

MATERIAL	SFM	Hardness: ≤ 28 Rc (≤ 271 HBn)															
		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	0.375	0.500	Radial	Axial	
ALUMINUM ALLOYS																	
Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00019	.00039	.00059	1 x Dia	.20 x Dia	.00068	.00101	.00136	.00204	.00272	.00408	.00545	1 x Dia	.50 x Dia	
		Roughing	.00025	.00051	.00077	.30 x Dia	1 x Dia	.00088	.00111	.00132	.00178	.00266	.00356	.00534	.00712	.60 x Dia	1 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing	.00027	.00056	.00085	.13 x Dia	1 x Dia	.00097	.00122	.00145	.00196	.00293	.00391	.00587	.00782	.25 x Dia	1 x Dia
		Slotting	.00017	.00035	.00053	1 x Dia	.20 x Dia	.00061	.00076	.00091	.00123	.00183	.00245	.00368	.00490	1 x Dia	.50 x Dia
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750	Slotting	.00017	.00035	.00053	1 x Dia	.20 x Dia	.00061	.00076	.00091	.00123	.00183	.00245	.00368	.00490	1 x Dia	.50 x Dia
		Roughing	.00022	.00046	.00069	.30 x Dia	1 x Dia	.00079	.00100	.00119	.00160	.00240	.00320	.00480	.00640	.60 x Dia	1 x Dia
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700	Slotting	.00017	.00035	.00053	1 x Dia	.20 x Dia	.00061	.00076	.00091	.00123	.00183	.00245	.00368	.00490	1 x Dia	.50 x Dia
		Roughing	.00022	.00046	.00069	.30 x Dia	1 x Dia	.00079	.00100	.00119	.00160	.00240	.00320	.00480	.00640	.60 x Dia	1 x Dia
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650	Slotting	.00017	.00035	.00053	1 x Dia	.20 x Dia	.00061	.00076	.00091	.00123	.00183	.00245	.00368	.00490	1 x Dia	.50 x Dia
		Roughing	.00022	.00046	.00069	.30 x Dia	1 x Dia	.00079	.00100	.00119	.00160	.00240	.00320	.00480	.00640	.60 x Dia	1 x Dia
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475	Slotting	.00017	.00035	.00053	1 x Dia	.20 x Dia	.00061	.00076	.00091	.00123	.00183	.00245	.00368	.00490	1 x Dia	.50 x Dia
		Roughing	.00022	.00046	.00069	.30 x Dia	1 x Dia	.00079	.00100	.00119	.00160	.00240	.00320	.00480	.00640	.60 x Dia	1 x Dia
Wrought - 5%-8% Si (4xxx)	1000	Finishing	.00024	.00050	.00076	.13 x Dia	1 x Dia	.00087	.00110	.00131	.00176	.00263	.00352	.00528	.00704	.25 x Dia	1 x Dia
		Slotting	.00019	.00039	.00059	1 x Dia	.20 x Dia	.00068	.00085	.00101	.00136	.00204	.00272	.00408	.00545	1 x Dia	.50 x Dia
Wrought - 8%-12% Si (4xxx)	800	Finishing	.00024	.00050	.00076	.13 x Dia	1 x Dia	.00087	.00110	.00131	.00176	.00263	.00352	.00528	.00704	.25 x Dia	1 x Dia
		Slotting	.00019	.00039	.00059	1 x Dia	.20 x Dia	.00068	.00085	.00101	.00136	.00204	.00272	.00408	.00545	1 x Dia	.50 x Dia
MAGNESIUM ALLOYS																	
ZINC ALLOYS	800	Roughing	.00025	.00051	.00077	.30 x Dia	1 x Dia	.00088	.00111	.00132	.00178	.00266	.00356	.00534	.00712	.60 x Dia	1 x Dia
		Finishing	.00027	.00056	.00085	.13 x Dia	1 x Dia	.00097	.00122	.00145	.00196	.00293	.00391	.00587	.00782	.25 x Dia	1 x Dia
