

# 7 PERFORMANCE END MILLS

HIGH PERFORMANCE TOOLS DESIGNED FOR EXTREME MACHINING RESULTS



Our new performance tool lines will give you the edge you need to reduce downtime, increase speeds and feeds, combine operations, and will ultimately increase profits.

These qualities, taken into account, create the most productive and indispensable tools available.

## ENHANCED PERFORMANCE

We are committed to providing the highest performing cutting tools and end mills in the industry and have been breaking ground on new products, developing new patents and improving old workhorses. Our tools have a proven record of being highly successful in their respective applications.

## STATE-OF-THE-ART

We combine ongoing, continuous improvement processes with thousands of hours of new tool development per year. We provide comprehensive pre-production research, which allows us to design a manufacturing process that optimizes performance, improves cycle times and promotes quality.

(888) 531-8500 | [info@conicaltool.com](mailto:info@conicaltool.com) | [www.conicalendmills.com](http://www.conicalendmills.com)





## 70 YEARS OF INNOVATION



### STATE-OF-THE-ART DESIGN

The metalworking industry is always competitive and overlooking a resource can make any successful company fail to perform. Our Vortex4 end mills demonstrate our history of innovation, through an advanced variable geometry that cannot be matched.

The usefulness of a tool is determined by its ability to perform in various applications. The Vortex4 gives you the flexibility required to perform slotting, light or heavy roughing, and finishing operations. These end mills do more

than just replace your old and worn out tools; they will reframe the way you look at machining.

When you use only the best materials, rely on our 70 years of experience and trust in our products, nothing will prevent your success. Call us today to find out about our guaranteed test tools.

### CONTINUOUS IMPROVEMENT

Since our founding, we have been a formidable leader of innovation, adaptation and technical experience; unparalleled elsewhere in the cutting tool industry. We strive to provide superior preforming products, which solve complex machining challenges. We have developed a rigorous program to do so and we believe our performance is not just measured by our products, but the technical resources we provide as well.

Global Cutting Tools  
Conical Tool Company

3890 Buchanan Ave SW  
Grand Rapids, MI 49548

T: 888.531.8500 | P: 616.531.8500  
F: 616.531.7742 | E: info@conicaltool.com

W: www.conicalendmills.com  
W: www.globalcuttingtools.com



Global Cutting Tools are distributed by:

**OVER 7,000  
DISTRIBUTORS WORLDWIDE**



Made in the U.S.A.

NEW PREMIUM TOOL LINE!

 **VORTEX4**<sup>TM</sup>  
ADVANCED VARIABLE GEOMETRY

AMERICAN  
MADE



GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR CHATTER-FREE MACHINING OF FERROUS MATERIALS





# VORTEX4™

ADVANCED VARIABLE GEOMETRY

## CHATTER FREE MACHINING

OF FERROUS MATERIALS

### FEATURES & BENEFITS

Our new high performance Vortex4, sub-micron grade carbide end mills have been put to the test. Featuring an industry leading advanced variable geometry, we combine variable helix and variable index flutes with our innovative engineering. The tool performs silently and flawlessly at incredible feeds & speeds. The Vortex4 performs without exception, which mirrors the mission of Global Cutting Tools. We set out to provide our customers with immediate improvement in performance and quality beyond what was available before in the market.

General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL™**  
CUTTING TOOLS

## SERIES: VX4

For high feed / material removal rate and chatter-free milling of most ferrous materials to create excellent surface finishes while slotting, pocketing, heavy roughing and finishing; wet or dry; low carbon steel to titanium.

**Square end option** to create sharp corners in finishing operations

**Coated** for heat resistance, wear resistance and increased lubricity

**Four flute design** improves chip evacuation for heavy roughing and slotting operations

High strength flutes reduce edge chipping, built up edge and extends tool life

Eccentric relief for improved flute strength

Proprietary design combines roughing and finishing operations into one

**Ball end option** for high performance contour milling in finishing operations

**Corner radius option** protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure

**Large core design** for increased stability; higher speeds & feeds; and reduced tool deflection

**Premium micro-grain carbide substrate** resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds

**Vibration dampening geometry** (variable helix, variable index, improved core)

Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

TIP & END			SHANK & LENGTH					FLUTE CONFIGURATION					MATERIAL	COATING

## RESULTS

Combining roughing and finishing operations, the Vortex4 will make your chips disappear with ease, leading to higher productivity and profitability. You will dramatically cut production times and have up to five times longer tool life, leading to significantly increased profit per job. The Vortex4

is excellent for pocketing, slotting, roughing and finishing at high feed rates. Instead of tying up more machine time, utilizing the correct end mill is indisputably a better solution. When you combine cost saving engineering with the ability to join multiple machine operations into one; the results will speak for themselves.

**Series VX4:** Micro-Grain Carbide, 4 Flute, Advanced Variable Geometry, AlCrN/Si3N4 Coated

**SubSeries:** VX4SS, VX4SR, VX4SL, VX4CS, VX4CR, VX4CL, VX4BR

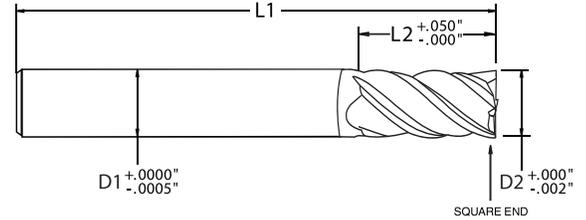
**Configuration:** Varying Diameters; Stub, Regular & Long Lengths; 37/39° Variable Helix; Variable Index; Variable Rake; Eccentric Relief; Square End, Corner Radius & Ball

## SERIES VX4 - CARBIDE, 4 FLUTE, ADVANCED VARIABLE GEOMETRY

### REPLACE YOUR OLD TOOLS

Our Vortex4 end mills demonstrate our history of innovation, through an advanced variable geometry that cannot be matched. These end mills will do more than just replace your old and worn out tools; they will reframe the way you look at machining.

- Square end option to create sharp corners in finishing operations
- Coated for heat resistance, wear resistance and increased lubricity
- Four flute design improves chip evacuation for heavy roughing and slotting operations
- High strength flutes reduce edge chipping, built up edge and extends tool life



TIP & END	SHANK & LENGTH	FLUTE CONFIGURATION	MATERIAL	COATING

### SERIES VX4SS - SQUARE END, STUB LENGTH

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	PLAIN SHANK	
				PART #	EDP #
1/8	0.125	3/8	2	VX4-0206-SQ	V1015
3/16	0.188	3/8	2	VX4-0306-SQ	V1025
1/4	0.250	3/8	2	VX4-0406-SQ	V1035
5/16	0.313	1/2	2	VX4-0508-SQ	V1045
3/8	0.375	5/8	2	VX4-0610-SQ	V1055
7/16	0.438	5/8	2 1/2	VX4-0710-SQ	V1065
1/2	0.500	5/8	2 1/2	VX4-0810-SQ	V1075
5/8	0.625	7/8	3	VX4-1014-SQ	V1085
3/4	0.750	1 1/8	3	VX4-1218-SQ	V1095

### SERIES VX4SR - SQUARE END, REGULAR LENGTH

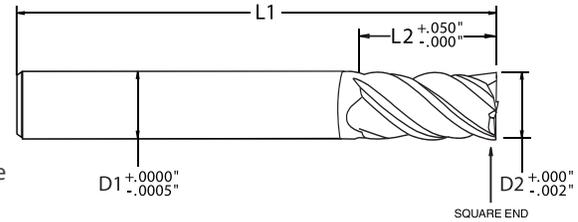
SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	PLAIN SHANK		WELDON SHANK	
				PART #	EDP #	PART #	EDP #
1/8	0.125	5/8	2	VX4-0210-SQ	V2015	—	—
3/16	0.188	5/8	2	VX4-0310-SQ	V2025	—	—
1/4	0.250	7/8	2 1/2	VX4-0414-SQ	V2035	—	—
5/16	0.313	7/8	2 1/2	VX4-0514-SQ	V2045	—	—
3/8	0.375	7/8	2 1/2	VX4-0614-SQ	V2055	VX4-0614-SQ-W	V2155
		1 3/8	3	VX4-0622-SQ	V2065	VX4-0622-SQ-W	V2165
7/16	0.438	1 1/8	3	VX4-0718-SQ	V2075	VX4-0718-SQ-W	V2175
		1 1/8	3	VX4-0818-SQ	V2085	VX4-0818-SQ-W	V2185
1/2	0.500	1 3/8	3	VX4-0822-SQ	V2095	VX4-0822-SQ-W	V2195
		1 5/8	3 1/2	VX4-0826-SQ	V2105	VX4-0826-SQ-W	V2205
		1 7/8	3 1/2	VX4-0830-SQ	V2115	VX4-0830-SQ-W	V2215
		1 3/8	3 1/2	VX4-1022-SQ	V2125	VX4-1022-SQ-W	V2225
3/4	0.750	1 5/8	4	VX4-1226-SQ	V2135	VX4-1226-SQ-W	V2235
1	1.000	1 7/8	4	VX4-1630-SQ	V2145	VX4-1630-SQ-W	V2245

## SERIES VX4 - CARBIDE, 4 FLUTE, ADVANCED VARIABLE GEOMETRY

### INNOVATIVE ENGINEERING

Featuring an industry leading advanced variable geometry, we combine variable helix and variable index flutes with our innovative engineering. The tool performs silently and flawlessly at incredible feeds & speeds.

- Eccentric relief for improved flute strength
- Ball end option for high performance contour milling in finishing operations
- Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure



TIP & END	SHANK & LENGTH	FLUTE CONFIGURATION	MATERIAL	COATING

## SERIES VX4SL - SQUARE END, LONG LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		PLAIN SHANK		WELDON SHANK	
PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	7/8	0.875	2 1/2	2.500	VX4-0214-SQ	V3015	—	—
3/16	0.188	3/16	0.188	7/8	0.875	2 1/2	2.500	VX4-0314-SQ	V3025	—	—
1/4	0.250	1/4	0.250	1 3/8	1.375	3	3.000	VX4-0422-SQ	V3035	—	—
				1 7/8	1.875	3 1/2	3.500	VX4-0430-SQ	V3045	—	—
5/16	0.313	5/16	0.313	1 3/8	1.375	3	3.000	VX4-0522-SQ	V3055	—	—
				2 1/8	2.125	4	4.000	VX4-0534-SQ	V3065	—	—
3/8	0.375	3/8	0.375	2 1/8	2.125	4	4.000	VX4-0634-SQ	V3075	VX4-0634-SQ-W	V3225
				2 5/8	2.625	5	5.000	VX4-0642-SQ	V3085	VX4-0642-SQ-W	V3235
7/16	0.438	7/16	0.438	2 1/8	2.125	4	4.000	VX4-0734-SQ	V3095	VX4-0734-SQ-W	V3245
				2 1/8	2.125	4	4.000	VX4-0834-SQ	V3105	VX4-0834-SQ-W	V3255
1/2	0.500	1/2	0.500	2 5/8	2.625	5	5.000	VX4-0842-SQ	V3115	VX4-0842-SQ-W	V3265
				3 3/8	3.375	6	6.000	VX4-0854-SQ	V3125	VX4-0854-SQ-W	V3275
				2 1/8	2.125	4	4.000	VX4-1034-SQ	V3135	VX4-1034-SQ-W	V3285
5/8	0.625	5/8	0.625	2 5/8	2.625	5	5.000	VX4-1042-SQ	V3145	VX4-1042-SQ-W	V3295
				3 3/8	3.375	6	6.000	VX4-1054-SQ	V3155	VX4-1054-SQ-W	V3305
				2 5/8	2.625	5	5.000	VX4-1242-SQ	V3165	VX4-1242-SQ-W	V3315
3/4	0.750	3/4	0.750	3 3/8	3.375	6	6.000	VX4-1254-SQ	V3175	VX4-1254-SQ-W	V3325
				4 3/8	4.375	7	7.000	VX4-1270-SQ	V3185	VX4-1270-SQ-W	V3335
				2 3/8	2.375	5	5.000	VX4-1638-SQ	V3195	VX4-1638-SQ-W	V3345
1	1.000	1	1.000	3 3/8	3.375	6	6.000	VX4-1654-SQ	V3205	VX4-1654-SQ-W	V3355
				4 3/8	4.375	7	7.000	VX4-1670-SQ	V3215	VX4-1670-SQ-W	V3365

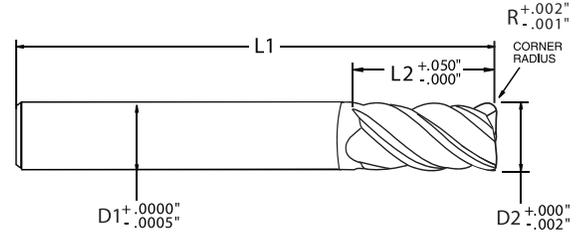
- VORTEX4
- VORTEX5
- CYCLONE MX
- HYDRA FX
- XTERRA3
- EXTREME3
- ZEPHYR3
- ALUMINUM 2 & 3 FLUTE
- CONICAL TAPERED CARBIDE
- CONICAL TAPERED HSS
- CONICAL TAPERED LHS - RHC
- CHAMFER CUTTERS
- TAPERED MINIATURES
- AUTOMOTIVE TAPERS
- DIE & MOLD CUTTERS
- PROFILE RIB CUTTERS
- RUNNER CUTTERS
- DIE SINKS
- GENERAL PURPOSE

## SERIES VX4 - CARBIDE, 4 FLUTE, ADVANCED VARIABLE GEOMETRY

### SILENT AND FLAWLESS

The Vortex4 performs silently and flawlessly at incredible feeds & speeds. The Vortex4 performs without exception, which reflects the ideals of Global Cutting Tools.

- Large core design for increased stability; higher speeds & feeds; and reduced tool deflection
- Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds
- Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure



TIP & END	SHANK & LENGTH	FLUTE CONFIGURATION	MATERIAL	COATING

### SERIES VX4CS - CORNER RADIUS, STUB LENGTH

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	CORNER RADIUS (R)	PLAIN SHANK	
					PART #	EDP #
1/8	0.125	3/8	2	0.015	VX4-0206-R1	V1011
3/16	0.188	3/8	2	0.015	VX4-0306-R1	V1021
1/4	0.250	3/8	2	0.020	VX4-0406-R2	V1032
5/16	0.313	1/2	2	0.030	VX4-0508-R3	V1043
3/8	0.375	5/8	2	0.030	VX4-0610-R3	V1053
7/16	0.438	5/8	2 1/2	0.030	VX4-0710-R3	V1063
1/2	0.500	5/8	2 1/2	0.030	VX4-0810-R3	V1073
5/8	0.625	7/8	3	0.040	VX4-1014-R4	V1084
3/4	0.750	1 1/8	3	0.050	VX4-1218-R5	V1095

### SERIES VX4CR - CORNER RADIUS, REGULAR LENGTH

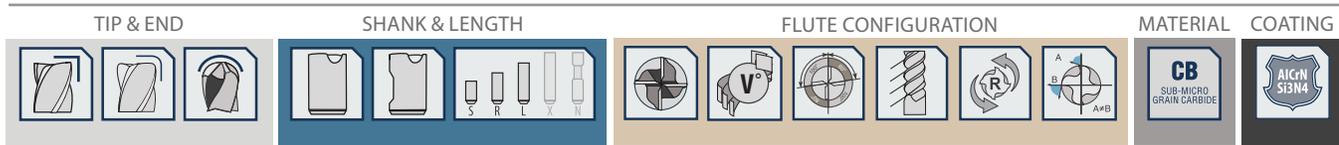
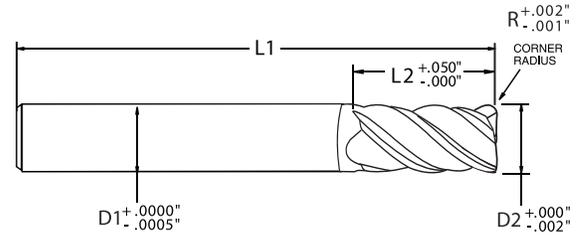
SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK	
					PART #	EDP #	PART #	EDP #
1/8	0.125	5/8	2	0.015	VX4-0210-R1	V2011	—	—
3/16	0.188	5/8	2	0.015	VX4-0310-R1	V2021	—	—
1/4	0.250	7/8	2 1/2	0.020	VX4-0414-R2	V2032	—	—
5/16	0.313	7/8	2 1/2	0.030	VX4-0514-R3	V2043	—	—
3/8	0.375	7/8	2 1/2	0.030	VX4-0614-R3	V2053	VX4-0614-R3-W	V2153
		1 3/8	3	0.030	VX4-0622-R3	V2063	VX4-0622-R3-W	V2163
7/16	0.438	1 1/8	3	0.030	VX4-0718-R3	V2073	VX4-0718-R3-W	V2173
		1 1/8	3	0.030	VX4-0818-R3	V2083	VX4-0818-R3-W	V2183
		1 3/8	3	0.030	VX4-0822-R3	V2093	VX4-0822-R3-W	V2193
1/2	0.500	1 5/8	3 1/2	0.030	VX4-0826-R3	V2103	VX4-0826-R3-W	V2203
		1 7/8	3 1/2	0.030	VX4-0830-R3	V2113	VX4-0830-R3-W	V2213
		1 3/8	3 1/2	0.040	VX4-1022-R4	V2124	VX4-1022-R4-W	V2224
5/8	0.625	1 5/8	4	0.050	VX4-1226-R5	V2135	VX4-1226-R5-W	V2235
3/4	0.750	1 7/8	4	0.060	VX4-1630-R6	V2146	VX4-1630-R6-W	V2246

## SERIES VX4 - CARBIDE, 4 FLUTE, ADVANCED VARIABLE GEOMETRY

### COMBINE OPERATIONS

Combining roughing and finishing operations, the Vortex4 will make your chips disappear with ease, leading to higher productivity and profitability.

- Coated for heat resistance, wear resistance and increased lubricity
- Four flute design improves chip evacuation for heavy roughing and slotting operations
- High strength flutes reduce edge chipping, built up edge and extends tool life
- Eccentric relief for improved flute strength



## SERIES VX4CL - CORNER RADIUS, LONG LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK	
									PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	7/8	0.875	2 1/2	2.500	0.015	VX4-0214-R1	V3011	—	—
3/16	0.188	3/16	0.188	7/8	0.875	2 1/2	2.500	0.015	VX4-0314-R1	V3021	—	—
1/4	0.250	1/4	0.250	1 3/8	1.375	3	3.000	0.020	VX4-0422-R2	V3032	—	—
				1 7/8	1.875	3 1/2	3.500	0.020	VX4-0430-R2	V3042	—	—
5/16	0.313	5/16	0.313	1 3/8	1.375	3	3.000	0.030	VX4-0522-R3	V3053	—	—
				2 1/8	2.125	4	4.000	0.030	VX4-0534-R3	V3063	—	—
3/8	0.375	3/8	0.375	2 1/8	2.125	4	4.000	0.030	VX4-0634-R3	V3073	VX4-0634-R3-W	V3223
				2 5/8	2.625	5	5.000	0.030	VX4-0642-R3	V3083	VX4-0642-R3-W	V3233
7/16	0.438	7/16	0.438	2 1/8	2.125	4	4.000	0.030	VX4-0734-R3	V3093	VX4-0734-R3-W	V3243
				2 1/8	2.125	4	4.000	0.030	VX4-0834-R3	V3103	VX4-0834-R3-W	V3253
1/2	0.500	1/2	0.500	2 5/8	2.625	5	5.000	0.030	VX4-0842-R3	V3113	VX4-0842-R3-W	V3263
				3 3/8	3.375	6	6.000	0.030	VX4-0854-R3	V3123	VX4-0854-R3-W	V3273
5/8	0.625	5/8	0.625	2 1/8	2.125	4	4.000	0.040	VX4-1034-R4	V3134	VX4-1034-R4-W	V3284
				2 5/8	2.625	5	5.000	0.040	VX4-1042-R4	V3144	VX4-1042-R4-W	V3294
3/4	0.750	3/4	0.750	3 3/8	3.375	6	6.000	0.040	VX4-1054-R4	V3154	VX4-1054-R4-W	V3304
				2 5/8	2.625	5	5.000	0.050	VX4-1242-R5	V3165	VX4-1242-R5-W	V3315
1	1.000	1	1.000	3 3/8	3.375	6	6.000	0.050	VX4-1254-R5	V3175	VX4-1254-R5-W	V3325
				4 3/8	4.375	7	7.000	0.050	VX4-1270-R5	V3185	VX4-1270-R5-W	V3335
1	1.000	1	1.000	2 3/8	2.375	5	5.000	0.060	VX4-1638-R6	V3196	VX4-1638-R6-W	V3346
				3 3/8	3.375	6	6.000	0.060	VX4-1654-R6	V3206	VX4-1654-R6-W	V3356
				4 3/8	4.375	7	7.000	0.060	VX4-1670-R6	V3216	VX4-1670-R6-W	V3366

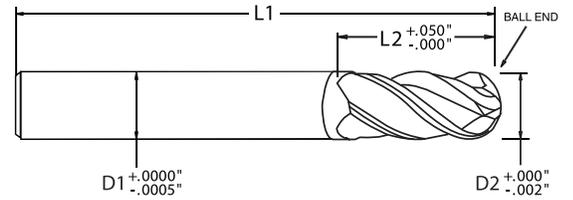
- VORTEX4
- VORTEX5
- CYCLONE MX
- HYDRA FX
- XTERRA3
- EXTREME3
- ZEPHYR3
- ALUMINUM 2 & 3 FLUTE
- CONICAL TAPERED CARBIDE
- CONICAL TAPERED HSS
- CONICAL TAPERED LHS - RHC
- CHAMFER CUTTERS
- TAPERED MINIATURES
- AUTOMOTIVE TAPERS
- DIE & MOLD CUTTERS
- PROFILE RIB CUTTERS
- RUNNER CUTTERS
- DIE SINKS
- GENERAL PURPOSE

SERIES VX4 - CARBIDE, 4 FLUTE, ADVANCED VARIABLE GEOMETRY

CUT PRODUCTION TIMES

You will dramatically cut production times and have up to five times longer tool life, leading to significantly increased profit per job. The Vortex4 is excellent for pocketing, slotting, roughing and finishing at high feed rates.

- Ball end option for high performance contour milling in finishing operations
- Large core design for increased stability; higher speeds & feeds; and reduced tool deflection
- Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds



TIP & END      SHANK & LENGTH      FLUTE CONFIGURATION      MATERIAL      COATING

SERIES VX4BR - BALL END, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		PLAIN SHANK		WELDON SHANK	
								PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	VX4-0210-BE	V201B	—	—
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000	VX4-0310-BE	V202B	—	—
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	VX4-0414-BE	V203B	—	—
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500	VX4-0514-BE	V204B	—	—
3/8	0.375	3/8	0.375	7/8	0.875	2 1/2	2.500	VX4-0614-BE	V205B	VX4-0614-BE-W	V211B
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	VX4-0718-BE	V206B	VX4-0718-BE-W	V212B
1/2	0.500	1/2	0.500	1 1/8	1.125	3	3.000	VX4-0818-BE	V207B	VX4-0818-BE-W	V213B
5/8	0.625	5/8	0.625	1 3/8	1.375	3 1/2	3.500	VX4-1022-BE	V208B	VX4-1022-BE-W	V214B
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	VX4-1226-BE	V209B	VX4-1226-BE-W	V215B
1	1.000	1	1.000	2 3/8	2.375	5	5.000	VX4-1638-BE	V210B	VX4-1638-BE-W	V216B

# RECONDITIONING PROGRAM

REGRIND ONLY: 1 WEEK; REGRIND & COATING: 2 WEEKS

## 70 YEARS OF GRINDING EXPERIENCE

### RE-SHARPENING SERVICES

Prices vary and are based on coating and diameter size. It does not matter how badly the tool may be damaged, we can regrind most any end mill. We will re-sharpen or recondition any tool, even competitor brands. Most any tool can be re-sharpened, however, when normal re-sharpening is not sufficient, reconditioning may be needed.

