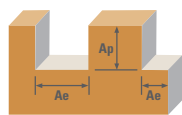


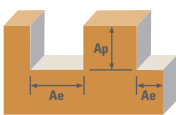
# 2 Flute, 12xD Overall Reach: Square, Ball



M2, M2B 12xD Fractional	Hardness	Profile	Ae x D <sub>1</sub>		Ap x D <sub>1</sub>	Vc (SFM)		Diameter (D <sub>1</sub> ) (inch)					
			≤ .22	≤ .45				≤ .25	0.0100	0.0156	0.0312	0.0625	0.0938
<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ .22	≤ .45	≤ .25	365	RPM	139430	89378	44689	22309	14865	11619
						(292-438)	Fz	0.000022	0.00003	0.00007	0.00013	0.00020	0.00026
		Slot	1	≤ .06	≤ .15	290	RPM	110780	71013	35506	17725	11810	9232
						(232-348)	Fz	0.000022	0.00003	0.00007	0.00013	0.00020	0.00026
		Profile	≤ .22	≤ .45	≤ .25	210	RPM	80220	51423	25712	12835	8552	6685
						(168-252)	Fz	0.000019	0.00003	0.00006	0.00012	0.00018	0.00023
Slot	1	≤ .06	≤ .15	165	RPM	63030	40404	20202	10085	6720	5253		
				(132-198)	Fz	0.000019	0.00003	0.00006	0.00012	0.00018	0.00023		
Profile	≤ .22	≤ .45	≤ .25	175	RPM	66850	42853	21426	10696	7127	5571		
				(140-210)	Fz	0.000016	0.00002	0.00005	0.00010	0.00015	0.00019		
Slot	1	≤ .06	≤ .15	140	RPM	53480	34282	17141	8557	5701	4457		
				(112-168)	Fz	0.000016	0.00002	0.00005	0.00010	0.00015	0.00019		
Profile	≤ .22	≤ .45	≤ .25	305	RPM	116510	74686	37343	18642	12421	9709		
				(244-366)	Fz	0.000022	0.00003	0.00007	0.00014	0.00020	0.00026		
Slot	1	≤ .06	≤ .15	245	RPM	93590	59994	29997	14974	9978	7799		
				(196-294)	Fz	0.000022	0.00003	0.00007	0.00014	0.00020	0.00026		
Profile	≤ .22	≤ .45	≤ .25	340	RPM	129880	83256	41628	20781	13846	10823		
				(272-408)	Fz	0.000022	0.00003	0.00007	0.00013	0.00020	0.00026		
Slot	1	≤ .06	≤ .15	270	RPM	103140	66115	33058	16502	10996	8595		
				(216-324)	Fz	0.000022	0.00003	0.00007	0.00013	0.00020	0.00026		
Profile	≤ .22	≤ .45	≤ .25	235	RPM	89770	57545	28772	14363	9570	7481		
				(188-282)	Fz	0.000019	0.00003	0.00006	0.00012	0.00018	0.00023		
Slot	1	≤ .06	≤ .15	185	RPM	70670	45301	22651	11307	7534	5889		
				(148-222)	Fz	0.000019	0.00003	0.00006	0.00012	0.00018	0.00023		
Profile	≤ .22	≤ .45	≤ .25	215	RPM	82130	52647	26324	13141	8756	6844		
				(172-258)	Fz	0.000014	0.00002	0.00004	0.00008	0.00013	0.00016		
Slot	1	≤ .06	≤ .15	170	RPM	64940	41628	20814	10390	6923	5412		
				(136-204)	Fz	0.000014	0.00002	0.00004	0.00008	0.00013	0.00016		
Profile	≤ .22	≤ .45	≤ .25	215	RPM	82130	52647	26324	13141	8756	6844		
				(172-258)	Fz	0.000014	0.00002	0.00004	0.00008	0.00013	0.00016		
Slot	1	≤ .06	≤ .15	170	RPM	64940	41628	20814	10390	6923	5412		
				(136-204)	Fz	0.000014	0.00002	0.00004	0.00008	0.00013	0.00016		

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# 2 Flute, 12xD Overall Reach: Square, Ball