COPPER ALLOYS																	
High Coppers - 90%+ (C1xxx)	225	Slotting	.00015	.00031	.00047	1 x Dia	.20 x Dia	.00054	.00068	.00081	.00109	.00163	.00218	.00327	.00436	1 x Dia	.50 x Dia
		Roughing	.00020	.00041	.00062	.30 x Dia	1 x Dia	.00071	.00089	.00106	.00142	.00213	.00285	.00427	.00569	.60 x Dia	1 x Dia
Brass (Copper-Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C66800)	500	Slotting	.00015	.00031	.00047	1 x Dia	.20 x Dia	.00054	.00068	.00081	.00109	.00163	.00218	.00327	.00436	1 x Dia	.50 x Dia
		Roughing	.00020	.00041	.00062	.30 x Dia	1 x Dia	.00071	.00089	.00106	.00142	.00213	.00285	.00427	.00569	.60 x Dia	1 x Dia
Phosphor Bronzes (Copper-Tin alloys, C5xxx)	225	Slotting	.00015	.00031	.00047	1 x Dia	.20 x Dia	.00054	.00068	.00081	.00109	.00163	.00218	.00327	.00436	1 x Dia	.50 x Dia
		Roughing	.00020	.00041	.00062	.30 x Dia	1 x Dia	.00071	.00089	.00106	.00142	.00213	.00285	.00427	.00569	.60 x Dia	1 x Dia
Aluminum Bronzes (Copper-Aluminum alloys, C66000-C64200)	500	Slotting	.00015	.00031	.00047	1 x Dia	.20 x Dia	.00054	.00068	.00081	.00109	.00163	.00218	.00327	.00436	1 x Dia	.50 x Dia
		Roughing	.00020	.00041	.00062	.30 x Dia	1 x Dia	.00071	.00089	.00106	.00142	.00213	.00285	.00427	.00569	.60 x Dia	1 x Dia
Silicon Bronzes (Copper-Silicon alloys, C64700-C66100)	500	Slotting	.00015	.00031	.00047	1 x Dia	.20 x Dia	.00054	.00068	.00081	.00109	.00163	.00218	.00327	.00436	1 x Dia	.50 x Dia
		Roughing	.00020	.00041	.00062	.30 x Dia	1 x Dia	.00071	.00089	.00106	.00142	.00213	.00285	.00427	.00569	.60 x Dia	1 x Dia
Copper-Nickels, Nickel-Silvers (Copper-Nickel alloys, C7xxx)	225	Slotting	.00015	.00031	.00047	1 x Dia	.20 x Dia	.00054	.00068	.00081	.00109	.00163	.00218	.00327	.00436	1 x Dia	.50 x Dia
		Roughing	.00020	.00041	.00062	.30 x Dia	1 x Dia	.00071	.00089	.00106	.00142	.00213	.00285	.00427	.00569	.60 x Dia	1 x Dia
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing	.00022	.00045	.00068	.13 x Dia	1 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.25 x Dia	1 x Dia
		Slotting	.00019	.00039	.00059	1 x Dia	.20 x Dia	.00068	.00085	.00101	.00136	.00204	.00272	.00408	.00545	1 x Dia	.50 x Dia



Speeds & Feeds

Product Table: Miniature End Mills - Square - Stub & Standard
Characteristics: 1.5x Length of Cut, 3 Flutes
Series: 8230xx, 8231xx

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	SFM	Hardness: 29-37 Rc (279-344 HBn)																
		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	0.375	0.500	Radial	Axial		
CARBON STEELS																		
Free-Machining/Low Carbon steels, 10xx, 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	Slotting	.00006	.00013	.00020	1 x Dia	.20 x Dia	.00023	.00029	.00035	.00047	.00070	.00094	.00140	.00187	1 x Dia	.50 x Dia	
