



Speeds & Feeds

**Product Table:** Miniature End Mills - Ball - Long Reach, Standard Flute  
**Characteristics:** 10x Reach Multiple, 2 Flutes  
**Series:** 76650, 8110xx

**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	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	
<b>ALUMINUM ALLOYS</b>																	
Casting (2xx, 5xx, 7xx, 8xx)	750	Slotting	.00012	.00024	.00036	1 x Dia	.07 x Dia	.00042	.00052	.00062	.00084	.00125	.00168	.00252	.00336	1 x Dia	.16 x Dia
		Roughing	.00014	.00030	.00045	25 x Dia	.30 x Dia	.00052	.00065	.00078	.00105	.00157	.00210	.00315	.00419	.50 x Dia	.30 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing	.00025	.00053	.00080	.05 x Dia	3 x Dia	.00092	.00115	.00137	.00185	.00276	.00369	.00554	.00739	.09 x Dia	3 x Dia
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750	Slotting	.00010	.00022	.00033	1 x Dia	.07 x Dia	.00037	.00047	.00056	.00075	.00113	.00151	.00226	.00302	1 x Dia	.16 x Dia
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700																
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650	Roughing	.00013	.00027	.00041	25 x Dia	.30 x Dia	.00047	.00059	.00070	.00094	.00141	.00189	.00283	.00377	.50 x Dia	.30 x Dia
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475																
Wrought - 5%-8% Si (4xxx)	1000	Finishing	.00023	.00047	.00072	.05 x Dia	3 x Dia	.00082	.00104	.00124	.00166	.00249	.00332	.00499	.00665	.09 x Dia	3 x Dia
Wrought - 8%-12% Si (4xxx)	800																
<b>MAGNESIUM ALLOYS</b>																	
	1500	Slotting	.00012	.00024	.00036	1 x Dia	.07 x Dia	.00042	.00052	.00062	.00084	.00125	.00168	.00252	.00336	1 x Dia	.16 x Dia
		Roughing	.00014	.00030	.00045	25 x Dia	.30 x Dia	.00052	.00065	.00078	.00105	.00157	.00210	.00315	.00419	.50 x Dia	.30 x Dia
<b>ZINC ALLOYS</b>																	
	800	Finishing	.00025	.00053	.00080	.05 x Dia	3 x Dia	.00092	.00115	.00137	.00185	.00276	.00369	.00554	.00739	.09 x Dia	3 x Dia
<b>COPPER ALLOYS</b>																	
High Coppers - 90%+ (C1xxx)	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.00033	.00042	.00050	.00067	.00100	.00134	.00201	.00268	1 x Dia	.16 x Dia
Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800)	500																
Phosphor Bronzes (Copper Tin alloys, C5xxx)	225																
Aluminum Bronzes (Copper Aluminum alloys, C66000-C64200)	500	Roughing	.00012	.00024	.00036	25 x Dia	.30 x Dia	.00042	.00052	.00062	.00084	.00125	.00168	.00252	.00336	.50 x Dia	.30 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C65100)	500																
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)	225																
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing	.00020	.00042	.00064	.05 x Dia	3 x Dia	.00073	.00092	.00110	.00148	.00221	.00295	.00443	.00591	.09 x Dia	3 x Dia

