

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	.00029	.00044	1 x Dia	.07 x Dia	.00051	.00064	.00076	.00103	.00154	.00205	.00308	.00411	1 x Dia	.19 x Dia	
		Roughing	.00018	.00037	.00056	.29 x Dia	.33 x Dia	.00064	.00080	.00096	.00128	.00192	.00257	.00385	.00514	.58 x Dia	.33 x Dia	
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing	.00029	.00059	.00090	.08 x Dia	1.5 x Dia	.00103	.00129	.00154	.00207	.00310	.00415	.00622	.00829	.15 x Dia	1.5 x Dia	
		Slotting	.00013	.00026	.00040	1 x Dia	.07 x Dia	.00046	.00058	.00069	.00092	.00138	.00185	.00277	.00370	1 x Dia	.19 x Dia	
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750	Slotting	.00013	.00026	.00040	1 x Dia	.07 x Dia	.00046	.00058	.00069	.00092	.00138	.00185	.00277	.00370	1 x Dia	.19 x Dia	
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700	Slotting	.00013	.00026	.00040	1 x Dia	.07 x Dia	.00046	.00058	.00069	.00092	.00138	.00185	.00277	.00370	1 x Dia	.19 x Dia	
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650	Roughing	.00016	.00033	.00050	.29 x Dia	.33 x Dia	.00057	.00072	.00086	.00116	.00173	.00231	.00347	.0462	.58 x Dia	.33 x Dia	
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475	Slotting	.00013	.00026	.00040	1 x Dia	.07 x Dia	.00046	.00058	.00069	.00092	.00138	.00185	.00277	.00370	1 x Dia	.19 x Dia	
Wrought - 5%-8% Si (4xxx)	1000	Finishing	.00026	.00053	.00081	.08 x Dia	1.5 x Dia	.00093	.00116	.00139	.00187	.00279	.00373	.00560	.0746	.15 x Dia	1.5 x Dia	
Wrought - 8%-12% Si (4xxx)	800	Slotting	.00014	.00029	.00044	1 x Dia	.07 x Dia	.00051	.00064	.00076	.00103	.00154	.00205	.00308	.00411	1 x Dia	.19 x Dia	
MAGNESIUM ALLOYS	1500	Roughing	.00018	.00037	.00056	.29 x Dia	.33 x Dia	.00064	.00080	.00096	.00128	.00192	.00257	.00385	.00514	.58 x Dia	.33 x Dia	
		Finishing	.00029	.00059	.00090	.08 x Dia	1.5 x Dia	.00103	.00129	.00154	.00207	.00310	.00415	.00622	.00829	.15 x Dia	1.5 x Dia	
ZINC ALLOYS	800	Finishing	.00029	.00059	.00090	.08 x Dia	1.5 x Dia	.00103	.00129	.00154	.00207	.00310	.00415	.00622	.00829	.15 x Dia	1.5 x Dia	
		Slotting	.00011	.00023	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00082	.00123	.00164	.00247	.00329	1 x Dia	.19 x Dia	
COPPER ALLOYS	225	High Coppers - 90%+ (C1xxx)	Slotting	.00011	.00023	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00082	.00123	.00164	.00247	.00329	1 x Dia	.19 x Dia
		Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800)	500	Slotting	.00011	.00023	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00082	.00123	.00164	.00247	.00329	1 x Dia
Phosphor Bronzes (Copper Tin alloys, C5xxx)	225	Slotting	.00011	.00023	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00082	.00123	.00164	.00247	.00329	1 x Dia	.19 x Dia	
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Roughing	.00014	.00029	.00044	.29 x Dia	.33 x Dia	.00051	.00064	.00076	.00103	.00154	.00205	.00308	.00411	.58 x Dia	.33 x Dia	
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	Roughing	.00014	.00029	.00044	.29 x Dia	.33 x Dia	.00051	.00064	.00076	.00103	.00154	.00205	.00308	.00411	.58 x Dia	.33 x Dia	
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)	225	Slotting	.00011	.00023	.00036	1 x Dia	.07 x Dia	.00041	.00051	.00061	.00082	.00123	.00164	.00247	.00329	1 x Dia	.19 x Dia	
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Finishing	.00023	.00047	.00072	.08 x Dia	1.5 x Dia	.00082	.00103	.00123	.00166	.00248	.00332	.00497	.0663	.15 x Dia	1.5 x Dia	



**Product Table:** Miniature End Mills - Ball - Long Reach, Stub Flute  
**Characteristics:** 7x Reach Multiple  
**Series:** 8682xx, 8683xx

