX</b> 30° HELICAL FLUTE PAGE# 27	15° HELICAL FLUTE PAGE# 27	TMLR PAGE # 24,25
M1.2-.25	SPTM032	—	—	—	—
M1.4-.3	SPTM040	—	—	—	TMLR1.4-.3mm
M1.6-.35	SPTM040	—	—	—	TMLR1.6-.35mm
M1.8-.35	SPTM050	—	—	—	—
M2-.4	SPTM060	—	—	—	TMLR2-.4mm
M2.5-.45	SPTM072	—	—	—	TMLR2.5-.45mm
M3-.35	SPTM072	—	—	—	—
M3-.5	SPTM080	TM3-.5mm	—	—	TMLR3-.5mm
M3.5-.35	SPTM072	—	—	—	—
M3.5-.6	SPTM098	TM3.5-.6mm	—	—	—
M4-.5	SPTM120	TM4-.5mm	—	—	TMLR4-.5mm
M4-.7	SPTM098	TM4-.7mm	—	—	TMLR4-.7mm
M4.5-.5	SPTM120	TM4-.5mm	—	—	TMLR4-.5mm
M4.5-.75	SPTM120	TM4.5-.75mm	—	TMI4.5-0.75-H	—
M5-.5	SPTM138	TM4-.5mm	—	—	TMLR4-.5mm
M5-.7	SPTM138	TM5-.7mm	—	—	TMLR4-.7mm
M5-.8	SPTM138	TM5-.8mm	—	TMI5.0-0.80-H	TMLR5-.8mm
M6-.5	SPTM160	TM6-.5mm	TM6-.5mm-H	—	TMLR4-.5mm
M6-.75	SPTM160	TM6-.75mm	TM6-.75mm-H	TMI4.5-0.75-H	—
M6-1.0	SPTM160	TM6-1mm	TM6-1mm-H	TMI6.0-1.00-H	TMLR6-1mm
M6-1.25	SPTM160	TM6-1.25mm	TM6-1.25mm-H	—	—
M8-.75	SPTM240	TM8-.75mm	TM8-.75mm-H	TMI8.0-0.75-H	TMLR8-.75mm
M8-1.0	SPTM240	TM8-1.0mm	TM8-1mm-H	TMI8.0-1.00-H	TMLR8-1mm
M8-1.25	SPTM240	TM8-1.25mm	TM8-1.25mm-H	TMI8.0-1.25-H	TMLR8-1.25mm
M9-1.25	SPTM240	TM8-1.25mm	TM8-1.25mm-H	TMI8.0-1.25-H	TMLR8-1.25mm
M10-.75	SPTM290	TM8-.75mm	TM8-.75mm-H	—	TMLR8-.75mm
M10-1.0	SPTM290	TM10-1mm	TM10-1mm-H	TMI8.0-1.00-H	TMLR10-1mm
M10-1.25	SPTM290	TM8-1.25mm	TM8-1.25mm-H	TMI8.0-1.25-H	TMLR8-1.25mm
M10-1.5	SPTM290	TM10-1.5mm	TM10-1.5mm-H	TMI10-1.50-H	TMLR10-1.5mm
M11-1.5	SPTM290	TM10-1.5mm	TM10-1.5mm-H	TMI10-1.50-H	TMLR10-1.5mm

**EX** Tools in column will also cut external threads

**Thread mills can cut any larger size internal thread of the same pitch**

# INTERNAL METRIC THREAD MILL LOCATER CHART

THREAD/ PITCH	EX SPTM PAGE# 23	STRAIGHT FLUTE PAGE# 26	EX 30° HELICAL FLUTE PAGE# 27	15° HELICAL FLUTE PAGE# 27	TMLR PAGE # 25
M12-1.0	SPTM372	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M12-1.25	SPTM372	TM12-1.25mm	TM12-1.25mm-H	TMI8-1.25-H	TMLR12-1.25mm
M12-1.5	SPTM372	TM12-1.5mm	TM12-1.5mm-H	TMI10-1.50-H	TMLR10-1.5mm
M12-1.75	SPTM372	TM12-1.75mm	TM12-1.75mm-H	TMI12-1.75-H	—
M14-1.0	SPTM372	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M14-1.25	SPTM372	TM14-1.25mm	TM14-1.25mm-H	TMI8-1.25-H	TMLR12-1.25mm
M14-1.5	SPTM372	TM14-1.5mm	TM14-1.5mm-H	TMI14-1.50-H	TMLR14-1.5mm
M14-1.75	SPTM372	TM14-1.75mm	TM14-1.75mm-H	TMI12-1.75-H	—
M14-2.0	SPTM372	TM14-2mm	TM14-2mm-H	—	TMLR14-2mm
M16-1.0	SPTM488	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M16-1.5	SPTM488	TM14-1.5mm	TM14-1.5mm-H	TMI14-1.50-H	TMLR14-1.5mm
M16-2.0	SPTM488	TM14-2mm	TM14-2mm-H	TMI16-2.00-H	TMLR14-2mm
M16-2.5	SPTM488	TM16-2.5mm	TM16-2.5mm-H	—	—
M18-1.0	SPTM488	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M18-1.5	SPTM488	TM14-1.5mm	TM14-1.5mm-H	TMI14-1.50-H	TMLR14-1.5mm
M18-2.5	SPTM488	TM16-2.5mm	TM16-2.5mm-H	—	—
M20-1.0	SPTM595	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M20-1.5	SPTM595	TM14-1.5mm	TM14-1.5mm-H	TMI18-1.50-H	TMLR14-1.5mm
M20-2.0	SPTM595	TM14-2mm	TM14-2mm-H	TMI16-2.00-H	TMLR14-2mm
M20-2.5	SPTM595	TM16-2.5mm	TM16-2.5mm-H	TMI20-2.5mm-H	—
M24-1.0	SPTM695	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M24-1.5	SPTM695	E TMC24-1.5mm	TM14-1.5mm-H	TMI18-1.50-H	TMLR14-1.5mm
M24-2.0	SPTM695	E TMC24-2mm	TM14-2mm-H	TMI16-2.00-H	TMLR14-2mm
M24-2.5	SPTM695	E TMC24-2.5mm	TM16-2.5mm-H	TMI20-2.5mm-H	—
M24-3.0	SPTM695	E TMC24-3mm	—	—	—
M27-3.0	SPTM695	E TMC24-3mm	—	—	—
M30-1.0	SPTM695	TM12-1mm	TM12-1mm-H	TMI12-1.00-H	TMLR12-1mm
M30-1.5	SPTM695	E TMC24-1.5mm	TM14-1.5mm-H	TMI18-1.50-H	TMLR14-1.5mm
M30-2.0	SPTM695	E TMC24-2mm	TM14-2mm-H	TMI16-2.00-H	TMLR14-2mm
M30-3.0	SPTM695	E TMC24-3mm	—	—	—
M30-3.5	SPTM745	—	—	—	—
M33-3.5	SPTM745	—	—	—	—
M36-4.0	SPTM745	E TMC36-4mm	—	—	—
M40-6.0	SPTM745	—	—	—	—

**EX** Tools in column will also cut external threads

**E** Tools in this series will also cut external threads

Thread mills can cut any larger size internal thread of the same pitch

# THREAD MILL FEED AND SPEED CHART

MATERIAL	HB/Rc	SPEED SFM* UNCOATED	SPEED SFM ALTiN+	FEED ( INCHES PER TOOTH)					
				TOOL DIAMETER					
				.032 - .056	.059 - .090	.100 - .190	.200 - .350	.370 - .595	.600+
CAST IRON	160 HB	100-220	200-425	.0004-.001	.0004-.0008	.0004-.0014	.0004-.002	.0004-.0035	.0004-.006
CARBON STEEL	18 Rc	100-200	190-425	.0003-.001	.0003-.0008	.0003-.0014	.0003-.002	.0003-.005	.0003-.006
ALLOY STEEL	20 Rc	80-200	200-375	.0003-.001 2 Passes	.0003-.0008 3 Passes	.0003-.0014	.0003-.0024	.0003-.005	.0003-.006
TOOL STEEL	20 Rc	80-175	175-250	.0003-.0004 2 Passes	.0003-.0005 3 Passes	.0003-.0005	.0003-.0009	.0003-.0026	.0003-.004
300 STAINLESS STEEL	150 HB	90-120	120-255	.0003-.0005 2 Passes	.0003-.0006 3 Passes	.0003-.0007	.0003-.002	.0003-.0035	.0003-.0045
400 STAINLESS STEEL	195 HB	90-150	140-375	.0003-.0005 2 Passes	.0003-.0006 3 Passes	.0003-.0007	.0003-.002	.0003-.0026	.0003-.0045
HIGH TEMP ALLOY (Ni & Co BASE)	20 Rc	50-125	100-125	.0003-.0004 3 Passes	.0003-.00045 3 Passes	.0003-.0005 2 Passes	.0003-.0009	.0003-.0026	.0003-.004
TITANIUM	25 Rc	50-130	100-170	.0003-.0004 3 Passes	.0003-.00045 3 Passes	.0003-.001 2 Passes	.0003-.0009	.0003-.0015	.0003-.003
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-90	90-150	.0003-.0004 3 Passes	.0003-.00045 3 Passes	.0003-.0005 2 Passes	.0003-.0008	.0003-.001	.0003-.0025
ALUMINUM	100 HB	100-800	100-1200	.0005-.0015	.0005-.002	.0005-.0025	.0005-.003	.0005-.006	.0005-.009
BRASS, ZINC	80 HB	200-350	200-750	.0005-.0015	.0005-.002	.0005-.0025	.0005-.003	.0005-.006	.0005-.009

\*SFM = Surface Feet per Minute

**Parameters are a starting point based on machinability rating at hardness listed.  
Check machinability rating of the material to be machined and adjust accordingly.**

# THREAD MILL FEED AND SPEED APPLICATION



**It may be necessary to use more radial depth passes than shown on the chart (p.36) when cutting an unfavorable length-to-diameter ratio, coarse pitches, or hard materials.** When cutting a thread with two passes, cut approximately **65% of the thread on the first pass and 35 percent on the finish pass.** For three passes, use a **50/30/20** ratio. For four passes, use a **40/27/20/13** ratio. The idea is to equalize the side cutting pressure.

Thread mills can sometimes be used to cut multiple start threads. Call engineering for assistance.

Thread mills can be cut off for shorter thread depths or necked back for deeper thread depths. Call for price and delivery.

In order to apply the Feed and Speed chart appropriately, it is necessary to understand that machining enters will apply the feed rate at the centerline of the spindle. It is correct to use a normal calculation and the following Feed & Speed Chart when cutting in a straight line; however, it is incorrect when cutting an internal thread. Therefore, the feed rate must be recalculated.

*The following is an example of how to apply the feed rate correctly:*

The tool is a TM290-24A cutting a 3/8-24 thread in stainless steel.

The outside diameter of the tool is 0.290.

The surface foot per minute (SFM) is 150.

The chip per tooth is 0.001. The tool has four flutes.

The revolutions per minute (RPM) equal the SFM x 3.82 divided by the outside diameter of the tool.

In this example: **(150 x 3.82) / 0.290**, which equals 1975 RPM.

The RPM x feed (chip per tooth) x the number of flutes equals the Non-Adjusted Feed Rate or NAFR.

In this example: **1975 x 0.001 x 4 = 7.9 NAFR**

The major diameter of the thread is 0.375. We will call this D.

The outside diameter of the tool is 0.290. We will call this d.

We will call the Adjusted Feed Rate the AFR.

The formula for the AFR for internal interpolation is **AFR = NAFR x (D-d) ÷ D**

In this example: **AFR = 7.9 x (0.375 - 0.290) ÷ 0.375**

Therefore, the Adjusted Feed Rate equals 1.79. This is the feed rate that will equal 0.001 chip per tooth in the above example. This is the feed rate that must be used in the CNC program.

# THREAD MILL TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
TAPERED THREADED HOLE	TOOL PRESSURE	Reduce the chip load and/or make more radial passes.
NO-GO GAGE GOES & GO GAGE DOES NOT GO	THREAD OVERCUTTING	Use a tool of smaller diameter with correct pitch. Make sure helical "ramp in" is used.
TEETH ARE CHIPPING	TOOL PRESSURE	Reduce feed rate per tooth.
	BUILT-UP EDGE	Use a coated tool to help reduce built-up edge.
RAPID WEAR	TOOL RUBBING NOT CUTTING	Increase chip load per tooth.
TEETH ARE BURNING	TOO MUCH HEAT	Reduce speed. Use a coated tool. Increase coolant.
TOOL BREAKS	TOO MUCH TOOL PRESSURE	Helical "arc in" must be used. Reduce feed rate and/or use more radial passes. Adjusted Feed Rate (AFR) must be used. (See Thread Mill Feed and Speed Chart)

Thread milling tools form a thread using a motion referred to as "helical interpolation". This process involves the machine simultaneously moving all three axes. The resulting motions are circular and axial. The "X" and "Y" axes move circular and the "Z" in an axial direction per 360° at a distance equal to the pitch of the thread being machined. The tool should "ramp in" over 90° in order to avoid breakage. This must be a helical move. Move 'Z' axially by  $\text{pitch} \div 4$  since  $90^\circ \div 4 = 360^\circ \div 4$ .

Bottom-to-top climb cutting machining is recommended when machining a right-hand thread. This will avoid re-cutting any chips. For left hand threading, a top-to-bottom machining with a right-hand helical tool is the preferred method. Refer to troubleshooting chart above for solutions to potential thread milling problems.



# SINGLE POINT



**Single Point Holders  
Radial Relief  
Mini Boring Bars  
Boring Bars  
Diamond Tipped  
Helical Boring Bars**

**Profile Boring Bars  
Back Chamfer  
Acme Threading Tools  
Thread Tools Qualified  
Thread Tools  
Groove Tools**

# SINGLE POINT TOOLS - PRODUCT OVERVIEW

All single point tools are designed for internal machining on a lathe. The helical boring bars can be used for both lathe and mill applications. All cutting tools are made from premium submicron carbide and are stocked with and without an ALTiN+ coating. Technical information available on pages 76-80.



p.41-43



p.44



p.45

## Single Point Holders

QHC Holders have two flats on the shank, two coolant holes, and four set screws. QHC Holders can be used with a Back Stop. DH Holders have two set screws and no flats.



p.46-47



p.48-49



p.50-51

## Boring Bars

Boring Bars come in a range of diameters from 0.050 to 0.490 inch and many different bore depths to achieve max rigidity.



p.52-53



p.54-56



p.57

## Diamond Tipped Boring Bars

PCD-Tipped Boring Bars are for cutting abrasive non-ferrous materials. CBN-Tipped Boring Bars are for cutting ferrous metal over 45 RC.

## Helical Boring Bars

Helical Boring Bars have a helical flute that produces less side cutting pressure, ideal for the cutting of unfavorable length-to-diameter ratios.

## Back Chamfer Boring Bars

Back Chamfer Boring Bars are designed to bore, cut a chamfer at the end of a hole, and cut thread reliefs.



p.58



p.59



p.60-61

## Profile Boring Bars

Profile Boring Bars are ideal tools for internal profiling on CNC lathes.

## Face Groove Tools

Face Groove Tools cut a groove in the face of the part.

## Undercut Groove Tools

Undercut Groove Tools come with and without a radius. The radius style can be used as a profile tool.



p.62-65



p.66-68



p.69

## Groove Tool - Retaining Ring

Retaining Ring Groove Tools cut an internal groove with straight edges.

## Groove Tools - Full Radius

Full Radius Groove Tools cut an internal groove with straight edges and a full radius.

## O-Ring Groove Tools

O-Ring Groove Tools are ideal for machining a groove with tapered sides.



p.70-71



p.72-73



p.74-75

## Thread Tools

Threading Tools come in many different sizes. This facilitates selecting the tool with maximum rigidity.

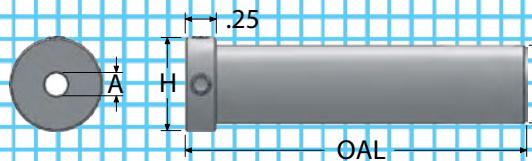
## Thread Tools Qualified

Thread Tools Qualified have a positive top rake on the flute and a qualified length to facilitate quick tool changes.

## Acme Threading Tools

Acme Threading Tools come with both acme and stub acme profiles.

# SINGLE POINT HOLDERS



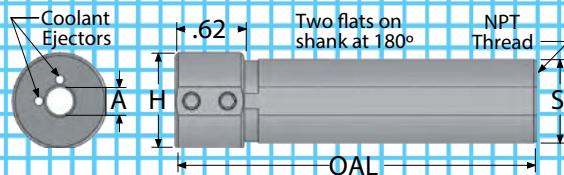
- Made with heat-treated steel
- Features two lock-down screws

## DH HOLDERS

"A" INSIDE DIA.	"S" SHANK DIA.	"H" HEAD DIA.	OAL	ORDER #
0.1250	0.375	0.500	2.00	DH37-1/8
0.1562	0.375	0.500	2.00	DH37-5/32
0.1875	0.375	0.500	2.00	DH37-3/16
0.2187	0.375	0.500	2.00	DH37-7/32
0.2500	0.375	0.500	2.00	DH37-1/4
0.1250	0.500	0.625	2.75	DH50-1/8
0.1562	0.500	0.625	2.75	DH50-5/32
0.1875	0.500	0.625	2.75	DH50-3/16
0.2187	0.500	0.625	2.75	DH50-7/32
0.2500	0.500	0.625	2.75	DH50-1/4
0.3125	0.500	0.625	2.75	DH50-5/16
0.3750	0.500	0.625	2.75	DH50-3/8
0.1250	0.625	0.750	2.75	DH62-1/8
0.1562	0.625	0.750	2.75	DH62-5/32
0.1875	0.625	0.750	2.75	DH62-3/16
0.2187	0.625	0.750	2.75	DH62-7/32
0.2500	0.625	0.750	2.75	DH62-1/4
0.3125	0.625	0.750	2.75	DH62-5/16
0.3750	0.625	0.750	2.75	DH62-3/8
0.1250	0.750	0.875	2.75	DH75-1/8
0.1875	0.750	0.875	2.75	DH75-3/16
0.2500	0.750	0.875	2.75	DH75-1/4
0.3125	0.750	0.875	2.75	DH75-5/16
0.3750	0.750	0.875	2.75	DH75-3/8
0.5000	0.750	0.875	2.75	DH75-1/2

**SINGLE POINT  
TOOLS  
HOLDERS**

# SINGLE POINT COOLANT HOLDERS



- Made with heat-treated steel
- Four lock-down screws for maximum rigidity
- Engineered for maximum coolant flow

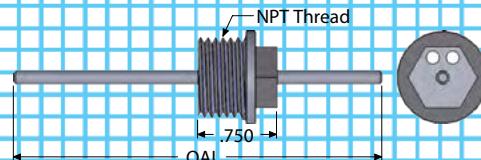
## QHC HOLDERS

"A" INSIDE DIA.	"S" SHANK DIA.	"H" HEAD DIA.	NPT THREAD	OAL	ORDER #
0.1250	0.375	0.500	1/16-27NPT	2.50	QHC37-1/8
0.1562	0.375	0.500	1/16-27NPT	2.50	QHC37-5/32
0.1875	0.375	0.500	1/16-27NPT	2.50	QHC37-3/16
0.1250	0.500	0.625	1/8-27NPT	2.75	QHC50-1/8
0.1875	0.500	0.625	1/8-27NPT	2.75	QHC50-3/16
0.2500	0.500	0.625	1/8-27NPT	2.75	QHC50-1/4
0.1250	0.625	0.750	1/4-18NPT	3.25	QHC62-1/8
0.1562	0.625	0.750	1/4-18NPT	3.25	QHC62-5/32
0.1875	0.625	0.750	1/4-18NPT	3.25	QHC62-3/16
0.2187	0.625	0.750	1/4-18NPT	3.25	QHC62-7/32
0.2500	0.625	0.750	1/4-18NPT	3.25	QHC62-1/4

## QHC HOLDERS

"A" INSIDE DIA.	"S" SHANK DIA.	"H" HEAD DIA.	NPT THREAD	OAL	ORDER #
0.1250	0.750	0.865	3/8-18NPT	3.25	QHC75-1/8
0.1562	0.750	0.865	3/8-18NPT	3.25	QHC75-5/32
0.1875	0.750	0.865	3/8-18NPT	3.25	QHC75-3/16
0.2187	0.750	0.865	3/8-18NPT	3.25	QHC75-7/32
0.2500	0.750	0.865	3/8-18NPT	3.25	QHC75-1/4
0.3125	0.750	0.865	3/8-18NPT	3.25	QHC75-5/16
0.3750	0.750	0.865	3/8-18NPT	3.25	QHC75-3/8
0.1250	1.000	1.115	1/2-14NPT	3.25	QHC10-1/8
0.1875	1.000	1.115	1/2-14NPT	3.25	QHC10-3/16
0.2500	1.000	1.115	1/2-14NPT	3.25	QHC10-1/4
0.3125	1.000	1.115	1/2-14NPT	3.25	QHC10-5/16
0.3750	1.000	1.115	1/2-14NPT	3.25	QHC10-3/8
0.5000	1.000	1.115	1/2-14NPT	3.25	QHC10-1/2

## BACK STOPS - FOR QHC SERIES



- Adjustable back stop for quick tool change
- Ideal for qualified threading tools (see pages 72-73)
- Engineered for maximum coolant flow
- Accessory Set comes with 6 screws and 1 key

## BACK STOP

NPT THREAD	STOP ROD DIAMETER	STOP ROD OAL	HOLDER SERIES	ORDER #
1/16-27NPT	0.093	2.75	QHC37	QHC37-BKS
1/8-27NPT	0.0125	3.00	QHC50	QHC50-BKS
1/4-18NPT	0.0125	3.00	QHC62	QHC62-BKS
3/8-18NPT	0.0125	3.00	QHC75	QHC75-BKS
1/2-14NPT	0.0125	3.50	QHC10	QHC10-BKS

## BACK STOP ACCESSORIES

6 SCREWS, 1 KEY	
BACKSTOP REFERENCE	ORDER #
QHC37-BKS	PKH-1/8
QHC50-BKS	
QHC62-BKS	
QHC75-BKS	PKH-3/16
QHC10-BKS	

# DH & QHC HOLDER ACCESSORIES

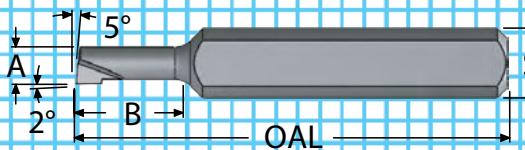


- Set comes with 6 screws and 1 key
- Works as a replacement set or as spares
- Use the holder order number to locate the proper accessory set for size.
- Backstop accessories on page 42.

6 SCREWS, 1 KEY	
DH HOLDER REFERENCE	ORDER #
DH37-1/4 DH50-3/8	PKH-1/8
DH37-1/8 DH37-5/32 DH37-3/16 DH37-7/32 DH50-7/32 DH50-1/4 DH50-5/16 DH62-5/16 DH62-3/8 DH75-1/2	PKH-3/16
DH50-1/8 DH50-5/32 DH50-3/16 DH62-1/8 DH62-5/32 DH62-3/16 DH62-7/32 DH62-1/4 DH75-1/4 DH75-5/16 DH75-3/8	PKH-1/4
DH75-1/8 DH75-3/16	PKH-3/8

6 SCREWS, 1 KEY	
QHC HOLDER REFERENCE	ORDER #
QHC37-1/8 QHC37-5/32 QHC37-3/16 QHC50-3/16 QHC50-1/4	PKH-3/16
QHC50-1/8 QHC62-1/8 QHC62-5/32 QHC62-3/16 QHC62-7/32 QHC62-1/4 QHC75-3/16 QHC75-7/32 QHC75-1/4 QHC75-5/16 QHC75-3/8 QHC10-1/2	PKH-1/4
QHC75-1/8 QHC75-5/32 QHC10-1/4 QHC10-5/16 QHC10-3/8	PKH-3/8
QHC10-1/8 QHC10-3/16	PKH-1/2

# MINI BORING BARS - SOLID CARBIDE

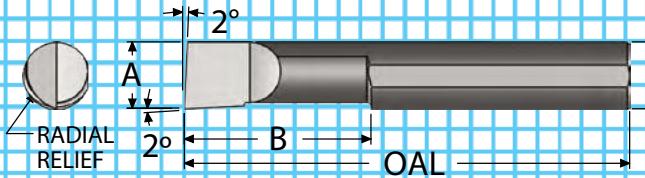


- Flute engineered for maximum strength
- ALTiN+ coating for improved surface finish
- Made with premium submicron grade carbide
- Starts at 0.015 minimum bore

SINGLE POINT TOOLS  
BORING

"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.015	0.050	0.125	1.50	MB015050	MB015050A
0.020	0.075	0.125	1.50	MB020075	MB020075A
0.025	0.100	0.125	1.50	MB025100	MB025100A
0.025	0.125	0.125	1.50	MB025125	MB025125A
0.030	0.100	0.125	1.50	MB030100	MB030100A
0.030	0.125	0.125	1.50	MB030125	MB030125A
0.030	0.150	0.125	1.50	MB030150	MB030150A
0.035	0.100	0.125	1.50	MB035100	MB035100A
0.035	0.150	0.125	1.50	MB035150	MB035150A
0.035	0.200	0.125	1.50	MB035200	MB035200A
0.040	0.100	0.125	1.50	MB040100	MB040100A
0.040	0.150	0.125	1.50	MB040150	MB040150A
0.040	0.200	0.125	1.50	MB040200	MB040200A
0.040	0.250	0.125	1.50	MB040250	MB040250A
0.045	0.100	0.125	1.50	MB045100	MB045100A
0.045	0.150	0.125	1.50	MB045150	MB045150A
0.045	0.200	0.125	1.50	MB045200	MB045200A
0.045	0.250	0.125	1.50	MB045250	MB045250A
0.045	0.300	0.125	1.50	MB045300	MB045300A
0.045	0.350	0.125	1.50	MB045350	MB045350A

# BORING BARS - RADIAL RELIEF - SOLID CARBIDE

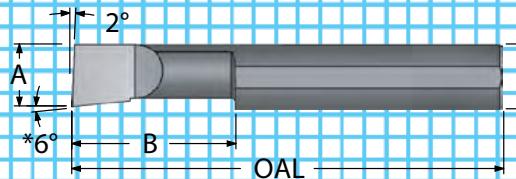


"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.060	0.125	0.125	1.50	BB61	BB61A
0.060	0.250	0.125	1.50	BB62	BB62A
0.060	0.375	0.125	1.50	BB63	BB63A
0.060	0.500	0.125	1.50	BB64	BB64A
0.075	0.125	0.125	1.50	BB71	BB71A
0.075	0.250	0.125	1.50	BB72	BB72A
0.075	0.375	0.125	1.50	BB73	BB73A
0.075	0.500	0.125	1.50	BB74	BB74A
0.090	0.125	0.125	1.50	BB91	BB91A
0.090	0.250	0.125	1.50	BB92	BB92A
0.090	0.375	0.125	1.50	BB93	BB93A
0.090	0.500	0.125	1.50	BB94	BB94A
0.090	0.625	0.125	1.50	BB95	BB95A
0.105	0.250	0.125	1.50	BB102	BB102A
0.105	0.375	0.125	1.50	BB103	BB103A
0.105	0.500	0.125	1.50	BB104	BB104A
0.105	0.625	0.125	1.50	BB105	BB105A
0.120	0.250	0.125	1.50	BB122	BB122A
0.120	0.375	0.125	1.50	BB123	BB123A
0.120	0.500	0.125	1.50	BB124	BB124A
0.120	0.625	0.125	1.50	BB125	BB125A
0.120	0.750	0.125	1.50	BB126	BB126A
0.155	0.375	0.1875	2.00	BB153	BB153A
0.155	0.500	0.1875	2.00	BB154	BB154A
0.155	0.625	0.1875	2.00	BB155	BB155A
0.155	0.750	0.1875	2.00	BB156	BB156A
0.155	1.000	0.1875	2.00	BB158	BB158A
0.185	0.375	0.1875	2.00	BB183	BB183A
0.185	0.500	0.1875	2.00	BB184	BB184A
0.185	0.625	0.1875	2.00	BB185	BB185A
0.185	0.750	0.1875	2.00	BB186	BB186A
0.185	1.000	0.1875	2.00	BB188	BB188A
0.185	1.250	0.1875	2.00	BB1812	BB1812A

"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.220	0.500	0.250	2.00	BB224	BB224A
0.220	0.625	0.250	2.00	BB225	BB225A
0.220	0.750	0.250	2.00	BB226	BB226A
0.220	1.000	0.250	2.00	BB228	BB228A
0.220	1.250	0.250	2.50	BB2212	BB2212A
0.248	0.500	0.250	2.00	BB254	BB254A
0.248	0.625	0.250	2.00	BB255	BB255A
0.248	0.750	0.250	2.00	BB256	BB256A
0.248	1.000	0.250	2.00	BB258	BB258A
0.248	1.250	0.250	2.50	BB2512	BB2512A
0.248	1.500	0.250	2.50	BB2514	BB2514A
0.310	0.500	0.3125	2.00	BB314	BB314A
0.310	0.750	0.3125	2.00	BB316	BB316A
0.310	0.750	0.3125	2.50	BB316L	BB316LA
0.310	1.000	0.3125	2.50	BB318	BB318A
0.310	1.250	0.3125	2.50	BB3112	BB3112A
0.310	1.500	0.3125	2.50	BB3114	BB3114A
0.310	1.750	0.3125	3.00	BB3116	BB3116A
0.373	0.500	0.375	2.00	BB374	BB374A
0.373	0.750	0.375	2.00	BB376	BB376A
0.373	0.750	0.375	2.50	BB376L	BB376LA
0.373	1.000	0.375	2.50	BB378	BB378A
0.373	1.250	0.375	2.50	BB3712	BB3712A
0.373	1.500	0.375	2.50	BB3714	BB3714A
0.373	1.500	0.375	3.00	BB3714L	BB3714LA
0.373	1.750	0.375	3.00	BB3716	BB3716A
0.373	2.000	0.375	3.00	BB3718	BB3718A

- Made with premium submicron grade carbide
- ALTiN+ coating extends tool life
- Radial relieved cutting clearance for max strength
- Polished flute face for optimal performance

# BORING BARS - SOLID CARBIDE



- Made with premium submicron grade carbide
- ALTiN+ coating for higher Surface Feet per Minute
- Precision ground flat for guaranteed tool orientation

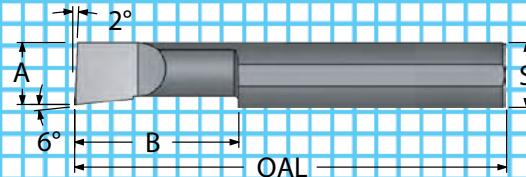
## SINGLE POINT TOOLS BORING

“A” MIN HOLE	“B” MAX DEPTH	“S” SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.050	0.150	0.125	1.50	B050150	B050150A
0.050	0.200	0.125	1.50	B050200	B050200A
0.050	0.300	0.125	1.50	B050300	B050300A
0.050	0.400	0.125	1.50	B050400	B050400A
0.060	0.150	0.125	1.50	B060150	B060150A
0.060	0.200	0.125	1.50	B060200	B060200A
0.060	0.300	0.125	1.50	B060300	B060300A
0.060	0.400	0.125	1.50	B060400	B060400A
0.060	0.500	0.125	1.50	B060500	B060500A
0.080	0.150	0.125	1.50	B080150	B080150A
0.080	0.200	0.125	1.50	B080200	B080200A
0.080	0.300	0.125	1.50	B080300	B080300A
0.080	0.400	0.125	1.50	B080400	B080400A
0.080	0.500	0.125	1.50	B080500	B080500A
0.080	0.600	0.125	1.50	B080600	B080600A
0.100	0.150	0.125	1.50	B100150	B100150A
0.100	0.200	0.125	1.50	B100200	B100200A
0.100	0.300	0.125	1.50	B100300	B100300A
0.100	0.400	0.125	1.50	B100400	B100400A
0.100	0.500	0.125	1.50	B100500	B100500A
0.100	0.600	0.125	1.50	B100600	B100600A
0.100	0.700	0.125	1.50	B100700	B100700A
0.110	0.150	0.125	1.50	B110150	B110150A
0.110	0.200	0.125	1.50	B110200	B110200A
0.110	0.300	0.125	1.50	B110300	B110300A
0.110	0.400	0.125	1.50	B110400	B110400A
0.110	0.500	0.125	1.50	B110500	B110500A
0.110	0.600	0.125	1.50	B110600	B110600A
0.110	0.700	0.125	1.50	B110700	B110700A
0.120	0.250	0.1875	2.00	B120250	B120250A
0.120	0.350	0.1875	2.00	B120350	B120350A
0.120	0.500	0.1875	2.00	B120500	B120500A
0.120	0.600	0.1875	2.00	B120600	B120600A
0.120	0.700	0.1875	2.00	B120700	B120700A
0.120	0.800	0.1875	2.00	B120800	B120800A

“A” MIN HOLE	“B” MAX DEPTH	“S” SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.140	0.250	0.1875	2.00	B140250	B140250A
0.140	0.400	0.1875	2.00	B140400	B140400A
0.140	0.500	0.1875	2.00	B140500	B140500A
0.140	0.600	0.1875	2.00	B140600	B140600A
0.140	0.700	0.1875	2.00	B140700	B140700A
0.140	0.750	0.1875	2.00	B140750	B140750A
0.140	0.800	0.1875	2.00	B140800	B140800A
0.160	0.250	0.1875	2.00	B160250	B160250A
0.160	0.400	0.1875	2.00	B160400	B160400A
0.160	0.500	0.1875	2.00	B160500	B160500A
0.160	0.600	0.1875	2.00	B160600	B160600A
0.160	0.750	0.1875	2.00	B160750	B160750A
0.160	0.900	0.1875	2.00	B160900	B160900A
0.160	1.000	0.1875	2.00	B1601000	B1601000A
0.180	0.350	0.250	2.50	B180350	B180350A
0.180	0.500	0.250	2.50	B180500	B180500A
0.180	0.600	0.250	2.50	B180600	B180600A
0.180	0.750	0.250	2.50	B180750	B180750A
0.180	0.900	0.250	2.50	B180900	B180900A
0.180	1.000	0.250	2.50	B1801000	B1801000A
0.180	1.100	0.250	2.50	B1801100	B1801100A
0.180	1.250	0.250	2.50	B1801250	B1801250A
0.180	1.500	0.250	2.50	B1801500	B1801500A
0.200	0.400	0.250	2.50	B200400	B200400A
0.200	0.500	0.250	2.50	B200500	B200500A
0.200	0.600	0.250	2.50	B200600	B200600A
0.200	0.700	0.250	2.50	B200700	B200700A
0.200	0.800	0.250	2.50	B200800	B200800A
0.200	0.900	0.250	2.50	B200900	B200900A
0.200	1.000	0.250	2.50	B2001000	B2001000A
0.200	1.100	0.250	2.50	B2001100	B2001100A
0.200	1.200	0.250	2.50	B2001200	B2001200A
0.200	1.300	0.250	2.50	B2001300	B2001300A

\* The B050 and the B060 series have 3° side clearance.

