Speeds & Feeds

Product Table: Miniature End Mills - Ball - Stub & Standard
Characteristics: 3x Length of Cut, 3 Flutes
Series: 8359xx, 8360xx

Hardness: ≤ 28 Rc (≤ 271 HBn)

MATERIAL	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	0.375	0.500	Radial	Axial
ALUMINUM ALLOYS Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00017	.00035	.00054	1 x Dia	.14 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	1 x Dia	.35 x Dia
		Roughing	.00017	.00035	.00054	.13 x Dia	3 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.25 x Dia	3 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing	.00022	.00045	.00068	.08 x Dia	3 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.15 x Dia	3 x Dia
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750 700	Slotting	.00015	.00032	.00048	1 x Dia	.14 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	1 x Dia	.35 x Dia
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx) Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650 475	Roughing	.00015	.00032	.00048	.13 x Dia	3 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	.25 x Dia	3 x Dia
Wrought - 5%-8% Si (4xxx) Wrought - 8%-12% Si (4xxx)	1000 800	Finishing	.00019	.00040	.00061	.08 x Dia	3 x Dia	.00070	.00088	.00105	.00141	.00211	.00282	.00422	.00563	.15 x Dia	3 x Dia
MAGNESIUM ALLOYS	1500	Slotting	.00017	.00035	.00054	1 x Dia	.14 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	1 x Dia	.35 x Dia
		Roughing	.00017	.00035	.00054	.13 x Dia	3 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.25 x Dia	3 x Dia
ZINC ALLOYS	800	Finishing	.00022	.00045	.00068	.08 x Dia	3 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.15 x Dia	3 x Dia
COPPER ALLOYS High Coppers - 90%+ (C1xxxx) Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	225 500	Slotting	.00014	.00028	.00043	1 x Dia	.14 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.35 x Dia
Phosphor Bronzes (Copper Tin alloys, C5xxxx) Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200) Silicon Bronzes (Copper Silicon alloys, C64700-C66100) Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225 500 500 225	Roughing	.00014	.00028	.00043	.13 x Dia	3 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	.25 x Dia	3 x Dia
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing	.00017	.00036	.00054	.08 x Dia	3 x Dia	.00062	.00078	.00093	.00125	.00187	.00250	.00375	.00501	.15 x Dia	3 x Dia

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.

Hardness: 29-37 Rc (279-344 HBn)

MATERIAL	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	0.375	0.500	Radial	Axial
CARBON STEELS		Slotting	.00006	.00012	.00018	1 x Dia	.14 x Dia	.00021	.00027	.00032	.00043	.00064	.00085	.00128	.00170	1 x Dia	.35 x Dia
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	Roughing	.00005	.00011	.00017	.13 x Dia	3 x Dia	.00019	.00024	.00028	.00038	.00057	.00077	.00115	.00153	.25 x Dia	3 x Dia
		Finishing	.00007	.00014	.00021	.08 x Dia	3 x Dia	.00024	.00031	.00036	.00049	.00073	.00098	.00147	.00196	.15 x Dia	3 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx		Slotting	.00005	.00011	.00017	1 x Dia	.14 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.35 x Dia
	200	Roughing	.00005	.00010	.00015	.13 x Dia	3 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.25 x Dia	3 x Dia
		Finishing	.00006	.00013	.00019	.08 x Dia	3 x Dia	.00022	.00028	.00033	.00045	.00067	.00089	.00134	.00179	.15 x Dia	3 x Dia
STAINLESS STEELS		Slotting	.00006	.00012	.00018	1 x Dia	.14 x Dia	.00021	.00027	.00032	.00043	.00064	.00085	.00128	.00170	1 x Dia	.35 x Dia
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	Roughing	.00005	.00011	.00017	.13 x Dia	3 x Dia	.00019	.00024	.00028	.00038	.00057	.00077	.00115	.00153	.25 x Dia	3 x Dia
		Finishing	.00007	.00014	.00021	.08 x Dia	3 x Dia	.00024	.00031	.00036	.00049	.00073	.00098	.00147	.00196	.15 x Dia	3 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	.00005	.00011	.00017	1 x Dia	.14 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.35 x Dia
	200	Roughing	.00005	.00010	.00015	.13 x Dia	3 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.25 x Dia	3 x Dia
		Finishing	.00006	.00013	.00019	.08 x Dia	3 x Dia	.00022	.00028	.00033	.00045	.00067	.00089	.00134	.00179	.15 x Dia	3 x Dia
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7		Slotting	.00003	.00007	.00011	1 x Dia	.14 x Dia	.00012	.00015	.00018	.00024	.00036	.00049	.00073	.00097	1 x Dia	.35 x Dia
	150	Roughing	.00003	.00006	.00009	.13 x Dia	3 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.25 x Dia	3 x Dia
		Finishing	.00004	.00008	.00012	.08 x Dia	3 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.15 x Dia	3 x Dia
TOOL STEELS		Slotting	.00005	.00011	.00017	1 x Dia	.14 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.35 x Dia
A, L, O, P, W series	200	Roughing	.00005	.00010	.00015	.13 x Dia	3 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.25 x Dia	3 x Dia
		Finishing	.00006	.00013	.00019	.08 x Dia	3 x Dia	.00022	.00028	.00033	.00045	.00067	.00089	.00134	.00179	.15 x Dia	3 x Dia
D, H, M, T, S series		Slotting	.00003	.00007	.00011	1 x Dia	.14 x Dia	.00012	.00015	.00018	.00024	.00036	.00049	.00073	.00097	1 x Dia	.35 x Dia
	150	Roughing	.00003	.00006	.00009	.13 x Dia	3 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.25 x Dia	3 x Dia
		Finishing	.00004	.00008	.00012	.08 x Dia	3 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.15 x Dia	3 x Dia
TITANIUM ALLOYS		Slotting	.00003	.00007	.00011	1 x Dia	.14 x Dia	.00012	.00015	.00018	.00024	.00036	.00049	.00073	.00097	1 x Dia	.35 x Dia
	150	Roughing	.00003	.00006	.00009	.13 x Dia	3 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.25 x Dia	3 x Dia
		Finishing	.00004	.00008	.00012	.08 x Dia	3 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.15 x Dia	3 x Dia
HIGH TEMP ALLOYS		Slotting	.00003	.00007	.00011	1 x Dia	.14 x Dia	.00012	.00015	.00018	.00024	.00036	.00049	.00073	.00097	1 x Dia	.35 x Dia
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	Roughing	.00003	.00006	.00009	.13 x Dia	3 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.25 x Dia	3 x Dia
		Finishing	.00004	.00008	.00012	.08 x Dia	3 x Dia	.00014	.00017	.00021	.00028	.00042	.00056	.00084	.00112	.15 x Dia	3 x Dia

