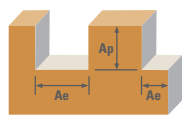


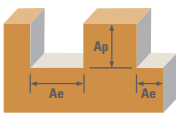
3 Flute, 5xD Overall Reach: Square, Ball



M3, M3B 5xD Fractional	Hardness	Profile	Ae x D ₁		Ap x D ₁	Vc (SFM)		Diameter (D ₁) (inch)					
			≤ .30	≤ .60				≤ .35	0.0100	0.0156	0.0312	0.0625	0.0938
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile	≤ .30	≤ .60	≤ .35	365	RPM	139430	89378	44689	22309	14865	11619
						(292-438)	Fz	0.000033	0.00005	0.00010	0.00021	0.00031	0.00040
							Feed (ipm)	13.85	13.85	13.85	13.85	13.85	13.85
		Slot	1	≤ .08	≤ .20	290	RPM	110780	71013	35506	17725	11810	9232
						(232-348)	Fz	0.000033	0.00005	0.00010	0.00021	0.00031	0.00040
							Feed (ipm)	11.01	11.01	11.01	11.01	11.01	11.01
H	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile	≤ .30	≤ .60	≤ .35	210	RPM	80220	51423	25712	12835	8552	6685
						(168-252)	Fz	0.000029	0.00005	0.00009	0.00018	0.00028	0.00035
							Feed (ipm)	7.08	7.08	7.08	7.08	7.08	7.08
		Slot	1	≤ .08	≤ .20	165	RPM	63030	40404	20202	10085	6720	5253
						(132-198)	Fz	0.000029	0.00005	0.00009	0.00018	0.00028	0.00035
							Feed (ipm)	5.57	5.57	5.57	5.57	5.57	5.57
K	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile	≤ .30	≤ .60	≤ .35	175	RPM	66850	42853	21426	10696	7127	5571
						(140-210)	Fz	0.000025	0.00004	0.00008	0.00015	0.00023	0.00029
							Feed (ipm)	4.92	4.92	4.92	4.92	4.92	4.92
		Slot	1	≤ .08	≤ .20	140	RPM	53480	34282	17141	8557	5701	4457
						(112-168)	Fz	0.000025	0.00004	0.00008	0.00015	0.00023	0.00029
							Feed (ipm)	3.93	3.93	3.93	3.93	3.93	3.93
M	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	Profile	≤ .30	≤ .60	≤ .35	305	RPM	116510	74686	37343	18642	12421	9709
						(244-366)	Fz	0.000033	0.00005	0.00010	0.00021	0.00031	0.00040
							Feed (ipm)	11.60	11.60	11.60	11.60	11.60	11.60
		Slot	1	≤ .08	≤ .20	245	RPM	93590	59994	29997	14974	9978	7799
						(196-294)	Fz	0.000033	0.00005	0.00010	0.00021	0.00031	0.00040
							Feed (ipm)	9.32	9.32	9.32	9.32	9.32	9.32
	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile	≤ .30	≤ .60	≤ .35	340	RPM	129880	83256	41628	20781	13846	10823
						(272-408)	Fz	0.000033	0.00005	0.00010	0.00021	0.00031	0.00040
							Feed (ipm)	12.90	12.90	12.90	12.90	12.90	12.90
		Slot	1	≤ .08	≤ .20	270	RPM	103140	66115	33058	16502	10996	8595
						(216-324)	Fz	0.000033	0.00005	0.00010	0.00021	0.00031	0.00040
							Feed (ipm)	10.25	10.25	10.25	10.25	10.25	10.25
STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile	≤ .30	≤ .60	≤ .35	235	RPM	89770	57545	28772	14363	9570	7481	
					(188-282)	Fz	0.000029	0.00005	0.00009	0.00018	0.00028	0.00035	
						Feed (ipm)	7.93	7.93	7.93	7.93	7.93	7.93	
	Slot	1	≤ .08	≤ .20	185	RPM	70670	45301	22651	11307	7534	5889	
					(148-222)	Fz	0.000029	0.00005	0.00009	0.00018	0.00028	0.00035	
						Feed (ipm)	6.24	6.24	6.24	6.24	6.24	6.24	
STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	Profile	≤ .30	≤ .60	≤ .35	215	RPM	82130	52647	26324	13141	8756	6844	
					(172-258)	Fz	0.000021	0.00003	0.00007	0.00013	0.00020	0.00025	
						Feed (ipm)	5.13	5.13	5.13	5.13	5.13	5.13	
	Slot	1	≤ .08	≤ .20	170	RPM	64940	41628	20814	10390	6923	5412	
					(136-204)	Fz	0.000021	0.00003	0.00007	0.00013	0.00020	0.00025	
						Feed (ipm)	4.06	4.06	4.06	4.06	4.06	4.06	