SEE PAGES 14 -15 FOR DETAILS



# VX4 APPLICATION GUIDE • SPEEDS & FEEDS

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)							
						1/8" (4 FL)	1/4" (4 FL)	3/8" (4 FL)	1/2" (4 FL)	5/8" (4 FL)	3/4" (4 FL)	1" (4 FL)	
CARBON STEEL	LOW CARBON STEELS ≤ 38 HRC 10xx; 11xx; 12xx; 12Lxx, 15xx	Slotting	1 x D	1 x D	4	330 - 375	0.0006 - 0.0008	0.0012 - 0.0016	0.0018 - 0.0024	0.0024 - 0.0032	0.0029 - 0.0039	0.0035 - 0.0047	0.0047 - 0.0063
		Roughing	1.5 x D	.5 x D	4	410 - 470	0.0008 - 0.0012	0.0015 - 0.0020	0.0022 - 0.0030	0.0030 - 0.0040	0.0037 - 0.0050	0.0045 - 0.0060	0.0059 - 0.0080
		High Efficiency (HEM)	2 x D	.2 x D	4	515 - 575	0.0015 - 0.0018	0.0030 - 0.0036	0.0044 - 0.0054	0.0058 - 0.0071	0.0073 - 0.0090	0.0088 - 0.0107	0.0117 - 0.0144
	MEDIUM CARBON STEELS ≤ 38 HRC 13xx; 41xx; 43xx; 86xx, 92xx; 93xx; Chromoly	Slotting	1 x D	1 x D	4	305 - 350	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060
		Roughing	1.5 x D	.5 x D	4	375 - 430	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0029	0.0028 - 0.0038	0.0035 - 0.0048	0.0042 - 0.0057	0.0055 - 0.0076
		High Efficiency (HEM)	2 x D	.2 x D	4	470 - 525	0.0014 - 0.0017	0.0027 - 0.0033	0.0040 - 0.0050	0.0053 - 0.0066	0.0066 - 0.0083	0.0080 - 0.0099	0.0106 - 0.0133
TOOL & DIE STEEL	TOOL & DIE STEELS ≤ 38 HRC A2; A3; D2; H11; H13; M1; O-1; S-7; NAK 55	Slotting	1 x D	1 x D	4	320 - 365	0.0007 - 0.0009	0.0012 - 0.0016	0.0019 - 0.0025	0.0024 - 0.0032	0.0028 - 0.0038	0.0036 - 0.0048	0.0048 - 0.0064
		Roughing	1.5 x D	.5 x D	4	395 - 450	0.0008 - 0.0012	0.0015 - 0.0020	0.0022 - 0.0030	0.0030 - 0.0040	0.0037 - 0.0050	0.0045 - 0.0060	0.0059 - 0.0080
		High Efficiency (HEM)	2 x D	.2 x D	4	495 - 550	0.0013 - 0.0016	0.0025 - 0.0031	0.0037 - 0.0047	0.0048 - 0.0061	0.0060 - 0.0077	0.0074 - 0.0093	0.0098 - 0.0125
	TOOL & DIE STEELS 39 to 48 HRC P20; P21; S-136; PX-5; NAK 80	Slotting	.75 x D	1 x D	4	305 - 350	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0026 - 0.0036	0.0032 - 0.0044	0.0043 - 0.0059
		Roughing	1.5 x D	.3 x D	4	375 - 430	0.0007 - 0.0011	0.0014 - 0.0019	0.0020 - 0.0028	0.0027 - 0.0037	0.0034 - 0.0047	0.0041 - 0.0056	0.0054 - 0.0075
		High Efficiency (HEM)	2 x D	.15 x D	4	470 - 525	0.0012 - 0.0015	0.0023 - 0.0029	0.0033 - 0.0043	0.0044 - 0.0057	0.0055 - 0.0072	0.0067 - 0.0086	0.0089 - 0.0116
HARDENED STEEL	HARDENED STEELS 48 to 57 HRC	Slotting	1 x D	1 x D	4	225 - 255	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060
		Roughing	1.5 x D	.5 x D	4	265 - 300	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072
		High Efficiency (HEM)	2 x D	.2 x D	4	380 - 425	0.0008 - 0.0011	0.0015 - 0.0021	0.0022 - 0.0032	0.0029 - 0.0042	0.0036 - 0.0053	0.0044 - 0.0063	0.0058 - 0.0085
	HARDENED STEELS 58 to 65 HRC	Slotting	.75 x D	1 x D	4	215 - 245	0.0005 - 0.0007	0.0008 - 0.0012	0.0013 - 0.0019	0.0016 - 0.0024	0.0019 - 0.0029	0.0024 - 0.0036	0.0032 - 0.0048
		Roughing	1.5 x D	.3 x D	4	250 - 285	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0023	0.0020 - 0.0030	0.0024 - 0.0037	0.0030 - 0.0045	0.0039 - 0.0060
		High Efficiency (HEM)	2 x D	.15 x D	4	360 - 400	0.0006 - 0.0009	0.0010 - 0.0016	0.0015 - 0.0025	0.0019 - 0.0032	0.0023 - 0.0040	0.0029 - 0.0048	0.0038 - 0.0065
STAINLESS STEEL	EASY TO MACHINE 72 - 85 HRB 410; 416; 420; 430F; 440C; 302; 303	Slotting	.75 x D	1 x D	4	305 - 350	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0026 - 0.0036	0.0032 - 0.0044	0.0043 - 0.0059
		Roughing	1.25 x D	.3 x D	4	375 - 430	0.0007 - 0.0011	0.0014 - 0.0019	0.0020 - 0.0028	0.0027 - 0.0037	0.0034 - 0.0047	0.0041 - 0.0056	0.0054 - 0.0075
		High Efficiency (HEM)	2 x D	.15 x D	4	470 - 525	0.0014 - 0.0017	0.0027 - 0.0033	0.0040 - 0.0050	0.0053 - 0.0066	0.0066 - 0.0083	0.0080 - 0.0099	0.0106 - 0.0133
	MODERATELY DIFFICULT 79 - 85 HRB; 25 - 41 HRC 304; 304L; 316; 316L; 320; 321; 347; Invar 36; Kovar	Slotting	.75 x D	1 x D	4	275 - 315	0.0007 - 0.0009	0.0012 - 0.0016	0.0019 - 0.0025	0.0024 - 0.0032	0.0030 - 0.0040	0.0036 - 0.0048	0.0048 - 0.0064
		Roughing	1.25 x D	.3 x D	4	340 - 390	0.0008 - 0.0012	0.0015 - 0.0020	0.0023 - 0.0031	0.0031 - 0.0041	0.0038 - 0.0051	0.0046 - 0.0061	0.0060 - 0.0081
		High Efficiency (HEM)	2 x D	.1 x D	4	425 - 475	0.0016 - 0.0019	0.0030 - 0.0036	0.0045 - 0.0055	0.0060 - 0.0073	0.0074 - 0.0091	0.0090 - 0.0109	0.0119 - 0.0146
DIFFICULT TO MACHINE 31 - 50 HRC 13-8 PH; 15-5 PH; 17-4 PH; Carpenter; Custo 465; Invar	Slotting	.5 x D	1 x D	4	260 - 295	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
	Roughing	1.25 x D	.3 x D	4	320 - 365	0.0006 - 0.0010	0.0012 - 0.0017	0.0017 - 0.0025	0.0023 - 0.0033	0.0028 - 0.0041	0.0035 - 0.0050	0.0045 - 0.0066	
	High Efficiency (HEM)	1.5 x D	.1 x D	4	405 - 450	0.0013 - 0.0016	0.0025 - 0.0031	0.0037 - 0.0047	0.0049 - 0.0062	0.0061 - 0.0078	0.0074 - 0.0093	0.0098 - 0.0125	
CAST IRON	GRAY 100 - 200 HRB	Slotting	1 x D	1 x D	4	320 - 365	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060
		Roughing	1.5 x D	.5 x D	4	395 - 450	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0029	0.0028 - 0.0038	0.0035 - 0.0048	0.0042 - 0.0057	0.0055 - 0.0076
		High Efficiency (HEM)	2 x D	.2 x D	4	495 - 550	0.0013 - 0.0016	0.0025 - 0.0031	0.0037 - 0.0047	0.0050 - 0.0063	0.0062 - 0.0079	0.0075 - 0.0094	0.0099 - 0.0126
	DUCTILE 150 - 300 HRB	Slotting	1 x D	1 x D	4	305 - 350	0.0005 - 0.0007	0.0010 - 0.0014	0.0015 - 0.0021	0.0020 - 0.0028	0.0024 - 0.0034	0.0029 - 0.0041	0.0039 - 0.0055
		Roughing	1.5 x D	.5 x D	4	375 - 430	0.0007 - 0.0011	0.0013 - 0.0018	0.0018 - 0.0026	0.0025 - 0.0035	0.0031 - 0.0044	0.0038 - 0.0053	0.0049 - 0.0070
		High Efficiency (HEM)	2 x D	.2 x D	4	470 - 525	0.0011 - 0.0014	0.0021 - 0.0027	0.0031 - 0.0041	0.0041 - 0.0054	0.0051 - 0.0068	0.0062 - 0.0081	0.0082 - 0.0109
MALLEABLE 150 - 310 HRB	Slotting	.75 x D	1 x D	4	255 - 290	0.0005 - 0.0007	0.0010 - 0.0014	0.0015 - 0.0021	0.0020 - 0.0028	0.0024 - 0.0034	0.0029 - 0.0041	0.0039 - 0.0055	
	Roughing	1.5 x D	.5 x D	4	295 - 335	0.0007 - 0.0011	0.0013 - 0.0018	0.0018 - 0.0026	0.0025 - 0.0035	0.0031 - 0.0044	0.0038 - 0.0053	0.0049 - 0.0070	
	High Efficiency (HEM)	2 x D	.2 x D	4	425 - 475	0.0011 - 0.0014	0.0021 - 0.0027	0.0031 - 0.0041	0.0041 - 0.0054	0.0051 - 0.0068	0.0062 - 0.0081	0.0082 - 0.0109	
ALLOYS	TITANIUM ALLOYS 70 - 100 HRB; 25 - 36 HRC Ti6Al4V; Grades 5-38	Slotting	.5 x D	1 x D	4	240 - 275	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052
		Roughing	1.25 x D	.3 x D	4	280 - 320	0.0006 - 0.0010	0.0012 - 0.0017	0.0017 - 0.0025	0.0023 - 0.0033	0.0028 - 0.0041	0.0035 - 0.0050	0.0045 - 0.0066
		High Efficiency (HEM)	1.5 x D	.1 x D	4	405 - 450	0.0012 - 0.0015	0.0023 - 0.0029	0.0034 - 0.0044	0.0045 - 0.0058	0.0056 - 0.0073	0.0068 - 0.0087	0.0090 - 0.0117
	HIGH TEMP ALLOYS 83 - 99 HRB; 30 - 52 HRC Inconel; Monel; A286; Rene; Stellite; Haynes; Waspalloy; Hastalloy; etc	Slotting	.25 x D	1 x D	4	70 - 80	0.0005 - 0.0007	0.0010 - 0.0014	0.0015 - 0.0021	0.0019 - 0.0027	0.0024 - 0.0034	0.0029 - 0.0041	0.0038 - 0.0054
		Roughing	1.25 x D	.25 x D	4	90 - 100	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0026	0.0025 - 0.0035	0.0030 - 0.0043	0.0037 - 0.0052	0.0048 - 0.0069
		High Efficiency (HEM)	1.5 x D	.1 x D	4	225 - 250	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0032 - 0.0045	0.0040 - 0.0057	0.0049 - 0.0068	0.0065 - 0.0092
Finishing	1.5 x D	.01 x D	4	115 - 125	0.0008 - 0.0012	0.0015 - 0.0020	0.0022 - 0.0029	0.0029 - 0.0038	0.0037 - 0.0048	0.0044 - 0.0058	0.0058 - 0.0077		

D = tool diameter • Reduce feed rates by 20% when using long length tools • Use reduced neck tooling for long reach slotting • Starting parameters shown



## 70 YEARS OF INNOVATION



### UNEQUALED PERFORMANCE

There are “high performance” tools and there are tools that purely perform. Slapping an adjective on a cutting tool does not make it a high performance tool. The way it machines does. The Vortex5 was tested against similarly claimed “high performance” cutting tools and came out on top. We manufacture the Vortex5 with one focus: to be the last time you ever switch cutting tool manufacturers.

The Vortex5 is designed from the substrate up, starting with the highest

grade, virgin sub-micron carbide available and finishing with a premium PVD coating. The design is optimized to improve rigidity, reduce harmonics, increase feed rates and leave a tight tolerance surface finish. The five flute design of our Vortex5 end mill offers a 20% increase in performance over four flute designs.

When it’s time to finish the job, while decreasing cutting costs and with as little setup or changeover time possible, use the Vortex5.



### VISION AND VALUES

Innovation is our past, present and will always be our future. Our loyal customer base is why we are in business and our vision is to provide consistent quality and service as we continue to expand. Simply saying we supply tools to the metalworking industry would leave out a large portion of who we are and what we do. Our aim is to provide our customers with value in everything we do.

Global Cutting Tools  
Conical Tool Company

3890 Buchanan Ave SW  
Grand Rapids, MI 49548

T: 888.531.8500 | P: 616.531.8500  
F: 616.531.7742 | E: info@conicaltool.com

W: www.conicalendmills.com  
W: www.globalcuttingtools.com



Global Cutting Tools are distributed by:

# OVER 7,000 DISTRIBUTORS WORLDWIDE



NEW PREMIUM TOOL LINE!

 **VORTEX5**<sup>TM</sup>  
ADVANCED VARIABLE GEOMETRY

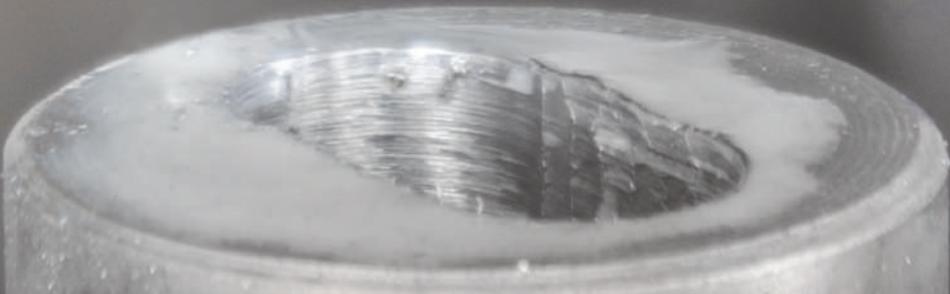


AMERICAN  
MADE

GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR CHATTER-FREE MACHINING OF FERROUS MATERIALS





# VORTEX5™

ADVANCED VARIABLE GEOMETRY

## CHATTER FREE MACHINING

OF FERROUS MATERIALS

### FEATURES & BENEFITS

Significantly improve your production rates and finish quality with our Vortex5 premium end mills. By starting with quality materials, our tools last longer, provide performance improvement and reduce costs. Our advanced variable geometry design allows for smooth, chatter free machining and an immediate 20% increase in performance over four flute designs. The five flute design of our Vortex 5 end mill offers higher efficiency through improved tool engagement and increased stability in the cut for tight tolerance applications.

#### General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

#### Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

#### Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL**™  
CUTTING TOOLS

# SERIES: VX5

For high feed rate, chatter-free milling of most ferrous materials to create excellent surface finishes. Slotting, pocketing, light roughing and finishing, wet or dry, low carbon steel to titanium up to 55 HRC.



Square end option to create sharp corners in finishing operations



Coated for heat resistance, wear resistance and increased lubricity



Improved tool engagement through 5 flute design creates a superior surface finish

High strength flutes reduce edge chipping, built up edge and extends tool life

Eccentric relief for enhanced edge strength along the flutes

Vibration dampening geometry: variable helix, variable index, increased core, and odd number of flutes



Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure

Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges

Large core design for increased stability; higher speeds & feeds; and reduced tool deflection

Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds

Proprietary design combines roughing and finishing operations into one



Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

## TIP & END



## SHANK & LENGTH



## FLUTE CONFIGURATION



## MATERIAL



## COATING



## RESULTS

The benefits are far reaching with up to five times longer tool life, decreases in work time and engineering you can trust to increase the profit per job. Increased productivity will always lead to greater profitability, when quality is guaranteed and delivered consistently. The Vortex5 will

turn any material from low carbon steel to high temp alloys, into easy materials to work with, while yielding superbly machined parts. You will spend less time changing your end mill and have more time for new projects, when you let our experience work for you.

Series VX5: Micro-Grain Carbide, 5 Flute, Advanced Variable Geometry, AlCrN/Si3N4 Coated

SubSeries: VX5SR, VX5SL, VX5CR, VX5CL

Configuration: Varying Diameters; Regular & Long Lengths; 37/39° Variable Helix;

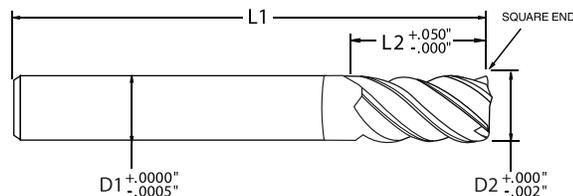
Variable Index; Variable Rake; Eccentric Relief; Square End & Corner Radius

## SERIES VX5 - CARBIDE, 5 FLUTE, ADVANCED VARIABLE GEOMETRY

### OPTIMIZED DESIGN

The design is optimized to improve rigidity, reduce harmonics, increase feed rates and leave a tight tolerance surface finish. The five flute design of our Vortex5 end mill offers a 20% increase in performance over four flute designs.

- Square end option to create sharp corners in finishing operations
- Coated for heat resistance, wear resistance and increased lubricity
- Improved tool engagement through 5 flute design creates a superior surface finish
- High strength flutes reduce edge chipping, built up edge and extends tool life



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

### SERIES VX5SR - SQUARE END, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		PLAIN SHANK		WELDON SHANK	
								PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	VX5-0210-SQ	W201S	—	—
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000	VX5-0310-SQ	W202S	—	—
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	VX5-0414-SQ	W203S	—	—
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500	VX5-0514-SQ	W204S	—	—
3/8	0.375	3/8	0.375	7/8	0.875	2 1/2	2.500	VX5-0614-SQ	W205S	VX5-0614-SQ-W	W211S
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	VX5-0718-SQ	W206S	VX5-0718-SQ-W	W212S
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000	VX5-0822-SQ	W207S	VX5-0822-SQ-W	W213S
5/8	0.625	5/8	0.625	1 3/8	1.375	3 1/2	3.500	VX5-1022-SQ	W208S	VX5-1022-SQ-W	W214S
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	VX5-1226-SQ	W209S	VX5-1226-SQ-W	W215S
1	1.000	1	1.000	1 7/8	1.875	4	4.000	VX5-1630-SQ	W210S	VX5-1630-SQ-W	W216S

### SERIES VX5SL - SQUARE END, LONG LENGTH

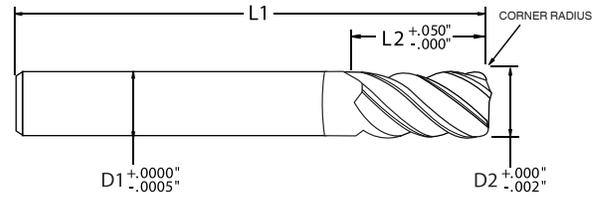
SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		PLAIN SHANK		WELDON SHANK	
								PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	7/8	0.875	2 1/2	2.500	VX5-0214-SQ	W301S	—	—
3/16	0.188	3/16	0.188	7/8	0.875	2 1/2	2.500	VX5-0314-SQ	W302S	—	—
1/4	0.250	1/4	0.250	1 7/8	1.875	3 1/2	3.500	VX5-0430-SQ	W303S	—	—
5/16	0.313	5/16	0.313	2 1/8	2.125	4	4.000	VX5-0534-SQ	W304S	—	—
3/8	0.375	3/8	0.375	2 1/8	2.125	4	4.000	VX5-0634-SQ	W305S	VX5-0634-SQ-W	W311S
7/16	0.438	7/16	0.438	2 1/8	2.125	4	4.000	VX5-0734-SQ	W306S	VX5-0734-SQ-W	W312S
1/2	0.500	1/2	0.500	2 5/8	2.625	5	5.000	VX5-0842-SQ	W307S	VX5-0842-SQ-W	W313S
5/8	0.625	5/8	0.625	2 5/8	2.625	5	5.000	VX5-1042-SQ	W308S	VX5-1042-SQ-W	W314S
3/4	0.750	3/4	0.750	2 5/8	2.625	5	5.000	VX5-1242-SQ	W309S	VX5-1242-SQ-W	W315S
1	1.000	1	1.000	3 3/8	3.375	6	6.000	VX5-1654-SQ	W310S	VX5-1654-SQ-W	W316S

## SERIES VX5 - CARBIDE, 5 FLUTE, ADVANCED VARIABLE GEOMETRY

### EASY MACHINING

The Vortex5 will turn any material from low carbon steel to high temp alloys, into easy materials to work with, while yielding superbly machined parts.

- Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure
- Eccentric relief for enhanced edge strength along the flutes
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges
- Large core design for increased stability; higher speeds & feeds; and reduced tool deflection



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATINGS

## SERIES VX5CR - CORNER RADIUS, REGULAR LENGTH

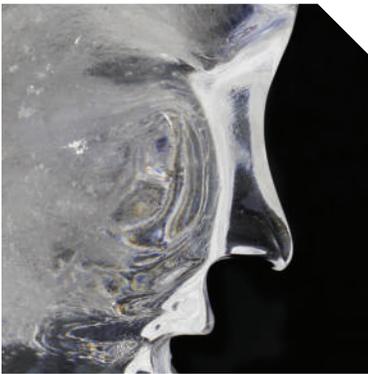
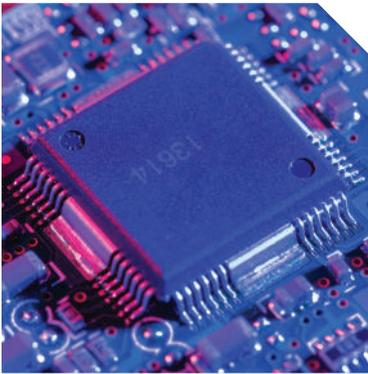
SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK	
									PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	0.015	VX5-0210-R1	W2011	—	—
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000	0.015	VX5-0310-R1	W2021	—	—
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	0.020	VX5-0414-R2	W2032	—	—
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500	0.030	VX5-0514-R3	W2043	—	—
3/8	0.375	3/8	0.375	7/8	0.875	2 1/2	2.500	0.030	VX5-0614-R3	W2053	VX5-0614-R3-W	W2113
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	0.030	VX5-0718-R3	W2063	VX5-0718-R3-W	W2123
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000	0.030	VX5-0822-R3	W2073	VX5-0822-R3-W	W2133
5/8	0.625	5/8	0.625	1 3/8	1.375	3 1/2	3.500	0.040	VX5-1022-R4	W2084	VX5-1022-R4-W	W2144
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	0.050	VX5-1226-R5	W2095	VX5-1226-R5-W	W2155
1	1.000	1	1.000	1 7/8	1.875	4	4.000	0.060	VX5-1630-R6	W2106	VX5-1630-R6-W	W2166

## SERIES VX5CL - CORNER RADIUS, LONG LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK	
									PART #	EDP #	PART #	EDP #
1/8	0.125	1/8	0.125	7/8	0.875	2 1/2	2.500	0.015	VX5-0214-R1	W3011	—	—
3/16	0.188	3/16	0.188	7/8	0.875	2 1/2	2.500	0.015	VX5-0314-R1	W3021	—	—
1/4	0.250	1/4	0.250	1 7/8	1.875	3 1/2	3.500	0.020	VX5-0430-R2	W3032	—	—
5/16	0.313	5/16	0.313	2 1/8	2.125	4	4.000	0.030	VX5-0534-R3	W3043	—	—
3/8	0.375	3/8	0.375	2 1/8	2.125	4	4.000	0.030	VX5-0634-R3	W3053	VX5-0634-R3-W	W3113
7/16	0.438	7/16	0.438	2 1/8	2.125	4	4.000	0.030	VX5-0734-R3	W3063	VX5-0734-R3-W	W3123
1/2	0.500	1/2	0.500	2 5/8	2.625	5	5.000	0.030	VX5-0842-R3	W3073	VX5-0842-R3-W	W3133
5/8	0.625	5/8	0.625	2 5/8	2.625	5	5.000	0.040	VX5-1042-R4	W3084	VX5-1042-R4-W	W3144
3/4	0.750	3/4	0.750	2 5/8	2.625	5	5.000	0.050	VX5-1242-R5	W3095	VX5-1242-R5-W	W3155
1	1.000	1	1.000	3 3/8	3.375	6	6.000	0.060	VX5-1654-R6	W3106	VX5-1654-R6-W	W3166

