

Hardness: ≤ 28 Rc (≤ 271 HBn)																	
MATERIAL	SFM	Chip Load (IPT) by Dia						Depth of Cut									
		Radial			Axial			Radial			Axial						
		0.015	0.031	0.047	0.062	0.078	0.093	0.125	0.187	0.250	0.375	0.500	Radial	Axial			
ALUMINUM ALLOYS	750	Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.0041	.00052	.00062	.00083	.00124	.00166	.00249	.00332	1 x Dia	.18 x Dia
		Roughing	.00014	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000	Finishing	.00026	.00053	.00080	.06 x Dia	1.5 x Dia	.0092	.00116	.00138	.00186	.00278	.00371	.00557	.00743	.12 x Dia	1.5 x Dia
		Slotting	.00010	.00021	.00032	1 x Dia	.07 x Dia	.0037	.00047	.00056	.00075	.00112	.00149	.00224	.00298	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	.0037	.00047	.00056	.00075	.00112	.00149	.00224	.00298	1 x Dia	.18 x Dia
		Roughing	.00013	.00027	.00040	25 x Dia	.30 x Dia	.0046	.00058	.00069	.00093	.00140	.00187	.00280	.00373	.50 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	.0037	.00047	.00056	.00075	.00112	.00149	.00224	.00298	1 x Dia	.18 x Dia
		Roughing	.00013	.00027	.00040	25 x Dia	.30 x Dia	.0046	.00058	.00069	.00093	.00140	.00187	.00280	.00373	.50 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	.0037	.00047	.00056	.00075	.00112	.00149	.00224	.00298	1 x Dia	.18 x Dia
		Roughing	.00013	.00027	.00040	25 x Dia	.30 x Dia	.0046	.00058	.00069	.00093	.00140	.00187	.00280	.00373	.50 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	.0037	.00047	.00056	.00075	.00112	.00149	.00224	.00298	1 x Dia	.18 x Dia
		Roughing	.00013	.00027	.00040	25 x Dia	.30 x Dia	.0046	.00058	.00069	.00093	.00140	.00187	.00280	.00373	.50 x Dia	.30 x Dia
Wrought - 5%-8% Si (4xxx)	1000	Finishing	.00023	.00048	.00072	.06 x Dia	1.5 x Dia	.0083	.00104	.00124	.00167	.00250	.00334	.00502	.00669	.12 x Dia	1.5 x Dia
		Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.0041	.00052	.00062	.00083	.00124	.00166	.00249	.00332	1 x Dia	.18 x Dia
Wrought - 8%-12% Si (4xxx)	800	Finishing	.00023	.00048	.00072	.06 x Dia	1.5 x Dia	.0083	.00104	.00124	.00167	.00250	.00334	.00502	.00669	.12 x Dia	1.5 x Dia
		Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.0041	.00052	.00062	.00083	.00124	.00166	.00249	.00332	1 x Dia	.18 x Dia
MAGNESIUM ALLOYS	1500	Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.0041	.00052	.00062	.00083	.00124	.00166	.00249	.00332	1 x Dia	.18 x Dia
ZINC ALLOYS	800	Finishing	.00026	.00053	.00080	.06 x Dia	1.5 x Dia	.0092	.00116	.00138	.00186	.00278	.00371	.00557	.00743	.12 x Dia	1.5 x Dia
		Slotting	.00011	.00024	.00036	1 x Dia	.07 x Dia	.0041	.00052	.00062	.00083	.00124	.00166	.00249	.00332	1 x Dia	.18 x Dia
COPPER ALLOYS	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
High Coppers - 90%+ (C1xxx)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800)	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
Phosphor Bronzes (Copper Tin alloys, C5xxx)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
Aluminum Bronzes (Copper Aluminum alloys, C66000-C64200)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxx)	225	Slotting	.00009	.00019	.00029	1 x Dia	.07 x Dia	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 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	.0033	.00041	.00049	.00066	.00099	.00133	.00199	.00265	1 x Dia	.18 x Dia
		Roughing	.00004	.00030	.00045	25 x Dia	.30 x Dia	.0051	.00065	.00077	.00104	.00155	.00207	.00311	.00415	.50 x Dia	.30 x Dia



**Product Table:** Miniature End Mills - Corner Radius - Long Reach, Stub Flute  
**Characteristics:** 10x Reach Multiple  
**Series:** 9178xx, 9179xx, 9214xx, 9215xx, 9232xx, 9233xx, 9537xx, 9538xx, 9656xx, 9657xx