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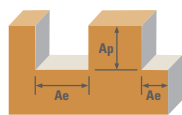
3 Flute, 5xD Overall Reach: Square, Ball



M3, M3B 5xD Fractional	Hardness	Profile	Ae x D ₁		Ap x D ₁		Vc (SFM)		Diameter (D ₁) (inch)						
			≤ .30	≤ .60	≤ .35				0.0100	0.0156	0.0312	0.0625	0.0938	0.1200	
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile	≤ .30	≤ .60	≤ .35		60	RPM	22920	14692	7346	3667	2443	1910	
							(48-72)	Fz	0.000019	0.00003	0.00006	0.00012	0.00017	0.00022	
								Feed (ipm)	1.27	1.27	1.27	1.27	1.27	1.27	
		Slot	1	≤ .08	≤ .20			45	RPM	17190	11019	5510	2750	1833	1433
								(36-54)	Fz	0.000019	0.00003	0.00006	0.00012	0.00017	0.00022
									Feed (ipm)	0.95	0.95	0.95	0.95	0.95	0.95
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile	≤ .30	≤ .60	≤ .35			45	RPM	17190	11019	5510	2750	1833	1433
								(36-54)	Fz	0.000012	0.00002	0.00004	0.00008	0.00012	0.00015
									Feed (ipm)	0.64	0.64	0.64	0.64	0.64	0.64
		Slot	1	≤ .08	≤ .20			35	RPM	13370	8571	4285	2139	1425	1114
								(28-42)	Fz	0.000012	0.00002	0.00004	0.00008	0.00012	0.00015
									Feed (ipm)	0.49	0.49	0.49	0.49	0.49	0.49
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile	≤ .30	≤ .60	≤ .35			160	RPM	61120	39179	19590	9779	6516	5093	
							(128-192)	Fz	0.000021	0.00003	0.00007	0.00013	0.00020	0.00025	
								Feed (ipm)	3.82	3.82	3.82	3.82	3.82	3.82	
	Slot	1	≤ .08	≤ .20			130	RPM	49660	31833	15917	7946	5294	4138	
							(104-156)	Fz	0.000021	0.00003	0.00007	0.00013	0.00020	0.00025	
								Feed (ipm)	3.11	3.11	3.11	3.11	3.11	3.11	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile	≤ .30	≤ .60	≤ .35			60	RPM	22920	14692	7346	3667	2443	1910	
							(48-72)	Fz	0.000015	0.00002	0.00005	0.00009	0.00014	0.00018	
								Feed (ipm)	1.01	1.01	1.01	1.01	1.01	1.01	
	Slot	1	≤ .08	≤ .20			45	RPM	17190	11019	5510	2750	1833	1433	
							(36-54)	Fz	0.000015	0.00002	0.00005	0.00009	0.00014	0.00018	
								Feed (ipm)	0.76	0.76	0.76	0.76	0.76	0.76	
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	Profile	≤ .30	≤ .60	≤ .35			1000	RPM	382000	244872	122436	61120	40725	31833
								(800-1200)	Fz	0.000098	0.00015	0.00031	0.00061	0.00092	0.00117
									Feed (ipm)	112.13	112.13	112.13	112.13	112.13	112.13
		Slot	1	≤ .08	≤ .20			800	RPM	305600	195897	97949	48896	32580	25467
								(640-960)	Fz	0.000098	0.00015	0.00031	0.00061	0.00092	0.00117
									Feed (ipm)	89.70	89.70	89.70	89.70	89.70	89.70
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	Profile	≤ .30	≤ .60	≤ .35			515	RPM	196730	126109	63054	31477	20973	16394
								(412-618)	Fz	0.000073	0.00011	0.00023	0.00046	0.00069	0.00088
									Feed (ipm)	43.34	43.34	43.34	43.34	43.34	43.34
		Slot	1	≤ .08	≤ .20			410	RPM	156620	100397	50199	25059	16697	13052
								(328-492)	Fz	0.000073	0.00011	0.00023	0.00046	0.00069	0.00088
									Feed (ipm)	34.50	34.50	34.50	34.50	34.50	34.50
PLASTICS Polycarbonate, PVC, Polypropylene	Profile	≤ .30	≤ .60	≤ .35			1000	RPM	382000	244872	122436	61120	40725	31833	
							(800-1200)	Fz	0.000098	0.00015	0.00031	0.00061	0.00092	0.00117	
								Feed (ipm)	112.13	112.13	112.13	112.13	112.13	112.13	
	Slot	1	≤ .08	≤ .20			800	RPM	305600	195897	97949	48896	32580	25467	
							(640-960)	Fz	0.000098	0.00015	0.00031	0.00061	0.00092	0.00117	
								Feed (ipm)	89.70	89.70	89.70	89.70	89.70	89.70	

