



**Product Table:** Miniature End Mills - Ball - Long Reach, Standard Flute  
**Characteristics:** 5x Reach Multiple, 4 Flutes  
**Series:** 9828xx, 9829xx

**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.

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	750	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia
		Roughing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia
	1000	Finishing	.00026	.00054	.00081	.06 x Dia	3 x Dia	.00093	.00117	.00140	.00188	.00281	.00375	.00563	.00751	.12 x Dia	3 x Dia
		Slotting	.00012	.00025	.00039	1 x Dia	.08 x Dia	.00044	.00056	.00068	.00089	.00133	.00178	.00267	.00356	1 x Dia	.20 x Dia
	750	Finishing	.00015	.00030	.00045	.30 x Dia	.35 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	.60 x Dia	.35 x Dia
		Slotting	.00012	.00025	.00039	1 x Dia	.08 x Dia	.00044	.00056	.00068	.00089	.00133	.00178	.00267	.00356	1 x Dia	.20 x Dia
650	Finishing	.00015	.00030	.00045	.30 x Dia	.35 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	.60 x Dia	.35 x Dia	
	Slotting	.00012	.00025	.00039	1 x Dia	.08 x Dia	.00044	.00056	.00068	.00089	.00133	.00178	.00267	.00356	1 x Dia	.20 x Dia	
475	Finishing	.00015	.00030	.00045	.30 x Dia	.35 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	.60 x Dia	.35 x Dia	
	Slotting	.00012	.00025	.00039	1 x Dia	.08 x Dia	.00044	.00056	.00068	.00089	.00133	.00178	.00267	.00356	1 x Dia	.20 x Dia	
1000	Finishing	.00023	.00048	.00073	.06 x Dia	3 x Dia	.00084	.00105	.00126	.00169	.00253	.00338	.00507	.00676	.12 x Dia	3 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
800	Finishing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
1500	Finishing	.00026	.00054	.00081	.06 x Dia	3 x Dia	.00093	.00117	.00140	.00188	.00281	.00375	.00563	.00751	.12 x Dia	3 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
800	Finishing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
225	Finishing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
500	Finishing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
500	Finishing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
225	Finishing	.00017	.00035	.00054	.30 x Dia	.35 x Dia	.00061	.00077	.00092	.00124	.00185	.00248	.00371	.00495	.60 x Dia	.35 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	
550	Finishing	.00021	.00043	.00065	.06 x Dia	3 x Dia	.00074	.00094	.00112	.00150	.00225	.00300	.00450	.00601	.12 x Dia	3 x Dia	
	Slotting	.00014	.00028	.00043	1 x Dia	.08 x Dia	.00049	.00062	.00074	.00099	.00148	.00198	.00297	.00396	1 x Dia	.20 x Dia	