# BORING BARS - SOLID CARBIDE

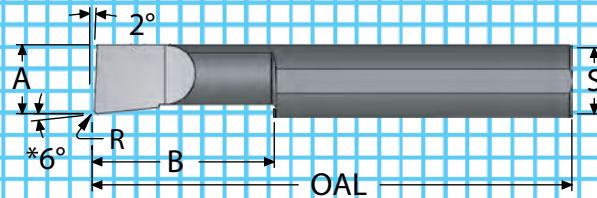


- ALTiN+ coating extends tool life
- Elliptically ground neck provides maximum strength
- Precision ground shank flat guarantees tool orientation

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>UNCOATED</b>	<b>ALTiN+</b>
0.230	0.400	0.3125	2.50	B230400	B230400A
0.230	0.500	0.3125	2.50	B230500	B230500A
0.230	0.600	0.3125	2.50	B230600	B230600A
0.230	0.700	0.3125	2.50	B230700	B230700A
0.230	0.800	0.3125	2.50	B230800	B230800A
0.230	0.900	0.3125	2.50	B230900	B230900A
0.230	1.000	0.3125	2.50	B2301000	B2301000A
0.230	1.100	0.3125	2.50	B2301100	B2301100A
0.230	1.150	0.3125	2.50	B2301150	B2301150A
0.230	1.200	0.3125	2.50	B2301200	B2301200A
0.230	1.250	0.3125	2.50	B2301250	B2301250A
0.230	1.400	0.3125	2.50	B2301400	B2301400A
0.230	1.500	0.3125	2.50	B2301500	B2301500A
0.230	1.600	0.3125	3.00	B2301600	B2301600A
0.290	0.500	0.3125	2.50	B290500	B290500A
0.290	0.600	0.3125	2.50	B290600	B290600A
0.290	0.750	0.3125	2.50	B290750	B290750A
0.290	0.900	0.3125	2.50	B290900	B290900A
0.290	1.000	0.3125	2.50	B2901000	B2901000A
0.290	1.100	0.3125	2.50	B2901100	B2901100A
0.290	1.250	0.3125	2.50	B2901250	B2901250A
0.290	1.350	0.3125	2.50	B2901350	B2901350A
0.290	1.500	0.3125	2.50	B2901500	B2901500A
0.290	1.600	0.3125	3.00	B2901600	B2901600A
0.290	1.750	0.3125	3.00	B2901750	B2901750A
0.320	0.500	0.375	2.50	B320500	B320500A
0.320	0.600	0.375	2.50	B320600	B320600A
0.320	0.750	0.375	2.50	B320750	B320750A
0.320	0.900	0.375	2.50	B320900	B320900A
0.320	1.000	0.375	2.50	B3201000	B3201000A
0.320	1.100	0.375	2.50	B3201100	B3201100A
0.320	1.250	0.375	2.50	B3201250	B3201250A
0.320	1.500	0.375	2.50	B3201500	B3201500A
0.320	1.600	0.375	3.00	B3201600	B3201600A
0.320	1.800	0.375	3.00	B3201800	B3201800A
0.320	2.000	0.375	4.00	B3202000	B3202000A
0.320	2.500	0.375	4.00	B3202500	B3202500A
0.320	3.000	0.375	4.00	B3203000	B3203000A

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>UNCOATED</b>	<b>ALTiN+</b>
0.360	0.500	0.375	2.50	B360500	B360500A
0.360	0.600	0.375	2.50	B360600	B360600A
0.360	0.750	0.375	2.50	B360750	B360750A
0.360	0.900	0.375	2.50	B360900	B360900A
0.360	1.000	0.375	2.50	B3601000	B3601000A
0.360	1.150	0.375	2.50	B3601150	B3601150A
0.360	1.250	0.375	2.50	B3601250	B3601250A
0.360	1.500	0.375	2.50	B3601500	B3601500A
0.360	1.600	0.375	3.00	B3601600	B3601600A
0.360	1.800	0.375	3.00	B3601800	B3601800A
0.360	2.000	0.375	4.00	B3602000	B3602000A
0.360	2.500	0.375	4.00	B3602500	B3602500A
0.360	3.000	0.375	4.00	B3603000	B3603000A
0.490	0.750	0.500	3.00	B490750	B490750A
0.490	1.000	0.500	3.00	B4901000	B4901000A
0.490	1.250	0.500	3.00	B4901250	B4901250A
0.490	1.500	0.500	3.00	B4901500	B4901500A
0.490	2.000	0.500	4.00	B4902000	B4902000A
0.490	2.500	0.500	4.00	B4902500	B4902500A
0.490	2.600	0.500	4.00	B4902600	B4902600A
0.490	2.750	0.500	4.00	B4902750	B4902750A
0.490	3.000	0.500	6.00	B4903000	B4903000A
0.490	3.500	0.500	6.00	B4903500	B4903500A
0.490	4.000	0.500	6.00	B4904000	B4904000A
0.490	4.500	0.500	6.00	B4904500	B4904500A

# RADIUS BORING BARS - SOLID CARBIDE



- ALTiN+ coating extends tool life
- Polished flute face for optimum performance
- Corner radius ensures strength and better surface finish

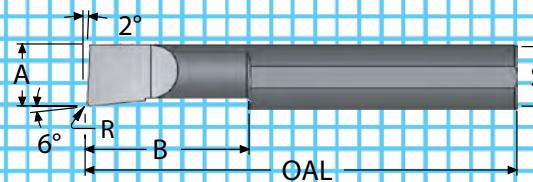
## SINGLE POINT TOOLS BORING

"A" MIN HOLE	"B" MAX DEPTH	"R" RADUIS $\pm 0.001$	"S" SHANK DIA.	OAL	ORDER #	
					UNCOATED	ALTiN+
0.050	0.150	0.004	0.125	1.50	B050150R	B050150RA
0.050	0.200	0.004	0.125	1.50	B050200R	B050200RA
0.050	0.300	0.004	0.125	1.50	B050300R	B050300RA
0.050	0.400	0.004	0.125	1.50	B050400R	B050400RA
0.060	0.150	0.004	0.125	1.50	B060150R	B060150RA
0.060	0.200	0.004	0.125	1.50	B060200R	B060200RA
0.060	0.300	0.004	0.125	1.50	B060300R	B060300RA
0.060	0.400	0.004	0.125	1.50	B060400R	B060400RA
0.060	0.500	0.004	0.125	1.50	B060500R	B060500RA
0.080	0.150	0.004	0.125	1.50	B080150R	B080150RA
0.080	0.200	0.004	0.125	1.50	B080200R	B080200RA
0.080	0.300	0.004	0.125	1.50	B080300R	B080300RA
0.080	0.400	0.004	0.125	1.50	B080400R	B080400RA
0.080	0.500	0.004	0.125	1.50	B080500R	B080500RA
0.080	0.600	0.004	0.125	1.50	B080600R	B080600RA
0.100	0.150	0.004	0.125	1.50	B100150R	B100150RA
0.100	0.200	0.004	0.125	1.50	B100200R	B100200RA
0.100	0.300	0.004	0.125	1.50	B100300R	B100300RA
0.100	0.400	0.004	0.125	1.50	B100400R	B100400RA
0.100	0.500	0.004	0.125	1.50	B100500R	B100500RA
0.100	0.600	0.004	0.125	1.50	B100600R	B100600RA
0.100	0.700	0.004	0.125	1.50	B100700R	B100700RA
0.110	0.150	0.004	0.125	1.50	B110150R	B110150RA
0.110	0.200	0.004	0.125	1.50	B110200R	B110200RA
0.110	0.300	0.004	0.125	1.50	B110300R	B110300RA
0.110	0.400	0.004	0.125	1.50	B110400R	B110400RA
0.110	0.500	0.004	0.125	1.50	B110500R	B110500RA
0.110	0.600	0.004	0.125	1.50	B110600R	B110600RA
0.110	0.700	0.004	0.125	1.50	B110700R	B110700RA
0.120	0.250	0.0065	0.1875	2.00	B120250R	B120250RA
0.120	0.350	0.0065	0.1875	2.00	B120350R	B120350RA
0.120	0.500	0.0065	0.1875	2.00	B120500R	B120500RA
0.120	0.600	0.0065	0.1875	2.00	B120600R	B120600RA
0.120	0.700	0.0065	0.1875	2.00	B120700R	B120700RA
0.120	0.800	0.0065	0.1875	2.00	B120800R	B120800RA

"A" MIN HOLE	"B" MAX DEPTH	"R" RADUIS $\pm 0.001$	"S" SHANK DIA.	OAL	ORDER #	
					UNCOATED	ALTiN+
0.140	0.250	0.0065	0.1875	2.00	B140250R	B140250RA
0.140	0.400	0.0065	0.1875	2.00	B140400R	B140400RA
0.140	0.500	0.0065	0.1875	2.00	B140500R	B140500RA
0.140	0.600	0.0065	0.1875	2.00	B140600R	B140600RA
0.140	0.700	0.0065	0.1875	2.00	B140700R	B140700RA
0.140	0.750	0.0065	0.1875	2.00	B140750R	B140750RA
0.140	0.800	0.0065	0.1875	2.00	B140800R	B140800RA
0.160	0.250	0.0065	0.1875	2.00	B160250R	B160250RA
0.160	0.400	0.0065	0.1875	2.00	B160400R	B160400RA
0.160	0.500	0.0065	0.1875	2.00	B160500R	B160500RA
0.160	0.600	0.0065	0.1875	2.00	B160600R	B160600RA
0.160	0.750	0.0065	0.1875	2.00	B160750R	B160750RA
0.160	0.900	0.0065	0.1875	2.00	B160900R	B160900RA
0.160	1.000	0.0065	0.1875	2.00	B1601000R	B1601000RA
0.180	0.350	0.0065	0.250	2.50	B180350R	B180350RA
0.180	0.500	0.0065	0.250	2.50	B180500R	B180500RA
0.180	0.600	0.0065	0.250	2.50	B180600R	B180600RA
0.180	0.750	0.0065	0.250	2.50	B180750R	B180750RA
0.180	0.900	0.0065	0.250	2.50	B180900R	B180900RA
0.180	1.000	0.0065	0.250	2.50	B1801000R	B1801000RA
0.180	1.100	0.0065	0.250	2.50	B1801100R	B1801100RA
0.180	1.250	0.0065	0.250	2.50	B1801250R	B1801250RA
0.180	1.500	0.0065	0.250	2.50	B1801500R	B1801500RA
0.200	0.400	0.0065	0.250	2.50	B200400R	B200400RA
0.200	0.500	0.0065	0.250	2.50	B200500R	B200500RA
0.200	0.600	0.0065	0.250	2.50	B200600R	B200600RA
0.200	0.700	0.0065	0.250	2.50	B200700R	B200700RA
0.200	0.800	0.0065	0.250	2.50	B200800R	B200800RA
0.200	0.900	0.0065	0.250	2.50	B200900R	B200900RA
0.200	1.000	0.0065	0.250	2.50	B2001000R	B2001000RA
0.200	1.100	0.0065	0.250	2.50	B2001100R	B2001100RA
0.200	1.200	0.0065	0.250	2.50	B2001200R	B2001200RA
0.200	1.300	0.0065	0.250	2.50	B2001300R	B2001300RA

\* The B050 and the B060 series have 3° side clearance.

# RADIUS BORING BARS - SOLID CARBIDE

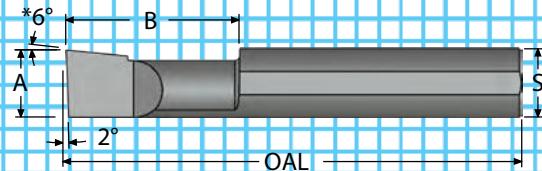


- Elliptically ground neck provides maximum strength
- Made with premium submicron grade carbide
- ALTiN+ coating for higher Surface Feet per Minute

“A” MIN HOLE	“B” MAX DEPTH	“R” ±0.001	“S” SHANK DIA.	OAL	ORDER #	
					UNCOATED	ALTiN+
0.230	0.400	0.0065	0.3125	2.50	B230400R	B230400RA
0.230	0.500	0.0065	0.3125	2.50	B230500R	B230500RA
0.230	0.600	0.0065	0.3125	2.50	B230600R	B230600RA
0.230	0.700	0.0065	0.3125	2.50	B230700R	B230700RA
0.230	0.800	0.0065	0.3125	2.50	B230800R	B230800RA
0.230	0.900	0.0065	0.3125	2.50	B230900R	B230900RA
0.230	1.000	0.0065	0.3125	2.50	B2301000R	B2301000RA
0.230	1.100	0.0065	0.3125	2.50	B2301100R	B2301100RA
0.230	1.150	0.0065	0.3125	2.50	B2301150R	B2301150RA
0.230	1.200	0.0065	0.3125	2.50	B2301200R	B2301200RA
0.230	1.250	0.0065	0.3125	2.50	B2301250R	B2301250RA
0.230	1.400	0.0065	0.3125	2.50	B2301400R	B2301400RA
0.230	1.500	0.0065	0.3125	2.50	B2301500R	B2301500RA
0.230	1.600	0.0065	0.3125	3.00	B2301600R	B2301600RA
0.290	0.500	0.0065	0.3125	2.50	B290500R	B290500RA
0.290	0.600	0.0065	0.3125	2.50	B290600R	B290600RA
0.290	0.750	0.0065	0.3125	2.50	B290750R	B290750RA
0.290	0.900	0.0065	0.3125	2.50	B290900R	B290900RA
0.290	1.000	0.0065	0.3125	2.50	B2901000R	B2901000RA
0.290	1.100	0.0065	0.3125	2.50	B2901100R	B2901100RA
0.290	1.250	0.0065	0.3125	2.50	B2901250R	B2901250RA
0.290	1.350	0.0065	0.3125	2.50	B2901350R	B2901350RA
0.290	1.500	0.0065	0.3125	2.50	B2901500R	B2901500RA
0.290	1.600	0.0065	0.3125	3.00	B2901600R	B2901600RA
0.290	1.750	0.0065	0.3125	3.00	B2901750R	B2901750RA
0.320	0.500	0.0065	0.375	2.50	B320500R	B320500RA
0.320	0.600	0.0065	0.375	2.50	B320600R	B320600RA
0.320	0.750	0.0065	0.375	2.50	B320750R	B320750RA
0.320	0.900	0.0065	0.375	2.50	B320900R	B320900RA
0.320	1.000	0.0065	0.375	2.50	B3201000R	B3201000RA
0.320	1.100	0.0065	0.375	2.50	B3201100R	B3201100RA
0.320	1.250	0.0065	0.375	2.50	B3201250R	B3201250RA
0.320	1.500	0.0065	0.375	2.50	B3201500R	B3201500RA
0.320	1.600	0.0065	0.375	3.00	B3201600R	B3201600RA
0.320	1.800	0.0065	0.375	3.00	B3201800R	B3201800RA
0.320	2.000	0.0065	0.375	4.00	B3202000R	B3202000RA
0.320	2.500	0.0065	0.375	4.00	B3202500R	B3202500RA
0.320	3.000	0.0065	0.375	4.00	B3203000R	B3203000RA

“A” MIN HOLE	“B” MAX DEPTH	“R” ±0.001	“S” SHANK DIA.	OAL	ORDER #	
					UNCOATED	ALTiN+
0.360	0.500	0.0065	0.375	2.50	B360500R	B360500RA
0.360	0.600	0.0065	0.375	2.50	B360600R	B360600RA
0.360	0.750	0.0065	0.375	2.50	B360750R	B360750RA
0.360	0.900	0.0065	0.375	2.50	B360900R	B360900RA
0.360	1.000	0.0065	0.375	2.50	B3601000R	B3601000RA
0.360	1.150	0.0065	0.375	2.50	B3601150R	B3601150RA
0.360	1.250	0.0065	0.375	2.50	B3601250R	B3601250RA
0.360	1.500	0.0065	0.375	2.50	B3601500R	B3601500RA
0.360	1.600	0.0065	0.375	3.00	B3601600R	B3601600RA
0.360	1.800	0.0065	0.375	3.00	B3601800R	B3601800RA
0.360	2.000	0.0065	0.375	4.00	B3602000R	B3602000RA
0.360	2.500	0.0065	0.375	4.00	B3602500R	B3602500RA
0.360	2.600	0.0065	0.375	4.00	B3602600R	B3602600RA
0.360	2.750	0.0065	0.375	4.00	B3602750R	B3602750RA
0.360	3.000	0.0065	0.375	6.00	B3603000R	B3603000RA
0.360	3.500	0.0065	0.375	6.00	B3603500R	B3603500RA
0.360	4.000	0.0065	0.375	6.00	B3604000R	B3604000RA
0.360	4.500	0.0065	0.375	6.00	B3604500R	B3604500RA

# BORING BARS - LEFT HAND - SOLID CARBIDE



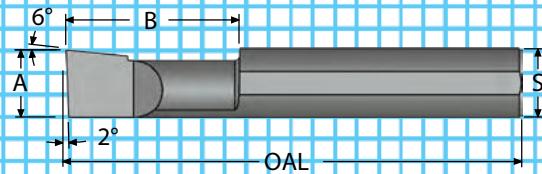
- ALTiN+ coating provides better surface finish
- Elliptically ground neck provides maximum strength
- Made with premium submicron grade carbide

## SINGLE POINT TOOLS BORING

"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #		"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+					UNCOATED	ALTiN+
0.050	0.150	0.125	1.50	LHB050150	LHB050150A	0.140	0.250	0.1875	2.00	LHB140250	LHB140250A
0.050	0.200	0.125	1.50	LHB050200	LHB050200A	0.140	0.400	0.1875	2.00	LHB140400	LHB140400A
0.050	0.300	0.125	1.50	LHB050300	LHB050300A	0.140	0.500	0.1875	2.00	LHB140500	LHB140500A
0.050	0.400	0.125	1.50	LHB050400	LHB050400A	0.140	0.600	0.1875	2.00	LHB140600	LHB140600A
0.060	0.150	0.125	1.50	LHB060150	LHB060150A	0.140	0.700	0.1875	2.00	LHB140700	LHB140700A
0.060	0.200	0.125	1.50	LHB060200	LHB060200A	0.140	0.750	0.1875	2.00	LHB140750	LHB140750A
0.060	0.300	0.125	1.50	LHB060300	LHB060300A	0.140	0.800	0.1875	2.00	LHB140800	LHB140800A
0.060	0.400	0.125	1.50	LHB060400	LHB060400A	0.160	0.250	0.1875	2.00	LHB160250	LHB160250A
0.060	0.500	0.125	1.50	LHB060500	LHB060500A	0.160	0.400	0.1875	2.00	LHB160400	LHB160400A
0.080	0.150	0.125	1.50	LHB080150	LHB080150A	0.160	0.500	0.1875	2.00	LHB160500	LHB160500A
0.080	0.200	0.125	1.50	LHB080200	LHB080200A	0.160	0.600	0.1875	2.00	LHB160600	LHB160600A
0.080	0.300	0.125	1.50	LHB080300	LHB080300A	0.160	0.750	0.1875	2.00	LHB160750	LHB160750A
0.080	0.400	0.125	1.50	LHB080400	LHB080400A	0.160	0.900	0.1875	2.00	LHB160900	LHB160900A
0.080	0.500	0.125	1.50	LHB080500	LHB080500A	0.160	1.000	0.1875	2.00	LHB1601000	LHB1601000A
0.080	0.600	0.125	1.50	LHB080600	LHB080600A	0.180	0.350	0.250	2.50	LHB180350	LHB180350A
0.100	0.150	0.125	1.50	LHB100150	LHB100150A	0.180	0.500	0.250	2.50	LHB180500	LHB180500A
0.100	0.200	0.125	1.50	LHB100200	LHB100200A	0.180	0.600	0.250	2.50	LHB180600	LHB180600A
0.100	0.300	0.125	1.50	LHB100300	LHB100300A	0.180	0.750	0.250	2.50	LHB180750	LHB180750A
0.100	0.400	0.125	1.50	LHB100400	LHB100400A	0.180	0.900	0.250	2.50	LHB180900	LHB180900A
0.100	0.500	0.125	1.50	LHB100500	LHB100500A	0.180	1.000	0.250	2.50	LHB1801000	LHB1801000A
0.100	0.600	0.125	1.50	LHB100600	LHB100600A	0.180	1.100	0.250	2.50	LHB1801100	LHB1801100A
0.100	0.700	0.125	1.50	LHB100700	LHB100700A	0.200	0.400	0.250	2.50	LHB200400	LHB200400A
0.110	0.150	0.125	1.50	LHB110150	LHB110150A	0.200	0.500	0.250	2.50	LHB200500	LHB200500A
0.110	0.200	0.125	1.50	LHB110200	LHB110200A	0.200	0.600	0.250	2.50	LHB200600	LHB200600A
0.110	0.300	0.125	1.50	LHB110300	LHB110300A	0.200	0.700	0.250	2.50	LHB200700	LHB200700A
0.110	0.400	0.125	1.50	LHB110400	LHB110400A	0.200	0.800	0.250	2.50	LHB200800	LHB200800A
0.110	0.500	0.125	1.50	LHB110500	LHB110500A	0.200	0.900	0.250	2.50	LHB200900	LHB200900A
0.110	0.600	0.125	1.50	LHB110600	LHB110600A	0.200	1.000	0.250	2.50	LHB2001000	LHB2001000A
0.110	0.700	0.125	1.50	LHB110700	LHB110700A	0.200	1.100	0.250	2.50	LHB2001100	LHB2001100A
0.120	0.250	0.1875	2.00	LHB120250	LHB120250A	0.200	1.200	0.250	2.50	LHB2001200	LHB2001200A
0.120	0.350	0.1875	2.00	LHB120350	LHB120350A	0.200	1.300	0.250	2.50	LHB2001300	LHB2001300A
0.120	0.500	0.1875	2.00	LHB120500	LHB120500A						
0.120	0.600	0.1875	2.00	LHB120600	LHB120600A						
0.120	0.700	0.1875	2.00	LHB120700	LHB120700A						
0.120	0.800	0.1875	2.00	LHB120800	LHB120800A						

\* The LHB050 and the LHB060 series have 3° side clearance.

# BORING BARS - LEFT HAND - SOLID CARBIDE

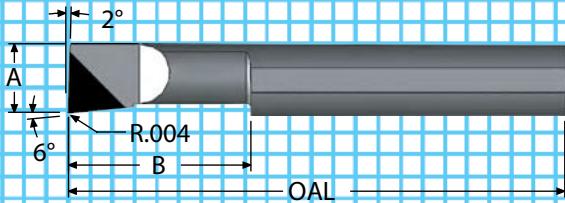


- ALTiN+ coating extends tool life
- Polished flute face for optimum performance
- Precision ground shank flat guarantees tool orientation

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>UNCOATED</b>	<b>ALTiN+</b>
0.230	0.400	0.3125	2.50	LHB230400	LHB230400A
0.230	0.500	0.3125	2.50	LHB230500	LHB230500A
0.230	0.600	0.3125	2.50	LHB230600	LHB230600A
0.230	0.700	0.3125	2.50	LHB230700	LHB230700A
0.230	0.800	0.3125	2.50	LHB230800	LHB230800A
0.230	0.900	0.3125	2.50	LHB230900	LHB230900A
0.230	1.000	0.3125	2.50	LHB2301000	LHB2301000A
0.230	1.150	0.3125	2.50	LHB2301150	LHB2301150A
0.230	1.200	0.3125	2.50	LHB2301200	LHB2301200A
0.230	1.250	0.3125	2.50	LHB2301250	LHB2301250A
0.230	1.400	0.3125	2.50	LHB2301400	LHB2301400A
0.230	1.500	0.3125	2.50	LHB2301500	LHB2301500A
0.230	1.600	0.3125	3.00	LHB2301600	LHB2301600A
0.290	0.500	0.3125	2.50	LHB290500	LHB290500A
0.290	0.600	0.3125	2.50	LHB290600	LHB290600A
0.290	0.750	0.3125	2.50	LHB290750	LHB290750A
0.290	0.900	0.3125	2.50	LHB290900	LHB290900A
0.290	1.000	0.3125	2.50	LHB2901000	LHB2901000A
0.290	1.100	0.3125	2.50	LHB2901100	LHB2901100A
0.290	1.250	0.3125	2.50	LHB2901250	LHB2901250A
0.290	1.350	0.3125	2.50	LHB2901350	LHB2901350A
0.290	1.500	0.3125	2.50	LHB2901500	LHB2901500A
0.290	1.600	0.3125	3.00	LHB2901600	LHB2901600A
0.290	1.750	0.3125	3.00	LHB2901750	LHB2901750A
0.320	0.500	0.375	2.50	LHB320500	LHB320500A
0.320	0.600	0.375	2.50	LHB320600	LHB320600A
0.320	0.750	0.375	2.50	LHB320750	LHB320750A
0.320	0.900	0.375	2.50	LHB320900	LHB320900A
0.320	1.000	0.375	2.50	LHB3201000	LHB3201000A
0.320	1.100	0.375	2.50	LHB3201100	LHB3201100A
0.320	1.250	0.375	2.50	LHB3201250	LHB3201250A
0.320	1.500	0.375	2.50	LHB3201500	LHB3201500A
0.320	1.600	0.375	3.00	LHB3201600	LHB3201600A
0.320	1.800	0.375	3.00	LHB3201800	LHB3201800A
0.320	2.000	0.375	4.00	LHB3202000	LHB3202000A
0.320	2.500	0.375	4.00	LHB3202500	LHB3202500A
0.320	3.000	0.375	4.00	LHB3203000	LHB3203000A

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>UNCOATED</b>	<b>ALTiN+</b>
0.360	0.500	0.375	2.50	LHB360500	LHB360500A
0.360	0.600	0.375	2.50	LHB360600	LHB360600A
0.360	0.750	0.375	2.50	LHB360750	LHB360750A
0.360	0.900	0.375	2.50	LHB360900	LHB360900A
0.360	1.000	0.375	2.50	LHB3601000	LHB3601000A
0.360	1.150	0.375	2.50	LHB3601150	LHB3601150A
0.360	1.250	0.375	2.50	LHB3601250	LHB3601250A
0.360	1.500	0.375	2.50	LHB3601500	LHB3601500A
0.360	1.600	0.375	3.00	LHB3601600	LHB3601600A
0.360	1.800	0.375	3.00	LHB3601800	LHB3601800A
0.360	2.000	0.375	4.00	LHB3602000	LHB3602000A
0.360	2.500	0.375	4.00	LHB3602500	LHB3602500A
0.360	3.000	0.375	4.00	LHB3603000	LHB3603000A
0.490	0.750	0.500	3.00	LHB490750	LHB490750A
0.490	1.000	0.500	3.00	LHB4901000	LHB4901000A
0.490	1.250	0.500	3.00	LHB4901250	LHB4901250A
0.490	1.500	0.500	3.00	LHB4901500	LHB4901500A
0.490	2.000	0.500	4.00	LHB4902000	LHB4902000A
0.490	2.500	0.500	4.00	LHB4902500	LHB4902500A
0.490	2.600	0.500	4.00	LHB4902600	LHB4902600A
0.490	2.750	0.500	4.00	LHB4902750	LHB4902750A
0.490	3.000	0.500	6.00	LHB4903000	LHB4903000A
0.490	3.500	0.500	6.00	LHB4903500	LHB4903500A
0.490	4.000	0.500	6.00	LHB4904000	LHB4904000A
0.490	4.500	0.500	6.00	LHB4904500	LHB4904500A

# BORING BARS - CBN TIPPED - PCD TIPPED

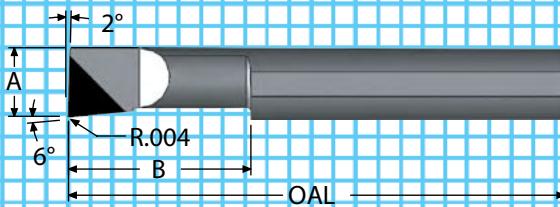


- PCD for abrasive non-ferrous materials
- CBN for hard ferrous metal - 45Rc plus
- Faster speeds and feeds
- Maintains tighter tolerances
- Solid carbide for maximum rigidity

**SINGLE POINT TOOLS  
BORING**

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>PCD</b>	<b>CBN</b>
0.120	0.250	0.1875	2.00	PCD-B120250	CBN-B120250
0.120	0.350	0.1875	2.00	PCD-B120350	CBN-B120350
0.120	0.500	0.1875	2.00	PCD-B120500	CBN-B120500
0.120	0.600	0.1875	2.00	PCD-B120600	CBN-B120600
0.120	0.700	0.1875	2.00	PCD-B120700	CBN-B120700
0.120	0.800	0.1875	2.00	PCD-B120800	CBN-B120800
0.140	0.250	0.1875	2.00	PCD-B140250	CBN-B140250
0.140	0.400	0.1875	2.00	PCD-B140400	CBN-B140400
0.140	0.500	0.1875	2.00	PCD-B140500	CBN-B140500
0.140	0.600	0.1875	2.00	PCD-B140600	CBN-B140600
0.140	0.700	0.1875	2.00	PCD-B140700	CBN-B140700
0.140	0.750	0.1875	2.00	PCD-B140750	CBN-B140750
0.140	0.800	0.1875	2.00	PCD-B140800	CBN-B140800
0.160	0.250	0.1875	2.00	PCD-B160250	CBN-B160250
0.160	0.400	0.1875	2.00	PCD-B160400	CBN-B160400
0.160	0.500	0.1875	2.00	PCD-B160500	CBN-B160500
0.160	0.600	0.1875	2.00	PCD-B160600	CBN-B160600
0.160	0.750	0.1875	2.00	PCD-B160750	CBN-B160750
0.160	0.900	0.1875	2.00	PCD-B160900	CBN-B160900
0.160	1.000	0.1875	2.00	PCD-B1601000	CBN-B1601000
0.180	0.350	0.250	2.50	PCD-B180350	CBN-B180350
0.180	0.500	0.250	2.50	PCD-B180500	CBN-B180500
0.180	0.600	0.250	2.50	PCD-B180600	CBN-B180600
0.180	0.750	0.250	2.50	PCD-B180750	CBN-B180750
0.180	0.900	0.250	2.50	PCD-B180900	CBN-B180900
0.180	1.000	0.250	2.50	PCD-B1801000	CBN-B1801000
0.180	1.100	0.250	2.50	PCD-B1801100	CBN-B1801100

# BORING BARS - CBN TIPPED - PCD TIPPED



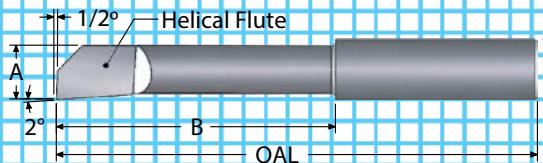
- PCD for abrasive non-ferrous materials
- CBN for hard ferrous metal - 45Rc plus
- Faster speeds and feeds
- Maintains tighter tolerances
- Solid carbide for maximum rigidity

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>PCD</b>	<b>CBN</b>
0.200	0.400	0.250	2.50	PCD-B200400	CBN-B200400
0.200	0.500	0.250	2.50	PCD-B200500	CBN-B200500
0.200	0.600	0.250	2.50	PCD-B200600	CBN-B200600
0.200	0.700	0.250	2.50	PCD-B200700	CBN-B200700
0.200	0.800	0.250	2.50	PCD-B200800	CBN-B200800
0.200	0.900	0.250	2.50	PCD-B200900	CBN-B200900
0.200	1.000	0.250	2.50	PCD-B2001000	CBN-B2001000
0.200	1.100	0.250	2.50	PCD-B2001100	CBN-B2001100
0.200	1.200	0.250	2.50	PCD-B2001200	CBN-B2001200
0.200	1.300	0.250	2.50	PCD-B2001300	CBN-B2001300
0.230	0.400	0.3125	2.50	PCD-B230400	CBN-B230400
0.230	0.500	0.3125	2.50	PCD-B230500	CBN-B230500
0.230	0.600	0.3125	2.50	PCD-B230600	CBN-B230600
0.230	0.700	0.3125	2.50	PCD-B230700	CBN-B230700
0.230	0.800	0.3125	2.50	PCD-B230800	CBN-B230800
0.230	0.900	0.3125	2.50	PCD-B230900	CBN-B230900
0.230	1.000	0.3125	2.50	PCD-B2301000	CBN-B2301000
0.230	1.150	0.3125	2.50	PCD-B2301150	CBN-B2301150
0.230	1.200	0.3125	2.50	PCD-B2301200	CBN-B2301200
0.230	1.250	0.3125	2.50	PCD-B2301250	CBN-B2301250
0.230	1.400	0.3125	2.50	PCD-B2301400	CBN-B2301400
0.230	1.500	0.3125	2.50	PCD-B2301500	CBN-B2301500
0.230	1.600	0.3125	2.50	PCD-B2301600	CBN-B2301600
0.290	0.500	0.3125	2.50	PCD-B290500	CBN-B290500
0.290	0.600	0.3125	2.50	PCD-B290600	CBN-B290600
0.290	0.750	0.3125	2.50	PCD-B290750	CBN-B290750
0.290	0.900	0.3125	2.50	PCD-B290900	CBN-B290900
0.290	1.000	0.3125	2.50	PCD-B2901000	CBN-B2901000
0.290	1.100	0.3125	2.50	PCD-B2901100	CBN-B2901100
0.290	1.250	0.3125	2.50	PCD-B2901250	CBN-B2901250
0.290	1.350	0.3125	2.50	PCD-B2901350	CBN-B2901350
0.290	1.500	0.3125	2.50	PCD-B2901500	CBN-B2901500
0.290	1.600	0.3125	2.50	PCD-B2901600	CBN-B2901600
0.290	1.750	0.3125	2.50	PCD-B2901750	CBN-B2901750

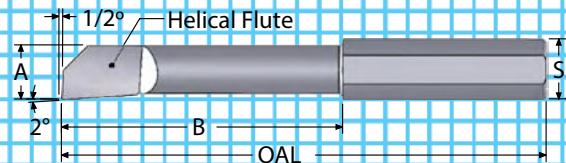
<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>PCD</b>	<b>CBN</b>
0.320	0.500	0.375	2.50	PCD-B320500	CBN-B320500
0.320	0.600	0.375	2.50	PCD-B320600	CBN-B320600
0.320	0.750	0.375	2.50	PCD-B320750	CBN-B320750
0.320	0.900	0.375	2.50	PCD-B320900	CBN-B320900
0.320	1.000	0.375	2.50	PCD-B3201000	CBN-B3201000
0.320	1.100	0.375	2.50	PCD-B3201100	CBN-B3201100
0.320	1.250	0.375	2.50	PCD-B3201250	CBN-B3201250
0.320	1.500	0.375	2.50	PCD-B3201500	CBN-B3201500
0.320	1.600	0.375	2.50	PCD-B3201600	CBN-B3201600
0.320	1.800	0.375	2.50	PCD-B3201800	CBN-B3201800
0.320	2.000	0.375	4.00	PCD-B3202000	CBN-B3202000
0.320	2.500	0.375	4.00	PCD-B3202500	CBN-B3202500
0.320	3.000	0.375	4.00	PCD-B3203000	CBN-B3203000
0.360	0.500	0.375	2.50	PCD-B360500	CBN-B360500
0.360	0.600	0.375	2.50	PCD-B360600	CBN-B360600
0.360	0.750	0.375	2.50	PCD-B360750	CBN-B360750
0.360	0.900	0.375	2.50	PCD-B360900	CBN-B360900
0.360	1.000	0.375	2.50	PCD-B3601000	CBN-B3601000
0.360	1.150	0.375	2.50	PCD-B3601150	CBN-B3601150
0.360	1.250	0.375	2.50	PCD-B3601250	CBN-B3601250
0.360	1.500	0.375	2.50	PCD-B3601500	CBN-B3601500
0.360	1.600	0.375	2.50	PCD-B3601600	CBN-B3601600
0.360	1.800	0.375	2.50	PCD-B3601800	CBN-B3601800
0.360	2.000	0.375	4.00	PCD-B3602000	CBN-B3602000
0.360	2.500	0.375	4.00	PCD-B3602500	CBN-B3602500
0.360	3.000	0.375	4.00	PCD-B3603000	CBN-B3603000

# BORING BARS - HELICAL - SOLID CARBIDE

- Positive high shear tool design reduces cutting force
- ALTiN+ coating helps extend tool life
- Stocked in both uncoated and ALTiN+ coating
- Made with premium submicron grade carbide



**HELICAL BACK RAKE  
WITHOUT FLAT**



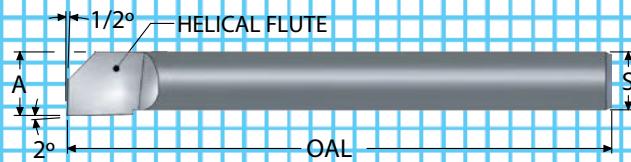
**HELICAL BACK RAKE  
WITH FLAT**

SINGLE POINT TOOLS  
BORING

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>UNCOATED</b>	<b>ALTiN+</b>
0.025	0.093	0.125	1.50	HB25	HB25A
0.027	0.125	0.125	1.50	HB27	HB27A
0.031	0.156	0.125	1.50	HB31	HB31A
0.031	0.187	0.125	1.50	HB31L	HB31LA
0.036	0.156	0.125	1.50	HB36	HB36A
0.036	0.250	0.125	1.50	HB36L	HB36LA
0.042	0.250	0.125	1.50	HB42	HB42A
0.042	0.312	0.125	1.50	HB42L	HB42LA
0.052	0.312	0.125	1.50	HB52	HB52A
0.057	0.312	0.125	1.50	HB57	HB57A
0.060	0.375	0.125	1.50	HB60	HB60A
0.060	0.500	0.125	1.50	HB60L	HB60LA
0.070	0.437	0.125	1.50	HB70	HB70A
0.080	0.500	0.125	1.50	HB80	HB80A
0.085	0.500	0.125	1.50	HB85	HB85A
0.090	0.500	0.125	1.50	HB90	HB90A
0.090	0.625	0.125	1.50	HB90L	HB90LA
0.100	0.562	0.125	1.50	HB100	HB100A
0.100	0.625	0.125	2.00	HB100L	HB100LA
0.110	0.562	0.125	1.50	HB110	HB110A
0.110	0.625	0.125	2.00	HB110L	HB110LA
0.120	0.625	0.125	1.50	HB120	HB120A
0.120	0.625	0.125	2.00	HB120L	HB120LA

<b>"A" MIN HOLE</b>	<b>"B" MAX DEPTH</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
				<b>UNCOATED</b>	<b>ALTiN+</b>
0.025	0.093	0.125	1.50	HB25F	HB25FA
0.027	0.125	0.125	1.50	HB27F	HB27FA
0.031	0.156	0.125	1.50	HB31F	HB31FA
0.031	0.187	0.125	1.50	HB31LF	HB31LFA
0.036	0.156	0.125	1.50	HB36F	HB36FA
0.036	0.250	0.125	1.50	HB36LF	HB36LFA
0.042	0.250	0.125	1.50	HB42F	HB42FA
0.042	0.312	0.125	1.50	HB42LF	HB42LFA
0.052	0.312	0.125	1.50	HB52F	HB52FA
0.057	0.312	0.125	1.50	HB57F	HB57FA
0.060	0.375	0.125	1.50	HB60F	HB60FA
0.060	0.500	0.125	1.50	HB60LF	HB60LFA
0.070	0.437	0.125	1.50	HB70F	HB70FA
0.080	0.500	0.125	1.50	HB80F	HB80FA
0.085	0.500	0.125	1.50	HB85F	HB85FA
0.090	0.500	0.125	1.50	HB90F	HB90FA
0.090	0.625	0.125	1.50	HB90LF	HB90LFA
0.100	0.562	0.125	1.50	HB100F	HB100FA
0.100	0.625	0.125	2.00	HB100LF	HB100LFA
0.110	0.562	0.125	1.50	HB110F	HB110FA
0.110	0.625	0.125	2.00	HB110LF	HB110LFA
0.120	0.625	0.125	1.50	HB120F	HB120FA
0.120	0.625	0.125	2.00	HB120LF	HB120LFA

# BORING BARS - HELICAL - SOLID CARBIDE

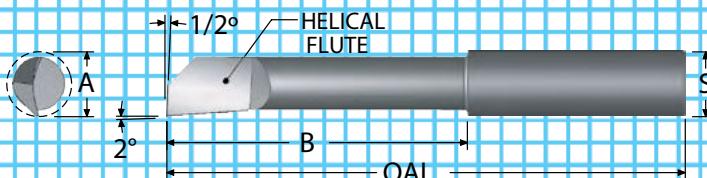


- Bar features an adjustable max bore depth
- ALTiN+ coating provides better surface finish
- Positive high shear tool design reduces cutting force
- Made with premium submicron grade carbide

## HELICAL BACK RAKE

<b>"A"</b> MIN HOLE	<b>"S"</b> SHANK DIA.	<b>OAL</b>	<b>ORDER #</b>	
			<b>UNCOATED</b>	<b>ALTiN+</b>
0.135	0.1093	1.50	HB135	HB135A
0.150	0.1250	1.50	HB150	HB150A
0.150	0.1250	2.50	HB150L	HB150LA
0.180	0.1562	1.50	HB180	HB180A
0.180	0.1562	2.00	HB180L	HB180LA
0.180	0.1562	3.00	HB180EL	HB180ELA
0.210	0.1875	1.50	HB210	HB210A
0.210	0.1875	3.00	HB210L	HB210LA
0.240	0.2187	1.50	HB240	HB240A
0.240	0.2187	3.00	HB240L	HB240LA
0.300	0.2500	2.50	HB300	HB300A
0.300	0.2500	3.50	HB300L	HB300LA
0.360	0.3125	3.00	HB360	HB360A
0.360	0.3125	5.00	HB360L	HB360LA
0.480	0.4375	3.00	HB480	HB480A
0.480	0.4375	6.00	HB480L	HB480LA

# BORING BARS - HELICAL - SOLID CARBIDE



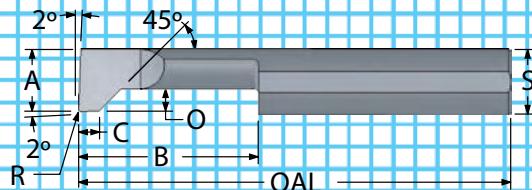
"A" minimum bore diameter refers to the size of the hole that is produced when the tools are rotated on centerline. These tools are designed to be used for both mill and lathe applications.