# VX5 APPLICATION GUIDE • SPEED & FEED

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)								
						1/8" (5 FL)	1/4" (5 FL)	3/8" (5 FL)	1/2" (5 FL)	5/8" (5 FL)	3/4" (5 FL)	1" (5 FL)		
CARBON STEEL	LOW CARBON STEELS ≤ 38 HRC 10xx; 11xx; 12xx; 12Lxx, 15xx	Slotting	.5 x D	1 x D	5	330 - 375	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060	
		Roughing	1.5 x D	.3 x D	5	410 - 470	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0029	0.0028 - 0.0038	0.0034 - 0.0047	0.0042 - 0.0057	0.0055 - 0.0076	
		High Efficiency (HEM)	2 x D	.15 x D	5	515 - 575	0.0008 - 0.0011	0.0014 - 0.0020	0.0021 - 0.0031	0.0027 - 0.0040	0.0033 - 0.0050	0.0041 - 0.0060	0.0054 - 0.0081	
		Finishing	1.5 x D	.015 x D	5	475 - 520	0.0008 - 0.0012	0.0015 - 0.0020	0.0023 - 0.0030	0.0030 - 0.0039	0.0038 - 0.0049	0.0045 - 0.0059	0.0060 - 0.0079	
	MEDIUM CARBON STEELS ≤ 38 HRC 13xx; 41xx; 43xx; 86xx, 92xx; 93xx; Chromoly	Slotting	.5 x D	1 x D	5	305 - 350	0.0006 - 0.0008	0.0010 - 0.0014	0.0016 - 0.0022	0.0020 - 0.0028	0.0024 - 0.0034	0.0030 - 0.0042	0.0040 - 0.0056	
		Roughing	1.5 x D	.3 x D	5	375 - 430	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072	
		High Efficiency (HEM)	2 x D	.15 x D	5	470 - 525	0.0007 - 0.0010	0.0013 - 0.0019	0.0019 - 0.0029	0.0025 - 0.0038	0.0031 - 0.0048	0.0038 - 0.0057	0.0050 - 0.0077	
		Finishing	1.5 x D	.015 x D	5	425 - 465	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0028	0.0028 - 0.0037	0.0035 - 0.0046	0.0042 - 0.0056	0.0056 - 0.0075	
	TOOL STEEL	TOOL & DIE STEELS ≤ 38 HRC A2; A3; D2; H11; H13; M1; O-1; S-7; NAK 55	Slotting	.5 x D	1 x D	5	320 - 365	0.0007 - 0.0009	0.0013 - 0.0017	0.0020 - 0.0026	0.0026 - 0.0034	0.0032 - 0.0042	0.0039 - 0.0051	0.0052 - 0.0068
			Roughing	1.5 x D	.3 x D	5	395 - 450	0.0008 - 0.0012	0.0015 - 0.0020	0.0022 - 0.0030	0.0030 - 0.0040	0.0037 - 0.0050	0.0045 - 0.0060	0.0059 - 0.0080
			High Efficiency (HEM)	2 x D	.15 x D	5	495 - 550	0.0008 - 0.0011	0.0015 - 0.0021	0.0022 - 0.0032	0.0029 - 0.0042	0.0036 - 0.0053	0.0044 - 0.0063	0.0058 - 0.0085
			Finishing	1.5 x D	.015 x D	5	450 - 495	0.0008 - 0.0012	0.0015 - 0.0020	0.0023 - 0.0030	0.0030 - 0.0039	0.0038 - 0.0049	0.0045 - 0.0059	0.0060 - 0.0079
TOOL & DIE STEELS 39 to 48 HRC P20; P21; S-136; PX-5; NAK 80		Slotting	.5 x D	1 x D	5	305 - 350	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.5 x D	.3 x D	5	375 - 430	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0026	0.0024 - 0.0034	0.0029 - 0.0042	0.0036 - 0.0051	0.0047 - 0.0068	
		High Efficiency (HEM)	2 x D	.15 x D	5	470 - 525	0.0007 - 0.0010	0.0012 - 0.0018	0.0018 - 0.0028	0.0023 - 0.0036	0.0028 - 0.0045	0.0035 - 0.0054	0.0046 - 0.0073	
		Finishing	1.5 x D	.015 x D	5	425 - 465	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0025	0.0024 - 0.0033	0.0030 - 0.0041	0.0036 - 0.0050	0.0048 - 0.0067	
HARDENED STEEL		HARDENED STEELS 48 to 57 HRC	Slotting	.5 x D	1 x D	5	225 - 255	0.0005 - 0.0007	0.0008 - 0.0012	0.0013 - 0.0019	0.0016 - 0.0024	0.0019 - 0.0029	0.0024 - 0.0036	0.0032 - 0.0048
			Roughing	1.5 x D	.3 x D	5	265 - 300	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0023	0.0020 - 0.0030	0.0024 - 0.0037	0.0030 - 0.0045	0.0039 - 0.0060
			High Efficiency (HEM)	2 x D	.15 x D	5	380 - 425	0.0006 - 0.0009	0.0010 - 0.0016	0.0015 - 0.0025	0.0019 - 0.0032	0.0023 - 0.0040	0.0029 - 0.0048	0.0038 - 0.0065
			Finishing	1.5 x D	.015 x D	5	330 - 360	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0022	0.0020 - 0.0029	0.0025 - 0.0036	0.0030 - 0.0044	0.0040 - 0.0059
	HARDENED STEELS 58 to 65 HRC	Slotting	.5 x D	1 x D	5	225 - 255	0.0005 - 0.0007	0.0008 - 0.0012	0.0013 - 0.0019	0.0016 - 0.0024	0.0019 - 0.0029	0.0024 - 0.0036	0.0032 - 0.0048	
		Roughing	1.5 x D	.3 x D	5	265 - 300	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0023	0.0020 - 0.0030	0.0024 - 0.0037	0.0030 - 0.0045	0.0039 - 0.0060	
		High Efficiency (HEM)	2 x D	.15 x D	5	380 - 425	0.0006 - 0.0009	0.0010 - 0.0016	0.0015 - 0.0025	0.0019 - 0.0032	0.0023 - 0.0040	0.0029 - 0.0048	0.0038 - 0.0065	
		Finishing	1.5 x D	.015 x D	5	355 - 390	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0022	0.0020 - 0.0029	0.0025 - 0.0036	0.0030 - 0.0044	0.0040 - 0.0059	
	STAINLESS STEEL	EASY TO MACHINE 72 - 85 HRB 410; 416; 420; 430F; 440C; 302; 303	Slotting	.5 x D	1 x D	5	305 - 350	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052
			Roughing	1.25 x D	.3 x D	5	375 - 430	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0026	0.0024 - 0.0034	0.0029 - 0.0042	0.0036 - 0.0051	0.0047 - 0.0068
			High Efficiency (HEM)	2 x D	.15 x D	5	470 - 525	0.0007 - 0.0010	0.0012 - 0.0018	0.0018 - 0.0028	0.0023 - 0.0036	0.0028 - 0.0045	0.0035 - 0.0054	0.0046 - 0.0073
			Finishing	1.5 x D	.015 x D	5	425 - 465	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0025	0.0024 - 0.0033	0.0030 - 0.0041	0.0036 - 0.0050	0.0048 - 0.0067
MODERATELY DIFFICULT 79 - 85 HRB; 25 - 41 HRC 304; 304L; 316; 316L; 320; 321; 347; Invar 36; Kovar		Slotting	.5 x D	1 x D	5	275 - 315	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060	
		Roughing	1.25 x D	.3 x D	5	340 - 390	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0029	0.0028 - 0.0038	0.0034 - 0.0047	0.0042 - 0.0057	0.0055 - 0.0076	
		High Efficiency (HEM)	2 x D	.1 x D	5	425 - 475	0.0008 - 0.0011	0.0014 - 0.0020	0.0021 - 0.0031	0.0027 - 0.0040	0.0033 - 0.0050	0.0041 - 0.0060	0.0054 - 0.0081	
		Finishing	1.5 x D	.01 x D	5	380 - 415	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0028	0.0028 - 0.0037	0.0035 - 0.0046	0.0042 - 0.0056	0.0056 - 0.0075	
DIFFICULT TO MACHINE 31 - 50 HRC 13-8 PH; 15-5 PH; 17-4 PH; Carpenter; Custo 465; Invar		Slotting	.5 x D	1 x D	5	260 - 295	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0014 - 0.0022	0.0017 - 0.0027	0.0021 - 0.0033	0.0028 - 0.0044	
		Roughing	1.25 x D	.3 x D	5	320 - 365	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0021	0.0018 - 0.0028	0.0022 - 0.0035	0.0027 - 0.0042	0.0035 - 0.0056	
		High Efficiency (HEM)	1.5 x D	.1 x D	5	405 - 450	0.0005 - 0.0008	0.0009 - 0.0015	0.0013 - 0.0023	0.0017 - 0.0030	0.0021 - 0.0038	0.0026 - 0.0045	0.0034 - 0.0061	
		Finishing	1.5 x D	.01 x D	5	355 - 390	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0022	0.0020 - 0.0029	0.0025 - 0.0036	0.0030 - 0.0044	0.0040 - 0.0059	
CAST IRON	GRAY 100 - 200 HRB	Slotting	.5 x D	1 x D	5	320 - 365	0.0006 - 0.0008	0.0010 - 0.0014	0.0016 - 0.0022	0.0020 - 0.0028	0.0024 - 0.0034	0.0030 - 0.0042	0.0040 - 0.0056	
		Roughing	1.5 x D	.3 x D	5	395 - 450	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072	
		High Efficiency (HEM)	2 x D	.15 x D	5	495 - 550	0.0007 - 0.0010	0.0013 - 0.0019	0.0019 - 0.0029	0.0025 - 0.0038	0.0031 - 0.0048	0.0038 - 0.0057	0.0050 - 0.0077	
		Finishing	1.5 x D	.015 x D	5	450 - 495	0.0008 - 0.0012	0.0014 - 0.0019	0.0021 - 0.0028	0.0028 - 0.0037	0.0035 - 0.0046	0.0042 - 0.0056	0.0056 - 0.0075	
	DUCTILE 150 - 300 HRB	Slotting	.5 x D	1 x D	5	305 - 350	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.5 x D	.3 x D	5	375 - 430	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	2 x D	.15 x D	5	470 - 525	0.0006 - 0.0009	0.0011 - 0.0017	0.0016 - 0.0026	0.0021 - 0.0034	0.0026 - 0.0043	0.0032 - 0.0051	0.0042 - 0.0069	
		Finishing	1.5 x D	.015 x D	5	425 - 465	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0025	0.0024 - 0.0033	0.0030 - 0.0041	0.0036 - 0.0050	0.0048 - 0.0067	
	MALLEABLE 150 - 310 HRB	Slotting	.5 x D	1 x D	5	255 - 290	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.5 x D	.3 x D	5	295 - 335	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	2 x D	.15 x D	5	425 - 475	0.0006 - 0.0009	0.0011 - 0.0017	0.0016 - 0.0026	0.0021 - 0.0034	0.0026 - 0.0043	0.0032 - 0.0051	0.0042 - 0.0069	
		Finishing	1.5 x D	.015 x D	5	380 - 415	0.0007 - 0.0011	0.0012 - 0.0017	0.0018 - 0.0025	0.0024 - 0.0033	0.0030 - 0.0041	0.0036 - 0.0050	0.0048 - 0.0067	
ALLOYS	TITANIUM ALLOYS 70 - 100 HRB; 25 - 36 HRC Ti6Al4V; Grades 5-38	Slotting	.5 x D	1 x D	5	240 - 275	0.0005 - 0.0007	0.0008 - 0.0012	0.0013 - 0.0019	0.0016 - 0.0024	0.0019 - 0.0029	0.0024 - 0.0036	0.0032 - 0.0048	
		Roughing	1.25 x D	.3 x D	5	280 - 320	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0023	0.0020 - 0.0030	0.0024 - 0.0037	0.0030 - 0.0045	0.0039 - 0.0060	
		High Efficiency (HEM)	1.5 x D	.1 x D	5	405 - 450	0.0006 - 0.0009	0.0010 - 0.0016	0.0015 - 0.0025	0.0019 - 0.0032	0.0023 - 0.0040	0.0029 - 0.0048	0.0038 - 0.0065	
		Finishing	1.5 x D	.01 x D	5	355 - 390	0.0006 - 0.0010	0.0010 - 0.0015	0.0015 - 0.0022	0.0020 - 0.0029	0.0025 - 0.0036	0.0030 - 0.0044	0.0040 - 0.0059	
	HIGH TEMP ALLOYS 83 - 99 HRB; 30 - 52 HRC Inconel; Monel; A286; Rene; Stellite; Haynes; Waspalloy; Hastalloy; etc	Slotting	.25 x D	1 x D	5	70 - 80	0.0005 - 0.0007	0.0008 - 0.0012	0.0013 - 0.0019	0.0016 - 0.0024	0.0019 - 0.0029	0.0024 - 0.0036	0.0032 - 0.0048	



# OUR INDUSTRIES

The original tapered end mill manufacturer, Conical Tool's industry expertise runs deep and we have maintained exceptional relationships with some of the world's largest companies. Our commitment to the industry as hands-on technical experts cross many sectors and geographies. Our 70 year history coupled with analytical, innovative thinking allows us to provide our customers with the most practical and efficient solutions to their tooling needs.

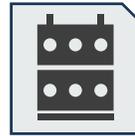
Our industry foresight is based on identifying the key issues our customers face, and developing rigorous programs to provide the most appropriate and beneficial solutions. These are only a small percentage of the industries we serve, contact us today for more information and to find out what we can do for you.



Hard Milling



Aerospace



Tool & Die



Medical



Automotive



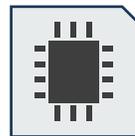
Dept. of Defense



Casting & Foundries



General Machining



Electronics



Agriculture



Furniture / Wood



Energy

NEARLY 7,000 DISTRIBUTORS WORLDWIDE & HUNDREDS OF THOUSANDS OF END USERS CAN'T BE WRONG

The manufacturing and materials industry is changing at an unprecedented pace and simply saying we supply tools to the metalworking industry would leave out a large portion of our customer base. Our tools have been used in every application imaginable, from sculptural ice carving to precision manufacturing of custom nuclear reactor parts.





## 70 YEARS OF INNOVATION



### UNMATCHED ABILITY

The Cyclone MX is a natural choice, for any ferrous or high hardness material milling, where increased feed rates are desired. Its staged, multi-flute design and AlTiN/Si3N4 Nano coating, gives you the aggressive cutting needed for hardened tool steels, stainless steels, high temp alloys and titanium.

When searching for an end mill with unmatched performance, search no more. The unique design balances tool engagement and chip evacuation to dramatically improve machine times and tool life.

Market demands continually shorten lead times and increase quality expectations for customers in the metalworking industry. The importance of doing the job right and doing it fast was the focus of the Cyclone MX's design. Engineered for precision machining of hard and difficult to machine materials, while minimizing tool deflection and taking heavy cuts, the Cyclone MX simply performs.

### END MILL PIONEERS

We have been filing patents and manufacturing end mills for worldwide distribution since the 1940's. New inventions of the 1970's increased production levels to meet the demands of the global marketplace, but we kept innovating, essentially creating the first CNC machine process capable of grinding complex shapes. Our innovations are still being employed today, as the most effective methods know in the industry.

Global Cutting Tools  
Conical Tool Company

3890 Buchanan Ave SW  
Grand Rapids, MI 49548  
T: 888.531.8500 | P: 616.531.8500  
F: 616.531.7742 | E: info@conicaltool.com  
W: www.conicalendmills.com  
W: www.globalcuttingtools.com



Global Cutting Tools are distributed by:

**OVER 7,000  
DISTRIBUTORS WORLDWIDE**



Made in the U.S.A.

NEW PREMIUM TOOL LINE!



# CYCLONE MX™

HIGH FEED & HIGH HARDNESS MILLING



AMERICAN  
MADE

GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR AGGRESSIVE MACHINING OF FERROUS AND HARDENED MATERIALS





# CYCLONE MX™

HIGH FEED & HIGH HARDNESS MILLING

## AGGRESSIVE MACHINING

OF FERROUS & HARDENED MATERIALS

### FEATURES & BENEFITS

The Cyclone MX excels at milling difficult to machine materials. The massive core increases stability and reduces tool deflection, while the rugged high strength six and eight flute design, maximizes the relationship between flute engagement and chip evacuation. Engineered with an advanced variable geometry, the Cyclone MX performs high speed, high efficiency machining of light to medium cuts. Its versatility allows the tool to be used either wet or dry.

#### General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

#### Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

#### Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL**™  
CUTTING TOOLS

# SERIES: CMX

For high performance milling of difficult to machine materials to improve chip evacuation while light to medium roughing or finishing; wet or dry; hardened tool steel > 48 HRC; stainless steel; high temp alloys; and titanium < 65HRC.

**Square end option to create sharp corners in finishing operations**

**Coated for heat resistance, wear resistance and increased lubricity**

**Improved tool stability through multi-flute flute design keeps more cutting edges engaged, creating a superior surface finish**

**High helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life**

**High strength flutes reduce edge chipping, built up edge and extends tool life**

**Corner radius protects corners during tool entry and roughing operations in difficult to machine materials by preventing corner chipping and tool failure**

**Engineered flute relief allows for superior chip evacuation without compromising flute integrity**

**Reduced neck option increases stability and reduces tool deflection while maintaining overall reach**

**Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds**

6 Flute      8 Flute      6 Flute      8 Flute

Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

<b>TIP &amp; END</b>	<b>SHANK &amp; LENGTH</b>	<b>FLUTE CONFIGURATION</b>	<b>MATERIAL</b>	<b>COATING</b>

## RESULTS

At the end of the day, you will have relied on the quality of the tool to do the work for you and maintain profitability. The Cyclone MX ensures reductions in edge chipping, built up edge and guarantees extended tool life. A higher helix angle reduces cutting forces by creating a higher shearing

plane, which again results in efficiencies and even longer tool life. The advantage of using a few quality end mills, instead of many less expensive ones, is more than just added profit; its quality you can trust.

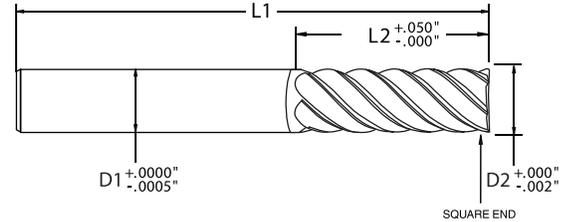
Series **CMX**: Micro-Grain Carbide, 6 & 8 Flute, Advanced Variable Geometry, AITIN/Si3N4 Coated  
 SubSeries: **CMXSR**, **CMXSL**, **CMXSN**, **CMXCR**, **CMXCL**, **CMXCN**  
 Configuration: Varying Diameters; Regular, Long, Extra-Long and Reduced Neck Lengths;  
 44/45/46° Variable Helix; Square End & Corner Radius

## SERIES CMX - CARBIDE, 6 & 8 FLUTE, 44/45/46° VARIABLE HELIX

### AGGRESSIVE CUTTING

The Cyclone MX has a staged, multi-flute design and AlTiN/Si3N4 coating, to give you the aggressive cutting needed for hardened tool steels, stainless steels, high temp alloys and titanium.

- Square end option to create sharp corners in finishing operations
- Coated for heat resistance, wear resistance and increased lubricity
- Improved tool stability through multi-flute flute design keeps more cutting edges engaged, creating a superior surface finish
- High helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

### SERIES CMXSR - SQUARE END, REGULAR LENGTH

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	# OF FLUTES	PLAIN SHANK		WELDON SHANK				
					PART #	EDP #	PART #	EDP #			
1/8	0.125	1/8	0.125	5/8	0.625	2 1/2	2.500	—	—		
3/16	0.188	3/16	0.188	5/8	0.625	2 1/2	2.500	—	—		
1/4	0.250	1/4	0.250	5/8	0.625	2 1/2	2.500	—	—		
5/16	0.313	5/16	0.313	7/8	0.875	3	3.000	—	—		
3/8	0.375	3/8	0.375	5/8	0.625	2 1/2	2.500	CMX-0610-SQ	C2055	CMX-0610-SQ-W	C2145
				7/8	0.875	3	3.000	CMX-0614-SQ	C2065	CMX-0614-SQ-W	C2155
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	CMX-0718-SQ	C2075	CMX-0718-SQ-W	C2165
				7/8	0.875	3 1/2	3.500	CMX-0814-SQ	C2085	CMX-0814-SQ-W	C2175
1/2	0.500	1/2	0.500	1 3/8	1.375	3 1/2	3.500	CMX-0822-SQ	C2095	CMX-0822-SQ-W	C2185
				7/8	0.875	3	3.000	CMX-1014-SQ	C2105	CMX-1014-SQ-W	C2195
5/8	0.625	5/8	0.625	1 3/8	1.375	3 1/2	3.500	CMX-1022-SQ	C2115	CMX-1022-SQ-W	C2205
				3/4	0.750	4	4.000	CMX-1226-SQ	C2125	CMX-1226-SQ-W	C2215
1	1.000	1	1.000	1 7/8	1.875	4	4.000	CMX-1630-SQ	C2135	CMX-1630-SQ-W	C2225

### SERIES CMXSL - SQUARE END, LONG LENGTH

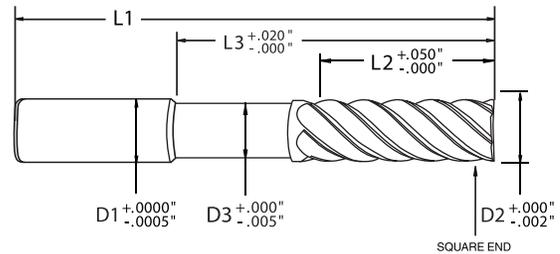
SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	# OF FLUTES	PLAIN SHANK		WELDON SHANK				
					PART #	EDP #	PART #	EDP #			
1/8	0.125	1/8	0.125	7/8	0.875	3	3.000	CMX-0214-SQ	C3015	—	—
3/16	0.188	3/16	0.188	7/8	0.875	3	3.000	CMX-0314-SQ	C3025	—	—
1/4	0.250	1/4	0.250	1 1/8	1.125	4	4.000	CMX-0418-SQ	C3035	—	—
5/16	0.313	5/16	0.313	1 5/8	1.625	4	4.000	CMX-0526-SQ	C3045	—	—
3/8	0.375	3/8	0.375	1 7/8	1.875	4	4.000	CMX-0630-SQ	C3055	CMX-0630-SQ-W	C3135
				2 1/8	2.125	4	4.000	CMX-0734-SQ	C3065	CMX-0734-SQ-W	C3145
7/16	0.438	7/16	0.438	2 1/8	2.125	4	4.000	CMX-0834-SQ	C3075	CMX-0834-SQ-W	C3155
				2 5/8	2.625	5	5.000	CMX-1042-SQ	C3085	CMX-1042-SQ-W	C3165
3/4	0.750	3/4	0.750	2 5/8	2.625	5	5.000	CMX-1242-SQ	C3095	CMX-1242-SQ-W	C3175
				3 3/8	3.375	6	6.000	CMX-1254-SQ	C3105	CMX-1254-SQ-W	C3185
1	1.000	1	1.000	4 3/8	4.375	7	7.000	CMX-1270-SQ	C3115	CMX-1270-SQ-W	C3195
				4 3/8	4.375	7	7.000	CMX-1670-SQ	C3125	CMX-1670-SQ-W	C3205

## SERIES CMX - CARBIDE, 6 & 8 FLUTE, 44/45/46° VARIABLE HELIX

### UNMATCHED PERFORMANCE

When searching for an end mill with unmatched performance, search no more. The unique design balances tool engagement and chip evacuation to dramatically improve machine times and tool life.

- Reduced neck option increases stability and reduces tool deflection while maintaining overall reach
- High strength flutes reduce edge chipping, built up edge and extends tool life
- Engineered flute relief allows for superior chip evacuation without compromising flute integrity



### SERIES CMXSN - SQUARE END, REDUCED NECK



SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		NECK LBS (L3)		NECK DIAMETER (D3)	# OF FLUTES	PLAIN SHANK		WELDON SHANK	
PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #		EDP #	PART #	EDP #	
1/8	0.125	1/8	0.125	1/4	0.250	2	2.000	1/2	0.500	0.118	6	CMX-0204-RN1-SQ	C501S	—	—
						3	3.000	1 1/2	1.500			CMX-0204-RN2-SQ	C502S	—	—
3/16	0.188	3/16	0.188	5/16	0.313	2	2.000	9/16	0.563	0.176		CMX-0305-RN1-SQ	C503S	—	—
						3	3.000	1 9/16	1.563			CMX-0305-RN2-SQ	C504S	—	—
1/4	0.250	1/4	0.250	3/8	0.375	2 1/2	2.500	1 1/8	1.125	0.235		CMX-0406-RN1-SQ	C505S	—	—
						3 1/2	3.500	2 1/8	2.125			CMX-0406-RN2-SQ	C506S	—	—
5/16	0.313	5/16	0.313	1/2	0.500	3	3.000	1 1/8	1.125	0.298		CMX-0508-RN1-SQ	C507S	—	—
						4	4.000	2 1/8	2.125			CMX-0508-RN2-SQ	C508S	—	—
3/8	0.375	3/8	0.375	1/2	0.500	3	3.000	1 1/8	1.125	0.355		CMX-0608-RN1-SQ	C509S	CMX-0608-RN1-SQ-W	C521S
						4	4.000	2 1/8	2.125			CMX-0608-RN2-SQ	C510S	CMX-0608-RN2-SQ-W	C522S
7/16	0.438	7/16	0.438	5/8	0.625	3	3.000	1 3/8	1.375	0.418		CMX-0710-RN1-SQ	C511S	CMX-0710-RN1-SQ-W	C523S
						4	4.000	2 3/8	2.375			CMX-0710-RN2-SQ	C512S	CMX-0710-RN2-SQ-W	C524S
1/2	0.500	1/2	0.500	5/8	0.625	3 1/2	3.500	1 3/8	1.375	0.475	CMX-0810-RN1-SQ	C513S	CMX-0810-RN1-SQ-W	C525S	
						4 1/2	4.500	2 3/8	2.375		CMX-0810-RN2-SQ	C514S	CMX-0810-RN2-SQ-W	C526S	
5/8	0.625	5/8	0.625	3/4	0.750	3 1/2	3.500	1 1/2	1.500	0.590	CMX-1012-RN1-SQ	C515S	CMX-1012-RN1-SQ-W	C527S	
						5	5.000	2 1/2	2.500		CMX-1012-RN2-SQ	C516S	CMX-1012-RN2-SQ-W	C528S	
3/4	0.750	3/4	0.750	1	1.000	4	4.000	1 3/4	1.750	0.715	CMX-1216-RN1-SQ	C517S	CMX-1216-RN1-SQ-W	C529S	
						5	5.000	2 3/4	2.750		CMX-1216-RN2-SQ	C518S	CMX-1216-RN2-SQ-W	C530S	
						6	6.000	3 3/4	3.750		CMX-1216-RN3-SQ	C519S	CMX-1216-RN3-SQ-W	C533S	
1	1.000	1	1.000	1 1/8	1.125	4	4.000	1 7/8	1.875	0.960	CMX-1618-RN1-SQ	C519S	CMX-1618-RN1-SQ-W	C531S	
						5	5.000	2 7/8	2.875		CMX-1618-RN2-SQ	C520S	CMX-1618-RN2-SQ-W	C532S	
						6	6.000	3 7/8	3.875		CMX-1618-RN3-SQ	C522S	CMX-1618-RN3-SQ-W	C536S	

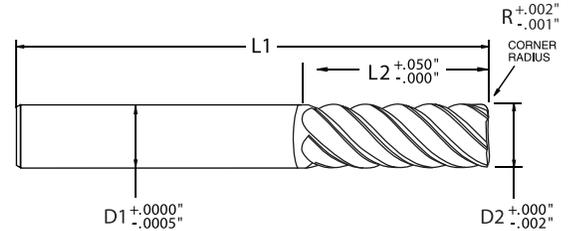
- CB CARBIDE
- HSS HIGH SPEED STEEL
- VORTEX4
- VORTEX5
- CYCLONE MX
- HYDRA FX
- XTERRA3
- EXTREME3
- ZEPHYR3
- ALUMINUM 2 & 3 FLUTE
- CONICAL TAPERED CARBIDE
- CONICAL TAPERED HSS
- CONICAL TAPERED LHS - RHC
- CHAMFER CUTTERS
- TAPERED MINIATURES
- AUTOMOTIVE TAPERS
- DIE & MOLD CUTTERS
- PROFILE RIB CUTTERS
- RUNNER CUTTERS
- DIE SINKS
- GENERAL PURPOSE

## SERIES CMX - CARBIDE, 6 & 8 FLUTE, 44/45/46° VARIABLE HELIX

### PRECISION MACHINING

Engineered for precision machining of hard and difficult to machine materials, while minimizing tool deflection and taking heavy cuts, the Cyclone MX simply performs.

- Corner radius protects corners during tool entry and roughing operations in difficult to machine materials by preventing corner chipping and tool failure
- Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds
- Large core design for increased stability; higher speeds & feeds; and reduced tool deflection in difficult to machine materials



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

### SERIES CMXCR - CORNER RADIUS, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		# OF FLUTES	CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK	
PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #			PART #	EDP #		
1/8	0.125	1/8	0.125	5/8	0.625	2 1/2	2.500	6	0.015	CMX-0210-R1	C2011	—	—
3/16	0.188	3/16	0.188	5/8	0.625	2 1/2	2.500		0.015	CMX-0310-R1	C2021	—	—
1/4	0.250	1/4	0.250	5/8	0.625	2 1/2	2.500		0.020	CMX-0410-R2	C2032	—	—
5/16	0.313	5/16	0.313	7/8	0.875	3	3.000		0.030	CMX-0514-R3	C2043	—	—
3/8	0.375	3/8	0.375	5/8	0.625	2 1/2	2.500		0.030	CMX-0610-R3	C2053	CMX-0610-R3-W	C2143
				7/8	0.875	3	3.000		0.030	CMX-0614-R3	C2063	CMX-0614-R3-W	C2153
7/16	0.438	7/16	0.438	11/8	1.125	3	3.000		0.030	CMX-0718-R3	C2073	CMX-0718-R3-W	C2163
				7/8	0.875	3 1/2	3.500		0.030	CMX-0814-R3	C2083	CMX-0814-R3-W	C2173
1/2	0.500	1/2	0.500	13/8	1.375	3 1/2	3.500		0.030	CMX-0822-R3	C2093	CMX-0822-R3-W	C2183
				7/8	0.875	3	3.000		0.040	CMX-1014-R4	C2104	CMX-1014-R4-W	C2194
5/8	0.625	5/8	0.625	13/8	1.375	3 1/2	3.500	0.040	CMX-1022-R4	C2114	CMX-1022-R4-W	C2204	
				3/4	0.750	15/8	1.625	4	4.000	0.050	CMX-1226-R5	C2125	CMX-1226-R5-W
1	1.000	1	1.000	17/8	1.875	4	4.000	0.060	CMX-1630-R6	C2136	CMX-1630-R6-W	C2226	

### SERIES CMXCL - CORNER RADIUS, LONG LENGTH

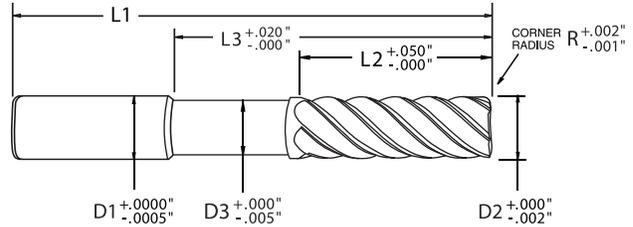
SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		# OF FLUTES	CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK	
PART #	EDP #	PART #	EDP #	PART #	EDP #	PART #	EDP #			PART #	EDP #		
1/8	0.125	1/8	0.125	7/8	0.875	3	3.000	6	0.015	CMX-0214-R1	C3011	—	—
3/16	0.188	3/16	0.188	7/8	0.875	3	3.000		0.015	CMX-0314-R1	C3021	—	—
1/4	0.250	1/4	0.250	1 1/8	1.125	4	4.000		0.020	CMX-0418-R2	C3032	—	—
5/16	0.313	5/16	0.313	1 5/8	1.625	4	4.000		0.030	CMX-0526-R3	C3043	—	—
3/8	0.375	3/8	0.375	1 7/8	1.875	4	4.000		0.030	CMX-0630-R3	C3053	CMX-0630-R3-W	C3133
				2 1/8	2.125	4	4.000		0.030	CMX-0734-R3	C3063	CMX-0734-R3-W	C3143
7/16	0.438	7/16	0.438	2 1/8	2.125	4	4.000		0.030	CMX-0834-R3	C3073	CMX-0834-R3-W	C3153
				2 5/8	2.625	5	5.000		0.040	CMX-1042-R4	C3084	CMX-1042-R4-W	C3164
5/8	0.625	5/8	0.625	2 5/8	2.625	5	5.000		0.050	CMX-1242-R5	C3095	CMX-1242-R5-W	C3175
				3 3/8	3.375	6	6.000		0.050	CMX-1254-R5	C3105	CMX-1254-R5-W	C3185
3/4	0.750	3/4	0.750	4 3/8	4.375	7	7.000	0.050	CMX-1270-R5	C3115	CMX-1270-R5-W	C3195	
				1	1.000	1	1.000	4 3/8	4.375	7	7.000	0.060	CMX-1670-R6

## SERIES CMX - CARBIDE, 6 & 8 FLUTE, 44/45/46° VARIABLE HELIX

### INCREASED STABILITY

The massive core increases stability and reduces tool deflection, while the rugged high strength six and eight flute design, maximizes the relationship between flute engagement and chip evacuation.