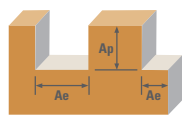


M2, M2B 12xD Fractional	Hardness	Profile	Ae x D <sub>1</sub>		Ap x D <sub>1</sub>	Vc (SFM)		Diameter (D <sub>1</sub> ) (inch)					
			≤ .22	≤ .45				≤ .25	0.0100	0.0156	0.0312	0.0625	0.0938
<b>S</b>	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile	≤ .22	≤ .45	≤ .25	60	RPM	22920	14692	7346	3667	2443	1910
						(48-72)	Fz	0.000012	0.00002	0.00004	0.00008	0.00011	0.00014
						Feed (ipm)	0.55	0.55	0.55	0.55	0.55	0.55	
		Slot	1	≤ .06	≤ .15	45	RPM	17190	11019	5510	2750	1833	1433
						(36-54)	Fz	0.000012	0.00002	0.00004	0.00008	0.00011	0.00014
						Feed (ipm)	0.42	0.42	0.42	0.42	0.42	0.42	
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	Profile	≤ .22	≤ .45	≤ .25	45	RPM	17190	11019	5510	2750	1833	1433
						(36-54)	Fz	0.000008	0.00001	0.00003	0.00005	0.00008	0.00010
						Feed (ipm)	0.28	0.28	0.28	0.28	0.28	0.28	
		Slot	1	≤ .06	≤ .15	35	RPM	13370	8571	4285	2139	1425	1114
						(28-42)	Fz	0.000008	0.00001	0.00003	0.00005	0.00008	0.00010
						Feed (ipm)	0.22	0.22	0.22	0.22	0.22	0.22	
TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	Profile	≤ .22	≤ .45	≤ .25	160	RPM	61120	39179	19590	9779	6516	5093	
					(128-192)	Fz	0.000014	0.00002	0.00004	0.00008	0.00013	0.00016	
					Feed (ipm)	1.66	1.66	1.66	1.66	1.66	1.66		
	Slot	1	≤ .06	≤ .15	130	RPM	49660	31833	15917	7946	5294	4138	
					(104-156)	Fz	0.000014	0.00002	0.00004	0.00008	0.00013	0.00016	
					Feed (ipm)	1.35	1.35	1.35	1.35	1.35	1.35		
TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	Profile	≤ .22	≤ .45	≤ .25	60	RPM	22920	14692	7346	3667	2443	1910	
					(48-72)	Fz	0.000010	0.00001	0.00003	0.00006	0.00009	0.00012	
					Feed (ipm)	0.44	0.44	0.44	0.44	0.44	0.44		
	Slot	1	≤ .06	≤ .15	45	RPM	17190	11019	5510	2750	1833	1433	
					(36-54)	Fz	0.000010	0.00001	0.00003	0.00006	0.00009	0.00012	
					Feed (ipm)	0.33	0.33	0.33	0.33	0.33	0.33		
ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	Profile	≤ .22	≤ .45	≤ .25	1000	RPM	382000	244872	122436	61120	40725	31833	
					(800-1200)	Fz	0.000064	0.00010	0.00020	0.00040	0.00060	0.00077	
					Feed (ipm)	48.75	48.75	48.75	48.75	48.75	48.75		
	Slot	1	≤ .06	≤ .15	800	RPM	305600	195897	97949	48896	32580	25467	
					(640-960)	Fz	0.000064	0.00010	0.00020	0.00040	0.00060	0.00077	
					Feed (ipm)	39.00	39.00	39.00	39.00	39.00	39.00		
COPPER ALLOYS Alum Bronze, C110, Muntz Brass	Profile	≤ .22	≤ .45	≤ .25	515	RPM	196730	126109	63054	31477	20973	16394	
					(412-618)	Fz	0.000048	0.00007	0.00015	0.00030	0.00045	0.00057	
					Feed (ipm)	18.84	18.84	18.84	18.84	18.84	18.84		
	Slot	1	≤ .06	≤ .15	410	RPM	156620	100397	50199	25059	16697	13052	
					(328-492)	Fz	0.000048	0.00007	0.00015	0.00030	0.00045	0.00057	
					Feed (ipm)	15.00	15.00	15.00	15.00	15.00	15.00		
PLASTICS Polycarbonate, PVC, Polypropylene	Profile	≤ .22	≤ .45	≤ .25	1000	RPM	382000	244872	122436	61120	40725	31833	
					(800-1200)	Fz	0.000064	0.00010	0.00020	0.00040	0.00060	0.00077	
					Feed (ipm)	48.75	48.75	48.75	48.75	48.75	48.75		
	Slot	1	≤ .06	≤ .15	800	RPM	305600	195897	97949	48896	32580	25467	
					(640-960)	Fz	0.000064	0.00010	0.00020	0.00040	0.00060	0.00077	
					Feed (ipm)	39.00	39.00	39.00	39.00	39.00	39.00		