## SINGLE POINT TOOLS BORING

"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.020	0.062	0.125	1.50	HB020062	HB020062A
0.025	0.062	0.125	1.50	HB025062	HB025062A
0.025	0.125	0.125	1.50	HB025125	HB025125A
0.030	0.125	0.125	1.50	HB030125	HB030125A
0.030	0.187	0.125	1.50	HB030187	HB030187A
0.035	0.125	0.125	1.50	HB035125	HB035125A
0.035	0.187	0.125	1.50	HB035187	HB035187A
0.040	0.187	0.125	1.50	HB040187	HB040187A
0.040	0.250	0.125	1.50	HB040250	HB040250A
0.050	0.312	0.125	1.50	HB050312	HB050312A
0.060	0.375	0.125	1.50	HB060375	HB060375A
0.070	0.437	0.125	1.50	HB070437	HB070437A
0.080	0.500	0.125	1.50	HB080500	HB080500A
0.090	0.500	0.125	1.50	HB090500	HB090500A
0.100	0.562	0.125	1.50	HB100562	HB100562A
0.120	0.625	0.125	1.50	HB120625	HB120625A
0.120	1.000	0.125	2.00	HB1201000	HB1201000A
0.135	0.750	0.1875	2.00	HB135750	HB135750A
0.135	1.000	0.1875	2.00	HB1351000	HB1351000A
0.150	1.000	0.1875	2.00	HB1501000	HB1501000A
0.150	1.250	0.1875	2.00	HB1501250	HB1501250A
0.180	1.000	0.1875	2.00	HB1801000	HB1801000A
0.180	1.250	0.1875	2.50	HB1801250	HB1801250A
0.180	1.500	0.1875	2.50	HB1801500	HB1801500A

"A" MIN HOLE	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
				UNCOATED	ALTiN+
0.210	1.000	0.250	2.50	HB2101000	HB2101000A
0.210	1.250	0.250	2.50	HB2101250	HB2101250A
0.210	1.500	0.250	2.50	HB2101500	HB2101500A
0.240	1.000	0.250	2.50	HB2401000	HB2401000A
0.240	1.500	0.250	2.50	HB2401500	HB2401500A
0.240	1.750	0.250	3.00	HB2401750	HB2401750A
0.300	1.000	0.312	2.50	HB3001000	HB3001000A
0.300	1.500	0.312	2.50	HB3001500	HB3001500A
0.300	1.750	0.312	3.00	HB3001750	HB3001750A
0.360	1.000	0.375	2.50	HB3601000	HB3601000A
0.360	1.500	0.375	2.50	HB3601500	HB3601500A
0.360	1.750	0.375	3.00	HB3601750	HB3601750A
0.360	2.000	0.375	4.00	HB3602000	HB3602000A
0.360	2.250	0.375	4.00	HB3602250	HB3602250A
0.360	2.500	0.375	4.00	HB3602500	HB3602500A
0.480	1.500	0.500	3.00	HB4801500	HB4801500A
0.480	2.000	0.500	3.00	HB4802000	HB4802000A
0.480	2.500	0.500	4.00	HB4802500	HB4802500A
0.480	3.000	0.500	4.00	HB4803000	HB4803000A
0.480	3.500	0.500	6.00	HB4803500	HB4803500A
0.480	4.000	0.500	6.00	HB4804000	HB4804000A
0.480	4.500	0.500	6.00	HB4804500	HB4804500A

# BACK CHAMFER BORING BARS - SOLID CARBIDE

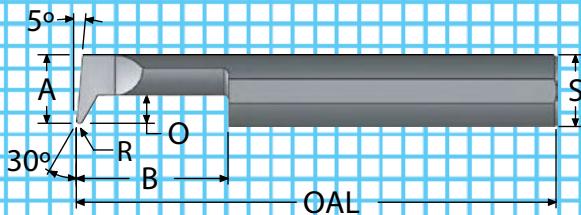


- Bar features multifunction design: bore, back bore, thread relief, and back chamfer
- ALTiN+ coating extends tool life
- Elliptically ground neck provides maximum strength
- Made with premium submicron grade carbide

“A” MIN HOLE	“B” MAX DEPTH	“C” CUT WIDTH	“O” OFF SET	“R” TOOL RADIUS	“S” SHANK DIA.	OAL	ORDER #	
							UNCOATED	ALTiN+
0.090	0.300	0.040	0.035	0.010	0.125	1.50	BC090300	BC090300A
0.090	0.400	0.040	0.035	0.010	0.125	1.50	BC090400	BC090400A
0.090	0.500	0.040	0.035	0.010	0.125	1.50	BC090500	BC090500A
0.120	0.400	0.050	0.045	0.010	0.125	1.50	BC120400	BC120400A
0.120	0.500	0.050	0.045	0.010	0.125	1.50	BC120500	BC120500A
0.120	0.600	0.050	0.045	0.010	0.125	1.50	BC120600	BC120600A
0.180	0.500	0.060	0.050	0.010	0.1875	2.00	BC180500	BC180500A
0.180	0.650	0.060	0.050	0.010	0.1875	2.00	BC180650	BC180650A
0.180	0.800	0.060	0.050	0.010	0.1875	2.00	BC180800	BC180800A
0.230	0.500	0.080	0.060	0.010	0.250	2.50	BC230500	BC230500A
0.230	0.700	0.080	0.060	0.010	0.250	2.50	BC230700	BC230700A
0.230	0.900	0.080	0.060	0.010	0.250	2.50	BC230900	BC230900A
0.290	0.700	0.080	0.080	0.010	0.3125	2.50	BC290700	BC290700A
0.290	0.900	0.080	0.080	0.010	0.3125	2.50	BC290900	BC290900A
0.290	1.100	0.080	0.080	0.010	0.3125	2.50	BC2901100	BC2901100A
0.360	0.750	0.100	0.120	0.010	0.375	2.50	BC360750	BC360750A
0.360	1.000	0.100	0.120	0.010	0.375	2.50	BC3601000	BC3601000A
0.360	1.250	0.100	0.120	0.010	0.375	2.50	BC3601250	BC3601250A
0.490	1.000	0.110	0.130	0.010	0.500	3.00	BC4901000	BC4901000A
0.490	1.250	0.110	0.130	0.010	0.500	3.00	BC4901250	BC4901250A
0.490	1.500	0.110	0.130	0.010	0.500	3.00	BC4901500	BC4901500A

# PROFILE BORING BARS - SOLID CARBIDE

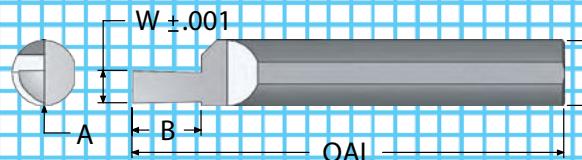
## SINGLE POINT TOOLS BORING



- Machines complex internal shapes with ease
- ALTiN+ coating allows higher Surface Feet per Minute
- Elliptically ground neck provides maximum strength
- Made with premium submicron grade carbide

"A" MIN HOLE	"B" MAX DEPTH	"O" OFF SET	"R" TOOL RADIUS	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.090	0.200	0.040	0.005	0.125	1.50	PB090200	PB090200A
0.090	0.300	0.040	0.005	0.125	1.50	PB090300	PB090300A
0.090	0.400	0.040	0.005	0.125	1.50	PB090400	PB090400A
0.120	0.250	0.050	0.007	0.125	1.50	PB120250	PB120250A
0.120	0.500	0.050	0.007	0.125	1.50	PB120500	PB120500A
0.120	0.750	0.050	0.007	0.125	1.50	PB120750	PB120750A
0.180	0.500	0.080	0.010	0.1875	2.00	PB180500	PB180500A
0.180	0.750	0.080	0.010	0.1875	2.00	PB180750	PB180750A
0.180	1.000	0.080	0.010	0.1875	2.00	PB1801000	PB1801000A
0.230	0.500	0.090	0.010	0.250	2.50	PB230500	PB230500A
0.230	0.750	0.090	0.010	0.250	2.50	PB230750	PB230750A
0.230	1.000	0.090	0.010	0.250	2.50	PB2301000	PB2301000A
0.290	0.500	0.110	0.015	0.3125	2.50	PB290500	PB290500A
0.290	0.750	0.110	0.015	0.3125	2.50	PB290750	PB290750A
0.290	1.000	0.110	0.015	0.3125	2.50	PB2901000	PB2901000A
0.360	0.500	0.140	0.015	0.375	2.50	PB360500	PB360500A
0.360	0.750	0.140	0.015	0.375	2.50	PB360750	PB360750A
0.360	1.000	0.140	0.015	0.375	2.50	PB3601000	PB3601000A
0.360	1.250	0.140	0.015	0.375	2.50	PB3601250	PB3601250A
0.490	0.500	0.180	0.015	0.500	3.00	PB490500	PB490500A
0.490	0.750	0.180	0.015	0.500	3.00	PB490750	PB490750A
0.490	1.000	0.180	0.015	0.500	3.00	PB4901000	PB4901000A
0.490	1.250	0.180	0.015	0.500	3.00	PB4901250	PB4901250A

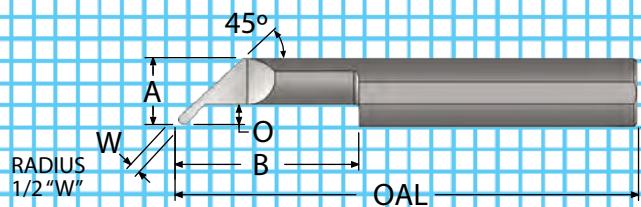
# FACE GROOVE TOOLS - SOLID CARBIDE



- ALTiN+ coating extends tool life
- Polished flute face for maximum performance
- Precision ground flat for guaranteed tool orientation
- Made with premium submicron grade carbide

"A" MIN. DIA.	"W" TOOL WIDTH	"B" MAX DEPTH	"S" SHANK DIA.	OAL	ORDER #	
					UNCOATED	ALTiN+
0.135	0.015	0.040	0.125	1.50	FG125-015	FG125-015A
0.135	0.020	0.050	0.125	1.50	FG125-020	FG125-020A
0.135	0.025	0.050	0.125	1.50	FG125-025	FG125-025A
0.135	0.030	0.060	0.125	1.50	FG125-030	FG125-030A
0.195	0.035	0.070	0.1875	2.00	FG187-035	FG187-035A
0.195	0.040	0.080	0.1875	2.00	FG187-040	FG187-040A
0.195	0.045	0.090	0.1875	2.00	FG187-045	FG187-045A
0.195	0.050	0.100	0.1875	2.00	FG187-050	FG187-050A
0.260	0.021	0.050	0.250	2.50	FG250-020	FG250-020A
0.260	0.031	0.060	0.250	2.50	FG250-030	FG250-030A
0.260	0.041	0.080	0.250	2.50	FG250-040	FG250-040A
0.260	0.051	0.100	0.250	2.50	FG250-050	FG250-050A
0.320	0.031	0.060	0.3125	2.50	FG312-030	FG312-030A
0.320	0.041	0.080	0.3125	2.50	FG312-040	FG312-040A
0.320	0.051	0.100	0.3125	2.50	FG312-050	FG312-050A
0.320	0.063	0.130	0.3125	2.50	FG312-062	FG312-062A
0.385	0.031	0.060	0.375	2.50	FG375-030	FG375-030A
0.385	0.063	0.130	0.375	2.50	FG375-062	FG375-062A
0.385	0.094	0.190	0.375	2.50	FG375-093	FG375-093A
0.385	0.126	0.250	0.375	2.50	FG375-125	FG375-125A
0.510	0.063	0.130	0.500	3.00	FG500-062	FG500-062A
0.510	0.094	0.190	0.500	3.00	FG500-093	FG500-093A
0.510	0.125	0.250	0.500	3.00	FG500-125	FG500-125A
0.510	0.157	0.310	0.500	3.00	FG500-156	FG500-156A
0.635	0.063	0.130	0.625	3.50	FG625-062	FG625-062A
0.635	0.094	0.190	0.625	3.50	FG625-093	FG625-093A
0.635	0.126	0.250	0.625	3.50	FG625-125	FG625-125A
0.635	0.157	0.310	0.625	3.50	FG625-156	FG625-156A
0.635	0.188	0.375	0.625	3.50	FG625-187	FG625-187A
0.760	0.063	0.130	0.750	4.00	FG750-062	FG750-062A
0.760	0.094	0.190	0.750	4.00	FG750-093	FG750-093A
0.760	0.126	0.250	0.750	4.00	FG750-125	FG750-125A
0.760	0.157	0.310	0.750	4.00	FG750-156	FG750-156A
0.760	0.188	0.375	0.750	4.00	FG750-187	FG750-187A
0.760	0.251	0.500	0.750	4.00	FG750-250	FG750-250A

# UNDERCUT GROOVE TOOLS - SOLID CARBIDE

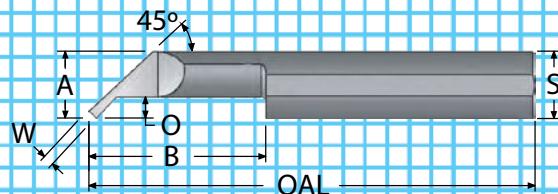


- ALTiN+ coating for higher Surface Feet per Minute
- Elliptically ground for maximum strength
- Polished flute face for optimum performance
- Made with premium submicron grade carbide

## UNDERCUT & PROFILE GROOVE TOOLS

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.250	0.031	0.500	0.060	0.250	2.50	UP25030-8	UP25030-8A
0.250	0.031	1.000	0.060	0.250	2.50	UP25030-16	UP25030-16A
0.310	0.051	0.500	0.110	0.3125	2.50	UP31050-8	UP31050-8A
0.310	0.051	1.000	0.110	0.3125	2.50	UP31050-16	UP31050-16A
0.310	0.063	1.000	0.110	0.3125	2.50	UP31062-16	UP31062-16A
0.310	0.063	1.250	0.110	0.3125	2.50	UP31062-20	UP31062-20A
0.375	0.063	1.000	0.110	0.375	2.50	UP37062-16	UP37062-16A
0.375	0.063	1.250	0.110	0.375	2.50	UP37062-20	UP37062-20A
0.375	0.094	1.000	0.110	0.375	2.50	UP37093-16	UP37093-16A
0.375	0.094	1.250	0.110	0.375	2.50	UP37093-20	UP37093-20A
0.375	0.126	1.000	0.110	0.375	2.50	UP37125-16	UP37125-16A
0.375	0.126	1.250	0.110	0.375	2.50	UP37125-20	UP37125-20A
0.500	0.063	1.000	0.160	0.500	3.00	UP50062-16	UP50062-16A
0.500	0.063	1.500	0.160	0.500	3.00	UP50062-24	UP50062-24A
0.500	0.094	1.000	0.160	0.500	3.00	UP50093-16	UP50093-16A
0.500	0.094	1.500	0.160	0.500	3.00	UP50093-24	UP50093-24A
0.500	0.126	1.000	0.160	0.500	3.00	UP50125-16	UP50125-16A
0.500	0.126	1.500	0.160	0.500	3.00	UP50125-24	UP50125-24A

# UNDERCUT GROOVE TOOLS - SOLID CARBIDE

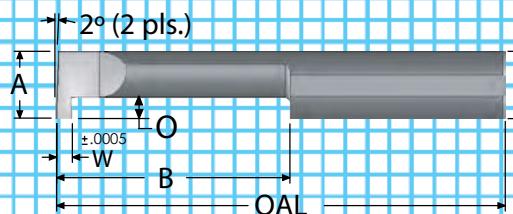


- ALTiN+ coating allows higher Surface Feet per Minute
- Elliptically ground for maximum strength
- Polished flute face for optimum performance

## UNDERCUT GROOVE TOOLS

<b>"A" MIN HOLE</b>	<b>"W" TOOL WIDTH</b>	<b>"B" MAX DEPTH</b>	<b>"O" OFF SET</b>	<b>"S" SHANK DIA.</b>	<b>OAL</b>	<b>ORDER #</b>	
						<b>UNCOATED</b>	<b>ALTiN+</b>
0.250	0.031	0.500	0.060	0.250	2.50	UC25030-8	UC25030-8A
0.250	0.031	1.000	0.060	0.250	2.50	UC25030-16	UC25030-16A
0.310	0.051	0.500	0.110	0.3125	2.50	UC31050-8	UC31050-8A
0.310	0.051	1.000	0.110	0.3125	2.50	UC31050-16	UC31050-16A
0.310	0.063	1.000	0.110	0.3125	2.50	UC31062-16	UC31062-16A
0.310	0.063	1.250	0.110	0.3125	2.50	UC31062-20	UC31062-20A
0.375	0.063	1.000	0.110	0.375	2.50	UC37062-16	UC37062-16A
0.375	0.063	1.250	0.110	0.375	2.50	UC37062-20	UC37062-20A
0.375	0.094	1.000	0.110	0.375	2.50	UC37093-16	UC37093-16A
0.375	0.094	1.250	0.110	0.375	2.50	UC37093-20	UC37093-20A
0.375	0.126	1.000	0.110	0.375	2.50	UC37125-16	UC37125-16A
0.375	0.126	1.250	0.110	0.375	2.50	UC37125-20	UC37125-20A
0.500	0.063	1.000	0.160	0.500	3.00	UC50062-16	UC50062-16A
0.500	0.063	1.500	0.160	0.500	3.00	UC50062-24	UC50062-24A
0.500	0.094	1.000	0.160	0.500	3.00	UC50093-16	UC50093-16A
0.500	0.094	1.500	0.160	0.500	3.00	UC50093-24	UC50093-24A
0.500	0.126	1.000	0.160	0.500	3.00	UC50125-16	UC50125-16A
0.500	0.126	1.500	0.160	0.500	3.00	UC50125-24	UC50125-24A

# GROOVE TOOLS – RETAINING RING – SOLID CARBIDE



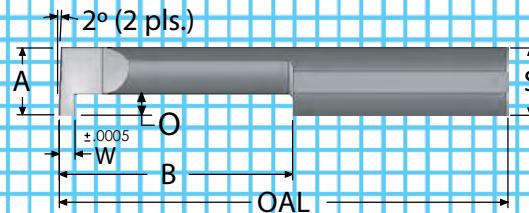
- ALTiN+ coating for higher Surface Feet per Minute
- Shank diameter is precision ground
- Made with premium submicron grade carbide

## SINGLE POINT TOOLS GROOVING

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.060	0.0320	0.187	0.020	0.125	1.50	GT031-3	GT031-3A
0.060	0.0320	0.250	0.020	0.125	1.50	GT031-4	GT031-4A
0.060	0.0320	0.375	0.020	0.125	1.50	GT031-6	GT031-6A
0.090	0.0460	0.250	0.030	0.125	1.50	GT045-4	GT045-4A
0.090	0.0460	0.375	0.030	0.125	1.50	GT045-6	GT045-6A
0.090	0.0460	0.500	0.030	0.125	1.50	GT045-8	GT045-8A
0.120	0.0620	0.250	0.040	0.125	1.50	GT061-4	GT061-4A
0.120	0.0620	0.375	0.040	0.125	1.50	GT061-6	GT061-6A
0.120	0.0620	0.500	0.040	0.125	1.50	GT061-8	GT061-8A
0.120	0.0620	0.625	0.040	0.125	1.50	GT061-10	GT061-10A
0.187	0.0175	0.250	0.050	0.1875	2.00	GT017K-4	GT017K-4A
0.187	0.0175	0.375	0.050	0.1875	2.00	GT017K-6	GT017K-6A
0.187	0.0175	0.500	0.050	0.1875	2.00	GT017K-8	GT017K-8A
0.187	0.0175	0.625	0.050	0.1875	2.00	GT017K-10	GT017K-10A
0.187	0.0255	0.250	0.050	0.1875	2.00	GT025K-4	GT025K-4A
0.187	0.0255	0.375	0.050	0.1875	2.00	GT025K-6	GT025K-6A
0.187	0.0255	0.500	0.050	0.1875	2.00	GT025K-8	GT025K-8A
0.187	0.0255	0.625	0.050	0.1875	2.00	GT025K-10	GT025K-10A
0.187	0.0305	0.250	0.050	0.1875	2.00	GT030K-4	GT030K-4A
0.187	0.0305	0.375	0.050	0.1875	2.00	GT030K-6	GT030K-6A
0.187	0.0305	0.500	0.050	0.1875	2.00	GT030K-8	GT030K-8A
0.187	0.0305	0.625	0.050	0.1875	2.00	GT030K-10	GT030K-10A
0.187	0.0630	0.250	0.050	0.1875	2.00	GT062K-4	GT062K-4A
0.187	0.0630	0.375	0.050	0.1875	2.00	GT062K-6	GT062K-6A
0.187	0.0630	0.500	0.050	0.1875	2.00	GT062K-8	GT062K-8A
0.187	0.0630	0.625	0.050	0.1875	2.00	GT062K-10	GT062K-10A

**Left-hand style available in all sizes. To order left-hand style, start order number with "LH."**

# GROOVE TOOLS – RETAINING RING – SOLID CARBIDE



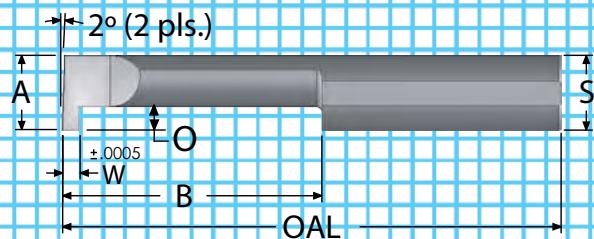
- ALTiN+ coating extends tool life
- Polished flute face for optimum performance
- Precision ground shank flat for guaranteed tool orientation

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.250	0.0175	0.250	0.060	0.250	2.50	GT017Q-4	GT017Q-4A
0.250	0.0175	0.375	0.060	0.250	2.50	GT017Q-6	GT017Q-6A
0.250	0.0175	0.500	0.060	0.250	2.50	GT017Q-8	GT017Q-8A
0.250	0.0175	0.625	0.060	0.250	2.50	GT017Q-10	GT017Q-10A
0.250	0.0255	0.250	0.060	0.250	2.50	GT025Q-4	GT025Q-4A
0.250	0.0255	0.375	0.060	0.250	2.50	GT025Q-6	GT025Q-6A
0.250	0.0255	0.500	0.060	0.250	2.50	GT025Q-8	GT025Q-8A
0.250	0.0255	0.625	0.060	0.250	2.50	GT025Q-10	GT025Q-10A
0.250	0.0305	0.250	0.060	0.250	2.50	GT030Q-4	GT030Q-4A
0.250	0.0305	0.375	0.060	0.250	2.50	GT030Q-6	GT030Q-6A
0.250	0.0305	0.500	0.060	0.250	2.50	GT030Q-8	GT030Q-8A
0.250	0.0305	0.625	0.060	0.250	2.50	GT030Q-10	GT030Q-10A
0.250	0.0630	0.250	0.060	0.250	2.50	GT062Q-4	GT062Q-4A
0.250	0.0630	0.375	0.060	0.250	2.50	GT062Q-6	GT062Q-6A
0.250	0.0630	0.500	0.060	0.250	2.50	GT062Q-8	GT062Q-8A
0.250	0.0630	0.625	0.060	0.250	2.50	GT062Q-10	GT062Q-10A
0.250	0.0930	0.250	0.060	0.250	2.50	GT092Q-4	GT092Q-4A
0.250	0.0930	0.375	0.060	0.250	2.50	GT092Q-6	GT092Q-6A
0.250	0.0930	0.500	0.060	0.250	2.50	GT092Q-8	GT092Q-8A
0.250	0.0930	0.625	0.060	0.250	2.50	GT092Q-10	GT092Q-10A
0.312	0.0335	0.250	0.110	0.3125	2.50	GT033-4	GT033-4A
0.312	0.0335	0.375	0.110	0.3125	2.50	GT033-6	GT033-6A
0.312	0.0335	0.500	0.110	0.3125	2.50	GT033-8	GT033-8A
0.312	0.0335	0.750	0.110	0.3125	2.50	GT033-12	GT033-12A
0.312	0.0385	0.250	0.110	0.3125	2.50	GT038-4	GT038-4A
0.312	0.0385	0.375	0.110	0.3125	2.50	GT038-6	GT038-6A
0.312	0.0385	0.500	0.110	0.3125	2.50	GT038-8	GT038-8A
0.312	0.0385	0.750	0.110	0.3125	2.50	GT038-12	GT038-12A
0.312	0.0630	0.375	0.110	0.3125	2.50	GT063-6	GT063-6A
0.312	0.0630	0.500	0.110	0.3125	2.50	GT063-8	GT063-8A
0.312	0.0630	0.750	0.110	0.3125	2.50	GT063-12	GT063-12A
0.312	0.0630	1.000	0.110	0.3125	2.50	GT063-16	GT063-16A
0.312	0.1250	0.375	0.110	0.3125	2.50	GT124-6	GT124-6A
0.312	0.1250	0.500	0.110	0.3125	2.50	GT124-8	GT124-8A
0.312	0.1250	0.750	0.110	0.3125	2.50	GT124-12	GT124-12A
0.312	0.1250	1.000	0.110	0.3125	2.50	GT124-16	GT124-16A

**Left-hand style available in all sizes. To order left-hand style, start order number with "LH."**

# GROOVE TOOLS – RETAINING RING – SOLID CARBIDE

**SINGLE POINT  
GROOVING**



- ALTiN+ coating for higher Surface Feet per Minute
- Shank diameter is precision ground
- Polished flute face for optimum performance
- Made with premium submicron grade carbide

“A” MIN HOLE	“W” TOOL WIDTH	“B” MAX DEPTH	“O” OFF SET	“S” SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.375	0.040	0.250	0.110	0.375	2.50	GT039-4	GT039-4A
0.375	0.040	0.375	0.110	0.375	2.50	GT039-6	GT039-6A
0.375	0.040	0.500	0.110	0.375	2.50	GT039-8	GT039-8A
0.375	0.040	0.750	0.110	0.375	2.50	GT039-12	GT039-12A
0.375	0.040	1.000	0.110	0.375	2.50	GT039-16	GT039-16A
0.375	0.040	1.250	0.110	0.375	2.50	GT039-20	GT039-20A
0.375	0.047	0.250	0.110	0.375	2.50	GT046-4	GT046-4A
0.375	0.047	0.375	0.110	0.375	2.50	GT046-6	GT046-6A
0.375	0.047	0.500	0.110	0.375	2.50	GT046-8	GT046-8A
0.375	0.047	0.750	0.110	0.375	2.50	GT046-12	GT046-12A
0.375	0.047	1.000	0.110	0.375	2.50	GT046-16	GT046-16A
0.375	0.047	1.250	0.110	0.375	2.50	GT046-20	GT046-20A
0.375	0.056	0.250	0.110	0.375	2.50	GT055-4	GT055-4A
0.375	0.056	0.375	0.110	0.375	2.50	GT055-6	GT055-6A
0.375	0.056	0.500	0.110	0.375	2.50	GT055-8	GT055-8A
0.375	0.056	0.750	0.110	0.375	2.50	GT055-12	GT055-12A
0.375	0.056	1.000	0.110	0.375	2.50	GT055-16	GT055-16A
0.375	0.056	1.250	0.110	0.375	2.50	GT055-20	GT055-20A
0.375	0.063	0.250	0.110	0.375	2.50	GT062-4	GT062-4A
0.375	0.063	0.375	0.110	0.375	2.50	GT062-6	GT062-6A
0.375	0.063	0.500	0.110	0.375	2.50	GT062-8	GT062-8A
0.375	0.063	0.750	0.110	0.375	2.50	GT062-12	GT062-12A
0.375	0.063	1.000	0.110	0.375	2.50	GT062-16	GT062-16A
0.375	0.063	1.250	0.110	0.375	2.50	GT062-20	GT062-20A
0.375	0.070	0.250	0.110	0.375	2.50	GT069-4	GT069-4A
0.375	0.070	0.375	0.110	0.375	2.50	GT069-6	GT069-6A
0.375	0.070	0.500	0.110	0.375	2.50	GT069-8	GT069-8A
0.375	0.070	0.750	0.110	0.375	2.50	GT069-12	GT069-12A
0.375	0.070	1.000	0.110	0.375	2.50	GT069-16	GT069-16A
0.375	0.070	1.250	0.110	0.375	2.50	GT069-20	GT069-20A

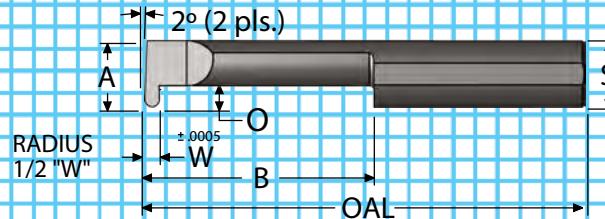
**Left-hand style available in all sizes. To order left-hand style, start order number with "LH."**

# GROOVE TOOLS – RETAINING RING – SOLID CARBIDE

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	TiALN
0.375	0.088	0.250	0.110	0.375	2.50	GT087-4	GT087-4A
0.375	0.088	0.375	0.110	0.375	2.50	GT087-6	GT087-6A
0.375	0.088	0.500	0.110	0.375	2.50	GT087-8	GT087-8A
0.375	0.088	0.750	0.110	0.375	2.50	GT087-12	GT087-12A
0.375	0.088	1.000	0.110	0.375	2.50	GT087-16	GT087-16A
0.375	0.088	1.250	0.110	0.375	2.50	GT087-20	GT087-20A
0.375	0.127	0.375	0.110	0.375	2.50	GT126-6	GT126-6A
0.375	0.127	0.500	0.110	0.375	2.50	GT126-8	GT126-8A
0.375	0.127	0.750	0.110	0.375	2.50	GT126-12	GT126-12A
0.375	0.127	1.000	0.110	0.375	2.50	GT126-16	GT126-16A
0.375	0.127	1.250	0.110	0.375	2.50	GT126-20	GT126-20A
0.375	0.158	0.375	0.110	0.375	2.50	GT157-6	GT157-6A
0.375	0.158	0.500	0.110	0.375	2.50	GT157-8	GT157-8A
0.375	0.158	0.750	0.110	0.375	2.50	GT157-12	GT157-12A
0.375	0.158	1.000	0.110	0.375	2.50	GT157-16	GT157-16A
0.375	0.158	1.250	0.110	0.375	2.50	GT157-20	GT157-20A
0.500	0.094	0.500	0.160	0.500	3.00	GT093-8	GT093-8A
0.500	0.094	0.750	0.160	0.500	3.00	GT093-12	GT093-12A
0.500	0.094	1.000	0.160	0.500	3.00	GT093-16	GT093-16A
0.500	0.094	1.250	0.160	0.500	3.00	GT093-20	GT093-20A
0.500	0.094	1.500	0.160	0.500	3.00	GT093-24	GT093-24A
0.500	0.126	0.500	0.160	0.500	3.00	GT125-8	GT125-8A
0.500	0.126	0.750	0.160	0.500	3.00	GT125-12	GT125-12A
0.500	0.126	1.000	0.160	0.500	3.00	GT125-16	GT125-16A
0.500	0.126	1.250	0.160	0.500	3.00	GT125-20	GT125-20A
0.500	0.126	1.500	0.160	0.500	3.00	GT125-24	GT125-24A
0.500	0.157	0.500	0.160	0.500	3.00	GT156-8	GT156-8A
0.500	0.157	0.750	0.160	0.500	3.00	GT156-12	GT156-12A
0.500	0.157	1.000	0.160	0.500	3.00	GT156-16	GT156-16A
0.500	0.157	1.250	0.160	0.500	3.00	GT156-20	GT156-20A
0.500	0.157	1.500	0.160	0.500	3.00	GT156-24	GT156-24A
0.500	0.188	0.500	0.160	0.500	3.00	GT187-8	GT187-8A
0.500	0.188	0.750	0.160	0.500	3.00	GT187-12	GT187-12A
0.500	0.188	1.000	0.160	0.500	3.00	GT187-16	GT187-16A
0.500	0.188	1.250	0.160	0.500	3.00	GT187-20	GT187-20A
0.500	0.188	1.500	0.160	0.500	3.00	GT187-24	GT187-24A
0.500	0.251	0.500	0.160	0.500	3.00	GT250-8	GT250-8A
0.500	0.251	0.750	0.160	0.500	3.00	GT250-12	GT250-12A
0.500	0.251	1.000	0.160	0.500	3.00	GT250-16	GT250-16A
0.500	0.251	1.250	0.160	0.500	3.00	GT250-20	GT250-20A
0.500	0.251	1.500	0.160	0.500	3.00	GT250-24	GT250-24A

Left-hand style available in all sizes. To order left-hand style, start order number with "LH."

