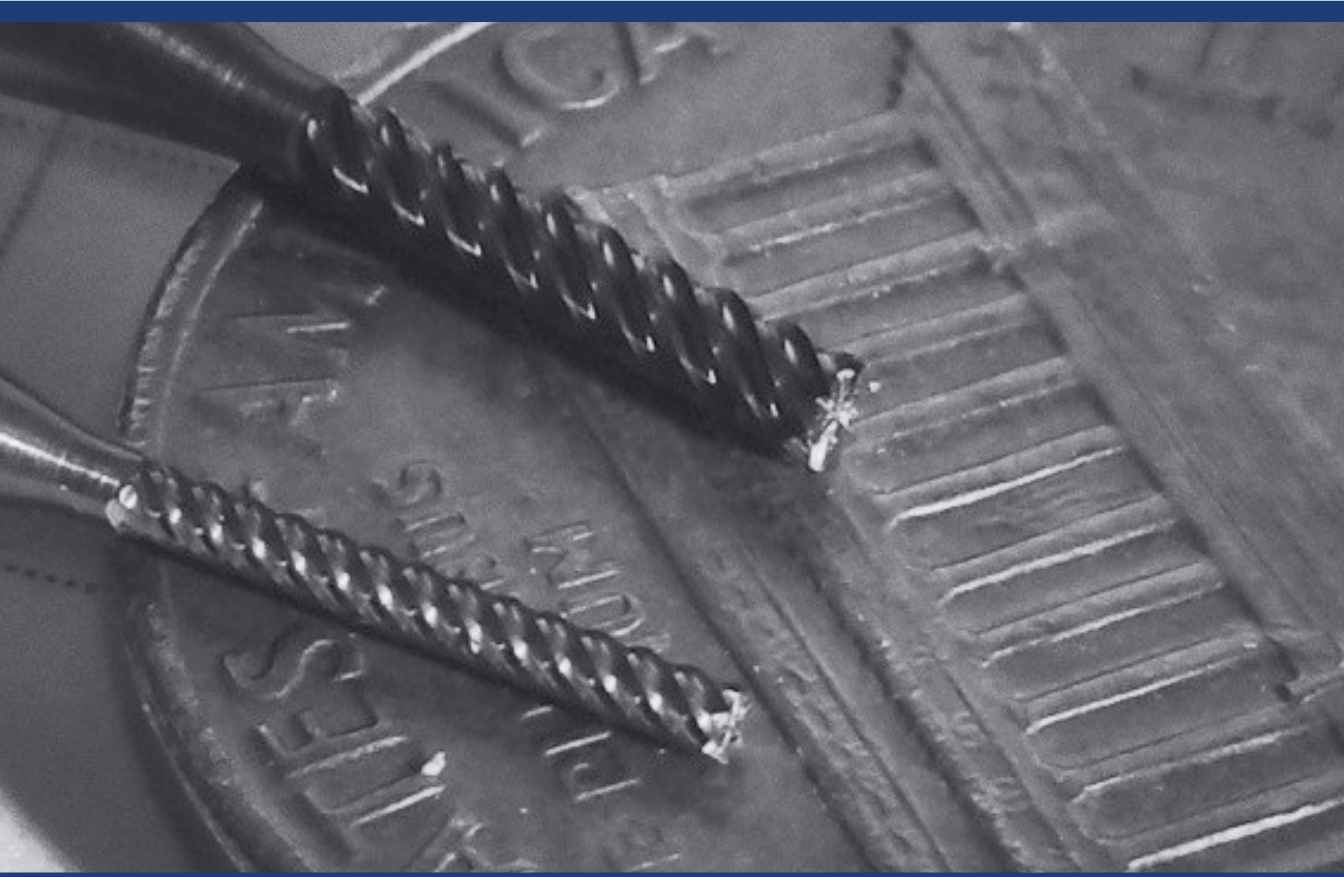




FEATURED SOLUTIONS

Finishing

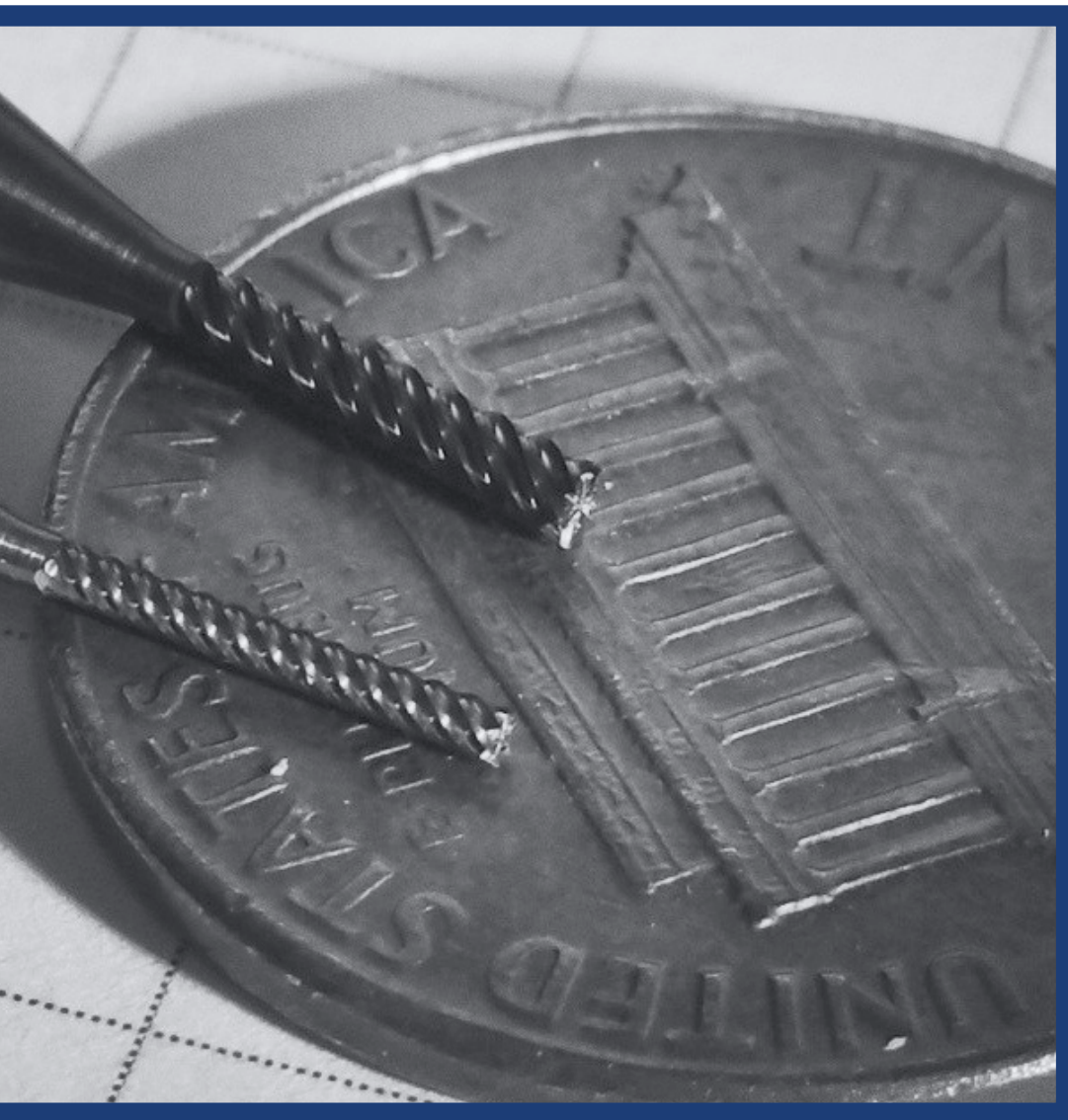


Photo courtesy of Philip G.

"I used these .031 and .047 six flute HarveyTool end mills to get into some of the really tight areas of the titanium prybar bottle opener I did for Kings Arsenal, it blows my mind! Harvey Tool, you guys are incredible."

– Philip G.

Finishing

Achieving **optimal surface finish** is a critical goal for any machinist, but not all tools are designed with finish requirements in mind. Harvey Tool has a wide selection of finishing tools with **material-specific geometries** designed to ensure **tight part tolerances** and **reduce witness marks**.

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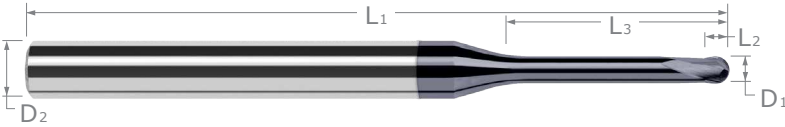
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END MILLS FOR HARDENED STEELS

Finishers – Ball

HARDENED STEELS



Stub Flute and
Large Rigid Core

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- Center cutting (3 flutes to center)
- Reduced neck diameter to avoid heeling
- CNC ground in the USA 

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO 2 FLUTE		AlTiN NANO 3 FLUTE	
D ₁			L ₂	L ₃	D ₂ (h6)	L ₁	2 FL	PRICE	3 FL	PRICE
+ .0000" - .0006"	+ .000mm - .014mm	decimal equivalent	+ .010" - .000" + .125mm - .000mm	+ .010" - .000" + .125mm - .000mm						
.008		.0080	.006	.012 (1.5x)	1/4	2-1/2	37808-C6	95.10		
.008		.0080	.006	.025 (3x)	1/4	2-1/2	31408-C6	95.10		
.008		.0080	.006	.040 (5x)	1/4	2-1/2	38708-C6	99.80		
.010		.0100	.008	.015 (1.5x)	1/4	2-1/2	37810-C6	86.40		
.010		.0100	.008	.031 (3x)	1/4	2-1/2	31410-C6	86.40		
.010		.0100	.008	.050 (5x)	1/4	2-1/2	38710-C6	90.40		
.015 (1/64)		.0150	.012	-	1/4	2-1/2	958315-C6	73.60		
.015 (1/64)		.0150	.012	.023 (1.5x)	1/4	2-1/2	37815-C6	69.70		
.015 (1/64)		.0150	.012	.047 (3x)	1/4	2-1/2	31415-C6	69.70	813115-C6	74.20
.015 (1/64)		.0150	.012	.062 (4x)	1/4	2-1/2	881515-C6	72.20		
.015 (1/64)		.0150	.012	.078 (5x)	1/4	2-1/2	38715-C6	72.20	812915-C6	76.70
.015 (1/64)		.0150	.012	.125 (8x)	1/4	2-1/2	32015-C6	76.40		
.015 (1/64)		.0150	.012	.187 (12x)	1/4	2-1/2	33815-C6	93.10		
.020		.0200	.016	-	1/4	2-1/2	958320-C6	73.60		
.020		.0200	.016	.031 (1.5x)	1/4	2-1/2	37820-C6	69.70		
.020		.0200	.016	.062 (3x)	1/4	2-1/2	31420-C6	69.70		
.020		.0200	.016	.080 (4x)	1/4	2-1/2	881520-C6	72.20		
.020		.0200	.016	.100 (5x)	1/4	2-1/2	38720-C6	72.20		
.020		.0200	.016	.160 (8x)	1/4	2-1/2	32020-C6	72.90		
.025		.0250	.020	.038 (1.5x)	1/4	2-1/2	37825-C6	69.70		
.025		.0250	.020	.075 (3x)	1/4	2-1/2	31425-C6	69.70		
.025		.0250	.020	.125 (5x)	1/4	2-1/2	38725-C6	72.20		
.031 (1/32)		.0310	.025	-	1/4	2-1/2	958331-C6	63.30		
.031 (1/32)		.0310	.025	.047 (1.5x)	1/4	2-1/2	37831-C6	59.60		
.031 (1/32)		.0310	.025	.093 (3x)	1/4	2-1/2	31431-C6	59.60	813131-C6	64.10
.031 (1/32)		.0310	.025	.125 (4x)	1/4	2-1/2	881531-C6	63.30		
.031 (1/32)		.0310	.025	.156 (5x)	1/4	2-1/2	38731-C6	65.20	812931-C6	69.70
.031 (1/32)		.0310	.025	.187 (6x)	1/4	2-1/2	858031-C6	66.50		
.031 (1/32)		.0310	.025	.218 (7x)	1/4	2-1/2	863231-C6	67.60		
.031 (1/32)		.0310	.025	.250 (8x)	1/4	2-1/2	32031-C6	68.70		
.031 (1/32)		.0310	.025	.312 (10x)	1/4	2-1/2	919131-C6	79.90		
.031 (1/32)		.0310	.025	.375 (12x)	1/4	2-1/2	33831-C6	79.90		
.031 (1/32)		.0310	.025	.470 (15x)	1/4	2-1/2	973231-C6	91.70		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

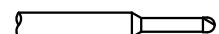


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	CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO 2 FLUTE		AITIN NANO 3 FLUTE	
	D ₁ +.0000" -.0006"	+.000mm -.014mm	decimal equivalent	L ₂ +.125mm -.000mm	L ₃ +.125mm -.000mm	D ₂ (h6)	L ₁	2 FL	PRICE	3 FL	PRICE
	.039		.0390	.031	-	1/4	2-1/2	958339-C6	63.30		
	.039		.0390	.031	.062 (1.5x)	1/4	2-1/2	37839-C6	59.60		
	.039		.0390	.031	.117 (3x)	1/4	2-1/2	31439-C6	59.60		
	.039		.0390	.031	.156 (4x)	1/4	2-1/2	881539-C6	65.20		
	.039		.0390	.031	.203 (5x)	1/4	2-1/2	38739-C6	65.20		
	.039		.0390	.031	.312 (8x)	1/4	2-1/2	32039-C6	68.70		
	.039		.0390	.031	.468 (12x)	1/4	2-1/2	33839-C6	79.90		
	1.0 mm		.0393	.80 mm	3.00 mm (3x)	6 mm	63 mm	882922-C6	65.20		
	1.0 mm		.0393	.80 mm	5.00 mm (5x)	6 mm	63 mm	881722-C6	70.60		
	.040		.0400	.032	.062 (1.5x)	1/4	2-1/2	37840-C6	59.60		
	.040		.0400	.032	.125 (3x)	1/4	2-1/2	31440-C6	59.60		
	.047 (3/64)		.0470	.038	-	1/4	2-1/2	958347-C6	63.30		
	.047 (3/64)		.0470	.038	.071 (1.5x)	1/4	2-1/2	37847-C6	59.60		
NEW	.047 (3/64)		.0470	.038	.141 (3x)	1/4	2-1/2	31447-C6	59.60	813147-C6	64.10
	.047 (3/64)		.0470	.038	.187 (4x)	1/4	2-1/2	881547-C6	65.20		
NEW	.047 (3/64)		.0470	.038	.250 (5x)	1/4	2-1/2	38747-C6	65.20	812947-C6	69.70
	.047 (3/64)		.0470	.038	.375 (8x)	1/4	2-1/2	32047-C6	68.70		
	.047 (3/64)		.0470	.038	.470 (10x)	1/4	2-1/2	919147-C6	79.90		
	.047 (3/64)		.0470	.038	.564 (12x)	1/4	2-1/2	33847-C6	79.90		
	.047 (3/64)		.0470	.038	.710 (15x)	1/4	2-1/2	973247-C6	91.70		
	.050		.0500	.040	.078 (1.5x)	1/4	2-1/2	37850-C6	59.60		
	.050		.0500	.040	.150 (3x)	1/4	2-1/2	31450-C6	59.60		
	.060		.0600	.048	.093 (1.5x)	1/4	2-1/2	37860-C6	59.60		
	.060		.0600	.048	.180 (3x)	1/4	2-1/2	31460-C6	59.60		
	.062 (1/16)		.0620	.050	-	1/4	2-1/2	958362-C6	63.30		
	.062 (1/16)		.0620	.050	.093 (1.5x)	1/4	2-1/2	37862-C6	59.60		
NEW	.062 (1/16)		.0620	.050	.187 (3x)	1/4	2-1/2	31462-C6	59.60	813162-C6	64.10
	.062 (1/16)		.0620	.050	.250 (4x)	1/4	2-1/2	881562-C6	63.30		
NEW	.062 (1/16)		.0620	.050	.312 (5x)	1/4	2-1/2	38762-C6	65.20	812962-C6	69.70
	.062 (1/16)		.0620	.050	.375 (6x)	1/4	2-1/2	858062-C6	66.50		
	.062 (1/16)		.0620	.050	.437 (7x)	1/4	2-1/2	863262-C6	67.60		
	.062 (1/16)		.0620	.050	.500 (8x)	1/4	2-1/2	32062-C6	68.70		
	.062 (1/16)		.0620	.050	.625 (10x)	1/4	2-1/2	919162-C6	86.90		
	.062 (1/16)		.0620	.050	.750 (12x)	1/4	4	33862-C6	86.90		
	.062 (1/16)		.0620	.050	.950 (15x)	1/4	4	973262-C6	99.10		
	.078 (5/64)		.0780	.062	-	1/4	2-1/2	958378-C6	63.30		
	.078 (5/64)		.0780	.062	.117 (1.5x)	1/4	2-1/2	37878-C6	59.60		
NEW	.078 (5/64)		.0780	.062	.234 (3x)	1/4	2-1/2	31478-C6	59.60	813178-C6	64.10
	.078 (5/64)		.0780	.062	.312 (4x)	1/4	2-1/2	881578-C6	65.20		
NEW	.078 (5/64)		.0780	.062	.406 (5x)	1/4	2-1/2	38778-C6	65.20	812978-C6	69.70
	.078 (5/64)		.0780	.062	.625 (8x)	1/4	2-1/2	32078-C6	68.70		
	.078 (5/64)		.0780	.062	.781 (10x)	1/4	2-1/2	919178-C6	86.90		
	.078 (5/64)		.0780	.062	.937 (12x)	1/4	4	33878-C6	86.90		
	.078 (5/64)		.0780	.062	1.187 (15x)	1/4	4	973278-C6	99.10		

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HARDENED STEELS



END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

HARDENED STEELS

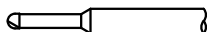


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CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO 2 FLUTE		AITIN NANO 3 FLUTE	
D ₁ +.0000" -.0006"	+.000mm -.014mm	decimal equivalent	L ₂ +.010" -.000" +.125mm -.000mm	L ₃ +.010" -.000" +.125mm -.000mm	D ₂ (h6)	L ₁	2 FL	PRICE	3 FL	PRICE
2.0 mm	.0787		1.60 mm	6.00 mm (3x)	6 mm	63 mm	882945-C6	65.20		
2.0 mm	.0787		1.60 mm	10.00 mm (5x)	6 mm	63 mm	881745-C6	70.60		
.093 (3/32)	.0930		.074	-	1/4	2-1/2	958393-C6	63.30		
.093 (3/32)	.0930		.074	.140 (1.5x)	1/4	2-1/2	37893-C6	59.60		
.093 (3/32)	.0930		.074	.281 (3x)	1/4	2-1/2	31493-C6	59.60	813193-C6	64.10
.093 (3/32)	.0930		.074	.375 (4x)	1/4	2-1/2	881593-C6	63.30		
.093 (3/32)	.0930		.074	.500 (5x)	1/4	2-1/2	38793-C6	65.20	812993-C6	69.70
.093 (3/32)	.0930		.074	.585 (6x)	1/4	2-1/2	858093-C6	66.50		
.093 (3/32)	.0930		.074	.670 (7x)	1/4	2-1/2	863293-C6	67.60		
.093 (3/32)	.0930		.074	.750 (8x)	1/4	2-1/2	32093-C6	68.70		
.093 (3/32)	.0930		.074	.937 (10x)	1/4	4	919193-C6	86.90		
.093 (3/32)	.0930		.074	1.125 (12x)	1/4	4	33893-C6	86.90		
.093 (3/32)	.0930		.074	1.400 (15x)	1/4	4	973293-C6	99.10		
.118	.1180		.094	.177 (1.5x)	1/4	2-1/2	37905-C6	66.80		
.118	.1180		.094	.354 (3x)	1/4	2-1/2	31505-C6	66.80		
.118	.1180		.094	.625 (5x)	1/4	2-1/2	38805-C6	75.90		
3.0 mm	.1181		2.40 mm	9.00 mm (3x)	6 mm	63 mm	882957-C6	72.20		
3.0 mm	.1181		2.40 mm	15.00 mm (5x)	6 mm	63 mm	881757-C6	81.50		
.125 (1/8)	.1250		.100	-	1/4	2-1/2	958408-C6	70.60		
.125 (1/8)	.1250		.100	.187 (1.5x)	1/4	2-1/2	37908-C6	66.80		
.125 (1/8)	.1250		.100	.375 (3x)	1/4	2-1/2	31508-C6	66.80	813208-C6	71.30
.125 (1/8)	.1250		.100	.500 (4x)	1/4	2-1/2	881608-C6	74.00		
.125 (1/8)	.1250		.100	.625 (5x)	1/4	2-1/2	38808-C6	75.90	813008-C6	80.40
.125 (1/8)	.1250		.100	.750 (6x)	1/4	2-1/2	858108-C6	77.40		
.125 (1/8)	.1250		.100	.875 (7x)	1/4	2-1/2	863308-C6	78.90		
.125 (1/8)	.1250		.100	1.000 (8x)	1/4	2-1/2	32108-C6	80.40		
.125 (1/8)	.1250		.100	1.250 (10x)	1/4	4	919208-C6	94.00		
.125 (1/8)	.1250		.100	1.500 (12x)	1/4	4	33908-C6	94.00		
.125 (1/8)	.1250		.100	1.875 (15x)	1/4	4	973308-C6	106.10		

D ₁ +.0000" -.0001"	+.000mm -.018mm	decimal equivalent	L ₂ +.020" -.000" +.500mm -.000mm	L ₃ +.020" -.000" +.500mm -.000mm	D ₂ (h6)	L ₁	2 FL	PRICE	3 FL	PRICE
.156 (5/32)	.1560		.125	.235 (1.5x)	1/4	2-1/2	37910-C6	66.80		
.156 (5/32)	.1560		.125	.470 (3x)	1/4	2-1/2	31510-C6	66.80		
.156 (5/32)	.1560		.125	.750 (5x)	1/4	2-1/2	38810-C6	75.90		
.187 (3/16)	.1870		.150	-	1/4	2-1/2	958412-C6	70.60		
.187 (3/16)	.1870		.150	.285 (1.5x)	1/4	2-1/2	37912-C6	66.80		
.187 (3/16)	.1870		.150	.570 (3x)	1/4	2-1/2	31512-C6	66.80	813212-C6	71.30
.187 (3/16)	.1870		.150	1.000 (5x)	1/4	2-1/2	38812-C6	75.90	813012-C6	80.40
.187 (3/16)	.1870		.150	1.500 (8x)	1/4	4	32112-C6	88.80		
.187 (3/16)	.1870		.150	2.250 (12x)	1/4	4	33912-C6	106.10		

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END MILLS FOR HARDENED STEELS

Finishers – Ball (cont.)