**Note:**

- Bhn (Brinell)      HRc (Rockwell C)
- when recommended speed exceeds your capability, use maximum available and recalculate ipm
- rpm = Vc x 3.82 / D<sub>1</sub>
- ipm = Fz x 2 x rpm
- helical ramp at 1 degree 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 D<sub>1</sub> maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

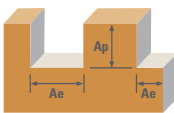
# 2 Flute, 8xD Overall Reach: Square, Ball



M2, M2B 8xD Fractional	Hardness	Profile	Ae x D <sub>1</sub>		Ap x D <sub>1</sub>	Vc (SFM)		Diameter (D <sub>1</sub> ) (inch)					
			≤ .25	≤ .50				≤ .30	0.0100	0.0156	0.0312	0.0625	0.0938
<b>P</b>	<b>CARBON STEELS</b> 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)	7.23	7.23	7.23	7.23	7.23	7.23
		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)	5.74	5.74	5.74	5.74	5.74	5.74
<b>H</b>	<b>ALLOY STEELS</b> 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)	3.70	3.70	3.70	3.70	3.70	3.70
		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)	2.90	2.90	2.90	2.90	2.90	2.90
<b>K</b>	<b>TOOL STEELS</b> 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)	2.57	2.57	2.57	2.57	2.57	2.57
		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)	2.05	2.05	2.05	2.05	2.05	2.05
<b>M</b>	<b>CAST IRONS (LOW &amp; MEDIUM ALLOY)</b> 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)	6.05	6.05	6.05	6.05	6.05	6.05
		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)	4.86	4.86	4.86	4.86	4.86	4.86
	<b>STAINLESS STEELS (FREE MACHINING)</b> 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)	6.73	6.73	6.73	6.73	6.73	6.73
		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)	5.35	5.35	5.35	5.35	5.35	5.35
<b>STAINLESS STEELS (DIFFICULT)</b> 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)	4.14	4.14	4.14	4.14	4.14	4.14	
	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)	3.26	3.26	3.26	3.26	3.26	3.26	
<b>STAINLESS STEELS (PH)</b> 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)	2.68	2.68	2.68	2.68	2.68	2.68	
	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)	2.12	2.12	2.12	2.12	2.12	2.12	

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# 2 Flute, 8xD Overall Reach: Square, Ball

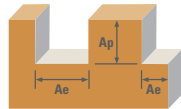


M2, M2B 8xD Fractional	Hardness	Profile	Ae x D <sub>1</sub>		Ap x D <sub>1</sub>		Vc (SFM)	Diameter (D <sub>1</sub> ) (inch)							
			≤ .25	≤ .50	≤ .30			0.0100	0.0156	0.0312	0.0625	0.0938	0.1200		
<b>S</b>	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	Profile	≤ .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)	0.66	0.66	0.66	0.66	0.66	0.66		
		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)	0.50	0.50	0.50	0.50	0.50	0.50	
	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)	0.33	0.33	0.33	0.33	0.33	0.33	
		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)	0.26	0.26	0.26	0.26	0.26	0.26	
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)	1.99	1.99	1.99	1.99	1.99	1.99		
	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)	1.62	1.62	1.62	1.62	1.62	1.62		
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)	0.53	0.53	0.53	0.53	0.53	0.53		
	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)	0.40	0.40	0.40	0.40	0.40	0.40		
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)	58.50	58.50	58.50	58.50	58.50	58.50		
	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)	46.80	46.80	46.80	46.80	46.80	46.80		
<b>N</b>	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)	22.61	22.61	22.61	22.61	22.61	22.61	
	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)	18.00	18.00	18.00	18.00	18.00	18.00		
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)	58.50	58.50	58.50	58.50	58.50	58.50	
	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)	46.80	46.80	46.80	46.80	46.80	46.80		

**Note:**

- Bhn (Brinell)      HRC (Rockwell C)
- when recommended speed exceeds your capability, use maximum available and recalculate ipm
- rpm = Vc x 3.82 / D<sub>1</sub>
- ipm = Fz x 2 x rpm
- helical ramp at 1 degree 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 D<sub>1</sub> maximum)
- refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

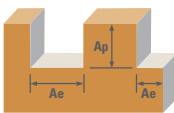
# 3 Flute, 3xD Overall Reach: Square, Ball