# GROOVE TOOLS - FULL RADIUS - SOLID CARBIDE

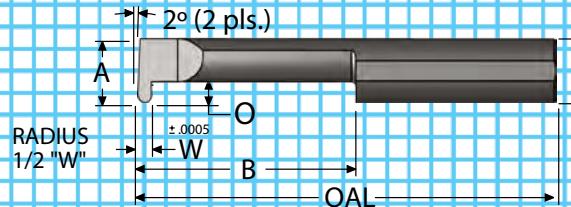


- ALTiN+ coating for higher Surface Feet per Minute
- Elliptically ground for maximum strength
- Polished flute face for optimum performance

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.187	0.0175	0.250	0.050	0.1875	2.00	GFR017K-4	GFR017K-4A
0.187	0.0175	0.375	0.050	0.1875	2.00	GFR017K-6	GFR017K-6A
0.187	0.0175	0.500	0.050	0.1875	2.00	GFR017K-8	GFR017K-8A
0.187	0.0175	0.625	0.050	0.1875	2.00	GFR017K-10	GFR017K-10A
0.187	0.0255	0.250	0.050	0.1875	2.00	GFR025K-4	GFR025K-4A
0.187	0.0255	0.375	0.050	0.1875	2.00	GFR025K-6	GFR025K-6A
0.187	0.0255	0.500	0.050	0.1875	2.00	GFR025K-8	GFR025K-8A
0.187	0.0255	0.625	0.050	0.1875	2.00	GFR025K-10	GFR025K-10A
0.187	0.0305	0.250	0.050	0.1875	2.00	GFR030K-4	GFR030K-4A
0.187	0.0305	0.375	0.050	0.1875	2.00	GFR030K-6	GFR030K-6A
0.187	0.0305	0.500	0.050	0.1875	2.00	GFR030K-8	GFR030K-8A
0.187	0.0305	0.625	0.050	0.1875	2.00	GFR030K-10	GFR030K-10A
0.250	0.0175	0.250	0.060	0.250	2.50	GFR017Q-4	GFR017Q-4A
0.250	0.0175	0.375	0.060	0.250	2.50	GFR017Q-6	GFR017Q-6A
0.250	0.0175	0.500	0.060	0.250	2.50	GFR017Q-8	GFR017Q-8A
0.250	0.0175	0.625	0.060	0.250	2.50	GFR017Q-10	GFR017Q-10A
0.250	0.0255	0.250	0.060	0.250	2.50	GFR025Q-4	GFR025Q-4A
0.250	0.0255	0.375	0.060	0.250	2.50	GFR025Q-6	GFR025Q-6A
0.250	0.0255	0.500	0.060	0.250	2.50	GFR025Q-8	GFR025Q-8A
0.250	0.0255	0.625	0.060	0.250	2.50	GFR025Q-10	GFR025Q-10A
0.250	0.0305	0.250	0.060	0.250	2.50	GFR030Q-4	GFR030Q-4A
0.250	0.0305	0.375	0.060	0.250	2.50	GFR030Q-6	GFR030Q-6A
0.250	0.0305	0.500	0.060	0.250	2.50	GFR030Q-8	GFR030Q-8A
0.250	0.0305	0.625	0.060	0.250	2.50	GFR030Q-10	GFR030Q-10A
0.312	0.0335	0.250	0.110	0.3125	2.50	GFR033-4	GFR033-4A
0.312	0.0335	0.375	0.110	0.3125	2.50	GFR033-6	GFR033-6A
0.312	0.0335	0.500	0.110	0.3125	2.50	GFR033-8	GFR033-8A
0.312	0.0335	0.750	0.110	0.3125	2.50	GFR033-12	GFR033-12A
0.312	0.0385	0.250	0.110	0.3125	2.50	GFR038-4	GFR038-4A
0.312	0.0385	0.375	0.110	0.3125	2.50	GFR038-6	GFR038-6A
0.312	0.0385	0.500	0.110	0.3125	2.50	GFR038-8	GFR038-8A
0.312	0.0385	0.750	0.110	0.3125	2.50	GFR038-12	GFR038-12A

Left-hand style available in all sizes. To order left-hand style, start order number with "LH."

# GROOVE TOOLS - FULL RADIUS - SOLID CARBIDE



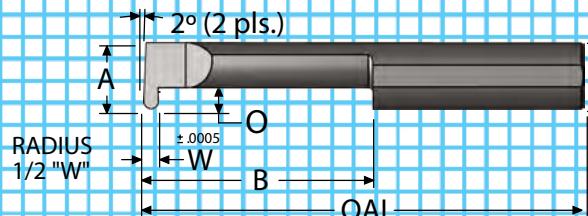
- ALTiN+ coating extends tool life
- Made with premium submicron grade carbide
- Precision ground shank flat for guaranteed tool orientation

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.375	0.040	0.250	0.110	0.375	2.50	GFR039-4	GFR039-4A
0.375	0.040	0.375	0.110	0.375	2.50	GFR039-6	GFR039-6A
0.375	0.040	0.500	0.110	0.375	2.50	GFR039-8	GFR039-8A
0.375	0.040	0.750	0.110	0.375	2.50	GFR039-12	GFR039-12A
0.375	0.040	1.000	0.110	0.375	2.50	GFR039-16	GFR039-16A
0.375	0.040	1.250	0.110	0.375	2.50	GFR039-20	GFR039-20A
0.375	0.047	0.250	0.110	0.375	2.50	GFR046-4	GFR046-4A
0.375	0.047	0.375	0.110	0.375	2.50	GFR046-6	GFR046-6A
0.375	0.047	0.500	0.110	0.375	2.50	GFR046-8	GFR046-8A
0.375	0.047	0.750	0.110	0.375	2.50	GFR046-12	GFR046-12A
0.375	0.047	1.000	0.110	0.375	2.50	GFR046-16	GFR046-16A
0.375	0.047	1.250	0.110	0.375	2.50	GFR046-20	GFR046-20A
0.375	0.056	0.250	0.110	0.375	2.50	GFR055-4	GFR055-4A
0.375	0.056	0.375	0.110	0.375	2.50	GFR055-6	GFR055-6A
0.375	0.056	0.500	0.110	0.375	2.50	GFR055-8	GFR055-8A
0.375	0.056	0.750	0.110	0.375	2.50	GFR055-12	GFR055-12A
0.375	0.056	1.000	0.110	0.375	2.50	GFR055-16	GFR055-16A
0.375	0.056	1.250	0.110	0.375	2.50	GFR055-20	GFR055-20A
0.375	0.063	0.250	0.110	0.375	2.50	GFR062-4	GFR062-4A
0.375	0.063	0.375	0.110	0.375	2.50	GFR062-6	GFR062-6A
0.375	0.063	0.500	0.110	0.375	2.50	GFR062-8	GFR062-8A
0.375	0.063	0.750	0.110	0.375	2.50	GFR062-12	GFR062-12A
0.375	0.063	1.000	0.110	0.375	2.50	GFR062-16	GFR062-16A
0.375	0.063	1.250	0.110	0.375	2.50	GFR062-20	GFR062-20A
0.375	0.070	0.250	0.110	0.375	2.50	GFR069-4	GFR069-4A
0.375	0.070	0.375	0.110	0.375	2.50	GFR069-6	GFR069-6A
0.375	0.070	0.500	0.110	0.375	2.50	GFR069-8	GFR069-8A
0.375	0.070	0.750	0.110	0.375	2.50	GFR069-12	GFR069-12A
0.375	0.070	1.000	0.110	0.375	2.50	GFR069-16	GFR069-16A
0.375	0.070	1.250	0.110	0.375	2.50	GFR069-20	GFR069-20A
0.375	0.088	0.250	0.110	0.375	2.50	GFR087-4	GFR087-4A
0.375	0.088	0.375	0.110	0.375	2.50	GFR087-6	GFR087-6A
0.375	0.088	0.500	0.110	0.375	2.50	GFR087-8	GFR087-8A
0.375	0.088	0.750	0.110	0.375	2.50	GFR087-12	GFR087-12A
0.375	0.088	1.000	0.110	0.375	2.50	GFR087-16	GFR087-16A
0.375	0.088	1.250	0.110	0.375	2.50	GFR087-20	GFR087-20A

**SINGLE POINT TOOLS**  
**SINGLE POINT TOOLS**  
**GROOVING**

**Left-hand style available in all sizes. To order left-hand style, start order number with "LH."**

# GROOVE TOOLS - FULL RADIUS - SOLID CARBIDE



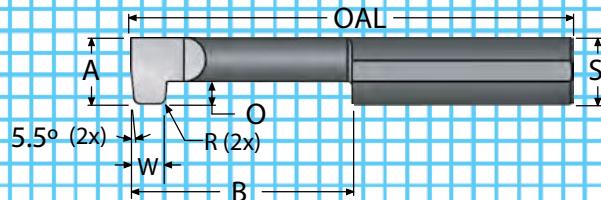
- ALTiN+ coating extends tool life
- Elliptically ground for maximum strength
- Polished flute face for optimum performance
- Made with premium submicron grade carbide

## SINGLE POINT TOOLS GROOVING

"A" MIN HOLE	"W" TOOL WIDTH	"B" MAX DEPTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.375	0.125	0.375	0.110	0.375	2.50	GFR124-6	GFR124-6A
0.375	0.125	0.500	0.110	0.375	2.50	GFR124-8	GFR124-8A
0.375	0.125	0.750	0.110	0.375	2.50	GFR124-12	GFR124-12A
0.375	0.125	1.000	0.110	0.375	2.50	GFR124-16	GFR124-16A
0.375	0.125	1.250	0.110	0.375	2.50	GFR124-20	GFR124-20A
0.500	0.094	0.500	0.160	0.500	3.00	GFR093-8	GFR093-8A
0.500	0.094	0.750	0.160	0.500	3.00	GFR093-12	GFR093-12A
0.500	0.094	1.000	0.160	0.500	3.00	GFR093-16	GFR093-16A
0.500	0.094	1.250	0.160	0.500	3.00	GFR093-20	GFR093-20A
0.500	0.094	1.500	0.160	0.500	3.00	GFR093-24	GFR093-24A
0.500	0.126	0.500	0.160	0.500	3.00	GFR125-8	GFR125-8A
0.500	0.126	0.750	0.160	0.500	3.00	GFR125-12	GFR125-12A
0.500	0.126	1.000	0.160	0.500	3.00	GFR125-16	GFR125-16A
0.500	0.126	1.250	0.160	0.500	3.00	GFR125-20	GFR125-20A
0.500	0.126	1.500	0.160	0.500	3.00	GFR125-24	GFR125-24A
0.500	0.157	0.500	0.160	0.500	3.00	GFR156-8	GFR156-8A
0.500	0.157	0.750	0.160	0.500	3.00	GFR156-12	GFR156-12A
0.500	0.157	1.000	0.160	0.500	3.00	GFR156-16	GFR156-16A
0.500	0.157	1.250	0.160	0.500	3.00	GFR156-20	GFR156-20A
0.500	0.157	1.500	0.160	0.500	3.00	GFR156-24	GFR156-24A
0.500	0.188	0.500	0.160	0.500	3.00	GFR187-8	GFR187-8A
0.500	0.188	0.750	0.160	0.500	3.00	GFR187-12	GFR187-12A
0.500	0.188	1.000	0.160	0.500	3.00	GFR187-16	GFR187-16A
0.500	0.188	1.250	0.160	0.500	3.00	GFR187-20	GFR187-20A
0.500	0.188	1.500	0.160	0.500	3.00	GFR187-24	GFR187-24A
0.500	0.251	0.500	0.160	0.500	3.00	GFR250-8	GFR250-8A
0.500	0.251	0.750	0.160	0.500	3.00	GFR250-12	GFR250-12A
0.500	0.251	1.000	0.160	0.500	3.00	GFR250-16	GFR250-16A
0.500	0.251	1.250	0.160	0.500	3.00	GFR250-20	GFR250-20A
0.500	0.251	1.500	0.160	0.500	3.00	GFR250-24	GFR250-24A

Left-hand style available in all sizes. To order left-hand style, start order number with "LH."

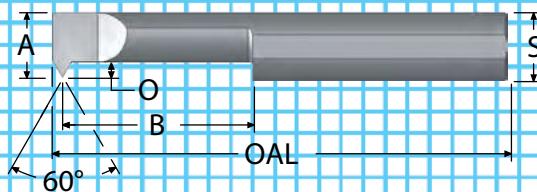
# GROOVE TOOLS - O-RING - SOLID CARBIDE



- ALTiN+ coating for higher Surface Feet per Minute
- Elliptically ground for maximum strength
- Made with premium submicron grade carbide

"A" MIN HOLE	"W" GROOVE WIDTH	"B" MAX DEPTH	"R" CORNERS RADIUS	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
							UNCOATED	ALTiN+
0.250	0.097	0.500	0.015	0.110	0.250	2.50	GOR096-8	GOR096-8A
0.250	0.142	0.562	0.040	0.110	0.250	2.50	GOR141-9	GOR141-9A
0.250	0.145	0.625	0.040	0.110	0.250	2.50	GOR144-10	GOR144-10A
0.375	0.175	0.750	0.015	0.125	0.375	2.50	GOR174-12	GOR174-12A
0.375	0.209	0.812	0.040	0.125	0.375	2.50	GOR208-13	GOR208-13A
0.375	0.242	0.937	0.040	0.125	0.375	2.50	GOR241-15	GOR241-15A

# THREADING TOOLS - SOLID CARBIDE



- 60° thread form for cutting UN, ISO, and NPT threads
- ALTiN+ coating extends tool life
- Precision ground shank flat guarantees tool orientation

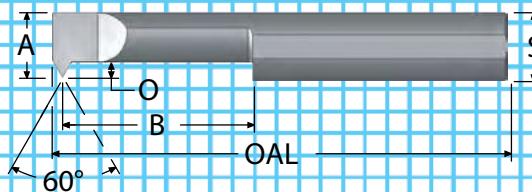
## SINGLE POINT TOOLS THREADING

"A" MIN HOLE	"B" MAX DEPTH	"O" MIN OFFSET	RECOM- MENDED TPI*	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTiN+
0.040	0.080	0.013	56 to 80	0.125	1.50	TT040080	TT040080A
0.040	0.100	0.013	56 to 80	0.125	1.50	TT040100	TT040100A
0.040	0.130	0.013	56 to 80	0.125	1.50	TT040130	TT040130A
0.050	0.100	0.017	48 to 80	0.125	1.50	TT050100	TT050100A
0.050	0.150	0.017	48 to 80	0.125	1.50	TT050150	TT050150A
0.050	0.200	0.017	48 to 80	0.125	1.50	TT050200	TT050200A
0.060	0.150	0.020	40 to 80	0.125	1.50	TT060150	TT060150A
0.060	0.200	0.020	40 to 80	0.125	1.50	TT060200	TT060200A
0.060	0.250	0.020	40 to 80	0.125	1.50	TT060250	TT060250A
0.060	0.300	0.020	40 to 80	0.125	1.50	TT060300	TT060300A
0.075	0.200	0.020	36 to 72	0.125	1.50	TT075200	TT075200A
0.075	0.300	0.020	36 to 72	0.125	1.50	TT075300	TT075300A
0.075	0.400	0.020	36 to 72	0.125	1.50	TT075400	TT075400A
0.090	0.200	0.025	32 to 64	0.125	1.50	TT090200	TT090200A
0.090	0.300	0.025	32 to 64	0.125	1.50	TT090300	TT090300A
0.090	0.400	0.025	32 to 64	0.125	1.50	TT090400	TT090400A
0.090	0.500	0.025	32 to 64	0.125	1.50	TT090500	TT090500A
0.120	0.250	0.030	24 to 56	0.1875	2.00	TT120250	TT120250A
0.120	0.400	0.030	24 to 56	0.1875	2.00	TT120400	TT120400A
0.120	0.600	0.030	24 to 56	0.1875	2.00	TT120600	TT120600A
0.120	0.750	0.030	24 to 56	0.1875	2.00	TT120750	TT120750A
0.150	0.350	0.035	20 to 56	0.1875	2.00	TT150350	TT150350A
0.150	0.500	0.035	20 to 56	0.1875	2.00	TT150500	TT150500A
0.150	0.750	0.035	20 to 56	0.1875	2.00	TT150750	TT150750A
0.180	0.350	0.040	18 to 56	0.250	2.50	TT180350	TT180350A
0.180	0.500	0.040	18 to 56	0.250	2.50	TT180500	TT180500A
0.180	0.750	0.040	18 to 56	0.250	2.50	TT180750	TT180750A
0.180	1.000	0.040	18 to 56	0.250	2.50	TT1801000	TT1801000A

\*TPI = Threads Per Inch

**Left-hand style available in all sizes. To order left-hand style, start order number with "LH."**

# THREADING TOOLS - SOLID CARBIDE



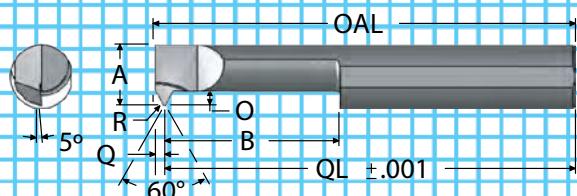
- 60° thread form for cutting UN, ISO, and NPT threads
- Elliptically ground neck provides maximum strength
- Made with premium submicron carbide

"A" MIN HOLE	"B" MAX DEPTH	"O" MIN OFFSET	RECOM- MENDED TPI*	"S" SHANK DIA.	OAL	ORDER #	
						UNCOATED	ALTIN+
0.200	0.400	0.045	16 to 40	0.250	2.50	TT200400	TT200400A
0.200	0.600	0.045	16 to 40	0.250	2.50	TT200600	TT200600A
0.200	0.800	0.045	16 to 40	0.250	2.50	TT200800	TT200800A
0.200	1.000	0.045	16 to 40	0.250	2.50	TT2001000	TT2001000A
0.230	0.400	0.055	14 to 40	0.3125	2.50	TT230400	TT230400A
0.230	0.600	0.055	14 to 40	0.3125	2.50	TT230600	TT230600A
0.230	0.750	0.055	14 to 40	0.3125	2.50	TT230750	TT230750A
0.230	1.000	0.055	14 to 40	0.3125	2.50	TT2301000	TT2301000A
0.230	1.250	0.055	14 to 40	0.3125	2.50	TT2301250	TT2301250A
0.290	0.500	0.070	12 to 40	0.3125	2.50	TT290500	TT290500A
0.290	0.750	0.070	12 to 40	0.3125	2.50	TT290750	TT290750A
0.290	1.000	0.070	12 to 40	0.3125	2.50	TT2901000	TT2901000A
0.290	1.250	0.070	12 to 40	0.3125	2.50	TT2901250	TT2901250A
0.290	1.500	0.070	12 to 40	0.3125	2.50	TT2901500	TT2901500A
0.320	0.500	0.075	10 to 32	0.375	2.50	TT320500	TT320500A
0.320	0.750	0.075	10 to 32	0.375	2.50	TT320750	TT320750A
0.320	1.000	0.075	10 to 32	0.375	2.50	TT3201000	TT3201000A
0.320	1.250	0.075	10 to 32	0.375	2.50	TT3201250	TT3201250A
0.320	1.500	0.075	10 to 32	0.375	2.50	TT3201500	TT3201500A
0.360	0.500	0.080	8 to 32	0.375	2.50	TT360500	TT360500A
0.360	0.750	0.080	8 to 32	0.375	2.50	TT360750	TT360750A
0.360	1.000	0.080	8 to 32	0.375	2.50	TT3601000	TT3601000A
0.360	1.250	0.080	8 to 32	0.375	2.50	TT3601250	TT3601250A
0.360	1.500	0.080	8 to 32	0.375	2.50	TT3601500	TT3601500A
0.360	1.800	0.080	8 to 32	0.375	3.00	TT3601800	TT3601800A
0.490	0.750	0.120	8 to 32	0.500	3.00	TT490750	TT490750A
0.490	1.500	0.120	8 to 32	0.500	3.00	TT4901500	TT4901500A
0.490	2.000	0.120	8 to 32	0.500	3.00	TT4902000	TT4902000A

\*TPI = Threads Per Inch

Left-hand style available in all sizes. To order left-hand style, start order number with "LH."

# THREADING TOOLS QUALIFIED - SOLID CARBIDE



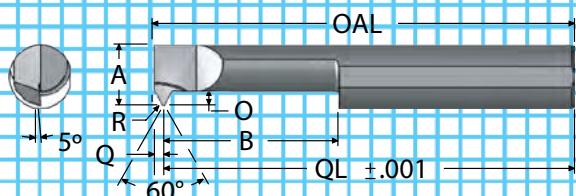
- 60° thread form for cutting UN, ISO, and NPT threads
- Positive rake improves surface finish and reduces burrs
- ALTiN+ coating provides better surface finish

## SINGLE POINT TOOLS THREADING

“A” MIN HOLE	“B” MAX DEPTH	“O” MIN OFFSET	“Q” LENGTH ±.001	“R” TOOL RADIUS	“QL” LENGTH ±.001	RECOM- MENDED TPI*	“S” SHANK DIA.	OAL	ORDER #	
									UNCOATED	ALTiN+
0.060	0.150	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060150	TTQ060150A
0.060	0.200	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060200	TTQ060200A
0.060	0.250	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060250	TTQ060250A
0.060	0.300	0.020	0.014	0.0012	1.486	40 to 80	0.125	1.50	TTQ060300	TTQ060300A
0.075	0.200	0.020	0.014	0.0013	1.486	36 to 72	0.125	1.50	TTQ075200	TTQ075200A
0.075	0.300	0.020	0.014	0.0013	1.486	36 to 72	0.125	1.50	TTQ075300	TTQ075300A
0.075	0.400	0.020	0.014	0.0013	1.486	36 to 72	0.125	1.50	TTQ075400	TTQ075400A
0.090	0.200	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090200	TTQ090200A
0.090	0.300	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090300	TTQ090300A
0.090	0.400	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090400	TTQ090400A
0.090	0.500	0.025	0.017	0.0015	1.483	32 to 64	0.125	1.50	TTQ090500	TTQ090500A
0.120	0.250	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120250	TTQ120250A
0.120	0.400	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120400	TTQ120400A
0.120	0.600	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120600	TTQ120600A
0.120	0.750	0.030	0.021	0.0017	1.979	24 to 56	0.1875	2.00	TTQ120750	TTQ120750A
0.150	0.350	0.035	0.023	0.0017	1.977	20 to 56	0.1875	2.00	TTQ150350	TTQ150350A
0.150	0.500	0.035	0.023	0.0017	1.977	20 to 56	0.1875	2.00	TTQ150500	TTQ150500A
0.150	0.750	0.035	0.023	0.0017	1.977	20 to 56	0.1875	2.00	TTQ150750	TTQ150750A
0.180	0.350	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ180350	TTQ180350A
0.180	0.500	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ180500	TTQ180500A
0.180	0.750	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ180750	TTQ180750A
0.180	1.000	0.040	0.027	0.0017	2.473	18 to 56	0.250	2.50	TTQ1801000	TTQ1801000A
0.200	0.400	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ200400	TTQ200400A
0.200	0.600	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ200600	TTQ200600A
0.200	0.800	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ200800	TTQ200800A
0.200	1.000	0.045	0.029	0.0024	2.471	16 to 40	0.250	2.50	TTQ2001000	TTQ2001000A

\*TPI = Threads Per Inch

# THREADING TOOLS QUALIFIED - SOLID CARBIDE

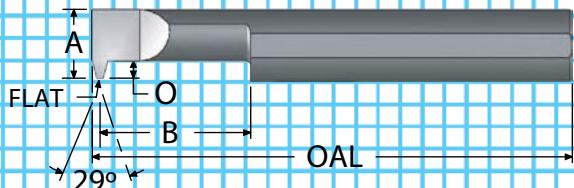


- Radius on tool tip for maximum strength
- Qualified length provides faster tool changes
- Made with premium submicron grade carbide

"A" MIN HOLE	"B" MAX DEPTH	"O" MIN OFFSET	"Q" LENGTH ±.001	"R" TOOL RADIUS	"QL" LENGTH ±.001	RECOM- MENDED TPI*	"S" SHANK DIA.	OAL	ORDER #	
									UNCOATED	ALTiN+
0.230	0.400	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ230400	TTQ230400A
0.230	0.600	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ230600	TTQ230600A
0.230	0.750	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ230750	TTQ230750A
0.230	1.000	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ2301000	TTQ2301000A
0.230	1.250	0.055	0.038	0.0024	2.462	14 to 40	0.3125	2.50	TTQ2301250	TTQ2301250A
0.290	0.500	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ290500	TTQ290500A
0.290	0.750	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ290750	TTQ290750A
0.290	1.000	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ2901000	TTQ2901000A
0.290	1.250	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ2901250	TTQ2901250A
0.290	1.500	0.070	0.047	0.0024	2.453	12 to 40	0.3125	2.50	TTQ2901500	TTQ2901500A
0.320	0.500	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ320500	TTQ320500A
0.320	0.750	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ320750	TTQ320750A
0.320	1.000	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ3201000	TTQ3201000A
0.320	1.250	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ3201250	TTQ3201250A
0.320	1.500	0.075	0.049	0.0030	2.451	10 to 32	0.375	2.50	TTQ3201500	TTQ3201500A
0.360	0.500	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ360500	TTQ360500A
0.360	0.750	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ360750	TTQ360750A
0.360	1.000	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ3601000	TTQ3601000A
0.360	1.250	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ3601250	TTQ3601250A
0.360	1.500	0.080	0.057	0.0040	2.443	8 to 24	0.375	2.50	TTQ3601500	TTQ3601500A

\*TPI = Threads Per Inch

# ACME THREADING TOOLS - SOLID CARBIDE



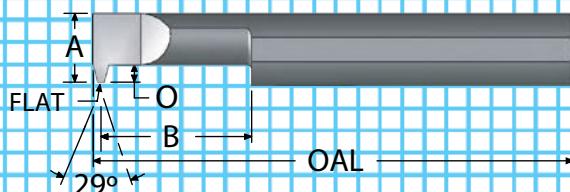
- ALTiN+ coating provides better surface finish
- Elliptically ground neck provides maximum strength
- Polished flute face for optimum performance

## SINGLE POINT TOOLS THREADING

MIN THREAD SIZE*	"A" MIN HOLE	"B" MAX DEPTH	FLAT WIDTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
							UNCOATED	ALTiN+
1/4-16	0.180	0.350	0.021	0.045	0.250	2.50	FAT180350-16	FAT180350-16A
1/4-16	0.180	0.500	0.021	0.045	0.250	2.50	FAT180500-16	FAT180500-16A
1/4-16	0.180	0.750	0.021	0.045	0.250	2.50	FAT180750-16	FAT180750-16A
1/4-16	0.180	1.000	0.021	0.045	0.250	2.50	FAT1801000-16	FAT1801000-16A
5/16-14	0.230	0.400	0.024	0.055	0.3125	2.50	FAT230400-14	FAT230400-14A
5/16-14	0.230	0.600	0.024	0.055	0.3125	2.50	FAT230600-14	FAT230600-14A
5/16-14	0.230	0.750	0.024	0.055	0.3125	2.50	FAT230750-14	FAT230750-14A
5/16-14	0.230	1.000	0.024	0.055	0.3125	2.50	FAT2301000-14	FAT2301000-14A
5/16-14	0.230	1.250	0.024	0.055	0.3125	2.50	FAT2301250-14	FAT2301250-14A
3/8-12	0.290	0.400	0.028	0.070	0.3125	2.50	FAT290400-12	FAT290400-12A
3/8-12	0.290	0.600	0.028	0.070	0.3125	2.50	FAT290600-12	FAT290600-12A
3/8-12	0.290	0.750	0.028	0.070	0.3125	2.50	FAT290750-12	FAT290750-12A
3/8-12	0.290	1.000	0.028	0.070	0.3125	2.50	FAT2901000-12	FAT2901000-12A
3/8-12	0.290	1.250	0.028	0.070	0.3125	2.50	FAT2901250-12	FAT2901250-12A
1/2-10	0.360	0.500	0.032	0.085	0.375	2.50	FAT360500-10	FAT360500-10A
1/2-10	0.360	0.750	0.032	0.085	0.375	2.50	FAT360750-10	FAT360750-10A
1/2-10	0.360	1.000	0.032	0.085	0.375	2.50	FAT3601000-10	FAT3601000-10A
1/2-10	0.360	1.250	0.032	0.085	0.375	2.50	FAT3601250-10	FAT3601250-10A
1/2-10	0.360	1.500	0.032	0.085	0.375	2.50	FAT3601500-10	FAT3601500-10A
5/8-8	0.490	0.750	0.041	0.120	0.500	3.00	FAT490750-8	FAT490750-8A
5/8-8	0.490	1.000	0.041	0.120	0.500	3.00	FAT4901000-8	FAT4901000-8A
5/8-8	0.490	2.000	0.041	0.120	0.500	3.00	FAT4902000-8	FAT4902000-8A
3/4-6	0.490	0.750	0.057	0.120	0.500	3.00	FAT490750-6	FAT490750-6A
3/4-6	0.490	1.000	0.057	0.120	0.500	3.00	FAT4901000-6	FAT4901000-6A
3/4-6	0.490	2.000	0.057	0.120	0.500	3.00	FAT4902000-6	FAT4902000-6A
1.0-5	0.490	0.750	0.069	0.130	0.500	3.00	FAT490750-5	FAT490750-5A
1.0-5	0.490	1.000	0.069	0.130	0.500	3.00	FAT4901000-5	FAT4901000-5A
1.0-5	0.490	2.000	0.069	0.130	0.500	3.00	FAT4902000-5	FAT4902000-5A

\*These tools can cut any larger size internal thread of the same pitch.

# STUB ACME THREADING TOOLS - SOLID CARBIDE



- ALTiN+ coating extends tool life
- Polished flute face for optimum performance
- Made with premium submicron grade carbide

MIN THREAD SIZE*	"A" MIN HOLE	"B" MAX DEPTH	FLAT WIDTH	"O" OFF SET	"S" SHANK DIA.	OAL	ORDER #	
							UNCOATED	ALTiN+
1/4-16	0.180	0.350	0.024	0.045	0.250	2.50	SAT180350-16	SAT180350-16A
1/4-16	0.180	0.500	0.024	0.045	0.250	2.50	SAT180500-16	SAT180500-16A
1/4-16	0.180	0.750	0.024	0.045	0.250	2.50	SAT180750-16	SAT180750-16A
1/4-16	0.180	1.000	0.024	0.045	0.250	2.50	SAT1801000-16	SAT1801000-16A
5/16-14	0.230	0.400	0.028	0.055	0.3125	2.50	SAT230400-14	SAT230400-14A
5/16-14	0.230	0.600	0.028	0.055	0.3125	2.50	SAT230600-14	SAT230600-14A
5/16-14	0.230	0.750	0.028	0.055	0.3125	2.50	SAT230750-14	SAT230750-14A
5/16-14	0.230	1.000	0.028	0.055	0.3125	2.50	SAT2301000-14	SAT2301000-14A
5/16-14	0.230	1.250	0.028	0.055	0.3125	2.50	SAT2301250-14	SAT2301250-14A
3/8-12	0.290	0.400	0.033	0.070	0.3125	2.50	SAT290400-12	SAT290400-12A
3/8-12	0.290	0.600	0.033	0.070	0.3125	2.50	SAT290600-12	SAT290600-12A
3/8-12	0.290	0.750	0.033	0.070	0.3125	2.50	SAT290750-12	SAT290750-12A
3/8-12	0.290	1.000	0.033	0.070	0.3125	2.50	SAT2901000-12	SAT2901000-12A
3/8-12	0.290	1.250	0.033	0.070	0.3125	2.50	SAT2901250-12	SAT2901250-12A
1/2-10	0.360	0.500	0.037	0.085	0.375	2.50	SAT360500-10	SAT360500-10A
1/2-10	0.360	0.750	0.037	0.085	0.375	2.50	SAT360750-10	SAT360750-10A
1/2-10	0.360	1.000	0.037	0.085	0.375	2.50	SAT3601000-10	SAT3601000-10A
1/2-10	0.360	1.250	0.037	0.085	0.375	2.50	SAT3601250-10	SAT3601250-10A
1/2-10	0.360	1.500	0.037	0.085	0.375	2.50	SAT3601500-10	SAT3601500-10A
5/8-8	0.490	0.750	0.048	0.120	0.500	3.00	SAT490750-8	SAT490750-8A
5/8-8	0.490	1.000	0.048	0.120	0.500	3.00	SAT4901000-8	SAT4901000-8A
5/8-8	0.490	2.000	0.048	0.120	0.500	3.00	SAT4902000-8	SAT4902000-8A
3/4-6	0.490	0.750	0.065	0.120	0.500	3.00	SAT490750-6	SAT490750-6A
3/4-6	0.490	1.000	0.065	0.120	0.500	3.00	SAT4901000-6	SAT4901000-6A
3/4-6	0.490	2.000	0.065	0.120	0.500	3.00	SAT4902000-6	SAT4902000-6A
1.0-5	0.490	0.750	0.079	0.130	0.500	3.00	SAT490750-5	SAT490750-5A
1.0-5	0.490	1.000	0.079	0.130	0.500	3.00	SAT4901000-5	SAT4901000-5A
1.0-5	0.490	2.000	0.079	0.130	0.500	3.00	SAT4902000-5	SAT4902000-5A

\*These tools can cut any larger size internal thread of the same pitch.

# SOLID CARBIDE BORING BAR FEED AND SPEED CHART

MATERIAL	BH/Rc	SPEED (SFM)		FEED IPR	CUTTING CONDITIONS						
		UNCOATED	ALTiN+		TOOL DIAMETER						
					.015-.045	.050-.100	.110-.160	.180-.230	.290-.320	.360+	
CAST IRON	160 HB	75-200	200-550	.0005-.010	0.006	0.008	0.010	0.014	0.020	0.031	
CARBON STEEL	18 Rc	75-200	200-450	.0005-.007	0.003	0.005	0.006	0.008	0.012	0.017	
ALLOY STEEL	20 Rc	75-200	200-425	.0005-.007	0.003	0.004	0.005	0.007	0.010	0.015	
TOOL STEEL	25 Rc	75-175	175-300	.0005-.005	0.002	0.003	0.004	0.006	0.008	0.012	
300 STAINLESS STEEL	150 HB	75-175	175-350	.0005-.005	0.003	0.003	0.004	0.006	0.008	0.013	
400 STAINLESS STEEL	195 HB	75-210	130-420	.0005-.005	0.002	0.003	0.004	0.006	0.008	0.012	
HIGH TEMP ALLOY (Ni & Co BASE)	20 Rc	50-130	130-300	.0005-.004	0.002	0.003	0.003	0.005	0.007	0.010	
TITANIUM	25 Rc	50-120	120-275	.0005-.005	0.003	0.004	0.005	0.006	0.009	0.014	
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	.0005-.005	0.002	0.002	0.003	0.004	0.006	0.009	
ALUMINUM	100 HB	75-250	250-750	.0005-.015	0.011	0.015	0.019	0.026	0.038	0.056	
BRASS, ZINC	80 HB	75-300	250-650	.001-.010	0.009	0.012	0.015	0.021	0.030	0.045	

SFM = Surface Feet Per Minute    DOC = Depth of Cut    IPR = Inches Per Revolution

Starting parameters only. Length-to-diameter ratios, setup, and machine rigidity may affect performance.

$$\text{SFM} = .262 \times \text{DIAMETER} \times \text{RPM}$$

$$\text{RPM} = 3.82 \times \text{SFM} \div \text{DIAMETER}$$

$$\text{IPM} = \text{FPT} \times \text{Number of Teeth} \times \text{RPM}$$

$$\text{Meters/Min} = \text{SFM} \times .3048$$

$$\text{Millimeters/Rev} = \text{IPR} \times 25.40$$

# SOLID CARBIDE BORING TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed and feed - See chart.
	TOOL	Select a coated tool.
	PART	Make sure prior operation did not work harden the metal.
BUILT-UP EDGE	TOOL	Select a coated tool.
	CUTTING FORCE	Check for excessive feed rate (IPR) - See chart.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
CORNER BREAKAGE	CUTTING CONDITIONS	Check for excessive feed and speed and depth of cut - see chart.
	TOOL	Select a tool with a radius. A radius is stronger than a sharp corner.
	PART	Check the drilled hole.
SURFACE TOO ROUGH	CUTTING CONDITIONS	Check for excessive feed rate (IPR) - See chart.
	BUILT-UP EDGE	See above (Built-Up Edge).
CHATTER	SET UP	Set tool above center. Reduce the overhang ratio. Clamping length should be at least 3x the boring bar diameter. Change the speed of the machine. Speed change may break up harmonics and reduce chatter.
	BORING BAR	Select the largest diameter boring bar that will bore the required diameter.
TAPER SMALLER IN BACK	CHIP PACKING	If the boring bar is too large to allow chips to evacuate, then the chips may pack on the tool and cause the bar to deflect away from the bore.
	PROGRAM	If the taper is consistent, then the program can be altered to bore a taper in opposite direction resulting in a straight hole.
TAPER BIGGER IN BACK	CUTTING FORCES	Reduce forces. Deflecting bar below center causes hole to become larger.
	BUILT-UP EDGE	Built up edge will cause the hole to become larger until the built edge breaks off, then the hole becomes smaller.
	PROGRAM	If taper is consistent, then the program can be altered to bore a taper in the opposite direction resulting in a straight hole.

