MATERIAL	Hardness: ≤ 28 Rc (≤ 271 HBn)													Depth of Cut	
	SFM	Chip Load (IPT) By Effective Cutter Diameter												Radial Passes	Axial DOC
		0.125	0.187	0.250	0.312	0.375	0.437	0.500	0.625	0.750	0.875	1.000	1.250		
ALUMINUM ALLOYS															
Casting (2xx, 5xx, 7xx, 8xx)	750	.00110	.00165	.00220	.00275	.00330	.00385	.00440	.00550	.00660	.00770	.00880	.01100	1-2	Full DOC
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000														
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750	.00099	.00148	.00198	.00247	.00297	.00346	.00396	.00495	.00594	.00693	.00792	.00990	1-2	Full DOC
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700														
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650														
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475														
Wrought - 5%-8% Si (4xxx)	1000														
Wrought - 8%-12% Si (4xxx)	800														
MAGNESIUM ALLOYS	1500	.00110	.00165	.00220	.00275	.00330	.00385	.00440	.00550	.00660	.00770	.00880	.01100	1-2	Full DOC
ZINC ALLOYS	800														
COPPER ALLOYS															
High Coppers - 90%+ (C1xxxx)	225	.00088	.00132	.00176	.00220	.00264	.00308	.00352	.00440	.00528	.00616	.00704	.00880	1-2	Full DOC
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500														
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225														
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														
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550														

HARVEY TOOL

Speeds & Feeds

Product Table: Concave Radius End Mills
Characteristics: 4 Flutes
Series: 328xx, 459xx

Product Notes:

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

Effective Cutter Diameter = Cutter Diameter - 2x Radius

Chip Loads (IPT) in table pertain to machining with OD and radius engaged on one side of part
If radius and OD are engaged on both sides of part, reduce posted chip load values by 40%
If radius only is engaged on one side of part, increase posted chip load values by 20%
If radius only is engaged on both sides of part, reduce posted chip load values by 25%

General Notes:

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 ≤ 28 Rc, chip loads can be increased 10%-20%.

If you require additional information, Harvey Tool has a team of technical experts available to assist you through even the most challenging applications. Please contact us at **800-645-5609** or **Harveytech@harveyperformance.com**.

WARNING: Cutting tools may shatter under improper use. Government regulations require use of safety glasses and other appropriate safety equipment in the vicinity of use.

MATERIAL	Hardness: 29-37 Rc (279-344 HBn)													Depth of Cut		Hardness: 38-45 Rc (353-421 HBn)												Depth of Cut	
	SFM	Chip Load (IPT) By Effective Cutter Diameter												Radial Passes	Axial DOC	SFM	Chip Load (IPT) By Effective Cutter Diameter												Radial Passes	Axial DOC
		0.125	0.187	0.250	0.312	0.375	0.437	0.500	0.625	0.750	0.875	1.000	1.250				0.125	0.187	0.250	0.312	0.375	0.437	0.500	0.625	0.750	0.875	1.000	1.250		
CARBON STEELS																														
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	.00034	.00051	.00068	.00085	.00102	.00119	.00136	.00170	.00204	.00238	.00272	.00340	2-3	Full DOC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	200	.00031	.00047	.00062	.00078	.00093	.00109	.00124	.00156	.00187	.00218	.00249	.00311	2-3	Full DOC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STAINLESS STEELS																														
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	.00034	.00051	.00068	.00085	.00102	.00119	.00136	.00170	.00204	.00238	.00272	.00340	2-3	Full DOC	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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, 420, 429, 430, 434, 436, 442, 446, 501, 502	200	.00031	.00047	.00062	.00078	.00093	.00109	.00124	.00156	.00187	.00218	.00249	.00311	2-3	Full DOC	100	.00016	.00023	.00031	.00039	.00047	.00054	.00062	.00078	.00093	.00109	.00124	.00156	3-4	Full DOC
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	.00019	.00029	.00039	.00049	.00058	.00068	.00078	.00097	.00117	.00136	.00156	.00194	2-3	Full DOC	90	.00010	.00015	.00019	.00024	.00029	.00034	.00039	.00049	.00058	.00068	.00078	.00097	3-4	Full DOC
TOOL STEELS																														
A, L, O, P, W series	200	.00031	.00047	.00062	.00078	.00093	.00109	.00124	.00156	.00187	.00218	.00249	.00311	2-3	Full DOC	100	.00016	.00023	.00031	.00039	.00047	.00054	.00062	.00078	.00093	.00109	.00124	.00156	3-4	Full DOC
D, H, M, T, S series	150	.00019	.00029	.00039	.00049	.00058	.00068	.00078	.00097	.00117	.00136	.00156	.00194	2-3	Full DOC	90	.00010	.00015	.00019	.00024	.00029	.00034	.00039	.00049	.00058	.00068	.00078	.00097	3-4	Full DOC
TITANIUM ALLOYS	150	.00019	.00029	.00039	.00049	.00058	.00068	.00078	.00097	.00117	.00136	.00156	.00194	2-3	Full DOC	75	.00010	.00015	.00019	.00024	.00029	.00034	.00039	.00049	.00058	.00068	.00078	.00097	3-4	Full DOC
HIGH TEMP ALLOYS																														
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00019	.00029	.00039	.00049	.00058	.00068	.00078	.00097	.00117	.00136	.00156	.00194	2-3	Full DOC	50	.00010	.00015	.00019	.00024	.00029	.00034	.00039	.00049	.00058	.00068	.00078	.00097	3-4	Full DOC