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	
<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	.00029	.00043	.00058	.00086	.00115	1 x Dia	.16 x Dia
		Roughing	.00004	.00009	.00014	25 x Dia	.30 x Dia	.00016	.00020	.00024	.00032	.00049	.00065	.00097	.00130	.50 x Dia	.30 x Dia
		Finishing	.00008	.00016	.00025	.05 x Dia	3 x Dia	.00029	.00036	.00043	.00058	.00086	.00115	.00173	.00231	.09 x Dia	3 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xx & 50Lxx, 51xx & 51Lxx, 52xx & 52Lxx, 6xx, 8xx, 9xx	200	Slotting	.00004	.00008	.00011	1 x Dia	.07 x Dia	.00013	.00016	.00020	.00026	.00039	.00053	.00079	.00105	1 x Dia	.16 x Dia
		Roughing	.00004	.00008	.00013	25 x Dia	.30 x Dia	.00015	.00018	.00022	.00030	.00044	.00059	.00089	.00119	.50 x Dia	.30 x Dia
		Finishing	.00007	.00015	.00023	.05 x Dia	3 x Dia	.00026	.00033	.00039	.00053	.00079	.00106	.00158	.00211	.09 x Dia	3 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	.00029	.00043	.00058	.00086	.00115	1 x Dia	.16 x Dia
		Roughing	.00004	.00009	.00014	25 x Dia	.30 x Dia	.00016	.00020	.00024	.00032	.00049	.00065	.00097	.00130	.50 x Dia	.30 x Dia
		Finishing	.00008	.00016	.00025	.05 x Dia	3 x Dia	.00029	.00036	.00043	.00058	.00086	.00115	.00173	.00231	.09 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	200	Slotting	.00004	.00008	.00011	1 x Dia	.07 x Dia	.00013	.00016	.00020	.00026	.00039	.00053	.00079	.00105	1 x Dia	.16 x Dia
		Roughing	.00004	.00008	.00013	25 x Dia	.30 x Dia	.00015	.00018	.00022	.00030	.00044	.00059	.00089	.00119	.50 x Dia	.30 x Dia
		Finishing	.00007	.00015	.00023	.05 x Dia	3 x Dia	.00026	.00033	.00039	.00053	.00079	.00106	.00158	.00211	.09 x Dia	3 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	.00025	.00033	.00049	.00066	1 x Dia	.16 x Dia
		Roughing	.00003	.00005	.00008	25 x Dia	.30 x Dia	.00009	.00012	.00014	.00019	.00028	.00037	.00056	.00074	.50 x Dia	.30 x Dia
		Finishing	.00005	.00009	.00014	.05 x Dia	3 x Dia	.00016	.00021	.00025	.00033	.00049	.00066	.00099	.00132	.09 x Dia	3 x Dia
<b>TOOL STEELS</b>																	
A, L, O, P, W series	200	Slotting	.00004	.00008	.00011	1 x Dia	.07 x Dia	.00013	.00016	.00020	.00026	.00039	.00053	.00079	.00105	1 x Dia	.16 x Dia
		Roughing	.00004	.00008	.00013	25 x Dia	.30 x Dia	.00015	.00018	.00022	.00030	.00044	.00059	.00089	.00119	.50 x Dia	.30 x Dia
		Finishing	.00007	.00015	.00023	.05 x Dia	3 x Dia	.00026	.00033	.00039	.00053	.00079	.00106	.00158	.00211	.09 x Dia	3 x Dia
D, H, M, T, S series	150	Slotting	.00002	.00005	.00007	1 x Dia	.07 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	1 x Dia	.16 x Dia
		Roughing	.00003	.00005	.00008	25 x Dia	.30 x Dia	.00009	.00012	.00014	.00019	.00028	.00037	.00056	.00074	.50 x Dia	.30 x Dia
		Finishing	.00005	.00009	.00014	.05 x Dia	3 x Dia	.00016	.00021	.00025	.00033	.00049	.00066	.00099	.00132	.09 x Dia	3 x Dia
<b>TITANIUM ALLOYS</b>																	
	150	Slotting	.00002	.00005	.00007	1 x Dia	.07 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	1 x Dia	.16 x Dia
		Roughing	.00003	.00005	.00008	25 x Dia	.30 x Dia	.00009	.00012	.00014	.00019	.00028	.00037	.00056	.00074	.50 x Dia	.30 x Dia
		Finishing	.00005	.00009	.00014	.05 x Dia	3 x Dia	.00016	.00021	.00025	.00033	.00049	.00066	.00099	.00132	.09 x Dia	3 x Dia
<b>HIGH TEMP ALLOYS</b>																	
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Incoloy	70	Slotting	.00002	.00005	.00007	1 x Dia	.07 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	1 x Dia	.16 x Dia
		Roughing	.00003	.00005	.00008	25 x Dia	.30 x Dia	.00009	.00012	.00014	.00019	.00028	.00037	.00056	.00074	.50 x Dia	.30 x Dia
		Finishing	.00005	.00009	.00014	.05 x Dia	3 x Dia	.00016	.00021	.00025	.00033	.00049	.00066	.00099	.00132	.09 x Dia	3 x Dia

MATERIAL	SFM	Hardness: 38-45 Rc (353-421 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	
		Slotting	-	-	-	1 x Dia	.07 x Dia	-	-	-	-	-	-	-	-	-	-
		Roughing	-	-	-	25 x Dia	.30 x Dia	-	-	-	-	-	-	-	-	-	-
		Finishing	-	-	-	.05 x Dia	3 x Dia	-	-	-	-	-	-	-	-	-	-
		Slotting	.00002	.00004	.00006	1 x Dia	.07 x Dia	.00007	.00008	.00010	.00013	.00020	.00026	.00040	.00053	1 x Dia	.16 x Dia
		Roughing	.00002	.00004	.00006	25 x Dia	.30 x Dia	.00007	.00009	.00011	.00015	.00022	.00030	.00044	.00059	.50 x Dia	.30 x Dia
		Finishing	.00004	.00008	.00012	.05 x Dia	3 x Dia	.00013	.00017	.00020	.00027	.00040	.00053	.00080	.001		