# GROOVING TOOL FEED AND SPEED CHART

MATERIAL	BH/Rc	SPEED (SFM)		CUTTING CONDITIONS				
				TOOL DIAMETER				
		UNCOATED	ALTiN+	.060 -.080	.090 -.120	.187	.250-.312	.375+
				MAX FPR	MAX FPR	MAX FPR	MAX FPR	MAX FPR
CAST IRON	160 HB	75-200	200-550	0.0010	0.0012	0.0017	0.0031	0.0044
CARBON STEEL	18 Rc	75-200	200-450	0.0007	0.0008	0.0011	0.0022	0.0030
ALLOY STEEL	20 Rc	75-200	200-425	0.0006	0.0007	0.0010	0.0019	0.0026
TOOL STEEL	25 Rc	75-175	175-300	0.0005	0.0006	0.0008	0.0015	0.0022
300 STAINLESS STEEL	150 HB	75-175	75-350	0.0006	0.0007	0.0010	0.0019	0.0026
400 STAINLESS STEEL	195 HB	75-210	130-420	0.0005	0.0006	0.0008	0.0016	0.0023
HIGH TEMP ALLOY (NICKEL & COBALT BASE)	20 Rc	50-130	130-300	0.0004	0.0005	0.0007	0.0013	0.0017
TITANIUM	25 Rc	50-120	120-275	0.0005	0.0006	0.0008	0.0016	0.0022
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	0.0004	0.0004	0.0006	0.0011	0.0016
ALUMINUM	100 HB	75-250	250-750	0.0022	0.0026	0.0037	0.0065	0.0085
BRASS, ZINC	80 HB	250-300	250-650	0.0018	0.0021	0.0030	0.0053	0.0079

SFM = Surface Feet Per Minute

FPR = Feed Per Revolution

Starting parameters only. Length-to-diameter ratios, setup, and machine rigidity may affect performance.

## GROOVING TOOL TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed - see chart.
	TOOL	Select a coated tool.
	PART	Make sure prior operation did not work harden the material.
BUILT-UP EDGE	TOOL	Select a coated tool.
	CUTTING FORCE	Check for excessive speed rate (IPR) - see chart.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
CHATTER	CUTTING CONDITIONS	Reduce RPM and increase feed rate within the feed and speed chart parameters.
	CLAMPING	Clamping length should be a minimum of 3x the shank diameter in the tool holder. Check tool holding rigidity.
	TOOL	Hone cutting edge. A light hone (0.0001-0.0003 inch) will help keep force constant.
TOOL BREAKAGE	CUTTING CONDITIONS	Check for excessive feed rate (IPR) - see chart.
	CHIP PACKING	Stagger - Peck grooving.

# SINGLE POINT THREADING TECHNICAL CHART

MATERIAL	BH/Rc	SPEED (SFM)		FIRST PASS DEPTH					
		UNCOATED	ALTiN+	.040-.050	.060-.092	.120-.152	.180-.232	.290-.362	.373+
CAST IRON	160 HB	75-200	200-550	0.003	0.004	0.005	0.007	0.008	0.009
CARBON STEEL	18 Rc	75-200	200-450	0.003	0.005	0.006	0.007	0.008	0.009
ALLOY STEEL	20 Rc	75-200	200-425	0.003	0.004	0.005	0.006	0.007	0.008
TOOL STEEL	25 Rc	75-175	175-300	0.002	0.003	0.004	0.005	0.006	0.007
300 STAINLESS STEEL	150 HB	75-175	175-350	0.003	0.003	0.004	0.005	0.006	0.007
400 STAINLESS STEEL	195 HB	75-210	130-420	0.003	0.004	0.005	0.006	0.006	0.007
HIGH TEMP ALLOY (NICKEL & COBALT BASE)	20 Rc	50-130	130-300	0.002	0.003	0.003	0.004	0.005	0.005
TITANIUM	25 Rc	50-100	120-275	0.003	0.003	0.004	0.005	0.006	0.007
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	0.002	0.002	0.003	0.004	0.004	0.005
ALUMINUM	100 HB	75-250	200-750	0.004	0.005	0.007	0.008	0.010	0.011
BRASS, ZINC	80 HB	75-300	250-650	0.003	0.005	0.006	0.007	0.008	0.009

Parameters are a starting point based on machinability rating at hardness listed.  
Check machinability rating of the material to be machined and adjust First Pass Depth.

## Helpful Formulas and Information

$$\text{PITCH} = \frac{1}{\text{TPI}}$$

TPI = Threads Per Inch

ACME Thread Depth = Pitch × 0.5

Stub ACME Thread Depth = Pitch × 0.3

NPT Pipe Thread Depth = Pitch × 0.76

Internal 60° Thread Depth = Pitch × 0.54

Feed Rate = Pitch × Number of Thread Starts

Minimum Depth per Pass should not be less than 0.0003

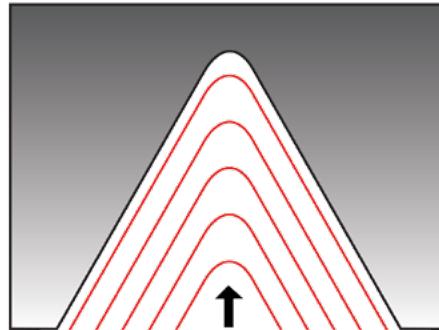
Threads not ending in a relief need at least one thread pitch length of pullout

Make sure feed rate calculation does not exceed the maximum feed rate of the machine

# SINGLE POINT THREADING TROUBLESHOOTING

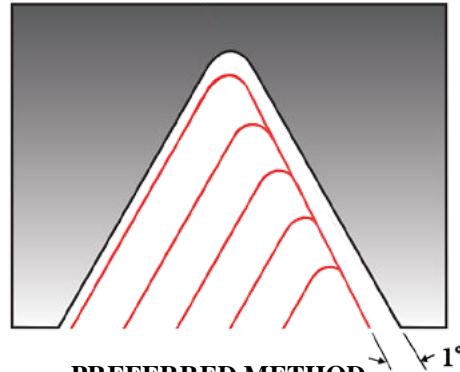
PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed - see chart.
	PART	Make sure prior operation did not work harden the material.
	TOOL	Select a coated tool.
BUILT-UP EDGE	TOOL	Select a coated tool.
	CUTTING FORCE	Increase the number of passes.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
CORNER BREAKAGE	CUTTING CONDITIONS	Reduce the depth-of-cut on the first pass.
	PROGRAM	If there is no thread relief, withdraw the tool on an angle.
	PART	End in thread relief.
CHIPS WRAPPING AROUND TOOL	TOOL	Use a tool that is at least 30% smaller than the hole diameter.

## RADIAL INFEED



NOT RECOMMENDED

## MODIFIED FLANK



PREFERRED METHOD

Radial Infeed is not recommended. Modified flank at 1° is recommended.

For unfavorable length-to-diameter ratios or difficult-to-machine materials, the number of passes will need to be increased up to 40% more.

Depth of cut per pass should not be less than 0.0003 inch.



# INDEXABLE TOOLING



**Bar and Insert Kits**  
**Right Hand Indexable Bars**  
**Left Hand Indexable Bars**  
**Diamond Shaped Inserts**  
**Triangle Shaped Inserts**  
**Chip Control Inserts**



# SCT INDEXABLE BORING - PRODUCT OVERVIEW

SCT indexable boring bars consist of micro grain carbide shanks with heat-treated steel heads. Select tools are crafted with a unique top cut which strengthens the pocket by 40% and directs chips away from the cut zone. Bars are stocked with or without flats. Inserts are available uncoated or in ALTiN+ coating or ZrCN coating and are available as diamond-shaped or triangle-shaped. Sets include a bar, inserts, screws, and a key and are available in many sizes. Technical information available on pages 100-102.



## 3/16" Right or Left-Hand Bars

The 3/16" indexable boring bar uses an 80° diamond-shaped insert to bore down to 0.220 inch diameter.



## 1/4" Right or Left-Hand Bars

The 1/4" indexable boring bar is available with an 80° diamond-shaped insert or 60° triangle-shaped insert to bore down to 0.286 inch diameter.



## 5/16" Right or Left-Hand Bars

The 5/16" indexable boring bar is available with an 80° diamond-shaped insert or 60° triangle-shaped insert to bore down to 0.350 inch diameter.



## 3/8" Right or Left-Hand Bars

The 3/8" indexable boring bar uses a 0.250" IC 60° triangle insert to bore down to 0.430 inch diameter.



## 1/2" Right or Left-Hand Bars

The 1/2" indexable boring bar uses a 0.250" IC 60° triangle insert to bore down to 0.560 inch diameter.



## 1/2" Right-Hand Step Bars

The 1/2" indexable boring bar is ideal for boring heads and is available with a diamond-shaped or triangle-shaped inserts. The bar will bore down to 0.220 inch diameter.



## 3/16" Sets

The bar for the 3/16" sets use an 80° diamond-shaped insert to bore down to 0.220 inch diameter. Sets include a bar, 5 inserts, and 5 screws with a key.



## 1/4" Sets:

The bar for the 1/4" sets use an 80° diamond-shaped insert or 60° triangle-shaped insert to bore down to 0.286 inch diameter. Sets include a bar, 5 inserts, and 5 screws with a key.



## 5/16" Sets

The bar for the 5/16" sets use an 80° diamond-shaped insert or 60° triangle-shaped insert to bore down to 0.350 inch diameter. Sets include a bar, 5 inserts, and 5 screws with a key.



## 3/8" Sets

The bar for the 3/8" sets uses a 0.250" IC 60° triangle-shaped insert to bore down to 0.430 inch diameter. Sets include a bar, 5 inserts, and 5 screws with a key. Packaging may differ for 3/8" sets.



## 1/2" Step Bar Sets

The bar for the 1/2" sets are ideal for boring heads. It is available with diamond-shaped or triangle-shaped inserts and will bore down to 0.220 inch diameter. Sets include a bar, 5 inserts, and 5 screws with a key.



## Flat Top and Chip Control Inserts

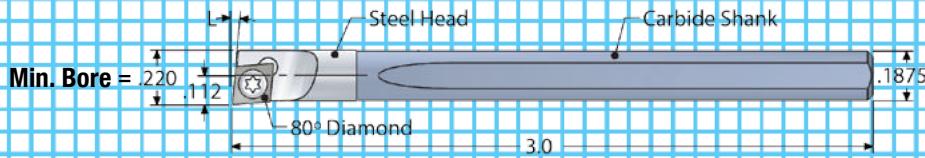
Inserts come in flat top or ground chip control. Corner radius options are 0.003, 0.007, or 0.015. Inserts can be ordered separately in 5-count packs and are available uncoated or in ALTiN+ or ZrCN coatings.

# INDEXABLE BORING BAR

## 3/16" AND 1/4" SHANK

EACH BAR COMES WITH ONE SCREW AND ONE KEY. INSERTS SOLD SEPARATELY (PAGE 99)

CHIP CONTROL INSERTS AVAILABLE FOR RIGHT-HAND ONLY



### 3/16" BARS FOR DIAMOND-SHAPED CARBIDE INSERTS

#### RIGHT HAND BAR

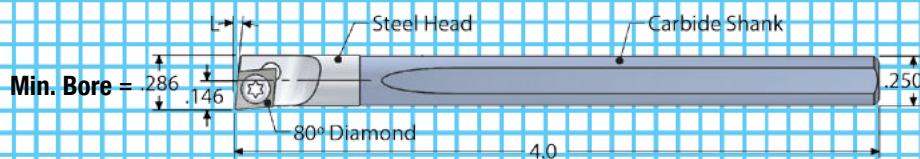
"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER #
				BAR ONLY
5°	NONE	ACD5XXXX	0.156	ACBC187R5R
	FLAT	ACD5XXXX	0.156	ACBC187F5R
0°	NONE	ACD5XXXX	0.156	ACBC187R0R
	FLAT	ACD5XXXX	0.156	ACBC187F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

#### LEFT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER #
				BAR ONLY
5°	NONE	ACD5XXXX	0.156	ACBC187R5L
	FLAT	ACD5XXXX	0.156	ACBC187F5L
0°	NONE	ACD5XXXX	0.156	ACBC187R0L
	FLAT	ACD5XXXX	0.156	ACBC187F0L

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.



### 1/4" BARS FOR DIAMOND-SHAPED CARBIDE INSERTS

#### RIGHT HAND BAR

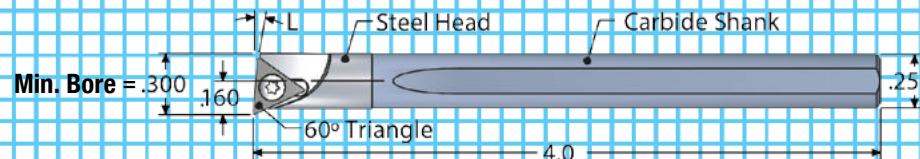
"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER #
				BAR ONLY
5°	NONE	ACD5XXXX	0.156	ACBC250R5R
	FLAT	ACD5XXXX	0.156	ACBC250F5R
0°	NONE	ACD5XXXX	0.156	ACBC250R0R
	FLAT	ACD5XXXX	0.156	ACBC250F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

#### LEFT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER #
				BAR ONLY
5°	NONE	ACD5XXXX	0.156	ACBC250R5L
	FLAT	ACD5XXXX	0.156	ACBC250F5L
0°	NONE	ACD5XXXX	0.156	ACBC250R0L
	FLAT	ACD5XXXX	0.156	ACBC250F0L

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.



### 1/4" BARS FOR TRIANGLE-SHAPED CARBIDE INSERTS

#### RIGHT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER #
				BAR ONLY
5°	NONE	ATD5XXXX	0.160	ACBT250R5R
	FLAT	ATD5XXXX	0.160	ACBT250F5R
0°	NONE	ATD5XXXX	0.160	ACBT250R0R
	FLAT	ATD5XXXX	0.160	ACBT250F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

#### LEFT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER #
				BAR ONLY
5°	NONE	ATD5XXXX	0.160	ACBT250R5L
	FLAT	ATD5XXXX	0.160	ACBT250F5L
0°	NONE	ATD5XXXX	0.160	ACBT250R0L
	FLAT	ATD5XXXX	0.160	ACBT250F0L

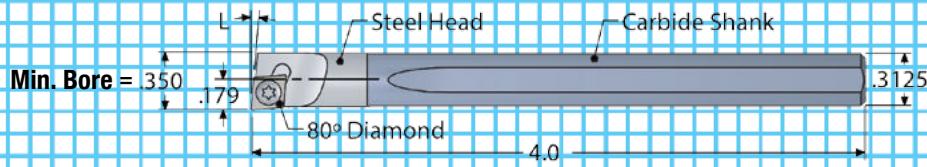
INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

# INDEXABLE BORING BAR

## 5/16" AND 3/8" SHANK

EACH BAR COMES WITH ONE SCREW AND ONE KEY. INSERTS SOLD SEPARATELY (PAGE 99)

CHIP CONTROL INSERTS AVAILABLE FOR RIGHT-HAND ONLY



**5/16" BARS FOR DIAMOND-SHAPED CARBIDE INSERTS**

### RIGHT HAND BAR

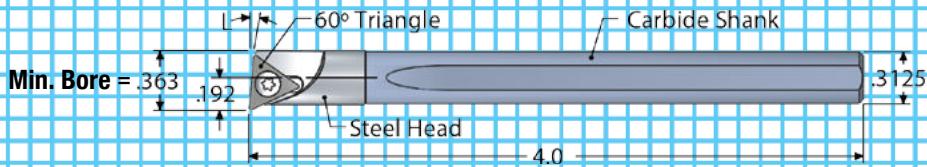
"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ACD5XXXX	0.156	ACBC312R5R
	FLAT	ACD5XXXX	0.156	ACBC312F5R
0°	NONE	ACD5XXXX	0.156	ACBC312R0R
	FLAT	ACD5XXXX	0.156	ACBC312F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

### LEFT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ACD5XXXX	0.156	ACBC312R5L
	FLAT	ACD5XXXX	0.156	ACBC312F5L
0°	NONE	ACD5XXXX	0.156	ACBC312R0L
	FLAT	ACD5XXXX	0.156	ACBC312F0L

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.



**5/16" BARS FOR TRIANGLE-SHAPED CARBIDE INSERTS**

### RIGHT HAND BAR

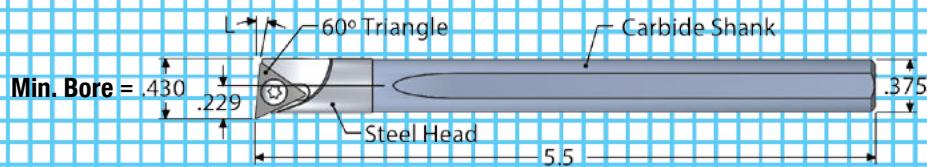
"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ATD5XXXX	0.160	ACBT312R5R
	FLAT	ATD5XXXX	0.160	ACBT312F5R
0°	NONE	ATD5XXXX	0.160	ACBT312R0R
	FLAT	ATD5XXXX	0.160	ACBT312F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

### LEFT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ATD5XXXX	0.160	ACBT312R5L
	FLAT	ATD5XXXX	0.160	ACBT312F5L
0°	NONE	ATD5XXXX	0.160	ACBT312R0L
	FLAT	ATD5XXXX	0.160	ACBT312F0L

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.



**3/8" BARS FOR TRIANGLE-SHAPED CARBIDE INSERTS**

### RIGHT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ATP2XXXX	0.250	ACBT375R5R
	FLAT	ATP2XXXX	0.250	ACBT375F5R
0°	NONE	ATP2XXXX	0.250	ACBT375R0R
	FLAT	ATP2XXXX	0.250	ACBT375F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

### LEFT HAND BAR

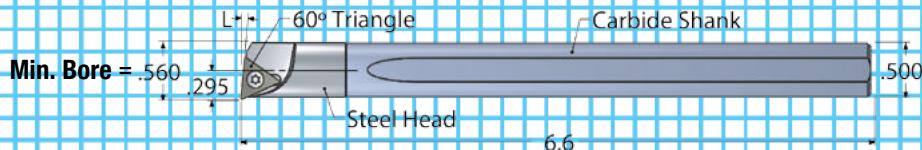
"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ATP2XXXX	0.250	ACBT375R5L
	FLAT	ATP2XXXX	0.250	ACBT375F5L
0°	NONE	ATP2XXXX	0.250	ACBT375R0L
	FLAT	ATP2XXXX	0.250	ACBT375F0L

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

# INDEXABLE BORING BAR

## 1/2" SHANK

EACH BAR COMES WITH ONE SCREW AND ONE KEY. INSERTS SOLD SEPARATELY (PAGE 99)  
CHIP CONTROL INSERTS AVAILABLE FOR RIGHT-HAND ONLY



### 1/2" BARS FOR TRIANGLE-SHAPED CARBIDE INSERTS

#### RIGHT HAND BAR

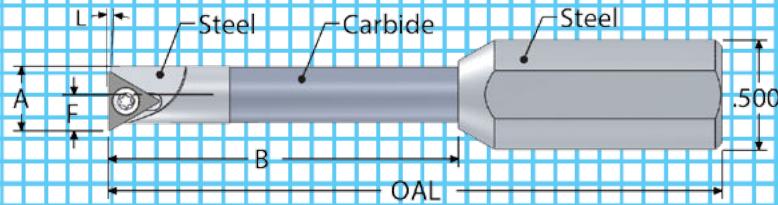
"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ATP2XXXX	0.250	ACBT500R5R
	FLAT	ATP2XXXX	0.250	ACBT500F5R
0°	NONE	ATP2XXXX	0.250	ACBT500R0R
	FLAT	ATP2XXXX	0.250	ACBT500F0R

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.

#### LEFT HAND BAR

"L" ANGLE	BAR FLAT	USES INSERT	INSERT I.C.	ORDER # BAR ONLY
5°	NONE	ATP2XXXX	0.250	ACBT500R5L
	FLAT	ATP2XXXX	0.250	ACBT500F5L
0°	NONE	ATP2XXXX	0.250	ACBT500R0L
	FLAT	ATP2XXXX	0.250	ACBT500F0L

INSERT PACKS SOLD SEPARATELY. SEE PAGE 99.



### 1/2" SHANK STEP BARS FOR CARBIDE INSERTS

#### RIGHT HAND STEP BARS

"L" ANGLE	BAR FLAT	INSERT SHAPE	"A" MIN BORE	"B" MAX DEPTH	"F" DIM	OAL	INSERT PACK	INSERT I.C.	ORDER # BAR ONLY
0°	FLAT	DIAMOND	0.220	1.31	0.112	2.800	ACD5XXXX	0.156	ACBC187S4FOR
	FLAT	TRIANGLE	0.300	1.75	0.160	3.200	ATD5XXXX	0.160	ACBT250S4FOR
	FLAT	TRIANGLE	0.363	2.19	0.192	3.600	ATD5XXXX	0.160	ACBT312S4FOR

INSERT PACKS ARE ALSO SOLD SEPARATELY. SEE PAGE 99.

# INDEXABLE BORING BAR SETS

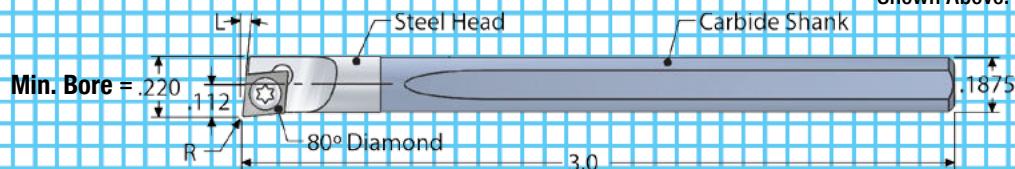
## 3/16" SHANK

### RIGHT-HAND BORING BAR SETS WITH DIAMOND-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five



Shown Above: Example of Set

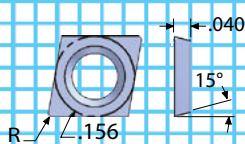


RIGHT HAND SETS				COMPLETE SET	
ONE BAR		FIVE INSERTS		ORDER NUMBER	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	NONE	ACD5071(E)	0.007	ACBC187R5R07	ACBC187R5R07E
		ACD5151(E)	0.015	ACBC187R5R15	ACBC187R5R15E
	FLAT	ACD5071(E)	0.007	ACBC187F5R07	ACBC187F5R07E
		ACD5151(E)	0.015	ACBC187F5R15	ACBC187F5R15E
0°	NONE	ACD5071(E)	0.007	ACBC187R0R07	ACBC187R0R07E
		ACD5151(E)	0.015	ACBC187R0R15	ACBC187R0R15E
	FLAT	ACD5071(E)	0.007	ACBC187F0R07	ACBC187F0R07E
		ACD5151(E)	0.015	ACBC187F0R15	ACBC187F0R15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

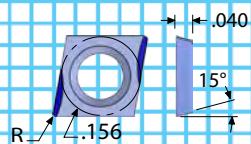
### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only
- Chip control inserts available as insert pack only
- Boring bars can be ordered separately (see page 83)



### 80° DIAMOND FLAT TOP 5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z



### 80° DIAMOND CHIP CONTROL 5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT6+	0.007	ACD507L2	ACD507L2E
	0.015	ACD515L2	ACD515L2E

CHIP CONTROL FOR RIGHT HAND BARS ONLY

# INDEXABLE BORING BAR SETS

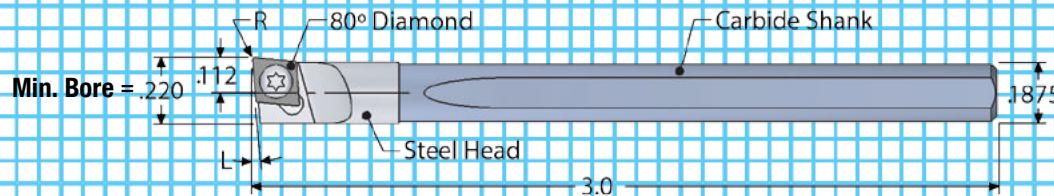
## 3/16" SHANK

### LEFT-HAND BORING BAR SETS WITH DIAMOND-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five



Shown Above: Example of Set



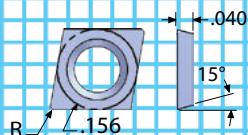
LEFT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	NONE	ACD5071(E)	0.007	ACBC187R5L07	ACBC187R5L07E
		ACD5151(E)	0.015	ACBC187R5L15	ACBC187R5L15E
	FLAT	ACD5071(E)	0.007	ACBC187F5L07	ACBC187F5L07E
		ACD5151(E)	0.015	ACBC187F5L15	ACBC187F5L15E
0°	NONE	ACD5071(E)	0.007	ACBC187R0L07	ACBC187R0L07E
		ACD5151(E)	0.015	ACBC187R0L15	ACBC187R0L15E
	FLAT	ACD5071(E)	0.007	ACBC187F0L07	ACBC187F0L07E
		ACD5151(E)	0.015	ACBC187F0L15	ACBC187F0L15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

INDEXABLE TOOLS  
BORING BAR SETS

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only



### 80° DIAMOND FLAT TOP 5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z

# INDEXABLE BORING BAR SETS

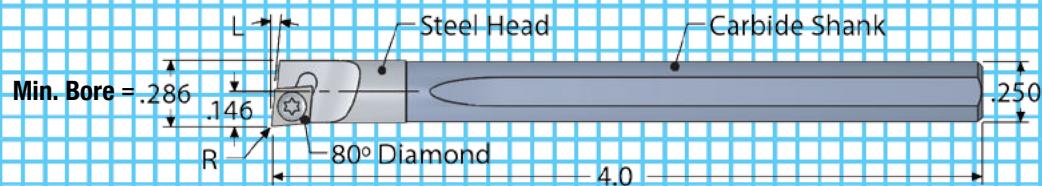
## 1/4" SHANK

### RIGHT-HAND BORING BAR SETS WITH DIAMOND-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five



Shown Above: Example of Set

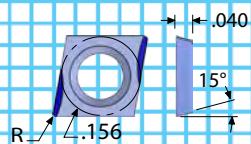
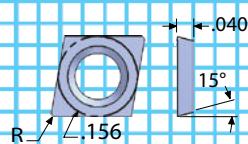


RIGHT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	ORDER NUMBER	
5°	FLAT	ACD5071(E)	0.007	ACBC250F5R07	ACBC250F5R07E
		ACD5151(E)	0.015	ACBC250F5R15	ACBC250F5R15E
0°	FLAT	ACD5071(E)	0.007	ACBC250F0R07	ACBC250F0R07E
		ACD5151(E)	0.015	ACBC250F0R15	ACBC250F0R15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only
- Chip control inserts available as insert pack only
- Boring bars can be ordered separately (see page 83)



### 80° DIAMOND FLAT TOP

5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z

### 80° DIAMOND CHIP CONTROL

5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	FIVE UNCOATED	FIVE ALTiN+
AT6+	0.007	ACD507L2	ACD507L2E
	0.015	ACD515L2	ACD515L2E

CHIP CONTROL FOR RIGHT HAND BARS ONLY

# INDEXABLE BORING BAR SETS

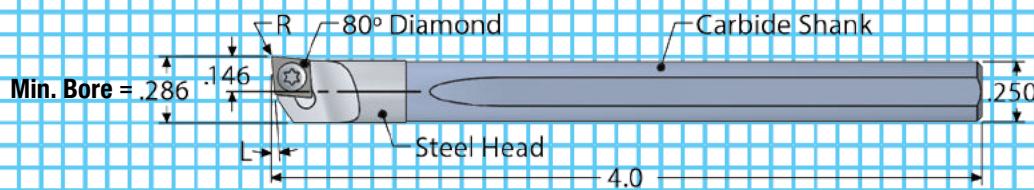
## 1/4" SHANK

### LEFT-HAND BORING BAR SETS WITH DIAMOND-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five



Shown Above: Example of Set

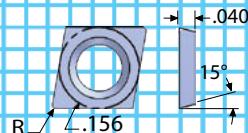


LEFT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	ORDER NUMBER	
5°	FLAT	ACD5071(E)	0.007	ACBC250F5L07	ACBC250F5L07E
		ACD5151(E)	0.015	ACBC250F5L15	ACBC250F5L15E
0°	FLAT	ACD5071(E)	0.007	ACBC250F0L07	ACBC250F0L07E
		ACD5151(E)	0.015	ACBC250F0L15	ACBC250F0L15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only



### 80° DIAMOND FLAT TOP 5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTIN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z

# INDEXABLE BORING BAR SETS

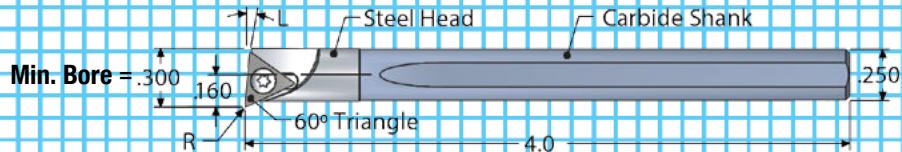
## 1/4" SHANK

### RIGHT-HAND BORING BAR SETS WITH TRIANGLE-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%.



Shown Above: Example of Set

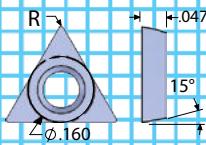


RIGHT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L"	BAR FLAT	INSERT PACK	"R"	ORDER NUMBER	
5°	NONE	ATD5071(E)	0.007	ACBT250R5R07	ACBT250R5R07E
		ATD5151(E)	0.015	ACBT250R5R15	ACBT250R5R15E
	FLAT	ATD5071(E)	0.007	ACBT250F5R07	ACBT250F5R07E
		ATD5151(E)	0.015	ACBT250F5R15	ACBT250F5R15E
0°	NONE	ATD5071(E)	0.007	ACBT250R0R07	ACBT250R0R07E
		ATD5151(E)	0.015	ACBT250R0R15	ACBT250R0R15E
	FLAT	ATD5071(E)	0.007	ACBT250F0R07	ACBT250F0R07E
		ATD5151(E)	0.015	ACBT250F0R15	ACBT250F0R15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

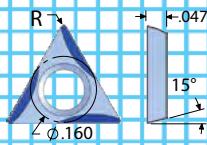
### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only
- Chip control inserts available as insert pack only
- Boring bars can be ordered separately (see page 83)



### 60° TRIANGLE FLAT TOP FIVE PIECE INSERT KIT - .160 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ATD5031	ATD5031E	ATD5031Z
	0.007	ATD5071	ATD5071E	ATD5071Z
	0.015	ATD5151	ATD5151E	ATD5151Z



### 60° TRIANGLE CHIP CONTROL FIVE PIECE INSERT KIT - .160 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT6+	0.007	ATD507L2	ATD507L2E
	0.015	ATD515L2	ATD515L2E

CHIP CONTROL FOR RIGHT HAND BARS ONLY

# INDEXABLE BORING BAR SETS

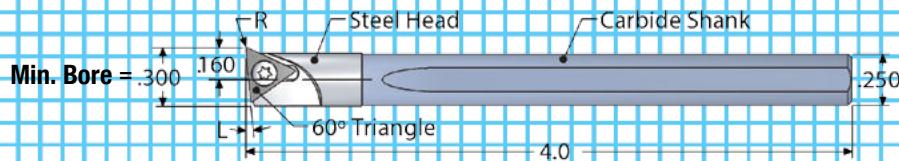
## 1/4" SHANK

### LEFT-HAND BORING BAR SETS WITH TRIANGLE-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%



Shown Above: Example of Set



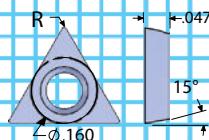
LEFT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	NONE	ATD5071(E)	0.007	ACBT250R5L07	ACBT250R5L07E
		ATD5151(E)	0.015	ACBT250R5L15	ACBT250R5L15E
	FLAT	ATD5071(E)	0.007	ACBT250F5L07	ACBT250F5L07E
		ATD5151(E)	0.015	ACBT250F5L15	ACBT250F5L15E
0°	NONE	ATD5071(E)	0.007	ACBT250R0L07	ACBT250R0L07E
		ATD5151(E)	0.015	ACBT250R0L15	ACBT250R0L15E
	FLAT	ATD5071(E)	0.007	ACBT250F0L07	ACBT250F0L07E
		ATD5151(E)	0.015	ACBT250F0L15	ACBT250F0L15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

INDEXABLE TOOLS  
BORING BAR SETS

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only



### 60° TRIANGLE FLAT TOP FIVE PIECE INSERT KIT - .160 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ATD5031	ATD5031E	ATD5031Z
	0.007	ATD5071	ATD5071E	ATD5071Z
	0.015	ATD5151	ATD5151E	ATD5151Z

# INDEXABLE BORING BAR SETS

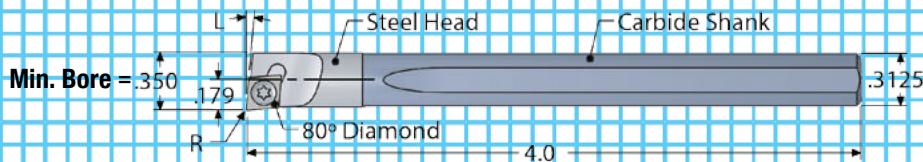
## 5/16" SHANK

### RIGHT-HAND BORING BAR SETS WITH DIAMOND-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five



Shown Above: Example of Set

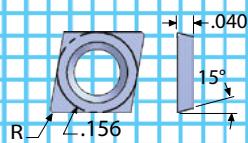


RIGHT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	ORDER NUMBER	
5°	FLAT	ACD5071(E)	0.007	ACBC312F5R07	ACBC312F5R07E
		ACD5151(E)	0.015	ACBC312F5R15	ACBC312F5R15E
0°	FLAT	ACD5071(E)	0.007	ACBC312F0R07	ACBC312F0R07E
		ACD5151(E)	0.015	ACBC312F0R15	ACBC312F0R15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

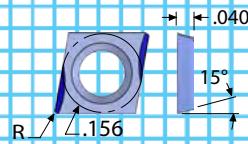
### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only
- Chip control inserts available as insert pack only
- Boring bars can be ordered separately (see page 84)



**80° DIAMOND FLAT TOP**  
5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTIN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z



**80° DIAMOND CHIP CONTROL**  
5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTIN+
AT6+	0.007	ACD507L2	ACD507L2E
	0.015	ACD515L2	ACD515L2E

