

MATERIAL		Hardness: ≤ 28 Rc (≤ 271 HBn)																
		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	.00015	.00032	.00048	1 x Dia	.11 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	1 x Dia	.27 x Dia
Casting (2xx, 5xx, 7xx, 8xx)			Roughing	.00013	.00026	.00040	.13 x Dia	4 x Dia	.00046	.00058	.00069	.00093	.00139	.00186	.00278	.00371	.25 x Dia	4 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)		1000	Finishing	.00019	.00039	.00059	.06 x Dia	4 x Dia	.00068	.00085	.00102	.00137	.00205	.00274	.00411	.00547	.12 x Dia	4 x Dia
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)		750	Slotting	.00014	.00029	.00043	1 x Dia	.11 x Dia	.00050	.00063	.00075	.00100	.00150	.00200	.00301	.00401	1 x Dia	.27 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	.00012	.00024	.00036	.13 x Dia	4 x Dia	.00041	.00052	.00062	.00084	.00125	.00167	.00251	.00334	.25 x Dia	4 x Dia
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)		475																
Wrought - 5%-8% Si (4xxx)		1000	Finishing	.00017	.00035	.00053	.06 x Dia	4 x Dia	.00061	.00077	.00092	.00123	.00184	.00246	.00370	.00493	.12 x Dia	4 x Dia
Wrought - 8%-12% Si (4xxx)		800																
MAGNESIUM ALLOYS		1500	Slotting	.00015	.00032	.00048	1 x Dia	.11 x Dia	.00055	.00069	.00083	.00111	.00167	.00223	.00334	.00446	1 x Dia	.27 x Dia
			Roughing	.00013	.00026	.00040	.13 x Dia	4 x Dia	.00046	.00058	.00069	.00093	.00139	.00186	.00278	.00371	.25 x Dia	4 x Dia
ZINC ALLOYS		800	Finishing	.00019	.00039	.00059	.06 x Dia	4 x Dia	.00068	.00085	.00102	.00137	.00205	.00274	.00411	.00547	.12 x Dia	4 x Dia
COPPER ALLOYS																		
High Coppers - 90%+ (C1xxx)		225	Slotting	.00012	.00025	.00039	1 x Dia	.11 x Dia	.00044	.00056	.00066	.00089	.00133	.00178	.00267	.00356	1 x Dia	.27 x Dia
Brass (Copper Zinc alloys, C2xxx, C3xxx, C4xxx, C66400-C69800)		500																
Phosphor Bronzes (Copper Tin alloys, C5xxx)		225																
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)		500	Roughing	.00010	.00021	.00032	.13 x Dia	4 x Dia	.00037	.00046	.00055	.00074	.00111	.00149	.00223	.00297	.25 x Dia	4 x Dia
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)		500																
Copper Nicksels, Nickel Silvers (Copper Nickel alloys, C7xxx)		225																
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)		550	Finishing	.00015	.00031	.00047	.06 x Dia	4 x Dia	.00054	.00068	.00081	.00109	.00164	.00219	.00328	.00438	.12 x Dia	4 x Dia



Product Table: Miniature End Mills - Ball - Long Flute
Characteristics: 4x Length of Cut, 3 Flutes
Series: 8957xx, 8958xx

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**.