		Roughing	.00008	.00016	.00024	.30 x Dia	1 x Dia	.00027	.00034	.00041	.00055	.00082	.00110	.00165	.00220	.60 x Dia	1 x Dia	
		Finishing	.00008	.00017	.00026	.13 x Dia	1 x Dia	.00030	.00038	.00045	.00061	.00091	.00122	.00183	.00245	.25 x Dia	1 x Dia	
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4Lxx, 5xxx & 5Lxx, 50xxx & 50Lxx, 51xxx & 51Lxx, 52xxx & 52Lxx, 6xxx, 8xxx, 9xxx	200	Slotting	.00006	.00012	.00018	1 x Dia	.20 x Dia	.00021	.00027	.00032	.00043	.00064	.00086	.00128	.00171	1 x Dia	.50 x Dia	
		Roughing	.00007	.00014	.00022	.30 x Dia	1 x Dia	.00025	.00031	.00037	.00050	.00075	.00101	.00151	.00201	.60 x Dia	1 x Dia	
		Finishing	.00008	.00016	.00024	.13 x Dia	1 x Dia	.00028	.00035	.00042	.00056	.00084	.00112	.00168	.00224	.25 x Dia	1 x Dia	
STAINLESS STEELS																		
	203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	Slotting	.00006	.00013	.00020	1 x Dia	.20 x Dia	.00023	.00029	.00035	.00047	.00070	.00094	.00140	.00187	1 x Dia	.50 x Dia
			Roughing	.00008	.00016	.00024	.30 x Dia	1 x Dia	.00027	.00034	.00041	.00055	.00082	.00110	.00165	.00220	.60 x Dia	1 x Dia
		Finishing	.00008	.00017	.00026	.13 x Dia	1 x Dia	.00030	.00038	.00045	.00061	.00091	.00122	.00183	.00245	.25 x Dia	1 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	Slotting	.00006	.00012	.00018	1 x Dia	.20 x Dia	.00021	.00027	.00032	.00043	.00064	.00086	.00128	.00171	1 x Dia	.50 x Dia	
		Roughing	.00007	.00014	.00022	.30 x Dia	1 x Dia	.00025	.00031	.00037	.00050	.00075	.00101	.00151	.00201	.60 x Dia	1 x Dia	
		Finishing	.00008	.00016	.00024	.13 x Dia	1 x Dia	.00028	.00035	.00042	.00056	.00084	.00112	.00168	.00224	.25 x Dia	1 x Dia	
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	Slotting	.00004	.00008	.00012	1 x Dia	.20 x Dia	.00013	.00017	.00020	.00027	.00040	.00053	.00080	.00107	1 x Dia	.50 x Dia	
		Roughing	.00004	.00009	.00014	.30 x Dia	1 x Dia	.00016	.00020	.00023	.00031	.00047	.00063	.00094	.00126	.60 x Dia	1 x Dia	
		Finishing	.00005	.00010	.00015	.13 x Dia	1 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.25 x Dia	1 x Dia	
TOOL STEELS																		
	A, L, O, P, W series	200	Slotting	.00006	.00012	.00018	1 x Dia	.20 x Dia	.00021	.00027	.00032	.00043	.00064	.00086	.00128	.00171	1 x Dia	.50 x Dia
			Roughing	.00007	.00014	.00022	.30 x Dia	1 x Dia	.00025	.00031	.00037	.00050	.00075	.00101	.00151	.00201	.60 x Dia	1 x Dia
		Finishing	.00008	.00016	.00024	.13 x Dia	1 x Dia	.00028	.00035	.00042	.00056	.00084	.00112	.00168	.00224	.25 x Dia	1 x Dia	
D, H, M, T, S series	150	Slotting	.00004	.00008	.00012	1 x Dia	.20 x Dia	.00013	.00017	.00020	.00027	.00040	.00053	.00080	.00107	1 x Dia	.50 x Dia	
		Roughing	.00004	.00009	.00014	.30 x Dia	1 x Dia	.00016	.00020	.00023	.00031	.00047	.00063	.00094	.00126	.60 x Dia	1 x Dia	
		Finishing	.00005	.00010	.00015	.13 x Dia	1 x Dia	.00017	.00022	.000								