



Speeds & Feeds

**Product Table:** Miniature End Mills - Square - Long Reach, Stub Flute  
**Characteristics:** 22x Reach Multiple  
**Series:** 9696xx, 9697xx

Hardness: ≤ 28 Rc (≤ 271 HBn)																	
MATERIAL	SFM	Chip Load (IPT) by Dia						Depth of Cut									
		0.015			0.031			0.047			0.062			0.078			
		Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial		
ALUMINUM ALLOYS	750	Slotting	.00006	.00012	.00019	1 x Dia	.04 x Dia	.00021	.00027	.00032	.00043	.00065	.00087	.00130	.00173	1 x Dia	.10 x Dia
		Roughing	.00007	.00015	.00023	.13 x Dia	.20 x Dia	.00027	.00034	.00040	.00054	.00081	.00108	.00162	.00217	.25 x Dia	.20 x Dia
		Finishing	.00018	.00036	.00055	.02 x Dia	1.5 x Dia	.00063	.00079	.00095	.00127	.00190	.00254	.00381	.00508	.05 x Dia	1.5 x Dia
	1000	Slotting	.00005	.00011	.00017	1 x Dia	.04 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
	750	Slotting	.00005	.00011	.00017	1 x Dia	.04 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
	650	Slotting	.00005	.00011	.00017	1 x Dia	.04 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.10 x Dia
Roughing		.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia	
Finishing		.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia	
475	Slotting	.00005	.00011	.00017	1 x Dia	.04 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.10 x Dia	
	Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia	
	Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia	
1000	Slotting	.00005	.00011	.00017	1 x Dia	.04 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.10 x Dia	
	Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia	
	Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia	
800	Slotting	.00005	.00011	.00017	1 x Dia	.04 x Dia	.00019	.00024	.00029	.00039	.00058	.00078	.00117	.00156	1 x Dia	.10 x Dia	
	Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia	
	Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia	
MAGNESIUM ALLOYS	1500	Slotting	.00006	.00012	.00019	1 x Dia	.04 x Dia	.00021	.00027	.00032	.00043	.00065	.00087	.00130	.00173	1 x Dia	.10 x Dia
		Roughing	.00007	.00015	.00023	.13 x Dia	.20 x Dia	.00027	.00034	.00040	.00054	.00081	.00108	.00162	.00217	.25 x Dia	.20 x Dia
		Finishing	.00018	.00036	.00055	.02 x Dia	1.5 x Dia	.00063	.00079	.00095	.00127	.00190	.00254	.00381	.00508	.05 x Dia	1.5 x Dia
ZINC ALLOYS	800	Slotting	.00006	.00012	.00019	1 x Dia	.04 x Dia	.00021	.00027	.00032	.00043	.00065	.00087	.00130	.00173	1 x Dia	.10 x Dia
		Roughing	.00007	.00015	.00023	.13 x Dia	.20 x Dia	.00027	.00034	.00040	.00054	.00081	.00108	.00162	.00217	.25 x Dia	.20 x Dia
		Finishing	.00018	.00036	.00055	.02 x Dia	1.5 x Dia	.00063	.00079	.00095	.00127	.00190	.00254	.00381	.00508	.05 x Dia	1.5 x Dia
COPPER ALLOYS	225	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
High Coppers - 90%+ (C1xxxx)	500	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	225	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	500	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550	Slotting	.00005	.00010	.00015	1 x Dia	.04 x Dia	.00017	.00022	.00026	.00035	.00052	.00069	.00104	.00139	1 x Dia	.10 x Dia
		Roughing	.00007	.00014	.00021	.13 x Dia	.20 x Dia	.00024	.00030	.00036	.00049	.00073	.00097	.00146	.00195	.25 x Dia	.20 x Dia
		Finishing	.00016	.00033	.00049	.02 x Dia	1.5 x Dia	.00057	.00071	.00085	.00114	.00171	.00229	.00343	.00458	.05 x Dia	1.5 x Dia

**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									
		0.015			0.031			0.047			0.062			0.078			
		Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial	Radial		
CARBON STEELS	600	Slotting	.00002	.00004	.00006	1 x Dia	.04 x Dia	.00007	.00009	.00011	.00015	.00022	.00030	.00045	.00060	1 x Dia	.10 x Dia
		Roughing	.00002	.00005	.00007	.13 x Dia	.20 x Dia	.00008	.00010	.00012	.00017	.00025	.00033	.00050	.00067	.25 x Dia	.20 x Dia
		Finishing	.00005	.00011	.00017	.02 x Dia	1.5 x Dia	.00020	.00025	.00030	.00040	.00059	.00079	.00119	.00159	.05 x Dia	1.5 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 20xx, 30xx, 40xx & 4xLx, 50xx & 5xLx, 50xx & 50Lxx, 51xx & 51Lxx, 52xx & 52Lxx, 60xx, 80xx, 90xx	200	Slotting	.00002	.00004	.00006	1 x Dia	.04 x Dia	.00007	.00008	.00010	.00014	.00020	.00027	.00041	.00054	1 x Dia	.10 x Dia
		Roughing	.00002	.00004	.00007	.13 x Dia	.20 x Dia	.00008	.00010	.00011	.00015	.00023	.00031	.00046	.00061	.25 x Dia	.20 x Dia
		Finishing	.00005	.00010	.00016	.02 x Dia	1.5 x Dia	.00018	.00023	.00027	.00036	.00054	.00073	.00109	.00145	.05 x Dia	1.5 x Dia
STAINLESS STEELS	450	Slotting	.00002	.00004	.00006	1 x Dia	.04 x Dia	.00007	.00009	.00011	.00015	.00022	.00030	.00045	.00060	1 x Dia	.10 x Dia
		Roughing	.00002	.00005	.00007	.13 x Dia	.20 x Dia	.00008	.00010	.00012	.00017	.00025	.00033	.00050	.00067	.25 x Dia	.20 x Dia
		Finishing	.00005	.00011	.00017	.02 x Dia	1.5 x Dia	.00020	.00025	.00030	.00040	.00					