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	600	Slotting	.00005	.00010	.00015	1 x Dia	.08 x Dia	.00017	.00021	.00025	.00034	.00051	.00068	.00102	.00136	1 x Dia	.20 x Dia
		Roughing	.00005	.00011	.00017	.30 x Dia	.35 x Dia	.00019	.00024	.00028	.00038	.00057	.00077	.00115	.00153	.60 x Dia	.35 x Dia
		Finishing	.00008	.00017	.00025	.06 x Dia	3 x Dia	.00029	.00037	.00044	.00059	.00086	.00117	.00176	.00235	.12 x Dia	3 x Dia
	200	Slotting	.00004	.00009	.00013	1 x Dia	.08 x Dia	.00015	.00019	.00023	.00031	.00047	.00062	.00093	.00124	1 x Dia	.20 x Dia
		Roughing	.00005	.00010	.00015	.30 x Dia	.35 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.60 x Dia	.35 x Dia
		Finishing	.00007	.00015	.00023	.06 x Dia	3 x Dia	.00027	.00033	.00040	.00054	.00080	.00107	.00161	.00215	.12 x Dia	3 x Dia
450	Slotting	.00005	.00010	.00015	1 x Dia	.08 x Dia	.00017	.00021	.00025	.00034	.00051	.00068	.00102	.00136	1 x Dia	.20 x Dia	
	Roughing	.00005	.00011	.00017	.30 x Dia	.35 x Dia	.00019	.00024	.00028	.00038	.00057	.00077	.00115	.00153	.60 x Dia	.35 x Dia	
	Finishing	.00008	.00017	.00025	.06 x Dia	3 x Dia	.00029	.00037	.00044	.00059	.00086	.00117	.00176	.00235	.12 x Dia	3 x Dia	
200	Slotting	.00004	.00009	.00013	1 x Dia	.08 x Dia	.00015	.00019	.00023	.00031	.00047	.00062	.00093	.00124	1 x Dia	.20 x Dia	
	Roughing	.00005	.00010	.00015	.30 x Dia	.35 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.60 x Dia	.35 x Dia	
	Finishing	.00007	.00015	.00023	.06 x Dia	3 x Dia	.00027	.00033	.00040	.00054	.00080	.00107	.00161	.00215	.12 x Dia	3 x Dia	
150	Slotting	.00003	.00006	.00008	1 x Dia	.08 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.20 x Dia	
	Roughing	.00003	.00006	.00009	.30 x Dia	.35 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.60 x Dia	.35 x Dia	
	Finishing	.00005	.00010	.00015	.06 x Dia	3 x Dia	.00017	.00021	.00025	.00034	.00050	.00067	.00101	.00134	.12 x Dia	3 x Dia	
200	Slotting	.00004	.00009	.00013	1 x Dia	.08 x Dia	.00015	.00019	.00023	.00031	.00047	.00062	.00093	.00124	1 x Dia	.20 x Dia	
	Roughing	.00005	.00010	.00015	.30 x Dia	.35 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	.60 x Dia	.35 x Dia	
	Finishing	.00007	.00015	.00023	.06 x Dia	3 x Dia	.00027	.00033	.00040	.00054	.00080	.00107	.00161	.00215	.12 x Dia	3 x Dia	
150	Slotting	.00003	.00006	.00008	1 x Dia	.08 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.20 x Dia	
	Roughing	.00003	.00006	.00009	.30 x Dia	.35 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.60 x Dia	.35 x Dia	
	Finishing	.00005	.00010	.00015	.06 x Dia	3 x Dia	.00017	.00021	.00025	.00034	.00050	.00067	.00101	.00134	.12 x Dia	3 x Dia	
150	Slotting	.00003	.00006	.00008	1 x Dia	.08 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.20 x Dia	
	Roughing	.00003	.00006	.00009	.30 x Dia	.35 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.60 x Dia	.35 x Dia	
	Finishing	.00005	.00010	.00015	.06 x Dia	3 x Dia	.00017	.00021	.00025	.00034	.00050	.00067	.00101	.00134	.12 x Dia	3 x Dia	
150	Slotting	.00003	.00006	.00008	1 x Dia	.08 x Dia	.00010	.00012	.00014	.00019	.00029	.00039	.00058	.00078	1 x Dia	.20 x Dia	
	Roughing	.00003	.00006	.00009	.30 x Dia	.35 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	.60 x Dia	.35 x Dia	
	Finishing	.00005	.00010	.00015	.06 x Dia	3 x Dia	.00017	.00021	.00025	.00034	.00050	.00067	.00101	.00134	.12 x Dia	3 x Dia	
75	Slotting	.00001	.00003	.00004	1 x Dia	.08 x Dia	.00005	.00006	.00007	.00010	.00013	.00016	.00021	.00025	.12 x Dia	3 x Dia	
	Roughing	.00002	.00003	.00005	.30 x Dia	.35 x Dia	.00003	.00004	.00005	.00007	.00010	.00013	.00016	.00021	.60 x Dia	.35 x Dia	
	Finishing	.00002	.00003	.00004	.06 x Dia	3 x Dia	.00003	.00004	.00005	.00007	.00010	.00013	.00016	.00021	.12 x Dia	3 x Dia	
50	Slotting	.00001	.00003	.00004	1 x Dia	.08 x Dia	.00005	.00006	.00007	.00010	.00013	.00016	.00021	.00025	1 x Dia	.20 x Dia	
	Roughing	.00002	.00003	.00005	.30 x Dia	.35 x Dia	.00003	.00004	.00005	.00007	.00010	.00013	.00016	.00021	.60 x Dia	.35 x Dia	
	Finishing	.00002	.00003	.00004	.06 x Dia	3 x Dia	.00003	.00004	.00005	.00007	.00010	.00013	.00016	.00021	.12 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				