CHIP CONTROL FOR RIGHT HAND BARS ONLY

# INDEXABLE BORING BAR SETS

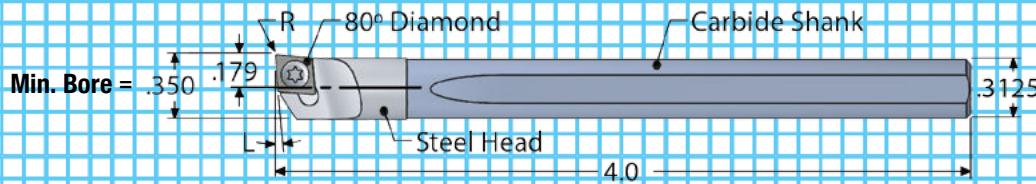
## 5/16" SHANK

### LEFT-HAND BORING BAR SETS WITH DIAMOND-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five



Shown Above: Example of Set



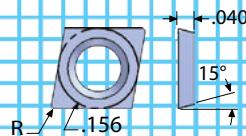
LEFT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	FLAT	ACD5071(E)	0.007	ACBC312F5L07	ACBC312F5L07E
		ACD5151(E)	0.015	ACBC312F5L15	ACBC312F5L15E
0°	FLAT	ACD5071(E)	0.007	ACBC312F0L07	ACBC312F0L07E
		ACD5151(E)	0.015	ACBC312F0L15	ACBC312F0L15E

ADDITIONAL INSERT OPTIONS AVAILABLE EXCLUSIVELY AS INSERT PACKS (SEE BELOW)

INDEXABLE TOOLS  
BORING BAR SETS

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only



### 80° DIAMOND FLAT TOP 5 PC INSERT PACK W/ SCREWS - .156 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z

# INDEXABLE BORING BAR SETS

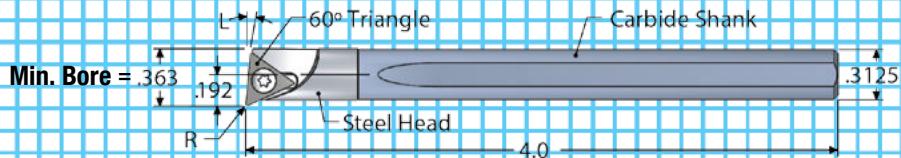
## 5/16" SHANK

### RIGHT-HAND BORING BAR SETS WITH TRIANGLE-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%



Shown Above: Example of Set

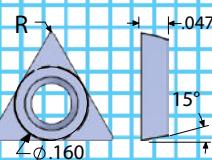


RIGHT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	NONE	ATD5071(E)	0.007	ACBT312R5R07	ACBT312R5R07E
		ATD5151(E)	0.015	ACBT312R5R15	ACBT312R5R15E
	FLAT	ATD5071(E)	0.007	ACBT312F5R07	ACBT312F5R07E
		ATD5151(E)	0.015	ACBT312F5R15	ACBT312F5R15E
0°	NONE	ATD5071(E)	0.007	ACBT312R0R07	ACBT312R0R07E
		ATD5151(E)	0.015	ACBT312R0R15	ACBT312R0R15E
	FLAT	ATD5071(E)	0.007	ACBT312F0R07	ACBT312F0R07E
		ATD5151(E)	0.015	ACBT312F0R15	ACBT312F0R15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

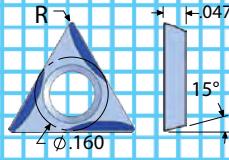
- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only
- Chip control inserts available as insert pack only
- Boring bars can be ordered separately (see page 84)



### 60° TRIANGLE FLAT TOP

#### FIVE PIECE INSERT KIT - .160 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ATD5031	ATD5031E	ATD5031Z
	0.007	ATD5071	ATD5071E	ATD5071Z
	0.015	ATD5151	ATD5151E	ATD5151Z



### 60° TRIANGLE CHIP CONTROL

#### FIVE PIECE INSERT KIT - .160 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT6+	0.007	ATD507L2	ATD507L2E
	0.015	ATD515L2	ATD515L2E

CHIP CONTROL FOR RIGHT-HAND BARS ONLY

# INDEXABLE BORING BAR SETS

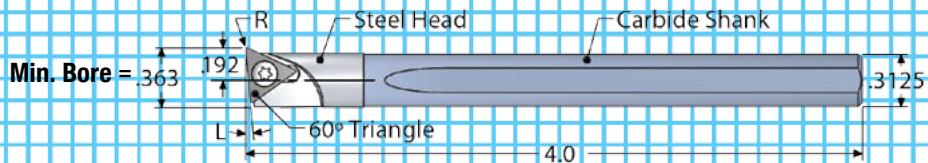
## 5/16" SHANK

### LEFT-HAND BORING BAR SETS WITH TRIANGLE-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%



Shown Above: Example of Set



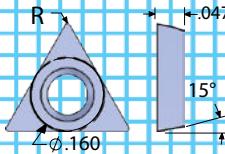
LEFT HAND SETS				COMPLETE SET	
ONE BAR		FIVE INSERTS		ORDER NUMBER	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTIN+
5°	NONE	ATD5071(E)	0.007	ACBT312R5L07	ACBT312R5L07E
		ATD5151(E)	0.015	ACBT312R5L15	ACBT312R5L15E
	FLAT	ATD5071(E)	0.007	ACBT312F5L07	ACBT312F5L07E
		ATD5151(E)	0.015	ACBT312F5L15	ACBT312F5L15E
0°	NONE	ATD5071(E)	0.007	ACBT312R0L07	ACBT312R0L07E
		ATD5151(E)	0.015	ACBT312R0L15	ACBT312R0L15E
	FLAT	ATD5071(E)	0.007	ACBT312F0L07	ACBT312F0L07E
		ATD5151(E)	0.015	ACBT312F0L15	ACBT312F0L15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

INDEXABLE TOOLS  
BORING BAR SETS

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only



### 60° TRIANGLE FLAT TOP FIVE PIECE INSERT KIT - .160 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTIN+	FIVE ZrCN
AT6+	0.003	ATD5031	ATD5031E	ATD5031Z
	0.007	ATD5071	ATD5071E	ATD5071Z
	0.015	ATD5151	ATD5151E	ATD5151Z

# INDEXABLE BORING BAR SETS

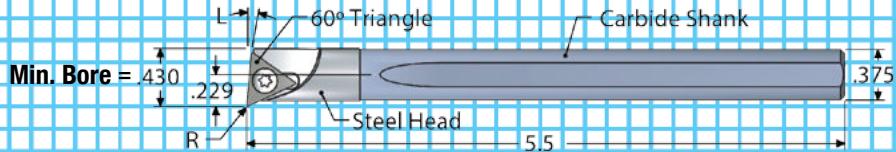
## 3/8" SHANK

### RIGHT-HAND BORING BAR SETS WITH TRIANGLE-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%



Shown above: Example of contents.  
Packaging may differ for 3/8" sets.

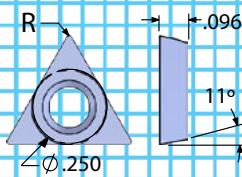


RIGHT HAND SETS					
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	NONE	ATP2071(E)	0.007	ACBT375R5R07	ACBT375R5R07E
		ATP2151(E)	0.015	ACBT375R5R15	ACBT375R5R15E
	FLAT	ATP2071(E)	0.007	ACBT375F5R07	ACBT375F5R07E
		ATP2151(E)	0.015	ACBT375F5R15	ACBT375F5R15E
0°	NONE	ATP2071(E)	0.007	ACBT375R0R07	ACBT375R0R07E
		ATP2151(E)	0.015	ACBT375R0R15	ACBT375R0R15E
	FLAT	ATP2071(E)	0.007	ACBT375F0R07	ACBT375F0R07E
		ATP2151(E)	0.015	ACBT375F0R15	ACBT375F0R15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

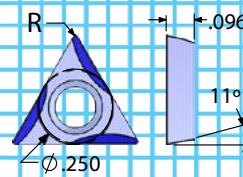
### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only
- Chip control inserts available as insert pack only
- Boring bars can be ordered separately (see page 84)



**60° TRIANGLE FLAT TOP**  
**FIVE PIECE INSERT KIT - .250 IC**

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT8+	0.003	ATP2031	ATP2031E	ATP2031Z
	0.007	ATP2071	ATP2071E	ATP2071Z
	0.015	ATP2151	ATP2151E	ATP2151Z



**60° TRIANGLE CHIP CONTROL**  
**FIVE PIECE INSERT KIT - .250 IC**

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT8+	0.007	ATP207L2	ATP207L2E
	0.015	ATP215L2	ATP215L2E

CHIP CONTROL FOR RIGHT-HAND BARS ONLY

# INDEXABLE BORING BAR SETS

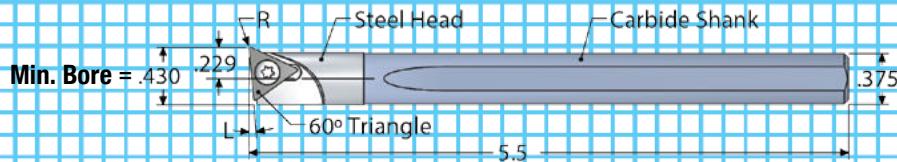
## 3/8" SHANK

### LEFT-HAND BORING BAR SETS WITH TRIANGLE-SHAPED CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%



Shown above: Example of contents.  
Packaging may differ for 3/8" sets.



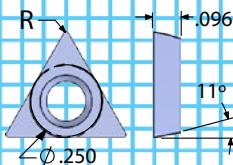
ONE BAR		FIVE INSERTS		COMPLETE SET	
"L" ANGLE	BAR FLAT	INSERT PACK	"R" RADIUS	UNCOATED	ALTiN+
5°	NONE	ATP2071(E)	0.007	ACBT375R5L07	ACBT375R5L07E
		ATP2151(E)	0.015	ACBT375R5L15	ACBT375R5L15E
	FLAT	ATP2071(E)	0.007	ACBT375F5L07	ACBT375F5L07E
		ATP2151(E)	0.015	ACBT375F5L15	ACBT375F5L15E
0°	NONE	ATP2071(E)	0.007	ACBT375R0L07	ACBT375R0L07E
		ATP2151(E)	0.015	ACBT375R0L15	ACBT375R0L15E
	FLAT	ATP2071(E)	0.007	ACBT375F0L07	ACBT375F0L07E
		ATP2151(E)	0.015	ACBT375F0L15	ACBT375F0L15E

ADDITIONAL INSERT OPTIONS AVAILABLE AS INSERT PACKS (SEE BELOW)

INDEXABLE TOOLS  
BORING BAR SETS

### REPLACEMENT AND ADDITIONAL INSERT PACK OPTIONS

- The 0.003 radius is available as insert pack only
- ZrCN coating is available as insert pack only



### 60° TRIANGLE FLAT TOP FIVE PIECE INSERT KIT - .250 IC

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT8+	0.003	ATP2031	ATP2031E	ATP2031Z
	0.007	ATP2071	ATP2071E	ATP2071Z
	0.015	ATP2151	ATP2151E	ATP2151Z

# INDEXABLE STEP BAR SETS

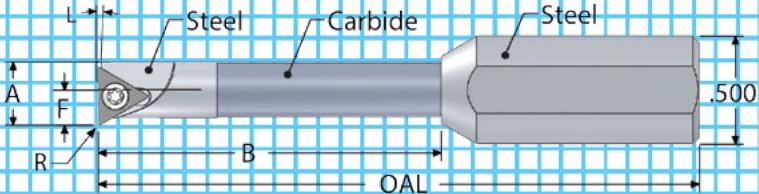
## 1/2" SHANK

### RIGHT-HAND STEP BAR SETS WITH CARBIDE INSERTS

- Set includes one bar, five inserts with screws, and key
- Set comes in a customized reusable box for easy storage
- Inserts can be ordered separately in packs of five
- Unique top cut strengthens pocket by 40%



Shown Above: Example of Set



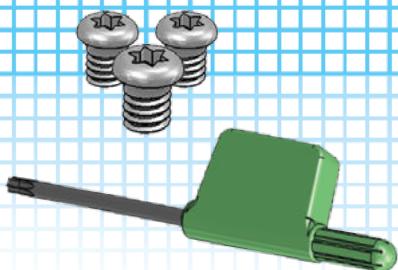
### RIGHT HAND STEP BAR SETS

“L” ANGLE	BAR FLAT	INSERT SHAPE	ONE BAR				FIVE INSERTS		COMPLETE SET ORDER NUMBER	
			“A” MIN BORE	“B” MAX DEPTH	“F” DIM	OAL	INSERT PACK	“R” RADIUS	UNCOATED	ALTIN+
0°	FLAT	DIAMOND	0.220	1.31	0.112	2.800	ACD5071(E)	0.007	ACBC187S4FOR07	ACBC187S4FOR07E
	FLAT	TRIANGLE	0.300	1.75	0.160	3.200	ATD5071(E)	0.007	ACBT250S4FOR07	ACBT250S4FOR07E
	FLAT	TRIANGLE	0.363	2.19	0.192	3.600	ATD5071(E)	0.007	ACBT312S4FOR07	ACBT312S4FOR07E

INSERT PACKS ARE ALSO SOLD SEPARATELY. SEE PAGE 99.

### INDEXABLE BORING BAR ACCESSORIES REPLACEMENT FLAG KEYS AND SCREWS

- All 3/16", 1/4", and 5/16" right and left-hand bars use AT6+ screws (for triangle or diamond-shaped inserts)
- All 3/8" and 1/2" bars use AT8+ screws
- AT6+ screws use AT6+ flag keys. AT8+ screws use AT8+ flag keys.

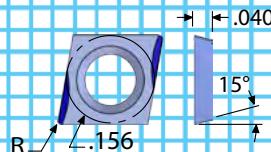
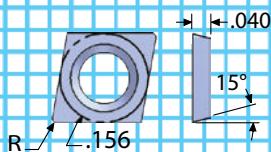


### REPLACEMENT PACKS

ACCESSORY	SIZE	ORDER NUMBER
REPLACEMENT FLAG KEY (2 PACK)	AT6+	A6KEY
	AT8+	A8KEY
REPLACEMENT SCREWS (10 PACK)	AT6+	A6SCREWS
	AT8+	A8SCREWS

# INDEXABLE BORING BAR CARBIDE INSERTS

## FLAT TOP AND CHIP CONTROL



### 80° DIAMOND FLAT TOP

5 PC INSERT PACK W/ SCREWS - .156 IC

FOR 3/16", 1/4" & 5/16" LEFT OR RIGHT-HAND  
ACBC DIAMOND BORING BARS

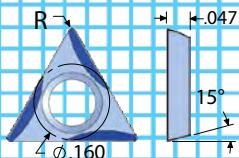
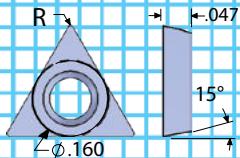
FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ACD5031	ACD5031E	ACD5031Z
	0.007	ACD5071	ACD5071E	ACD5071Z
	0.015	ACD5151	ACD5151E	ACD5151Z

### 80° DIAMOND CHIP CONTROL

5 PC INSERT PACK W/ SCREWS - .156 IC

FOR 3/16", 1/4" & 5/16" **RIGHT-HAND ONLY**  
ACBC DIAMOND BORING BARS

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT6+	0.007	ACD507L2	ACD507L2E
	0.015	ACD515L2	ACD515L2E



### 60° TRIANGLE FLAT TOP

5 PC INSERT PACK W/ SCREWS - .160 IC

FOR 1/4" & 5/16" LEFT OR RIGHT-HAND  
ACBT TRIANGLE BORING BARS

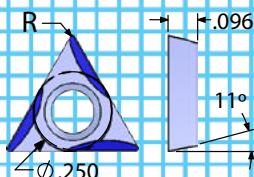
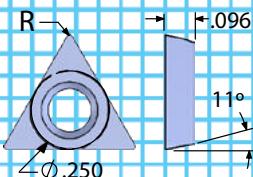
FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT6+	0.003	ATD5031	ATD5031E	ATD5031Z
	0.007	ATD5071	ATD5071E	ATD5071Z
	0.015	ATD5151	ATD5151E	ATD5151Z

### 60° TRIANGLE CHIP CONTROL

5 PC INSERT PACK W/ SCREWS - .160 IC

FOR 1/4" & 5/16" **RIGHT-HAND ONLY**  
ACBT TRIANGLE BORING BARS

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT6+	0.007	ATD507L2	ATD507L2E
	0.015	ATD515L2	ATD515L2E



### 60° TRIANGLE FLAT TOP

5 PC INSERT PACK W/ SCREWS - .250 IC

FOR 3/8" & 1/2" LEFT OR RIGHT-HAND  
ACBT TRIANGLE BORING BARS

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER		
		FIVE UNCOATED	FIVE ALTiN+	FIVE ZrCN
AT8+	0.003	ATP2031	ATP2031E	ATP2031Z
	0.007	ATP2071	ATP2071E	ATP2071Z
	0.015	ATP2151	ATP2151E	ATP2151Z

### 60° TRIANGLE CHIP CONTROL

5 PC INSERT PACK W/ SCREWS - .250 IC

FOR 3/8" & 1/2" **RIGHT-HAND ONLY**  
ACBT TRIANGLE BORING BARS

FIVE SCREWS	"R" CORNER RADIUS	ORDER NUMBER	
		FIVE UNCOATED	FIVE ALTiN+
AT8+	0.007	ATP207L2	ATP207L2E
	0.015	ATP215L2	ATP215L2E

PCD and CBN tipped inserts available. Call for price and delivery. Chip control inserts are for right-hand bars only.

# INDEXABLE BORING BAR FEED AND SPEED CHART

MATERIAL	HB/Rc	SPEED RANGE (SFM)			CUTTING CONDITIONS		
		UNCOATED	ALTIN+	ZRCN	MAX DOC ACD & ATD	MAX DOC ATP	FEED IPR
CAST IRON	160 HB	75-200	200-550	N/A	0.020	0.060	.0005-.010
CARBON STEEL	18 Rc	75-200	200-450	N/A	0.018	0.060	.0005-.010
ALLOY STEEL	20 Rc	75-200	200-425	N/A	0.015	0.060	.0005-.010
TOOL STEEL	25 Rc	75-175	175-300	N/A	0.010	0.030	.0005-.010
300 STAINLESS STEEL	150 HB	75-175	175-350	N/A	0.015	0.028	.0005-.010
400 STAINLESS STEEL	195 HB	75-210	130-420	N/A	0.012	0.028	.0005-.010
HIGH TEMP ALLOY (Ni & Co BASE)	20 Rc	50-130	130-300	N/A	0.008	0.020	.0005-.010
TITANIUM	25 Rc	50-120	120-275	N/A	0.009	0.022	.0005-.010
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-100	100-200	N/A	0.005	0.010	.0005-.005
ALUMINUM	100 HB	75-250	250-750	150-2000	0.025	0.095	.0005-.010
BRASS, ZINC	80 HB	75-300	250-650	250-1000	0.023	0.090	.0005-.010

SFM = Surface Feet per Minute

Starting parameters only. Length to diameter ratios, setup, and machine rigidity may affect performance. The max Depth Of Cut (DOC) acceptable at the minimum Inches Per Revolution (IPR).

## SELECTING AN INDEXABLE BORING BAR

- 1** From the part or print, obtain the diameter of hole to be machined. Select the boring bar that has a minimum bore diameter smaller than the diameter to be machined.
- 2** Check machine for shank size needed. If the shank needs to be larger, go to page 98.
- 3** Match the operation needed on the part with the necessary lead angle. Select 0° lead to bore to a shoulder. Select 5° lead to bore and face a shoulder.
- 4** Choose from flat top or chip control insert based on application and material being machined.
- 5** Choose from .003", .007", or .015" radius based on finish required and part specifications for corner radius.

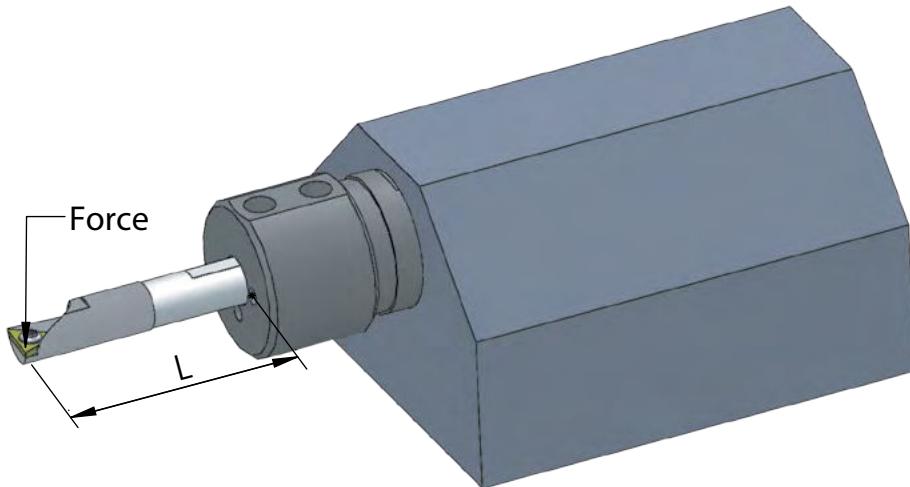
## SELECTING AN INDEXABLE INSERT GRADE

<b>UNCOATED</b>	Uncoated is a submicron premium carbide grade for machining steel and non-ferrous materials.
<b>ALTIN+</b>	ALTIN+ is a premium coated grade for steel, cast irons and high temperature alloys at highest SFM.
<b>ZrCN</b>	ZrCN is a superior coated grade for machining non-ferrous materials.

# INDEXABLE BORING BAR TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Reduce the cutting speed.
	INSERT	Select a coated grade.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
BUILT-UP EDGE	INSERT	Select a coated grade.
	CUTTING FORCE	Use chip control insert to free up cut.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
INSERT BREAKAGE	CUTTING CONDITIONS	Reduce depth of cut. Reduce feed rate.
	INSERT	Select a larger corner radius
	PART	Check the drilled hole to make sure the full diameter of the drill is deeper than the programmed bore depth.
SURFACE TOO ROUGH	CUTTING CONDITIONS	Reduce feed rate. The rate is too great for the nose radius.
	INSERT	Select a larger corner radius. The feed rate (IPR) should not be greater than 1/2 the nose radius.
CHATTER	SETUP	Set insert above center. Change the speed of the machine. The overhang ratio should be less than 8x bar diameter for carbide. Clamping length should be at least 3x the boring bar diameter.
	BORING BAR	Select the largest diameter bar that will bore the required diameter.
TAPER BIGGER IN BACK	CUTTING FORCES	Forces may deflect bar below center causing hole to become larger.
	BUILT-UP EDGE	A built-up edge will cause the hole to become large until the built-up edge breaks off, then hole will be smaller.
	PROGRAM	If the taper is consistent (not from chip packing) then the program can be altered to bore a taper in opposite direction resulting in a straight hole.
TAPER SMALLER IN BACK	CHIP PACKING	If the boring bar is too large to allow chips to evacuate then the chips may pack on the insert and cause the bar to deflect away from the bore.
	PROGRAM	If the taper is consistent (not from chip packing) then the program can be altered to bore a taper in opposite direction resulting in a straight hole.

# INDEXABLE BORING BAR DEFLECTION



$$\text{Bar Deflection: } \frac{F \times L^3}{3 \times E \times I} \quad I = \frac{3.14 \times D^4}{64}$$

F = Cutting force (lbs)   L = Overhang (in.)   E = Coefficient of Elasticity of Bar Shank   D = Tool Diameter   I = Moment of Inertia

The greatest amount of force on the boring bar is on the top of the cutting edge. This force can deflect the cutting edge below the centerline of the part, resulting in incorrect bore size.

To minimize deflection, the length of overhang should be kept as short as possible. As shown in the formula, the length of overhang is multiplied to the third power, and the diameter is multiplied to the fourth power. This means that a small change in length of overhang or bar diameter can make a large difference in deflection.

Using the largest diameter bar with the least amount of overhang as possible gives the best chance of successful boring operations.

The picture shows the boring bar in a coolant holder\*. Coolant or shop air provided to the holder will cool the insert and part, and evacuate chips from the hole.

\*Coolant holders available. See page 42.



# PORT TOOLS



**Tapered Pipe Reamer**

**BSPP**

**MS16142**

**ISO6149**

**MS33649**

**AND10050**

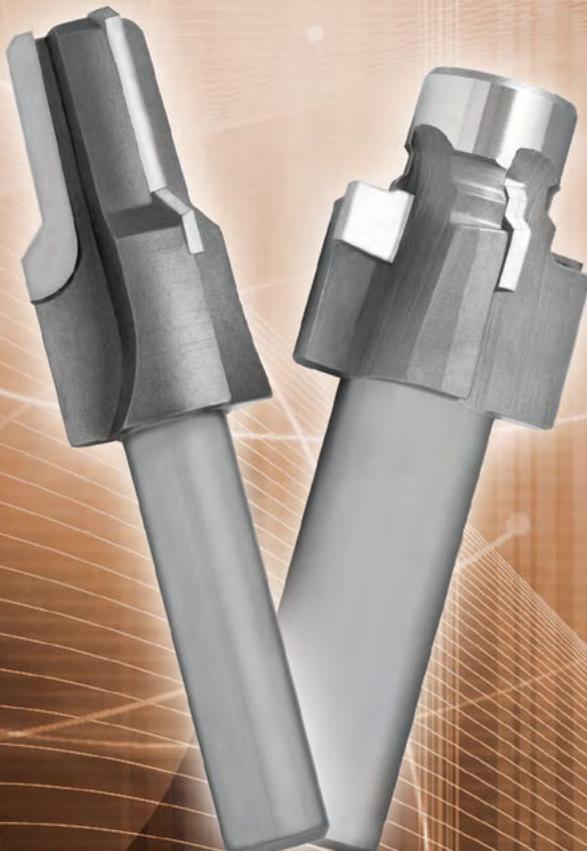
**MS33514**

**RPT - Rosan Cavity**

**Hydraforce**

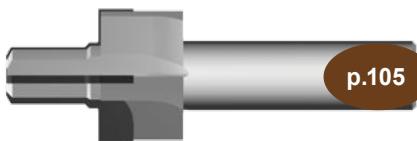
**MS21921**

**MS33651**



# PORT TOOLS - PRODUCT OVERVIEW

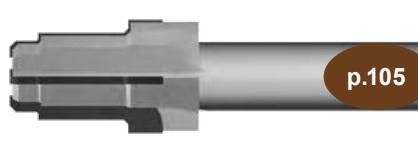
All Port Tools are ground between centers to ensure absolute concentricity. They are made from heat-treated alloy steel with brazed carbide inserts. They are designed to enlarge a pre-drilled hole and easily produce a complex form. Port Tools can be used for both lathe and mill applications. Technical information available on page 124. **Modified Port Tools and Specials quoted upon request.**



p.105

**MS33651**

This carbide tipped port tool also meets the requirements of the AND10071 port.



p.105

**Hard to Find Port Tools**

Many of these hard-to-find port tools are stocked. They also serve as an example of the types of specials we offer.



p.106

**MS16142-S**

This port is also called the O-Ring Boss or ORB, SAEJ1926-1, SAEJ514 or just SAE (dash number). The solid pilot design does not cut the minor-thread diameter.



p.107

**MS16142-R**

This port is also called the O-Ring Boss or ORB, SAEJ1926-1, SAEJ514 or just SAE (dash number). The reamer pilot design cuts the minor-thread diameter.



p.108

**MS33649-S**

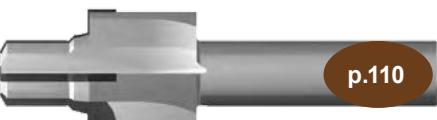
This port is also called the AS5202. The solid pilot design does not cut the minor-thread diameter.



p.109

**MS33649-R**

This port is also called the AS5202. The reamer pilot design cuts the minor-thread diameter.



p.110

**ISO6149-1**

This port is also called the SAEJ2244-1. This port does not have the identification notch that identifies it as a metric port.



p.111

**ISO6149-1 (ID)**

This port is also called the SAEJ2244-1. This port has the identification notch that identifies it as a metric port.



p.112

**AND10050-S**

The solid pilot design does not cut the minor-thread diameter.



p.113

**AND10050-R**

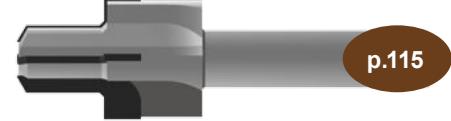
The reamer pilot design cuts the minor-thread diameter.



p.114

**Tapered Pipe Reamer**

The (PRSS) tapered pipe reamers cut taper minor diameter of the NPT ( $1^{\circ}47'$  angle) and the  $45^{\circ}$  countersink for the thread.



p.115

**BSPP- Pipe Reamer**

British standard parallel pipe port tools (PT-BSP) cut the minor-thread diameter, the  $45^{\circ}$  angle, and the spot face.



p.116

**MS33514**

This port will cut the AS33514, MS33514 and MS33515 in both style "E" and "G" configurations.



p.117

**RPT – Rosan Cavity**

RPT port tool will cut a Rosan cavity per AS1300 specification. Another name for this port is PS10035.



p.118

**MS21921**

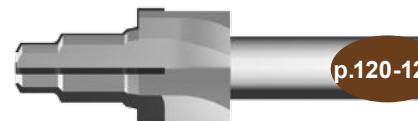
MS21921 port tools are made with the same quality heat-treated steel and carbide as the rest of our port tools.



p.118

**BACD2036**

BACD2036 carbide tipped port tools are designed to cut this otherwise difficult-to-cut port.



p.120-121

**Hydraforce**

Hydraforce (VC) carbide tipped cavity tools are stocked in both roughing and finishing versions.

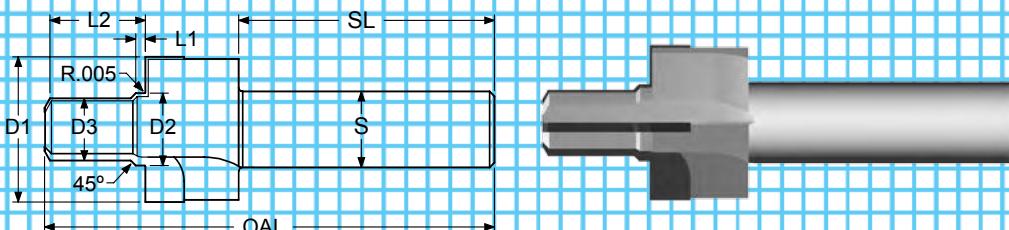


p.122-123

**Sun Hydraulic**

Sun Hydraulic cavity tools are stocked in both HSS roughing step drills and carbide tipped finishing versions.

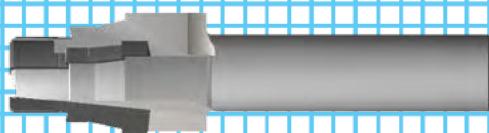
## MS33651 (AND10071) - PORT TOOL - CARBIDE TIPPED



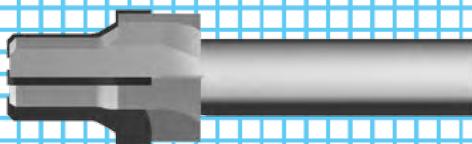
- Polished flute face for optimum performance
- ALTiN+ coating for improved surface finish

D1	D2	D3	L1	L2	S	SL	OAL	THREAD	ORDER #	
									UNCOATED	ALTiN+
1.050	0.523	0.450	0.070	0.690	0.500	1.88	3.25	0.500-20 UNF-3B	MS33651	MS33651A

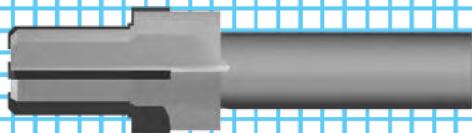
## HARD TO FIND PORT TOOLS CALL FOR AVAILABILITY



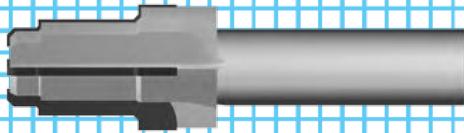
BACU24AB



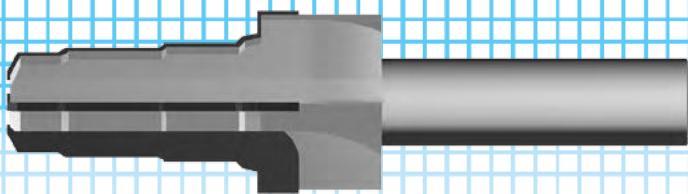
MS20819



MS21922



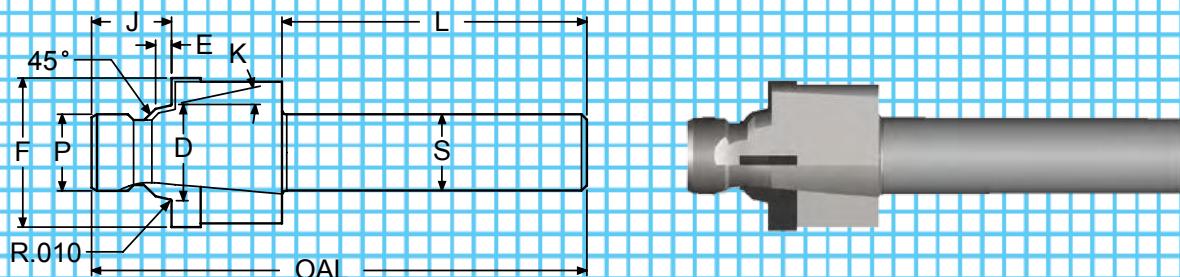
AN818



COMMON CAVITY

Port Tools

# MS16142 (SAEJ1926) (SAEJ514) O-RING BOSS SOLID PILOT - CARBIDE TIPPED

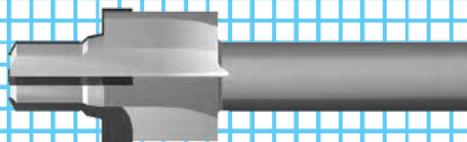
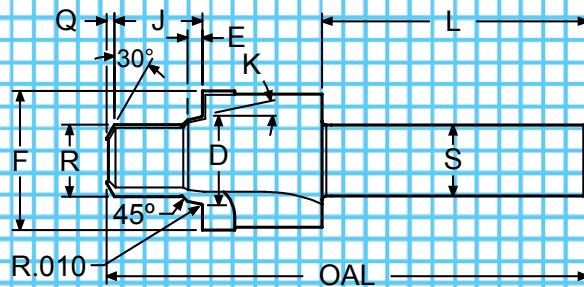


- Ideal for non-standard minor diameter lengths
- Polished flute face for optimum performance
- Often called SAE (followed by port size number)
- ALTiN+ coating for improved surface finish

K	D	E	F	P	J	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #	
												UNCOATED	ALTiN+
12°	0.3605	0.082	0.682	0.270	0.365	2.00	0.500	3.00	3	0.125	0.312-24 UNF-2B	MS16142-2S	MS16142-2SA
12°	0.4235	0.082	0.760	0.331	0.415	2.00	0.500	3.00	3	0.188	0.375-24 UNF-2B	MS16142-3S	MS16142-3SA
12°	0.4895	0.101	0.838	0.385	0.445	2.00	0.500	3.12	3	0.250	0.437-20 UNF-2B	MS16142-4S	MS16142-4SA
12°	0.5525	0.101	0.916	0.448	0.465	2.00	0.500	3.12	4	0.312	0.500-20 UNF-2B	MS16142-5S	MS16142-5SA
12°	0.6185	0.105	0.979	0.504	0.495	2.00	0.500	3.25	4	0.375	0.562-18 UNF-2B	MS16142-6S	MS16142-6SA
15°	0.8135	0.108	1.198	0.685	0.560	2.12	0.750	3.57	4	0.500	0.750-16 UNF-2B	MS16142-8S	MS16142-8SA
15°	0.9445	0.108	1.354	0.801	0.610	2.12	0.750	3.66	4	0.625	0.875-14 UNF-2B	MS16142-10S	MS16142-10SA
15°	1.1505	0.138	1.635	0.975	0.640	2.12	0.750	3.75	4	0.750	1.062-12 UN-2B	MS16142-12S	MS16142-12SA
15°	1.2755	0.138	1.775	1.101	0.710	2.25	1.000	4.00	4	0.875	1.187-12 UN-2B	MS16142-14S	MS16142-14SA
15°	1.4005	0.138	1.920	1.225	0.710	2.25	1.000	4.05	4	1.000	1.312-12 UN-2B	MS16142-16S	MS16142-16SA
15°	1.7155	0.140	2.280	1.537	0.750	2.25	1.000	4.20	4	1.250	1.625-12 UN-2B	MS16142-20S	MS16142-20SA
15°	1.9645	0.140	2.570	1.787	0.750	2.25	1.000	4.20	4	1.500	1.875-12 UN-2B	MS16142-24S	MS16142-24SA
15°	2.5895	0.140	3.490	2.412	0.800	2.50	1.250	4.60	4	2.000	2.500-12 UN-2B	MS16142-32S	MS16142-32SA

Thread mills available. See pages 9-17.