**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: 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	.07 x Dia	.00018	.00022	.00026	.00035	.00053	.00071	.00106	.00141	1 x Dia	.19 x Dia
		Roughing	.00005	.00011	.00017	.29 x Dia	.33 x Dia	.00020	.00025	.00030	.00040	.00059	.00079	.00119	.00159	.58 x Dia	.33 x Dia
		Finishing	.00009	.00018	.00028	.08 x Dia	1.5 x Dia	.00032	.00040	.00048	.00065	.00097	.00130	.00194	.00259	.15 x Dia	1.5 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4Lxx, 5xxx & 5Lxx, 50xxx & 50Lxx, 51xxx & 51Lxx, 52xxx & 52Lxx, 6xxx, 8xx, 9xxx	200	Slotting	.00004	.00009	.00014	1 x Dia	.07 x Dia	.00016	.00020	.00024	.00032	.00048	.00065	.00097	.00129	1 x Dia	.19 x Dia
		Roughing	.00005	.00010	.00016	.29 x Dia	.33 x Dia	.00018	.00023	.00027	.00036	.00054	.00073	.00109	.00145	.58 x Dia	.33 x Dia
		Finishing	.00008	.00017	.00026	.08 x Dia	1.5 x Dia	.00029	.00037	.00044	.00059	.00089	.00118	.00178	.00237	.15 x Dia	1.5 x Dia
STAINLESS STEELS	450	Slotting	.00005	.00010	.00015	1 x Dia	.07 x Dia	.00018	.00022	.00026	.00035	.00053	.00071	.00106	.00141	1 x Dia	.19 x Dia
		Roughing	.00005	.00011	.00017	.29 x Dia	.33 x Dia	.00020	.00025	.00030	.00040	.00059	.00079	.00119	.00159	.58 x Dia	.33 x Dia
		Finishing	.00009	.00018	.00028	.08 x Dia	1.5 x Dia	.00032	.00040	.00048	.00065	.00097	.00130	.00194	.00259	.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	.00009	.00014	1 x Dia	.07 x Dia	.00016	.00020	.00024	.00032	.00048	.00065	.00097	.00129	1 x Dia	.19 x Dia
		Roughing	.00005	.00010	.00016	.29 x Dia	.33 x Dia	.00018	.00023	.00027	.00036	.00054	.00073	.00109	.00145	.58 x Dia	.33 x Dia
		Finishing	.00008	.00017	.00026	.08 x Dia	1.5 x Dia	.00029	.00037	.00044	.00059	.00089	.00118	.00178	.00237	.15 x Dia	1.5 x Dia
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	Slotting	.00003	.00006	.00009	1 x Dia	.07 x Dia	.00010	.00013	.00015	.00020	.00030	.00040	.00061	.00081	1 x Dia	.19 x Dia
		Roughing	.00003	.00006	.00010	.29 x Dia	.33 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00091	.58 x Dia	.33 x Dia
		Finishing	.00005	.00011	.00016	.08 x Dia	1.5 x Dia	.00018	.00023	.00028	.00037	.00055	.00074	.00111	.00148	.15 x Dia	1.5 x Dia
TOOL STEELS	200	Slotting	.00004	.00009	.00014	1 x Dia	.07 x Dia	.00016	.00020	.00024	.00032	.00048	.00065	.00097	.00129	1 x Dia	.19 x Dia
		Roughing	.00005	.00010	.00016	.29 x Dia	.33 x Dia	.00018	.00023	.00027	.00036	.00054	.00073	.00109	.00145	.58 x Dia	.33 x Dia
		Finishing	.00008	.00017	.00026	.08 x Dia	1.5 x Dia	.00029	.00037	.00044	.00059	.00089	.00118	.00178	.00237	.15 x Dia	1.5 x Dia
A, L, O, P, W series	150	Slotting	.00003	.00006	.00009	1 x Dia	.07 x Dia	.00010	.00013	.00015	.00020	.00030	.00040	.00061	.00081	1 x Dia	.19 x Dia
		Roughing	.00003	.00006	.00010	.29 x Dia	.33 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00091	.58 x Dia	.33 x Dia
		Finishing	.00005	.00011	.00016	.08 x Dia	1.5 x Dia	.00018	.00023	.00028	.00037	.00055	.00074	.00111	.00148	.15 x Dia	1.5 x Dia
D, H, M, T, S series	150	Slotting	.00003	.00006	.00009	1 x Dia	.07 x Dia	.00010	.00013	.00015	.00020	.00030	.00040	.00061	.00081	1 x Dia	.19 x Dia
		Roughing	.00003	.00006	.00010	.29 x Dia	.33 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00091	.58 x Dia	.33 x Dia
		Finishing	.00005	.00011	.00016	.08 x Dia	1.5 x Dia	.00018	.00023	.00028	.00037	.00055	.00074	.00111	.00148	.15 x Dia	1.5 x Dia
TITANIUM ALLOYS	150	Slotting	.00003	.00006	.00009	1 x Dia	.07 x Dia	.00010	.00013	.00015	.00020	.00030	.00040	.00061	.00081	1 x Dia	.19 x Dia
		Roughing	.00003	.00006	.00010	.29 x Dia	.33 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00091	.58 x Dia	.33 x Dia
		Finishing	.00005	.00011	.00016	.08 x Dia	1.5 x Dia	.00018	.00023	.00028	.00037	.00055	.00074	.00111	.00148	.15 x Dia	1.5 x Dia
HIGH TEMP ALLOYS	70	Slotting	.00003	.00006	.00009	1 x Dia	.07 x Dia	.00010	.00013	.00015	.00020	.00030	.00040	.00061	.00081	1 x Dia	.19 x Dia
		Roughing	.00003	.00006	.00010	.29 x Dia	.33 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00091	.58 x Dia	.33 x Dia
		Finishing	.00005	.00011	.00016	.08 x Dia	1.5 x Dia	.00018	.00023	.00028	.00037	.00055	.00074	.00111	.00148	.15 x Dia	1.5 x Dia
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discology, Incoloy	70	Slotting	.00003	.00006	.00009	1 x Dia	.07 x Dia	.00010	.00013	.00015	.00020	.00030	.00040	.00061	.00081	1 x Dia	.19 x Dia
		Roughing	.00003	.00006	.00010	.29 x Dia	.33 x Dia	.00011	.00014	.00017	.00023	.00034	.00045	.00068	.00091	.58 x Dia	.33 x Dia
		Finishing	.00005	.00011	.00016	.08 x Dia	1.5 x Dia	.00018	.00023	.00028	.00037	.00055	.00074	.00111	.00148	.15 x Dia	1.5 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	600	Slotting	.00005	.00010	.00015	1 x Dia	.0									