- Note:**
- Bhn (Brinell) HRC (Rockwell C)
 - when recommended speed exceeds your capability, use maximum available and recalculate ipm
 - rpm = Vc x 3.82 / D₁
 - ipm = Fz x 3 x rpm
 - helical ramp at 1 degrees or less, using slotting speed and feed rates (plunging is not recommended)
 - reduce speed and feed for materials harder than listed
 - reduce feed and Ae when finish milling (.02 x D₁ maximum)
 - refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

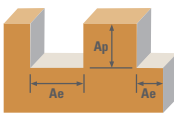
3 Flute, 8xD Overall Reach: Square, Ball



M3, M3B 8xD Fractional	Hardness	Profile	Ae x D ₁		Ap x D ₁	Vc (SFM)		Diameter (D ₁) (inch)					
			≤ .25	≤ .50				≤ .30	0.0100	0.0156	0.0312	0.0625	0.0938
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile	≤ .25	≤ .50	≤ .30	365	RPM	139430	89378	44689	22309	14865	11619
						(292-438)	Fz	0.000026	0.00004	0.00008	0.00016	0.00024	0.00031
							Feed (ipm)	10.84	10.84	10.84	10.84	10.84	10.84
		Slot	1	≤ .07	≤ .17	290	RPM	110780	71013	35506	17725	11810	9232
						(232-348)	Fz	0.000026	0.00004	0.00008	0.00016	0.00024	0.00031
							Feed (ipm)	8.61	8.61	8.61	8.61	8.61	8.61
H	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile	≤ .25	≤ .50	≤ .30	210	RPM	80220	51423	25712	12835	8552	6685
						(168-252)	Fz	0.000023	0.00004	0.00007	0.00014	0.00022	0.00028
							Feed (ipm)	5.54	5.54	5.54	5.54	5.54	5.54
		Slot	1	≤ .07	≤ .17	165	RPM	63030	40404	20202	10085	6720	5253
						(132-198)	Fz	0.000023	0.00004	0.00007	0.00014	0.00022	0.00028
							Feed (ipm)	4.36	4.36	4.36	4.36	4.36	4.36
K	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	Profile	≤ .25	≤ .50	≤ .30	175	RPM	66850	42853	21426	10696	7127	5571
						(140-210)	Fz	0.000019	0.00003	0.00006	0.00012	0.00018	0.00023
							Feed (ipm)	3.85	3.85	3.85	3.85	3.85	3.85
		Slot	1	≤ .07	≤ .17	140	RPM	53480	34282	17141	8557	5701	4457