# MS16142 (SAEJ1926) (SAEJ514) O-RING BOSS REAMER PILOT - CARBIDE TIPPED

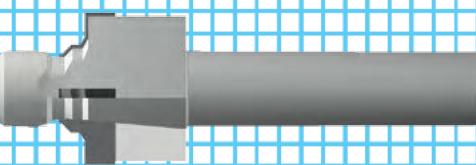
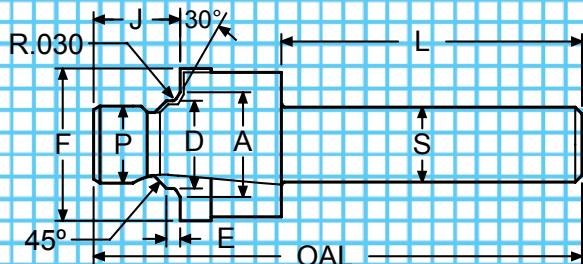


- Reams minor-thread diameter to size
- Precision ground for maximum concentricity
- Often called SAE (followed by port size number)
- ALTiN+ coating extends tool life

K	D	E	F	R	J	Q	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #	
													UNCOATED	ALTiN+
12°	0.3605	0.082	0.682	0.271	0.479	0.032	1.75	0.500	3.00	3	0.125	0.312-24 UNF-2B	MS16142-2R	MS16142-2RA
12°	0.4235	0.082	0.760	0.333	0.479	0.040	1.75	0.500	3.00	3	0.188	0.375-24 UNF-2B	MS16142-3R	MS16142-3RA
12°	0.4895	0.101	0.838	0.388	0.558	0.045	1.88	0.500	3.12	3	0.250	0.437-20 UNF-2B	MS16142-4R	MS16142-4RA
12°	0.5525	0.101	0.916	0.450	0.558	0.045	1.88	0.500	3.12	4	0.312	0.500-20 UNF-2B	MS16142-5R	MS16142-5RA
12°	0.6185	0.105	0.979	0.507	0.620	0.055	1.88	0.500	3.38	4	0.375	0.562-18 UNF-2B	MS16142-6R	MS16142-6RA
15°	0.8135	0.108	1.198	0.688	0.699	0.070	2.12	0.750	3.70	4	0.500	0.750-16 UNF-2B	MS16142-8R	MS16142-8RA
15°	0.9445	0.108	1.354	0.804	0.792	0.080	2.12	0.750	3.80	4	0.625	0.875-14 UNF-2B	MS16142-10R	MS16142-10RA
15°	1.1505	0.138	1.635	0.979	0.917	0.080	2.12	0.750	3.94	4	0.750	1.062-12 UN-2B	MS16142-12R	MS16142-12RA
15°	1.2755	0.138	1.775	1.104	0.917	0.090	2.25	1.000	4.21	4	0.875	1.187-12 UN-2B	MS16142-14R	MS16142-14RA
15°	1.4005	0.138	1.920	1.229	0.917	0.090	2.25	1.000	4.25	4	1.000	1.312-12 UN-2B	MS16142-16R	MS16142-16RA
15°	1.7155	0.140	2.280	1.542	0.917	0.095	2.25	1.000	4.35	4	1.250	1.625-12 UN-2B	MS16142-20R	MS16142-20RA
15°	1.9645	0.140	2.570	1.792	0.917	0.095	2.25	1.000	4.54	4	1.500	1.875-12 UN-2B	MS16142-24R	MS16142-24RA
15°	2.5895	0.140	3.490	2.417	0.917	0.095	2.50	1.250	5.15	4	2.000	2.500-12 UN-2B	MS16142-32R	MS16142-32RA

Thread mills available. See pages 9-17.

# MS33649 (AS5202) - SOLID PILOT PORT TOOL CARBIDE TIPPED

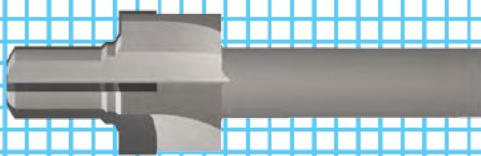
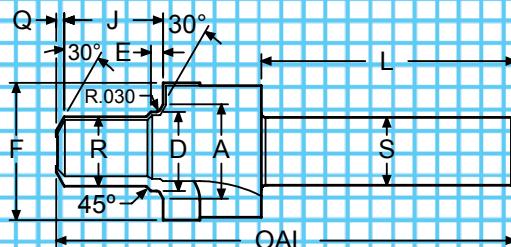


- Ideal for non-standard minor diameter lengths
- Polished flute face for optimum performance
- ALTiN+ coating for improved surface finish
- This port requires a UNJ thread which will specify a larger minor-thread diameter

A	D	E	F	J	P	L	S	OAL	FLUTE SLOTS	TUBE	THREAD	ORDER #	
												UNCOATED	ALTiN+
0.367	0.2665	0.071	0.575	0.345	0.217	2.00	0.500	3.00	3	N/A	0.250-28 UNJF-3B	MS33649-1S	MS33649-1SA
0.446	0.3305	0.071	0.742	0.365	0.274	2.00	0.500	3.00	3	0.125	0.312-24 UNJF-3B	MS33649-2S	MS33649-2SA
0.508	0.3925	0.071	0.805	0.415	0.337	2.00	0.500	3.00	3	0.188	0.375-24 UNJF-3B	MS33649-3S	MS33649-3SA
0.570	0.4565	0.083	0.888	0.445	0.392	2.00	0.500	3.12	4	0.250	0.437-20 UNJF-3B	MS33649-4S	MS33649-4SA
0.633	0.5195	0.083	0.950	0.465	0.454	2.00	0.500	3.12	4	0.312	0.500-20 UNJF-3B	MS33649-5S	MS33649-5SA
0.696	0.5825	0.091	1.012	0.495	0.511	2.00	0.500	3.25	4	0.375	0.562-18 UNJF-3B	MS33649-6S	MS33649-6SA
0.758	0.6455	0.102	1.105	0.495	0.574	2.00	0.500	3.25	4	0.438	0.625-18 UNJF-3B	MS33649-7S	MS33649-7SA
0.883	0.7715	0.102	1.240	0.560	0.692	2.12	0.750	3.57	4	0.500	0.750-16 UNJF-3B	MS33649-8S	MS33649-8SA
0.946	0.8345	0.115	1.300	0.590	0.755	2.12	0.750	3.61	4	0.562	0.812-16 UNJ-3B	MS33649-9S	MS33649-9SA
1.008	0.8985	0.115	1.415	0.610	0.809	2.12	0.750	3.66	4	0.625	0.875-14 UNJF-3B	MS33649-10S	MS33649-10SA
1.164	1.0255	0.133	1.602	0.640	0.923	2.12	0.750	3.75	4	0.688	1.000-12 UNJF-3B	MS33649-11S	MS33649-11SA
1.242	1.0885	0.133	1.665	0.640	0.983	2.12	0.750	3.75	4	0.750	1.062-12 UNJ-3B	MS33649-12S	MS33649-12SA
1.370	1.2135	0.133	1.790	0.710	1.110	2.25	1.000	4.00	4	0.875	1.187-12 UNJ-3B	MS33649-14S	MS33649-14SA
1.495	1.3385	0.133	1.965	0.710	1.233	2.25	1.000	4.05	4	1.000	1.312-12 UNJ-3B	MS33649-16S	MS33649-16SA
1.808	1.6505	0.133	2.310	0.750	1.547	2.25	1.000	4.20	4	1.250	1.625-12 UNJ-3B	MS33649-20S	MS33649-20SA
2.058	1.9005	0.133	2.628	0.750	1.797	2.25	1.000	4.20	4	1.500	1.875-12 UNJ-3B	MS33649-24S	MS33649-24SA
2.433	2.2755	0.133	3.050	0.800	2.172	2.25	1.250	4.50	4	1.750	2.250-12 UNJ-3B	MS33649-28S	MS33649-28SA
2.683	2.5265	0.133	3.520	0.800	2.422	2.50	1.250	4.60	4	2.000	2.500-12 UNJ-3B	MS33649-32S	MS33649-32SA

Thread mills available. See pages 9-17.

# MS33649 (AS5202) - REAMER PILOT PORT TOOL CARBIDE TIPPED

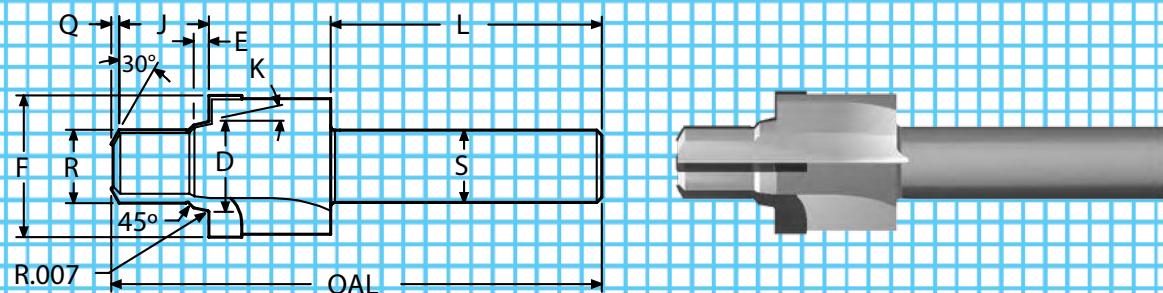


- Reams minor-thread diameter to size
- ALTIN+ coated tool for higher cutting speed
- Precision ground for maximum concentricity
- This port requires a UNJ thread which specifies a larger minor-thread diameter

A	D	E	F	J	Q	R	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #	
													UNCOATED	ALTIN+
Solid Carbide														
0.367	0.2665	0.071	0.575	0.425	0.025	0.219	2.00	0.500	3.00	3	N/A	0.250-28 UNJF-3B	MS33649-1R	MS33649-1RA
0.446	0.3305	0.071	0.742	0.597	0.032	0.276	1.75	0.500	3.00	3	0.125	0.312-24 UNJF-3B	Carbide Tipped	
0.508	0.3925	0.071	0.805	0.603	0.040	0.339	1.75	0.500	3.00	3	0.188	0.375-24 UNJF-3B	MS33649-2R	MS33649-2RA
0.570	0.4565	0.083	0.888	0.676	0.040	0.393	1.88	0.500	3.12	4	0.250	0.437-20 UNJF-3B	MS33649-3R	MS33649-3RA
0.633	0.5195	0.083	0.950	0.676	0.045	0.455	1.88	0.500	3.12	4	0.312	0.500-20 UNJF-3B	MS33649-4R	MS33649-4RA
0.696	0.5825	0.091	1.012	0.729	0.060	0.513	1.88	0.500	3.38	4	0.375	0.562-18 UNJF-3B	MS33649-5R	MS33649-5RA
0.758	0.6455	0.102	1.105	0.745	0.060	0.575	1.88	0.500	3.38	4	0.438	0.625-18 UNJF-3B	MS33649-6R	MS33649-6RA
0.883	0.7715	0.102	1.240	0.854	0.070	0.693	2.12	0.750	3.84	4	0.500	0.750-16 UNJF-3B	MS33649-7R	MS33649-7RA
0.946	0.8345	0.115	1.300	0.870	0.070	0.758	2.12	0.750	3.84	4	0.562	0.812-16 UNJ-3B	MS33649-8R	MS33649-8RA
1.008	0.8985	0.115	1.415	0.950	0.080	0.810	2.12	0.750	3.94	4	0.625	0.875-14 UNJF-3B	MS33649-9R	MS33649-9RA
1.164	1.0255	0.133	1.500	1.084	0.080	0.925	2.12	0.750	4.12	4	0.688	1.000-12 UNJF-3B	MS33649-10R	MS33649-10RA
1.242	1.0885	0.133	1.665	1.084	0.080	0.985	2.12	0.750	4.12	4	0.750	1.062-12 UNJ-3B	MS33649-11R	MS33649-11RA
1.370	1.2135	0.133	1.790	1.084	0.090	1.112	2.25	1.000	4.37	4	0.875	1.187-12 UNJ-3B	MS33649-12R	MS33649-12RA
1.495	1.3385	0.133	1.965	1.084	0.090	1.235	2.25	1.000	4.37	4	1.000	1.312-12 UNJ-3B	MS33649-14R	MS33649-14RA
1.683	1.5265	0.133	2.090	1.136	0.090	1.425	2.25	1.000	4.53	4	1.125	1.500-12 UNJF-3B	MS33649-16R	MS33649-16RA
1.808	1.6505	0.133	2.310	1.136	0.090	1.549	2.25	1.000	4.54	4	1.250	1.625-12 UNJ-3B	MS33649-18R	MS33649-18RA
2.058	1.9005	0.133	2.628	1.147	0.095	1.799	2.25	1.000	4.54	4	1.500	1.875-12 UNJ-3B	MS33649-20R	MS33649-20RA
2.433	2.2755	0.133	3.050	1.263	0.095	2.174	2.50	1.250	4.92	4	1.750	2.250-12 UNJ-3B	MS33649-24R	MS33649-24RA
2.683	2.5265	0.133	3.520	1.388	0.095	2.424	2.50	1.250	5.15	4	2.000	2.500-12 UNJ-3B	MS33649-28R	MS33649-28RA
													MS33649-32R	MS33649-32RA

Thread mills available. See pages 9-17.

# IS06149-1 (SAEJ2244-1) METRIC PORT TOOL CARBIDE TIPPED

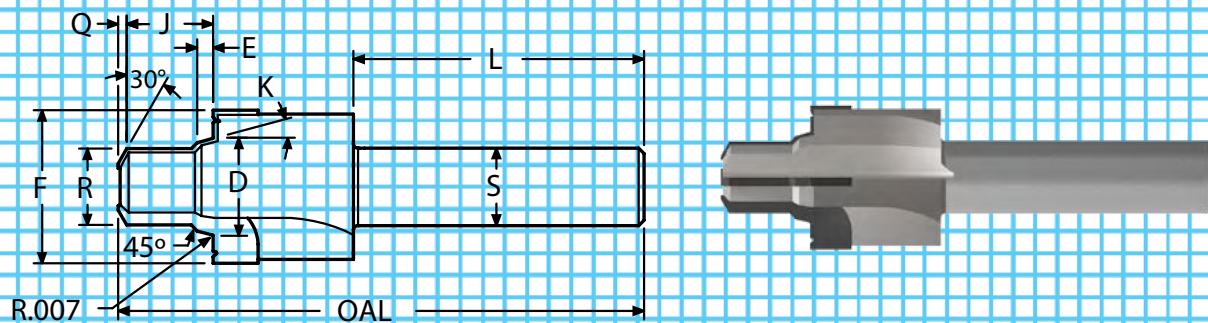


- Bodies are made with heat treated alloy steel
- Polished flute face for optimum performance
- Carbide inserts are made with premium submicron carbide
- ALTIN+ coated for improved surface finish

K (deg)	D (mm)	E (mm)	F (mm)	R (mm)	J (mm)	Q (inch)	L (inch)	S (inch)	OAL (inch)	FLUTES	THREAD	ORDER #	
												UNCOATED	ALTIN+
12°	9.15	1.8	14.1	7.0	11.6	0.032	1.75	0.500	3.00	3	M8X1	6149-M8X1	6149-M8X1A
12°	11.15	1.8	16.1	9.0	11.6	0.045	1.75	0.500	3.00	3	M10X1	6149-M10X1	6149-M10X1A
15°	13.85	2.6	19.1	10.5	14.1	0.045	1.88	0.500	3.12	3	M12X1.5	6149-M12X1.5	6149-M12X1.5A
15°	15.85	2.6	21.1	12.5	14.1	0.055	1.88	0.500	3.38	4	M14X1.5	6149-M14X1.5	6149-M14X1.5A
15°	17.85	2.6	24.1	14.5	15.6	0.060	1.88	0.500	3.38	4	M16X1.5	6149-M16X1.5	6149-M16X1.5A
15°	19.85	2.6	26.1	16.5	17.1	0.070	2.12	0.750	3.70	4	M18X1.5	6149-M18X1.5	6149-M18X1.5A
15°	21.85	2.6	27.1	18.5	17.5	0.080	2.12	0.750	3.75	4	M20X1.5	6149-M20X1.5	6149-M20X1.5A
15°	23.85	2.6	29.1	20.5	18.1	0.080	2.12	0.750	3.80	4	M22X1.5	6149-M22X1.5	6149-M22X1.5A
15°	29.45	3.3	34.2	25.0	22.1	0.080	2.12	0.750	3.94	4	M27X2.0	6149-M27X2.0	6149-M27X2.0A
15°	35.45	3.3	43.1	31.0	22.1	0.090	2.25	1.000	4.25	4	M33X2.0	6149-M33X2.0	6149-M33X2.0A
15°	44.45	3.3	52.1	40.0	22.6	0.090	2.25	1.000	4.35	4	M42X2.0	6149-M42X2.0	6149-M42X2.0A
15°	50.45	3.3	57.1	46.0	25.1	0.095	2.25	1.000	4.35	4	M48X2.0	6149-M48X2.0	6149-M48X2.0A
15°	62.45	3.3	67.1	58.0	27.6	0.095	2.25	1.250	4.35	4	M60X2.0	6149-M60X2.0	6149-M60X2.0A

Thread mills available. See pages 23-27.

# ISO6149-1 (SAEJ2244-1) METRIC PORT TOOL WITH ID NOTCH - CARBIDE TIPPED

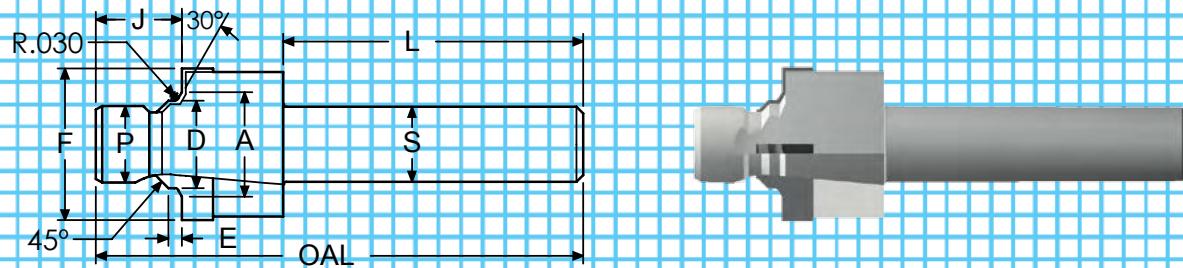


- Metric port with identification notch
- Polished flute face for optimum performance
- Precision ground for maximum concentricity
- ALTiN+ coating extends tool life

K (deg)	D (mm)	E (mm)	F (mm)	R (mm)	J (mm)	Q (inch)	L (inch)	S (inch)	OAL (inch)	FLUTES	THREAD	ORDER #	
												UNCOATED	ALTiN+
12°	9.15	1.8	17.1	7.0	11.6	0.032	1.75	0.500	3.00	3	M8X1	6149-M8X1-ID	6149-M8X1-IDA
12°	11.15	1.8	20.1	9.0	11.6	0.045	1.75	0.500	3.00	3	M10X1	6149-M10X1-ID	6149-M10X1-IDA
15°	13.85	2.6	23.1	10.5	14.1	0.045	1.88	0.500	3.12	3	M12X1.5	6149-M12X1.5-ID	6149-M12X1.5-IDA
15°	15.85	2.6	25.1	12.5	14.1	0.055	1.88	0.500	3.38	4	M14X1.5	6149-M14X1.5-ID	6149-M14X1.5-IDA
15°	17.85	2.6	28.1	14.5	15.6	0.060	1.88	0.500	3.38	4	M16X1.5	6149-M16X1.5-ID	6149-M16X1.5-IDA
15°	19.85	2.6	30.1	16.5	17.1	0.070	2.12	0.750	3.70	4	M18X1.5	6149-M18X1.5-ID	6149-M18X1.5-IDA
15°	21.85	2.6	32.1	18.5	17.5	0.080	2.12	0.750	3.75	4	M20X1.5	6149-M20X1.5-ID	6149-M20X1.5-IDA
15°	23.85	2.6	34.1	20.5	18.1	0.080	2.12	0.750	3.80	4	M22X1.5	6149-M22X1.5-ID	6149-M22X1.5-IDA
15°	29.45	3.3	40.1	25.0	22.1	0.080	2.12	0.750	3.94	4	M27X2.0	6149-M27X2.0-ID	6149-M27X2.0-IDA
15°	35.45	3.3	49.1	31.0	22.1	0.090	2.25	1.000	4.25	4	M33X2.0	6149-M33X2.0-ID	6149-M33X2.0-IDA
15°	44.45	3.3	60.1	40.0	22.6	0.090	2.25	1.000	4.35	4	M42X2.0	6149-M42X2.0-ID	6149-M42X2.0-IDA
15°	50.45	3.3	66.1	46.0	25.1	0.095	2.25	1.000	4.35	4	M48X2.0	6149-M48X2.0-ID	6149-M48X2.0-IDA
15°	62.45	3.3	76.1	58.0	27.6	0.095	2.25	1.250	4.35	4	M60X2.0	6149-M60X2.0-ID	6149-M60X2.0-IDA

Thread mills available. See pages 23-27.

# AND10050 - SOLID PILOT PORT TOOL CARBIDE TIPPED

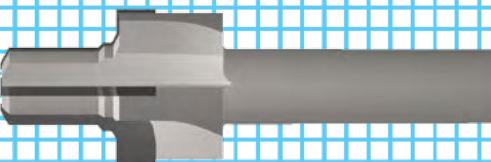
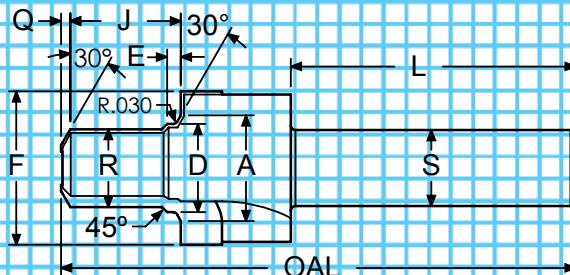


- Bodies made with heat treated alloy steel
- Ideal for non-standard minor-thread diameter lengths
- ALTiN+ coating for improved surface finish
- Carbide inserts made with premium submicron carbide

A	D	E	F	J	P	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #	
												UNCOATED	ALTiN+
0.446	0.3305	0.071	0.742	0.365	0.270	2.00	0.500	3.00	3	0.125	0.312-24 UNF-3B	AND10050-2S	AND10050-2SA
0.508	0.3925	0.071	0.805	0.415	0.331	2.00	0.500	3.00	3	0.188	0.375-24 UNF-3B	AND10050-3S	AND10050-3SA
0.570	0.4565	0.083	0.888	0.445	0.385	2.00	0.500	3.12	4	0.250	0.437-20 UNF-3B	AND10050-4S	AND10050-4SA
0.633	0.5195	0.083	0.950	0.465	0.448	2.00	0.500	3.12	4	0.312	0.500-20 UNF-3B	AND10050-5S	AND10050-5SA
0.696	0.5825	0.091	1.012	0.495	0.504	2.00	0.500	3.25	4	0.375	0.562-18 UNF-3B	AND10050-6S	AND10050-6SA
0.883	0.7715	0.102	1.240	0.560	0.685	2.12	0.750	3.57	4	0.500	0.750-16 UNF-3B	AND10050-8S	AND10050-8SA
1.008	0.8985	0.115	1.415	0.590	0.801	2.12	0.750	3.66	4	0.625	0.875-14 UNF-3B	AND10050-10S	AND10050-10SA
1.242	1.0885	0.133	1.665	0.640	0.975	2.12	0.750	3.75	4	0.750	1.062-12 UN-3B	AND10050-12S	AND10050-12SA
1.495	1.3385	0.133	1.965	0.710	1.225	2.25	1.000	4.05	4	1.000	1.312-12 UN-3B	AND10050-16S	AND10050-16SA
1.808	1.6505	0.133	2.310	0.750	1.537	2.25	1.000	4.20	4	1.250	1.625-12 UN-3B	AND10050-20S	AND10050-20SA
2.058	1.9005	0.133	2.628	0.750	1.787	2.25	1.000	4.20	4	1.500	1.875-12 UN-3B	AND10050-24S	AND10050-24SA
2.433	2.2755	0.133	3.050	0.800	2.162	2.50	1.250	4.50	4	1.750	2.250-12 UN-3B	AND10050-28S	AND10050-28SA
2.683	2.5265	0.133	3.520	0.800	2.412	2.50	1.250	4.60	4	2.000	2.500-12 UN-3B	AND10050-32S	AND10050-32SA

Thread mills available. See pages 9-17.

# AND10050 - REAMER PILOT PORT TOOL CARBIDE TIPPED

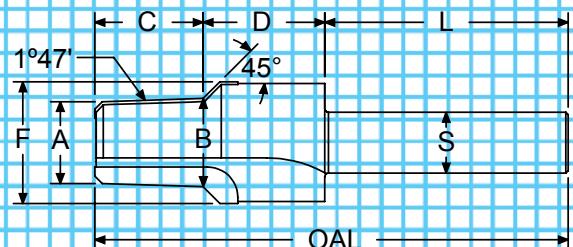


- Reams the minor-thread diameter to size
- Bodies made with head treated alloy steel
- Bodies made with heat treated alloy steel
- ALTiN+ coating extends tool life

A	D	E	F	J	R	Q	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #	
													UNCOATED	ALTiN+
0.446	0.3305	0.071	0.742	0.520	0.271	0.032	1.75	0.500	3.00	3	0.125	0.312-24 UNF-3B	AND10050-2R	AND10050-2RA
0.508	0.3925	0.071	0.805	0.520	0.333	0.040	1.75	0.500	3.00	3	0.188	0.375-24 UNF-3B	AND10050-3R	AND10050-3RA
0.570	0.4565	0.083	0.888	0.610	0.386	0.045	1.88	0.500	3.12	4	0.250	0.437-20 UNF-3B	AND10050-4R	AND10050-4RA
0.633	0.5195	0.083	0.950	0.610	0.449	0.045	1.88	0.500	3.12	4	0.312	0.500-20 UNF-3B	AND10050-5R	AND10050-5RA
0.696	0.5825	0.091	1.012	0.630	0.506	0.060	1.88	0.500	3.38	4	0.375	0.562-18 UNF-3B	AND10050-6R	AND10050-6RA
0.883	0.7715	0.102	1.240	0.738	0.686	0.070	2.12	0.750	3.70	4	0.500	0.750-16 UNF-3B	AND10050-8R	AND10050-8RA
1.008	0.8985	0.115	1.415	0.801	0.802	0.080	2.12	0.750	3.80	4	0.625	0.875-14 UNF-3B	AND10050-10R	AND10050-10RA
1.242	1.0885	0.133	1.665	0.926	0.976	0.080	2.12	0.750	3.94	4	0.750	1.062-12 UN-3B	AND10050-12R	AND10050-12RA
1.495	1.3385	0.133	1.965	0.958	1.226	0.080	2.25	1.000	4.25	4	1.000	1.312-12 UN-3B	AND10050-16R	AND10050-16RA
1.808	1.6505	0.133	2.310	1.004	1.538	0.090	2.25	1.000	4.35	4	1.250	1.625-12 UN-3B	AND10050-20R	AND10050-20RA
2.058	1.9005	0.133	2.628	1.145	1.788	0.095	2.25	1.000	4.54	4	1.500	1.875-12 UN-3B	AND10050-24R	AND10050-24RA
2.433	2.2755	0.133	3.050	1.260	2.163	0.095	2.50	1.250	4.92	4	1.750	2.250-12 UN-3B	AND10050-28R	AND10050-28RA
2.683	2.5265	0.133	3.520	1.395	2.413	0.095	2.50	1.250	5.15	4	2.000	2.500-12 UN-3B	AND10050-32R	AND10050-32RA

Thread mills available. See pages 9-17.

# TAPERED PIPE REAMERS (NPT) - CARBIDE TIPPED

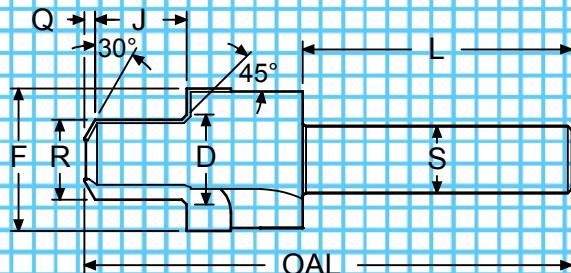


- Reams minor thread diameter on a taper
- Cuts 45° chamfer for easy threading
- ALTiN+ coating for higher cutting speed
- Carbide inserts made with premium submicron carbide

A	B	C	D	F	L	S	OAL	FLUTES	THREAD	ORDER #	
										UNCOATED	ALTiN+
0.318	0.347	0.467	0.625	0.625	1.50	0.500	2.60	3	1/8-27NPT	PRSS-01	PRSS-01A
0.409	0.450	0.655	0.750	0.750	1.50	0.500	2.91	3	1/4-18NPT	PRSS-02	PRSS-02A
0.543	0.586	0.687	0.750	0.875	2.00	0.500	3.44	3	3/8-18NPT	PRSS-03	PRSS-03A
0.670	0.725	0.875	1.000	1.000	2.00	0.500	3.88	3	1/2-14NPT	PRSS-04	PRSS-04A
0.882	0.937	0.875	1.250	1.250	2.50	1.000	4.62	5	3/4-14NPT	PRSS-05	PRSS-05A
1.107	1.173	1.060	1.500	1.500	2.50	1.000	5.06	5	1-11.5NPT	PRSS-06	PRSS-06A
1.448	1.518	1.125	1.500	1.875	3.00	1.250	5.62	5	1 1/4-11.5NPT	PRSS-07	PRSS-07A
1.687	1.757	1.125	1.750	2.125	3.00	1.250	5.88	5	1 1/2-11.5NPT	PRSS-08	PRSS-08A
2.154	2.230	1.220	2.000	2.625	3.00	1.250	6.22	5	2-11.5NPT	PRSS-09	PRSS-09A
2.561	2.670	1.750	2.000	3.125	3.00	1.250	6.75	5	2 1/2-8NPT	PRSS-10	PRSS-10A
3.180	3.296	1.875	2.000	3.750	3.00	1.250	6.88	5	3-8NPT	PRSS-11	PRSS-11A

Thread mills available. See pages 18-20.

# BRITISH STANDARD PARALLEL PIPE - PORT TOOL CARBIDE TIPPED

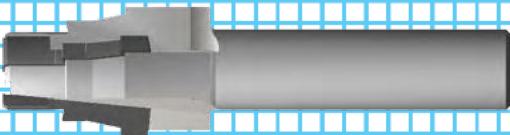
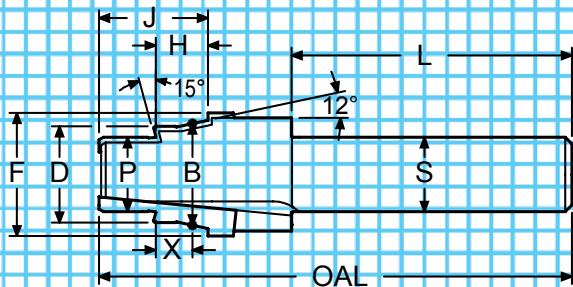


- ALTiN+ coating for improved surface finish
- Polished flute face for optimum performance
- Precision ground for maximum concentricity
- Bodies made with head treated alloy steel

D	F	J	R	Q	L	S	OAL	FLUTES	THREAD	ORDER #	
										UNCOATED	ALTiN+
0.398	0.719	0.565	0.345	0.045	2.00	0.500	3.62	3	1/8 BSPP	PT-BSPP-1/8	PT-BSPP-1/8A
0.533	0.938	0.683	0.459	0.065	2.00	0.500	3.62	3	1/4 BSPP	PT-BSPP-1/4	PT-BSPP-1/4A
0.671	1.063	0.683	0.597	0.080	2.00	0.500	3.62	4	3/8 BSPP	PT-BSPP-3/8	PT-BSPP-3/8A
0.840	1.250	0.801	0.741	0.090	2.00	0.750	3.62	4	1/2 BSPP	PT-BSPP-1/2	PT-BSPP-1/2A
1.055	1.500	0.880	0.958	0.120	2.50	0.750	4.37	4	3/4 BSPP	PT-BSPP-3/4	PT-BSPP-3/4A
1.325	1.875	0.998	1.201	0.120	2.50	1.000	4.62	4	1.0 BSPP	PT-BSPP-1.0	PT-BSPP-1.0A
1.665	2.313	1.078	1.541	0.125	2.50	1.000	4.62	4	1 1/4 BSPP	PT-BSPP-1-1/4	PT-BSPP-1-1/4A
1.897	2.563	1.078	1.774	0.125	2.50	1.000	4.88	4	1 1/2 BSPP	PT-BSPP-1-1/2	PT-BSPP-1-1/2A

Thread mills available. See page 21.

# MS33514 (AS33514) - PORT TOOL CARBIDE

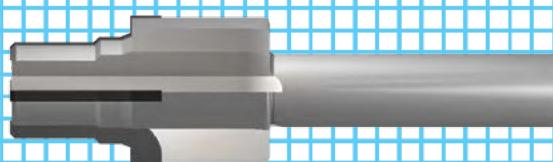
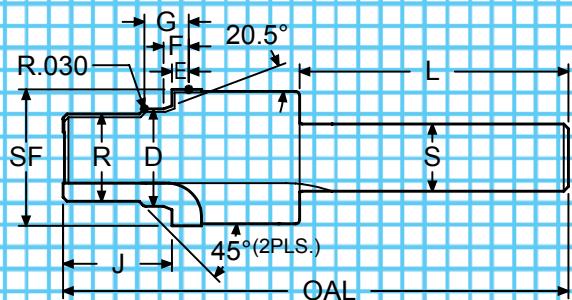


- Meets the requirements of the MS33515
- Precision ground for maximum conicity
- ALTiN+ coating for higher cutting speed
- Polished flute face for optimum performance

B	D	F	H	J	P	X	L	S	OAL	FLUTE S	TUBE	THREAD	ORDER #	
													UNCOATED	ALTiN+
Solid Carbide														
0.163	0.137	0.300	0.188	0.380	0.091	0.128	2.00	0.375	3.00	3	0.125	0.312-24 UNJF-3A	MS33514-2	MS33514-2A
0.234	0.198	0.375	0.234	0.460	0.123	0.158	2.00	0.375	3.00	3	0.188	0.375-24 UNJF-3A	MS33514-3	MS33514-3A
0.293	0.263	0.415	0.234	0.460	0.185	0.174	2.00	0.500	3.00	3	0.250	0.437-20 UNJF-3A	MS33514-4	MS33514-4A
0.356	0.326	0.475	0.250	0.480	0.232	0.190	2.00	0.500	3.00	3	0.312	0.500-20 UNJF-3A	MS33514-5	MS33514-5A
0.416	0.388	0.530	0.250	0.480	0.295	0.193	2.00	0.500	3.00	3	0.375	0.562-18 UNJF-3A	MS33514-6	MS33514-6A
Carbide Tipped														
0.560	0.516	0.690	0.305	0.675	0.420	0.210	1.88	0.500	3.00	3	0.500	0.750-16 UNJF-3A	MS33514-8	MS33514-8A
0.686	0.643	0.825	0.350	0.725	0.498	0.255	1.88	0.500	3.15	3	0.625	0.875-14 UNJF-3A	MS33514-10	MS33514-10A
0.810	0.768	1.000	0.350	0.775	0.654	0.253	1.88	0.500	3.23	3	0.750	1.062-12 UNJ-3A	MS33514-12	MS33514-12A
1.062	1.018	1.250	0.415	0.915	0.873	0.322	2.00	0.750	3.50	4	1.000	1.312-12 UNJ-3A	MS33514-16	MS33514-16A
1.316	1.272	1.560	0.415	0.925	1.091	0.325	2.00	0.750	3.62	4	1.250	1.625-12 UNJ-3A	MS33514-20	MS33514-20A
1.565	1.522	1.800	0.485	0.925	1.342	0.390	2.12	1.000	3.82	4	1.500	1.875-12 UNJ-3A	MS33514-24	MS33514-24A
2.068	2.024	2.400	0.485	0.925	1.811	0.395	2.25	1.000	4.09	4	2.000	2.500-12 UNJ-3A	MS33514-32	MS33514-32A

Thread mills available. See page 7.