**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									
		Radial			Axial			Radial			Axial						
		0.015	0.031	0.047	0.062	0.078	0.093	0.125	0.187	0.250	0.375	0.500	Radial	Axial			
CARBON STEELS	600	Slotting	.00004	.00008	.00012	1 x Dia	.07 x Dia	.0014	.00018	.00021	.00028	.00043	.00057	.00085	.00114	1 x Dia	.18 x Dia
		Roughing	.00004	.00009	.00014	25 x Dia	.30 x Dia	.0016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.50 x Dia	.30 x Dia
		Finishing	.00008	.00017	.00025	.06 x Dia	1.5 x Dia	.0029	.00036	.00043	.00058	.00087	.00116	.00174	.00232	.12 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	.00007	.00011	1 x Dia	.07 x Dia	.0013	.00016	.00019	.00026	.00039	.00052	.00078	.00104	1 x Dia	.18 x Dia
		Roughing	.00004	.00008	.00013	25 x Dia	.30 x Dia	.0015	.00018	.00022	.00029	.00044	.00059	.00088	.00117	.50 x Dia	.30 x Dia
		Finishing	.00007	.00015	.00023	.06 x Dia	1.5 x Dia	.0026	.00033	.00040	.00053	.00079	.00106	.00159	.00212	.12 x Dia	1.5 x Dia
STAINLESS STEELS	450	Slotting	.00004	.00008	.00012	1 x Dia	.07 x Dia	.0014	.00018	.00021	.00028	.00043	.00057	.00085	.00114	1 x Dia	.18 x Dia
		Roughing	.00004	.00009	.00014	25 x Dia	.30 x Dia	.0016	.00020	.00024	.00032	.00048	.00064	.00096	.00128	.50 x Dia	.30 x Dia
		Finishing	.00008	.00017	.00025	.06 x Dia	1.5 x Dia	.0029	.00036	.00043	.00058	.00087	.00116	.00174	.00232	.12 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	.0013	.00016	.00019	.00026	.00039	.00052	.00078	.00104	1 x Dia	.18 x Dia
		Roughing	.00004	.00008	.00013	25 x Dia	.30 x Dia	.0015	.00018	.00022	.00029	.00044	.00059	.00088	.00117	.50 x Dia	.30 x Dia
		Finishing	.00007	.00015	.00023	.06 x Dia	1.5 x Dia	.0026	.00033	.00040	.00053	.00079	.00106	.00159	.00212	.12 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	.0008	.00010	.00012	.00016	.00024	.00033	.00049	.00065	1 x Dia	.18 x Dia
		Roughing	.00003	.00005	.00008	25 x Dia	.30 x Dia	.0009	.00011	.00014	.00018	.00027	.00037	.00055	.00073	.50 x Dia	.30 x Dia
		Finishing	.00005	.00009	.00014	.06 x Dia	1.5 x Dia	.0016	.00021	.00025	.00033	.00050	.00066	.00100	.00133	.12 x Dia	1.5 x Dia
TOOL STEELS	200	Slotting	.00004	.00007	.00011	1 x Dia	.07 x Dia	.0013	.00016	.00019	.00026	.00039	.00052	.00078	.00104	1 x Dia	.18 x Dia
		Roughing	.00004	.00008	.00013	25 x Dia	.30 x Dia	.0015	.00018	.00022	.00029	.00044	.00059	.00088	.00117	.50 x Dia	.30 x Dia
		Finishing	.00007	.00015	.00023	.06 x Dia	1.5 x Dia	.0026	.00033	.00040	.00053	.00079	.00106	.00159	.00212	.12 x Dia	1.5 x Dia
A, L, O, P, W series	150	Slotting	.00002	.00005	.00007	1 x Dia	.07 x Dia	.0008	.00010	.00012	.00016	.00024	.00033	.00049	.00065	1 x Dia	.18 x Dia
		Roughing	.00003	.00005	.00008	25 x Dia	.30 x Dia	.0009	.00011	.00014	.00018	.00027	.00037	.00055	.00073	.50 x Dia	.30 x Dia
		Finishing	.00005	.00009	.00014	.06 x Dia	1.5 x Dia	.0016	.00021	.00025	.00033	.00050	.00066	.00100	.00133	.12 x Dia	1.5 x Dia
D, H, M, T, S series	150	Slotting	.00002	.00005	.00007	1 x Dia	.07 x Dia	.0008	.00010	.00012	.00016	.00024	.00033	.0			