Twister® GP

Recommended Cutting Data 302 / 306 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	vc - SFM	Drill Diameter <.030 f - IPR	.031-.036 f - IPR	.037-.040 f - IPR	.041-.051 f - IPR	>.052 f - IPR
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	302		300	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	302	●	225	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	302		200	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Hardened Steels A2 / 52100	H	35-45 Rc	302	●	175	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Free Machining Stainless	M	up to 28 Rc	302		175	.0002-.0004	.0006	.0008	.0010	.0012
			306							
Stainless Steel - Austenitic 304 / 316	M	up to 28 Rc	302		200	.0002-.0004	.0006	.0008	.0010	.0012
			306	●						
Stainless Steel - Ferritic / Martensitic	M	up to 28 Rc	302		100	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	over 28 Rc	302		75	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Aluminum (<10% Si)	N		302		450	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Aluminum (>10% Si)	N		302		325	.0002-.0006	.0008	.0010	.0014	.0015
			306	●						
Plastics	N		302		550	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Composities / Fiber Reinforced Materials / Circuit Boards	N		302		650	.0005-.0015	.0020	.0030	.0040	.0050
			306							
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	302		400	.0002-.0006	.0008	.0010	.0014	.0015
			306	●						
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	302		350	.0002-.0006	.0008	.0010	.0014	.0015
			306							
Titanium 6Al-4V	S	up to 42 Rc	302		60	.0002-.0004	.0006	.0008	.0010	.0012
			306	●						
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys-Monel	S	up to 42 Rc	302		50	.0002-.0004	.0006	.0008	.0010	.0012
			306							

Chiploads above .006 are not recommended since location problems become more evident.

In typical circuit board materials, Micro Drills operate efficiently in the 600-700 SFM (180-215 m/min) ranges. Higher speed rates tend to produce excessive drill wear and early failure. In general, smaller diameter drills are limited to slower speeds, because of machine limitations.

Feed rates can be set extremely high in most applications, because of the quality and design features of the M.A. Ford® Micro Drill. However, certain precautions should be taken for proper performance and safety. When determining optimum feed rates, consider the following factors:

- Spindle motors must be rated at least one hp (1 horsepower).
- To prevent delamination, entry materials must be used.
- Pressure foot clamping must be appropriate.

When drilling harder materials, the Micro Drill life may be variable. Drilling set ups must be precise. The drill TIR must be less than .0001" (.0025mm). The feed axis motion must be smooth without any play. Machining practices are very important.

Note: Micro drills should be kept in their original packaging, or equivalent when not in use. Mechanical micrometers are not recommended for checking size.

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Twister® GP

Recommended Cutting Data 302 / 306 - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	vc - m/min	Drill Diameter (mm) <.76	.077-.92	.93-1.02	1.03-1.30	>1.31
						f - mm/Rev				
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	302		90	.005-.015	.020	.025	.036	.038
			306							
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	302	●	70	.005-.015	.020	.025	.036	.038
			306							
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L6, L7, P2, P20, S1, S5, S7, 52100, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	302		60	.005-.015	.020	.025	.036	.038
			306							
Hardened Steels A2 / 52100	H	35-45 Rc	302	●	55	.005-.015	.020	.025	.036	.038
			306							
Free Machining Stainless	M	up to 28 Rc	302		55	.005-.015	.020	.025	.036	.038
			306							
Stainless Steel - Austenitic 304 / 316	M	up to 28 Rc	302		60	.005-.015	.020	.025 .025	.036	.038
			306							
Stainless Steel - Ferritic / Martensitic	M	up to 28 Rc	302	●	30	.005-.015	.020	.025	.036	.038
			306							
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	over 28 Rc	302		25	.005-.015	.020	.025	.036	.038
			306							
Aluminum (<10% Si)	N		302		140	.005-.015	.020	.025	.036	.038
			306							
Aluminum (>10% Si)	N		302		100	.005-.015	.020	.025	.036	.038
			306							
Plastics	N		302	●	170	.005-.015	.020	.025	.036	.038
			306							
Composities / Fiber Reinforced Materials / Circuit Boards	N		302		200	.013-.038	.051	.076	.102	.127
			306							
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	302		120	.005-.015	.020	.025	.036	.038
			306							
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	302	●	110	.005-.015	.020	.025	.036	.038
			306							
Titanium 6Al-4V	S	up to 42 Rc	302		20	.005-.010	.015	.020	.025	.030
			306							
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys-Monel	S	up to 42 Rc	302	●	15	.005-.010	.015	.020	.025	.030
			306							

Chiploads above .140 are not recommended since location problems become more evident.

In typical circuit board materials, Micro Drills operate efficiently in the 600-700 SFM (180-215 m/min) ranges. Higher speed rates tend to produce excessive drill wear and early failure. In general, smaller diameter drills are limited to slower speeds, because of machine limitations.

Feed rates can be set extremely high in most applications, because of the quality and design features of the M.A. Ford® Micro Drill. However, certain precautions should be taken for proper performance and safety. When determining optimum feed rates, consider the following factors:

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