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	CUTTER DIAMETER		LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO 2 FLUTE		AITIN NANO 3 FLUTE	
	D ₁ +.000" -.001"	+ .000mm -.018mm decimal equivalent	L ₂ +.020" -.000" +.500mm -.000mm	L ₃ +.020" -.000" +.500mm -.000mm	D ₂ (h6)	L ₁	2 FL	PRICE	3 FL	PRICE
	6.0 mm	.2362	4.80 mm	18.00 mm (3x)	6 mm	63 mm	882966-C6	72.20		
	6.0 mm	.2362	4.80 mm	30.00 mm (5x)	6 mm	63 mm	881766-C6	81.50		
	.250 (1/4)	.2500	.200	-	1/4	2-1/2	958416-C6	70.60		
	.250 (1/4)	.2500	.200	.375 (1.5x)	1/4	2-1/2	37916-C6	66.80		
NEW	.250 (1/4)	.2500	.200	.750 (3x)	1/4	2-1/2	31516-C6	75.90	813216-C6	80.40
	.250 (1/4)	.2500	.200	1.000 (4x)	1/4	2-1/2	881616-C6	75.90		
NEW	.250 (1/4)	.2500	.200	1.250 (5x)	1/4	2-1/2	38816-C6	75.90	813016-C6	80.40
	.250 (1/4)	.2500	.200	1.500 (6x)	1/4	3	858116-C6	82.30		
	.250 (1/4)	.2500	.200	1.750 (7x)	1/4	3	863316-C6	82.30		
	.250 (1/4)	.2500	.200	2.000 (8x)	1/4	4	32116-C6	88.80		
	.312 (5/16)	.3120	.250	.470 (1.5x)	5/16	2-1/2	37920-C6	87.50		
	.312 (5/16)	.3120	.250	1.000 (3x)	5/16	2-1/2	31520-C6	92.50		
	.375 (3/8)	.3750	.300	.570 (1.5x)	3/8	2-1/2	37924-C6	94.10		
	.375 (3/8)	.3750	.300	1.125 (3x)	3/8	2-1/2	31524-C6	99.30		

HARDENED STEELS

GUIDELINES FOR MILLING HARDENED STEELS

- Rigid machining enhances tool life by centering and balancing tool holders, which minimizes vibration.
- Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
- Climb Milling will extend tool life and improve workpiece finish.

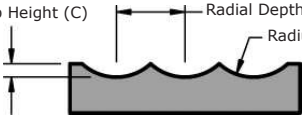
SPEEDS & FEEDS (End Mills for Hardened Steels – Ball)

Important Note: Values in table are in inches and are based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 3 Flutes, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut		
		.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial*	Axial	
45-55 Rc	700	Finishing (.8x Reach)	.00028	.00058	.00088	.00116	.00146	.00174	.00234	.00350	.00468	.00584	.00702	.00936	.10 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00027	.00056	.00084	.00111	.00140	.00167	.00224	.00335	.00449	.00560	.00673	.00897	.10 x Dia	.04 x Dia
		Finishing (3x Reach)	.00026	.00053	.00081	.00106	.00134	.00160	.00215	.00321	.00429	.00535	.00644	.00858	.10 x Dia	.04 x Dia
		Finishing (4x Reach)	.00025	.00051	.00077	.00102	.00128	.00152	.00205	.00306	.00410	.00511	.00614	.00819	.10 x Dia	.04 x Dia
		Finishing (5x Reach)	.00023	.00048	.00073	.00097	.00122	.00145	.00195	.00292	.00390	.00487	.00585	.00780	.10 x Dia	.04 x Dia
		Finishing (6x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.10 x Dia	.03 x Dia
		Finishing (7x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.10 x Dia	.03 x Dia
		Finishing (8x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.10 x Dia	.03 x Dia
		Finishing (10x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.10 x Dia	.02 x Dia
		Finishing (12x Reach)	.00016	.00034	.00051	.00068	.00085	.00102	.00137	.00204	.00273	.00341	.00410	.00546	.08 x Dia	.02 x Dia
		Finishing (15x Reach)	.00015	.00031	.00048	.00063	.00079	.00094	.00127	.00190	.00254	.00316	.00380	.00507	.08 x Dia	.01 x Dia
56-68 Rc	600	Finishing (.8x Reach)	.00022	.00046	.00070	.00093	.00117	.00139	.00187	.00280	.00374	.00467	.00562	.00749	.07 x Dia	.04 x Dia
		Finishing (1.5x Reach)	.00022	.00044	.00067	.00089	.00112	.00133	.00179	.00268	.00359	.00448	.00538	.00718	.07 x Dia	.04 x Dia
		Finishing (3x Reach)	.00021	.00043	.00065	.00085	.00107	.00128	.00172	.00257	.00343	.00428	.00515	.00686	.07 x Dia	.04 x Dia
		Finishing (4x Reach)	.00020	.00041	.00062	.00081	.00102	.00122	.00164	.00245	.00328	.00409	.00491	.00655	.07 x Dia	.04 x Dia
		Finishing (5x Reach)	.00019	.00039	.00059	.00077	.00097	.00116	.00156	.00233	.00312	.00389	.00468	.00624	.07 x Dia	.04 x Dia
		Finishing (6x Reach)	.00018	.00037	.00056	.00074	.00093	.00111	.00150	.00224	.00300	.00374	.00449	.00599	.07 x Dia	.03 x Dia
		Finishing (7x Reach)	.00017	.00036	.00054	.00071	.00090	.00107	.00144	.00215	.00287	.00358	.00431	.00574	.07 x Dia	.03 x Dia
		Finishing (8x Reach)	.00016	.00034	.00052	.00068	.00086	.00102	.00137	.00205	.00275	.00343	.00412	.00549	.07 x Dia	.03 x Dia
		Finishing (10x Reach)	.00015	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250	.00312	.00374	.00499	.07 x Dia	.02 x Dia
		Finishing (12x Reach)	.00013	.00027	.00041	.00054	.00068	.00081	.00109	.00163	.00218	.00273	.00328	.00437	.06 x Dia	.02 x Dia
		Finishing (15x Reach)	.00012	.00025	.00038	.00050	.00063	.00075	.00101	.00152	.00203	.00253	.00304	.00406	.06 x Dia	.01 x Dia

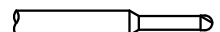
* Operator must consider proper Radial Depth of Cut since it relates directly to cusp height and part finish

Cusp Height (C) Radial Depth of Cut (P) Radius on Cutter (R)



$$P = 2 [R^2 - (C-R)^2]^{1/2}$$

$$C = R - [R^2 - (P^2/4)]^{1/2}$$



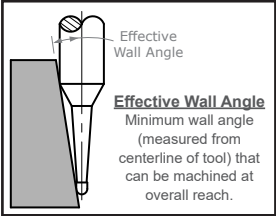
END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach

HARDENED STEELS

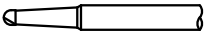
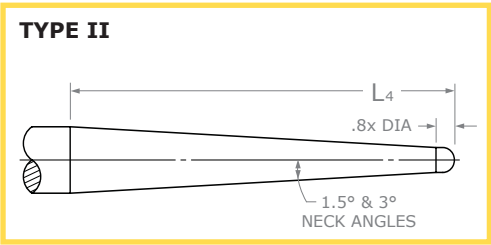
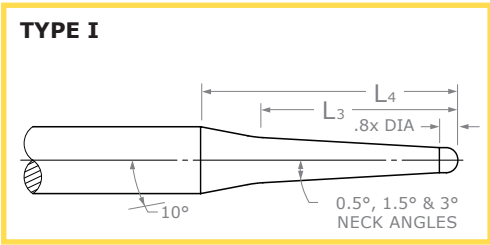


- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Solid tapered neck for increased rigidity and strength
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders
- 2 flutes
- Center cutting
- CNC ground in the USA 



NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
	D1 ^{+0.0000"} -0.0006"	L2 ^{+0.010"} -0.000"		L3	L4		D2 (h6)	L1	2 FL	PRICE
0.5°	.031 (1/32)	.025	I	.093	.757	8.4°	1/4	2-1/2	998703-C6	62.80
	.031 (1/32)	.025	I	.156	.817	7.8°	1/4	2-1/2	998706-C6	68.10
	.031 (1/32)	.025	I	.250	.906	7.0°	1/4	2-1/2	998709-C6	70.80
	.047 (3/64)	.038	I	.156	.772	7.7°	1/4	2-1/2	998712-C6	62.80
	.047 (3/64)	.038	I	.250	.862	6.9°	1/4	2-1/2	998715-C6	68.10
	.047 (3/64)	.038	I	.375	.981	6.1°	1/4	2-1/2	998718-C6	70.80
	.062 (1/16)	.050	I	.312	.879	6.4°	1/4	2-1/2	998721-C6	62.80
	.062 (1/16)	.050	I	.500	1.057	5.3°	1/4	2-1/2	998724-C6	68.10
	.062 (1/16)	.050	I	.750	1.295	4.3°	1/4	2-1/2	998727-C6	70.80
	.078 (5/64)	.062	I	.437	.953	5.4°	1/4	2-1/2	998730-C6	62.80
	.078 (5/64)	.062	I	.625	1.131	4.5°	1/4	2-1/2	998733-C6	68.10
	.078 (5/64)	.062	I	1.000	1.488	3.4°	1/4	3	998736-C6	78.30
	.093 (3/32)	.074	I	.500	.971	4.9°	1/4	2-1/2	998739-C6	62.80
	.093 (3/32)	.074	I	.750	1.208	3.9°	1/4	2-1/2	998742-C6	68.10
	.093 (3/32)	.074	I	1.125	1.565	3.0°	1/4	3	998745-C6	78.30
	.125 (1/8)	.100	I	.625	1.000	3.9°	1/4	2-1/2	998748-C6	66.60
	.125 (1/8)	.100	I	1.000	1.357	2.8°	1/4	2-1/2	998751-C6	68.60
	.125 (1/8)	.100	I	1.500	1.832	2.1°	1/4	3	998754-C6	78.70

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END MILLS FOR HARDENED STEELS

Finishers – Ball – Tapered Reach (cont.)

continued from previous page

NECK ANGLE	CUTTER DIAMETER	LENGTH OF CUT	TYPE	TAPERED REACH	OVERALL REACH	EFFECTIVE WALL ANGLE	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
	D ₁ ^{+0.0000"} -0.0006"	L ₂ ^{+0.010"} -0.000"		L ₃	L ₄		D ₂ (h6)	L ₁	2 FL	PRICE
1.5°	.031 (1/32)	.025	I	.250	.875	7.3°	1/4	2-1/2	997407-C6	68.10
	.031 (1/32)	.025	I	.500	1.088	5.9°	1/4	2-1/2	997414-C6	70.80
	.047 (3/64)	.038	I	.375	.938	6.4°	1/4	2-1/2	997421-C6	68.10
	.062 (1/16)	.050	I	.500	1.004	5.6°	1/4	2-1/2	997428-C6	68.10
	.062 (1/16)	.050	I	1.000	1.429	3.9°	1/4	3	997435-C6	78.30
	.078 (5/64)	.062	I	.625	1.066	4.8°	1/4	2-1/2	997442-C6	68.10
	.078 (5/64)	.062	I	1.250	1.599	3.2°	1/4	3	997449-C6	78.30
	.093 (3/32)	.074	I	.750	1.132	4.2°	1/4	2-1/2	997456-C6	68.10
	.093 (3/32)	.074	I	1.500	1.771	2.7°	1/4	3	997463-C6	78.30
	.125 (1/8)	.100	I	1.000	1.258	3.0°	1/4	2-1/2	997470-C6	68.60
	.125 (1/8)	.100	II	2.487	2.487	1.5°	1/4	4	997477-C6	78.70
3.0°	.031 (1/32)	.025	I	.312	.714	8.9°	1/4	2-1/2	994907-C6	70.40
	.031 (1/32)	.025	I	.750	1.067	6.0°	1/4	2-1/2	994914-C6	72.40
	.047 (3/64)	.038	I	.875	1.140	5.2°	1/4	2-1/2	994921-C6	70.40
	.047 (3/64)	.038	I	1.250	1.442	4.1°	1/4	3	994928-C6	78.30
	.062 (1/16)	.050	I	.875	1.114	5.0°	1/4	2-1/2	994935-C6	70.40
	.062 (1/16)	.050	II	1.844	1.844	3.0°	1/4	3	994942-C6	78.30
	.078 (5/64)	.062	I	1.125	1.288	4.0°	1/4	2-1/2	994949-C6	70.40
	.078 (5/64)	.062	II	1.703	1.703	3.0°	1/4	3	994956-C6	78.30
	.093 (3/32)	.074	I	1.000	1.162	4.1°	1/4	2-1/2	994963-C6	70.40
	.093 (3/32)	.074	II	1.572	1.572	3.0°	1/4	3	994970-C6	78.30
	.125 (1/8)	.100	II	1.293	1.293	2.9°	1/4	2-1/2	994977-C6	77.30
	.125 (1/8)	.100	II	2.485	2.485	3.0°	3/8	4	994984-C6	112.10

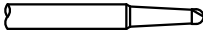
HARDENED STEELS



" the coolest 5 Axis CNC machined titanium wedding rings ever made with #HarveyTool"

— @titanringdesigns

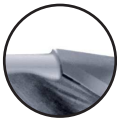
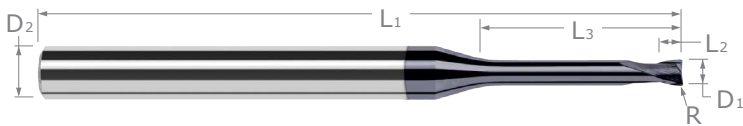
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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius

HARDENED STEELS



Reduced Neck Diameter to Avoid Heeling

- **Designed to profile and finish hardened tool, die, and mold steels 46Rc to 68Rc**
- Select carbide grade for improved edge retention
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- Geometry includes stub flute, large rigid core diameter, and eccentric relief
- Increased shank diameter to maintain strength and stiffness
- h6 shank tolerance for high precision tool holders ➤ Center cutting
- CNC ground in the USA 

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO 2 FLUTE		AITIN NANO 4 FLUTE	
D ₁ ^{+0.000"} _{-0.006"}	R ^{+0.0002"} _{-0.0002"}	L ₂ ^{+0.010"} _{-0.000"}	L ₃ ^{+0.010"} _{-0.000"}	D ₂ (h6)	L ₁	2 FL	PRICE	4 FL	PRICE
.010	.002	.008	.015 (1.5x)	1/4	2-1/2	40210-C6	85.30		
.010	.002	.008	.031 (3x)	1/4	2-1/2	30610-C6	85.30		
.015 (1/64)	.002	.012	.023 (1.5x)	1/4	2-1/2	40215-C6	66.80	951415-C6	67.90
.015 (1/64)	.002	.012	.047 (3x)	1/4	2-1/2	30615-C6	66.80		
.015 (1/64)	.002	.012	.078 (5x)	1/4	2-1/2	40615-C6	75.40		
.015 (1/64)	.002	.012	.125 (8x)	1/4	2-1/2	31015-C6	75.90		
.015 (1/64)	.002	.012	.187 (12x)	1/4	2-1/2	33015-C6	88.40		
.020	.004	.016	.031 (1.5x)	1/4	2-1/2	40220-C6	66.80	951420-C6	67.90
.020	.004	.016	.062 (3x)	1/4	2-1/2	30620-C6	66.80		
.020	.004	.016	.100 (5x)	1/4	2-1/2	40620-C6	72.20		
.025	.004	.020	.038 (1.5x)	1/4	2-1/2	40225-C6	66.80		
.025	.004	.020	.075 (3x)	1/4	2-1/2	30625-C6	66.80		
.025	.004	.020	.125 (5x)	1/4	2-1/2	40625-C6	72.20		
.031 (1/32)	.005	.025	.047 (1.5x)	1/4	2-1/2	40231-C6	59.00	951431-C6	60.10
.031 (1/32)	.005	.025	.093 (3x)	1/4	2-1/2	30631-C6	59.00	938731-C6	60.10
.031 (1/32)	.005	.025	.156 (5x)	1/4	2-1/2	40631-C6	63.90	996331-C6	65.20
.031 (1/32)	.005	.025	.250 (8x)	1/4	2-1/2	31031-C6	67.60	999031-C6	68.70
.031 (1/32)	.005	.025	.375 (12x)	1/4	2-1/2	33031-C6	75.70		
.031 (1/32)	.005	.025	.470 (15x)	1/4	2-1/2	942431-C6	88.60		
.031 (1/32)	.010	.025	.093 (3x)	1/4	2-1/2	982631-C6	61.10		
.031 (1/32)	.010	.025	.156 (5x)	1/4	2-1/2	957431-C6	66.10		
.039 (1 mm)	.005	.031	.062 (1.5x)	1/4	2-1/2	40239-C6	59.00		
.039 (1 mm)	.005	.031	.117 (3x)	1/4	2-1/2	30639-C6	59.00	938739-C6	60.10
.039 (1 mm)	.005	.031	.203 (5x)	1/4	2-1/2	40639-C6	63.90	996339-C6	65.20
.039 (1 mm)	.005	.031	.312 (8x)	1/4	2-1/2	31039-C6	67.60		
.039 (1 mm)	.005	.031	.468 (12x)	1/4	2-1/2	33039-C6	75.70		
.047 (3/64)	.008	.038	.071 (1.5x)	1/4	2-1/2	40247-C6	59.00		
.047 (3/64)	.008	.038	.141 (3x)	1/4	2-1/2	30647-C6	59.00	938747-C6	60.10
.047 (3/64)	.008	.038	.250 (5x)	1/4	2-1/2	40647-C6	63.90	996347-C6	65.20
.047 (3/64)	.008	.038	.375 (8x)	1/4	2-1/2	31047-C6	67.60	999047-C6	68.70
.047 (3/64)	.008	.038	.564 (12x)	1/4	2-1/2	33047-C6	75.70		
.047 (3/64)	.008	.038	.710 (15x)	1/4	2-1/2	942447-C6	88.60		