Hardness: 38-45 Rc (353-421 HBn)

MATERIAL	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	0.375	0.500	Radial	Axial
CARBON STEELS – Free-Machining/Low Carbon steels	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CARBON STEELS – 1030 - 1095 …	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STAINLESS STEELS – 203 EZ, 303 …	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STAINLESS STEELS – 201, 202 … 502	100	Slotting	.00003	.00006	.00008	1 x Dia	.14 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.35 x Dia
		Roughing	.00002	.00005	.00008	.13 x Dia	3 x Dia	.00009	.00011	.00013	.00017	.00026	.00035	.00052	.00070	.25 x Dia	3 x Dia
		Finishing	.00003	.00006	.00010	.08 x Dia	3 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00090	.15 x Dia	3 x Dia
STAINLESS STEELS – 414, 431 … 17-7	90	Slotting	.00002	.00003	.00005	1 x Dia	.14 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.35 x Dia
		Roughing	.00002	.00003	.00005	.13 x Dia	3 x Dia	.00005	.00007	.00008	.00011	.00016	.00022	.00033	.00044	.25 x Dia	3 x Dia
		Finishing	.00002	.00004	.00006	.08 x Dia	3 x Dia	.00007	.00009	.00010	.00014	.00021	.00028	.00042	.00056	.15 x Dia	3 x Dia
TOOL STEELS – A, L, O, P, W series	100	Slotting	.00003	.00006	.00008	1 x Dia	.14 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.35 x Dia
		Roughing	.00002	.00005	.00008	.13 x Dia	3 x Dia	.00009	.00011	.00013	.00017	.00026	.00035	.00052	.00070	.25 x Dia	3 x Dia
		Finishing	.00003	.00006	.00010	.08 x Dia	3 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00090	.15 x Dia	3 x Dia
TOOL STEELS – D, H, M, T, S series	90	Slotting	.00002	.00003	.00005	1 x Dia	.14 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.35 x Dia
		Roughing	.00002	.00003	.00005	.13 x Dia	3 x Dia	.00005	.00007	.00008	.00011	.00016	.00022	.00033	.00044	.25 x Dia	3 x Dia
		Finishing	.00002	.00004	.00006	.08 x Dia	3 x Dia	.00007	.00009	.00010	.00014	.00021	.00028	.00042	.00056	.15 x Dia	3 x Dia
TITANIUM ALLOYS	75	Slotting	.00002	.00003	.00005	1 x Dia	.14 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.35 x Dia
		Roughing	.00002	.00003	.00005	.13 x Dia	3 x Dia	.00005	.00007	.00008	.00011	.00016	.00022	.00033	.00044	.25 x Dia	3 x Dia
		Finishing	.00002	.00004	.00006	.08 x Dia	3 x Dia	.00007	.00009	.00010	.00014	.00021	.00028	.00042	.00056	.15 x Dia	3 x Dia
HIGH TEMP ALLOYS	50	Slotting	.00002	.00003	.00005	1 x Dia	.14 x Dia	.00006	.00008	.00009	.00012	.00018	.00024	.00036	.00049	1 x Dia	.35 x Dia
		Roughing	.00002	.00003	.00005	.13 x Dia	3 x Dia	.00005	.00007	.00008	.00011	.00016	.00022	.00033	.00044	.25 x Dia	3 x Dia
		Finishing	.00002	.00004	.00006	.08 x Dia	3 x Dia	.00007	.00009	.00010	.00014	.00021	.00028	.00042	.00056	.15 x Dia	3 x Dia