M3, M3B 3xD Fractional	Hardness	Profile	Ae x D <sub>1</sub>		Ap x D <sub>1</sub>	Vc (SFM)	RPM	Diameter (D <sub>1</sub> ) (inch)					
			≤ .30	≤ .60				≤ .5	0.0100	0.0156	0.0312	0.0625	0.0938
<b>P</b>	<b>CARBON STEELS</b> 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	Profile	≤ .30	≤ .60	≤ .5	365	Fz	139430	89378	44689	22309	14865	11619
						(292-438)	Feed (ipm)	0.000040	0.00006	0.00013	0.00025	0.00038	0.00048
						290	RPM	110780	71013	35506	17725	11810	9232
		Slot	1	≤ .15	≤ .30	(232-348)	Fz	0.000040	0.00006	0.00013	0.00025	0.00038	0.00048
						Feed (ipm)	13.40	13.40	13.40	13.40	13.40	13.40	
						210	RPM	80220	51423	25712	12835	8552	6685
	<b>ALLOY STEELS</b> 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	Profile	≤ .30	≤ .60	≤ .5	(168-252)	Fz	0.000036	0.00006	0.00011	0.00022	0.00034	0.00043
						Feed (ipm)	8.62	8.62	8.62	8.62	8.62	8.62	
						165	RPM	63030	40404	20202	10085	6720	5253
		Slot	1	≤ .15	≤ .30	(132-198)	Fz	0.000036	0.00006	0.00011	0.00022	0.00034	0.00043
						Feed (ipm)	6.78	6.78	6.78	6.78	6.78	6.78	
						175	RPM	66850	42853	21426	10696	7127	5571
<b>H</b>	Profile	≤ .30	≤ .60	≤ .5	(140-210)	Fz	0.000030	0.00005	0.00009	0.00019	0.00028	0.00036	
					Feed (ipm)	5.99	5.99	5.99	5.99	5.99	5.99		
					140	RPM	53480	34282	17141	8557	5701	4457	
	Slot	1	≤ .15	≤ .30	(112-168)	Fz	0.000030	0.00005	0.00009	0.00019	0.00028	0.00036	
					Feed (ipm)	4.79	4.79	4.79	4.79	4.79	4.79		
					305	RPM	116510	74686	37343	18642	12421	9709	
<b>K</b>	Profile	≤ .30	≤ .60	≤ .5	(244-366)	Fz	0.000040	0.00006	0.00013	0.00025	0.00038	0.00048	
					Feed (ipm)	14.12	14.12	14.12	14.12	14.12	14.12		
					245	RPM	93590	59994	29997	14974	9978	7799	
	Slot	1	≤ .15	≤ .30	(196-294)	Fz	0.000040	0.00006	0.00013	0.00025	0.00038	0.00048	
					Feed (ipm)	11.34	11.34	11.34	11.34	11.34	11.34		
					340	RPM	129880	83256	41628	20781	13846	10823	
<b>M</b>	Profile	≤ .30	≤ .60	≤ .5	(272-408)	Fz	0.000040	0.00006	0.00013	0.00025	0.00038	0.00048	
					Feed (ipm)	15.71	15.71	15.71	15.71	15.71	15.71		
					270	RPM	103140	66115	33058	16502	10996	8595	
	Slot	1	≤ .15	≤ .30	(216-324)	Fz	0.000040	0.00006	0.00013	0.00025	0.00038	0.00048	
					Feed (ipm)	12.47	12.47	12.47	12.47	12.47	12.47		
					235	RPM	89770	57545	28772	14363	9570	7481	
<b>M</b>	Profile	≤ .30	≤ .60	≤ .5	(188-282)	Fz	0.000036	0.00006	0.00011	0.00022	0.00034	0.00043	
					Feed (ipm)	9.66	9.66	9.66	9.66	9.66	9.66		
					185	RPM	70670	45301	22651	11307	7534	5889	
	Slot	1	≤ .15	≤ .30	(148-222)	Fz	0.000036	0.00006	0.00011	0.00022	0.00034	0.00043	
					Feed (ipm)	7.60	7.60	7.60	7.60	7.60	7.60		
					215	RPM	82130	52647	26324	13141	8756	6844	
<b>M</b>	Profile	≤ .30	≤ .60	≤ .5	(172-258)	Fz	0.000025	0.00004	0.00008	0.00016	0.00024	0.00030	
					Feed (ipm)	6.25	6.25	6.25	6.25	6.25	6.25		
					170	RPM	64940	41628	20814	10390	6923	5412	
	Slot	1	≤ .15	≤ .30	(136-204)	Fz	0.000025	0.00004	0.00008	0.00016	0.00024	0.00030	
					Feed (ipm)	4.94	4.94	4.94	4.94	4.94	4.94		
					215	RPM	82130	52647	26324	13141	8756	6844	