- Reduced neck option increases stability and reduces tool deflection while maintaining overall reach
- High strength flutes reduce edge chipping, built up edge and extends tool life
- Engineered flute relief allows for superior chip evacuation without compromising flute integrity



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

## SERIES CMXCN - CORNER RADIUS, REDUCED NECK

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)		NECK LBS (L3)		NECK DIAMETER (L3)	# OF FLUTES	CORNER RADIUS (R)	PLAIN SHANK		WELDON SHANK				
			2	3	1	2				PART #	EDP #	PART #	EDP #			
1/8	0.125	1/8	0.125	1/4	0.250	2	2.000	1/2	0.500	0.118	6	0.015	CMX-0204-RN1-R1	C5011	—	—
						3	3.000	1 1/2	1.500				CMX-0204-RN2-R1	C5021	—	—
3/16	0.188	3/16	0.188	5/16	0.313	2	2.000	9/16	0.563	0.176	6	0.015	CMX-0305-RN1-R1	C5031	—	—
						3	3.000	1 9/16	1.563				CMX-0305-RN2-R1	C5041	—	—
1/4	0.250	1/4	0.250	3/8	0.375	2 1/2	2.500	1 1/8	1.125	0.235	6	0.020	CMX-0406-RN1-R2	C5052	—	—
						3 1/2	3.500	2 1/8	2.125				CMX-0406-RN2-R2	C5062	—	—
5/16	0.313	5/16	0.313	1/2	0.500	3	3.000	1 1/8	1.125	0.298	6	0.030	CMX-0508-RN1-R3	C5073	—	—
						4	4.000	2 1/8	2.125				CMX-0508-RN2-R3	C5083	—	—
3/8	0.375	3/8	0.375	1/2	0.500	3	3.000	1 1/8	1.125	0.355	6	0.030	CMX-0608-RN1-R3	C5093	CMX-0608-RN1-R3-W	C5213
						4	4.000	2 1/8	2.125				CMX-0608-RN2-R3	C5103	CMX-0608-RN2-R3-W	C5223
7/16	0.438	7/16	0.438	5/8	0.625	3	3.000	1 3/8	1.375	0.418	6	0.030	CMX-0710-RN1-R3	C5113	CMX-0710-RN1-R3-W	C5233
						4	4.000	2 3/8	2.375				CMX-0710-RN2-R3	C5123	CMX-0710-RN2-R3-W	C5243
1/2	0.500	1/2	0.500	5/8	0.625	3 1/2	3.500	1 3/8	1.375	0.475	6	0.030	CMX-0810-RN1-R3	C5133	CMX-0810-RN1-R3-W	C5253
						4 1/2	4.500	2 3/8	2.375				CMX-0810-RN2-R3	C5143	CMX-0810-RN2-R3-W	C5263
5/8	0.625	5/8	0.625	3/4	0.750	3 1/2	3.500	1 1/2	1.500	0.590	6	0.040	CMX-1012-RN1-R4	C5154	CMX-1012-RN1-R4-W	C5274
						5	5.000	2 1/2	2.500				CMX-1012-RN2-R4	C5164	CMX-1012-RN2-R4-W	C5284
3/4	0.750	3/4	0.750	1	1.000	4	4.000	1 3/4	1.750	0.715	6	0.050	CMX-1216-RN1-R5	C5175	CMX-1216-RN1-R5-W	C5295
						5	5.000	2 3/4	2.750				CMX-1216-RN2-R5	C5185	CMX-1216-RN2-R5-W	C5305
						6	6.000	3 3/4	3.750				CMX-1216-RN3-R5	C5195	CMX-1216-RN3-R5-W	C5335
1	1.000	1	1.000	1 1/8	1.125	4	4.000	1 7/8	1.875	0.960	6	0.060	CMX-1618-RN1-R6	C5196	CMX-1618-RN1-R6-W	C5316
						5	5.000	2 7/8	2.875				CMX-1618-RN2-R6	C5206	CMX-1618-RN2-R6-W	C5326
						6	6.000	3 7/8	3.875				CMX-1618-RN3-R6	C5226	CMX-1618-RN3-R6-W	C5366

- CB CARBIDE
- HSS HIGH SPEED STEEL
- VORTEX4
- VORTEX5
- CYCLONE MX
- HYDRA FX
- XTERRA3
- EXTREME3
- ZEPHYR3
- ALUMINUM 2 & 3 FLUTE
- CONICAL TAPERED CARBIDE
- CONICAL TAPERED HSS
- CONICAL TAPERED LHS - RHC
- CHAMFER CUTTERS
- TAPERED MINIATURES
- AUTOMOTIVE TAPERS
- DIE & MOLD CUTTERS
- PROFILE RIB CUTTERS
- RUNNER CUTTERS
- DIE SINKS
- GENERAL PURPOSE

# CMX APPLICATION GUIDE • SPEEDS & FEEDS

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)								
						1/8" (6 FL)	1/4" (6 FL)	3/8" (6 FL)	1/2" (6 FL)	5/8" (6 FL)	3/4" (8 FL)	1" (8 FL)		
CARBON STEEL	LOW CARBON STEELS ≤ 38 HRC 10xx; 11xx; 12xx; 12Lxx, 15xx	Slotting	1 x D	1 x D	6 / 8	255 - 290	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.5 x D	.5 x D	6 / 8	295 - 335	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	2 x D	.2 x D	6 / 8	425 - 475	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0033 - 0.0046	0.0041 - 0.0058	0.0050 - 0.0069	0.0066 - 0.0093	
	MEDIUM CARBON STEELS ≤ 38 HRC 13xx; 41xx; 43xx; 86xx, 92xx; 93xx; Chromoly	Slotting	1 x D	1 x D	6 / 8	260 - 295	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.5 x D	.5 x D	6 / 8	280 - 320	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	2 x D	.2 x D	6 / 8	405 - 450	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0033 - 0.0046	0.0041 - 0.0058	0.0050 - 0.0069	0.0066 - 0.0093	
	TOOL & DIE STEELS	TOOL & DIE STEELS ≤ 38 HRC A2; A3; D2; H11; H13; M1; O-1; S-7; NAK 55	Slotting	1 x D	1 x D	6 / 8	200 - 230	0.0006 - 0.0008	0.0010 - 0.0014	0.0016 - 0.0022	0.0020 - 0.0028	0.0024 - 0.0034	0.0030 - 0.0042	0.0040 - 0.0056
			Roughing	1.5 x D	.5 x D	6 / 8	335 - 385	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064
			High Efficiency (HEM)	2 x D	.2 x D	6 / 8	450 - 500	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0033 - 0.0046	0.0041 - 0.0058	0.0050 - 0.0069	0.0066 - 0.0093
TOOL & DIE STEELS 39 to 48 HRC P20; P21; S-136; PX-5; NAK 80		Slotting	.75 x D	1 x D	6 / 8	190 - 215	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.5 x D	.3 x D	6 / 8	295 - 335	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	2 x D	.15 x D	6 / 8	425 - 475	0.0008 - 0.0011	0.0015 - 0.0021	0.0022 - 0.0032	0.0029 - 0.0042	0.0036 - 0.0053	0.0044 - 0.0063	0.0058 - 0.0085	
HARDENED STEEL		HARDENED STEELS 48 to 57 HRC	Slotting	1 x D	1 x D	6 / 8	100 - 115	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0014 - 0.0022	0.0017 - 0.0027	0.0021 - 0.0033	0.0028 - 0.0044
			Roughing	1.5 x D	.5 x D	6 / 8	170 - 195	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0021	0.0018 - 0.0028	0.0022 - 0.0035	0.0027 - 0.0042	0.0035 - 0.0056
			High Efficiency (HEM)	2 x D	.2 x D	6 / 8	345 - 385	0.0006 - 0.0009	0.0011 - 0.0017	0.0016 - 0.0026	0.0021 - 0.0034	0.0026 - 0.0043	0.0032 - 0.0051	0.0042 - 0.0069
	HARDENED STEELS 58 to 65HRC	Slotting	.75 x D	1 x D	6 / 8	90 - 100	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0014 - 0.0022	0.0017 - 0.0027	0.0021 - 0.0033	0.0028 - 0.0044	
		Roughing	1.5 x D	.3 x D	6 / 8	160 - 180	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0021	0.0018 - 0.0028	0.0022 - 0.0035	0.0027 - 0.0042	0.0035 - 0.0056	
		High Efficiency (HEM)	2 x D	.15 x D	6 / 8	365 - 410	0.0005 - 0.0008	0.0009 - 0.0015	0.0013 - 0.0023	0.0017 - 0.0030	0.0021 - 0.0038	0.0026 - 0.0045	0.0034 - 0.0061	
	STAINLESS STEEL	EASY TO MACHINE 72 - 85 HRB 410; 416; 420; 430F; 440C; 302; 303	Slotting	.75 x D	1 x D	6 / 8	190 - 215	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0014 - 0.0022	0.0017 - 0.0027	0.0021 - 0.0033	0.0028 - 0.0044
			Roughing	1.25 x D	.3 x D	6 / 8	265 - 300	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0021	0.0018 - 0.0028	0.0022 - 0.0035	0.0027 - 0.0042	0.0035 - 0.0056
			High Efficiency (HEM)	2 x D	.15 x D	6 / 8	410 - 460	0.0006 - 0.0009	0.0011 - 0.0017	0.0016 - 0.0026	0.0021 - 0.0034	0.0026 - 0.0043	0.0032 - 0.0051	0.0042 - 0.0069
MODERATELY DIFFICULT 79 - 85 HRB; 25 - 41 HRC 304; 304L; 316; 316L; 320; 321; 347; Invar 36; Kovar		Slotting	.75 x D	1 x D	6 / 8	190 - 215	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.25 x D	.3 x D	6 / 8	220 - 250	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072	
		High Efficiency (HEM)	2 x D	.1 x D	6 / 8	320 - 360	0.0010 - 0.0013	0.0019 - 0.0025	0.0028 - 0.0038	0.0037 - 0.0050	0.0046 - 0.0063	0.0056 - 0.0075	0.0074 - 0.0101	
DIFFICULT TO MACHINE 31 - 50 HRC 13-8 PH; 15-5 PH; 17-4 PH; Carpenter; Custo 465; Invar		Slotting	.5 x D	1 x D	6 / 8	185 - 210	0.0005 - 0.0007	0.0009 - 0.0013	0.0014 - 0.0020	0.0018 - 0.0026	0.0022 - 0.0032	0.0027 - 0.0039	0.0036 - 0.0052	
		Roughing	1.25 x D	.3 x D	6 / 8	235 - 270	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	1.5 x D	.1 x D	6 / 8	315 - 350	0.0011 - 0.0014	0.0021 - 0.0027	0.0031 - 0.0041	0.0041 - 0.0054	0.0051 - 0.0068	0.0062 - 0.0081	0.0082 - 0.0109	
CAST IRON	GRAY 100 - 200 HRB	Slotting	1 x D	1 x D	6 / 8	275 - 315	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060	
		Roughing	1.5 x D	.5 x D	6 / 8	340 - 390	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072	
		High Efficiency (HEM)	2 x D	.2 x D	6 / 8	425 - 475	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0033 - 0.0046	0.0041 - 0.0058	0.0050 - 0.0069	0.0066 - 0.0093	
	DUCTILE 150 - 300 HRB	Slotting	1 x D	1 x D	6 / 8	275 - 315	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060	
		Roughing	1.5 x D	.5 x D	6 / 8	340 - 390	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072	
		High Efficiency (HEM)	2 x D	.2 x D	6 / 8	425 - 475	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0033 - 0.0046	0.0041 - 0.0058	0.0050 - 0.0069	0.0066 - 0.0093	
	MALLEABLE 150 - 310 HRB	Slotting	1 x D	1 x D	6 / 8	275 - 315	0.0006 - 0.0008	0.0011 - 0.0015	0.0017 - 0.0023	0.0022 - 0.0030	0.0027 - 0.0037	0.0033 - 0.0045	0.0044 - 0.0060	
		Roughing	1.5 x D	.5 x D	6 / 8	340 - 390	0.0007 - 0.0011	0.0013 - 0.0018	0.0019 - 0.0027	0.0026 - 0.0036	0.0032 - 0.0045	0.0039 - 0.0054	0.0051 - 0.0072	
		High Efficiency (HEM)	2 x D	.2 x D	6 / 8	425 - 475	0.0009 - 0.0012	0.0017 - 0.0023	0.0025 - 0.0035	0.0033 - 0.0046	0.0041 - 0.0058	0.0050 - 0.0069	0.0066 - 0.0093	
ALLOYS	TITANIUM ALLOYS 70 - 100 HRB; 25 - 36 HRC Ti61AL4V; Grades 5-38	Slotting	.5 x D	1 x D	6 / 8	170 - 195	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0014 - 0.0022	0.0017 - 0.0027	0.0021 - 0.0033	0.0028 - 0.0044	
		Roughing	1.25 x D	.3 x D	6 / 8	220 - 250	0.0006 - 0.0010	0.0011 - 0.0016	0.0016 - 0.0024	0.0022 - 0.0032	0.0027 - 0.0040	0.0033 - 0.0048	0.0043 - 0.0064	
		High Efficiency (HEM)	1.5 x D	.1 x D	6 / 8	315 - 350	0.0011 - 0.0014	0.0021 - 0.0027	0.0031 - 0.0041	0.0041 - 0.0054	0.0051 - 0.0068	0.0062 - 0.0081	0.0082 - 0.0109	
	HIGH TEMP ALLOYS 83 - 99 HRB; 30 - 52 HRC Inconel; Monel; A286; Reue; Stellite; Haynes; Waspalloy; Hastalloy; etc	Slotting	.25 x D	1 x D	6 / 8	60 - 65	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0014 - 0.0022	0.0017 - 0.0027	0.0021 - 0.0033	0.0028 - 0.0044	
		Roughing	1.25 x D	.25 x D	6 / 8	75 - 85	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0021	0.0018 - 0.0028	0.0022 - 0.0035	0.0027 - 0.0042	0.0035 - 0.0056	
		High Efficiency (HEM)	1.5 x D	.1 x D	6 / 8	155 - 175	0.0005 - 0.0008	0.0009 - 0.0015	0.0013 - 0.0023	0.0017 - 0.0030	0.0021 - 0.0038	0.0026 - 0.0045	0.0034 - 0.0061	
	Finishing	1.5 x D	.01 x D	6 / 8	115 - 125	0.0005 - 0.0009	0.0009 - 0.0014	0.0014 - 0.0021	0.0018 - 0.0027	0.0023 - 0.0034	0.0027 - 0.0041	0.0036 - 0.0055		

D = tool diameter • Reduce feed rates by 20% when using long length tools • Use reduced neck tooling for long reach slotting • Starting parameters shown





## 70 YEARS OF INNOVATION



### UNRIVALED QUALITY

The Hydra FX keeps the tight tolerance finishing of ferrous materials under control. This high performance end mill is fashioned from micro-grain carbide, with a multilayer AlCrN/Si3N4 coating.

The staged multi-flute design maximizes core diameter and keeps the highest number of flutes engaged possible. When flawless surface finishes are critical; this end mill delivers impressive results, wet or dry.

Smooth, chatterless cutting and high feed finishing is only possible with a stable, engaged tool.

There are many inferior solutions, but when finish quality is critical, the Hydra FX is the only choice. Its advanced variable geometry staggers the entry and exit of the flutes reducing vibration and creates a fluid machining environment.



## EXPERIENCE THAT COUNTS

We spend thousands of hours each year creating custom, complex geometries and additional time testing and refining those designs based on customer feedback. That experience is poured right back into every new tool line we design. Multiple designs are tested in a multitude of materials, in a never ending quest for the highest performing end mills in the industry.

Global Cutting Tools  
Conical Tool Company

3890 Buchanan Ave SW  
Grand Rapids, MI 49548  
T: 888.531.8500 | P: 616.531.8500  
F: 616.531.7742 | E: info@conicaltool.com  
W: www.conicalendmills.com  
W: www.globalcuttingtools.com



Global Cutting Tools are distributed by:

**OVER 7,000  
DISTRIBUTORS WORLDWIDE**



NEW PREMIUM TOOL LINE!



# HYDRA FX™

PERFORMANCE FINISHING

AMERICAN  
MADE



GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR TIGHT TOLERANCE FINISHING OF FERROUS MATERIALS





# HYDRA FX™

PERFORMANCE FINISHING

## TIGHT TOLERANCE FINISHING

OF FERROUS MATERIALS

### FEATURES & BENEFITS

Welcome to the 21st century of metalworking and the Hydra FX line of high performance finishing end mills. Imagine high speed, tight tolerance milling that produces a remarkable surface finish. Our HydraFX line is offered in 5, 7, 9 and 11 flute configurations to meet any and all of your surface finish challenges. The odd number of flutes design is engineered for strength and endurance, as well as to resist many common machining problems. Consistent and smooth tool engagement was the motivation behind our engineering philosophy.

General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL™**  
CUTTING TOOLS

# SERIES: HFX

For high feed finishing and tight tolerance milling of most ferrous materials where excellent surface finishes are critical. Higher flute counts promote smoother cutting actions, increased tool life, improved productivity and performance; wet or dry; low carbon steel to titanium up to 65 HRC.

**Square end option to create sharp corners in finishing operations**

**Coated for heat resistance, wear resistance and increased lubricity**

**Improved tool stability through multi-flute flute design keeps more cutting edges engaged, creating a superior surface finish**

**High strength flutes reduce edge chipping, built up edge and extends tool life**

**Large core design for increased stability; higher speeds & feeds; and reduced tool deflection in difficult to machine materials**

**Corner radius option protects corners in difficult to machine materials by preventing corner chipping and tool failure**

**Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds**

**Helix angle allows for proper chip management and longer tool life**

**Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges**

**Engineered flute relief allows for superior chip evacuation without compromising flute integrity**

5 Flute 1/8" - 3/16"  
7 Flute 1/4" - 3/8"  
9 Flute 7/16" - 5/8"  
11 Flute 3/4" - 1"

Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

<b>TIP &amp; END</b>	<b>SHANK &amp; LENGTH</b>	<b>FLUTE CONFIGURATION</b>	<b>MATERIAL</b>	<b>COATING</b>

## RESULTS

The Hydra FX is designed with a 35 degree constant helix and is coated for heat resistance and added lubricity. Available in 5, 7, 9 & 11 flute designs, the odd number of flutes create quiet machining, while more cutting edges engaged enables superior stability and chip management.

The Hydra FX end mill is available in square end and corner radius options, to make sharp corners in finishing operations, or protect corners in difficult to machine materials. Every HydraFX end mill will leave your work piece with a near polished shine, while ensuring your future in the industry does the same.

Series HFX: Micro-Grain Carbide, Multi-Flute Configuration, Vibration Dampening Geometry, AlCrN/Si3N4 Coated  
Subseries: HFXSR, HFXCR

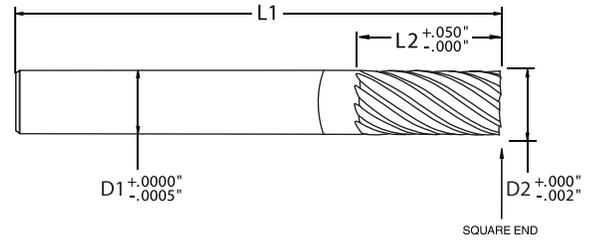
Configuration: Varying Diameters; Regular Lengths; 35° Constant Helix; 5 Flutes (1/8" - 3/16"); 7 Flutes (1/4" - 3/8"); 9 Flutes (7/16" - 5/8"); 11 Flutes (3/4" - 1"); Square End & Corner Radius

## SERIES HFX - CARBIDE, 5, 7, 9, & 11 FLUTE, 35° CONSTANT HELIX

### TIGHT TOLERANCE FINISHING

The Hydra FX keeps the tight tolerance finishing of ferrous materials under control. This high performance end mill is fashioned from micro-grain carbide, with a multilayer AlTiN/Si3N4 coating.

- Square end option to create sharp corners in finishing operations
- Improved tool stability through multi-flute flute design keeps more cutting edges engaged, creating a superior surface finish
- High strength flutes reduce edge chipping, built up edge and extends tool life
- Helix angle allows for proper chip management and longer tool life



TIP & END	SHANK & LENGTH	FLUTE CONFIGURATION	MATERIAL	COATING

## SERIES HFXSR - SQUARE END, REGULAR LENGTH

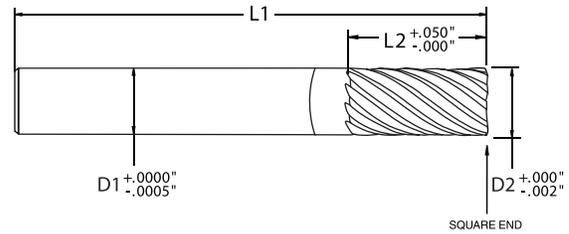
SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		# OF FLUTES	PLAIN SHANK	
									PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	5	HFX-0210-SQ	H201S
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000		HFX-0310-SQ	H202S
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	7	HFX-0414-SQ	H203S
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500		HFX-0514-SQ	H204S
3/8	0.375	3/8	0.375	1 1/8	1.125	3	3.000	9	HFX-0618-SQ	H205S
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000		HFX-0718-SQ	H206S
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000	11	HFX-0822-SQ	H207S
5/8	0.625	5/8	0.625	1 5/8	1.625	3 1/2	3.500		HFX-1026-SQ	H208S
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	11	HFX-1226-SQ	H209S
1	1.000	1	1.000	2 1/8	2.125	5	5.000		HFX-1634-SQ	H210S

## SERIES HFX - CARBIDE, 5, 7, 9, & 11 FLUTE, 35° CONSTANT HELIX

### IMPRESSIVE RESULTS

The staged multi-flute design maximizes core diameter and keeps the highest number of flutes engaged possible. When flawless surface finishes are critical; this end mill delivers impressive results, wet or dry.

- Corner radius option protects corners in difficult to machine materials by preventing corner chipping and tool failure
- Large core design for increased stability; higher speeds & feeds; and reduced tool deflection in difficult to machine materials
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges
- Superior chip evacuation without compromising flute integrity



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

## SERIES HFXCR - CORNER RADIUS, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		# OF FLUTES	CORNER RADIUS (R)	PLAIN SHANK	
										PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	5	0.015	HFX-0210-R1	H2011
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000		0.015	HFX-0310-R1	H2021
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	7	0.020	HFX-0414-R2	H2032
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500		0.030	HFX-0514-R3	H2043
3/8	0.375	3/8	0.375	1 1/8	1.125	3	3.000	9	0.030	HFX-0618-R3	H2053
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000		0.030	HFX-0718-R3	H2063
1/2	0.500	1/2	0.500	13/8	1.375	3	3.000	11	0.030	HFX-0822-R3	H2073
				13/8	1.375	3	3.000		0.090	HFX-0822-R9	H2087
				13/8	1.375	3	3.000		0.120	HFX-0822-R12	H2098
5/8	0.625	5/8	0.625	15/8	1.625	3 1/2	3.500	11	0.030	HFX-1026-R3	H2103
				15/8	1.625	3 1/2	3.500		0.090	HFX-1026-R9	H2117
				15/8	1.625	3 1/2	3.500		0.120	HFX-1026-R12	H2128
3/4	0.750	3/4	0.750	15/8	1.625	4	4.000	11	0.030	HFX-1226-R3	H2133
				15/8	1.625	4	4.000		0.090	HFX-1226-R9	H2147
				15/8	1.625	4	4.000		0.120	HFX-1226-R12	H2158
1	1.000	1	1.000	2 1/8	2.125	5	5.000	11	0.030	HFX-1634-R3	H2163
				2 1/8	2.125	5	5.000		0.090	HFX-1634-R9	H2177
				2 1/8	2.125	5	5.000		0.120	HFX-1634-R12	H2188

- VORTEX4
- VORTEX5
- CYCLONE MX
- HYDRA FX**
- XTERRA3
- EXTREME3
- ZEPHYR3
- ALUMINUM 2 & 3 FLUTE
- CONICAL TAPERED CARBIDE
- CONICAL TAPERED HSS
- CONICAL TAPERED LHS - RHC
- CHAMFER CUTTERS
- TAPERED MINIATURES
- AUTOMOTIVE TAPERS
- DIE & MOLD CUTTERS
- PROFILE RIB CUTTERS
- RUNNER CUTTERS
- DIE SINKS
- GENERAL PURPOSE

# HFX APPLICATION GUIDE • SPEED & FEED

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)						
						1/8" (5 FL)	1/4" (7 FL)	3/8" (7 FL)	1/2" (9 FL)	5/8" (9 FL)	3/4" (11 FL)	1" (11 FL)
CARBON STEEL LOW CARBON STEELS ≤ 38 HRc	Profiling	1 x D	.1 x D	5/7/9/11	535 - 595	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
	Finishing	1 x D	.05 x D	5/7/9/11	680 - 745	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
CARBON STEEL MEDIUM CARBON STEELS ≤ 38 HRc	Profiling	1 x D	.1 x D	5/7/9/11	465 - 520	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
	Finishing	1 x D	.05 x D	5/7/9/11	595 - 650	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
TOOL STEEL TOOL & DIE STEELS ≤ 38 HRc	Profiling	1 x D	.1 x D	5/7/9/11	395 - 440	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	500 - 550	0.0005 - 0.0008	0.0008 - 0.0012	0.0014 - 0.0019	0.0020 - 0.0026	0.0023 - 0.0030	0.0025 - 0.0034	0.0029 - 0.0041
TOOL STEEL TOOL & DIE STEELS 39 to 48 HRc	Profiling	1 x D	.1 x D	5/7/9/11	355 - 395	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	445 - 485	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
HARDENED STEEL HARDENED STEELS 48 to 57 HRc	Profiling	1 x D	.1 x D	5/7/9/11	275 - 310	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	340 - 370	0.0005 - 0.0008	0.0008 - 0.0012	0.0014 - 0.0019	0.0020 - 0.0026	0.0023 - 0.0030	0.0025 - 0.0034	0.0029 - 0.0041
HARDENED STEEL HARDENED STEELS 58 to 65HRc	Profiling	1 x D	.1 x D	5/7/9/11	225 - 255	0.0002 - 0.0004	0.0004 - 0.0007	0.0007 - 0.0010	0.0010 - 0.0014	0.0009 - 0.0014	0.0013 - 0.0019	0.0014 - 0.0022
	Finishing	1 x D	.05 x D	5/7/9/11	275 - 300	0.0003 - 0.0006	0.0005 - 0.0009	0.0009 - 0.0014	0.0013 - 0.0019	0.0015 - 0.0022	0.0016 - 0.0025	0.0019 - 0.0030
STAINLESS STEEL EASY TO MACHINE 72 - 85 HRb	Profiling	1 x D	.1 x D	5/7/9/11	405 - 455	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	530 - 580	0.0005 - 0.0008	0.0008 - 0.0012	0.0014 - 0.0019	0.0020 - 0.0026	0.0023 - 0.0030	0.0025 - 0.0034	0.0029 - 0.0041
STAINLESS STEEL MODERATELY DIFFICULT 79 - 85 HRb; 25 - 41 HRc	Profiling	1 x D	.1 x D	5/7/9/11	295 - 330	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	365 - 400	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
STAINLESS STEEL DIFFICULT TO MACHINE 31 - 50 HRc	Profiling	1 x D	.1 x D	5/7/9/11	270 - 305	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	335 - 365	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
CAST IRON GRAY 100 - 200 HRb	Profiling	1 x D	.1 x D	5/7/9/11	535 - 595	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
	Finishing	1 x D	.05 x D	5/7/9/11	680 - 745	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
CAST IRON DUCTILE 150 - 300 HRb	Profiling	1 x D	.1 x D	5/7/9/11	520 - 580	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
	Finishing	1 x D	.05 x D	5/7/9/11	665 - 730	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
CAST IRON MALLEABLE 150 - 310 HRb	Profiling	1 x D	.1 x D	5/7/9/11	395 - 440	0.0005 - 0.0007	0.0009 - 0.0011	0.0015 - 0.0018	0.0021 - 0.0025	0.0022 - 0.0026	0.0027 - 0.0033	0.0030 - 0.0038
	Finishing	1 x D	.05 x D	5/7/9/11	495 - 540	0.0006 - 0.0009	0.0011 - 0.0015	0.0020 - 0.0024	0.0027 - 0.0033	0.0031 - 0.0038	0.0035 - 0.0044	0.0040 - 0.0051
ALLOYS TITANIUM ALLOYS 70 - 100 HRb; 25 - 36 HRc	Profiling	1 x D	.1 x D	5/7/9/11	295 - 330	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	370 - 405	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035
ALLOYS HIGH TEMP ALLOYS 83 - 99 HRb; 30 - 52 HRc	Profiling	1 x D	.1 x D	5/7/9/11	95 - 110	0.0003 - 0.0005	0.0006 - 0.0008	0.0010 - 0.0013	0.0014 - 0.0018	0.0014 - 0.0018	0.0018 - 0.0024	0.0020 - 0.0027
	Finishing	1 x D	.05 x D	5/7/9/11	95 - 100	0.0004 - 0.0007	0.0007 - 0.0010	0.0012 - 0.0016	0.0016 - 0.0022	0.0019 - 0.0026	0.0021 - 0.0030	0.0024 - 0.0035

D = tool diameter • Reduce feed rates by 20% when using long length tools • Use reduced neck tooling for long reach slotting • Starting parameters shown

NEW PREMIUM TOOL LINE!