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO 2 FLUTE		AITIN NANO 4 FLUTE	
D ₁ ^{+0.000"} -0.006"	R ^{+0.0002"} -0.0002"	L ₂ ^{+0.010"} -0.000"	L ₃ ^{+0.010"} -0.000"	D ₂ (h6)	L ₁	2 FL	PRICE	4 FL	PRICE
.062 (1/16)	.005	.050	.187 (3x)	1/4	2-1/2	893162-C6	59.00		
.062 (1/16)	.010	.050	-	1/4	2-1/2	870362-C6	57.60	862262-C6	58.60
.062 (1/16)	.010	.050	.093 (1.5x)	1/4	2-1/2	40262-C6	59.00	951462-C6	60.10
.062 (1/16)	.010	.050	.187 (3x)	1/4	2-1/2	30662-C6	59.00	938762-C6	60.10
.062 (1/16)	.010	.050	.312 (5x)	1/4	2-1/2	40662-C6	63.90	996362-C6	65.20
.062 (1/16)	.010	.050	.500 (8x)	1/4	2-1/2	31062-C6	67.60	999062-C6	68.70
.062 (1/16)	.010	.050	.750 (12x)	1/4	4	33062-C6	85.00	924162-C6	86.20
.062 (1/16)	.010	.050	.950 (15x)	1/4	4	942462-C6	97.60		
.062 (1/16)	.020	.050	.187 (3x)	1/4	2-1/2	991562-C6	61.10		
.062 (1/16)	.020	.050	.312 (5x)	1/4	2-1/2	953162-C6	66.10		
.078 (5/64)	.010	.062	.117 (1.5x)	1/4	2-1/2	40278-C6	59.00		
.078 (5/64)	.010	.062	.234 (3x)	1/4	2-1/2	30678-C6	59.00	938778-C6	60.10
.078 (5/64)	.010	.062	.406 (5x)	1/4	2-1/2	40678-C6	63.90	996378-C6	65.20
.078 (5/64)	.010	.062	.625 (8x)	1/4	2-1/2	31078-C6	67.60	999078-C6	68.70
.078 (5/64)	.010	.062	.937 (12x)	1/4	4	33078-C6	85.00		
.093 (3/32)	.005	.074	.281 (3x)	1/4	2-1/2	893193-C6	59.00		
.093 (3/32)	.010	.074	.281 (3x)	1/4	2-1/2	982693-C6	59.00		
.093 (3/32)	.015	.074	-	1/4	2-1/2	850893-C6	57.60		
.093 (3/32)	.015	.074	.140 (1.5x)	1/4	2-1/2	40293-C6	59.00	951493-C6	60.10
.093 (3/32)	.015	.074	.281 (3x)	1/4	2-1/2	30693-C6	59.00	938793-C6	60.10
.093 (3/32)	.015	.074	.500 (5x)	1/4	2-1/2	40693-C6	63.90	996393-C6	65.20
.093 (3/32)	.015	.074	.750 (8x)	1/4	2-1/2	31093-C6	67.60	999093-C6	68.70
.093 (3/32)	.015	.074	1.125 (12x)	1/4	4	33093-C6	85.00	924193-C6	86.20
.093 (3/32)	.030	.074	.281 (3x)	1/4	2-1/2	963393-C6	61.10		
.093 (3/32)	.030	.074	.500 (5x)	1/4	2-1/2	946393-C6	66.10		
.118 (3 mm)	.015	.094	.177 (1.5x)	1/4	2-1/2	40305-C6	63.30		
.118 (3 mm)	.015	.094	.354 (3x)	1/4	2-1/2	30705-C6	63.30		
.125 (1/8)	.005	.100	.375 (3x)	1/4	2-1/2	893208-C6	63.30		
.125 (1/8)	.010	.100	.375 (3x)	1/4	2-1/2	982708-C6	63.30		
.125 (1/8)	.015	.100	-	1/4	2-1/2	850908-C6	61.80		
.125 (1/8)	.015	.100	.187 (1.5x)	1/4	2-1/2	40308-C6	63.30	951508-C6	64.30
.125 (1/8)	.015	.100	.375 (3x)	1/4	2-1/2	30708-C6	63.30	938808-C6	64.30
.125 (1/8)	.015	.100	.625 (5x)	1/4	2-1/2	40708-C6	69.40	996408-C6	75.90
.125 (1/8)	.015	.100	1.000 (8x)	1/4	2-1/2	31108-C6	73.60	999108-C6	79.90
.125 (1/8)	.015	.100	1.500 (12x)	1/4	4	33108-C6	91.10	924208-C6	98.10
.125 (1/8)	.030	.100	.375 (3x)	1/4	2-1/2	963408-C6	65.40		
.125 (1/8)	.030	.100	.625 (5x)	1/4	2-1/2	946408-C6	71.80		

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END MILLS FOR HARDENED STEELS

Finishers – Corner Radius (cont.)

continued from previous page

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	OVERALL REACH	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO 2 FLUTE		AITIN NANO 4 FLUTE	
						2 FL	PRICE	4 FL	PRICE
D ₁ $\begin{smallmatrix} +.000" \\ -.001" \end{smallmatrix}$	R $\begin{smallmatrix} +.0005" \\ -.0005" \end{smallmatrix}$	L ₂ $\begin{smallmatrix} +.020" \\ -.000" \end{smallmatrix}$	L ₃ $\begin{smallmatrix} +.020" \\ -.000" \end{smallmatrix}$	D ₂ (h6)	L ₁				
.156 (5/32)	.015	.125	.235 (1.5x)	1/4	2-1/2	40310-C6	63.30		
.156 (5/32)	.015	.125	.470 (3x)	1/4	2-1/2	30710-C6	63.30		
.187 (3/16)	.015	.150	.285 (1.5x)	1/4	2-1/2	40312-C6	63.30	951512-C6	64.30
.187 (3/16)	.015	.150	.570 (3x)	1/4	2-1/2	30712-C6	63.30	938812-C6	64.30
.187 (3/16)	.015	.150	1.000 (5x)	1/4	2-1/2	40712-C6	69.40	996412-C6	75.90
.187 (3/16)	.015	.150	1.500 (8x)	1/4	4	31112-C6	82.90		
.187 (3/16)	.015	.150	2.250 (12x)	1/4	4	33112-C6	97.60		
.187 (3/16)	.060	.150	.570 (3x)	1/4	2-1/2	939212-C6	72.60	934412-C6	78.90
.250 (1/4)	.015	.200	.375 (1.5x)	1/4	2-1/2	40316-C6	63.30	951516-C6	64.30
.250 (1/4)	.015	.200	.750 (3x)	1/4	2-1/2	30716-C6	66.30	938816-C6	72.40
.250 (1/4)	.015	.200	1.250 (5x)	1/4	2-1/2	40716-C6	69.40		
.250 (1/4)	.015	.200	2.000 (8x)	1/4	4	31116-C6	82.90		
.250 (1/4)	.060	.200	.750 (3x)	1/4	2-1/2	939216-C6	72.60	934416-C6	78.90
.312 (5/16)	.030	.250	1.000 (3x)	5/16	2-1/2			938820-C6	79.90
.375 (3/8)	.030	.300	1.125 (3x)	3/8	2-1/2			938824-C6	92.20

HARDENED STEELS

GUIDELINES FOR MILLING HARDENED STEELS

- Rigid machining centers and balanced tool holders that minimize vibration and TIR will enhance tool life.
 - Mist or air coolant is recommended for material hardness of 45Rc or more.
- Enter workpiece slowly by ramping or helical interpolation to avoid potential chipping or breakage.
 - Climb Milling will extend tool life and improve workpiece finish.

SPEEDS & FEEDS (End Mills for Hardened Steels – Corner Radius)

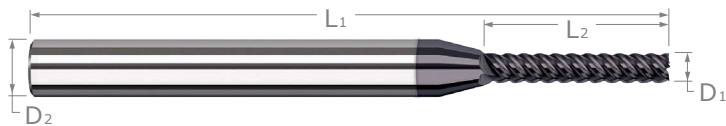
Important Note: Values in table are in inches and based on 2 flute end mills. For end mills with more flutes, table values of IPT must be reduced (for 4 flutes, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com.

Material Hardness	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter												Depth of Cut		
		.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	Radial	Axial	
45-55 Rc	700	Finishing (0.8x Reach)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.00292	.00351	.00468	.35 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00013	.00028	.00042	.00056	.00070	.00083	.00112	.00168	.00224	.00280	.00336	.00449	.35 x Dia	.02 x Dia
		Finishing (3x Reach)	.00013	.00027	.00040	.00053	.00067	.00080	.00107	.00160	.00215	.00268	.00322	.00429	.35 x Dia	.02 x Dia
		Finishing (5x Reach)	.00012	.00024	.00037	.00048	.00061	.00073	.00098	.00146	.00195	.00243	.00293	.00390	.35 x Dia	.02 x Dia
		Finishing (8x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.35 x Dia	.02 x Dia
		Finishing (12x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00068	.00102	.00137	.00170	.00205	.00273	.35 x Dia	.01 x Dia
		Finishing (15x Reach)	.00008	.00016	.00024	.00031	.00040	.00047	.00063	.00095	.00127	.00158	.00190	.00254	.35 x Dia	.01 x Dia
56-68 Rc	600	Finishing (0.8x Reach)	.00011	.00023	.00035	.00046	.00058	.00070	.00094	.00140	.00187	.00234	.00281	.00374	.25 x Dia	.02 x Dia
		Finishing (1.5x Reach)	.00011	.00022	.00034	.00044	.00056	.00067	.00090	.00134	.00179	.00224	.00269	.00359	.25 x Dia	.02 x Dia
		Finishing (3x Reach)	.00010	.00021	.00032	.00043	.00054	.00064	.00086	.00128	.00172	.00214	.00257	.00343	.25 x Dia	.02 x Dia
		Finishing (5x Reach)	.00009	.00019	.00029	.00039	.00049	.00058	.00078	.00117	.00156	.00195	.00234	.00312	.25 x Dia	.02 x Dia
		Finishing (8x Reach)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00137	.00171	.00206	.00275	.25 x Dia	.02 x Dia
		Finishing (12x Reach)	.00007	.00014	.00021	.00027	.00034	.00041	.00055	.00082	.00109	.00136	.00164	.00218	.25 x Dia	.01 x Dia
		Finishing (15x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00076	.00101	.00127	.00152	.00203	.25 x Dia	.01 x Dia



VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square



Up to 7 Flutes!

- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

EXOTIC ALLOYS

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .0005"	+ .00mm	decimal	+ .010"					
- .0005"	- .02mm	equivalent	- .000"					
			+ .25mm					
			- .00mm					
.2 mm	.0078		.60 mm (3x)	4	4 mm	50 mm	967604-C6	53.80
.2 mm	.0078		1.00 mm (5x)	4	4 mm	50 mm	974504-C6	61.80
.2 mm	.0078		1.60 mm (8x)	4	4 mm	50 mm	976104-C6	63.40
.010	.0100		.030 (3x)	4	1/8	1-1/2	57810-C6	53.60
.010	.0100		.050 (5x)	4	1/8	2-1/2	62610-C6	61.50
.3 mm	.0118		.90 mm (3x)	4	4 mm	50 mm	967606-C6	49.70
.015 (1/64)	.0150		.023 (1.5x)	4	1/8	1-1/2	946115-C6	42.70
.015 (1/64)	.0150		.045 (3x)	4	1/8	1-1/2	57815-C6	42.70
.015 (1/64)	.0150		.078 (5x)	4	1/8	2-1/2	62615-C6	53.00
.015 (1/64)	.0150		.125 (8x)	4	1/8	2-1/2	59015-C6	54.40
.015 (1/64)	.0150		.156 (10x)	4	1/8	2-1/2	941815-C6	63.00
.4 mm	.0157		1.20 mm (3x)	4	4 mm	50 mm	967609-C6	47.20
.4 mm	.0157		2.00 mm (5x)	4	4 mm	50 mm	974509-C6	55.30
.4 mm	.0157		3.20 mm (8x)	4	4 mm	50 mm	976109-C6	57.00
.5 mm	.0196		1.50 mm (3x)	4	4 mm	50 mm	967611-C6	47.20
.5 mm	.0196		2.50 mm (5x)	4	4 mm	50 mm	974511-C6	54.60
.5 mm	.0196		4.00 mm (8x)	4	4 mm	50 mm	976111-C6	56.00
.020	.0200		.030 (1.5x)	4	1/8	1-1/2	946120-C6	41.90
.020	.0200		.060 (3x)	4	1/8	1-1/2	57820-C6	41.90
.020	.0200		.100 (5x)	4	1/8	2-1/2	62620-C6	52.70
.020	.0200		.160 (8x)	4	1/8	2-1/2	59020-C6	54.20
.020	.0200		.200 (10x)	4	1/8	2-1/2	941820-C6	62.40
.6 mm	.0236		1.80 mm (3x)	4	4 mm	50 mm	967613-C6	47.20
.6 mm	.0236		3.00 mm (5x)	4	4 mm	50 mm	974513-C6	54.60
.6 mm	.0236		4.80 mm (8x)	4	4 mm	50 mm	976113-C6	56.00
.025	.0250		.075 (3x)	4	1/8	1-1/2	57825-C6	39.30
.025	.0250		.125 (5x)	4	1/8	2-1/2	62625-C6	50.80
.025	.0250		.203 (8x)	4	1/8	2-1/2	59025-C6	52.40
.025	.0250		.250 (10x)	4	1/8	2-1/2	941825-C6	60.70
.7 mm	.0275		2.10 mm (3x)	4	4 mm	50 mm	967615-C6	47.00
.030	.0300		.090 (3x)	6	1/8	1-1/2	57830-C6	39.30
.030	.0300		.156 (5x)	6	1/8	2-1/2	62630-C6	50.80

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)



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CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .0005"	+ .00 mm	decimal	+ .010"					
- .0005"	- .02 mm	equivalent	- .000"					
			+ .25 mm					
			- .00 mm					
.031 (1/32)		.0310	.047 (1.5x)	6	1/8	1-1/2	946131-C6	35.20
.031 (1/32)		.0310	.093 (3x)	6	1/8	1-1/2	57831-C6	35.20
.031 (1/32)		.0310	.125 (4x)	6	1/8	2-1/2	890131-C6	48.60
.031 (1/32)		.0310	.156 (5x)	6	1/8	2-1/2	62631-C6	48.60
.031 (1/32)		.0310	.187 (6x)	6	1/8	2-1/2	868531-C6	49.20
.031 (1/32)		.0310	.218 (7x)	6	1/8	2-1/2	881331-C6	49.20
.031 (1/32)		.0310	.250 (8x)	6	1/8	2-1/2	59031-C6	50.00
.031 (1/32)		.0310	.312 (10x)	6	1/8	2-1/2	941831-C6	58.20
.031 (1/31)		.0310	.375 (12x)	6	1/8	2-1/2	69131-C6	62.40
	.8 mm	.0314	2.40 mm (3x)	6	4 mm	50 mm	967618-C6	42.40
	.8 mm	.0314	4.00 mm (5x)	6	4 mm	50 mm	974518-C6	49.70
	.8 mm	.0314	6.50 mm (8x)	6	4 mm	50 mm	976118-C6	51.20
.035		.0350	.105 (3x)	6	1/8	1-1/2	57835-C6	37.90
.035		.0350	.187 (5x)	6	1/8	2-1/2	62635-C6	39.30
	.9 mm	.0354	2.70 mm (3x)	6	4 mm	50 mm	967620-C6	41.30
	1.0 mm	.0393	1.50 mm (1.5x)	6	4 mm	50 mm	846722-C6	41.30
	1.0 mm	.0393	3.00 mm (3x)	6	4 mm	50 mm	967622-C6	41.30
	1.0 mm	.0393	5.00 mm (5x)	6	4 mm	50 mm	974522-C6	51.10
	1.0 mm	.0393	8.00 mm (8x)	6	4 mm	50 mm	976122-C6	53.50
	1.0 mm	.0393	10.00 mm (10x)	6	4 mm	50 mm	938322-C6	60.30
.040		.0400	.060 (1.5x)	6	1/8	1-1/2	946140-C6	35.20
.040		.0400	.120 (3x)	6	1/8	1-1/2	57840-C6	35.20
.040		.0400	.203 (5x)	6	1/8	2-1/2	62640-C6	48.60
.040		.0400	.325 (8x)	6	1/8	2-1/2	59040-C6	50.00
	1.1 mm	.0433	3.00 mm (3x)	6	4 mm	50 mm	967624-C6	40.10
.045		.0450	.135 (3x)	6	1/8	1-1/2	57845-C6	37.90
.045		.0450	.225 (5x)	6	1/8	2-1/2	62645-C6	39.30
.047 (3/64)		.0470	.071 (1.5x)	6	1/8	1-1/2	946147-C6	36.00
.047 (3/64)		.0470	.141 (3x)	6	1/8	1-1/2	57847-C6	35.20
.047 (3/64)		.0470	.187 (4x)	6	1/8	2-1/2	890147-C6	48.60
.047 (3/64)		.0470	.250 (5x)	6	1/8	2-1/2	62647-C6	48.60
.047 (3/64)		.0470	.281 (6x)	6	1/8	2-1/2	868547-C6	49.20
.047 (3/64)		.0470	.328 (7x)	6	1/8	2-1/2	881347-C6	49.20
.047 (3/64)		.0470	.375 (8x)	6	1/8	2-1/2	59047-C6	50.00
.047 (3/64)		.0470	.480 (10x)	6	1/8	2-1/2	941847-C6	58.20
.047 (3/64)		.0470	.570 (12x)	6	1/8	2-1/2	69147-C6	62.40
	1.2 mm	.0472	3.50 mm (3x)	6	4 mm	50 mm	967627-C6	41.30
	1.2 mm	.0472	6.00 mm (5x)	6	4 mm	50 mm	974527-C6	51.10
	1.2 mm	.0472	9.50 mm (8x)	6	4 mm	50 mm	976127-C6	53.50
.050		.0500	.075 (1.5x)	7	1/8	1-1/2	946150-C6	36.00
.050		.0500	.150 (3x)	7	1/8	1-1/2	57850-C6	35.20
.050		.0500	.250 (5x)	7	1/8	2-1/2	62650-C6	48.60
.050		.0500	.400 (8x)	7	1/8	2-1/2	59050-C6	50.00
	1.3 mm	.0511	4.00 mm (3x)	7	4 mm	50 mm	967629-C6	41.30

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EXOTIC ALLOYS



VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

EXOTIC ALLOYS



continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+.0005" -.0005"	+.00mm -.02mm	decimal equivalent	+.010" -.000" +.25mm -.00mm					
.055		.0550	.165 (3x)	7	1/8	1-1/2	57855-C6	37.30
.055		.0550	.275 (5x)	7	1/8	2-1/2	62655-C6	38.30
	1.4 mm	.0551	4.00 mm (3x)	7	4 mm	50 mm	967631-C6	41.30
	1.4 mm	.0551	7.00 mm (5x)	7	4 mm	50 mm	974531-C6	51.10
	1.4 mm	.0551	11.00 mm (8x)	7	4 mm	50 mm	976131-C6	53.50
	1.5 mm	.0590	2.20 mm (1.5x)	7	4 mm	50 mm	846733-C6	39.90
	1.5 mm	.0590	4.50 mm (3x)	7	4 mm	50 mm	967633-C6	39.90
	1.5 mm	.0590	7.50 mm (5x)	7	4 mm	50 mm	974533-C6	49.70
	1.5 mm	.0590	12.00 mm (8x)	7	4 mm	50 mm	976133-C6	52.00
	1.5 mm	.0590	15.00 mm (10x)	7	4 mm	50 mm	938333-C6	61.60
.060		.0600	.090 (1.5x)	7	1/8	1-1/2	946160-C6	34.70
.060		.0600	.180 (3x)	7	1/8	1-1/2	57860-C6	34.70
.060		.0600	.312 (5x)	7	1/8	2-1/2	62660-C6	44.90
.060		.0600	.500 (8x)	7	1/8	2-1/2	59060-C6	46.40
.062 (1/16)		.0620	.093 (1.5x)	7	1/8	1-1/2	946162-C6	34.70
.062 (1/16)		.0620	.186 (3x)	7	1/8	1-1/2	57862-C6	34.70
.062 (1/16)		.0620	.250 (4x)	7	1/8	2-1/2	890162-C6	45.90
.062 (1/16)		.0620	.312 (5x)	7	1/8	2-1/2	62662-C6	45.90
.062 (1/16)		.0620	.375 (6x)	7	1/8	2-1/2	868562-C6	46.50
.062 (1/16)		.0620	.437 (7x)	7	1/8	2-1/2	881362-C6	46.50
.062 (1/16)		.0620	.500 (8x)	7	1/8	2-1/2	59062-C6	47.30
.062 (1/16)		.0620	.625 (10x)	7	1/8	2-1/2	941862-C6	59.20
.062 (1/16)		.0620	.750 (12x)	7	1/8	2-1/2	69162-C6	66.50
.062 (1/16)		.0620	.950 (15x)	7	1/8	2-1/2	68762-C6	83.60
	1.6 mm	.0629	5.00 mm (3x)	7	4 mm	50 mm	967636-C6	39.90
	1.6 mm	.0629	8.00 mm (5x)	7	4 mm	50 mm	974536-C6	49.70
	1.6 mm	.0629	13.00 mm (8x)	7	4 mm	50 mm	976136-C6	52.00
	1.7 mm	.0669	5.00 mm (3x)	7	4 mm	50 mm	967638-C6	39.90
.070		.0700	.210 (3x)	7	1/8	1-1/2	57870-C6	32.80
.070		.0700	.375 (5x)	7	1/8	2-1/2	62670-C6	45.90
.070		.0700	.570 (8x)	7	1/8	2-1/2	59070-C6	47.30
	1.8 mm	.0708	5.50 mm (3x)	7	4 mm	50 mm	967640-C6	39.90
	1.8 mm	.0708	9.00 mm (5x)	7	4 mm	50 mm	974540-C6	49.70
	1.8 mm	.0708	14.00 mm (8x)	7	4 mm	50 mm	976140-C6	52.00
	1.9 mm	.0748	5.50 mm (3x)	7	4 mm	50 mm	967642-C6	39.90
.078 (5/64)		.0780	.117 (1.5x)	7	1/8	1-1/2	946178-C6	32.80
.078 (5/64)		.0780	.234 (3x)	7	1/8	1-1/2	57878-C6	32.80
.078 (5/64)		.0780	.312 (4x)	7	1/8	2-1/2	890178-C6	45.90
.078 (5/64)		.0780	.406 (5x)	7	1/8	2-1/2	62678-C6	45.90
.078 (5/64)		.0780	.475 (6x)	7	1/8	2-1/2	868578-C6	46.50
.078 (5/64)		.0780	.550 (7x)	7	1/8	2-1/2	881378-C6	46.50
.078 (5/64)		.0780	.625 (8x)	7	1/8	2-1/2	59078-C6	47.30
.078 (5/64)		.0780	.800 (10x)	7	1/8	2-1/2	941878-C6	59.20