						(112-168)	Fz	0.000019	0.00003	0.00006	0.00012	0.00018	0.00023
							Feed (ipm)	3.08	3.08	3.08	3.08	3.08	3.08
M	CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile	Profile	≤ .25	≤ .50	≤ .30	305	RPM	116510	74686	37343	18642	12421	9709
						(244-366)	Fz	0.000026	0.00004	0.00008	0.00016	0.00024	0.00031
							Feed (ipm)	9.08	9.08	9.08	9.08	9.08	9.08
		Slot	1	≤ .07	≤ .17	245	RPM	93590	59994	29997	14974	9978	7799
						(196-294)	Fz	0.000026	0.00004	0.00008	0.00016	0.00024	0.00031
							Feed (ipm)	7.29	7.29	7.29	7.29	7.29	7.29
N	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	Profile	≤ .25	≤ .50	≤ .30	340	RPM	129880	83256	41628	20781	13846	10823
						(272-408)	Fz	0.000026	0.00004	0.00008	0.00016	0.00024	0.00031
							Feed (ipm)	10.10	10.10	10.10	10.10	10.10	10.10
		Slot	1	≤ .07	≤ .17	270	RPM	103140	66115	33058	16502	10996	8595
						(216-324)	Fz	0.000026	0.00004	0.00008	0.00016	0.00024	0.00031
							Feed (ipm)	8.02	8.02	8.02	8.02	8.02	8.02
O	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	Profile	≤ .25	≤ .50	≤ .30	235	RPM	89770	57545	28772	14363	9570	7481
						(188-282)	Fz	0.000023	0.00004	0.00007	0.00014	0.00022	0.00028
							Feed (ipm)	6.21	6.21	6.21	6.21	6.21	6.21
		Slot	1	≤ .07	≤ .17	185	RPM	70670	45301	22651	11307	7534	5889
						(148-222)	Fz	0.000023	0.00004	0.00007	0.00014	0.00022	0.00028
							Feed (ipm)	4.89	4.89	4.89	4.89	4.89	4.89
P	STAINLESS STEELS (PH) 13-8 PH, 15-5PH, 17-4 PH, CUSTOM 450	Profile	≤ .25	≤ .50	≤ .30	215	RPM	82130	52647	26324	13141	8756	6844
						(172-258)	Fz	0.000016	0.00003	0.00005	0.00010	0.00015	0.00020
							Feed (ipm)	4.02	4.02	4.02	4.02	4.02	4.02
		Slot	1	≤ .07	≤ .17	170	RPM	64940	41628	20814	10390	6923	5412
						(136-204)	Fz	0.000016	0.00003	0.00005	0.00010	0.00015	0.00020
							Feed (ipm)	3.18	3.18	3.18	3.18	3.18	3.18

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3 Flute, 8xD Overall Reach: Square, Ball



