



Corner Rounding End Mills															
Material Guide		Hardness	SFM	Chip Load (IPT) By Effective Cutter Diameter											
				0.062	0.078	0.093	0.125	0.187	0.25	0.375	0.5	0.625	0.75	1	1.25
TITANIUM ALLOYS	Ti 3Al-2.5V, Ti 6Al-4V	29-37 Rc	150	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
		38-45 Rc	75	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
HIGH TEMP ALLOYS	Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	29-37 Rc	70	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
		38-45 Rc	50	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
STAINLESS STEEL	203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	29-37 Rc	450	.00028	.00035	.00042	.00056	.00084	.00112	.00168	.00224	.00281	.00337	.00449	.00561
		29-37 Rc	200	.00025	.00032	.00038	.00051	.00077	.00103	.00154	.00205	.00257	.00308	.00410	.00513
		38-45 Rc	100	.00025	.00032	.00038	.00051	.00077	.00103	.00154	.00205	.00257	.00308	.00410	.00513
		29-37 Rc	150	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
TOOL STEELS	A, L, O, P, W series	29-37 Rc	200	.00025	.00032	.00038	.00051	.00077	.00103	.00154	.00205	.00257	.00308	.00410	.00513
		38-45 Rc	100	.00025	.00032	.00038	.00051	.00077	.00103	.00154	.00205	.00257	.00308	.00410	.00513
	D, H, M, T, S series	29-37 Rc	150	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
		38-45 Rc	90	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.00160	.00192	.00257	.00321
CARBON STEELS	A36, 12L14, 12L15, 1005, 1018, 1020, 1108-1119, 1213-1215, 1513-1518, 4012, 5015, 9310	29-37 Rc		.00028	.00035	.00042	.00056	.00084	.00112	.00168	.00224	.00281	.00337	.00449	.00561
		29-37 Rc	200	.00025	.00032	.00038	.00051	.00077	.00103	.00154	.00205	.00257	.00308	.00410	.00513
ALUMINUM ALLOYS	Casting (2xx, 5xx, 7xx, 8xx)	≤ 28 Rc	750												
		≤ 28 Rc	1000	.00065	.00082	.00097	.00131	.00195	.00261	.00392	.00523	.00653	.00784	.01045	.01306
ALUMINUM ALLOYS (CASTINGS)	Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	≤ 28 Rc	750												
		≤ 28 Rc	700												
		≤ 28 Rc	650	.00058	.00073	.00087	.00118	.00176	.00235	.00353	.00470	.00588	.00705	.00941	.01176
		≤ 28 Rc	475												
ALUMINUM ALLOYS (WROUGHT)	Wrought - 5%-8% Si (4xxx)	≤ 28 Rc	1000												
		≤ 28 Rc	800												
MAGNESIUM ALLOYS		≤ 28 Rc	1500	.00065	.00082	.00097	.00131	.00195	.00261	.00392	.00523	.00653	.00784	.01045	.01306
ZINC ALLOYS		≤ 28 Rc	800												
COPPER ALLOYS	High Coppers - 90%+ (C1xxxx)	≤ 28 Rc	225												
BRASS	Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx)	≤ 28 Rc	500												
PHOSPHOR BRONZES	Phosphor Bronzes (Copper Tin alloys, C5xxxx)	≤ 28 Rc	225												
SILICON BRONZES	Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	≤ 28 Rc	500	.00052	.00065	.00078	.00105	.00156	.00209	.00314	.00418	.00523	.00627	.00836	.01045
COPPER NICKELS, NICKEL SILVERS	Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	≤ 28 Rc	225												
CAST COPPER ALLOYS	(C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	≤ 28 Rc	550												

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MILLING PROCESS	HARDNESS	ADOC	RDOC
Non-Ferrous Corner Rounding	n/a	100%	2 Passes at Full Depth
Ferrous Corner Rounding	< 37 HRC	100%	3 Passes at Full Depth
	> 37 HRC	100%	4 Passes at Full Depth

All posted speed and feed parameters are suggested starting values that may be increased given optimal setup conditions. Chip loads reflect uncoated cutters and may be increased 10%-20% if coated. For ferrous materials with hardness  $\leq 28$  Rc, chip loads can be increased 10%-20%.

**Product notes:**

Due to a varying diameter, an Effective Cutter Diameter must be determined for Chip Load selection and RPM calculation:

For a Radius/Pilot ratio < 2.5, Effective Cutter Diameter = Pilot Diameter + Radius

For a Radius/Pilot ratio  $\geq 2.5$ , Effective Cutter Diameter = Pilot Diameter + .7x Radius

Depth of Cut is shown as a full Radial stepover with multiple, descending Axial passes with following breakdown (same progression works for full Axial depth with multiple, descending Radial passes):

1 pass = 1x Radius

2 passes = .7x Radius, .3x Radius

3 passes = .4x Radius, .4x Radius, .2x Radius

4 passes = .4x Radius, .3x Radius, .2x Radius, .1x Radius

5 passes = .3x Radius, .3x Radius, .2x Radius, .1x Radius, .1x Radius

Chip Loads (IPT) within table pertain to rounding a corner on one side of existing slot.

For rounding on both sides, reduce Chip Loads to 60%-80% depending on contact length and finish

For vertical plunging into a hole, reduce Chip Loads to 40%-50% depending on finish