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)



continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .0005"	+ .00mm	decimal	+ .010"					
- .0005"	- .02mm	equivalent	- .000"					
			+ .25mm					
			- .00mm					
.078 (5/64)		.0780	.940 (12x)	7	1/8	2-1/2	69178-C6	66.50
.078 (5/64)		.0780	1.187 (15x)	7	1/8	2-1/2	68778-C6	83.60
	2.0 mm	.0787	3.00 mm (1.5x)	7	4 mm	50 mm	846745-C6	39.90
	2.0 mm	.0787	6.00 mm (3x)	7	4 mm	50 mm	967645-C6	39.90
	2.0 mm	.0787	10.00 mm (5x)	7	4 mm	50 mm	974545-C6	49.40
	2.0 mm	.0787	16.00 mm (8x)	7	4 mm	50 mm	976145-C6	51.70
.080		.0800	.120 (1.5x)	7	1/8	1-1/2	946180-C6	34.70
.080		.0800	.240 (3x)	7	1/8	1-1/2	57880-C6	32.80
.080		.0800	.406 (5x)	7	1/8	2-1/2	62680-C6	45.90
.080		.0800	.650 (8x)	7	1/8	2-1/2	59080-C6	47.30
.090		.0900	.270 (3x)	7	1/8	1-1/2	57890-C6	32.80
.090		.0900	.450 (5x)	7	1/8	2-1/2	62690-C6	45.90
.090		.0900	.750 (8x)	7	1/8	2-1/2	59090-C6	47.30
.093 (3/32)		.0930	.074 (0.8x)	7	1/8	1-1/2	836593-C6	35.70
.093 (3/32)		.0930	.140 (1.5x)	7	1/8	1-1/2	946193-C6	32.80
.093 (3/32)		.0930	.279 (3x)	7	1/8	1-1/2	57893-C6	32.80
.093 (3/32)		.0930	.375 (4x)	7	1/8	2-1/2	890193-C6	45.90
.093 (3/32)		.0930	.500 (5x)	7	1/8	2-1/2	62693-C6	45.90
.093 (3/32)		.0930	.585 (6x)	7	1/8	2-1/2	868593-C6	46.50
.093 (3/32)		.0930	.670 (7x)	7	1/8	2-1/2	881393-C6	46.50
.093 (3/32)		.0930	.750 (8x)	7	1/8	2-1/2	59093-C6	47.30
.093 (3/32)		.0930	.950 (10x)	7	1/8	2-1/2	941893-C6	59.20
.093 (3/32)		.0930	1.125 (12x)	7	1/8	2-1/2	69193-C6	66.50
.093 (3/32)		.0930	1.400 (15x)	7	1/8	3	68793-C6	84.00
	2.5 mm	.0984	7.50 mm (3x)	7	4 mm	50 mm	967651-C6	39.90
.100		.1000	.150 (1.5x)	7	1/8	1-1/2	960100-C6	33.00
.100		.1000	.300 (3x)	7	1/8	1-1/2	57900-C6	32.80
.100		.1000	.500 (5x)	7	1/8	2-1/2	62700-C6	45.90
.100		.1000	.800 (8x)	7	1/8	2-1/2	59100-C6	47.30
.109 (7/64)		.1090	.327 (3x)	7	1/8	1-1/2	57902-C6	32.80
.109 (7/64)		.1090	.570 (5x)	7	1/8	2-1/2	62702-C6	45.90
.109 (7/64)		.1090	.900 (8x)	7	1/8	2-1/2	59102-C6	48.70
	3.0 mm	.1181	4.50 mm (1.5x)	7	4 mm	50 mm	846757-C6	39.90
	3.0 mm	.1181	9.00 mm (3x)	7	4 mm	50 mm	967657-C6	39.90
	3.0 mm	.1181	15.00 mm (5x)	7	4 mm	50 mm	974557-C6	41.20
	3.0 mm	.1181	24.00 mm (8x)	7	4 mm	50 mm	976157-C6	44.70

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EXOTIC ALLOYS



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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)



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EXOTIC ALLOYS

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .000" - .002"	+ .00mm - .04mm	decimal equivalent	+ .030" - .000" + .75mm - .00mm					
.125 (1/8)		.1250	.100 (0.8x)	7	1/8	1-1/2	836608-C6	34.40
.125 (1/8)		.1250	.187 (1.5x)	7	1/8	1-1/2	960108-C6	31.50
.125 (1/8)		.1250	.375 (3x)	7	1/8	1-1/2	57908-C6	30.90
.125 (1/8)		.1250	.500 (4x)	7	1/8	2-1/2	890208-C6	45.10
.125 (1/8)		.1250	.625 (5x)	7	1/8	2-1/2	62708-C6	45.10
.125 (1/8)		.1250	.750 (6x)	7	1/8	2-1/2	868608-C6	45.80
.125 (1/8)		.1250	.875 (7x)	7	1/8	2-1/2	881408-C6	45.80
.125 (1/8)		.1250	1.000 (8x)	7	1/8	2-1/2	59108-C6	46.50
.125 (1/8)		.1250	1.250 (10x)	7	1/8	2-1/2	941908-C6	58.50
.125 (1/8)		.1250	1.500 (12x)	7	1/8	3	69208-C6	66.00
.125 (1/8)		.1250	1.875 (15x)	7	1/8	3	68808-C6	85.20
.140 (9/64)		.1406	.425 (3x)	7	3/16	2	57909-C6	43.20
.140 (9/64)		.1406	.750 (5x)	7	3/16	3	62709-C6	45.10
.140 (9/64)		.1406	1.125 (8x)	7	3/16	3	59109-C6	47.60
.156 (5/32)		.1562	.235 (1.5x)	7	3/16	2	960110-C6	35.70
.156 (5/32)		.1562	.470 (3x)	7	3/16	2	57910-C6	35.20
.156 (5/32)		.1562	.750 (5x)	7	3/16	3	62710-C6	47.50
.156 (5/32)		.1562	1.250 (8x)	7	3/16	3	59110-C6	50.40
.187 (3/16)		.1875	.150 (0.8x)	7	3/16	2	836612-C6	38.60
.187 (3/16)		.1875	.285 (1.5x)	7	3/16	2	960112-C6	35.70
.187 (3/16)		.1875	.570 (3x)	7	3/16	2	57912-C6	35.20
.187 (3/16)		.1875	.750 (4x)	7	3/16	3	890212-C6	47.50
.187 (3/16)		.1875	1.000 (5x)	7	3/16	3	62712-C6	47.50
.187 (3/16)		.1875	1.156 (6x)	7	3/16	3	868612-C6	49.80
.187 (3/16)		.1875	1.312 (7x)	7	3/16	3	881412-C6	49.80
.187 (3/16)		.1875	1.500 (8x)	7	3/16	3	59112-C6	50.60
6.0 mm		.2362	18.00 mm (3x)	7	6 mm	63 mm	967666-C6	44.90
6.0 mm		.2362	30.00 mm (5x)	7	6 mm	63 mm	974566-C6	47.60
.250 (1/4)		.2500	.200 (0.8x)	7	1/4	2-1/2	836616-C6	49.40
.250 (1/4)		.2500	.375 (1.5x)	7	1/4	2-1/2	960116-C6	46.40
.250 (1/4)		.2500	.750 (3x)	7	1/4	2-1/2	57916-C6	45.70
.250 (1/4)		.2500	1.000 (4x)	7	1/4	4	890216-C6	58.20
.250 (1/4)		.2500	1.250 (5x)	7	1/4	4	62716-C6	58.20
.250 (1/4)		.2500	1.500 (6x)	7	1/4	4	868616-C6	60.90
.250 (1/4)		.2500	1.750 (7x)	7	1/4	4	881416-C6	60.90
.250 (1/4)		.2500	2.000 (8x)	7	1/4	4	59116-C6	61.60
.312 (5/16)		.3125	.470 (1.5x)	7	5/16	2-1/2	960120-C6	62.70
.312 (5/16)		.3125	1.000 (3x)	7	5/16	2-1/2	57920-C6	61.90
.375 (3/8)		.3750	.570 (1.5x)	7	3/8	2-1/2	960124-C6	71.20
.375 (3/8)		.3750	1.125 (3x)	7	3/8	2-1/2	57924-C6	70.60
.375 (3/8)		.3750	2.000 (5x)	7	3/8	4	62724-C6	89.60
.500 (1/2)		.5000	.750 (1.5x)	7	1/2	3	960132-C6	91.50
.500 (1/2)		.5000	1.500 (3x)	7	1/2	3	57932-C6	91.50

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

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SPEEDS & FEEDS (Finishers for Exotic Alloys)														
Material	Hardness (HBn)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter										Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial	
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300 300 - 350	400 350	Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
			Finishing (0.8x LOC)	.00013	.00026	.00040	.00053	.00066	.00079	.00106	.00158	.00212	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00012	.00024	.00036	.00048	.00060	.00072	.00096	.00144	.00193	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00011	.00022	.00033	.00043	.00055	.00065	.00088	.00131	.00175	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00010	.00021	.00031	.00042	.00052	.00062	.00084	.00125	.00167	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00008	.00016	.00025	.00033	.00041	.00049	.00066	.00098	.00131	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00007	.00015	.00022	.00030	.00037	.00044	.00060	.00089	.00119	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00006	.00013	.00020	.00026	.00032	.00039	.00052	.00078	.00104	< .05x Dia	.5x - 7x Dia
	350 - 400	250	Finishing (8x LOC)	.00006	.00012	.00018	.00024	.00030	.00036	.00048	.00072	.00096	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00011	.00017	.00023	.00028	.00034	.00046	.00068	.00091	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00011	.00016	.00022	.00027	.00033	.00044	.00065	.00088	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00020	.00025	.00029	.00039	.00059	.00079	< .02x Dia	.5x - 15x Dia
			Finishing (0.8x LOC)	.00010	.00021	.00032	.00042	.00053	.00063	.00085	.00127	.00169	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00009	.00019	.00029	.00038	.00048	.00057	.00077	.00115	.00154	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00008	.00017	.00026	.00035	.00044	.00052	.00070	.00105	.00140	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00008	.00017	.00025	.00033	.00042	.00050	.00067	.00100	.00134	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00006	.00013	.00020	.00026	.00033	.00039	.00053	.00079	.00105	< .07x Dia	.5x - 5x Dia
	400 - 540	200	Finishing (6x LOC)	.00006	.00012	.00018	.00024	.00030	.00035	.00048	.00071	.00095	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00005	.00010	.00016	.00021	.00026	.00031	.00042	.00062	.00083	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00005	.00010	.00014	.00019	.00024	.00029	.00039	.00058	.00077	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00009	.00014	.00018	.00023	.00027	.00036	.00054	.00073	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00016	.00020	.00023	.00032	.00047	.00063	< .02x Dia	.5x - 15x Dia
			Finishing (0.8x LOC)	.00008	.00017	.00026	.00034	.00043	.00051	.00069	.00103	.00138	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00125	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00007	.00014	.00021	.00028	.00035	.00042	.00057	.00085	.00114	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00007	.00013	.00020	.00027	.00034	.00040	.00054	.00081	.00109	< .10x Dia	.5x - 5x Dia
			Finishing (5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00077	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00050	.00067	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00004	.00008	.00012	.00016	.00020	.00023	.00031	.00047	.00063	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00007	.00011	.00015	.00018	.00022	.00030	.00044	.00059	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00007	.00011	.00014	.00018	.00021	.00028	.00043	.00057	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00013	.00016	.00019	.00026	.00038	.00051	< .02x Dia	.5x - 15x Dia

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square (cont.)

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SPEEDS & FEEDS (Finishers for Exotic Alloys)

Material	Hardness (HBn)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter										Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250		Radial	Axial
Titanium: All alloys	275 - 300 300 - 350	300 200	Finishing (0.8x LOC)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00070	.00094	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00005	.00011	.00016	.00021	.00027	.00032	.00043	.00064	.00085	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00005	.00010	.00015	.00019	.00024	.00029	.00039	.00058	.00078	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00009	.00014	.00018	.00023	.00028	.00037	.00055	.00074	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00007	.00010	.00013	.00016	.00020	.00026	.00039	.00053	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00034	.00046	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00003	.00005	.00008	.00011	.00013	.00016	.00021	.00032	.00043	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00005	.00008	.00010	.00013	.00015	.00020	.00030	.00040	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00005	.00007	.00010	.00012	.00014	.00019	.00029	.00039	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00009	.00011	.00013	.00017	.00026	.00035	< .02x Dia	.5x - 15x Dia
	350 - 400 400 - 425	150 100	Finishing (0.8x LOC)	.00005	.00009	.00014	.00019	.00023	.00028	.00038	.00056	.00075	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00004	.00008	.00013	.00017	.00021	.00025	.00034	.00051	.00068	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00004	.00008	.00012	.00015	.00019	.00023	.00031	.00046	.00062	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00004	.00007	.00011	.00015	.00019	.00022	.00030	.00044	.00059	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00003	.00006	.00009	.00012	.00015	.00017	.00023	.00035	.00047	< .07x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00032	.00042	< .07x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00002	.00005	.00007	.00009	.00011	.00014	.00018	.00028	.00037	< .05x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00002	.00004	.00006	.00008	.00011	.00013	.00017	.00026	.00034	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00032	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00004	.00006	.00008	.00010	.00012	.00016	.00023	.00031	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00007	.00009	.00010	.00014	.00021	.00028	< .02x Dia	.5x - 15x Dia
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300 300 - 350	150 100	Finishing (0.8x LOC)	.00002	.00005	.00007	.00010	.00012	.00015	.00020	.00029	.00039	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00007	.00009	.00011	.00013	.00018	.00027	.00036	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00033	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00004	.00005	.00006	.00007	.00010	.00015	.00020	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00005	.00006	.00007	.00009	.00014	.00018	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00007	.00011	.00015	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00011	.00015	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00002	.00002	.00003	.00004	.00005	.00007	.00010	.00013	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00003	.00004	.00004	.00006	.00009	.00011	< .01x Dia	.5x - 15x Dia
	350 - 400 400 - 425	80 60	Finishing (0.8x LOC)	.00002	.00004	.00006	.00008	.00010	.00012	.00016	.00024	.00031	< .10x Dia	.5x - 1.5x Dia
			Finishing (1.5x LOC)	.00002	.00004	.00005	.00007	.00009	.00011	.00014	.00021	.00029	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	.00002	.00003	.00005	.00006	.00008	.00010	.00013	.00019	.00026	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00001	.00003	.00004	.00006	.00007	.00009	.00011	.00017	.00023	< .10x Dia	.5x - 4x Dia
			Finishing (5x LOC)	.00001	.00002	.00003	.00004	.00005	.00006	.00008	.00012	.00016	< .05x Dia	.5x - 5x Dia
			Finishing (6x LOC)	.00001	.00002	.00003	.00004	.00005	.00007	.00011	.00015	.00020	< .05x Dia	.5x - 6x Dia
			Finishing (7x LOC)	.00001	.00001	.00002	.00003	.00004	.00004	.00006	.00009	.00012	< .03x Dia	.5x - 7x Dia
			Finishing (8x LOC)	.00001	.00002	.00002	.00003	.00004	.00005	.00006	.00009	.00012	< .03x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00006	.00008	.00011	< .02x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00010	< .02x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	.00002	.00003	.00003	.00005	.00007	.00009	< .01x Dia	.5x - 15x Dia



VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Square – Long Reach



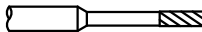
- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Long reach design for deep cavities and increased rigidity
- Length of cut = 3x diameter
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Large core and eccentric relief for improved tool life
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

EXOTIC ALLOYS

mm & in

CUTTER DIAMETER			LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
D ₁			L ₂	L ₃		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .0005" / - .0005"	+ .00mm / - .02mm	decimal equivalent	+ .010" / - .000" / + .25mm / - .00mm	+ .010" / - .000" / + .25mm / - .00mm					
.015 (1/64)	.0150	.0150	.045	.078 (5x)	4	1/8	2-1/2	940715-C6	56.40
.015 (1/64)	.0150	.0150	.045	.125 (8x)	4	1/8	2-1/2	962115-C6	58.30
.015 (1/64)	.0150	.0150	.045	.187 (12x)	4	1/8	2-1/2	951815-C6	61.50
.020	.0200	.0200	.060	.160 (8x)	4	1/8	2-1/2	962120-C6	51.00
.025	.0250	.0250	.075	.203 (8x)	4	1/8	2-1/2	962125-C6	51.00
.031 (1/32)	.0310	.0310	.093	.156 (5x)	6	1/8	2-1/2	940731-C6	49.70
.031 (1/32)	.0310	.0310	.093	.250 (8x)	6	1/8	2-1/2	962131-C6	51.00
.031 (1/32)	.0310	.0310	.093	.312 (10x)	6	1/8	2-1/2	862831-C6	52.70
.031 (1/32)	.0310	.0310	.093	.375 (12x)	6	1/8	2-1/2	951831-C6	54.20
1.0 mm	.0393	3.00 mm	8.0 mm (8x)	6	4 mm	50 mm	924722-C6	51.50	
.040	.0400	.120	.325 (8x)	6	1/8	2-1/2	962140-C6	51.00	
.047 (3/64)	.0470	.141	.250 (5x)	6	1/8	2-1/2	940747-C6	49.70	
.047 (3/64)	.0470	.141	.375 (8x)	6	1/8	2-1/2	962147-C6	51.00	
.047 (3/64)	.0470	.141	.570 (12x)	6	1/8	2-1/2	951847-C6	54.20	
.050	.0500	.150	.400 (8x)	7	1/8	2-1/2	962150-C6	51.00	
1.5 mm	.0590	4.50 mm	12.0 mm (8x)	7	4 mm	50 mm	924733-C6	51.50	
.060	.0600	.180	.500 (8x)	7	1/8	2-1/2	962160-C6	51.00	
.062 (1/16)	.0620	.186	.312 (5x)	7	1/8	2-1/2	940762-C6	47.50	
.062 (1/16)	.0620	.186	.500 (8x)	7	1/8	2-1/2	962162-C6	48.90	
.062 (1/16)	.0620	.186	.625 (10x)	7	1/8	2-1/2	862862-C6	50.60	
.062 (1/16)	.0620	.186	.750 (12x)	7	1/8	2-1/2	951862-C6	52.20	
.070	.0700	.210	.570 (8x)	7	1/8	2-1/2	962170-C6	48.90	
.078 (5/64)	.0780	.234	.406 (5x)	7	1/8	2-1/2	940778-C6	47.50	
.078 (5/64)	.0780	.234	.625 (8x)	7	1/8	2-1/2	962178-C6	48.90	
.078 (5/64)	.0780	.234	.940 (12x)	7	1/8	2-1/2	951878-C6	52.20	
2.0 mm	.0787	6.00 mm	16.0 mm (8x)	7	4 mm	50 mm	924745-C6	49.40	
.080	.0800	.240	.650 (8x)	7	1/8	2-1/2	962180-C6	48.90	
.090	.0900	.270	.750 (8x)	7	1/8	2-1/2	962190-C6	48.90	
.093 (3/32)	.0930	.279	.500 (5x)	7	1/8	2-1/2	940793-C6	47.50	
.093 (3/32)	.0930	.279	.750 (8x)	7	1/8	2-1/2	962193-C6	48.90	
.093 (3/32)	.0930	.279	.950 (10x)	7	1/8	2-1/2	862893-C6	50.60	
.093 (3/32)	.0930	.279	1.125 (12x)	7	1/8	2-1/2	951893-C6	52.20	
.100	.1000	.300	.800 (8x)	7	1/8	2-1/2	962200-C6	48.90	
.109 (7/64)	0.1094	.327	.570 (5x)	7	1/8	2-1/2	940802-C6	47.50	
.109 (7/64)	0.1094	.327	.900 (8x)	7	1/8	2-1/2	962202-C6	48.90	
3.0 mm	.1181	9.00 mm	24.0 mm (8x)	7	4 mm	50 mm	924757-C6	49.40	