# RPT (AS1300) (PS10035) - ROSAN CAVITY PORT TOOL CARBIDE TIPPED

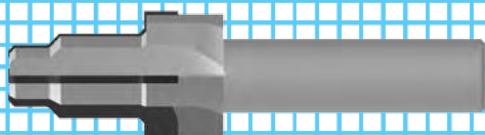
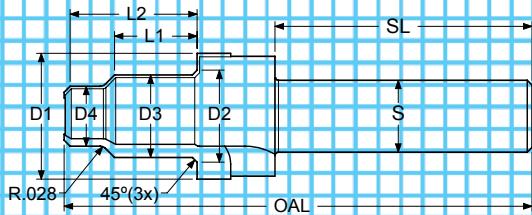


- Polished flute face for optimum performance
- Precision ground for maximum concentricity
- Bodies made with heat-treated alloy steel
- ALTiN+ coating extends tool life

D	E	F	G	J	R	SF	L	S	OAL	FLUTES	TUBE	THREAD	ORDER #	
													UNCOATED	ALTiN+
Solid Carbide														
0.255	0.093	0.1555	0.2985	0.610	0.184	0.382	2.00	0.375	3.50	3	0.125	0.216-28 UNJF-3B	RPT-2	RPT-2A
0.287	0.093	0.1555	0.2985	0.670	0.218	0.449	2.00	0.500	4.00	3	0.188	0.250-28 UNJF-3B	RPT-3	RPT-3A
0.340	0.093	0.1555	0.2985	0.700	0.275	0.496	2.00	0.500	4.00	3	0.250	0.312-24 UNJF-3B	RPT-4	RPT-4A
Carbide Tipped														
0.402	0.093	0.1555	0.2985	0.725	0.337	0.602	2.00	0.500	3.48	3	0.312	0.375-24 UNJF-3B	RPT-5	RPT-5A
0.465	0.108	0.1705	0.3135	0.785	0.392	0.676	2.00	0.500	3.53	4	0.375	0.437-20 UNJF-3B	RPT-6	RPT-6A
0.583	0.108	0.1705	0.3135	0.850	0.511	0.785	2.00	0.500	3.85	4	0.500	0.562-18 UNJF-3B	RPT-8	RPT-8A
0.726	0.108	0.1705	0.3135	0.810	0.650	1.016	2.00	0.500	3.81	4	0.625	0.687-24 UNJEF-3B	RPT-10	RPT-10A
0.900	0.108	0.1705	0.3455	0.950	0.767	1.140	2.00	0.750	4.20	4	0.750	0.812-20 UNJEF-3B	RPT-12	RPT-12A
1.163	0.108	0.1705	0.3455	1.015	1.073	1.428	2.00	0.750	4.26	4	1.000	1.125-18 UNJEF-3B	RPT-16	RPT-16A
1.388	0.135	0.1975	0.3775	1.020	1.261	1.751	2.00	0.750	4.52	4	1.250	1.312-18 UNJEF-3B	RPT-20	RPT-20A

Thread mills available. See pages 9-17.

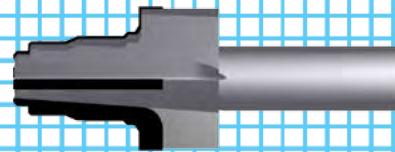
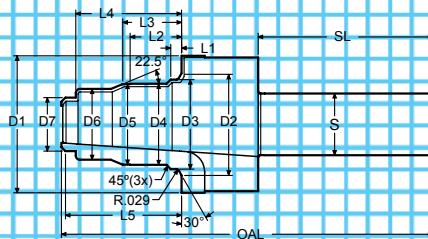
# MS21921 - PORT TOOL - CARBIDE TIPPED



D1	D2	D3	D4	L1	L2	S	SL	OAL	FLUTES	TUBE	THREAD	ORDER #	
												UNCOATED	ALTiN+
0.400	0.328	0.277	0.173	0.425	0.570	0.500	1.75	3.00	3	0.125	0.312-24 UNJF-3B	MS21921-2	MS21921-2A
0.475	0.391	0.338	0.234	0.429	0.625	0.500	1.75	3.00	3	0.187	0.375-24 UNJF-3B	MS21921-3	MS21921-3A
0.600	0.460	0.393	0.302	0.547	0.760	0.500	1.75	3.25	3	0.250	0.437-20 UNJF-3B	MS21921-4	MS21921-4A
0.675	0.520	0.455	0.368	0.562	0.800	0.500	1.75	3.25	3	0.312	0.500-20 UNJF-3B	MS21921-5	MS21921-5A
0.750	0.582	0.513	0.427	0.578	0.840	0.625	1.75	3.25	4	0.375	0.562-18 UNJF-3B	MS21921-6	MS21921-6A
0.900	0.770	0.693	0.554	0.609	0.900	0.625	1.75	3.50	4	0.500	0.750-16 UNJF-3B	MS21921-8	MS21921-8A
1.050	0.895	0.810	0.692	0.687	1.020	0.750	2.00	3.75	4	0.625	0.875-14 UNJF-3B	MS21921-10	MS21921-10A
1.300	1.082	0.987	0.828	0.687	1.040	0.750	2.13	4.00	4	0.750	1.062-12 UNJF-3B	MS21921-12	MS21921-12A
1.550	1.332	1.236	1.076	0.687	1.090	1.000	2.25	4.25	4	1.000	1.312-12 UNJF-3B	MS21921-16	MS21921-16A

Thread mills available. See pages 9-17.

# BACD2036 - PORT TOOL - CARBIDE TIPPED

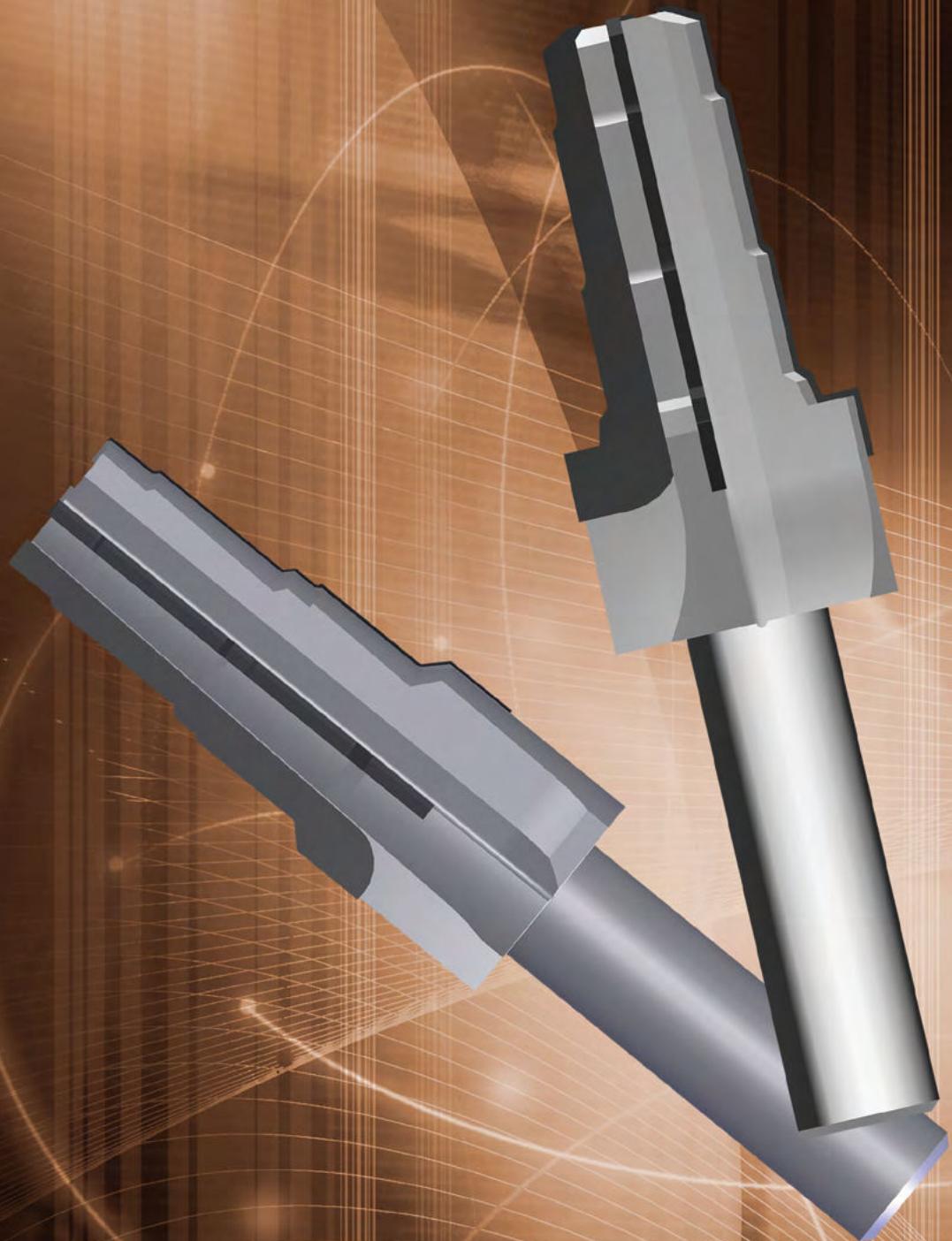


D1	D2	D3	D4	D5	D6	D7	L1	L2	L3	L4	L5	S	SL	OAL	FLUTES	THREAD	ORDER #	
																	UNCOATED	ALTiN+
0.888	0.570	0.4565	0.392	0.387	0.2945	0.170	0.083	0.425	0.480	0.971	1.071	0.500	2.00	4.00	3	0.437-20 UNJF-3B	BACD2036-4	BACD2036-4A
1.012	0.696	0.5825	0.512	0.507	0.4195	0.280	0.091	0.450	0.505	1.004	1.104	0.500	2.00	4.00	3	0.562-18 UNJF-3B	BACD2036-6	BACD2036-6A
1.290	0.883	0.7715	0.693	0.688	0.6110	0.400	0.104	0.545	0.605	1.144	1.244	0.750	2.13	4.25	4	0.750-18 UNJF-3B	BACD2036-8	BACD2036-8A
1.415	1.008	0.8985	0.810	0.804	0.7330	0.490	0.115	0.600	0.665	1.215	1.340	0.750	2.13	4.50	4	0.875-14 UNJF-3B	BACD2036-10	BACD2036-10A
1.665	1.242	1.0885	0.985	0.980	0.8610	0.650	0.133	0.625	0.715	1.287	1.412	0.750	2.13	4.50	4	1.062-12 UNJF-3B	BACD2036-12	BACD2036-12A
1.965	1.495	1.3385	1.235	1.230	1.1140	0.825	0.133	0.665	0.755	1.392	1.517	1.000	2.13	4.50	4	1.312-16 UNJF-3B	BACD2036-16	BACD2036-16A

Thread mills available. See pages 9-17.



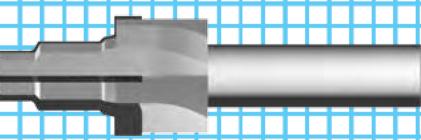
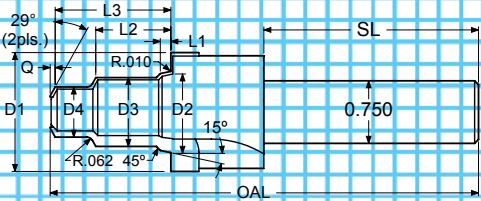
# CAVITY TOOLS



**Hydraforce Rougher**  
**Hydraforce Finisher**  
**Sun Cavity Rougher**  
**Sun Cavity Finisher**

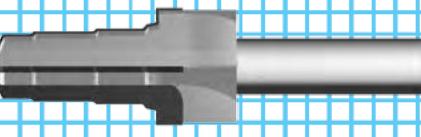
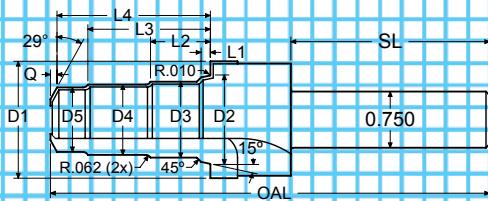
# HYDRAFORCE CARTRIDGE VALVE TOOLS

## 4 FLUTE ROUGHER - CARBIDE TIPPED



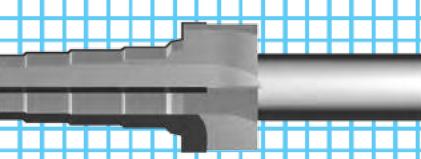
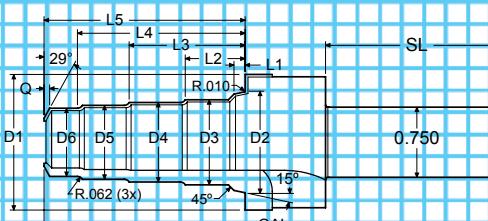
### TWO WAY CAVITY

D1	D2	D3	D4	L1	L2	L3	Q	OAL	SL	ORDER #	
										UNCOATED	ALTIN+
1.163	0.788	0.663	0.476	0.108	0.750	1.156	0.045	4.00	2.00	VC08-2-ROUGH	VC08-2-ROUGH-A
1.163	0.920	0.787	0.601	0.108	0.932	1.312	0.060	4.00	2.00	VC10-2-ROUGH	VC10-2-ROUGH-A
1.475	1.125	0.952	0.851	0.138	1.400	1.920	0.075	5.25	2.25	VC12-2-ROUGH	VC12-2-ROUGH-A
1.725	1.376	1.209	1.102	0.138	1.344	1.844	0.075	5.50	2.25	VC16-2-ROUGH	VC16-2-ROUGH-A



### THREE WAY CAVITY

D1	D2	D3	D4	D5	L1	L2	L3	L4	Q	OAL	SL	ORDER #	
												UNCOATED	ALTIN+
1.163	0.788	0.663	0.601	0.538	0.108	0.718	1.270	1.703	0.060	5.00	2.12	VC08-3-ROUGH	VC08-3-ROUGH-A
1.163	0.920	0.787	0.664	0.601	0.108	0.860	1.500	1.875	0.050	5.00	2.12	VC10-3-ROUGH	VC10-3-ROUGH-A
1.475	1.125	0.950	0.913	0.851	0.138	1.400	2.370	2.890	0.070	6.25	2.12	VC12-3-ROUGH	VC12-3-ROUGH-A
1.725	1.376	1.209	1.102	1.039	0.138	1.344	2.469	2.968	0.065	6.25	2.12	VC16-3-ROUGH	VC16-3-ROUGH-A

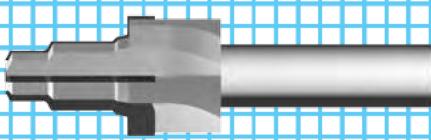
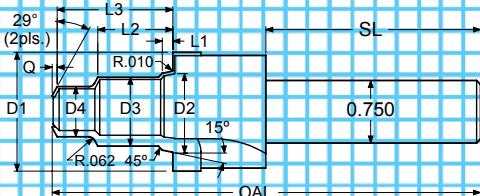


### FOUR WAY CAVITY

D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	Q	OAL	SL	ORDER #	
														UNCOATED	ALTIN+
1.163	0.788	0.663	0.601	0.538	0.476	0.108	0.718	1.270	1.830	2.210	0.050	5.50	2.12	VC08-4-ROUGH	VC08-4-ROUGH-A
1.163	0.920	0.787	0.726	0.664	0.601	0.108	0.870	1.500	2.125	2.500	0.045	5.50	2.12	VC10-4-ROUGH	VC10-4-ROUGH-A
1.475	1.125	0.950	0.913	0.851	0.788	0.138	1.400	2.370	3.330	3.860	0.070	7.00	2.25	VC12-4-ROUGH	VC12-4-ROUGH-A
1.725	1.376	1.209	1.102	1.039	0.977	0.138	1.344	2.469	3.594	4.094	0.070	7.25	2.25	VC16-4-ROUGH	VC16-4-ROUGH-A

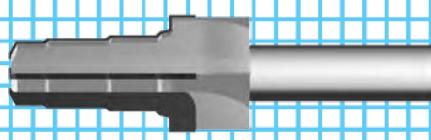
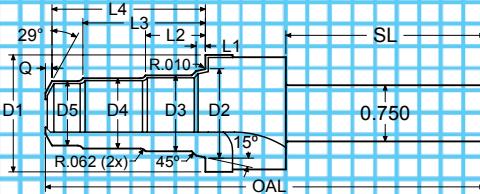
# HYDRAFORCE CARTRIDGE VALVE TOOLS

## 4 FLUTE FINISHER - CARBIDE TIPPED



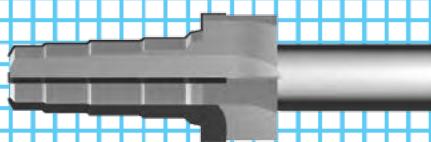
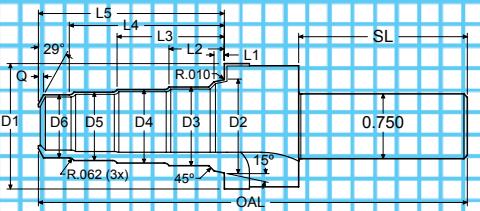
### TWO WAY CAVITY

D1	D2	D3	D4	L1	L2	L3	Q	OAL	SL	ORDER #	
										UNCOATED	ALTIN+
1.188	0.813	0.688	0.501	0.108	0.750	1.156	0.050	4.00	2.00	VC08-2-FINISH	VC08-2-FINISH-A
1.188	0.945	0.812	0.626	0.108	0.932	1.312	0.060	4.00	2.00	VC10-2-FINISH	VC10-2-FINISH-A
1.500	1.150	0.977	0.876	0.138	1.400	1.920	0.075	5.25	2.25	VC12-2-FINISH	VC12-2-FINISH-A
1.750	1.401	1.234	1.127	0.138	1.344	1.844	0.075	5.50	2.25	VC16-2-FINISH	VC16-2-FINISH-A



### THREE WAY CAVITY

D1	D2	D3	D4	D5	L1	L2	L3	L4	Q	OAL	SL	ORDER #	
												UNCOATED	ALTIN+
1.188	0.813	0.688	0.626	0.563	0.108	0.718	1.270	1.703	0.060	5.00	2.12	VC08-3-FINISH	VC08-3-FINISH-A
1.188	0.945	0.812	0.689	0.626	0.108	0.860	1.500	1.875	0.050	5.00	2.12	VC10-3-FINISH	VC10-3-FINISH-A
1.500	1.150	0.975	0.938	0.876	0.138	1.400	2.370	2.890	0.070	6.25	2.12	VC12-3-FINISH	VC12-3-FINISH-A
1.750	1.401	1.234	1.127	1.064	0.138	1.344	2.469	2.968	0.065	6.25	2.12	VC16-3-FINISH	VC16-3-FINISH-A



### FOUR WAY CAVITY

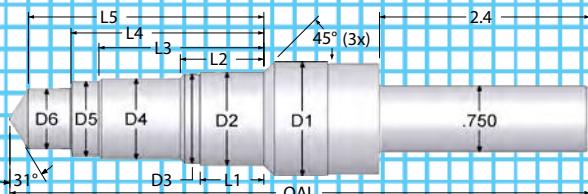
D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	Q	OAL	SL	ORDER #	
														UNCOATED	ALTIN+
1.188	0.813	0.688	0.626	0.563	0.501	0.108	0.718	1.270	1.830	2.210	0.050	5.50	2.12	VC08-4-FINISH	VC08-4-FINISH-A
1.188	0.945	0.812	0.751	0.689	0.626	0.108	0.870	1.500	2.125	2.500	0.055	5.50	2.12	VC10-4-FINISH	VC10-4-FINISH-A
1.500	1.150	0.975	0.938	0.876	0.813	0.138	1.400	2.370	3.330	3.860	0.070	7.00	2.25	VC12-4-FINISH	VC12-4-FINISH-A
1.750	1.401	1.234	1.127	1.064	1.002	0.138	1.344	2.469	3.594	4.094	0.070	7.25	2.25	VC16-4-FINISH	VC16-4-FINISH-A

# SUN HYDRAULIC CARTRIDGE VALVE TOOLS

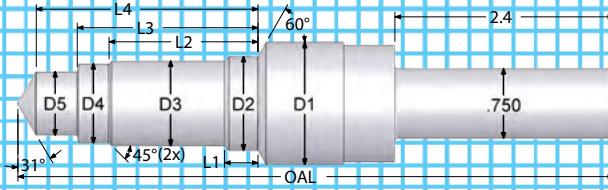
## HIGH SPEED STEEL ROUGHING STEP DRILLS



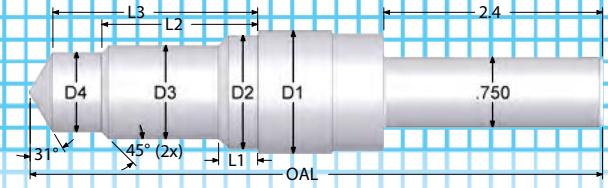
- Precision ground for maximum concentricity
- Prepares cavity for finish tool



D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	L5	FLUTES	OAL	THREAD	ORDER #	
														UNCOATED	COATED
1.285	1.056	1.011	0.913	0.854	0.686	0.681	0.893	1.764	2.062	2.517	2	6.40	1.0-14 UNS-2B	T-2A-DRILL	T-2A-DRILL-A
0.980	0.838	0.791	0.710	0.666	0.529	0.152	0.353	1.444	1.718	2.018	2	6.40	M20X 1.5-6H	T-10A-DRILL	T-10A-DRILL-A
0.980	0.838	0.791	0.710	0.666	0.529	0.646	0.849	1.753	2.025	2.322	2	6.40	M20X 1.5-6H	T-11A-DRILL	T-11A-DRILL-A
0.980	0.838	0.791	0.710	0.666	0.529	0.150	0.315	1.237	1.536	1.858	2	6.40	M20X 1.5-6H	T-13A-DRILL	T-13A-DRILL-A



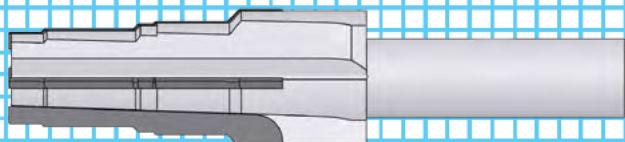
D1	D2	D3	D4	D5	L1	L2	L3	L4	FLUTES	OAL	THREAD	ORDER #	
												UNCOATED	COATED
1.312	1.011	0.913	0.854	0.686	0.255	1.626	1.926	2.382	2	6.40	1.0-14 UNS-2B	T-3A-DRILL	T-3A-DRILL-A
1.312	1.011	0.913	0.854	0.686	0.270	1.390	1.691	2.147	2	6.40	1.0-14 UNS-2B	T-5A-DRILL	T-5A-DRILL-A



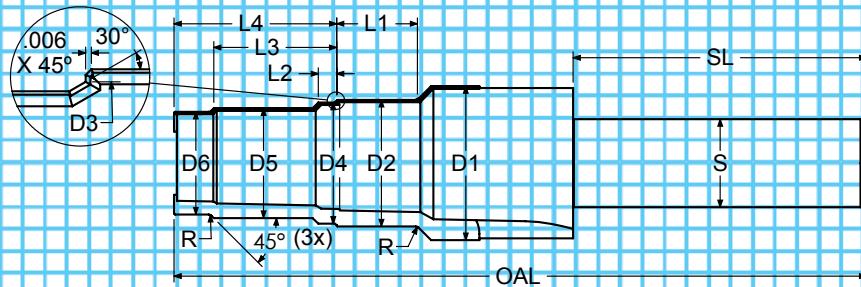
D1	D2	D3	D4	L1	L2	L3	FLUTES	OAL	THREAD	ORDER #	
										UNCOATED	COATED
1.500	1.410	1.317	1.223	0.244	2.119	2.377	2	6.50	M36X 2.0-6H	T-16A-DRILL	T-16A-DRILL-A

# SUN HYDRAULIC CARTRIDGE VALVE TOOLS

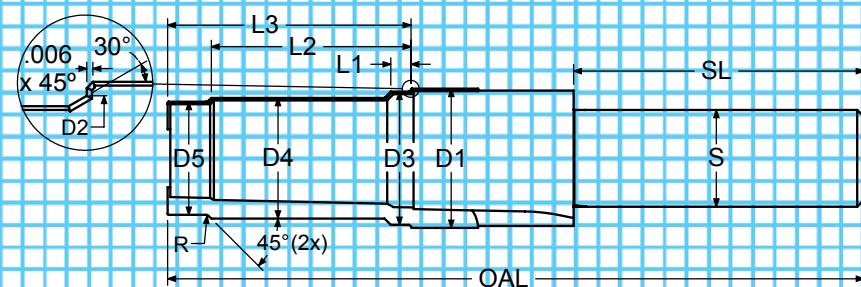
## 4 FLUTE FINISHER - CARBIDE TIPPED



- ALTiN+ coating for higher cutting speed
- Polished flute face for optimum performance
- Precision ground for maximum concentricity
- Carbide inserts made with premium submicron carbide



D1	D2	D3	D4	D5	D6	L1	L2	L3	L4	R	S	SL	OAL	ORDER #	
														UNCOATED	ALTiN+
1.312	1.079	1.052	1.032	0.935	0.876	0.688	0.156	1.047	1.3850	0.031	0.750	2.50	5.88	T-2A-FINISH	T-2A-FINISH-A
1.000	0.860	0.833	0.813	0.732	0.688	0.156	0.156	1.266	1.5695	0.020	0.750	2.25	5.25	T-10A-FINISH	T-10A-FINISH-A
1.000	0.860	0.833	0.813	0.732	0.688	0.653	0.156	1.078	1.3825	0.020	0.750	2.25	5.50	T-11A-FINISH	T-11A-FINISH-A
1.000	0.860	0.833	0.813	0.732	0.688	0.156	0.156	1.078	1.3825	0.020	0.750	2.25	5.00	T-13A-FINISH	T-13A-FINISH-A



D1	D2	D3	D4	D5	L1	L2	L3	R	S	SL	OAL	ORDER #	
												UNCOATED	ALTiN+
1.079	1.052	1.032	0.935	0.876	0.156	1.574	1.885	0.031	0.750	2.25	5.38	T-3A-FINISH	T-3A-FINISH-A
1.079	1.052	1.032	0.935	0.876	0.156	1.297	1.635	0.031	0.750	2.25	5.13	T-5A-FINISH	T-5A-FINISH-A
1.563	1.469	1.439	1.345	1.251	0.188	2.062	2.448	0.031	1.000	2.25	6.00	T-16A-FINISH	T16A-FINISH-A

# PORT AND CAVITY TOOL TECHNICAL INFORMATION

MATERIAL	BH/Rc	SPEED (SFM)		CUTTING CONDITIONS	
		UNCOATED	ALTiN+	INFEED PER FLUTE REAM	INFEED PER FLUTE SPOT FACE
CAST IRON	130 HB	75-210	200-450	.001-.0025	.0008-.0020
CARBON STEEL	18 Rc	125-190	190-400	.001-.0030	.001-.0020
ALLOY STEEL	20 Rc	70-135	130-350	.001-.0030	.0008-.0020
TOOL STEEL	25 Rc	75-100	100-220	.001-.0025	.0005-.0020
300 STAINLESS STEEL	150 HB	90-100	100-230	.001-.0020	.0007-.0015
400 STAINLESS STEEL	195 HB	90-135	135-300	.001-.0020	.0005-.0015
HIGH TEMP ALLOY (NICKEL & COBALT BASE)	20 Rc	30-125	100-150	.008-.0015	.0005-.0010
TITANIUM	25 Rc	50-100	100-140	.001-.0020	.0005-.0010
HEAT TREATED ALLOYS (38-45Rc)	40 Rc	50-75	75-130	.008-.0015	.0005-.0010
ALUMINUM	100 HB	850-1000	800-1500	.002-.0040	.0010-.0030
BRASS, ZINC	80 HB	750-950	800-1200	.002-.0040	.0010-.0030

SFM = Surface Feet per Minute

RPM = SFM x 3.82 divided by tool diameter

Starting parameters only. Setup and machine rigidity may affect performance.

PROBLEM	CAUSE	SOLUTION
RAPID FLANK WEAR	CUTTING CONDITIONS	Check for excessive speed and feed - see chart.
	TOOL	Select a coated tool.
	PROGRAM	Remove dwell from program at end of cut.
BUILT-UP EDGE	TOOL	Select a coated tool. The coating will resist built-up edges.
	HEAT	Use the SCT coolant holder. If coolant is not available, use shop air and a coated tool.
SURFACE TORN	TOOL	Use a coated tool. On most carbon steels, an uncoated tool will not produce an acceptable finish.
CHATTER	TOOL	Hone cutting edge of spot face. Use Coated Tool. Increase chip load.
LIGHT CHATTER	PROGRAM	Increase speed by 15-20%. A faster speed reduces forces. A dwell typically will not remove chatter.
POOR TOOL LIFE	AMOUNT OF STOCK	Rough port to 0.97 inch of finish size.
	PART	Make sure prior operation did not work harden the material.

## SAMPLE PROGRAM FOR MAXIMUM PRODUCTION

N51 (Sample Port Tool Program: MS33649-4RA (ALTiN+) cutting Carbon Steel

**T51 M06****Select Tool****S2916 M03****SFM = 300 ; RPM = 300 x 3.82 / Reamer Diameter****G00 G90 G54 X0. Y0.****RPM = 300 X 3.82 / 0.393****G43 H51 Z0.1 M08****RPM = 2916****G01 Z-0.6 F23.3****Feed Rate = RPM x 0.002 x 4 (Number of Flutes)****S1290 M03****RPM = 300 x 3.82 / 0.888 (Spot Face Diameter)****G04 P1.****Dwell to slow down spindle****G01 Z-.73 F10.3****Feed rate = RPM x 0.002 x 4 (Number of Flutes)****G00 Z5. M09**



# SPECIALTY END MILL



**Corner Rounding  
Engraving Tool**

## SPECIALTY END MILLS - PRODUCT OVERVIEW

These specialty end mills feature the same premium submicron carbide as the rest of the product lines. They are ground on modern CNC tool-and-cutter grinders to tight tolerances and have been engineered for high performance.



### Corner Rounding End Mills

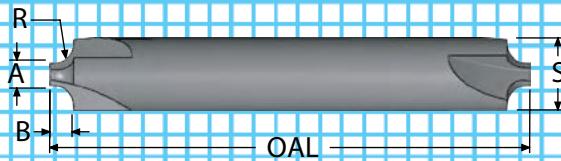
Corner Rounding End Mills have three flutes and are double ended to provide maximum value. The cutter diameter and the cut depth are held to  $\pm 0.001$  inch tolerance to provide ease of set-up.



### Engraving Tools

Engraving Tools come in a large variety of angles and sizes. These solid carbide tools will engrave on a large variety of materials. The tool tip is held to  $\pm 0.001$  inch tolerance for uniformity.

# CORNER ROUNDING END MILLS - SOLID CARBIDE

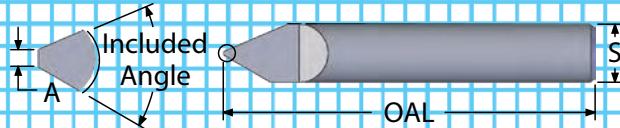


- Tool diameter (A) and the cut depth (B) are held to  $\pm 0.001$  inch tolerance to provide ease of set-up
- ALTiN+ coating for higher cutting speed
- Precision ground for maximum concentricity

"R" RADIUS SIZE	"A" TOOL DIA.	"B" CUT DEPTH	"S" SHANK DIA.	OAL	FLUTES	ORDER NUMBERS	
						UNCOATED	ALTiN+
0.005	0.080	0.020	0.125	1.50	3	CR125005	CR125005A
0.008	0.080	0.023	0.125	1.50	3	CR125008	CR125008A
0.010	0.080	0.025	0.125	1.50	3	CR125010	CR125010A
0.015	0.080	0.030	0.125	1.50	3	CR125015	CR125015A
0.010	0.120	0.025	0.1875	2.00	3	CR187010	CR187010A
0.015	0.120	0.030	0.1875	2.00	3	CR187015	CR187015A
0.020	0.100	0.035	0.1875	2.00	3	CR187020	CR187020A
0.031	0.100	0.046	0.1875	2.00	3	CR187031	CR187031A
0.010	0.170	0.025	0.250	2.50	3	CR250010	CR250010A
0.015	0.170	0.030	0.250	2.50	3	CR250015	CR250015A
0.020	0.170	0.035	0.250	2.50	3	CR250020	CR250020A
0.025	0.170	0.040	0.250	2.50	3	CR250025	CR250025A
0.031	0.140	0.046	0.250	2.50	3	CR250031	CR250031A
0.035	0.140	0.050	0.250	2.50	3	CR250035	CR250035A
0.040	0.140	0.055	0.250	2.50	3	CR250040	CR250040A
0.046	0.140	0.061	0.250	2.50	3	CR250046	CR250046A
0.050	0.100	0.065	0.250	2.50	3	CR250050	CR250050A
0.055	0.100	0.070	0.250	2.50	3	CR250055	CR250055A
0.062	0.100	0.077	0.250	2.50	3	CR250062	CR250062A
0.072	0.100	0.087	0.250	2.50	3	CR250072	CR250072A
0.078	0.150	0.098	0.375	2.50	3	CR375078	CR375078A
0.085	0.150	0.105	0.375	2.50	3	CR375085	CR375085A
0.094	0.150	0.114	0.375	2.50	3	CR375094	CR375094A
0.100	0.120	0.120	0.375	2.50	3	CR375100	CR375100A
0.110	0.120	0.130	0.375	2.50	3	CR375110	CR375110A
0.118	0.100	0.138	0.375	2.50	3	CR375118	CR375118A
0.125	0.100	0.145	0.375	2.50	3	CR375125	CR375125A
0.140	0.150	0.10	0.500	3.00	3	CR500140	CR500140A
0.156	0.150	0.176	0.500	3.00	3	CR500156	CR500156A
0.172	0.100	0.192	0.500	3.00	3	CR500172	CR500172A
0.187	0.100	0.207	0.500	3.00	3	CR500187	CR500187A

SPECIALTY END MILLS  
CORNER ROUNDER

# ENGRAVING TOOLS - SOLID CARBIDE



- The tool tip (A) is held to  $\pm 0.001$  inch tolerance
- ALTiN+ coating extends tool life
- Made with premium submicron carbide

INCLUDED ANGLE	"S" SHANK DIA.	OAL	"A" TIP DIA.	ORDER NUMBERS	
				UNCOATED	ALTiN+
30°	0.1250	1.50	0.005	EN125-30	EN125-30A
30°	0.1875	2.00	0.007	EN187-30	EN187-30A
30°	0.2500	2.50	0.009	EN250-30	EN250-30A
30°	0.3125	2.50	0.011	EN312-30	EN312-30A
30°	0.3750	2.50	0.013	EN375-30	EN375-30A
30°	0.5000	3.00	0.015	EN500-30	EN500-30A
40°	0.1250	1.50	0.005	EN125-40	EN125-40A
40°	0.1875	2.00	0.007	EN187-40	EN187-40A
40°	0.2500	2.50	0.009	EN250-40	EN250-40A
40°	0.3125	2.50	0.011	EN312-40	EN312-40A
40°	0.3750	2.50	0.013	EN375-40	EN375-40A
40°	0.5000	3.00	0.015	EN500-40	EN500-40A
60°	0.1250	1.50	0.005	EN125-60	EN125-60A
60°	0.1875	2.00	0.007	EN187-60	EN187-60A
60°	0.2500	2.50	0.009	EN250-60	EN250-60A
60°	0.3125	2.50	0.011	EN312-60	EN312-60A
60°	0.3750	2.50	0.013	EN375-60	EN375-60A
60°	0.5000	3.00	0.015	EN500-60	EN500-60A
90°	0.1250	1.50	0.005	EN125-90	EN125-90A
90°	0.1875	2.00	0.007	EN187-90	EN187-90A
90°	0.2500	2.50	0.009	EN250-90	EN250-90A
90°	0.3125	2.50	0.011	EN312-90	EN312-90A
90°	0.3750	2.50	0.013	EN375-90	EN375-90A
90°	0.5000	3.00	0.015	EN500-90	EN500-90A
120°	0.1250	1.50	0.005	EN125-120	EN125-120A
120°	0.1875	2.00	0.007	EN187-120	EN187-120A
120°	0.2500	2.50	0.009	EN250-120	EN250-120A
120°	0.3125	2.50	0.011	EN312-120	EN312-120A
120°	0.3750	2.50	0.013	EN375-120	EN375-120A
120°	0.5000	3.00	0.015	EN500-120	EN500-120A

## NOTES

## NOTES

*Celebrating 50 Years of Excellence*



**Scientific Cutting Tools, Inc.**

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800.383.2244   FAX 888.728.3295**

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