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		Hardness: 29-37 Rc (279-344 HBn)																
		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	.00011	.00017	1 x Dia	.11 x Dia	.00019	.00024	.00028	.00038	.00057	.00077	.00115	.00153	1 x Dia	.27 x Dia
Free-Machining Low Carbon steels, 10xx-1029 & all 10Lxx, 11xx-1139 & all 11Lxx, 12xx-1215 & all 12Lxx			Roughing	.00004	.00008	.00012	.13 x Dia	4 x Dia	.00014	.00018	.00021	.00029	.00043	.00057	.00086	.00115	.25 x Dia	4 x Dia
			Finishing	.00006	.00012	.00019	.06 x Dia	4 x Dia	.00021	.00027	.00032	.00043	.00064	.00086	.00128	.00171	.12 x Dia	4 x Dia
1030-1095, 1140-1151, 13xx, 15xx, 20xx, 30xx, 40xx & 4Lxx, 50xx & 5Lxx, 50xxx & 50Lxx, 51xxx & 51Lxx, 52xxx & 52Lxx, 60xx, 80xx, 90xx		200	Slotting	.00005	.00010	.00015	1 x Dia	.11 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	1 x Dia	.27 x Dia
			Roughing	.00004	.00007	.00011	.13 x Dia	4 x Dia	.00013	.00016	.00020	.00026	.00039	.00052	.00079	.00105	.25 x Dia	4 x Dia
			Finishing	.00005	.00011	.00017	.06 x Dia	4 x Dia	.00019	.00024	.00029	.00039	.00059	.00078	.00117	.00156	.12 x Dia	4 x Dia
STAINLESS STEELS		450	Slotting	.00005	.00011	.00017	1 x Dia	.11 x Dia	.00019	.00024	.00028	.00038	.00057	.00077	.00115	.00153	1 x Dia	.27 x Dia
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe			Roughing	.00004	.00008	.00012	.13 x Dia	4 x Dia	.00014	.00018	.00021	.00029	.00043	.00057	.00086	.00115	.25 x Dia	4 x Dia
			Finishing	.00006	.00012	.00019	.06 x Dia	4 x Dia	.00021	.00027	.00032	.00043	.00064	.00086	.00128	.00171	.12 x Dia	4 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	.00005	.00010	.00015	1 x Dia	.11 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	1 x Dia	.27 x Dia
			Roughing	.00004	.00007	.00011	.13 x Dia	4 x Dia	.00013	.00016	.00020	.00026	.00039	.00052	.00079	.00105	.25 x Dia	4 x Dia
			Finishing	.00005	.00011	.00017	.06 x Dia	4 x Dia	.00019	.00024	.00029	.00039	.00059	.00078	.00117	.00156	.12 x Dia	4 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	.11 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	1 x Dia	.27 x Dia
			Roughing	.00002	.00005	.00007	.13 x Dia	4 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	.25 x Dia	4 x Dia
			Finishing	.00003	.00007	.00011	.06 x Dia	4 x Dia	.00012	.00015	.00018	.00024	.00037	.00049	.00073	.00098	.12 x Dia	4 x Dia
TOOL STEELS		200	Slotting	.00005	.00010	.00015	1 x Dia	.11 x Dia	.00017	.00022	.00026	.00035	.00052	.00070	.00105	.00140	1 x Dia	.27 x Dia
A, L, O, P, W series			Roughing	.00004	.00007	.00011	.13 x Dia	4 x Dia	.00013	.00016	.00020	.00026	.00039	.00052	.00079	.00105	.25 x Dia	4 x Dia
			Finishing	.00005	.00011	.00017	.06 x Dia	4 x Dia	.00019	.00024	.00029	.00039	.00059	.00078	.00117	.00156	.12 x Dia	4 x Dia
D, H, M, T, S series		150	Slotting	.00003	.00006	.00009	1 x Dia	.11 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	1 x Dia	.27 x Dia
			Roughing	.00002	.00005	.00007	.13 x Dia	4 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	.25 x Dia	4 x Dia
			Finishing	.00003	.00007	.00011	.06 x Dia	4 x Dia	.00012	.00015	.00018	.00024	.00037	.00049	.00073	.00098	.12 x Dia	4 x Dia
TITANIUM ALLOYS		150	Slotting	.00003	.00006	.00009	1 x Dia	.11 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	1 x Dia	.27 x Dia
			Roughing	.00002	.00005	.00007	.13 x Dia	4 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	.25 x Dia	4 x Dia
			Finishing	.00003	.00007	.00011	.06 x Dia	4 x Dia	.00012	.00015	.00018	.00024	.00037	.00049	.00073	.00098	.12 x Dia	4 x Dia
HIGH TEMP ALLOYS		70	Slotting	.00003	.00006	.00009	1 x Dia	.11 x Dia	.00011	.00014	.00016	.00022	.00033	.00044	.00066	.00087	1 x Dia	.27 x Dia
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discology, Incoloy			Roughing	.00002	.00005	.00007	.13 x Dia	4 x Dia	.00008	.00010	.00012	.00016	.00025	.00033	.00049	.00066	.25 x Dia	4 x Dia
			Finishing	.00003	.00007	.00011	.06 x Dia	4 x Dia	.00012	.00015	.00018	.00024	.00037	.00049	.00073	.00098	.12 x Dia	4 x Dia

MATERIAL		Hardness: 38-45 Rc (353-421 HBn)																
		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	
			Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Roughing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Finishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Slotting	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Roughing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Finishing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			Slotting	.00002	.00005	.00008	1 x Dia	.11 x Dia	.00009	.00011	.00013	.00017	.00026	.00035	.00052	.00070	1 x Dia	.27 x Dia
			Roughing	.00002	.00004	.00006	.13 x Dia	4 x Dia	.00007	.00008	.00010	.00013	.00020	.00026	.00039	.00052	.25 x Dia	4 x Dia
			Finishing	.00003	.00006	.00009	.06 x Dia	4 x Dia	.00010	.00012	.00015	.00020	.00030	.00039	.00059	.00079	.12 x Dia	4 x Dia
			Slotting	.00002	.00003	.00005	1 x Dia	.11 x Dia	.00005	.00007	.00008	.00010	.00016	.00022	.00033	.00044	1 x Dia	.27 x Dia
			Roughing	.00001	.00002	.00004	.13 x Dia	4 x Dia	.00004	.00005	.00006	.00008	.00012	.00016	.00025	.00033	.25 x Dia	4 x Dia
			Finishing	.00002	.00004	.00005	.06 x Dia	4 x										