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VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

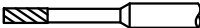
Finishers – Square – Long Reach (cont.)

continued from previous page

CUTTER DIAMETER		LENGTH OF CUT	OVERALL REACH	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AISI IN NANO COATED	
D ₁ ^{+0.000"} _{-.002"}		L ₂ ^{+0.030"} _{-.000"}	L ₃ ^{+0.030"} _{-.000"}		D ₂ (h6)	L ₁	TOOL #	PRICE
.125 (1/8)	.1250	.375	.625 (5x)	7	1/8	2-1/2	940808-C6	45.90
.125 (1/8)	.1250	.375	1.000 (8x)	7	1/8	2-1/2	962208-C6	47.20
.125 (1/8)	.1250	.375	1.250 (10x)	7	1/8	3	862908-C6	48.70
.125 (1/8)	.1250	.375	1.500 (12x)	7	1/8	3	951908-C6	50.20
.156 (5/32)	.1562	.470	.750 (5x)	7	3/16	3	940810-C6	45.90
.156 (5/32)	.1562	.470	1.250 (8x)	7	3/16	3	962210-C6	47.20
.187 (3/16)	.1875	.570	1.000 (5x)	7	3/16	3	940812-C6	48.60
.250 (1/4)	.2500	.750	1.250 (5x)	7	1/4	4	940816-C6	58.70
.250 (1/4)	.2500	.750	2.000 (8x)	7	1/4	4	962216-C6	60.60

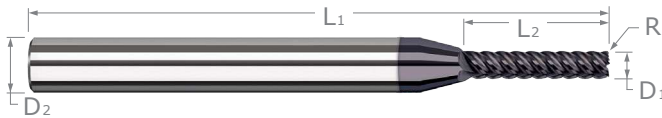
EXOTIC ALLOYS

SPEEDS & FEEDS (Finishers – Long Reach for Exotic Alloys)															
Material	Hardness (HBn)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter										Depth of Cut		
			.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial		
Stainless Steels: 40x, 41x, 42x, 43x, 44x, 13-8, 15-5, 15-7, 17-4, 17-7	275 - 300 300 - 350	400 350	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	< .07x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00007	0.00015	0.00023	0.00030	0.00038	0.00046	0.00061	0.00092	0.00123	< .06x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	< .05x Dia	.5x - 3x Dia	
Tool Steels: D, H, M, T, S series	300 - 350	500	Finishing (5x Reach)	.00009	.00020	.00030	.00039	.00049	.00059	.00079	.00118	.00158	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00008	.00016	.00025	.00032	.00041	.00049	.00065	.00098	.00131	< .07x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00007	0.00015	0.00023	0.00030	0.00038	0.00046	0.00061	0.00092	0.00123	< .06x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00007	.00015	.00022	.00029	.00037	.00044	.00059	.00088	.00118	< .05x Dia	.5x - 3x Dia	
	350 - 400	250	Finishing (5x Reach)	.00008	.00016	.00024	.00031	.00039	.00047	.00063	.00094	.00126	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00006	.00013	.00020	.00026	.00033	.00039	.00052	.00078	.00105	< .07x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00006	0.00012	0.00018	0.00024	0.00031	0.00037	0.00049	0.00074	0.00098	< .06x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00006	.00012	.00018	.00023	.00029	.00035	.00047	.00071	.00095	< .05x Dia	.5x - 3x Dia	
	400 - 540	200	Finishing (5x Reach)	.00006	.00013	.00019	.00025	.00032	.00038	.00051	.00077	.00102	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00005	.00011	.00016	.00021	.00027	.00032	.00042	.00064	.00085	< .07x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00005	0.00010	0.00015	0.00020	0.00025	0.00030	0.00040	0.00060	0.00080	< .06x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00005	.00010	.00014	.00019	.00024	.00029	.00038	.00057	.00077	< .05x Dia	.5x - 3x Dia	
	Titanium: All alloys	275 - 300 300 - 350	300 200	Finishing (5x Reach)	.00004	.00009	.00013	.00017	.00022	.00026	.00035	.00052	.00070	< .10x Dia	.5x - 3x Dia
				Finishing (8x Reach)	.00003	.00007	.00011	.00014	.00018	.00022	.00029	.00043	.00058	< .07x Dia	.5x - 3x Dia
				Finishing (10x Reach)	.00003	0.00007	0.00010	0.00013	0.00017	0.00020	0.00027	0.00041	0.00054	< .06x Dia	.5x - 3x Dia
				Finishing (12x Reach)	.00003	.00006	.00010	.00013	.00016	.00019	.00026	.00039	.00052	< .05x Dia	.5x - 3x Dia
350 - 400 400 - 425		150 100	Finishing (5x Reach)	.00003	.00007	.00010	.00014	.00017	.00021	.00028	.00042	.00056	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00003	.00006	.00009	.00011	.00014	.00017	.00023	.00035	.00046	< .07x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00003	0.00005	0.00008	0.00011	0.00014	0.00016	0.00022	0.00033	0.00044	< .06x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00003	.00005	.00008	.00010	.00013	.00016	.00021	.00031	.00042	< .05x Dia	.5x - 3x Dia	
Nickel Alloys: Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	275 - 300 300 - 350	150 100	Finishing (5x Reach)	.00002	.00004	.00005	.00007	.00009	.00011	.00015	.00022	.00029	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00001	.00002	.00003	.00004	.00005	.00007	.00009	.00013	.00018	< .05x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00001	0.00002	0.00003	0.00004	0.00005	0.00005	0.00007	0.00011	0.00015	< .04x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00010	.00014	< .03x Dia	.5x - 3x Dia	
	350 - 400 400 - 425	80 60	Finishing (5x Reach)	.00001	.00003	.00004	.00006	.00007	.00009	.00012	.00018	.00023	< .10x Dia	.5x - 3x Dia	
			Finishing (8x Reach)	.00001	.00002	.00003	.00003	.00004	.00005	.00007	.00011	.00014	< .05x Dia	.5x - 3x Dia	
			Finishing (10x Reach)	.00001	0.00001	0.00002	0.00003	0.00004	0.00004	0.00006	0.00009	0.00012	< .04x Dia	.5x - 3x Dia	
			Finishing (12x Reach)	.00001	.00001	.00002	.00003	.00003	.00004	.00005	.00008	.00011	< .03x Dia	.5x - 3x Dia	



VARIABLE HELIX END MILLS FOR EXOTIC ALLOYS

Finishers – Corner Radius



- Optimized for titanium alloys, inconel, nickel alloys, and other high-temperature materials with outstanding performance in difficult-to-machine steels, stainless steels, and tool steels
- Variable helix design (approx. 41°) reduces chatter and harmonics improving finish
- Latest generation AlTiN Nano coating offers superior hardness and heat resistance
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA 

CUTTER DIAMETER	CORNER RADIUS	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AlTiN NANO COATED	
$D_1 \begin{smallmatrix} +.0005'' \\ -.0005'' \end{smallmatrix}$	$R \begin{smallmatrix} +.001'' \\ -.001'' \end{smallmatrix}$	$L_2 \begin{smallmatrix} +.010'' \\ -.000'' \end{smallmatrix}$		$D_2 \text{ (h6)}$	L_1	TOOL #	PRICE
.031 (1/32)	.005	.093 (3x)	6	1/8	1-1/2	873031-C6	37.30
.031 (1/32)	.005	.156 (5x)	6	1/8	2-1/2	874631-C6	50.80
.047 (3/64)	.005	.141 (3x)	6	1/8	1-1/2	873047-C6	37.30
.047 (3/64)	.005	.250 (5x)	6	1/8	2-1/2	874647-C6	50.80
.047 (3/64)	.010	.141 (3x)	6	1/8	1-1/2	882647-C6	37.30
.047 (3/64)	.010	.250 (5x)	6	1/8	2-1/2	885447-C6	50.80
.062 (1/16)	.005	.186 (3x)	7	1/8	1-1/2	873062-C6	37.10
.062 (1/16)	.005	.312 (5x)	7	1/8	2-1/2	874662-C6	48.60
.062 (1/16)	.010	.186 (3x)	7	1/8	1-1/2	882662-C6	37.10
.062 (1/16)	.010	.312 (5x)	7	1/8	2-1/2	885462-C6	48.60
.078 (5/64)	.005	.234 (3x)	7	1/8	1-1/2	873078-C6	35.40
.078 (5/64)	.005	.406 (5x)	7	1/8	2-1/2	874678-C6	48.60
.078 (5/64)	.010	.234 (3x)	7	1/8	1-1/2	882678-C6	35.40
.078 (5/64)	.010	.406 (5x)	7	1/8	2-1/2	885478-C6	48.60
.093 (3/32)	.005	.279 (3x)	7	1/8	1-1/2	873093-C6	35.40
.093 (3/32)	.005	.500 (5x)	7	1/8	2-1/2	874693-C6	48.60
.093 (3/32)	.010	.279 (3x)	7	1/8	1-1/2	882693-C6	35.40
.093 (3/32)	.010	.500 (5x)	7	1/8	2-1/2	885493-C6	48.60

	$D_1 \begin{smallmatrix} +.000'' \\ -.002'' \end{smallmatrix}$	$R \begin{smallmatrix} +.001'' \\ -.001'' \end{smallmatrix}$	$L_2 \begin{smallmatrix} +.030'' \\ -.000'' \end{smallmatrix}$		$D_2 \text{ (h6)}$	L_1	TOOL #	PRICE
NEW	.125 (1/8)	.005	.187 (1.5x)	7	1/8	1-1/2	872308-C6	32.40
	.125 (1/8)	.005	.375 (3x)	7	1/8	1-1/2	873108-C6	32.10
	.125 (1/8)	.010	.187 (1.5x)	7	1/8	1-1/2	880108-C6	32.40
	.125 (1/8)	.010	.375 (3x)	7	1/8	1-1/2	882708-C6	32.10
	.125 (1/8)	.015	.375 (3x)	7	1/8	1-1/2	813808-C6	32.10
	.125 (1/8)	.030	.187 (1.5x)	7	1/8	1-1/2	890508-C6	32.40
	.125 (1/8)	.030	.375 (3x)	7	1/8	1-1/2	892708-C6	32.10
	.187 (3/16)	.005	.285 (1.5x)	7	3/16	2	872312-C6	36.50
NEW	.187 (3/16)	.005	.570 (3x)	7	3/16	2	873112-C6	36.00
	.187 (3/16)	.010	.285 (1.5x)	7	3/16	2	880112-C6	36.50
	.187 (3/16)	.010	.570 (3x)	7	3/16	2	882712-C6	36.00
	.187 (3/16)	.015	.570 (3x)	7	3/16	2	813812-C6	36.00
	.187 (3/16)	.030	.285 (1.5x)	7	3/16	2	890512-C6	36.50
	.187 (3/16)	.030	.570 (3x)	7	3/16	2	892712-C6	36.00
	.250 (1/4)	.005	.375 (1.5x)	7	1/4	2-1/2	872316-C6	47.00
	.250 (1/4)	.005	.750 (3x)	7	1/4	2-1/2	873116-C6	46.20
NEW	.250 (1/4)	.010	.375 (1.5x)	7	1/4	2-1/2	880116-C6	47.00
	.250 (1/4)	.010	.750 (3x)	7	1/4	2-1/2	882716-C6	46.20
	.250 (1/4)	.015	.750 (3x)	7	1/4	2-1/2	813816-C6	46.20
	.250 (1/4)	.030	.375 (1.5x)	7	1/4	2-1/2	890516-C6	47.00
	.250 (1/4)	.030	.750 (3x)	7	1/4	2-1/2	892716-C6	46.20

PLEASE SEE SPEEDS & FEEDS ON PAGE 129

VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square



◀ **Down to
.2 mm!**

- ⚙ Optimized for readily machinable medium alloy steels, stainless steels, and tool steels
- ⚙ Multi-flute, high helix (approx. 44°), coated design improves finishing in carbon steels, 300 and 400 stainless steels, and machinable tool steels
- ⚙ Can be used in light duty roughing and profiling applications
- ⚙ AlTiN Nano coating offers superior hardness and heat resistance
- ⚙ h6 shank tolerance for high precision tool holders
- ⚙ End cutting (not center cutting)
- ⚙ Solid carbide
- ⚙ CNC ground in the USA 🇺🇸

mm & in

CUTTER DIAMETER D ₁ +.0005" - .0005" +.00mm - .02mm decimal equivalent	LENGTH OF CUT L ₂ +.010" - .000" +.25mm - .00mm	FLUTES	SHANK DIAMETER D ₂ (h6)	OVERALL LENGTH L ₁	AlTiN NANO COATED	
					TOOL #	PRICE
.2 mm .0078	.60 mm (3x)	4	4 mm	50 mm	977704-C6	51.00
.2 mm .0078	1.00 mm (5x)	4	4 mm	50 mm	980104-C6	59.00
.2 mm .0078	1.60 mm (8x)	4	4 mm	50 mm	981704-C6	60.40
.3 mm .0118	.90 mm (3x)	4	4 mm	50 mm	977706-C6	47.20
.015 (1/64)	.045 (3x)	4	1/8	1-1/2	24315-C6	41.40
.015 (1/64)	.078 (5x)	4	1/8	2-1/2	53315-C6	51.40
.015 (1/64)	.125 (8x)	4	1/8	2-1/2	62815-C6	53.00
.4 mm .0157	1.20 mm (3x)	4	4 mm	50 mm	977709-C6	44.90
.4 mm .0157	2.00 mm (5x)	4	4 mm	50 mm	980109-C6	53.00
.4 mm .0157	3.20 mm (8x)	4	4 mm	50 mm	981709-C6	54.20
.5 mm .0196	1.50 mm (3x)	4	4 mm	50 mm	977711-C6	44.30
.5 mm .0196	2.50 mm (5x)	4	4 mm	50 mm	980111-C6	51.50
.5 mm .0196	4.00 mm (8x)	4	4 mm	50 mm	981711-C6	53.40
.020	.030 (1.5x)	4	1/8	1-1/2	935920-C6	40.70
.020	.060 (3x)	4	1/8	1-1/2	24320-C6	40.70
.020	.100 (5x)	4	1/8	2-1/2	53320-C6	51.00
.020	.160 (8x)	4	1/8	2-1/2	62820-C6	52.00
.6 mm .0236	1.80 mm (3x)	4	4 mm	50 mm	977713-C6	44.30
.6 mm .0236	3.00 mm (5x)	4	4 mm	50 mm	980113-C6	51.50
.6 mm .0236	4.80 mm (8x)	4	4 mm	50 mm	981713-C6	53.40
.025	.038 (1.5x)	4	1/8	1-1/2	935925-C6	38.20
.025	.075 (3x)	4	1/8	1-1/2	24325-C6	38.20
.025	.125 (5x)	4	1/8	2-1/2	53325-C6	49.40
.025	.203 (8x)	4	1/8	2-1/2	62825-C6	50.40
.7 mm .0275	2.10 mm (3x)	4	4 mm	50 mm	977715-C6	44.30
.031 (1/32)	.047 (1.5x)	5	1/8	1-1/2	935931-C6	34.00
.031 (1/32)	.093 (3x)	5	1/8	1-1/2	24331-C6	34.00
.031 (1/32)	.125 (4x)	5	1/8	2-1/2	835331-C6	47.00
.031 (1/32)	.156 (5x)	5	1/8	2-1/2	53331-C6	47.50
.031 (1/32)	.250 (8x)	5	1/8	2-1/2	62831-C6	48.30
.031 (1/32)	.312 (10x)	5	1/8	2-1/2	882431-C6	55.40
.031 (1/32)	.375 (12x)	5	1/8	2-1/2	68531-C6	59.60

continued on next page

MEDIUM ALLOY STEELS



VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)



continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .0005" - .0005"	+ .00mm - .02mm	decimal equivalent	+ .010" - .000" + .25mm - .00mm					
.8 mm	.0314		2.40 mm (3x)	5	4 mm	50 mm	977718-C6	39.00
.8 mm	.0314		4.00 mm (5x)	5	4 mm	50 mm	980118-C6	48.60
.8 mm	.0314		6.50 mm (8x)	5	4 mm	50 mm	981718-C6	50.00
.9 mm	.0354		2.70 mm (3x)	5	4 mm	50 mm	977720-C6	39.00
1.0 mm	.0393		3.00 mm (3x)	5	4 mm	50 mm	977722-C6	39.00
1.0 mm	.0393		5.00 mm (5x)	5	4 mm	50 mm	980122-C6	48.60
1.0 mm	.0393		8.00 mm (8x)	5	4 mm	50 mm	981722-C6	50.00
.040	.0400		.060 (1.5x)	5	1/8	1-1/2	935940-C6	34.00
.040	.0400		.120 (3x)	5	1/8	1-1/2	24340-C6	34.00
.040	.0400		.203 (5x)	5	1/8	2-1/2	53340-C6	47.50
.040	.0400		.325 (8x)	5	1/8	2-1/2	62840-C6	48.30
1.1 mm	.0433		3.00 mm (3x)	5	4 mm	50 mm	977724-C6	39.00
.047 (3/64)	.0470		.071 (1.5x)	5	1/8	1-1/2	935947-C6	34.00
.047 (3/64)	.0470		.141 (3x)	5	1/8	1-1/2	24347-C6	34.00
.047 (3/64)	.0470		.250 (5x)	5	1/8	2-1/2	53347-C6	47.50
.047 (3/64)	.0470		.375 (8x)	5	1/8	2-1/2	62847-C6	48.30
.047 (3/64)	.0470		.480 (10x)	5	1/8	2-1/2	882447-C6	55.40
.047 (3/64)	.0470		.570 (12x)	5	1/8	2-1/2	68547-C6	59.60
1.2 mm	.0472		3.50 mm (3x)	5	4 mm	50 mm	977727-C6	39.00
1.2 mm	.0472		6.00 mm (5x)	5	4 mm	50 mm	980127-C6	48.60
1.2 mm	.0472		9.50 mm (8x)	5	4 mm	50 mm	981727-C6	50.00
.050	.0500		.075 (1.5x)	5	1/8	1-1/2	935950-C6	34.00
.050	.0500		.150 (3x)	5	1/8	1-1/2	24350-C6	34.00
.050	.0500		.250 (5x)	5	1/8	2-1/2	53350-C6	47.50
.050	.0500		.400 (8x)	5	1/8	2-1/2	62850-C6	48.30
1.3 mm	.0511		4.00 mm (3x)	5	4 mm	50 mm	977729-C6	39.00
1.4 mm	.0551		4.00 mm (3x)	5	4 mm	50 mm	977731-C6	39.00
1.4 mm	.0551		7.00 mm (5x)	5	4 mm	50 mm	980131-C6	48.60
1.4 mm	.0551		11.00 mm (8x)	5	4 mm	50 mm	981731-C6	50.00
1.5 mm	.0590		4.50 mm (3x)	5	4 mm	50 mm	977733-C6	37.70
1.5 mm	.0590		7.50 mm (5x)	5	4 mm	50 mm	980133-C6	47.20
1.5 mm	.0590		12.00 mm (8x)	5	4 mm	50 mm	981733-C6	48.90
.060	.0600		.090 (1.5x)	5	1/8	1-1/2	935960-C6	34.00
.060	.0600		.180 (3x)	5	1/8	1-1/2	24360-C6	34.00
.060	.0600		.312 (5x)	5	1/8	2-1/2	53360-C6	47.50
.060	.0600		.500 (8x)	5	1/8	2-1/2	62860-C6	48.30
.062 (1/16)	.0620		.093 (1.5x)	5	1/8	1-1/2	935962-C6	32.00
.062 (1/16)	.0620		.186 (3x)	5	1/8	1-1/2	24362-C6	32.00
.062 (1/16)	.0620		.250 (4x)	5	1/8	2-1/2	835362-C6	44.20
.062 (1/16)	.0620		.312 (5x)	5	1/8	2-1/2	53362-C6	44.70
.062 (1/16)	.0620		.500 (8x)	5	1/8	2-1/2	62862-C6	45.40
.062 (1/16)	.0620		.625 (10x)	5	1/8	2-1/2	882462-C6	56.40
.062 (1/16)	.0620		.750 (12x)	5	1/8	2-1/2	68562-C6	63.60
.062 (1/16)	.0620		.950 (15x)	5	1/8	2-1/2	68962-C6	80.10
1.6 mm	.0629		5.00 mm (3x)	5	4 mm	50 mm	977736-C6	37.70
1.6 mm	.0629		8.00 mm (5x)	5	4 mm	50 mm	980136-C6	47.50
1.6 mm	.0629		13.00 mm (8x)	5	4 mm	50 mm	981736-C6	48.30