M3, M3B 8xD Fractional	Hardness	Profile	Ae x D ₁		Ap x D ₁	Vc (SFM)		Diameter (D ₁) (inch)					
			≤ .25	≤ .50				≤ .30	0.0100	0.0156	0.0312	0.0625	0.0938
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile	≤ .25	≤ .50	≤ .30	60	RPM	22920	14692	7346	3667	2443	1910
						(48-72)	Fz	0.000014	0.00002	0.00005	0.00009	0.00014	0.00017
							Feed (ipm)	1.00	1.00	1.00	1.00	1.00	1.00
		Slot	1	≤ .07	≤ .17	45	RPM	17190	11019	5510	2750	1833	1433
						(36-54)	Fz	0.000014	0.00002	0.00005	0.00009	0.00014	0.00017
							Feed (ipm)	0.75	0.75	0.75	0.75	0.75	0.75
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile	≤ .25	≤ .50	≤ .30	45	RPM	17190	11019	5510	2750	1833	1433
						(36-54)	Fz	0.000010	0.00002	0.00003	0.00006	0.00009	0.00012
							Feed (ipm)	0.50	0.50	0.50	0.50	0.50	0.50
		Slot	1	≤ .07	≤ .17	35	RPM	13370	8571	4285	2139	1425	1114
						(28-42)	Fz	0.000010	0.00002	0.00003	0.00006	0.00009	0.00012
							Feed (ipm)	0.39	0.39	0.39	0.39	0.39	0.39
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile	≤ .25	≤ .50	≤ .30	160	RPM	61120	39179	19590	9779	6516	5093	
					(128-192)	Fz	0.000016	0.00003	0.00005	0.00010	0.00015	0.00020	
						Feed (ipm)	2.99	2.99	2.99	2.99	2.99	2.99	
	Slot	1	≤ .07	≤ .17	130	RPM	49660	31833	15917	7946	5294	4138	
					(104-156)	Fz	0.000016	0.00003	0.00005	0.00010	0.00015	0.00020	
						Feed (ipm)	2.43	2.43	2.43	2.43	2.43	2.43	
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile	≤ .25	≤ .50	≤ .30	60	RPM	22920	14692	7346	3667	2443	1910	
					(48-72)	Fz	0.000012	0.00002	0.00004	0.00007	0.00011	0.00014	
						Feed (ipm)	0.79	0.79	0.79	0.79	0.79	0.79	
	Slot	1	≤ .07	≤ .17	45	RPM	17190	11019	5510	2750	1833	1433	
					(36-54)	Fz	0.000012	0.00002	0.00004	0.00007	0.00011	0.00014	
						Feed (ipm)	0.59	0.59	0.59	0.59	0.59	0.59	
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	Profile	≤ .25	≤ .50	≤ .30	1000	RPM	382000	244872	122436	61120	40725	31833
						(800-1200)	Fz	0.000077	0.00012	0.00024	0.00048	0.00072	0.00092
							Feed (ipm)	87.75	87.75	87.75	87.75	87.75	87.75
		Slot	1	≤ .07	≤ .17	800	RPM	305600	195897	97949	48896	32580	25467
						(640-960)	Fz	0.000077	0.00012	0.00024	0.00048	0.00072	0.00092
							Feed (ipm)	70.20	70.20	70.20	70.20	70.20	70.20
COPPER ALLOYS Alum Bronze, C110, Muntz Brass	Profile	≤ .25	≤ .50	≤ .30	515	RPM	196730	126109	63054	31477	20973	16394	
					(412-618)	Fz	0.000057	0.00009	0.00018	0.00036	0.00054	0.00069	
						Feed (ipm)	33.91	33.91	33.91	33.91	33.91	33.91	
	Slot	1	≤ .07	≤ .17	410	RPM	156620	100397	50199	25059	16697	13052	
					(328-492)	Fz	0.000057	0.00009	0.00018	0.00036	0.00054	0.00069	
						Feed (ipm)	27.00	27.00	27.00	27.00	27.00	27.00	
PLASTICS Polycarbonate, PVC, Polypropylene	Profile	≤ .25	≤ .50	≤ .30	1000	RPM	382000	244872	122436	61120	40725	31833	
					(800-1200)	Fz	0.000077	0.00012	0.00024	0.00048	0.00072	0.00092	
						Feed (ipm)	87.75	87.75	87.75	87.75	87.75	87.75	
	Slot	1	≤ .07	≤ .17	800	RPM	305600	195897	97949	48896	32580	25467	
					(640-960)	Fz	0.000077	0.00012	0.00024	0.00048	0.00072	0.00092	
						Feed (ipm)	70.20	70.20	70.20	70.20	70.20	70.20	

- Note:**
- Bhn (Brinell) HRc (Rockwell C)
 - when recommended speed exceeds your capability, use maximum available and recalculate ipm
 - rpm = Vc x 3.82 / D₁
 - ipm = Fz x 3 x rpm
 - helical ramp at 1 degrees or less, using slotting speed and feed rates (plunging is not recommended)
 - reduce speed and feed for materials harder than listed
 - reduce feed and Ae when finish milling (.02 x D₁ maximum)
 - refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)