



Speeds & Feeds

**Product Table:** Miniature End Mills - Ball - Long Reach, Stub Flute  
**Characteristics:** 8x Reach Multiple, 4 Flutes  
**Series:** 8013xx, 8014xx

**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](mailto: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: ≤ 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	0.375	0.500	Radial	Axial
<b>ALUMINUM ALLOYS</b>																	
Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00083	.00123	.00165	.00248	.00330	1 x Dia	.18 x Dia
		Roughing	.00014	.00029	.00045	.28 x Dia	.30 x Dia	.00051	.00064	.00077	.00103	.00154	.00206	.00309	.00413	.55 x Dia	.30 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing	.00024	.00050	.00075	.08 x Dia	1.5 x Dia	.00086	.00108	.00129	.00174	.00260	.00348	.00521	.00695	.15 x Dia	1.5 x Dia
		Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750	Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
		Roughing	.00013	.00026	.00040	.28 x Dia	.30 x Dia	.00046	.00058	.00069	.00093	.00139	.00186	.00278	.00371	.55 x Dia	.30 x Dia
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700	Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
		Roughing	.00013	.00026	.00040	.28 x Dia	.30 x Dia	.00046	.00058	.00069	.00093	.00139	.00186	.00278	.00371	.55 x Dia	.30 x Dia
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650	Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
		Roughing	.00013	.00026	.00040	.28 x Dia	.30 x Dia	.00046	.00058	.00069	.00093	.00139	.00186	.00278	.00371	.55 x Dia	.30 x Dia
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475	Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
		Roughing	.00013	.00026	.00040	.28 x Dia	.30 x Dia	.00046	.00058	.00069	.00093	.00139	.00186	.00278	.00371	.55 x Dia	.30 x Dia
Wrought - 5%-8% Si (4xxx)	1000	Finishing	.00022	.00045	.00068	.08 x Dia	1.5 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.15 x Dia	1.5 x Dia
		Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00083	.00123	.00165	.00248	.00330	1 x Dia	.18 x Dia
Wrought - 8%-12% Si (4xxx)	800	Finishing	.00022	.00045	.00068	.08 x Dia	1.5 x Dia	.00078	.00098	.00116	.00156	.00234	.00313	.00469	.00626	.15 x Dia	1.5 x Dia
		Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00083	.00123	.00165	.00248	.00330	1 x Dia	.18 x Dia
<b>MAGNESIUM ALLOYS</b>																	
	1500	Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00083	.00123	.00165	.00248	.00330	1 x Dia	.18 x Dia
		Roughing	.00014	.00029	.00045	.28 x Dia	.30 x Dia	.00051	.00064	.00077	.00103	.00154	.00206	.00309	.00413	.55 x Dia	.30 x Dia
	800	Finishing	.00024	.00050	.00075	.08 x Dia	1.5 x Dia	.00086	.00108	.00129	.00174	.00260	.00348	.00521	.00695	.15 x Dia	1.5 x Dia
		Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
<b>ZINC ALLOYS</b>																	
	800	Finishing	.00024	.00050	.00075	.08 x Dia	1.5 x Dia	.00086	.00108	.00129	.00174	.00260	.00348	.00521	.00695	.15 x Dia	1.5 x Dia
		Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	1 x Dia	.18 x Dia
<b>COPPER ALLOYS</b>																	
High Coppers - 90%+ (C1xxx)	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C6400-C69800)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
Phosphor Bronzes (Copper Tin alloys, C5xxx)	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia
		Roughing	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00041	.00049	.00066	.00099	.00132	.00198	.00264	1 x Dia	.18 x Dia

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	0.375	0.500	Radial	Axial	
<b>CARBON STEELS</b>																		
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	Slotting	.00004	.00008	.00012	1 x Dia	.07 x Dia	.00014	.00018	.00021	.00028	.00042	.00057	.00085	.00113	1 x Dia	.18 x Dia	
		Roughing	.00004	.00009	.00014	.28 x Dia	.30 x Dia	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.55 x Dia	.30 x Dia	
		Finishing	.00007	.00015	.00023	.08 x Dia	1.5 x Dia	.00027	.00034	.00040	.00054	.00081	.00109	.00163	.00217	.15 x Dia	1.5 x Dia	
1030 - 1095, 1140 - 1151, 13xx, 15xx, 20xx, 30xx, 40xx & 44Lxx, 50xx & 54Lxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 60xx, 80xx, 90xx	200	Slotting	.00004	.00007	.00011	1 x Dia	.07 x Dia	.00013	.00016	.00019	.00026	.00039	.00052	.00078	.00104	1 x Dia	.18 x Dia	
		Roughing	.00004	.00008	.00013	.28 x Dia	.30 x Dia	.00014	.00018	.00022	.00029	.00044	.00058	.00087	.00117	.55 x Dia	.30 x Dia	
		Finishing	.00007	.00014	.00021	.08 x Dia	1.5 x Dia	.00025	.00031	.00037	.00050	.00074	.00099	.00149	.00199	.15 x Dia	1.5 x Dia	
<b>STAINLESS STEELS</b>																		
	203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	Slotting	.00004	.00008	.00012	1 x Dia	.07 x Dia	.00014	.00018	.00021	.00028	.00042	.00057	.00085	.00113	1 x Dia	.18 x Dia
			Roughing	.00004	.00009	.00014	.28 x Dia	.30 x Dia	.00016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.55 x Dia	.30 x Dia
Finishing			.00007	.00015	.00023	.08 x Dia	1.5 x Dia	.00027	.00034	.00040	.00054	.00081	.00109	.00163	.00217	.15 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	200	Slotting	.00004	.00007	.00011	1 x Dia	.07 x Dia	.00013	.00016	.00019	.00026	.00039	.00052	.00078	.00104	1 x Dia	.18 x Dia	
		Roughing	.00004	.00008	.00013	.28 x Dia	.30 x Dia	.00014	.00018	.00022	.00029	.00044	.00058	.00087	.00117	.55 x Dia	.30 x Dia	
		Finishing	.00007	.00014	.00021	.08 x Dia	1.5 x Dia	.00025	.00031	.00037	.00050	.00074	.00099	.00149	.00199	.15 x Dia	1.5 x Dia	
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	Slotting	.00002	.00005	.00007	1 x Dia	.07 x Dia	.00008	.00010	.00012	.00016	.00024	.00032	.00049	.00065	1 x Dia	.18 x Dia	
		Roughing	.00003	.00005	.00008	.28 x Dia	.30 x Dia	.00009	.00011	.00014	.00018	.00027	.00036	.00055	.00073	.55 x Dia	.30 x Dia	
		Finishing	.00004	.00009	.00013	.08 x Dia	1.5 x Dia	.00015	.00019	.00023	.00031	.00046	.00062	.00093	.00124	.15 x Dia	1.5 x Dia	
<b>TOOL STEELS</b>																		
A, L, O, P, W series	200	Slotting	.00004	.00007	.00011	1 x Dia	.07 x Dia	.00013	.00016	.00019	.00026	.00039	.00052	.00078	.			