continued on next page



VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)



continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AITIN NANO COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+ .0005" - .0005"	+ .00mm - .02mm	decimal equivalent	+ .010" - .000" + .25mm - .00mm					
1.7 mm	.0669		5.00 mm (3x)	5	4 mm	50 mm	977738-C6	37.70
.070	.0700		.210 (3x)	5	1/8	1-1/2	24370-C6	32.00
.070	.0700		.375 (5x)	5	1/8	2-1/2	53370-C6	44.70
.070	.0700		.570 (8x)	5	1/8	2-1/2	62870-C6	45.40
1.8 mm	.0708		5.50 mm (3x)	5	4 mm	50 mm	977740-C6	37.70
1.8 mm	.0708		9.00 mm (5x)	5	4 mm	50 mm	980140-C6	47.20
1.8 mm	.0708		14.00 mm (8x)	5	4 mm	50 mm	981740-C6	48.90
1.9 mm	.0748		5.50 mm (3x)	5	4 mm	50 mm	977742-C6	37.70
.078 (5/64)	.0780		.117 (1.5x)	5	1/8	1-1/2	935978-C6	32.00
.078 (5/64)	.0780		.234 (3x)	5	1/8	1-1/2	24378-C6	32.00
.078 (5/64)	.0780		.406 (5x)	5	1/8	2-1/2	53378-C6	44.70
.078 (5/64)	.0780		.625 (8x)	5	1/8	2-1/2	62878-C6	45.40
.078 (5/64)	.0780		.800 (10x)	5	1/8	2-1/2	882478-C6	56.40
.078 (5/64)	.0780		.940 (12x)	5	1/8	2-1/2	68578-C6	63.60
.078 (5/64)	.0780		1.187 (15x)	5	1/8	2-1/2	68978-C6	80.10
2.0 mm	.0787		6.00 mm (3x)	5	4 mm	50 mm	977745-C6	37.70
2.0 mm	.0787		10.00 mm (5x)	5	4 mm	50 mm	980145-C6	47.20
2.0 mm	.0787		16.00 mm (8x)	5	4 mm	50 mm	981745-C6	48.90
.080	.0800		.120 (1.5x)	5	1/8	1-1/2	935980-C6	32.00
.080	.0800		.240 (3x)	5	1/8	1-1/2	24380-C6	32.00
.080	.0800		.406 (5x)	5	1/8	2-1/2	53380-C6	44.70
.080	.0800		.650 (8x)	5	1/8	2-1/2	62880-C6	45.40
.090	.0900		.270 (3x)	5	1/8	1-1/2	24390-C6	32.00
.090	.0900		.450 (5x)	5	1/8	2-1/2	53390-C6	44.70
.090	.0900		.750 (8x)	5	1/8	2-1/2	62890-C6	45.40
.093 (3/32)	.0930		.140 (1.5x)	5	1/8	1-1/2	935993-C6	32.00
.093 (3/32)	.0930		.279 (3x)	5	1/8	1-1/2	24393-C6	32.00
.093 (3/32)	.0930		.375 (4x)	5	1/8	2-1/2	835393-C6	44.20
.093 (3/32)	.0930		.500 (5x)	5	1/8	2-1/2	53393-C6	44.70
.093 (3/32)	.0930		.750 (8x)	5	1/8	2-1/2	62893-C6	45.40
.093 (3/32)	.0930		.950 (10x)	5	1/8	2-1/2	882493-C6	56.40
.093 (3/32)	.0930		1.125 (12x)	5	1/8	2-1/2	68593-C6	63.60
.093 (3/32)	.0930		1.400 (15x)	5	1/8	3	68993-C6	80.80
2.5 mm	.0984		7.50 mm (3x)	5	4 mm	50 mm	977751-C6	37.70
.100	.1000		.150 (1.5x)	5	1/8	1-1/2	936000-C6	32.00
.100	.1000		.300 (3x)	5	1/8	1-1/2	24399-C6	32.00
.100	.1000		.500 (5x)	5	1/8	2-1/2	53399-C6	44.70
.100	.1000		.800 (8x)	5	1/8	2-1/2	53400-C6	45.40
.109 (7/64)	.1090		.327 (3x)	5	1/8	1-1/2	24402-C6	32.20
.109 (7/64)	.1090		.570 (5x)	5	1/8	2-1/2	63502-C6	44.70
3.0 mm	.1181		9.00 mm (3x)	5	4 mm	50 mm	977757-C6	37.70
3.0 mm	.1181		15.00 mm (5x)	5	4 mm	50 mm	980157-C6	46.80
3.0 mm	.1181		24.00 mm (8x)	5	4 mm	50 mm	981757-C6	49.10

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MEDIUM ALLOY STEELS



VARIABLE HELIX END MILLS FOR MEDIUM ALLOY STEELS

Finishers – Square (cont.)



continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AISI NANO COATED	
D ₁ $\pm .000$ - .002"	decimal equivalent	L ₂ $\pm .030$ - .000"	D ₂ (h6)	L ₁	TOOL #	PRICE
.125 (1/8)	.1250	.187 (1.5x)	5	1/8	1-1/2	936008-C6 29.10
.125 (1/8)	.1250	.500 (4x)	5	1/8	1-1/2	24408-C6 29.10
.125 (1/8)	.1250	.750 (6x)	5	1/8	2-1/2	63508-C6 43.70
.125 (1/8)	.1250	1.000 (8x)	5	1/8	2-1/2	53408-C6 44.70
.125 (1/8)	.1250	1.125 (10x)	5	1/8	2-1/2	882508-C6 55.00
.125 (1/8)	.1250	1.500 (12x)	5	1/8	3	68608-C6 62.70
.125 (1/8)	.1250	1.875 (15x)	5	1/8	3	69008-C6 79.90
.140 (9/64)	.1406	.500 (3x)	5	3/16	2	24409-C6 42.20
.140 (9/64)	.1406	.750 (5x)	5	3/16	3	63509-C6 43.70
.156 (5/32)	.1562	.235 (1.5x)	5	3/16	2	936010-C6 34.70
.156 (5/32)	.1562	.562 (3x)	5	3/16	2	24410-C6 34.70
.156 (5/32)	.1562	.875 (5x)	5	3/16	3	63510-C6 46.50
.156 (5/32)	.1562	1.250 (8x)	5	3/16	3	53410-C6 47.30
.187 (3/16)	.1875	.285 (1.5x)	5	3/16	2	936012-C6 33.20
.187 (3/16)	.1875	.625 (3x)	5	3/16	2	24412-C6 33.20
.187 (3/16)	.1875	1.000 (5x)	5	3/16	3	63512-C6 46.50
.187 (3/16)	.1875	1.500 (8x)	5	3/16	3	53412-C6 47.30
.250 (1/4)	.2500	.375 (1.5x)	5	1/4	2-1/2	936016-C6 42.20
.250 (1/4)	.2500	.750 (3x)	5	1/4	2-1/2	24416-C6 42.20
.250 (1/4)	.2500	1.250 (5x)	5	1/4	4	63516-C6 56.80
.250 (1/4)	.2500	2.000 (8x)	5	1/4	4	53416-C6 57.90
.375 (3/8)	.3750	1.125 (3x)	5	3/8	2-1/2	24424-C6 67.10
.500 (1/2)	.5000	1.500 (3x)	5	1/2	3	24432-C6 87.20

MEDIUM ALLOY STEELS

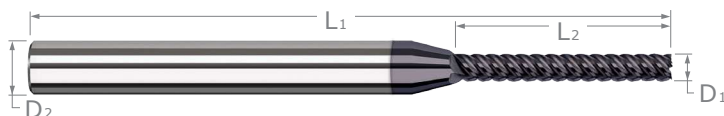
SPEEDS & FEEDS (High-Helix Finishers for Medium Alloy Steels)

Material	Hardness (HBN)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter										Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250		Radial	Axial
Carbon Steels: 1030 - 1095, 1140 - 1151, 13xx, 15xx, 20xx, 30xx, 40xx & 4xLxx, 50xx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 60xx, 80xx, 90xx	225 - 250 250 - 275	600 550	Finishing (1.5x LOC)	0.00020	0.00041	0.00062	0.00082	0.00103	0.00123	0.00165	0.00247	0.00330	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00018	0.00037	0.00056	0.00074	0.00094	0.00112	0.00150	0.00224	0.00300	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00016	0.00032	0.00049	0.00065	0.00081	0.00097	0.00131	0.00195	0.00261	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00014	0.00028	0.00042	0.00056	0.00070	0.00084	0.00113	0.00168	0.00225	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00010	0.00020	0.00031	0.00041	0.00051	0.00061	0.00083	0.00123	0.00165	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00019	0.00029	0.00039	0.00049	0.00058	0.00078	0.00117	0.00156	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00019	0.00028	0.00037	0.00047	0.00056	0.00075	0.00112	0.00150	< .04x Dia	.5x - 12x Dia
	275 - 300	500	Finishing (15x LOC)	-	-	-	0.00033	0.00042	0.00050	0.00068	0.00101	0.00135	< .02x Dia	.5x - 15x Dia
			Finishing (1.5x LOC)	0.00018	0.00038	0.00057	0.00075	0.00094	0.00113	0.00151	0.00226	0.00303	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00017	0.00034	0.00052	0.00068	0.00086	0.00102	0.00138	0.00206	0.00275	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00014	0.00030	0.00045	0.00059	0.00075	0.00089	0.00120	0.00179	0.00239	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00012	0.00026	0.00039	0.00051	0.00064	0.00077	0.00103	0.00154	0.00206	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00009	0.00019	0.00028	0.00038	0.00047	0.00056	0.00076	0.00113	0.00151	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00018	0.00027	0.00035	0.00045	0.00053	0.00072	0.00107	0.00143	< .04x Dia	.5x - 10x Dia
Stainless Steels: 201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 414, 42x, 43x, 44x, 501, 502	225 - 250 250 - 275	500 500	Finishing (12x LOC)	-	0.00017	0.00026	0.00034	0.00043	0.00051	0.00069	0.00103	0.00138	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00031	0.00039	0.00046	0.00062	0.00093	0.00124	< .02x Dia	.5x - 15x Dia
			Finishing (1.5x LOC)	0.00017	0.00034	0.00052	0.00068	0.00086	0.00102	0.00138	0.00206	0.00275	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00015	0.00031	0.00047	0.00062	0.00078	0.00093	0.00125	0.00187	0.00250	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00013	0.00027	0.00041	0.00054	0.00068	0.00081	0.00109	0.00163	0.00218	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00011	0.00023	0.00035	0.00047	0.00059	0.00070	0.00094	0.00140	0.00188	< .07x Dia	.5x - 5x Dia
			Finishing (8x LOC)	0.00008	0.00017	0.00026	0.00034	0.00043	0.00051	0.00069	0.00103	0.00138	< .05x Dia	.5x - 8x Dia
	275 - 300 300 - 350	500 500	Finishing (10x LOC)	-	0.00016	0.00024	0.00032	0.00041	0.00048	0.00065	0.00097	0.00130	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00014	0.00021	0.00028	0.00035	0.00042	0.00056	0.00084	0.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00028	0.00035	0.00042	0.00056	0.00084	0.00113	< .02x Dia	.5x - 15x Dia
			Finishing (1.5x LOC)	0.00015	0.00031	0.00047	0.00061	0.00077	0.00092	0.00124	0.00185	0.00248	< .10x Dia	.5x - 1.5x Dia
			Finishing (3x LOC)	0.00014	0.00028	0.00042	0.00056	0.00070	0.00084	0.00113	0.00168	0.00225	< .10x Dia	.5x - 3x Dia
			Finishing (4x LOC)	0.00012	0.00024	0.00037	0.00049	0.00061	0.00073	0.00098	0.00146	0.00196	< .09x Dia	.5x - 4x Dia
			Finishing (5x LOC)	0.00010	0.00021	0.00032	0.00042	0.00053	0.00063	0.00084	0.00126	0.00169	< .07x Dia	.5x - 5x Dia
Tool Steels: A, L, O, P, W series	275 - 300 300 - 350	500 500	Finishing (8x LOC)	0.00007	0.00015	0.00023	0.00031	0.00039	0.00046	0.00062	0.00093	0.00124	< .05x Dia	.5x - 8x Dia
			Finishing (10x LOC)	-	0.00015	0.00022	0.00029	0.00037	0.00044	0.00059	0.00088	0.00117	< .04x Dia	.5x - 10x Dia
			Finishing (12x LOC)	-	0.00014	0.00021	0.00028	0.00035	0.00042	0.00056	0.00084	0.00113	< .04x Dia	.5x - 12x Dia
			Finishing (15x LOC)	-	-	-	0.00025	0.00032	0.00038	0.00051	0.00076	0.00101	< .02x Dia	.5x - 15x Dia



VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square



- Optimized for free machining varieties of carbon steels and stainless steels
- Variable helix design (approx. 47°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA 

mm & in

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AISI COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE
+0.0005" / -0.0005"	+0.00mm / -0.02mm	decimal equivalent	+0.010" / -0.000" / +0.25mm / -0.00mm					
.015 (1/64)	.0150		.045 (3x)	4	1/8	1-1/2	967815-C3	41.40
.015 (1/64)	.0150		.078 (5x)	4	1/8	2-1/2	972415-C3	51.40
.015 (1/64)	.0150		.125 (8x)	4	1/8	2-1/2	983615-C3	52.00
.020	.0200		.060 (3x)	4	1/8	1-1/2	967820-C3	40.70
.020	.0200		.100 (5x)	4	1/8	2-1/2	972420-C3	51.00
.025	.0250		.075 (3x)	4	1/8	1-1/2	967825-C3	38.20
.025	.0250		.125 (5x)	4	1/8	2-1/2	972425-C3	49.40
.031 (1/32)	.0310		.047 (1.5x)	5	1/8	1-1/2	935131-C3	34.00
.031 (1/32)	.0310		.093 (3x)	5	1/8	1-1/2	967831-C3	34.00
.031 (1/32)	.0310		.156 (5x)	5	1/8	2-1/2	972431-C3	47.50
.031 (1/32)	.0310		.250 (8x)	5	1/8	2-1/2	983631-C3	48.30
1.0 mm	.0393		3.00 mm (3x)	5	4 mm	50 mm	921922-C3	39.00
1.0 mm	.0393		5.00 mm (5x)	5	4 mm	50 mm	916422-C3	48.60
.040	.0400		.120 (3x)	5	1/8	1-1/2	967840-C3	34.70
.040	.0400		.203 (5x)	5	1/8	2-1/2	972440-C3	48.00
.047 (3/64)	.0470		.141 (3x)	5	1/8	1-1/2	967847-C3	34.00
.047 (3/64)	.0470		.250 (5x)	5	1/8	2-1/2	972447-C3	47.50
.047 (3/64)	.0470		.375 (8x)	5	1/8	2-1/2	983647-C3	48.30
.050	.0500		.150 (3x)	5	1/8	1-1/2	967850-C3	34.70
.050	.0500		.250 (5x)	5	1/8	2-1/2	972450-C3	48.00
.060	.0600		.180 (3x)	5	1/8	1-1/2	967860-C3	34.70
.060	.0600		.312 (5x)	5	1/8	2-1/2	972460-C3	48.00
.062 (1/16)	.0620		.093 (1.5x)	5	1/8	1-1/2	935162-C3	32.00
.062 (1/16)	.0620		.186 (3x)	5	1/8	1-1/2	967862-C3	32.00
.062 (1/16)	.0620		.312 (5x)	5	1/8	2-1/2	972462-C3	44.70
.062 (1/16)	.0620		.500 (8x)	5	1/8	2-1/2	983662-C3	45.40
.078 (5/64)	.0780		.234 (3x)	5	1/8	1-1/2	967878-C3	32.00
.078 (5/64)	.0780		.406 (5x)	5	1/8	2-1/2	972478-C3	44.70
.078 (5/64)	.0780		.625 (8x)	5	1/8	2-1/2	983678-C3	45.40
2.0 mm	.0787		6.00 mm (3x)	5	4 mm	50 mm	921945-C3	37.70
2.0 mm	.0787		10.00 mm (5x)	5	4 mm	50 mm	916445-C3	47.20

continued on next page

FREE MACHINING STEELS



VARIABLE HELIX END MILLS FOR FREE MACHINING STEELS

Finishers – Square (cont.)



continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	AISI IN COATED	
D ₁ +.0005" -.0005" +.00mm -.02mm decimal equivalent	L ₂ +.010" -.000" +.25mm -.00mm		D ₂ (h6)	L ₁	TOOL #	PRICE
.093 (3/32)	.0930	.140 (1.5x)	5	1/8	1-1/2	935193-C3 32.00
.093 (3/32)	.0930	.279 (3x)	5	1/8	1-1/2	967893-C3 32.00
.093 (3/32)	.0930	.500 (5x)	5	1/8	2-1/2	972493-C3 44.70
.093 (3/32)	.0930	.750 (8x)	5	1/8	2-1/2	983693-C3 45.40
.100	.1000	.300 (3x)	5	1/8	1-1/2	967900-C3 32.50
.100	.1000	.500 (5x)	5	1/8	2-1/2	972500-C3 44.70
3.0 mm	.1181	9.00 mm (3x)	5	4 mm	50 mm	921957-C3 37.70
3.0 mm	.1181	15.00 mm (5x)	5	4 mm	50 mm	916457-C3 47.20

D ₁ ^{+.000"} _{-.002"}	decimal equivalent	L ₂ ^{+.030"} _{-.000"}		D ₂ (h6)	L ₁	TOOL #	PRICE
.125 (1/8)	.1250	.187 (1.5x)	5	1/8	1-1/2	935208-C3	30.40
.125 (1/8)	.1250	.375 (3x)	5	1/8	1-1/2	967908-C3	30.40
.125 (1/8)	.1250	.625 (5x)	5	1/8	2-1/2	972508-C3	43.70
.125 (1/8)	.1250	1.000 (8x)	5	1/8	2-1/2	983708-C3	44.70
.156 (5/32)	.1562	.470 (3x)	5	3/16	2	967910-C3	34.70
.156 (5/32)	.1562	.750 (5x)	5	3/16	3	972510-C3	46.50
.187 (3/16)	.1875	.570 (3x)	5	3/16	2	967912-C3	34.70
.187 (3/16)	.1875	1.000 (5x)	5	3/16	3	972512-C3	46.50
.187 (3/16)	.1875	1.500 (8x)	5	3/16	3	983712-C3	47.30
.250 (1/4)	.2500	.750 (3x)	5	1/4	2-1/2	967916-C3	44.00
.250 (1/4)	.2500	1.250 (5x)	5	1/4	4	972516-C3	56.80
.250 (1/4)	.2500	2.000 (8x)	5	1/4	4	983716-C3	57.90

SPEEDS & FEEDS (High-Helix Finishers for Free Machining Steels)

Material	Hardness (HBn)	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter										Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250		Radial	Axial
Carbon Steels: 10xx - 1030 & all 10Lxx, 11xx - 1140 & all 11Lxx, 12xx - 1215 & all 12Lxx	100 - 125	500	Finishing (1.5x LOC)	.00025	.00051	.00078	.00102	.00129	.00153	.00206	.00309	.00413	< .10x Dia	.5x - 1.5x Dia
	125 - 150	425	Finishing (3x LOC)	.00023	.00047	.00071	.00093	.00117	.00140	.00188	.00281	.00375	< .10x Dia	.5x - 3x Dia
	150 - 175	400	Finishing (5x LOC)	.00017	.00035	.00053	.00070	.00088	.00105	.00141	.00210	.00281	< .07x Dia	.5x - 5x Dia
Stainless Steels: 203 EZ, 303 (all types), 416, 416 Se, 416 Plus X, 420 F, 420 F Se, 440 F, 440 F Se	175 - 200	375	Finishing (8x LOC)	.00012	.00026	.00039	.00051	.00064	.00077	.00103	.00154	.00206	< .05x Dia	.5x - 8x Dia
	200 - 225	350												