# XTERRA<sup>3</sup>™

ADVANCED VARIABLE GEOMETRY



AMERICAN  
MADE

GLOBALY  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR HIGH FEED SLOTTING & PROFILING





# XTERRA<sup>3</sup><sup>TM</sup>

ADVANCED VARIABLE GEOMETRY

## FOR SLOTTING & FINISHING

OF DIFFICULT TO MACHINE MATERIALS

### FEATURES & BENEFITS

The 30-48 degree variable pitch helix of our Xterra3 end mill is “the” solution to impossible operations in difficult to machine materials. The industry’s only variable pitch and tapered core design permits an exceptional material removal rate, making the Xterra3 perfect for maximum chip evacuation when ramping, pocketing or slotting. The odd numbers of flutes and advanced variable design minimize chatter creating smooth machining, a high shearing plane and controlled chip management.

General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL**<sup>TM</sup>  
CUTTING TOOLS

# SERIES: XT3

For high feed / material removal rate of difficult to machine materials to improve chip evacuation while ramping, pocketing or slotting; wet or dry; hardened steel, stainless steel, titanium and inconel.



Coated for heat resistance, wear resistance and increased lubricity



Three flute design improves chip formation and evacuation

Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges

High helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life



Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure

Eccentric relief for enhanced edge strength along the flutes

Large tapered core design for increased stability; higher speeds & feeds; and reduced tool deflection in heavy roughing operations

Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds



Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

Variable pitch helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life

## TIP & END



## SHANK & LENGTH



## FLUTE CONFIGURATION



## MATERIAL



## COATING



## RESULTS

Through a focused engineering approach, the Xterra3 combines aggressive cutting with strength and stability for the most demanding operations in the most demanding materials. Operators historically had to choose between performance and tool life, but that was before the Xterra3.

Now, performance can be achieved without sacrificing tool life, part finish or machine time. The Xterra3 end mill creates opportunities to maximize productivity; where none had previously existed.

Series XT3: Micro-Grain Carbide, 3 Flute, Advanced Variable Geometry, AITIN/Si3N4 Coated

Subseries: XT3CR

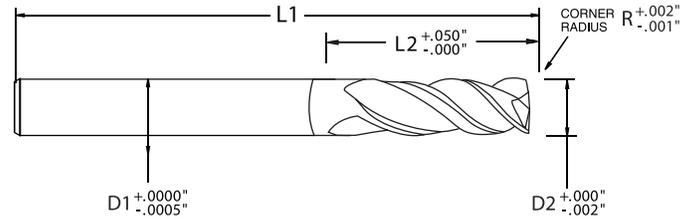
Configuration: Varying Diameters; Regular Lengths; 30-48° Variable Pitch Helix; Corner Radius

## SERIES XT3 - CARBIDE, 3 FLUTE, 30-48° VARIABLE PITCH HELIX

### EXCEPTIONAL REMOVAL RATES

The industry's only variable pitch and tapered core design permits an exceptional material removal rate, making the Xterra3 perfect for maximum chip evacuation when ramping, pocketing or slotting.

- Three flute design improves chip formation and evacuation
- High helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life
- Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure



TIP & END	SHANK & LENGTH	FLUTE CONFIGURATION	MATERIAL	COATING

## SERIES XT3CR - CORNER RADIUS, REGULAR LENGTH

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)		CORNER RADIUS (R)	PLAIN SHANK	
			IN	MM		PART #	EDP #
1/8	0.125	3/8	2 1/2	2.500	0.015	XT3-0206-R1	X2011
3/16	0.188	5/8	2 1/2	2.500	0.015	XT3-0310-R1	X2021
1/4	0.250	7/8	2 1/2	2.500	0.020	XT3-0414-R2	X2032
5/16	0.313	7/8	2 1/2	2.500	0.030	XT3-0514-R3	X2043
3/8	0.375	1 1/8	3	3.000	0.030	XT3-0618-R3	X2053
7/16	0.438	1 1/8	3	3.000	0.030	XT3-0718-R3	X2063
1/2	0.500	1 3/8	3 1/2	3.500	0.030	XT3-0822-R3	X2073
5/8	0.625	1 5/8	3 1/2	3.500	0.040	XT3-1026-R4	X2084
3/4	0.750	1 7/8	4	4.000	0.050	XT3-1230-R5	X2095
1	1.000	2 3/8	5	5.000	0.060	XT3-1638-R6	X2106

## SURFACE TREATMENTS & COATINGS

SELECT ADVANCED SPECIALTY COATING

### SELECTING YOUR COATING

Certain applications, materials or performances simply require the enhancement of a specialty coating and knowledge of the properties of the coatings available. Temperature, friction resistance, hardness, lubricity, toughness and cohesion of the resulting process must be examined prior to the selection.

UNCOATED	TITANIUM NITRIDE	TITANIUM CARBON NITRIDE	TITANIUM ALUMINUM NITRIDE NANO	ALUMINUM TITANIUM NITRIDE NANO	ALUMINUM TITANIUM NITRIDE/SILICON NITRIDE	ALUMINUM CHROMIUM NITRIDE NANO	ZIRCONIUM NITRIDE	TITANIUM DIBORIDE	AMORPHOUS DIAMOND & CVD

SEE PAGES 42 - 44 FOR DETAILS

# XT3 APPLICATION GUIDE • SPEED & FEED

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)							
						1/8" (3 FL)	1/4" (3 FL)	3/8" (3 FL)	1/2" (3 FL)	5/8" (3 FL)	3/4" (3 FL)	1" (3 FL)	
CARBON STEEL	LOW CARBON STEELS ≤ 38 HRC 10xx; 11xx; 12xx; 12Lxx, 15xx	Slotting	1 x D	1 x D	3	410 - 490	0.0004 - 0.0006	0.0007 - 0.0011	0.0011 - 0.0017	0.0015 - 0.0023	0.0017 - 0.0027	0.0022 - 0.0034	0.0029 - 0.0045
		Roughing	1.5 x D	.5 x D	3	505 - 580	0.0005 - 0.0009	0.0008 - 0.0013	0.0012 - 0.0020	0.0016 - 0.0026	0.0020 - 0.0033	0.0024 - 0.0039	0.0031 - 0.0052
		High Efficiency (HEM)	2 x D	.2 x D	3	635 - 710	0.0007 - 0.0010	0.0013 - 0.0019	0.0019 - 0.0029	0.0024 - 0.0037	0.0030 - 0.0047	0.0037 - 0.0056	0.0049 - 0.0076
		Finishing	1.5 x D	.015 x D	3	455 - 500	0.0005 - 0.0009	0.0008 - 0.0013	0.0012 - 0.0019	0.0016 - 0.0025	0.0021 - 0.0032	0.0025 - 0.0039	0.0032 - 0.0051
	MEDIUM CARBON STEELS ≤ 38 HRC 13xx; 41xx; 43xx; 86xx, 92xx; 93xx; Chromoly	Slotting	1 x D	1 x D	3	340 - 405	0.0003 - 0.0005	0.0005 - 0.0009	0.0008 - 0.0014	0.0010 - 0.0018	0.0012 - 0.0022	0.0015 - 0.0027	0.0020 - 0.0036
		Roughing	1.5 x D	.5 x D	3	420 - 480	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0016	0.0012 - 0.0022	0.0014 - 0.0027	0.0017 - 0.0032	0.0022 - 0.0043
		High Efficiency (HEM)	2 x D	.2 x D	3	530 - 590	0.0005 - 0.0008	0.0009 - 0.0015	0.0013 - 0.0023	0.0017 - 0.0030	0.0021 - 0.0038	0.0026 - 0.0045	0.0034 - 0.0061
		Finishing	1.5 x D	.015 x D	3	305 - 335	0.0003 - 0.0007	0.0005 - 0.0010	0.0009 - 0.0016	0.0011 - 0.0020	0.0015 - 0.0026	0.0017 - 0.0031	0.0023 - 0.0042
TOOL STEEL	TOOL & DIE STEELS ≤ 38 HRC A2; A3; D2; H11; H13; M1; O-1; S-7; NAK 55	Slotting	1 x D	1 x D	3	220 - 260	0.0003 - 0.0005	0.0005 - 0.0009	0.0008 - 0.0014	0.0010 - 0.0018	0.0012 - 0.0022	0.0015 - 0.0027	0.0020 - 0.0036
		Roughing	1.5 x D	.5 x D	3	270 - 310	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0016	0.0012 - 0.0022	0.0014 - 0.0027	0.0017 - 0.0032	0.0022 - 0.0043
		High Efficiency (HEM)	2 x D	.2 x D	3	340 - 380	0.0005 - 0.0008	0.0009 - 0.0015	0.0013 - 0.0023	0.0017 - 0.0030	0.0021 - 0.0038	0.0026 - 0.0045	0.0034 - 0.0061
		Finishing	1.5 x D	.015 x D	3	225 - 245	0.0003 - 0.0007	0.0005 - 0.0010	0.0009 - 0.0016	0.0011 - 0.0020	0.0015 - 0.0026	0.0017 - 0.0031	0.0023 - 0.0042
	TOOL & DIE STEELS 39 to 48 HRC P20; P21; S-136; PX-5; NAK 80	Slotting	.75 x D	1 x D	3	205 - 245	0.0003 - 0.0005	0.0004 - 0.0008	0.0007 - 0.0013	0.0009 - 0.0017	0.0010 - 0.0020	0.0013 - 0.0025	0.0018 - 0.0034
		Roughing	1.5 x D	.3 x D	3	255 - 290	0.0003 - 0.0007	0.0005 - 0.0010	0.0007 - 0.0015	0.0010 - 0.0020	0.0012 - 0.0025	0.0015 - 0.0030	0.0019 - 0.0040
		High Efficiency (HEM)	2 x D	.15 x D	3	320 - 358	0.0005 - 0.0008	0.0008 - 0.0014	0.0012 - 0.0022	0.0015 - 0.0028	0.0018 - 0.0035	0.0023 - 0.0042	0.0030 - 0.0057
		Finishing	1.5 x D	.015 x D	3	210 - 230	0.0004 - 0.0008	0.0006 - 0.0011	0.0010 - 0.0017	0.0012 - 0.0021	0.0016 - 0.0027	0.0019 - 0.0033	0.0025 - 0.0044
HARDENED STEEL	HARDENED STEELS 48 to 57 HRC	Slotting	1 x D	1 x D	3	195 - 230	0.0003 - 0.0005	0.0004 - 0.0008	0.0007 - 0.0013	0.0009 - 0.0017	0.0010 - 0.0020	0.0013 - 0.0025	0.0018 - 0.0034
		Roughing	1.5 x D	.5 x D	3	240 - 275	0.0003 - 0.0007	0.0005 - 0.0010	0.0007 - 0.0015	0.0010 - 0.0020	0.0012 - 0.0025	0.0015 - 0.0030	0.0019 - 0.0040
		High Efficiency (HEM)	2 x D	.2 x D	3	300 - 336	0.0005 - 0.0008	0.0008 - 0.0014	0.0012 - 0.0022	0.0015 - 0.0028	0.0018 - 0.0035	0.0023 - 0.0042	0.0030 - 0.0057
		Finishing	1.5 x D	.015 x D	3	195 - 210	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0015	0.0010 - 0.0019	0.0013 - 0.0024	0.0015 - 0.0029	0.0020 - 0.0039
	HARDENED STEELS 58 to 65 HRC	Slotting	.75 x D	1 x D	3	180 - 215	0.0002 - 0.0004	0.0004 - 0.0008	0.0006 - 0.0012	0.0007 - 0.0015	0.0008 - 0.0018	0.0011 - 0.0023	0.0014 - 0.0030
		Roughing	1.5 x D	.3 x D	3	220 - 250	0.0003 - 0.0007	0.0004 - 0.0009	0.0006 - 0.0014	0.0008 - 0.0018	0.0009 - 0.0022	0.0012 - 0.0027	0.0015 - 0.0036
		High Efficiency (HEM)	2 x D	.15 x D	3	280 - 314	0.0004 - 0.0007	0.0007 - 0.0013	0.0009 - 0.0019	0.0012 - 0.0025	0.0014 - 0.0031	0.0018 - 0.0037	0.0024 - 0.0051
		Finishing	1.5 x D	.015 x D	3	180 - 195	0.0003 - 0.0007	0.0004 - 0.0009	0.0006 - 0.0013	0.0008 - 0.0017	0.0010 - 0.0021	0.0012 - 0.0026	0.0016 - 0.0035
STAINLESS STEEL	EASY TO MACHINE 72 - 85 HRB 410; 416; 420; 430F; 440C; 302; 303	Slotting	.75 x D	1 x D	3	315 - 375	0.0003 - 0.0005	0.0006 - 0.0010	0.0009 - 0.0015	0.0011 - 0.0019	0.0013 - 0.0023	0.0017 - 0.0029	0.0023 - 0.0039
		Roughing	1.25 x D	.3 x D	3	390 - 445	0.0004 - 0.0008	0.0006 - 0.0011	0.0009 - 0.0017	0.0013 - 0.0023	0.0015 - 0.0028	0.0019 - 0.0034	0.0024 - 0.0045
		High Efficiency (HEM)	2 x D	.15 x D	3	490 - 545	0.0006 - 0.0009	0.0010 - 0.0016	0.0015 - 0.0025	0.0019 - 0.0032	0.0023 - 0.0040	0.0029 - 0.0048	0.0038 - 0.0065
		Finishing	1.5 x D	.015 x D	3	340 - 370	0.0004 - 0.0008	0.0006 - 0.0011	0.0010 - 0.0017	0.0012 - 0.0021	0.0016 - 0.0027	0.0019 - 0.0033	0.0025 - 0.0044
	MODERATELY DIFFICULT 79 - 85 HRB; 25 - 41 HRC 304; 304L; 316; 316L; 320; 321; 347; Invar 36; Kovar	Slotting	.75 x D	1 x D	3	285 - 340	0.0003 - 0.0005	0.0004 - 0.0008	0.0007 - 0.0013	0.0009 - 0.0017	0.0010 - 0.0020	0.0013 - 0.0025	0.0018 - 0.0034
		Roughing	1.25 x D	.3 x D	3	350 - 400	0.0003 - 0.0007	0.0005 - 0.0010	0.0007 - 0.0015	0.0010 - 0.0020	0.0012 - 0.0025	0.0015 - 0.0030	0.0019 - 0.0040
		High Efficiency (HEM)	2 x D	.1 x D	3	440 - 490	0.0005 - 0.0008	0.0008 - 0.0014	0.0012 - 0.0022	0.0015 - 0.0028	0.0018 - 0.0035	0.0023 - 0.0042	0.0030 - 0.0057
		Finishing	1.5 x D	.01 x D	3	305 - 335	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0015	0.0010 - 0.0019	0.0013 - 0.0024	0.0015 - 0.0029	0.0020 - 0.0039
	DIFFICULT TO MACHINE 31 - 50 HRC 13-8 PH; 15-5 PH; 17-4 PH; Carpenter; Custo 465; Invar	Slotting	.5 x D	1 x D	3	225 - 270	0.0003 - 0.0005	0.0004 - 0.0008	0.0007 - 0.0013	0.0009 - 0.0017	0.0010 - 0.0020	0.0013 - 0.0025	0.0018 - 0.0034
		Roughing	1.25 x D	.3 x D	3	280 - 320	0.0003 - 0.0007	0.0005 - 0.0010	0.0007 - 0.0015	0.0010 - 0.0020	0.0012 - 0.0025	0.0015 - 0.0030	0.0019 - 0.0040
		High Efficiency (HEM)	1.5 x D	.1 x D	3	350 - 391	0.0005 - 0.0008	0.0008 - 0.0014	0.0012 - 0.0022	0.0015 - 0.0028	0.0018 - 0.0035	0.0023 - 0.0042	0.0030 - 0.0057
		Finishing	1.5 x D	.01 x D	3	235 - 255	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0015	0.0010 - 0.0019	0.0013 - 0.0024	0.0015 - 0.0029	0.0020 - 0.0039
CAST IRON	GRAY 100 - 200 HRB	Slotting	1 x D	1 x D	3	315 - 360	0.0003 - 0.0005	0.0005 - 0.0009	0.0007 - 0.0013	0.0009 - 0.0017	0.0010 - 0.0020	0.0014 - 0.0026	0.0018 - 0.0034
		Roughing	1.5 x D	.5 x D	3	390 - 445	0.0003 - 0.0007	0.0005 - 0.0010	0.0007 - 0.0015	0.0010 - 0.0020	0.0012 - 0.0025	0.0015 - 0.0030	0.0019 - 0.0040
		High Efficiency (HEM)	2 x D	.2 x D	3	490 - 545	0.0005 - 0.0008	0.0008 - 0.0014	0.0012 - 0.0022	0.0015 - 0.0028	0.0019 - 0.0036	0.0023 - 0.0042	0.0031 - 0.0058
		Finishing	1.5 x D	.015 x D	3	380 - 415	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0015	0.0010 - 0.0019	0.0013 - 0.0024	0.0016 - 0.0030	0.0020 - 0.0039
	DUCTILE 150 - 300 HRB	Slotting	1 x D	1 x D	3	300 - 345	0.0002 - 0.0004	0.0004 - 0.0008	0.0006 - 0.0012	0.0007 - 0.0015	0.0008 - 0.0018	0.0011 - 0.0023	0.0014 - 0.0030
		Roughing	1.5 x D	.5 x D	3	370 - 425	0.0003 - 0.0007	0.0004 - 0.0009	0.0006 - 0.0014	0.0008 - 0.0018	0.0009 - 0.0022	0.0012 - 0.0027	0.0015 - 0.0036
		High Efficiency (HEM)	2 x D	.2 x D	3	465 - 520	0.0004 - 0.0007	0.0007 - 0.0013	0.0009 - 0.0019	0.0012 - 0.0025	0.0014 - 0.0031	0.0018 - 0.0037	0.0024 - 0.0051
		Finishing	1.5 x D	.015 x D	3	360 - 395	0.0003 - 0.0007	0.0004 - 0.0009	0.0006 - 0.0013	0.0008 - 0.0017	0.0010 - 0.0021	0.0012 - 0.0026	0.0016 - 0.0035
	MALLEABLE 150 - 310 HRB	Slotting	.75 x D	1 x D	3	220 - 260	0.0002 - 0.0004	0.0004 - 0.0008	0.0006 - 0.0012	0.0007 - 0.0015	0.0008 - 0.0018	0.0011 - 0.0023	0.0014 - 0.0030
		Roughing	1.5 x D	.5 x D	3	270 - 310	0.0003 - 0.0007	0.0004 - 0.0009	0.0006 - 0.0014	0.0008 - 0.0018	0.0009 - 0.0022	0.0012 - 0.0027	0.0015 - 0.0036
		High Efficiency (HEM)	2 x D	.2 x D	3	340 - 380	0.0004 - 0.0007	0.0007 - 0.0013	0.0009 - 0.0019	0.0012 - 0.0025	0.0014 - 0.0031	0.0018 - 0.0037	0.0024 - 0.0051
		Finishing	1.5 x D	.015 x D	3	225 - 245	0.0003 - 0.0007	0.0004 - 0.0009	0.0006 - 0.0013	0.0008 - 0.0017	0.0010 - 0.0021	0.0012 - 0.0026	0.0016 - 0.0035
ALLOYS	TITANIUM ALLOYS 70 - 100 HRB; 25 - 36 HRC Ti6Al4V; Grades 5-38	Slotting	.5 x D	1 x D	3	120 - 160	0.0003 - 0.0005	0.0004 - 0.0008	0.0007 - 0.0013	0.0009 - 0.0017	0.0010 - 0.0020	0.0013 - 0.0025	0.0018 - 0.0034
		Roughing	1.25 x D	.3 x D	3	205 - 275	0.0003 - 0.0007	0.0005 - 0.0010	0.0007 - 0.0015	0.0010 - 0.0020	0.0012 - 0.0025	0.0015 - 0.0030	0.0019 - 0.0040
		High Efficiency (HEM)	1.5 x D	.1 x D	3	275 - 310	0.0005 - 0.0008	0.0008 - 0.0014	0.0012 - 0.0022	0.0015 - 0.0028	0.0018 - 0.0035	0.0023 - 0.0042	0.0030 - 0.0057
		Finishing	1.5 x D	.01 x D	3	200 - 240	0.0003 - 0.0007	0.0005 - 0.0010	0.0008 - 0.0015	0.0010 - 0.0019	0.0013 - 0.0024	0.0015 - 0.0029	0.0020 - 0.0039
	HIGH TEMP ALLOYS 83 - 99 HRB; 30 - 52 HRC Inconel; Monel; A286; Rene; Stellite; Haynes; Waspalloy; Hastalloy; etc	Slotting	.25 x D	1 x D	3	50 - 65	0.0002 - 0.0004	0.0003 - 0.0007	0.0004 - 0.0010	0.0005 - 0.0013	0.0006 - 0.0016	0.0008 - 0.0020	0.0010 - 0.0026
		Roughing	1.25 x D	.25 x D	3	80 - 105	0.0002 - 0.0006	0.0003 - 0.0008	0.0004 - 0.0012	0.0006 - 0.0016	0.0007 - 0.0020	0.0009 - 0.0024	0.0011 - 0.0032
		High Efficiency (HEM)	1.5 x D	.1 x D	3	120 - 135	0.0003 - 0.0006	0.0005 - 0.0011	0.0007 - 0.0017	0.0009 - 0.0022	0.0011 - 0.0028	0.0014 - 0.0033	0.0018 - 0.0045
		Finishing	1.5 x D	.01 x D	3	60 - 70	0.0002 - 0.0006	0.0003 - 0.0008	0.0005 - 0.0012	0.0006 - 0.0015	0.0008 - 0.0019	0.0009 - 0.0023	0.0012 - 0.0031

D = tool diameter • Reduce feed rates by 20% when using long length tools • Use reduced neck tooling for long reach slotting • Starting parameters shown




## 70 YEARS OF INNOVATION



### INCOMPARABLE INNOVATION

The benefits of a higher helix angle are well known. Traditionally, those benefits were limited by weakened end configurations and thin, fragile flutes. Our Extreme 3 end mill has an advanced variable design, coupled with the only transitional fluting design in the industry.

A maximum core diameter ensures rigidity while high efficiency machining and the eccentrically relieved flutes add the strength to perform, and keep performing.

This end mill is perfect for high feed material removal rates in easy to machine ferrous material. The strength of the design improves performances in low horsepower and spindle speed machines, giving older machines new life.

It's simple; Global Cutting Tools designed a performance end mill for your standard performance machine tools. Relying on our Extreme 3 will keep your machines in use and your operations effective. The increased tool life guarantees your old and tired machines will finally see some run time.



### PRINCIPLES AND COMMITMENTS

We are committed to excellence in our business practices, and our products share the same goal; to provide the best technologies, processes and tools possible for our customers. We are in the business of providing solutions, experience, options and quality products. Our principles are based on the ethical foundations, laid by our company founders, almost 70 years ago.

Global Cutting Tools  
Conical Tool Company

3890 Buchanan Ave SW  
Grand Rapids, MI 49548  
T: 888.531.8500 | P: 616.531.8500  
F: 616.531.7742 | E: info@conicaltool.com  
W: www.conicalendmills.com  
W: www.globalcuttingtools.com



Global Cutting Tools are distributed by:

**OVER 7,000  
DISTRIBUTORS WORLDWIDE**



Made in the U.S.A.

NEW PREMIUM TOOL LINE!



# EXTREME<sup>3</sup><sup>TM</sup>

ADVANCED VARIABLE GEOMETRY



AMERICAN  
MADE

GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR HIGH FEED MACHINING & EXTREME MATERIAL REMOVAL RATES





# EXTREME<sup>3</sup><sup>TM</sup>

ADVANCED VARIABLE GEOMETRY

**HIGH FEED  
MACHINING**  
EXTREME MATERIAL REMOVAL RATES

## FEATURES & BENEFITS

The Extreme3 end mill will perform exceptionally well in easy to machine materials. It is designed with a large core diameter for increased stability and a multi stage, transitional variable pitch helix to protect fragile corners and allow for extreme helix angles. The Extreme3 performs rapid material removal rates and makes quick work of easy work, which results in robust profits all around.

### General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

### Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

### Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL**<sup>TM</sup>  
CUTTING TOOLS

# SERIES: EX3

For high feed / material removal rate of easy to machine materials to improve chip evacuation while ramping, pocketing, roughing or slotting; wet or dry; low carbon steel to stainless steel < 48 HRc.

