

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																
750	Slotting	.00009	.00018	.00027	1 x Dia	.06 x Dia	.00031	.00039	.00046	.00062	.00093	.00124	.00186	.00248	1 x Dia	.15 x Dia
Casting (2xx, 5xx, 7xx, 8xx)	Roughing	.00011	.00022	.00033	.15 x Dia	.25 x Dia	.00038	.00048	.00058	.00077	.00116	.00155	.00232	.00309	.30 x Dia	.25 x Dia
1000	Finishing	.00022	.00045	.00068	.04 x Dia	1.5 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.08 x Dia	1.5 x Dia
Wrought (1xx, 2xx, 3xx, 5xxx, 6xxx, 7xxx, 8xxx)																
750	Slotting	.00008	.00016	.00024	1 x Dia	.06 x Dia	.00028	.00035	.00041	.00056	.00083	.00111	.00167	.00223	1 x Dia	.15 x Dia
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)																
700	Slotting	.00008	.00016	.00024	1 x Dia	.06 x Dia	.00028	.00035	.00041	.00056	.00083	.00111	.00167	.00223	1 x Dia	.15 x Dia
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)																
650	Roughing	.00010	.00020	.00030	.15 x Dia	.25 x Dia	.00035	.00043	.00052	.00070	.00104	.00139	.00209	.00278	.30 x Dia	.25 x Dia
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)																
475	Slotting	.00009	.00018	.00027	1 x Dia	.06 x Dia	.00031	.00039	.00046	.00062	.00093	.00124	.00186	.00248	1 x Dia	.15 x Dia
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)																
1000	Finishing	.00019	.00040	.00061	.04 x Dia	1.5 x Dia	.00070	.00088	.00105	.00141	.00211	.00282	.00422	.00563	.08 x Dia	1.5 x Dia
Wrought - 5%-8% Si (4xxx)																
800	Slotting	.00009	.00018	.00027	1 x Dia	.06 x Dia	.00031	.00039	.00046	.00062	.00093	.00124	.00186	.00248	1 x Dia	.15 x Dia
MAGNESIUM ALLOYS																
1500	Roughing	.00011	.00022	.00033	.15 x Dia	.25 x Dia	.00038	.00048	.00058	.00077	.00116	.00155	.00232	.00309	.30 x Dia	.25 x Dia
ZINC ALLOYS																
800	Finishing	.00022	.00045	.00068	.04 x Dia	1.5 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.08 x Dia	1.5 x Dia
COPPER ALLOYS																
High Coppers - 90%+ (C1xxx)																
225	Slotting	.00007	.00014	.00021	1 x Dia	.06 x Dia	.00025	.00031	.00037	.00050	.00074	.00099	.00149	.00198	1 x Dia	.15 x Dia
Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C6600-C6800)																
225	Slotting	.00007	.00014	.00021	1 x Dia	.06 x Dia	.00025	.00031	.00037	.00050	.00074	.00099	.00149	.00198	1 x Dia	.15 x Dia
Phosphor Bronzes (Copper Tin alloys, C5xxx)																
500	Roughing	.00009	.00018	.00027	.15 x Dia	.25 x Dia	.00031	.00039	.00046	.00062	.00093	.00124	.00186	.00248	.30 x Dia	.25 x Dia
Aluminum Bronzes (Copper Aluminum alloys, C6600-C64200)																
500	Roughing	.00009	.00018	.00027	.15 x Dia	.25 x Dia	.00031	.00039	.00046	.00062	.00093	.00124	.00186	.00248	.30 x Dia	.25 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)																
225	Slotting	.00007	.00014	.00021	1 x Dia	.06 x Dia	.00025	.00031	.00037	.00050	.00074	.00099	.00149	.00198	1 x Dia	.15 x Dia
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)																
650	Finishing	.00017	.00036	.00054	.04 x Dia	1.5 x Dia	.00062	.00078	.00093	.00125	.00187	.00250	.00375	.00501	.08 x Dia	1.5 x Dia
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)																



Speeds & Feeds

Product Table: Miniature End Mills - Square - Long Reach, Stub Flute
Characteristics: 15x Reach Multiple
Series: 489xx, 490xx