continued on next page

# 3 Flute, 3xD Overall Reach: Square, Ball



M3, M3B 3xD Fractional	Hardness	Profile	Ae x D <sub>1</sub>		Ap x D <sub>1</sub>		Vc (SFM)		Diameter (D <sub>1</sub> ) (inch)					
			≤ .30	≤ .60	≤ .15	≤ .30			0.0100	0.0156	0.0312	0.0625	0.0938	0.1200
<b>S</b>	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	60	RPM	22920	14692	7346	3667	2443	1910
							(48-72)	Fz	0.000023	0.00004	0.00007	0.00014	0.00021	0.00027
							Feed (ipm)	1.55	1.55	1.55	1.55	1.55	1.55	
		Slot	1	≤ .15	≤ .30	45	RPM	17190	11019	5510	2750	1833	1433	
						(36-54)	Fz	0.000023	0.00004	0.00007	0.00014	0.00021	0.00027	
						Feed (ipm)	1.16	1.16	1.16	1.16	1.16	1.16		
	<b>SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	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)	0.77	0.77	0.77	0.77	0.77	0.77	
		Slot	1	≤ .15	≤ .30	35	RPM	13370	8571	4285	2139	1425	1114	
						(28-42)	Fz	0.000015	0.00002	0.00005	0.00009	0.00014	0.00018	
						Feed (ipm)	0.60	0.60	0.60	0.60	0.60	0.60		
<b>TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	160	RPM	61120	39179	19590	9779	6516	5093	
						(128-192)	Fz	0.000025	0.00004	0.00008	0.00016	0.00024	0.00030	
						Feed (ipm)	4.65	4.65	4.65	4.65	4.65	4.65		
	Slot	1	≤ .15	≤ .30	130	RPM	49660	31833	15917	7946	5294	4138		
					(104-156)	Fz	0.000025	0.00004	0.00008	0.00016	0.00024	0.00030		
					Feed (ipm)	3.78	3.78	3.78	3.78	3.78	3.78			
<b>TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	60	RPM	22920	14692	7346	3667	2443	1910	
						(48-72)	Fz	0.000018	0.00003	0.00006	0.00011	0.00017	0.00022	
						Feed (ipm)	1.23	1.23	1.23	1.23	1.23	1.23		
	Slot	1	≤ .15	≤ .30	45	RPM	17190	11019	5510	2750	1833	1433		
					(36-54)	Fz	0.000018	0.00003	0.00006	0.00011	0.00017	0.00022		
					Feed (ipm)	0.92	0.92	0.92	0.92	0.92	0.92			
<b>N</b>	<b>ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	1000	RPM	382000	244872	122436	61120	40725	31833
							(800-1200)	Fz	0.000119	0.00019	0.00037	0.00074	0.00112	0.00143
							Feed (ipm)	136.50	136.50	136.50	136.50	136.50	136.50	
		Slot	1	≤ .15	≤ .30	800	RPM	305600	195897	97949	48896	32580	25467	
						(640-960)	Fz	0.000119	0.00019	0.00037	0.00074	0.00112	0.00143	
						Feed (ipm)	109.20	109.20	109.20	109.20	109.20	109.20		
<b>COPPER ALLOYS Alum Bronze, C110, Muntz Brass</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	515	RPM	196730	126109	63054	31477	20973	16394	
						(412-618)	Fz	0.000089	0.00014	0.00028	0.00056	0.00084	0.00107	
						Feed (ipm)	52.76	52.76	52.76	52.76	52.76	52.76		
	Slot	1	≤ .15	≤ .30	410	RPM	156620	100397	50199	25059	16697	13052		
					(328-492)	Fz	0.000089	0.00014	0.00028	0.00056	0.00084	0.00107		
					Feed (ipm)	42.00	42.00	42.00	42.00	42.00	42.00			
<b>PLASTICS Polycarbonate, PVC, Polypropylene</b>	Profile	≤ .30	≤ .60	≤ .15	≤ .30	1000	RPM	382000	244872	122436	61120	40725	31833	
						(800-1200)	Fz	0.000119	0.00019	0.00037	0.00074	0.00112	0.00143	
						Feed (ipm)	136.50	136.50	136.50	136.50	136.50	136.50		
	Slot	1	≤ .15	≤ .30	800	RPM	305600	195897	97949	48896	32580	25467		
					(640-960)	Fz	0.000119	0.00019	0.00037	0.00074	0.00112	0.00143		
					Feed (ipm)	109.20	109.20	109.20	109.20	109.20	109.20			

- Note:**
- Bhn (Brinell)      HRc (Rockwell C)
  - when recommended speed exceeds your capability, use maximum available and recalculate ipm
  - rpm = Vc x 3.82 / D<sub>1</sub>
  - 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 D<sub>1</sub> maximum)
  - refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)