 Square end to create sharp corners in finishing operations

 Coated for heat resistance, wear resistance and increased lubricity

 Three flute design improves chip formation and evacuation

Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges

Vibration Dampening Geometry: Variable Helix, Variable Index, Increased Core and Cutting Flute Engagement

 Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure

 Eccentric relief for enhanced edge strength along the flutes

 High helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life

 Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds

Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

<b>TIP &amp; END</b>	<b>SHANK &amp; LENGTH</b>	<b>FLUTE CONFIGURATION</b>	<b>MATERIAL</b>	<b>COATING</b>
 		     		

## RESULTS

Extreme3 end mills are intended for high feed material removal rates of easy to machine ferrous materials. Best used in profiling operations, the Extreme3 is engineered with an eccentric relief to improve cutting flute strength and withstand the forces of high speed machining. The

3 flute design maintains stability and manages chip formation and evacuation, to make high speed machining possible.

Series EX3: Micro-Grain Carbide, 3 Flute, Advanced Variable Geometry, AlTiN/Si3N4 Coated

Subseries: EX3SR, EX3CR,

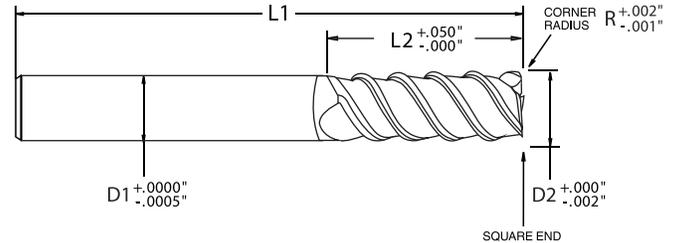
Configuration: Varying Diameters; Regular Length; 45/60° Transitional Variable Helix; Variable Index; 58/59/60° Variable Helix; Square End & Corner Radius

## SERIES EX3 - CARBIDE, 3 FLUTE, 45/60° TRANSITIONAL VARIABLE HELIX

### EXTREME TOOL DESIGN

The Extreme3 is designed with a large core diameter for increased stability and a multi stage, transitional variable pitch helix to protect fragile corners and allow for extreme helix angles

- Three flute design improves chip formation and evacuation
- Eccentric relief for enhanced edge strength along the flutes
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges
- Square end to create sharp corners in finishing operations



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

### SERIES EX3 - SQUARE END, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		PLAIN SHANK	
								PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	EX3-0210-SQ	E2015
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000	EX3-0310-SQ	E2025
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	EX3-0414-SQ	E2035
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500	EX3-0514-SQ	E2045
3/8	0.375	3/8	0.375	1 1/8	1.125	3	3.000	EX3-0618-SQ	E2055
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	EX3-0718-SQ	E2065
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000	EX3-0822-SQ	E2075
5/8	0.625	5/8	0.625	1 5/8	1.625	3 1/2	3.500	EX3-1026-SQ	E2085
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	EX3-1226-SQ	E2095
1	1.000	1	1.000	2 1/8	2.125	5	5.000	EX3-1634-SQ	E2105

### SERIES EX3 - CORNER RADIUS, REGULAR LENGTH

SHANK DIAMETER (D1)		CUTTER DIAMETER (D2)		FLUTE LENGTH (L2)		OVERALL LENGTH (L1)		CORNER RADIUS (R)	PLAIN SHANK	
									PART #	EDP #
1/8	0.125	1/8	0.125	5/8	0.625	2	2.000	0.015	EX3-0210-R1	E2011
3/16	0.188	3/16	0.188	5/8	0.625	2	2.000	0.015	EX3-0310-R1	E2021
1/4	0.250	1/4	0.250	7/8	0.875	2 1/2	2.500	0.020	EX3-0414-R2	E2032
5/16	0.313	5/16	0.313	7/8	0.875	2 1/2	2.500	0.030	EX3-0514-R3	E2043
3/8	0.375	3/8	0.375	1 1/8	1.125	3	3.000	0.030	EX3-0618-R3	E2053
7/16	0.438	7/16	0.438	1 1/8	1.125	3	3.000	0.030	EX3-0718-R3	E2063
1/2	0.500	1/2	0.500	1 3/8	1.375	3	3.000	0.030	EX3-0822-R3	E2073
5/8	0.625	5/8	0.625	1 5/8	1.625	3 1/2	3.500	0.040	EX3-1026-R4	E2084
3/4	0.750	3/4	0.750	1 5/8	1.625	4	4.000	0.050	EX3-1226-R5	E2095
1	1.000	1	1.000	2 1/8	2.125	5	5.000	0.060	EX3-1634-R6	E2106

# EX3 APPLICATION GUIDE • SPEED & FEED

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)							
						1/8" (3 FL)	1/4" (3 FL)	3/8" (3 FL)	1/2" (3 FL)	5/8" (3 FL)	3/4" (3 FL)	1" (3 FL)	
CARBON STEEL	LOW CARBON STEELS ≤ 38 HRc 10xx; 11xx; 12xx; 12Lxx, 15xx	Slotting	.5 x D	1 x D	3	260 - 295	0.0012 - 0.0014	0.0017 - 0.0021	0.0023 - 0.0029	0.0028 - 0.0036	0.0033 - 0.0043	0.0039 - 0.0051	0.0044 - 0.0060
		Roughing	1 x D	.5 x D	3	305 - 350	0.0014 - 0.0018	0.0020 - 0.0025	0.0026 - 0.0034	0.0033 - 0.0043	0.0039 - 0.0052	0.0046 - 0.0061	0.0051 - 0.0072
		Finishing	1.5 x D	.015 x D	3	355 - 390	0.0014 - 0.0018	0.0020 - 0.0025	0.0027 - 0.0034	0.0033 - 0.0042	0.0040 - 0.0051	0.0046 - 0.0060	0.0052 - 0.0071
	MEDIUM CARBON STEELS ≤ 38 HRc 13xx; 41xx; 43xx; 86xx, 92xx; 93xx; Chromoly	Slotting	.5 x D	1 x D	3	260 - 295	0.0010 - 0.0012	0.0014 - 0.0018	0.0019 - 0.0025	0.0023 - 0.0031	0.0027 - 0.0037	0.0032 - 0.0044	0.0036 - 0.0052
		Roughing	1 x D	.5 x D	3	305 - 350	0.0012 - 0.0016	0.0017 - 0.0022	0.0022 - 0.0030	0.0028 - 0.0038	0.0033 - 0.0046	0.0039 - 0.0054	0.0043 - 0.0064
		Finishing	1.5 x D	.015 x D	3	355 - 390	0.0012 - 0.0016	0.0017 - 0.0022	0.0023 - 0.0030	0.0028 - 0.0037	0.0034 - 0.0045	0.0039 - 0.0053	0.0044 - 0.0063
TOOL STEEL	TOOL & DIE STEELS ≤ 38 HRc A2; A3; D2; H11; H13; M1; O-1; S-7; NAK 55	Slotting	.5 x D	1 x D	3	210 - 240	0.0007 - 0.0009	0.0010 - 0.0014	0.0013 - 0.0019	0.0016 - 0.0024	0.0018 - 0.0028	0.0022 - 0.0034	0.0024 - 0.0040
		Roughing	1 x D	.5 x D	3	260 - 295	0.0008 - 0.0012	0.0011 - 0.0016	0.0014 - 0.0022	0.0018 - 0.0028	0.0021 - 0.0034	0.0025 - 0.0040	0.0027 - 0.0048
		Finishing	1.5 x D	.015 x D	3	305 - 335	0.0008 - 0.0012	0.0011 - 0.0016	0.0015 - 0.0022	0.0018 - 0.0027	0.0022 - 0.0033	0.0025 - 0.0039	0.0028 - 0.0047
	TOOL & DIE STEELS 39 to 48 HRc P20; P21; S-136; PX-5; NAK 80	Slotting	.5 x D	1 x D	3	190 - 215	0.0006 - 0.0008	0.0008 - 0.0012	0.0011 - 0.0017	0.0013 - 0.0021	0.0015 - 0.0025	0.0018 - 0.0030	0.0020 - 0.0036
		Roughing	1 x D	.5 x D	3	235 - 270	0.0008 - 0.0012	0.0011 - 0.0016	0.0014 - 0.0022	0.0018 - 0.0028	0.0021 - 0.0034	0.0025 - 0.0040	0.0027 - 0.0048
		Finishing	1.5 x D	.015 x D	3	285 - 310	0.0008 - 0.0012	0.0011 - 0.0016	0.0015 - 0.0022	0.0018 - 0.0027	0.0022 - 0.0033	0.0025 - 0.0039	0.0028 - 0.0047
STAINLESS STEEL	EASY TO MACHINE 72 - 85 HRb 410; 416; 420; 430F; 440C; 302; 303	Slotting	.5 x D	1 x D	3	235 - 270	0.0010 - 0.0012	0.0014 - 0.0018	0.0019 - 0.0025	0.0023 - 0.0031	0.0027 - 0.0037	0.0032 - 0.0044	0.0036 - 0.0052
		Roughing	1 x D	.5 x D	3	285 - 325	0.0013 - 0.0017	0.0018 - 0.0023	0.0024 - 0.0032	0.0031 - 0.0041	0.0036 - 0.0049	0.0042 - 0.0057	0.0047 - 0.0068
		Finishing	1.5 x D	.015 x D	3	330 - 360	0.0014 - 0.0018	0.0020 - 0.0025	0.0027 - 0.0034	0.0033 - 0.0042	0.0040 - 0.0051	0.0046 - 0.0060	0.0052 - 0.0071
	MODERATELY DIFFICULT 79 - 85 HRb; 25 - 41 HRc 304; 304L; 316; 316L; 320; 321; 347; Invar 36; Kovar	Slotting	.5 x D	1 x D	3	235 - 270	0.0007 - 0.0009	0.0010 - 0.0014	0.0013 - 0.0019	0.0016 - 0.0024	0.0018 - 0.0028	0.0022 - 0.0034	0.0024 - 0.0040
		Roughing	1 x D	.5 x D	3	260 - 295	0.0011 - 0.0015	0.0015 - 0.0020	0.0020 - 0.0028	0.0026 - 0.0036	0.0030 - 0.0043	0.0035 - 0.0050	0.0039 - 0.0060
		Finishing	1.5 x D	.015 x D	3	305 - 335	0.0012 - 0.0016	0.0017 - 0.0022	0.0023 - 0.0030	0.0028 - 0.0037	0.0034 - 0.0045	0.0039 - 0.0053	0.0044 - 0.0063
DIFFICULT TO MACHINE 31 - 50 HRc 13-8 PH; 15-5 PH; 17-4 PH; Carpenter; Custo 465; Invar	Slotting	.5 x D	1 x D	3	210 - 240	0.0006 - 0.0008	0.0008 - 0.0012	0.0011 - 0.0017	0.0013 - 0.0021	0.0015 - 0.0025	0.0018 - 0.0030	0.0020 - 0.0036	
	Roughing	1 x D	.5 x D	3	260 - 295	0.0007 - 0.0011	0.0009 - 0.0014	0.0012 - 0.0020	0.0016 - 0.0026	0.0018 - 0.0031	0.0021 - 0.0036	0.0023 - 0.0044	
	Finishing	1.5 x D	.015 x D	3	305 - 335	0.0011 - 0.0015	0.0015 - 0.0020	0.0021 - 0.0028	0.0025 - 0.0034	0.0031 - 0.0042	0.0036 - 0.0050	0.0040 - 0.0059	
CAST IRON	GRAY 100 - 200 HRb	Slotting	.5 x D	1 x D	3	260 - 295	0.0012 - 0.0014	0.0017 - 0.0021	0.0023 - 0.0029	0.0028 - 0.0036	0.0033 - 0.0043	0.0039 - 0.0051	0.0044 - 0.0060
		Roughing	1 x D	.5 x D	3	305 - 350	0.0014 - 0.0018	0.0020 - 0.0025	0.0026 - 0.0034	0.0033 - 0.0043	0.0039 - 0.0052	0.0046 - 0.0061	0.0051 - 0.0072
		Finishing	1.5 x D	.015 x D	3	355 - 390	0.0014 - 0.0018	0.0020 - 0.0025	0.0027 - 0.0034	0.0033 - 0.0042	0.0040 - 0.0051	0.0046 - 0.0060	0.0052 - 0.0071
	DUCTILE 150 - 300 HRb	Slotting	.5 x D	1 x D	3	260 - 295	0.0012 - 0.0014	0.0017 - 0.0021	0.0023 - 0.0029	0.0028 - 0.0036	0.0033 - 0.0043	0.0039 - 0.0051	0.0044 - 0.0060
		Roughing	1 x D	.5 x D	3	305 - 350	0.0014 - 0.0018	0.0020 - 0.0025	0.0026 - 0.0034	0.0033 - 0.0043	0.0039 - 0.0052	0.0046 - 0.0061	0.0051 - 0.0072
		Finishing	1.5 x D	.015 x D	3	355 - 390	0.0014 - 0.0018	0.0020 - 0.0025	0.0027 - 0.0034	0.0033 - 0.0042	0.0040 - 0.0051	0.0046 - 0.0060	0.0052 - 0.0071
	MALLEABLE 150 - 310 HRb	Slotting	.5 x D	1 x D	3	235 - 270	0.0010 - 0.0012	0.0014 - 0.0018	0.0019 - 0.0025	0.0023 - 0.0031	0.0027 - 0.0037	0.0032 - 0.0044	0.0036 - 0.0052
		Roughing	1 x D	.5 x D	3	285 - 325	0.0013 - 0.0017	0.0018 - 0.0023	0.0024 - 0.0032	0.0031 - 0.0041	0.0036 - 0.0049	0.0042 - 0.0057	0.0047 - 0.0068
		Finishing	1.5 x D	.015 x D	3	330 - 360	0.0014 - 0.0018	0.0020 - 0.0025	0.0027 - 0.0034	0.0033 - 0.0042	0.0040 - 0.0051	0.0046 - 0.0060	0.0052 - 0.0071

D = tool diameter • Reduce feed rates by 20% when using long length tools • Use reduced neck tooling for long reach slotting • Starting parameters shown

CB  
CARBIDE

HSS  
HIGH SPEED STEEL

VORTEX4

VORTEX5

CYCLONE MX

HYDRA FX

XTERRA3

EXTREME3

ZEPHYR3

ALUMINUM  
2 & 3 FLUTE

CONICAL  
TAPERED  
CARBIDE

CONICAL  
TAPERED  
HSS

CONICAL  
TAPERED  
LHS - RHC

CHAMFER  
CUTTERS

TAPERED  
MINIATURES

AUTOMOTIVE  
TAPERS

DIE & MOLD  
CUTTERS

PROFILE  
RIB CUTTERS

RUNNER  
CUTTERS

DIE  
SINKS

GENERAL  
PURPOSE



## 70 YEARS OF INNOVATION



### UNQUESTIONABLE RESULTS

Achieving an average performance improvement of over 50% in field tests, our customers swear by the Zephyr3. Our proprietary design uses the most advanced machining and coating processes, combined with an innovative advanced variable geometry, to create the ultimate aluminum and non-ferrous material end mill.

Engineered for unquestionable results, the Zephyr3 was designed for high

speeds and feeds. A variable pitch, variable index, variable core design combines with the strength of our eccentric relief, to create an exceptional performing tool, in all non-ferrous materials.

Whether cutting copper, magnesium or any grade of aluminum, the Zephyr3 has incredible material removal rates. Rather than adding additional shifts, machines or personnel, use the right tool for the job and increase your machining capacity.

## A TRUSTED INDUSTRY LEADER

We encourage customers to test our end mills for performance and production enhancements against any manufacturer. For over 70 years, we've been creating and innovating the best specialty and performance cutting tools in the market. It is never easy staying ahead of the competition, but having the experience and investing in the latest technologies gives us an edge in the market today.

Global Cutting Tools  
Conical Tool Company

3890 Buchanan Ave SW  
Grand Rapids, MI 49548

T: 888.531.8500 | P: 616.531.8500  
F: 616.531.7742 | E: info@conicaltool.com

W: www.conicalendmills.com  
W: www.globalcuttingtools.com



Global Cutting Tools are distributed by:

**OVER 7,000  
DISTRIBUTORS WORLDWIDE**



Made in the U.S.A.

NEW PREMIUM TOOL LINE!



# ZEPHYR3™

ADVANCED VARIABLE GEOMETRY



AMERICAN  
MADE

GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
FOR CHATTER-FREE MACHINING OF NON-FERROUS MATERIALS





# ZEPHYR3™

ADVANCED VARIABLE GEOMETRY

## CHATTER FREE MACHINING

OF NON FERROUS MATERIALS

### FEATURES & BENEFITS

The Zephyr3 3 flute is yet another testament to the adaptability of Global Cutting Tools. We are proud to boast about the fact this tool increased performance in tests by over 50%, while leaving exemplary surface finishes. The Zephyr3 is a trifecta of strength, endurance and rapid material removal. The eccentric relief and variable pitch design of this end mill enable operations at vastly improved speeds and feeds. This tool has standard ZrN coating for added lubricity and hardness, giving the tool a pale gold coloration.

General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL™**  
CUTTING TOOLS

## SERIES: AVX

For high feed / material removal rate of aluminum and non-ferrous materials to maximize productivity and surface finish while roughing, slotting, pocketing and finishing ; wet or dry; aluminum, magnesium, and copper alloys, composites, plastics and fiberglass.



Square end option to create sharp corners in finishing operations



Coated for heat resistance, wear resistance and increased lubricity



Three flute design improves chip formation and evacuation

Variable pitch helix angle reduces cutting forces by creating a higher shearing plane for better efficiencies, chip management and longer tool life

Eccentric relief for enhanced edge strength along the flutes



Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure

Ball end option for high performance contour milling in finishing operations

Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds

Vibration Dampening Geometry: Variable Pitch, Variable Index, Increased Core and Cutting Flute Engagement



Edge prep drag finishing increases tool life by improving the surface quality in the flute and radiusing the cutting edge of the tool, reducing the potential for premature failure.

Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges. Immediate 50% increase in performance over 2 flute designs

Post polishing is performed after the tools are coated to remove surface inconsistencies and increase lubricity. This also increases feed rates and allows for smoother operations. The tool runs cooler and performs longer

### TIP OPTIONS



### SHANK OPTIONS



### FLUTE OPTIONS



### MATERIALS



### COATING



## RESULTS

At Global we know results are all that matter. The Zephyr3 offers multiple end, shank and length configurations, to turn materials like copper, magnesium and any grade of aluminum into a job well done. The advantage of a better tool is never taken for granted by our end users. The

Zephyr3 end mills increase machine time utilization and lower tooling costs by increasing rigidity, stability, and chip evacuation at high speeds, or when the cutter is fully engaged. Run this end mill with any plastics, or fiberglass, but be prepared to get the work done a little quicker than usual.

Series AVX: Micro-Grain Carbide, 3 Flute, Advanced Variable Geometry, ZrN Coated

Subseries: AVXSR, AVXCR, AVXBR

Configuration: Variable Pitch 30-48°; Stub, Regular & Long Lengths;

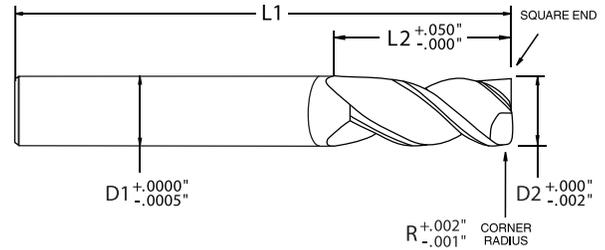
Variable Helix; Square End, Corner Radius & Ball End

## SERIES AVX - CARBIDE, 3 FLUTE, ADVANCED VARIABLE GEOMETRY

### ADVANCED MACHINING

Our proprietary design uses the most advanced machining and coating processes, combined with an innovative advanced variable geometry, to create the ultimate aluminum and non-ferrous material end mill.

- Square end option to create sharp corners in finishing operations
- Three flute design improves chip formation and evacuation
- Cylindrical land for excellent surface finishes
- High strength flutes reduce edge chipping, built up edge and extends tool life



## SERIES AVX - SQUARE END & CORNER RADIUS, PLAIN SHANK

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	SQUARE END		CORNER RADIUS									
				PART #	EDP #	PART # .015 (R)	EDP #	PART # .030 (R)	EDP #	PART # .060 (R)	EDP #	PART # .090 (R)	EDP #		
1/8	0.125	3/8	0.375	2	2.000	AVX-0206-SQ	A0015	AVX-0206-R1	A0011	—	—	—	—	—	—
			0.625	2	2.000	AVX-0210-SQ	A0025	AVX-0210-R1	A0021	—	—	—	—	—	—
			0.375	2	2.000	AVX-0306-SQ	A0035	AVX-0306-R1	A0031	AVX-0306-R3	A0013	—	—	—	—
3/16	0.188	3/8	0.375	2	2.000	AVX-0310-SQ	A0045	AVX-0310-R1	A0041	AVX-0310-R3	A0023	—	—	—	—
			0.625	2	2.000	AVX-0406-SQ	A0055	AVX-0406-R1	A0051	AVX-0406-R3	A0033	AVX-0406-R6	A0016	—	—
			0.875	2 1/2	2.500	AVX-0414-SQ	A0065	AVX-0414-R1	A0061	AVX-0414-R3	A0043	AVX-0414-R6	A0026	—	—
1/4	0.250	7/8	1.375	3	3.000	AVX-0422-SQ	A0075	AVX-0422-R1	A0071	AVX-0422-R3	A0053	AVX-0422-R6	A0036	—	—
			0.500	2	2.000	AVX-0508-SQ	A0085	AVX-0508-R1	A0081	AVX-0508-R3	A0063	AVX-0508-R6	A0046	—	—
			0.875	2 1/2	2.500	AVX-0514-SQ	A0095	AVX-0514-R1	A0091	AVX-0514-R3	A0073	AVX-0514-R6	A0056	—	—
5/16	0.313	1 3/8	1.375	3	3.000	AVX-0522-SQ	A0105	AVX-0522-R1	A0101	AVX-0522-R3	A0083	AVX-0522-R6	A0066	—	—
			0.625	2	2.000	AVX-0610-SQ	A0115	AVX-0610-R1	A0111	AVX-0610-R3	A0093	AVX-0610-R6	A0076	AVX-0610-R9	A0017
			0.875	2 1/2	2.500	AVX-0614-SQ	A0125	AVX-0614-R1	A0121	AVX-0614-R3	A0103	AVX-0614-R6	A0086	AVX-0614-R9	A0027
3/8	0.375	1 3/8	1.375	3	3.000	AVX-0622-SQ	A0135	AVX-0622-R1	A0131	AVX-0622-R3	A0113	AVX-0622-R6	A0096	AVX-0622-R9	A0037
			1.875	3 1/2	3.500	AVX-0630-SQ	A0145	AVX-0630-R1	A0141	AVX-0630-R3	A0123	AVX-0630-R6	A0106	AVX-0630-R9	A0047
			2.125	4	4.000	AVX-0634-SQ	A0155	AVX-0634-R1	A0151	AVX-0634-R3	A0133	AVX-0634-R6	A0116	AVX-0634-R9	A0057
7/16	0.438	1 7/8	1.125	3	3.000	AVX-0710-SQ	A0165	AVX-0710-R1	A0161	AVX-0710-R3	A0143	AVX-0710-R6	A0126	AVX-0710-R9	A0067
			1.125	3	3.000	AVX-0718-SQ	A0175	AVX-0718-R1	A0171	AVX-0718-R3	A0153	AVX-0718-R6	A0136	AVX-0718-R9	A0077
			2.125	4	4.000	AVX-0734-SQ	A0185	AVX-0734-R1	A0181	AVX-0734-R3	A0163	AVX-0734-R6	A0146	AVX-0734-R9	A0087
1/2	0.500	2 1/8	0.625	2 1/2	2.500	AVX-0810-SQ	A0195	AVX-0810-R1	A0191	AVX-0810-R3	A0173	AVX-0810-R6	A0156	AVX-0810-R9	A0097
			1.125	3	3.000	AVX-0818-SQ	A0205	AVX-0818-R1	A0201	AVX-0818-R3	A0183	AVX-0818-R6	A0166	AVX-0818-R9	A0107
			1.625	3 1/2	3.500	AVX-0826-SQ	A0215	AVX-0826-R1	A0211	AVX-0826-R3	A0193	AVX-0826-R6	A0176	AVX-0826-R9	A0117
			2.125	4	4.000	AVX-0834-SQ	A0225	AVX-0834-R1	A0221	AVX-0834-R3	A0203	AVX-0834-R6	A0186	AVX-0834-R9	A0127
			2.625	5	5.000	AVX-0842-SQ	A0235	AVX-0842-R1	A0231	AVX-0842-R3	A0213	AVX-0842-R6	A0196	AVX-0842-R9	A0137
			3.375	6	6.000	AVX-0854-SQ	A0245	AVX-0854-R1	A0241	AVX-0854-R3	A0223	AVX-0854-R6	A0206	AVX-0854-R9	A0147
5/8	0.625	2 1/8	0.875	3	3.000	AVX-1014-SQ	A0255	—	—	AVX-1014-R3	A0233	AVX-1014-R6	A0216	AVX-1014-R9	A0157
			1.5	3 1/2	3.500	AVX-1026-SQ	A0265	—	—	AVX-1026-R3	A0243	AVX-1026-R6	A0226	AVX-1026-R9	A0167
			2.125	4	4.000	AVX-1034-SQ	A0275	—	—	AVX-1034-R3	A0253	AVX-1034-R6	A0236	AVX-1034-R9	A0177
			2.625	5	5.000	AVX-1042-SQ	A0285	—	—	AVX-1042-R3	A0263	AVX-1042-R6	A0246	AVX-1042-R9	A0187
			3.375	6	6.000	AVX-1054-SQ	A0295	—	—	AVX-1054-R3	A0273	AVX-1054-R6	A0256	AVX-1054-R9	A0197
3/4	0.750	1 1/8	1.125	3	3.000	AVX-1218-SQ	A0305	—	—	AVX-1218-R3	A0283	AVX-1218-R6	A0266	AVX-1218-R9	A0207
			1.5	4	4.000	AVX-1226-SQ	A0315	—	—	AVX-1226-R3	A0293	AVX-1226-R6	A0276	AVX-1226-R9	A0217
			2.5	5	5.000	AVX-1242-SQ	A0325	—	—	AVX-1242-R3	A0303	AVX-1242-R6	A0286	AVX-1242-R9	A0227
			3.375	6	6.000	AVX-1254-SQ	A0335	—	—	AVX-1254-R3	A0313	AVX-1254-R6	A0296	AVX-1254-R9	A0237
			4.125	7	7.000	AVX-1266-SQ	A0345	—	—	AVX-1266-R3	A0323	AVX-1266-R6	A0306	AVX-1266-R9	A0247
1	1.000	1 5/8	1.625	4	4.000	AVX-1626-SQ	A0355	—	—	AVX-1626-R3	A0333	AVX-1626-R6	A0316	AVX-1626-R9	A0257
			2.125	4	4.000	AVX-1634-SQ	A0365	—	—	AVX-1634-R3	A0343	AVX-1634-R6	A0326	AVX-1634-R9	A0267
			2.5	5	5.000	AVX-1642-SQ	A0375	—	—	AVX-1642-R3	A0353	AVX-1642-R6	A0336	AVX-1642-R9	A0277
			3.375	6	6.000	AVX-1654-SQ	A0385	—	—	AVX-1654-R3	A0363	AVX-1654-R6	A0346	AVX-1654-R9	A0287
			4.375	7	7.000	AVX-1670-SQ	A0395	—	—	AVX-1670-R3	A0613	AVX-1670-R6	A0356	AVX-1670-R9	A0297

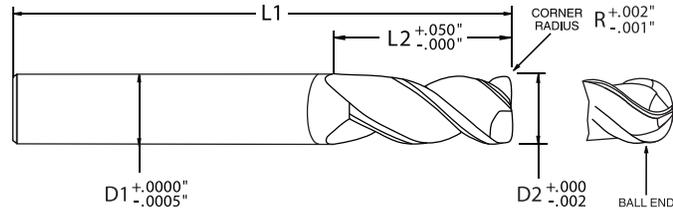
(continued)

## SERIES AVX - CARBIDE, 3 FLUTE, ADVANCED VARIABLE GEOMETRY

### EXCEPTIONAL PERFORMANCE

A variable pitch, variable index, variable core design combines with the strength of our eccentric relief, to create an exceptional performing tool, in all non-ferrous materials.

- Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure
- Ball end option for high performance contour milling in finishing operations
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATING

### SERIES AVX - CORNER RADIUS & BALL END, PLAIN SHANK



SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	CORNER RADIUS								BALL END				
				.125 (R)		.156 (R)		.190 (R)		.250 (R)		PART #	EDP #			
1/8	0.125	1/8	0.125	3/8	0.375	2	2.000	—	—	—	—	—	—	—	—	—
				5/8	0.625	2	2.000	—	—	—	—	—	—	—	—	—
3/16	0.188	3/16	0.188	3/8	0.375	2	2.000	—	—	—	—	—	—	—	—	—
				5/8	0.625	2	2.000	—	—	—	—	—	—	—	—	—
1/4	0.250	1/4	0.250	3/8	0.375	2	2.000	—	—	—	—	—	—	—	—	—
				7/8	0.875	2 1/2	2.500	—	—	—	—	—	—	—	—	—
5/16	0.313	5/16	0.313	1 3/8	1.375	3	3.000	—	—	—	—	—	—	—	—	—
				1/2	0.500	2	2.000	—	—	—	—	—	—	—	—	—
3/8	0.375	3/8	0.375	7/8	0.875	2 1/2	2.500	—	—	—	—	—	—	—	—	—
				1 3/8	1.375	3	3.000	—	—	—	—	—	—	—	—	—
7/16	0.438	7/16	0.438	1 7/8	1.875	3 1/2	3.500	—	—	—	—	—	—	—	—	—
				2 1/8	2.125	4	4.000	—	—	—	—	—	—	—	—	—
1/2	0.500	1/2	0.500	5/8	0.625	2	2.000	—	—	—	—	—	—	—	—	—
				7/8	0.875	2 1/2	2.500	—	—	—	—	—	—	—	—	—
5/8	0.625	5/8	0.625	1 3/8	1.375	3	3.000	—	—	—	—	—	—	—	—	—
				1 7/8	1.875	3 1/2	3.500	—	—	—	—	—	—	—	—	—
3/4	0.750	3/4	0.750	2 1/8	2.125	4	4.000	—	—	—	—	—	—	—	—	—
				2 5/8	2.625	5	5.000	—	—	—	—	—	—	—	—	—
1	1.000	1	1.000	3 3/8	3.375	6	6.000	—	—	—	—	—	—	—	—	—
				4 3/8	4.375	7	7.000	—	—	—	—	—	—	—	—	—

## AVX APPLICATION GUIDE • SPEED & FEED

WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)							
						1/8" (2 & 3 FL)	1/4" (2 & 3 FL)	3/8" (2 & 3 FL)	1/2" (2 & 3 FL)	5/8" (2 & 3 FL)	3/4" (2 & 3 FL)	1" (2 & 3 FL)	
ALUMINUM ALUMINUM ALLOYS Low Silicon Content 20xx; 50xx; 60xx; 70xx	Slotting	1 x D	1 x D	3	905 - 1040	0.0014 - 0.0016	0.0027 - 0.0031	0.0041 - 0.0047	0.0054 - 0.0062	0.0067 - 0.0077	0.0081 - 0.0093	0.0108 - 0.0124	
	Roughing	1 x D	.75 x D	3	1115 - 1280	0.0017 - 0.0021	0.0033 - 0.0038	0.0049 - 0.0057	0.0066 - 0.0076	0.0082 - 0.0095	0.0099 - 0.0114	0.0131 - 0.0152	
	High Efficiency (HEM)	2 x D	.2 x D	3	1395 - 1550	0.0031 - 0.0034	0.0061 - 0.0067	0.0091 - 0.0101	0.0121 - 0.0134	0.0151 - 0.0168	0.0182 - 0.0201	0.0242 - 0.0269	
	Finishing	1.5 x D	.01 x D	3	1330 - 1460	0.0020 - 0.0024	0.0039 - 0.0044	0.0059 - 0.0066	0.0078 - 0.0087	0.0098 - 0.0109	0.0117 - 0.0131	0.0156 - 0.0175	
	ALUMINUM DIE CAST ALLOY High Silicon Content A-38x; A-39x; B39x	Slotting	.75 x D	1 x D	3	760 - 870	0.0012 - 0.0014	0.0023 - 0.0027	0.0035 - 0.0041	0.0046 - 0.0054	0.0057 - 0.0067	0.0069 - 0.0081	0.0092 - 0.0108
		Roughing	1 x D	.5 x D	3	935 - 1075	0.0015 - 0.0019	0.0029 - 0.0034	0.0043 - 0.0051	0.0058 - 0.0068	0.0072 - 0.0085	0.0087 - 0.0102	0.0115 - 0.0136
High Efficiency (HEM)		2 x D	.15 x D	3	1170 - 1300	0.0024 - 0.0027	0.0048 - 0.0054	0.0071 - 0.0081	0.0094 - 0.0107	0.0117 - 0.0134	0.0141 - 0.0160	0.0188 - 0.0215	
NONFERROUS MAGNESIUM ALLOYS ≤ 38 HRC	Slotting	1 x D	1 x D	3	905 - 1040	0.0014 - 0.0016	0.0027 - 0.0031	0.0041 - 0.0047	0.0054 - 0.0062	0.0067 - 0.0077	0.0081 - 0.0093	0.0108 - 0.0124	
	Roughing	1 x D	.75 x D	3	1115 - 1280	0.0017 - 0.0021	0.0033 - 0.0038	0.0049 - 0.0057	0.0066 - 0.0076	0.0082 - 0.0095	0.0099 - 0.0114	0.0131 - 0.0152	
	High Efficiency (HEM)	2 x D	.2 x D	3	1395 - 1550	0.0033 - 0.0036	0.0064 - 0.0070	0.0096 - 0.0106	0.0127 - 0.0140	0.0158 - 0.0175	0.0191 - 0.0210	0.0254 - 0.0281	
	Finishing	1.5 x D	.01 x D	3	1330 - 1460	0.0021 - 0.0025	0.0041 - 0.0046	0.0062 - 0.0069	0.0082 - 0.0091	0.0103 - 0.0114	0.0123 - 0.0137	0.0164 - 0.0183	
	COPPER ALLOYS, BRASS & BRONZE 39 to 48 HRC Manganese Bronze, Tin Bronze, Beryllium	Slotting	1 x D	1 x D	3	760 - 870	0.0012 - 0.0014	0.0023 - 0.0027	0.0035 - 0.0041	0.0046 - 0.0054	0.0057 - 0.0067	0.0069 - 0.0081	0.0092 - 0.0108
		Roughing	1 x D	.75 x D	3	935 - 1075	0.0015 - 0.0019	0.0029 - 0.0034	0.0043 - 0.0051	0.0058 - 0.0068	0.0072 - 0.0085	0.0087 - 0.0102	0.0115 - 0.0136
High Efficiency (HEM)		2 x D	.2 x D	3	1170 - 1300	0.0028 - 0.0031	0.0055 - 0.0061	0.0082 - 0.0092	0.0108 - 0.0121	0.0135 - 0.0152	0.0163 - 0.0182	0.0217 - 0.0244	
COMPOSITES, PLASTICS & FIBERGLASS 48 to 57 HRC ABS, Polycarbonate, PVC, Polypropylene	Slotting	1 x D	1 x D	3	760 - 870	0.0012 - 0.0014	0.0023 - 0.0027	0.0035 - 0.0041	0.0046 - 0.0054	0.0057 - 0.0067	0.0069 - 0.0081	0.0092 - 0.0108	
	Roughing	1 x D	.75 x D	3	935 - 1075	0.0015 - 0.0019	0.0029 - 0.0034	0.0043 - 0.0051	0.0058 - 0.0068	0.0072 - 0.0085	0.0087 - 0.0102	0.0115 - 0.0136	
	High Efficiency (HEM)	2 x D	.2 x D	3	1170 - 1300	0.0028 - 0.0031	0.0055 - 0.0061	0.0082 - 0.0092	0.0108 - 0.0121	0.0135 - 0.0152	0.0163 - 0.0182	0.0217 - 0.0244	
Finishing	1.5 x D	.01 x D	3	1140 - 1250	0.0018 - 0.0022	0.0035 - 0.0040	0.0053 - 0.0060	0.0070 - 0.0079	0.0088 - 0.0099	0.0105 - 0.0119	0.0140 - 0.0159		

# MODIFICATION PROGRAM

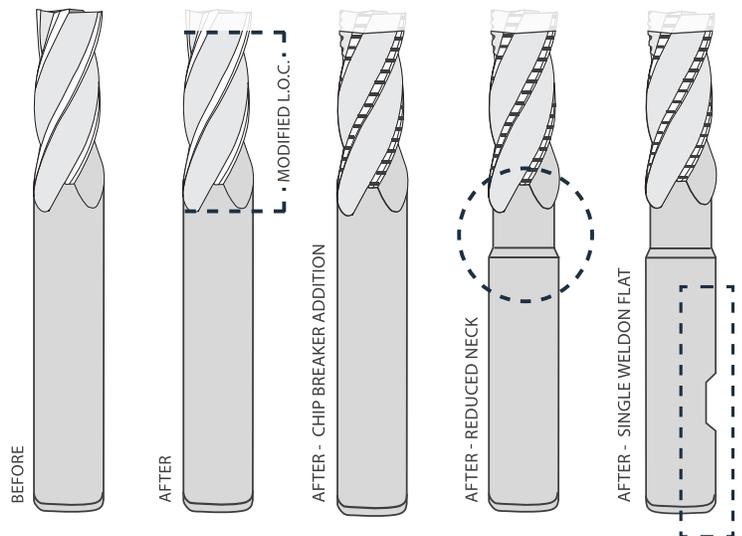
MODIFICATION OF IN-STOCK TOOLS

## WE CAN MODIFY MOST ANY TOOL

We can modify our standard tools or manufacture a highly specialized tool to your exact specifications. Modifications ensure fast delivery of your tool (subject to availability) and decrease costs on small batch runs. Most modifications ship within 2 - 3 business days. Please allow additional time when adding coatings. If you need assistance with modification selection or have any questions, please contact us.



SEE PAGE 16 - 21 FOR DETAILS



NEW PREMIUM TOOL LINE!



# ALUMINUM 2 & 3™

HIGH PERFORMANCE MILLING



AMERICAN  
MADE

GLOBAL  
RENOWNED

HIGH PERFORMANCE END MILLS  
HIGH FEED AND REMOVAL RATES OF NON-FERROUS MATERIALS





# ALUMINUM 2&3™

HIGH PERFORMANCE MILLING

## HIGH FEED & REMOVAL RATES

FOR FERROUS MATERIALS

### FEATURES & BENEFITS

The Aluminum 2&3 is no exception to the Global commitment for continuous improvement. These end mills offer multi-functionality and cost effectiveness, rarely attained in an end mill. Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength, for greater feeds and speeds. The numerous combinations of tip, shank, flute and coating options, make this end mill popular among users who have a diversity of materials they need to process.

General Inquiries:

3890 Buchanann Ave SW  
Grand Rapids, MI 49548

**P:** (616) 531-8500

**F:** (616) 531-7742

**E:** [info@conicaltool.com](mailto:info@conicaltool.com)

Sales & Distribution:

**T:** (888) 531-8500

**E:** [sales@conicaltool.com](mailto:sales@conicaltool.com)

Custom Tooling:

**E:** [quotes@conicaltool.com](mailto:quotes@conicaltool.com)

**W:** [conicalendmills.com/custom-tool-ordering](http://conicalendmills.com/custom-tool-ordering)



**GLOBAL™**  
CUTTING TOOLS

# SERIES: AL2 & AL3

For high feed / material removal rate of aluminum and non-ferrous materials to maximize productivity and surface finish while roughing, slotting, pocketing and finishing ; wet or dry; aluminum, magnesium, and copper alloys, composites, plastics and fiberglass.



Square end option to create sharp corners in finishing operations



Ball end option for high performance contour milling in finishing operations



Two flute design permits maximum chip evacuation while high performance milling in heavy roughing or slotting operations at increased depths

Cylindrical land for excellent surface finishes

Cylindrical flute grind / relief for enhanced chip formation and improved chip evacuation



Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure

Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges

Improved tool engagement through 3 flute design creates more stability in the cut and a superior surface finish

Secondary flute polish creates an internal chip breaker, improving chip management and evacuation.

Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds



Proper chip evacuation allows for increased material removal rates at lower horsepower

Immediate 50% increase in performance over 2 flute designs

Chip evacuation reduces spindle drag to maximize the horsepower available for increased feed rates

## TIP OPTIONS



## SHANK OPTIONS



## FLUTE OPTIONS



## MATERIALS



## COATINGS



STANDARD OPTIONAL OPTIONAL

## RESULTS

These end mills breeze through non-ferrous materials like brass, bronze, copper, plastics, and of course aluminum. Their performance leaves little to question about its effectiveness or value. Coatings are optional to fine tune the end mill to your application and material, yet this tool

still produces increased material removal rates even with lower horsepower machines. This tool gives you solutions to complex machining challenges, while simplifying the process and delivering consistent results with measurable success.

Series AL2 & AL3: Micro-Grain Carbide, 2 & 3 Flute, 45° Constant Helix

Subseries: AL2SR, AL2CR, AL2BR, AL2SS, AL2CS, AL2BS, AL2SL, AL2CL, AL2BL, AL3SR, AL3CR, AL3BR, AL3SS, AL3CS, AL3BS, AL3SL, AL3CL, AL3BL

Configuration: Varying Diameters; Stub, Regular & Long Lengths; 45° Constant Helix; Square End, Corner Radius & Ball End (2 Flute only)

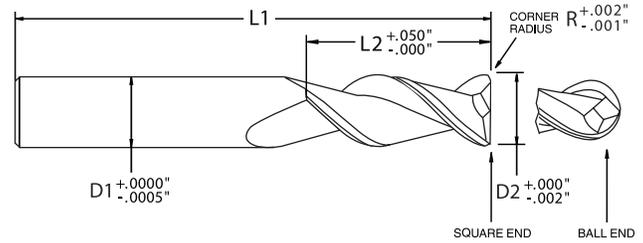
# ALUMINUM 2 FLUTE

## SERIES AL2 - CARBIDE, 2 FLUTE, 45° CONSTANT HELIX

### FOR USE IN DIVERSE MATERIALS

The numerous combinations of tip, shank, flute and coating options, make this end mill popular among users who have a diversity of materials they need to process.

- Square end option to create sharp corners in finishing operations
- Two flute design permits maximum chip evacuation while high performance milling in heavy roughing or slotting operations at increased depths
- Cylindrical land for excellent surface finishes • Cylindrical flute grind / relief for enhanced chip formation and improved chip evacuation



TIP & END	SHANK & LENGTH	FLUTE CONFIGURATION	MATERIAL	COATINGS

### SERIES AL2SR - SQUARE END & CORNER RADIUS, PLAIN SHANK

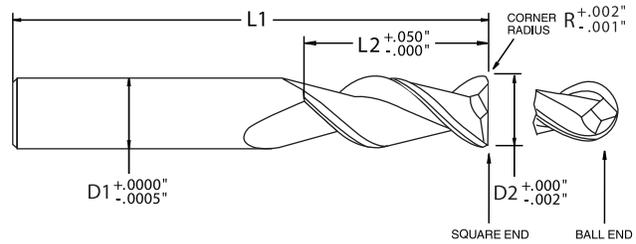
SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	SQUARE END		CORNER RADIUS									
				PART #	EDP #	PART # .015 (R)	EDP #	PART # .030 (R)	EDP #	PART # .060 (R)	EDP #	PART # .090 (R)	EDP #		
1/8	0.125	3/8	0.375	2	2.000	AL2-0206-SQ	B0015	AL2-0206-R1	B0011	—	—	—	—	—	—
		5/8	0.625	2	2.000	AL2-0210-SQ	B0025	AL2-0210-R1	B0021	—	—	—	—	—	—
3/16	0.188	3/8	0.375	2	2.000	AL2-0306-SQ	B0035	AL2-0306-R1	B0031	AL2-0306-R3	B0013	—	—	—	—
		5/8	0.625	2	2.000	AL2-0310-SQ	B0045	AL2-0310-R1	B0041	AL2-0310-R3	B0023	—	—	—	—
1/4	0.250	3/8	0.375	2	2.000	AL2-0406-SQ	B0055	AL2-0406-R1	B0051	AL2-0406-R3	B0033	AL2-0406-R6	B0016	—	—
		7/8	0.875	2 1/2	2.500	AL2-0414-SQ	B0065	AL2-0414-R1	B0061	AL2-0414-R3	B0043	AL2-0414-R6	B0026	—	—
		1 3/8	1.375	3	3.000	AL2-0422-SQ	B0075	AL2-0422-R1	B0071	AL2-0422-R3	B0053	AL2-0422-R6	B0036	—	—
5/16	0.313	1/2	0.500	2	2.000	AL2-0508-SQ	B0085	AL2-0508-R1	B0081	AL2-0508-R3	B0063	AL2-0508-R6	B0046	—	—
		7/8	0.875	2 1/2	2.500	AL2-0514-SQ	B0095	AL2-0514-R1	B0091	AL2-0514-R3	B0073	AL2-0514-R6	B0056	—	—
		1 3/8	1.375	3	3.000	AL2-0522-SQ	B0105	AL2-0522-R1	B0101	AL2-0522-R3	B0083	AL2-0522-R6	B0066	—	—
3/8	0.375	5/8	0.625	2	2.000	AL2-0610-SQ	B0115	AL2-0610-R1	B0111	AL2-0610-R3	B0093	AL2-0610-R6	B0076	AL2-0610-R9	B0017
		7/8	0.875	2 1/2	2.500	AL2-0614-SQ	B0125	AL2-0614-R1	B0121	AL2-0614-R3	B0103	AL2-0614-R6	B0086	AL2-0614-R9	B0027
		1 3/8	1.375	3	3.000	AL2-0622-SQ	B0135	AL2-0622-R1	B0131	AL2-0622-R3	B0113	AL2-0622-R6	B0096	AL2-0622-R9	B0037
		1 7/8	1.875	3 1/2	3.500	AL2-0630-SQ	B0145	AL2-0630-R1	B0141	AL2-0630-R3	B0123	AL2-0630-R6	B0106	AL2-0630-R9	B0047
		2 1/8	2.125	4	4.000	AL2-0634-SQ	B0155	AL2-0634-R1	B0151	AL2-0634-R3	B0133	AL2-0634-R6	B0116	AL2-0634-R9	B0057
7/16	0.438	5/8	0.625	2 1/2	2.500	AL2-0710-SQ	B0165	AL2-0710-R1	B0161	AL2-0710-R3	B0143	AL2-0710-R6	B0126	AL2-0710-R9	B0067
		1 1/8	1.125	3	3.000	AL2-0718-SQ	B0175	AL2-0718-R1	B0171	AL2-0718-R3	B0153	AL2-0718-R6	B0136	AL2-0718-R9	B0077
		2 1/8	2.125	4	4.000	AL2-0734-SQ	B0185	AL2-0734-R1	B0181	AL2-0734-R3	B0163	AL2-0734-R6	B0146	AL2-0734-R9	B0087
1/2	0.500	5/8	0.625	2 1/2	2.500	AL2-0810-SQ	B0195	AL2-0810-R1	B0191	AL2-0810-R3	B0173	AL2-0810-R6	B0156	AL2-0810-R9	B0097
		1 1/8	1.125	3	3.000	AL2-0818-SQ	B0205	AL2-0818-R1	B0201	AL2-0818-R3	B0183	AL2-0818-R6	B0166	AL2-0818-R9	B0107
		1 5/8	1.625	3 1/2	3.500	AL2-0826-SQ	B0215	AL2-0826-R1	B0211	AL2-0826-R3	B0193	AL2-0826-R6	B0176	AL2-0826-R9	B0117
		2 1/8	2.125	4	4.000	AL2-0834-SQ	B0225	AL2-0834-R1	B0221	AL2-0834-R3	B0203	AL2-0834-R6	B0186	AL2-0834-R9	B0127
		2 5/8	2.625	5	5.000	AL2-0842-SQ	B0235	AL2-0842-R1	B0231	AL2-0842-R3	B0213	AL2-0842-R6	B0196	AL2-0842-R9	B0137
		3 3/8	3.375	6	6.000	AL2-0854-SQ	B0245	AL2-0854-R1	B0241	AL2-0854-R3	B0223	AL2-0854-R6	B0206	AL2-0854-R9	B0147
5/8	0.625	7/8	0.875	3	3.000	AL2-1014-SQ	B0255	—	—	AL2-1014-R3	B0233	AL2-1014-R6	B0216	AL2-1014-R9	B0157
		1 5/8	1.625	3 1/2	3.500	AL2-1026-SQ	B0265	—	—	AL2-1026-R3	B0243	AL2-1026-R6	B0226	AL2-1026-R9	B0167
		2 1/8	2.125	4	4.000	AL2-1034-SQ	B0275	—	—	AL2-1034-R3	B0253	AL2-1034-R6	B0236	AL2-1034-R9	B0177
		2 5/8	2.625	5	5.000	AL2-1042-SQ	B0285	—	—	AL2-1042-R3	B0263	AL2-1042-R6	B0246	AL2-1042-R9	B0187
		3 3/8	3.375	6	6.000	AL2-1054-SQ	B0295	—	—	AL2-1054-R3	B0273	AL2-1054-R6	B0256	AL2-1054-R9	B0197
3/4	0.750	1 1/8	1.125	3	3.000	AL2-1218-SQ	B0305	—	—	AL2-1218-R3	B0283	AL2-1218-R6	B0266	AL2-1218-R9	B0207
		1 5/8	1.625	4	4.000	AL2-1226-SQ	B0315	—	—	AL2-1226-R3	B0293	AL2-1226-R6	B0276	AL2-1226-R9	B0217
		2 5/8	2.625	5	5.000	AL2-1242-SQ	B0325	—	—	AL2-1242-R3	B0303	AL2-1242-R6	B0286	AL2-1242-R9	B0227
		3 3/8	3.375	6	6.000	AL2-1254-SQ	B0335	—	—	AL2-1254-R3	B0313	AL2-1254-R6	B0296	AL2-1254-R9	B0237
		4 1/8	4.125	7	7.000	AL2-1266-SQ	B0345	—	—	AL2-1266-R3	B0323	AL2-1266-R6	B0306	AL2-1266-R9	B0247
1	1.000	1 5/8	1.625	4	4.000	AL2-1626-SQ	B0355	—	—	AL2-1626-R3	B0333	AL2-1626-R6	B0316	AL2-1626-R9	B0257
		2 1/8	2.125	4	4.000	AL2-1634-SQ	B0365	—	—	AL2-1634-R3	B0343	AL2-1634-R6	B0326	AL2-1634-R9	B0267
		2 5/8	2.625	5	5.000	AL2-1642-SQ	B0375	—	—	AL2-1642-R3	B0353	AL2-1642-R6	B0336	AL2-1642-R9	B0277
		3 3/8	3.375	6	6.000	AL2-1654-SQ	B0385	—	—	AL2-1654-R3	B0363	AL2-1654-R6	B0346	AL2-1654-R9	B0287
		4 3/8	4.375	7	7.000	AL2-1670-SQ	B0395	—	—	AL2-1670-R3	B0373	AL2-1670-R6	B0356	AL2-1670-R9	B0297

## SERIES AL2 - CARBIDE, 2 FLUTE, 45° CONSTANT HELIX

### GREATER FEEDS AND SPEEDS

These end mills offer multi- functionality and cost effectiveness, rarely attained in an end mill. Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength, for greater feeds and speeds.

- Cylindrical flute grind / relief for enhanced chip formation and improved chip evacuation
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges
- Premium micro-grain carbide substrate resists chipping, tool ..... deflection, and has a high transverse rupture strength for greater feeds and speeds



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATINGS

## SERIES AL2SL - CORNER RADIUS & BALL END, PLAIN SHANK

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	CORNER RADIUS				BALL END											
				PART # .125 (R)	EDP #	PART # .156 (R)	EDP #	PART # .190 (R)	EDP #	PART # .250 (R)	EDP #	PART #	EDP #						
1/8	0.125	3/8	0.375	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	
		5/8	0.625	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3/16	0.188	3/8	0.375	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	
		5/8	0.625	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1/4	0.250	3/8	0.375	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	
		7/8	0.875	2 1/2	2.500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		13/8	1.375	3	3.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5/16	0.313	1/2	0.500	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	
		7/8	0.875	2 1/2	2.500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		13/8	1.375	3	3.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3/8	0.375	5/8	0.625	2	2.000	—	—	—	—	—	—	—	—	—	—	—	—	—	
		7/8	0.875	2 1/2	2.500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		13/8	1.375	3	3.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		17/8	1.875	3 1/2	3.500	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/16	0.438	5/8	0.625	2 1/2	2.500	—	—	—	—	—	—	—	—	—	—	—	—	—	
		1 1/8	1.125	3	3.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		2 1/8	2.125	4	4.000	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1/2	0.500	5/8	0.625	2 1/2	2.500	AL2-0810-R12	B0018	—	—	—	—	—	—	—	—	—	—	—	
		1 1/8	1.125	3	3.000	AL2-0818-R12	B0028	—	—	—	—	—	—	—	—	—	—	—	
		1 5/8	1.625	3 1/2	3.500	AL2-0826-R12	B0038	—	—	—	—	—	—	—	—	—	—	—	
		2 1/8	2.125	4	4.000	AL2-0834-R12	B0048	—	—	—	—	—	—	—	—	—	—	—	—
		2 5/8	2.625	5	5.000	AL2-0842-R12	B0058	—	—	—	—	—	—	—	—	—	—	—	—
		3 3/8	3.375	6	6.000	AL2-0854-R12	B0068	—	—	—	—	—	—	—	—	—	—	—	—
5/8	0.625	7/8	0.875	3	3.000	AL2-1014-R12	B0078	—	—	—	—	—	—	—	—	—	—	—	
		1 5/8	1.625	3 1/2	3.500	AL2-1026-R12	B0088	—	—	—	—	—	—	—	—	—	—	—	
		2 1/8	2.125	4	4.000	AL2-1034-R12	B0098	—	—	—	—	—	—	—	—	—	—	—	
		2 5/8	2.625	5	5.000	AL2-1042-R12	B0108	—	—	—	—	—	—	—	—	—	—	—	
3/4	0.750	3 3/8	3.375	6	6.000	AL2-1054-R12	B0118	—	—	—	—	—	—	—	—	—	—	—	
		1 1/8	1.125	3	3.000	AL2-1218-R12	B0128	AL2-1218-R15	B0019	AL2-1218-R19	B0010	—	—	—	—	—	—	—	
		1 5/8	1.625	4	4.000	AL2-1226-R12	B0138	AL2-1226-R15	B0029	AL2-1226-R19	B0020	—	—	—	—	—	—	—	
		2 5/8	2.625	5	5.000	AL2-1242-R12	B0148	AL2-1242-R15	B0039	AL2-1242-R19	B0030	—	—	—	—	—	—	—	
		3 3/8	3.375	6	6.000	AL2-1254-R12	B0158	AL2-1254-R15	B0049	AL2-1254-R19	B0040	—	—	—	—	—	—	—	
1	1.000	4 1/8	4.125	7	7.000	AL2-1266-R12	B0168	AL2-1266-R15	B0059	AL2-1266-R19	B0050	—	—	—	—	—	—	—	
		1 5/8	1.625	4	4.000	AL2-1626-R12	B0178	AL2-1626-R15	B0069	AL2-1626-R19	B0060	AL2-1626-R25	B0110	—	—	—	—	—	
		2 1/8	2.125	4	4.000	AL2-1634-R12	B0188	AL2-1634-R15	B0079	AL2-1634-R19	B0070	AL2-1634-R25	B0120	AL2-1634-BE	B210B	—	—		
		2 5/8	2.625	5	5.000	AL2-1642-R12	B0198	AL2-1642-R15	B0089	AL2-1642-R19	B0080	AL2-1642-R25	B0130	—	—	—	—		
		3 3/8	3.375	6	6.000	AL2-1654-R12	B0208	AL2-1654-R15	B0099	AL2-1654-R19	B0090	AL2-1654-R25	B0140	—	—	—	—		
		4 3/8	4.375	7	7.000	AL2-1670-R12	B0218	AL2-1670-R15	B0109	AL2-1670-R19	B0100	AL2-1670-R25	B0150	—	—	—	—		

# ALUMINUM 3 FLUTE

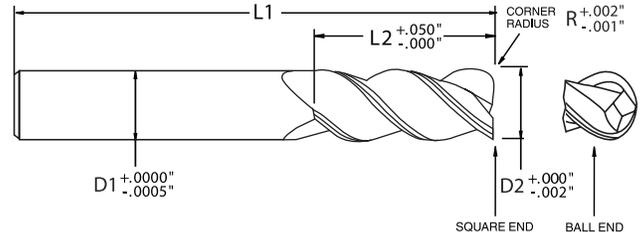


## SERIES AL3 - CARBIDE, 3 FLUTE, 45° CONSTANT HELIX

### EFFECTIVENESS AND VALUE

These end mills breeze through non-ferrous materials like brass, bronze, copper, plastics, and of course aluminum. Their performance leaves little to question about its effectiveness or value.