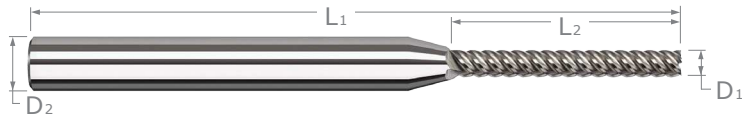
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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square



- Optimized for aluminum and aluminum alloys with excellent performance in copper, brass, and bronze alloys
- Variable helix design (approx. 50°) reduces chatter and harmonics, improving finish
- High helix for effective chip evacuation
- h6 shank tolerance for high precision tool holders
- End cutting (not center cutting)
- Solid carbide
- CNC ground in the USA

ALUMINUM ALLOYS

mm & in			CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB ₂ COATED	
D ₁				L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE	TOOL #	PRICE
+ .0005"	+ .00mm	decimal		+ .010"							
- .0005"	- .02mm	equivalent		+ .25mm							
				- .00mm							
.015 (1/64)		.0150		.078 (5x)	4	1/8	2-1/2	66715	45.10	66715-C8	51.90
.015 (1/64)		.0150		.125 (8x)	4	1/8	2-1/2	67115	45.70	67115-C8	52.50
.020		.0200		.100 (5x)	4	1/8	2-1/2	66720	43.90	66720-C8	50.70
.020		.0200		.160 (8x)	4	1/8	2-1/2	67120	45.40	67120-C8	52.20
.025		.0250		.125 (5x)	4	1/8	2-1/2	66725	42.70	66725-C8	49.50
.025		.0250		.203 (8x)	4	1/8	2-1/2	67125	43.70	67125-C8	50.50
.031 (1/32)		.0310		.093 (3x)	5	1/8	1-1/2	948831	29.10	948831-C8	35.90
.031 (1/32)		.0310		.156 (5x)	5	1/8	2-1/2	66731	40.70	66731-C8	47.50
.031 (1/32)		.0310		.250 (8x)	5	1/8	2-1/2	67131	41.90	67131-C8	48.70
.031 (1/32)		.0310		.312 (10x)	5	1/8	2-1/2	917631	53.40	917631-C8	60.20
1.0 mm		.0393		5.00 mm (5x)	5	4 mm	50 mm	915522	41.90	915522-C8	49.00
1.0 mm		.0393		8.00 mm (8x)	5	4 mm	50 mm	907122	43.20	907122-C8	50.30
.040		.0400		.203 (5x)	5	1/8	2-1/2	66740	40.70	66740-C8	47.50
.040		.0400		.325 (8x)	5	1/8	2-1/2	67140	41.90	67140-C8	48.70
.047 (3/64)		.0470		.141 (3x)	5	1/8	1-1/2	948847	29.10	948847-C8	35.90
.047 (3/64)		.0470		.250 (5x)	5	1/8	2-1/2	66747	40.70	66747-C8	47.50
.047 (3/64)		.0470		.375 (8x)	5	1/8	2-1/2	67147	41.90	67147-C8	48.70
.050		.0500		.250 (5x)	5	1/8	2-1/2	66750	40.70	66750-C8	47.50
.050		.0500		.400 (8x)	5	1/8	2-1/2	67150	41.90	67150-C8	48.70
.060		.0600		.312 (5x)	5	1/8	2-1/2	66760	37.90	66760-C8	44.70
.060		.0600		.500 (8x)	5	1/8	2-1/2	67160	39.00	67160-C8	45.80
.062 (1/16)		.0620		.186 (3x)	5	1/8	1-1/2	948862	27.20	948862-C8	34.00
.062 (1/16)		.0620		.312 (5x)	5	1/8	2-1/2	66762	37.90	66762-C8	44.70
.062 (1/16)		.0620		.500 (8x)	5	1/8	2-1/2	67162	39.00	67162-C8	45.80
.062 (1/16)		.0620		.625 (10x)	5	1/8	2-1/2	917662	57.30	917662-C8	64.10
.078 (5/64)		.0780		.234 (3x)	5	1/8	1-1/2	948878	27.20	948878-C8	34.00
.078 (5/64)		.0780		.406 (5x)	5	1/8	2-1/2	66778	37.90	66778-C8	44.70
.078 (5/64)		.0780		.625 (8x)	5	1/8	2-1/2	67178	39.00	67178-C8	45.80
2.0 mm		.0787		10.00 mm (5x)	5	4 mm	50 mm	915545	40.50	915545-C8	47.60
2.0 mm		.0787		16.00 mm (8x)	5	4 mm	50 mm	907145	41.90	907145-C8	49.00
.093 (3/32)		.0930		.279 (3x)	5	1/8	1-1/2	948893	27.20	948893-C8	34.00
.093 (3/32)		.0930		.375 (4x)	5	1/8	2-1/2	829493	37.40	829493-C8	44.20
.093 (3/32)		.0930		.500 (5x)	5	1/8	2-1/2	66793	37.90	66793-C8	44.70
.093 (3/32)		.0930		.750 (8x)	5	1/8	2-1/2	67193	39.00	67193-C8	45.80
.093 (3/32)		.0930		.950 (10x)	5	1/8	2-1/2	917693	57.30	917693-C8	64.10

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VARIABLE HELIX END MILLS FOR ALUMINUM ALLOYS

Finishers – Square (cont.)



continued from previous page

CUTTER DIAMETER			LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		TiB ₂ COATED	
D ₁			L ₂		D ₂ (h6)	L ₁	TOOL #	PRICE	TOOL #	PRICE
+ .0005" / - .0005"	+ .00mm / - .02mm	decimal equivalent	+ .010" / - .000" / + .25mm / - .00mm							
.100		.1000	.500 (5x)	5	1/8	2-1/2	66800	37.90	66800-C8	44.70
.100		.1000	.800 (8x)	5	1/8	2-1/2	67200	39.00	67200-C8	45.80
.109 (7/64)		.1090	.570 (5x)	5	1/8	2-1/2	66802	37.90	66802-C8	44.70
.109 (7/64)		.1090	.900 (8x)	5	1/8	2-1/2	67202	39.00	67202-C8	45.80
3.0 mm		.1181	15.00 mm (5x)	5	4 mm	50 mm	915557	40.50	915557-C8	47.60
3.0 mm		.1181	24.00 mm (8x)	5	4 mm	50 mm	907157	41.90	907157-C8	49.00

D ₁	+ .000" / - .002"	decimal equivalent	L ₂	+ .030" / - .000"	D ₂ (h6)	L ₁	TOOL #	PRICE	TOOL #	PRICE
.125 (1/8)		.1250	.187 (1.5x)	5	1/8	1-1/2	856908	25.20	856908-C8	32.00
.125 (1/8)		.1250	.375 (3x)	5	1/8	1-1/2	948908	25.20	948908-C8	32.00
.125 (1/8)		.1250	.500 (4x)	5	1/8	2-1/2	829508	36.40	829508-C8	43.20
.125 (1/8)		.1250	.625 (5x)	5	1/8	2-1/2	66808	36.90	66808-C8	43.70
.125 (1/8)		.1250	1.000 (8x)	5	1/8	2-1/2	67208	38.20	67208-C8	45.00
.125 (1/8)		.1250	1.125 (10x)	5	1/8	2-1/2	917708	56.60	917708-C8	63.40
.156 (5/32)		.1562	.750 (5x)	5	3/16	3	66810	39.50	66810-C8	46.30
.156 (5/32)		.1562	1.250 (8x)	5	3/16	3	67210	41.10	67210-C8	47.90
.187 (3/16)		.1875	.285 (1.5x)	5	3/16	2	856912	29.70	856912-C8	36.50
.187 (3/16)		.1875	.570 (3x)	5	3/16	2	948912	29.70	948912-C8	36.50
.187 (3/16)		.1875	1.000 (5x)	5	3/16	3	66812	39.50	66812-C8	46.30
.187 (3/16)		.1875	1.500 (8x)	5	3/16	3	67212	41.10	67212-C8	47.90
.187 (3/16)		.1875	1.875 (10x)	5	3/16	4	917712	57.50	917712-C8	64.80
.250 (1/4)		.2500	.375 (1.5x)	5	1/4	2-1/2	856916	39.10	856916-C8	46.40
.250 (1/4)		.2500	.750 (3x)	5	1/4	2-1/2	948916	39.10	948916-C8	46.40
.250 (1/4)		.2500	1.250 (5x)	5	1/4	4	66816	48.10	66816-C8	56.30
.250 (1/4)		.2500	2.000 (8x)	5	1/4	4	67216	49.40	67216-C8	57.60

ALUMINUM ALLOYS

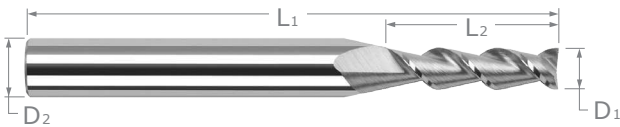
SPEEDS & FEEDS (High Helix Finishers for Aluminum & Non-Ferrous Alloys)

Cutter Series	Material	SFM	Chip Load Per Tooth (IPT)										Depth of Cut	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	Radial	Axial	
Uncoated	Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx)	750	Finishing (3x LOC)	.00027	.00056	.00085	.00112	.00140	.00167	.00225	.00337	.00450	.12x Dia	.5x - 3x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000												
	Magnesium Alloys: All alloys	1500												
	Zinc Alloys: All alloys	800	Finishing (4x LOC)	.00024	.00049	.00074	.00098	.00123	.00146	.00197	.00295	.00394	.10x Dia	.5x - 4x Dia
	Copper Alloys: High Coppers - 90%+ (C1xxxx)	225												
	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500												
	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225	Finishing (5x LOC)	.00020	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338	.09x Dia	.5x - 5x Dia
	Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500												
	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500												
	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225	Finishing (8x LOC)	.00015	.00031	.00047	.00061	.00077	.00092	.00124	.00185	.00248	.07x Dia	.5x - 8x Dia
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing (10x LOC)	.00014	.00029	.00044	.00058	.00073	.00087	.00117	.00175	.00234	.05x Dia	.5x - 10x Dia	
TiB ₂	Aluminum: Casting (2xx, 5xx, 7xx, 8xx)	1000	Finishing (3x LOC)	.00035	.00073	.00110	.00145	.00183	.00218	.00293	.00438	.00585	.12x Dia	.5x - 3x Dia
			Finishing (4x LOC)	.00031	.00063	.00096	.00127	.00160	.00190	.00256	.00383	.00512	.10x Dia	.5x - 4x Dia
	Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1400	Finishing (5x LOC)	.00026	.00054	.00082	.00109	.00137	.00163	.00219	.00328	.00439	.09x Dia	.5x - 5x Dia
	Magnesium Alloys: All alloys	2000	Finishing (8x LOC)	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00241	.00322	.07x Dia	.5x - 8x Dia
	Zinc Alloys: All alloys	1100	Finishing (10x LOC)	.00018	.00038	.00057	.00075	.00095	.00113	.00152	.00228	.00304	.05x Dia	.5x - 10x Dia



HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square



◀ Down to .010"!

- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA

OUTSTANDING
IN ALUMINUM!

ALUMINUM ALLOYS

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB ₂ COATED	
				2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
D ₁ ^{+ .0005"} - .0005"	L ₂ ^{+ .010"} - .000"	D ₂ (h6)	L ₁						
.010	.030 (3x)	1/8	1-1/2	24110	29.40			24110-C8	36.20
.015 (1/64)	.045 (3x)	1/8	1-1/2	24115	28.60			24115-C8	35.40
.020	.060 (3x)	1/8	1-1/2	24120	26.90			24120-C8	33.70
.025	.075 (3x)	1/8	1-1/2	24125	25.00			24125-C8	31.80
.030	.090 (3x)	1/8	1-1/2	24130	21.70			24130-C8	28.50
.031 (1/32)	.047 (1.5x)	1/8	1-1/2	935531	21.70			935531-C8	28.50
.031 (1/32)	.093 (3x)	1/8	1-1/2	24131	21.70	24131-C7	27.00	24131-C8	28.50
.031 (1/32)	.156 (5x)	1/8	2-1/2	932031	27.90			932031-C8	34.70
.039 (1 mm)	.117 (3x)	1/8	1-1/2	24139	21.70			24139-C8	28.50
.040	.120 (3x)	1/8	1-1/2	24140	21.70	24140-C7	27.00	24140-C8	28.50
.040	.203 (5x)	1/8	2-1/2	932040	27.90			932040-C8	34.70
.047 (3/64)	.071 (1.5x)	1/8	1-1/2	935547	21.70			935547-C8	28.50
.047 (3/64)	.141 (3x)	1/8	1-1/2	24147	21.70	24147-C7	27.00	24147-C8	28.50
.047 (3/64)	.250 (5x)	1/8	2-1/2	932047	27.90			932047-C8	34.70
.050	.150 (3x)	1/8	1-1/2	24150	21.70	24150-C7	27.00	24150-C8	28.50
.050	.250 (5x)	1/8	2-1/2	932050	27.90			932050-C8	34.70
.060	.180 (3x)	1/8	1-1/2	24160	21.70	24160-C7	27.00	24160-C8	28.50
.060	.312 (5x)	1/8	2-1/2	932060	28.80			932060-C8	35.60
.062 (1/16)	.093 (1.5x)	1/8	1-1/2	935562	19.00			935562-C8	25.80
.062 (1/16)	.186 (3x)	1/8	1-1/2	24162	19.00	24162-C7	24.30	24162-C8	25.80
.062 (1/16)	.312 (5x)	1/8	2-1/2	932062	28.80			932062-C8	35.60
.070	.210 (3x)	1/8	1-1/2	24170	19.00	24170-C7	24.30	24170-C8	25.80
.078 (5/64)	.117 (1.5x)	1/8	1-1/2	935578	19.00			935578-C8	25.80
.078 (5/64)	.234 (3x)	1/8	1-1/2	24178	19.00	24178-C7	24.30	24178-C8	25.80
.078 (5/64)	.406 (5x)	1/8	2-1/2	932078	28.80			932078-C8	35.60
.080	.240 (3x)	1/8	1-1/2	24180	19.00	24180-C7	24.30	24180-C8	25.80
.090	.270 (3x)	1/8	1-1/2	24190	19.00	24190-C7	24.30	24190-C8	25.80
.093 (3/32)	.140 (1.5x)	1/8	1-1/2	935593	19.00			935593-C8	25.80
.093 (3/32)	.279 (3x)	1/8	1-1/2	24193	19.00	24193-C7	24.30	24193-C8	25.80
.093 (3/32)	.500 (5x)	1/8	2-1/2	932093	28.80			932093-C8	35.60
.100	.300 (3x)	1/8	1-1/2	24199	19.00	24199-C7	24.30	24199-C8	25.80
.109 (7/64)	.327 (3x)	1/8	1-1/2	24202	28.60			24202-C8	35.40
.118 (3 mm)	.354 (3x)	1/8	1-1/2	24205	28.40			24205-C8	35.20

continued on next page



HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Square (cont.)

continued from previous page

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB ₂ COATED	
D ₁ ^{+0.000"} -0.002"	L ₂ ^{+0.030"} -0.000"	D ₂ (h6)	L ₁	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.125 (1/8)	.187 (1.5x)	1/8	1-1/2	935608	17.50			935608-C8	24.30
.125 (1/8)	.500 (4x)	1/8	1-1/2	24208	17.50	24208-C7	22.80	24208-C8	24.30
.125 (1/8)	.625 (5x)	1/8	2-1/2	932108	23.70			932108-C8	30.50
.140 (9/64)	.500 (3x)	3/16	2	24209	23.10			24209-C8	29.90
.156 (5/32)	.235 (1.5x)	3/16	2	935610	19.80			935610-C8	26.60
.156 (5/32)	.562 (3x)	3/16	2	24210	19.80			24210-C8	26.60
.156 (5/32)	.750 (5x)	3/16	3	932110	23.20			932110-C8	30.00
.187 (3/16)	.285 (1.5x)	3/16	2	935612	19.80			935612-C8	26.60
.187 (3/16)	.625 (3x)	3/16	2	24212	19.80	24212-C7	25.50	24212-C8	26.60
.187 (3/16)	1.000 (5x)	3/16	3	932112	23.20			932112-C8	30.00
.250 (1/4)	.375 (1.5x)	1/4	2-1/2	935616	24.40			935616-C8	31.70
.250 (1/4)	.750 (3x)	1/4	2-1/2	24216	24.40	24216-C7	32.50	24216-C8	31.70
.250 (1/4)	1.250 (5x)	1/4	4	932116	29.00			932116-C8	37.20

ALUMINUM ALLOYS

SPEEDS & FEEDS (45° Helix – 2 Flutes)

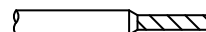
Important Note: Values in table are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 5x, reduce to 80%). For complete speeds and feeds charts, please see www.harveytool.com

SERIES	MATERIAL	SFM	CHIP LOAD PER TOOTH (IPT) BY CUTTER DIAMETER									
Uncoated	Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx) Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	750 1000		.031	.047	.062	.078	.093	.125	.187	.250	
	Copper Alloys: High Coppers - 90%+ (C1xxx) Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800) Phosphor Bronzes (Copper Tin alloys, C5xxx) Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) Silicon Bronzes (Copper Silicon alloys, C64700-C66100) Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx) Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	225 500 225 500 500 225 550	Slotting	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250	
			Roughing	.00037	.00056	.00074	.00094	.00112	.00150	.00224	.00300	
			Finishing	.00025	.00038	.00050	.00062	.00074	.00100	.00150	.00200	
	Magnesium Alloys	1500	Radial Depth of Cut*: Slotting: 1x Dia Roughing: .5x Dia Finishing: 1x Dia				Axial Depth of Cut*: Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: 1x - 1x Dia					
	Zinc Alloys	800	Finishing: 1x - 3x Dia									
	ZrN	Aluminum Alloys (High Silicon): Casting - 3% - 5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) Casting - 5% - 8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) Casting - 8% - 12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) Casting - 12% - 16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) Wrought - 5% - 8% Si (4xxx) Wrought - 8% - 12% Si (4xxx)	2500 2000 1500 1000 2200 1700		.031	.047	.062	.078	.093	.125	.187	.250
		Copper Alloys: High Coppers - 90%+ (C1xxx) Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800) Phosphor Bronzes (Copper Tin alloys, C5xxx) Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) Silicon Bronzes (Copper Silicon alloys, C64700-C66100) Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx) Cast Copper Alloys (C80100-C82800, C86300, C90200-C91700, C96200-C96600, C99300) Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	800 1500 800 1000 1000 800 150 750	Slotting	.00039	.00059	.00078	.00098	.00116	.00156	.00234	.00313
				Roughing	.00042	.00063	.00084	.00105	.00126	.00169	.00252	.00338
				Finishing	.00031	.00047	.00062	.00078	.00093	.00125	.00187	.00250
Magnesium Alloys		2000	Radial Depth of Cut*: Slotting: 1x Dia Roughing: .5x Dia Finishing: 1x Dia				Axial Depth of Cut*: Slotting: .5x Dia Roughing: .5x - 1x Dia Finishing: 1x - 3x Dia					
Zinc Alloys		1100	Finishing: 1x - 3x Dia									
TiB ₂		Aluminum Alloys: Casting (2xx, 5xx, 7xx, 8xx) Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000 1400									
		Magnesium Alloys	2000									
		Zinc Alloys	1100									



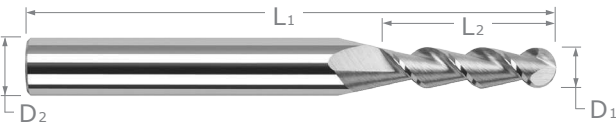
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HIGH HELIX END MILLS FOR ALUMINUM ALLOYS

45° Helix – Ball



- 2 flute, high helix design improves results in aluminum and other non-ferrous applications
- 45° helix for faster chip removal and better finish
- h6 shank tolerance for high precision tool holders
- Center cutting
- Solid carbide
- CNC ground in the USA 

OUTSTANDING
IN ALUMINUM!



