

MATERIAL	Hardness: ≤ 28 Rc (≤ 271 HBn)														
	SFM	Chip Load (IPT) by Dia			Depth of Cut		Chip Load (IPT) by Cutter Dia					Depth of Cut			
		0.015	0.031	0.047	Radial	Axial	0.062	0.078	0.093	0.125	0.187	0.250	Radial	Axial	
<b>ALUMINUM ALLOYS</b>															
Casting (2xx, 5xx, 7xx, 8xx)	750	Finishing	.00004	.00008	.00013	.03 x Dia	12 x Dia	.00015	.00018	.00022	.00029	.00044	.00059	.06 x Dia	12 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000														
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750														
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700														
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650	Finishing	.00004	.00008	.00011	.03 x Dia	12 x Dia	.00013	.00016	.00020	.00026	.00039	.00053	.06 x Dia	12 x Dia
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475														
Wrought - 5%-8% Si (4xxx)	1000														
Wrought - 8%-12% Si (4xxx)	800														
<b>MAGNESIUM ALLOYS</b>	1500	Finishing	.00004	.00008	.00013	.03 x Dia	12 x Dia	.00015	.00018	.00022	.00029	.00044	.00059	.06 x Dia	12 x Dia
<b>ZINC ALLOYS</b>	800														
<b>COPPER ALLOYS</b>															
High Coppers - 90%+ (C1xxx)	225														
Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C6400-C69800)	500														
Phosphor Bronzes (Copper Tin alloys, Cxxx)	225														
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Finishing	.00003	.00007	.00010	.03 x Dia	12 x Dia	.00012	.00015	.00017	.00023	.00035	.00047	.06 x Dia	12 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500														
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)	225														
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550														



Speeds & Feeds

**Product Table:** Miniature End Mills - Ball - Long Flute  
**Characteristics:** 12x Length of Cut, 3 Flutes  
**Series:** 351xx, 352xx

**Please note:**

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)														
	SFM	Chip Load (IPT) by Dia			Depth of Cut		Chip Load (IPT) by Cutter Dia					Depth of Cut			
		0.015	0.031	0.047	Radial	Axial	0.062	0.078	0.093	0.125	0.187	0.250	Radial	Axial	
<b>CARBON STEELS</b>															
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	Finishing	.00001	.00003	.00004	.03 x Dia	12 x Dia	.00005	.00006	.00007	.00009	.00014	.00018	.06 x Dia	12 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 20xx, 30xx, 40xx & 4xLxx, 50xx & 5xLxx, 50xxx & 50Lxx, 51xxx & 51Lxx, 52xxx & 52Lxx, 60xx, 80xx, 90xx	200	Finishing	.00001	.00002	.00004	.03 x Dia	12 x Dia	.00004	.00005	.00006	.00008	.00013	.00017	.06 x Dia	12 x Dia
<b>STAINLESS STEELS</b>															
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	Finishing	.00001	.00003	.00004	.03 x Dia	12 x Dia	.00005	.00006	.00007	.00009	.00014	.00018	.06 x Dia	12 x Dia
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	Finishing	.00001	.00002	.00004	.03 x Dia	12 x Dia	.00004	.00005	.00006	.00008	.00013	.00017	.06 x Dia	12 x Dia
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	Finishing	.00001	.00001	.00002	.03 x Dia	12 x Dia	.00003	.00003	.00004	.00005	.00008	.00010	.06 x Dia	12 x Dia
<b>TOOL STEELS</b>															
A, L, O, P, W series	200	Finishing	.00001	.00002	.00004	.03 x Dia	12 x Dia	.00004	.00005	.00006	.00008	.00013	.00017	.06 x Dia	12 x Dia
D, H, M, T, S series	150	Finishing	.00001	.00001	.00002	.03 x Dia	12 x Dia	.00003	.00003	.00004	.00005	.00008	.00010	.06 x Dia	12 x Dia
<b>TITANIUM ALLOYS</b>	150	Finishing	.00001	.00001	.00002	.03 x Dia	12 x Dia	.00003	.00003	.00004	.00005	.00008	.00010	.06 x Dia	12 x Dia
<b>HIGH TEMP ALLOYS</b>															
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	Finishing	.00001	.00001	.00002	.03 x Dia	12 x Dia	.00003	.00003	.00004	.00005	.00008	.00010	.06 x Dia	12 x Dia

MATERIAL	Hardness: 38-45 Rc (353-421 HBn)														
	SFM	Chip Load (IPT) by Dia			Depth of Cut		Chip Load (IPT) by Cutter Dia					Depth of Cut			
		0.015	0.031	0.047	Radial	Axial	0.062	0.078	0.093	0.125	0.187	0.250	Radial	Axial	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	100	Finishing	.00001	.00001	.00002	.03 x Dia	12 x Dia	.00002	.00003	.00003	.00004	.00006	.00008	.06 x Dia	12 x Dia
	90	Finishing	.00000	.00001	.00001	.03 x Dia	12 x Dia	.00001	.00002	.00002	.00003	.00004	.00005	.06 x Dia	12 x Dia
	100	Finishing	.00001	.00001	.00002	.03 x Dia	12 x Dia	.00002	.00003	.00003	.00004	.00006	.00008	.06 x Dia	12 x Dia
	90	Finishing	.00000	.00001	.00001	.03 x Dia	12 x Dia	.00001	.00002	.00002	.00003	.00004	.00005	.06 x Dia	12 x Dia
	75	Finishing	.00000	.00001	.00001	.03 x Dia	12 x Dia	.00001	.00002	.00002	.00003	.00004	.00005	.06 x Dia	12 x Dia
	50	Finishing	.00000	.00001	.00001	.03 x Dia	12 x Dia	.00001	.00002	.00002	.00003	.00004	.00005	.06 x Dia	12 x Dia