- Corner radius option protects corners in roughing operations and difficult to machine materials by preventing corner chipping and tool failure
- Immediate 50% increase in performance over 2 flute designs
- Premium micro-grain carbide substrate resists chipping, tool deflection, and has a high transverse rupture strength for greater feeds and speeds



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATINGS

## SERIES AL3SR - SQUARE END & CORNER RADIUS, PLAIN SHANK

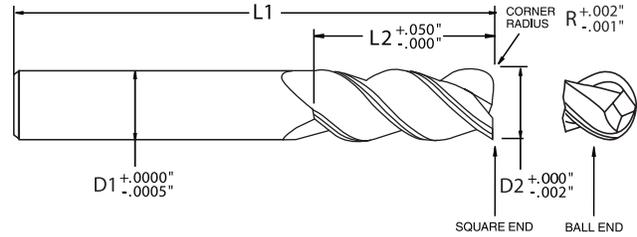
SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	SQUARE END		CORNER RADIUS									
				PART #	EDP #	PART # .015 (R)	EDP #	PART # .030 (R)	EDP #	PART # .060 (R)	EDP #	PART # .090 (R)	EDP #		
1/8	0.125	3/8	0.375	2	2.000	AL3-0206-SQ	C0015	AL3-0206-R1	C0011	—	—	—	—	—	—
		5/8	0.625	2	2.000	AL3-0210-SQ	C0025	AL3-0210-R1	C0021	—	—	—	—	—	—
3/16	0.188	3/8	0.375	2	2.000	AL3-0306-SQ	C0035	AL3-0306-R1	C0031	AL3-0306-R3	C0013	—	—	—	—
		5/8	0.625	2	2.000	AL3-0310-SQ	C0045	AL3-0310-R1	C0041	AL3-0310-R3	C0023	—	—	—	—
1/4	0.250	3/8	0.375	2	2.000	AL3-0406-SQ	C0055	AL3-0406-R1	C0051	AL3-0406-R3	C0033	AL3-0406-R6	C0016	—	—
		7/8	0.875	2 1/2	2.500	AL3-0414-SQ	C0065	AL3-0414-R1	C0061	AL3-0414-R3	C0043	AL3-0414-R6	C0026	—	—
		1 3/8	1.375	3	3.000	AL3-0422-SQ	C0075	AL3-0422-R1	C0071	AL3-0422-R3	C0053	AL3-0422-R6	C0036	—	—
5/16	0.313	1/2	0.500	2	2.000	AL3-0508-SQ	C0085	AL3-0508-R1	C0081	AL3-0508-R3	C0063	AL3-0508-R6	C0046	—	—
		7/8	0.875	2 1/2	2.500	AL3-0514-SQ	C0095	AL3-0514-R1	C0091	AL3-0514-R3	C0073	AL3-0514-R6	C0056	—	—
		1 3/8	1.375	3	3.000	AL3-0522-SQ	C0105	AL3-0522-R1	C0101	AL3-0522-R3	C0083	AL3-0522-R6	C0066	—	—
3/8	0.375	5/8	0.625	2	2.000	AL3-0610-SQ	C0115	AL3-0610-R1	C0111	AL3-0610-R3	C0093	AL3-0610-R6	C0076	AL3-0610-R9	C0017
		7/8	0.875	2 1/2	2.500	AL3-0614-SQ	C0125	AL3-0614-R1	C0121	AL3-0614-R3	C0103	AL3-0614-R6	C0086	AL3-0614-R9	C0027
		1 3/8	1.375	3	3.000	AL3-0622-SQ	C0135	AL3-0622-R1	C0131	AL3-0622-R3	C0113	AL3-0622-R6	C0096	AL3-0622-R9	C0037
		1 7/8	1.875	3 1/2	3.500	AL3-0630-SQ	C0145	AL3-0630-R1	C0141	AL3-0630-R3	C0123	AL3-0630-R6	C0106	AL3-0630-R9	C0047
		2 1/8	2.125	4	4.000	AL3-0634-SQ	C0155	AL3-0634-R1	C0151	AL3-0634-R3	C0133	AL3-0634-R6	C0116	AL3-0634-R9	C0057
7/16	0.438	5/8	0.625	2 1/2	2.500	AL3-0710-SQ	C0165	AL3-0710-R1	C0161	AL3-0710-R3	C0143	AL3-0710-R6	C0126	AL3-0710-R9	C0067
		1 1/8	1.125	3	3.000	AL3-0718-SQ	C0175	AL3-0718-R1	C0171	AL3-0718-R3	C0153	AL3-0718-R6	C0136	AL3-0718-R9	C0077
		2 1/8	2.125	4	4.000	AL3-0734-SQ	C0185	AL3-0734-R1	C0181	AL3-0734-R3	C0163	AL3-0734-R6	C0146	AL3-0734-R9	C0087
		5/8	0.625	2 1/2	2.500	AL3-0810-SQ	C0195	AL3-0810-R1	C0191	AL3-0810-R3	C0173	AL3-0810-R6	C0156	AL3-0810-R9	C0097
1/2	0.500	1 1/8	1.125	3	3.000	AL3-0818-SQ	C0205	AL3-0818-R1	C0201	AL3-0818-R3	C0183	AL3-0818-R6	C0166	AL3-0818-R9	C0107
		1 5/8	1.625	3 1/2	3.500	AL3-0826-SQ	C0215	AL3-0826-R1	C0211	AL3-0826-R3	C0193	AL3-0826-R6	C0176	AL3-0826-R9	C0117
		2 1/8	2.125	4	4.000	AL3-0834-SQ	C0225	AL3-0834-R1	C0221	AL3-0834-R3	C0203	AL3-0834-R6	C0186	AL3-0834-R9	C0127
		2 5/8	2.625	5	5.000	AL3-0842-SQ	C0235	AL3-0842-R1	C0231	AL3-0842-R3	C0213	AL3-0842-R6	C0196	AL3-0842-R9	C0137
		3 3/8	3.375	6	6.000	AL3-0854-SQ	C0245	AL3-0854-R1	C0241	AL3-0854-R3	C0223	AL3-0854-R6	C0206	AL3-0854-R9	C0147
5/8	0.625	7/8	0.875	3	3.000	AL3-1014-SQ	C0255	—	—	AL3-1014-R3	C0233	AL3-1014-R6	C0216	AL3-1014-R9	C0157
		1 5/8	1.625	3 1/2	3.500	AL3-1026-SQ	C0265	—	—	AL3-1026-R3	C0243	AL3-1026-R6	C0226	AL3-1026-R9	C0167
		2 1/8	2.125	4	4.000	AL3-1034-SQ	C0275	—	—	AL3-1034-R3	C0253	AL3-1034-R6	C0236	AL3-1034-R9	C0177
		2 5/8	2.625	5	5.000	AL3-1042-SQ	C0285	—	—	AL3-1042-R3	C0263	AL3-1042-R6	C0246	AL3-1042-R9	C0187
		3 3/8	3.375	6	6.000	AL3-1054-SQ	C0295	—	—	AL3-1054-R3	C0273	AL3-1054-R6	C0256	AL3-1054-R9	C0197
3/4	0.750	1 1/8	1.125	3	3.000	AL3-1218-SQ	C0305	—	—	AL3-1218-R3	C0283	AL3-1218-R6	C0266	AL3-1218-R9	C0207
		1 5/8	1.625	4	4.000	AL3-1226-SQ	C0315	—	—	AL3-1226-R3	C0293	AL3-1226-R6	C0276	AL3-1226-R9	C0217
		2 5/8	2.625	5	5.000	AL3-1242-SQ	C0325	—	—	AL3-1242-R3	C0303	AL3-1242-R6	C0286	AL3-1242-R9	C0227
		3 3/8	3.375	6	6.000	AL3-1254-SQ	C0335	—	—	AL3-1254-R3	C0313	AL3-1254-R6	C0296	AL3-1254-R9	C0237
		4 1/8	4.125	7	7.000	AL3-1266-SQ	C0345	—	—	AL3-1266-R3	C0323	AL3-1266-R6	C0306	AL3-1266-R9	C0247
1	1.000	1 5/8	1.625	4	4.000	AL3-1626-SQ	C0355	—	—	AL3-1626-R3	C0333	AL3-1626-R6	C0316	AL3-1626-R9	C0257
		2 1/8	2.125	4	4.000	AL3-1634-SQ	C0365	—	—	AL3-1634-R3	C0343	AL3-1634-R6	C0326	AL3-1634-R9	C0267
		2 5/8	2.625	5	5.000	AL3-1642-SQ	C0375	—	—	AL3-1642-R3	C0353	AL3-1642-R6	C0336	AL3-1642-R9	C0277
		3 3/8	3.375	6	6.000	AL3-1654-SQ	C0385	—	—	AL3-1654-R3	C0363	AL3-1654-R6	C0346	AL3-1654-R9	C0287
		4 3/8	4.375	7	7.000	AL3-1670-SQ	C0395	—	—	AL3-1670-R3	C0373	AL3-1670-R6	C0356	AL3-1670-R9	C0297

## SERIES AL3 - CARBIDE, 3 FLUTE, 45° CONSTANT HELIX

### SIMPLIFY YOUR PROCESS

This tool gives you solutions to complex machining challenges, while simplifying the process and delivering consistent results with measurable success.

- Cylindrical flute grind / relief for enhanced chip formation and improved chip evacuation
- Odd number of flutes reduce harmonics by staggering the entry and exit of the cutting edges
- Improved tool engagement through 3 flute design creates more stability in the cut and a superior surface finish



TIP & END

SHANK & LENGTH

FLUTE CONFIGURATION

MATERIAL

COATINGS

## SERIES AL3SL - CORNER RADIUS & BALL END, PLAIN SHANK

SHANK DIAMETER (D1)	CUTTER DIAMETER (D2)	FLUTE LENGTH (L2)	OVERALL LENGTH (L1)	CORNER RADIUS				BALL END			
				PART # .0125 (R)	EDP #	PART # .156 (R)	EDP #	PART # .190 (R)	EDP #	PART #	EDP #
1/8	0.125	3/8	0.375	2	2.000	—	—	—	—	—	—
		5/8	0.625	2	2.000	—	—	—	—	—	—
3/16	0.188	3/8	0.375	2	2.000	—	—	—	—	—	—
		5/8	0.625	2	2.000	—	—	—	—	—	—
1/4	0.250	3/8	0.375	2	2.000	—	—	—	—	—	—
		7/8	0.875	2 1/2	2.500	—	—	—	—	—	—
		1 3/8	1.375	3	3.000	—	—	—	—	—	—
5/16	0.313	1/2	0.500	2	2.000	—	—	—	—	—	—
		7/8	0.875	2 1/2	2.500	—	—	—	—	—	—
		1 3/8	1.375	3	3.000	—	—	—	—	—	—
3/8	0.375	5/8	0.625	2	2.000	—	—	—	—	—	—
		7/8	0.875	2 1/2	2.500	—	—	—	—	—	—
		1 3/8	1.375	3	3.000	—	—	—	—	—	—
		1 7/8	1.875	3 1/2	3.500	—	—	—	—	—	—
		2 1/8	2.125	4	4.000	—	—	—	—	—	—
7/16	0.438	5/8	0.625	2 1/2	2.500	—	—	—	—	—	—
		1 1/8	1.125	3	3.000	—	—	—	—	—	—
		2 1/8	2.125	4	4.000	—	—	—	—	—	—
1/2	0.500	5/8	0.625	2 1/2	2.500	AL3-0810-R12	C0018	—	—	—	—
		1 1/8	1.125	3	3.000	AL3-0818-R12	C0028	—	—	—	—
		1 5/8	1.625	3 1/2	3.500	AL3-0826-R12	C0038	—	—	—	—
		2 1/8	2.125	4	4.000	AL3-0834-R12	C0048	—	—	—	—
		2 5/8	2.625	5	5.000	AL3-0842-R12	C0058	—	—	—	—
		3 3/8	3.375	6	6.000	AL3-0854-R12	C0068	—	—	—	—
5/8	0.625	7/8	0.875	3	3.000	AL3-1014-R12	C0078	—	—	—	—
		1 5/8	1.625	3 1/2	3.500	AL3-1026-R12	C0088	—	—	—	—
		2 1/8	2.125	4	4.000	AL3-1034-R12	C0098	—	—	—	—
		2 5/8	2.625	5	5.000	AL3-1042-R12	C0108	—	—	—	—
		3 3/8	3.375	6	6.000	AL3-1054-R12	C0118	—	—	—	—
3/4	0.750	1 1/8	1.125	3	3.000	AL3-1218-R12	C0128	AL3-1218-R15	C0019	AL3-1218-R19	C0010
		1 5/8	1.625	4	4.000	AL3-1226-R12	C0138	AL3-1226-R15	C0029	AL3-1226-R19	C0020
		2 5/8	2.625	5	5.000	AL3-1242-R12	C0148	AL3-1242-R15	C0039	AL3-1242-R19	C0030
		3 3/8	3.375	6	6.000	AL3-1254-R12	C0158	AL3-1254-R15	C0049	AL3-1254-R19	C0040
		4 1/8	4.125	7	7.000	AL3-1266-R12	C0168	AL3-1266-R15	C0059	AL3-1266-R19	C0050
1	1.000	1 5/8	1.625	4	4.000	AL3-1626-R12	C0178	AL3-1626-R15	C0069	AL3-1626-R19	C0060
		2 1/8	2.125	4	4.000	AL3-1634-R12	C0188	AL3-1634-R15	C0079	AL3-1634-R19	C0070
		2 5/8	2.625	5	5.000	AL3-1642-R12	C0198	AL3-1642-R15	C0089	AL3-1642-R19	C0080
		3 3/8	3.375	6	6.000	AL3-1654-R12	C0208	AL3-1654-R15	C0099	AL3-1654-R19	C0090
		4 3/8	4.375	7	7.000	AL3-1670-R12	C0218	AL3-1670-R15	C0109	AL3-1670-R19	C0100
—	—	—	—	—	—	—	—	—	AL3-1626-R25	C0110	
—	—	—	—	—	—	—	—	—	AL3-1634-R25	C0120	
—	—	—	—	—	—	—	—	—	AL3-1634-BE	C210B	
—	—	—	—	—	—	—	—	—	AL3-1642-R25	C0130	
—	—	—	—	—	—	—	—	—	AL3-1654-R25	C0140	
—	—	—	—	—	—	—	—	—	AL3-1670-R25	C0150	

- CB CARBIDE
- HSS HIGH SPEED STEEL
- VORTEX4
- VORTEX5
- CYCLONE MX
- HYDRA FX
- XTERRA3
- EXTREME3
- ZEPHYR3
- ALUMINUM 2 & 3 FLUTE
- CONICAL TAPERED CARBIDE
- CONICAL TAPERED HSS
- CONICAL TAPERED LHS - RHC
- CHAMFER CUTTERS
- TAPERED MINIATURES
- AUTOMOTIVE TAPERS
- DIE & MOLD CUTTERS
- PROFILE RIB CUTTERS
- RUNNER CUTTERS
- DIE SINKS
- GENERAL PURPOSE

# AL 2 & 3 APPLICATION GUIDE • SPEED & FEED

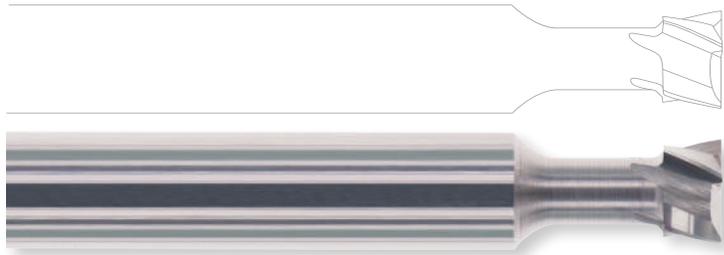
WORK MATERIAL	TYPE OF CUT	AXIAL DOC	RADIAL DOC	NO. OF FLUTES	SPEED (SFM)	FEED (INCHES PER TOOTH)							
						1/8" (2 & 3 FL)	1/4" (2 & 3 FL)	3/8" (2 & 3 FL)	1/2" (2 & 3 FL)	5/8" (2 & 3 FL)	3/4" (2 & 3 FL)	1" (2 & 3 FL)	
ALUMINUM ALUMINUM ALLOYS Low Silicon Content 20xx; 50xx; 60xx; 70xx	Slotting	1 x D	1 x D	2 / 3	815 - 935	0.0011 - 0.0013	0.0021 - 0.0025	0.0032 - 0.0038	0.0042 - 0.0050	0.0052 - 0.0062	0.0063 - 0.0075	0.0084 - 0.010	
	Roughing	1 x D	.5 x D	2 / 3	1005 - 1155	0.0014 - 0.0018	0.0027 - 0.0032	0.0040 - 0.0048	0.0054 - 0.0064	0.0067 - 0.0080	0.0081 - 0.0096	0.0107 - 0.0128	
	High Efficiency (HEM)	2 x D	.2 x D	2 / 3	1260 - 1400	0.0027 - 0.0030	0.0053 - 0.0059	0.0079 - 0.0089	0.0105 - 0.0118	0.0131 - 0.0148	0.0158 - 0.0177	0.0210 - 0.0237	
	Finishing	1.5 x D	.01 x D	2 / 3	1045 - 1145	0.0017 - 0.0021	0.0033 - 0.0038	0.0050 - 0.0057	0.0066 - 0.0075	0.0083 - 0.0094	0.0099 - 0.0113	0.0132 - 0.0151	
	ALUMINUM DIE CAST ALLOY High Silicon Content A-38x; A-39x; B39x	Slotting	.75 x D	1 x D	2 / 3	670 - 770	0.0090 - 0.0092	0.0179 - 0.0183	0.0269 - 0.0275	0.0358 - 0.0366	0.0447 - 0.0457	0.0537 - 0.0549	0.0716 - 0.0732
		Roughing	1 x D	.5 x D	2 / 3	825 - 945	0.0012 - 0.0016	0.0023 - 0.0028	0.0034 - 0.0042	0.0046 - 0.0056	0.0057 - 0.0070	0.0069 - 0.0084	0.0091 - 0.0112
High Efficiency (HEM)		2 x D	.15 x D	2 / 3	1035 - 1150	0.0021 - 0.0024	0.0041 - 0.0047	0.0061 - 0.0071	0.0081 - 0.0094	0.0101 - 0.0118	0.0122 - 0.0141	0.0162 - 0.0189	
MAGNESIUM ALLOYS ≤ 38 HRC	Slotting	1 x D	1 x D	2 / 3	845 - 970	0.0011 - 0.0013	0.0021 - 0.0025	0.0032 - 0.0038	0.0042 - 0.0050	0.0052 - 0.0062	0.0063 - 0.0075	0.0084 - 0.010	
	Roughing	1 x D	.75 x D	2 / 3	1040 - 1195	0.0014 - 0.0018	0.0027 - 0.0032	0.0040 - 0.0048	0.0054 - 0.0064	0.0067 - 0.0080	0.0081 - 0.0096	0.0107 - 0.0128	
	High Efficiency (HEM)	2 x D	.2 x D	2 / 3	1305 - 1450	0.0030 - 0.0033	0.0059 - 0.0065	0.0088 - 0.0098	0.0117 - 0.0130	0.0146 - 0.0163	0.0176 - 0.0195	0.0234 - 0.0261	
NONFERROUS COPPER ALLOYS, BRASS & BRONZE 39 to 48 Hrc Manganese Bronze, Tin Bronze, Beryllium	Slotting	1 x D	1 x D	2 / 3	670 - 770	0.0009 - 0.0011	0.0017 - 0.0021	0.0026 - 0.0032	0.0034 - 0.0042	0.0042 - 0.0052	0.0051 - 0.0063	0.0068 - 0.0084	
	Roughing	1 x D	.75 x D	2 / 3	825 - 945	0.0012 - 0.0016	0.0023 - 0.0028	0.0034 - 0.0042	0.0046 - 0.0056	0.0057 - 0.0070	0.0069 - 0.0084	0.0091 - 0.0112	
	High Efficiency (HEM)	2 x D	.2 x D	2 / 3	1035 - 1150	0.0025 - 0.0028	0.0049 - 0.0055	0.0073 - 0.0083	0.0097 - 0.0110	0.0121 - 0.0138	0.0146 - 0.0165	0.0194 - 0.0221	
COMPOSITES, PLASTICS & FIBERGLASS 48 to 57 Hrc ABS, Polycarbonate, PVC, Polypropylene	Slotting	1 x D	1 x D	2 / 3	670 - 770	0.0009 - 0.0011	0.0017 - 0.0021	0.0026 - 0.0032	0.0034 - 0.0042	0.0042 - 0.0052	0.0051 - 0.0063	0.0068 - 0.0084	
	Roughing	1 x D	.75 x D	2 / 3	825 - 945	0.0012 - 0.0016	0.0023 - 0.0028	0.0034 - 0.0042	0.0046 - 0.0056	0.0057 - 0.0070	0.0069 - 0.0084	0.0091 - 0.0112	
	High Efficiency (HEM)	2 x D	.2 x D	2 / 3	1035 - 1150	0.0025 - 0.0028	0.0049 - 0.0055	0.0073 - 0.0083	0.0097 - 0.0110	0.0121 - 0.0138	0.0146 - 0.0165	0.0194 - 0.0221	
	Finishing	1.5 x D	.01 x D	2 / 3	995 - 1090	0.0015 - 0.0019	0.0029 - 0.0034	0.0044 - 0.0051	0.0058 - 0.0067	0.0073 - 0.0084	0.0087 - 0.0101	0.0116 - 0.0135	
	Finishing	1.5 x D	.01 x D	2 / 3	995 - 1090	0.0015 - 0.0019	0.0029 - 0.0034	0.0044 - 0.0051	0.0058 - 0.0067	0.0073 - 0.0084	0.0087 - 0.0101	0.0116 - 0.0135	
	Finishing	1.5 x D	.01 x D	2 / 3	995 - 1090	0.0015 - 0.0019	0.0029 - 0.0034	0.0044 - 0.0051	0.0058 - 0.0067	0.0073 - 0.0084	0.0087 - 0.0101	0.0116 - 0.0135	

# CUSTOM TOOL ORDERING

TO SOLVE MACHINING CHALLENGES

## WE'LL HELP YOU FIND THE SOLUTION

Along with our standard tool offerings, Conical Tool Company manufactures custom carbide and high speed steel end mills and cutters. Whether a variation of a standard tool or specialized tool meant to combine multiple processes into one pass, our custom tools improve performance and reduce cycle time at the best value in the industry.



**CONICAL TOOL COMPANY** REQUEST FOR QUOTATION (RFQ) **GLOBAL TOOL COMPANY**  
**CUSTOM CHAMFER CUTTER**

By using the services of our sales department and the tool company and tool design department, please understand that the requests are submitted to us and we will not be held responsible for any errors or omissions. Please refer to our website for more information. Please refer to our website for more information. Please refer to our website for more information.

**TOOL DIMENSIONS**

ITEM NO.	DESCRIPTION	QUANTITY	UNIT PRICE	TOTAL PRICE
1	1/2" Dia Chamfer Cutter	10	\$12.00	\$120.00
2	3/8" Dia Chamfer Cutter	5	\$8.00	\$40.00
3	1/4" Dia Chamfer Cutter	5	\$6.00	\$30.00
4	3/16" Dia Chamfer Cutter	5	\$4.00	\$20.00
5	1/8" Dia Chamfer Cutter	5	\$3.00	\$15.00

**TOOL DESIGN**

Material:  HSS  Carbide  Other: \_\_\_\_\_  
 Length: \_\_\_\_\_  
 Diameter: \_\_\_\_\_  
 Flute Length: \_\_\_\_\_  
 Flute Diameter: \_\_\_\_\_  
 Chamfer Angle: \_\_\_\_\_  
 Chamfer Width: \_\_\_\_\_  
 Chamfer Depth: \_\_\_\_\_  
 Chamfer Radius: \_\_\_\_\_  
 Chamfer Fillet: \_\_\_\_\_  
 Chamfer Chamfer: \_\_\_\_\_

**END USER / SHIPPING INFORMATION**

Company: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone/Fax: \_\_\_\_\_  
 Email: \_\_\_\_\_

**DISTRIBUTOR / BILLING INFORMATION**

Company: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Phone/Fax: \_\_\_\_\_  
 Email: \_\_\_\_\_

3000 Buchanan Ave. Ste. 4 - Grand Rapids, MI 49504 • T: 888.531.8500 • F: 616.531.8500 • E: info@conicaltool.com • www.conicalendmills.com

SEE PAGES 27-36 FOR DETAILS, VISIT CONICALENDMILLS.COM, OR CALL (888) 531-8500