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																
600	Slotting	.00003	.00006	.00009	1 x Dia	.06 x Dia	.00011	.00013	.00016	.00021	.00032	.00043	.00064	.00085	1 x Dia	.15 x Dia
Free-Machining/Low Carbon steels, 10xx-1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	Roughing	.00003	.00007	.00010	.15 x Dia	.25 x Dia	.00012	.00015	.00018	.00024	.00036	.00048	.00072	.00096	.30 x Dia	.25 x Dia
200	Finishing	.00007	.00014	.00021	.04 x Dia	1.5 x Dia	.00024	.00031	.00036	.00049	.00073	.00098	.00147	.00196	.08 x Dia	1.5 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xx, 3xx, 4xx & 4Lxx, 5xx & 5Lxx, 50xx & 50Lxx, 51xx & 51Lxx, 52xx & 52Lxx, 6xx, 8xx, 9xx	Slotting	.00003	.00006	.00008	1 x Dia	.06 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.15 x Dia
200	Roughing	.00003	.00006	.00009	.15 x Dia	.25 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.30 x Dia	.25 x Dia
450	Finishing	.00006	.00013	.00019	.04 x Dia	1.5 x Dia	.00022	.00028	.00033	.00045	.00067	.00089	.00134	.00179	.08 x Dia	1.5 x Dia
STAINLESS STEELS																
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	Slotting	.00003	.00006	.00009	1 x Dia	.06 x Dia	.00011	.00013	.00016	.00021	.00032	.00043	.00064	.00085	1 x Dia	.15 x Dia
450	Roughing	.00003	.00007	.00010	.15 x Dia	.25 x Dia	.00012	.00015	.00018	.00024	.00036	.00048	.00072	.00096	.30 x Dia	.25 x Dia
200	Finishing	.00007	.00014	.00021	.04 x Dia	1.5 x Dia	.00024	.00031	.00036	.00049	.00073	.00098	.00147	.00196	.08 x Dia	1.5 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	Slotting	.00003	.00006	.00008	1 x Dia	.06 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.15 x Dia
200	Roughing	.00003	.00006	.00009	.15 x Dia	.25 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.30 x Dia	.25 x Dia
450	Finishing	.00006	.00013	.00019	.04 x Dia	1.5 x Dia	.00022	.00028	.00033	.00045	.00067	.00089	.00134	.00179	.08 x Dia	1.5 x Dia
150	Slotting	.00002	.00003	.00005	1 x Dia	.06 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.15 x Dia
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	Roughing	.00002	.00004	.00006	.15 x Dia	.25 x Dia	.00007	.00009	.00010	.00014	.00020	.00027	.00041	.00055	.30 x Dia	.25 x Dia
200	Finishing	.00004	.00008	.00012	.04 x Dia	1.5 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.08 x Dia	1.5 x Dia
TOOL STEELS																
200	Slotting	.00003	.00006	.00008	1 x Dia	.06 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.15 x Dia
A, L, O, P, W series	Roughing	.00003	.00006	.00009	.15 x Dia	.25 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.30 x Dia	.25 x Dia
150	Finishing	.00006	.00013	.00019	.04 x Dia	1.5 x Dia	.00022	.00028	.00033	.00045	.00067	.00089	.00134	.00179	.08 x Dia	1.5 x Dia
D, H, M, T, S series	Slotting	.00002	.00003	.00005	1 x Dia	.06 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.15 x Dia
150	Roughing	.00002	.00004	.00006	.15 x Dia	.25 x Dia	.00007	.00009	.00010	.00014	.00020	.00027	.00041	.00055	.30 x Dia	.25 x Dia
70	Finishing	.00004	.00008	.00012	.04 x Dia	1.5 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.08 x Dia	1.5 x Dia
TITANIUM ALLOYS																
150	Slotting	.00002	.00003	.00005	1 x Dia	.06 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.15 x Dia
75	Roughing	.00002	.00004	.00006	.15 x Dia	.25 x Dia	.00007	.00009	.00010	.00014	.00020	.00027	.00041	.00055	.30 x Dia	.25 x Dia
70	Finishing	.00004	.00008	.00012	.04 x Dia	1.5 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.08 x Dia	1.5 x Dia
HIGH TEMP ALLOYS																
70	Slotting	.00002	.00003	.00005	1 x Dia	.06 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.15 x Dia
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discobloy, Incoloy	Roughing	.00002	.00004	.00006	.15 x Dia	.25 x Dia	.00007	.00009	.00010	.00014	.00020	.00027	.00041	.00055	.30 x Dia	.25 x Dia
50	Finishing	.00004	.00008	.00012	.04 x Dia	1.5 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.08 x Dia	1.5 x Dia

MATERIAL	SFM	Hardness: 38-45 Rc (353-421 HBn)</											
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