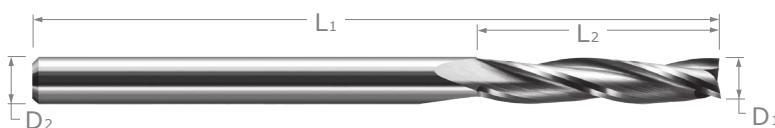
ALUMINUM ALLOYS

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		ZrN COATED		TiB ₂ COATED	
				2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
D ₁ $\begin{smallmatrix} +.0005'' \\ -.0005'' \end{smallmatrix}$	L ₂ $\begin{smallmatrix} +.010'' \\ -.000'' \end{smallmatrix}$	D ₂ (h6)	L ₁						
.015 (1/64)	.045 (3x)	1/8	1-1/2	27815	32.30			27815-C8	39.10
.020	.060 (3x)	1/8	1-1/2	27820	30.80			27820-C8	37.60
.031 (1/32)	.047 (1.5x)	1/8	1-1/2	894831	25.00			894831-C8	31.80
.031 (1/32)	.093 (3x)	1/8	1-1/2	27831	25.00	27831-C7	30.30	27831-C8	31.80
.031 (1/32)	.156 (5x)	1/8	2-1/2	887631	30.90			887631-C8	37.70
.040	.120 (3x)	1/8	1-1/2	27840	25.00	27840-C7	30.30	27840-C8	31.80
.047 (3/64)	.141 (3x)	1/8	1-1/2	27847	25.00	27847-C7	30.30	27847-C8	31.80
.050	.150 (3x)	1/8	1-1/2	27850	25.00	27850-C7	30.30	27850-C8	31.80
.060	.180 (3x)	1/8	1-1/2	27860	25.00	27860-C7	30.30	27860-C8	31.80
.062 (1/16)	.093 (1.5x)	1/8	1-1/2	894862	23.70			894862-C8	30.50
.062 (1/16)	.186 (3x)	1/8	1-1/2	27862	23.70	27862-C7	29.00	27862-C8	30.50
.062 (1/16)	.312 (5x)	1/8	2-1/2	887662	30.90			887662-C8	37.70
.070	.210 (3x)	1/8	1-1/2	27870	23.70	27870-C7	29.00	27870-C8	30.50
.078 (5/64)	.234 (3x)	1/8	1-1/2	27878	23.70	27878-C7	29.00	27878-C8	30.50
.080	.240 (3x)	1/8	1-1/2	27880	23.70	27880-C7	29.00	27880-C8	30.50
.090	.270 (3x)	1/8	1-1/2	27890	23.70	27890-C7	29.00	27890-C8	30.50
.093 (3/32)	.140 (1.5x)	1/8	1-1/2	894893	23.70			894893-C8	30.50
.093 (3/32)	.279 (3x)	1/8	1-1/2	27893	23.70	27893-C7	29.00	27893-C8	30.50
.093 (3/32)	.500 (5x)	1/8	2-1/2	887693	30.90			887693-C8	37.70
.100	.300 (3x)	1/8	1-1/2	27899	23.70	27899-C7	29.00	27899-C8	30.50
.118 (3 mm)	.354 (3x)	1/8	1-1/2	27905	32.10			27905-C8	38.90
D ₁ $\begin{smallmatrix} +.000'' \\ -.002'' \end{smallmatrix}$	L ₂ $\begin{smallmatrix} +.030'' \\ -.000'' \end{smallmatrix}$	D ₂ (h6)	L ₁	2 FL	PRICE	2 FL	PRICE	2 FL	PRICE
.125 (1/8)	.187 (1.5x)	1/8	1-1/2	894908	21.90			894908-C8	28.70
.125 (1/8)	.500 (4x)	1/8	1-1/2	27908	21.90	27908-C7	27.20	27908-C8	28.70
.125 (1/8)	.625 (5x)	1/8	2-1/2	887708	27.20			887708-C8	34.00
.156 (5/32)	.562 (3x)	3/16	2	27910	23.70			27910-C8	30.50
.187 (3/16)	.625 (3x)	3/16	2	27912	23.70	27912-C7	29.40	27912-C8	30.50
.250 (1/4)	.750 (3x)	1/4	2-1/2	27916	26.80	27916-C7	34.90	27916-C8	34.30

PLEASE SEE SPEEDS & FEEDS ON PAGE 183



END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (**Slow Helix**)

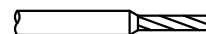
Specialized Wiper
Flat Geometry for
Improved Finish

- 3 flute design strengthens rigidity and improves wall finish
- Specialized end geometry enhances bottom finish by reducing traditional circular marks
- Slower helix (approx. 22°) reduces lifting forces for fiber-reinforced applications and vacuum table setups
- Center cutting
- Solid carbide
- CNC ground in the USA 

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
$D_1 \begin{smallmatrix} +.000'' \\ -.001'' \end{smallmatrix}$	$L_2 \begin{smallmatrix} +.010'' \\ -.000'' \end{smallmatrix}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/32	3/32 (3x)	1/8	1-1/2	915631	47.50		
1/32	5/32 (5x)	1/8	1-1/2	986431	47.50		
1/32	1/4 (8x)	1/8	1-1/2	992331	51.00		
3/64	1/4 (5x)	1/8	1-1/2	986447	36.50		
3/64	3/8 (8x)	1/8	2	992347	39.40		
$D_1 \begin{smallmatrix} +.000'' \\ -.002'' \end{smallmatrix}$	$L_2 \begin{smallmatrix} +.030'' \\ -.000'' \end{smallmatrix}$	D_2	L_1	3 FL	PRICE	3 FL	PRICE
1/16	3/16 (3x)	1/8	1-1/2	915662	30.00		
1/16	5/16 (5x)	1/8	2	986462	35.20	986462-C4	52.40
1/16	1/2 (8x)	1/8	2	992362	38.30		
1/16	5/8 (10x)	1/8	2	871662	48.40		
5/64	13/32 (5x)	1/8	2	986478	35.20		
5/64	5/8 (8x)	1/8	2	992378	38.30		
3/32	9/32 (3x)	1/8	1-1/2	915693	30.00		
3/32	1/2 (5x)	1/8	2	986493	35.20	986493-C4	52.40
3/32	3/4 (8x)	1/8	2	992393	38.30		
1/8	3/8 (3x)	1/8	1-1/2	915708	30.00		
1/8	5/8 (5x)	1/8	2	986508	35.20	986508-C4	52.40
1/8	1 (8x)	1/8	2	992408	38.30		
1/8	1-1/4 (10x)	1/8	2-1/2	871708	48.40		
5/32	15/32 (3x)	3/16	2	915710	46.50		
5/32	3/4 (5x)	3/16	3	986510	48.60		
3/16	9/16 (3x)	3/16	2	915712	46.50		
3/16	1 (5x)	3/16	3	986512	48.60	986512-C4	64.70
3/16	1-1/2 (8x)	3/16	3	992412	57.50		
1/4	3/8 (1.5x)	1/4	2-1/2	869316	46.40		
1/4	3/4 (3x)	1/4	2-1/2	915716	48.60		
1/4	1-1/4 (5x)	1/4	3	986516	55.00	986516-C4	73.30
1/4	2 (8x)	1/4	4	992416	71.60		
3/8	9/16 (1.5x)	3/8	3	869324	78.10		
3/8	1-1/8 (3x)	3/8	3	915724	81.10		
3/8	2 (5x)	3/8	4	986524	87.70		
1/2	3/4 (1.5x)	1/2	4	869332	135.70		
1/2	1-1/2 (3x)	1/2	4	915732	140.80		
1/2	2-5/8 (5x)	1/2	5	986532	147.40		

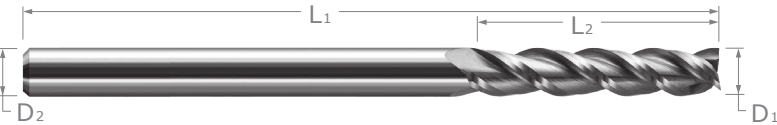
PLASTICS

PLEASE SEE SPEEDS & FEEDS ON PAGE 213



END MILLS FOR PLASTICS

Finishers – Square Upcut – 3 Flute (High Helix)



Specialized Wiper
Flat Geometry for
Improved Finish

- 3 flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- Specialized end geometry enhances bottom finish by reducing traditional circular marks
- Design is ideally suited for thin-walled applications and tightly secured workpieces
- Center cutting
- Solid carbide
- CNC ground in the USA 

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
				3 FL	PRICE	3 FL	PRICE
D ₁ ^{+0.000"} -0.001"	L ₂ ^{+0.010"} -0.000"	D ₂	L ₁				
1/32	3/32 (3x)	1/8	1-1/2	902131	47.00		
1/32	5/32 (5x)	1/8	1-1/2	941231	48.90		
1/32	1/4 (8x)	1/8	1-1/2	900731	52.50		
3/64	1/4 (5x)	1/8	1-1/2	941247	37.60		

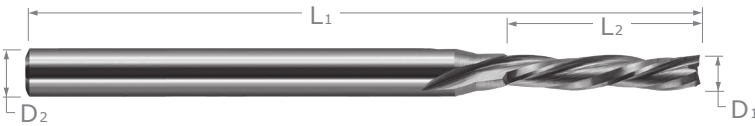
CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
				3 FL	PRICE	3 FL	PRICE
D ₁ ^{+0.000"} -0.002"	L ₂ ^{+0.030"} -0.000"	D ₂	L ₁				
1/16	3/16 (3x)	1/8	1-1/2	902162	34.70		
1/16	5/16 (5x)	1/8	2	941262	36.50	941262-C4	53.70
1/16	1/2 (8x)	1/8	2	900762	39.40		
1/16	5/8 (10x)	1/8	2	854662	41.70		
5/64	13/32 (5x)	1/8	2	941278	36.50		
3/32	9/32 (3x)	1/8	1-1/2	902193	34.70		
3/32	1/2 (5x)	1/8	2	941293	36.50	941293-C4	53.70
3/32	3/4 (8x)	1/8	2	900793	39.40		
1/8	3/8 (3x)	1/8	1-1/2	902208	34.70		
1/8	5/8 (5x)	1/8	2	941308	36.50	941308-C4	53.70
1/8	1 (8x)	1/8	2	900808	39.40		
1/8	1-1/4 (10x)	1/8	2-1/2	854708	41.70		
5/32	15/32 (3x)	3/16	2	902210	46.80		
5/32	3/4 (5x)	3/16	3	941310	48.60		
3/16	9/16 (3x)	3/16	2	902212	46.80		
3/16	1 (5x)	3/16	3	941312	48.60	941312-C4	64.70
3/16	1-1/2 (8x)	3/16	3	900812	52.20		
1/4	3/8 (1.5x)	1/4	2-1/2	852016	51.40		
1/4	3/4 (3x)	1/4	2-1/2	902216	53.40		
1/4	1-1/4 (5x)	1/4	3	941316	55.00	941316-C4	73.30
1/4	2 (8x)	1/4	4	900816	71.60		
3/8	9/16 (1.5x)	3/8	3	852024	79.10		
3/8	1-1/8 (3x)	3/8	3	902224	81.10		
3/8	2 (5x)	3/8	4	941324	87.70		
1/2	3/4 (1.5x)	1/2	4	852032	134.60		
1/2	1-1/2 (3x)	1/2	4	902232	139.60		
1/2	2-5/8 (5x)	1/2	5	941332	147.40		

PLEASE SEE SPEEDS & FEEDS ON PAGE 214



END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (Slow Helix)



- 3 left hand spiral, right hand cut flute design strengthens rigidity and improves wall finish
- Slower helix (approx. 22°) ideal for overhung, less secure parts
- Center cutting
- Solid carbide
- CNC ground in the USA 

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
$D_1 \begin{smallmatrix} +.000" \\ -.001" \end{smallmatrix}$	$L_2 \begin{smallmatrix} +.010" \\ -.000" \end{smallmatrix}$	D_2	L_1	3 FL	PRICE
1/32	5/32 (5x)	1/8	1-1/2	880431	47.50

$D_1 \begin{smallmatrix} +.000" \\ -.002" \end{smallmatrix}$	$L_2 \begin{smallmatrix} +.030" \\ -.000" \end{smallmatrix}$	D_2	L_1	3 FL	PRICE
1/16	5/16 (5x)	1/8	2	880462	38.30
3/32	1/2 (5x)	1/8	2	880493	38.30
1/8	5/8 (5x)	1/8	2	880508	38.30
3/16	1 (5x)	3/16	3	880512	50.40
1/4	1-1/4 (5x)	1/4	3	880516	56.90
3/8	1-1/8 (3x)	3/8	3	878124	83.00
1/2	1-1/2 (3x)	1/2	4	878132	140.50

PLASTICS

SPEEDS & FEEDS (3 Flute Plastic Finisher – Slow Helix)

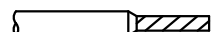
Important Note: Values in table are in inches and are based on standard (5x Dia) length of cut end mills. For shorter lengths of cuts, table values of IPT must be increased (for 1.5x, increase to 120%; for 3x, increase to 110%). For longer lengths of cut, table values of IPT must be reduced (for 8x, reduce to 66%; for 10x, reduce to 55%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type	SFM	Chip Load Per Tooth (IPT) By Cutter Diameter																Depth of Cut	
			.015	.031	.047	.062	.078	.125	.187	.250	.312	.375	.500	.625	.750			Radial	Axial
Un-filled	Unfilled	800-1200	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
Filled Plastics	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00041	.00084	.00128	.00168	.00212	.00253	.00340	.00508	.00679	.00721	.00866	.01155	.01444	.01732	.35 x Dia	1 x Dia
			Finishing	.00013	.00028	.00042	.00055	.00070	.00083	.00112	.00167	.00223	.00237	.00285	.00379	.00474	.00569	.10 x Dia	5 x Dia
Fiber Reinforced	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00033	.00069	.00104	.00138	.00173	.00207	.00278	.00416	.00556	.00590	.00709	.00945	.01181	.01417	.35 x Dia	1 x Dia
			Finishing	.00011	.00023	.00034	.00045	.00057	.00068	.00091	.00137	.00183	.00194	.00233	.00310	.00388	.00466	.10 x Dia	5 x Dia



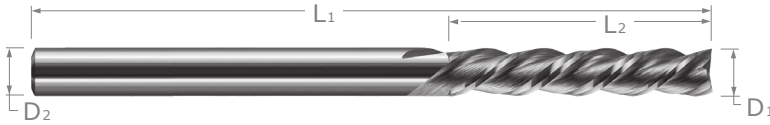
View a comprehensive library of **Speeds & Feeds** charts for every Harvey Tool End Mill on the new Harveytool.com.

Access **Simulation Files** in DXF format for every Harvey Tool product, downloadable now from the new Harveytool.com



END MILLS FOR PLASTICS

Finishers – Square Downcut – 3 Flute (High Helix)



- ✦ 3 left hand spiral, right hand cut flute, higher helix (approx. 40°) design strengthens rigidity and increases cutting action to improve wall finish
- ✦ Design is ideally suited for thin-walled applications
- ✦ Solid carbide
- ✦ Center cutting
- ✦ CNC ground in the USA 

CUTTER DIAMETER	LENGTH OF CUT	SHANK DIAMETER	OVERALL LENGTH	UNCOATED	
D ₁ $\pm .000$ / $-.001$ "	D ₁ $\pm .010$ / $-.000$ "	D ₂	L ₁	3 FL	PRICE
1/32	5/32 (5x)	1/8	1-1/2	864331	53.10

D ₁ $\pm .000$ / $-.002$ "	D ₁ $\pm .030$ / $-.000$ "	D ₂	L ₁	3 FL	PRICE
1/16	5/16 (5x)	1/8	2	864362	43.00
3/32	1/2 (5x)	1/8	2	864393	42.00
1/8	3/8 (3x)	1/8	1-1/2	873808	33.60
1/8	5/8 (5x)	1/8	2	864408	37.00
3/16	9/16 (3x)	3/16	2	873812	45.30
3/16	1 (5x)	3/16	3	864412	50.40
1/4	3/4 (3x)	1/4	2-1/2	873816	51.50
1/4	1-1/4 (5x)	1/4	3	864416	56.90
3/8	1-1/8 (3x)	3/8	3	873824	83.00
1/2	1-1/2 (3x)	1/2	4	873832	141.60

PLASTICS

SPEEDS & FEEDS (3 Flute Plastic Finisher – High Helix)

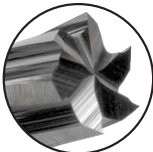
Important Note: Values are in inches and are based on standard (3x Dia) length of cut end mills. For shorter lengths of cut, table values of IPT must be increased (for 1.5x, increase 115%). For longer lengths of cuts, table values of IPT must be reduced (for 5x, reduce to 90%). For complete speeds and feeds charts, please see www.harveytool.com

Material Type		SFM	Chip Load Per Tooth (IPT) By Cutter Diameter														Depth of Cut Radial Axial	
			.015	.031	.047	.062	.078	.093	.125	.187	.250	.312	.375	.500	.625	.750		
Un-filled	Unfilled	800-1200	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia 1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia 3 x Dia
Filled Plastics	Carbon/Glass Filled 5% < 20%	600-800	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia 1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia 3 x Dia
	Carbon/Glass Filled 21% < 40%	500-700	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia 1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia 3 x Dia
Fiber Reinforced	Carbon/Glass Fiber 5% < 20%	500-700	Semi-Roughing	.00043	.00089	.00135	.00178	.00224	.00267	.00359	.00536	.00717	.00761	.00914	.01219	.01524	.01829	.35 x Dia 1 x Dia
			Finishing	.00024	.00049	.00074	.00097	.00123	.00146	.00196	.00294	.00393	.00417	.00501	.00668	.00835	.01002	.10 x Dia 3 x Dia
	Carbon/Glass Fiber 21% < 40%	300-400	Semi-Roughing	.00035	.00073	.00110	.00146	.00183	.00218	.00293	.00439	.00587	.00622	.00748	.00997	.01247	.01496	.35 x Dia 1 x Dia
			Finishing	.00019	.00040	.00060	.00080	.00100	.00120	.00161	.00240	.00321	.00341	.00410	.00546	.00683	.00820	.10 x Dia 3 x Dia



END MILLS FOR COMPOSITES

Finisher



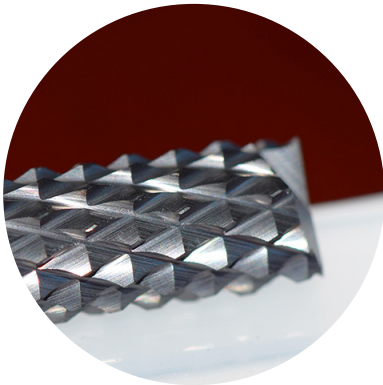
Bur-Style End

- Optimized geometry and high flute count for finishing in composite materials with high fiber or fill concentration
- Slow helix improves finish and minimizes fraying of fiber-reinforced and layered materials by reducing vertical forces on the workpiece
- Bur-style end allows for shallow ramping, not suited for plunge cutting
- Solid carbide
- CNC ground in the USA 

CUTTER DIAMETER	LENGTH OF CUT	FLUTES	SHANK DIAMETER	OVERALL LENGTH	UNCOATED		AMORPHOUS DIAMOND	
D ₁ ^{+0.000"} _{-0.001"}	L ₂ ^{+0.010"} _{-0.000"}		D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
1/32	3/32 (3x)	4	1/8	1-1/2	944731	48.40	944731-C4	60.10
3/64	9/64 (3x)	4	1/8	1-1/2	944747	48.40	944747-C4	60.10
1/16	3/16 (3x)	6	1/8	1-1/2	944762	46.20	944762-C4	57.90
1/16	5/16 (5x)	6	1/8	1-1/2	889262	48.40	889262-C4	60.10
5/64	15/64 (3x)	6	1/8	1-1/2	944778	46.20	944778-C4	57.90
3/32	9/32 (3x)	6	1/8	1-1/2	944793	46.20	944793-C4	57.90
3/32	1/2 (5x)	6	1/8	1-1/2	889293	48.40	889293-C4	60.10

D ₁ ^{+0.000"} _{-0.002"}	L ₂ ^{+0.030"} _{-0.000"}		D ₂	L ₁	TOOL #	PRICE	TOOL #	PRICE
1/8	3/8 (3x)	8	1/8	1-1/2	944808	44.60	944808-C4	56.30
1/8	5/8 (5x)	8	1/8	2	889208	46.80	889208-C4	58.70
3/16	9/16 (3x)	8	3/16	2	944812	49.20	944812-C4	65.30
3/16	1 (5x)	8	3/16	2-1/2	889212	51.60	889212-C4	67.70
1/4	3/4 (3x)	8	1/4	2-1/2	944816	59.00	944816-C4	77.30
1/4	1-1/4 (5x)	8	1/4	2-1/2	889216	71.80	889216-C4	90.10
3/8	1-1/8 (3x)	10	3/8	3	944824	96.90	944824-C4	119.00
1/2	1-1/2 (3x)	10	1/2	4	944832	170.50	944832-C4	197.00

COMPOSITES



Ideal Tooling for Machining Composites

Composites are a very beneficial, unique material group for their rewarding properties. But machining composites can lead to challenges if not done right. Learn why certain tools are capable of machining composites in our "In the Loupe" blog post **Ideal Tooling for Machining Composites**.

Read more on harveypformance.com/in-the-loupe/

