

Twister® Micro XD

















Recommended Cutting Data MPDCS / MXDSR / MXDCR / MXDCL Series - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	vc-SFM	Drill Diameter (mm)					
							0.5	1.0	1.5	2.0	2.5	2.95
							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	MXDSR		5	150	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2	300	—	.0010	.0015	.0020	.0025	.0030
			MXDCR		5							
			MXDCL		12							
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	MXDSR		5	130	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2	300	—	.0010	.0015	.0020	.0025	.0030
			MXDCR		5							
			MXDCL		12							
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, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	MXDSR		5	120	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2	250	—	.0010	.0015	.0020	.0025	.0030
			MXDCR		5							
			MXDCL		12							
Hardened Steels A2 / 52100	H	45 to 55 Rc	MXDSR		5	50	.0002	.0004	.0007	.0009	.0011	.0014
			MPDCS		2	80	—	.0004	.0007	.0009	.0011	.0014
			MXDCR		5							
			MXDCL		12							
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	MXDSR		5	140	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2	300	—	.0010	.0015	.0020	.0025	.0030
			MXDCR		5							
			MXDCL		12							
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	MXDSR		5	125	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2	230	—	.0008	.0012	.0016	.0020	.0023
			MXDCR		5							
			MXDCL		12							
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	MXDSR		5	60	.0002	.0004	.0007	.0009	.0011	.0014
			MPDCS		2	80	—	.0004	.0007	.0009	.0011	.0014
			MXDCR		5							
			MXDCL		12							

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

Twister® Micro XD

Recommended Cutting Data MPDCS / MXDSR / MXDCR / MXDCL Series - Inch (continued)

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	vc-SFM	Drill Diameter (mm)					
							0.5	1.0	1.5	2.0	2.5	2.95
							f - IPR					
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	MXDSR		5	150	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2							
			MXDCR		5	325	—	.0010	.0015	.0020	.0025	.0030
			MXDCL		12							
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	MXDSR		5	150	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2							
			MXDCR		5	250	—	.0010	.0015	.0020	.0025	.0030
			MXDCL		12							
Titanium 6Al-4V	S	up to 40 Rc	MXDSR		5	70	.0005	.0010	.0015	.0020	.0025	.0030
			MPDCS		2							
			MXDCR		5	230	—	.0004	.0006	.0008	.0010	.0012
			MXDCL		12							
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys - Monel	S	up to 40 Rc	MXDSR		5	60	.0002	.0004	.0007	.0009	.0011	.0014
			MPDCS		2							
			MXDCR		5	155	—	.0004	.0006	.0008	.0010	.0012
			MXDCL		12							

Recommended Peck Depths for MXDSR (Solid) Drilling

Diameter	Peck Depth
0.50 mm	.2 x Diameter
1.00 mm	.3 x Diameter
1.50 mm	.6 x Diameter
2.00 mm	.8 x Diameter
2.50 mm	1.0 x Diameter
2.95 mm	3.0 x Diameter

*Peck depths can vary by material type.

Recommended Machine Requirements

High Pressure Pump System (1,000 psi / 68.9 bar)
Coolant filtration of 10 microns or better
Total runout of .0004" (.01 mm) Max. at drill tip

For best MXDCL performance, the following steps are recommended:

- When Drilling with the MXDCL, drill a pilot hole 1.5 - 2 x diameter deep using a MPDCS drill.
- Insert MXDCL into pilot hole at a low speed (300-500 RPM) stopping short of the pilot hole bottom.
- Start coolant flow and increase speed to recommended RPM.
- Feed to full depth. (Pecking may be required for standard coolant pressure. Follow the MXDSR peck depth chart. To prevent drill whip and corner damage, do not retract all the way out of hole while pecking.)
- After reaching desired depth, reduce speed (300-500 RPM) before retracting from the hole at a feed of 2-4 times the drilling feed.

Note: Under optimal conditions (high pressure coolant), one shot drilling may be accomplished with the MXDCL.

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

For product information, call your local distributor.

Twister® Micro XD

















Recommended Cutting Data MPDCS / MXDSR / MXDCR / MXDCL Series - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	vc-m/min.	Drill Diameter (mm)					
							0.5	1.0	1.5	2.0	2.5	2.95
							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	MXDSR		5	45	.013	.025	.038	.051	.064	.076
			MPDCS		2	90	—	.025	.038	.051	.064	.076
			MXDCR		5							
			MXDCL		12							
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	MXDSR		5	40	.013	.025	.038	.051	.064	.076
			MPDCS		2	90	—	.025	.038	.051	.064	.076
			MXDCR		5							
			MXDCL		12							
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, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	MXDSR		5	35	.013	.025	.038	.051	.064	.076
			MPDCS		2	75	—	.025	.038	.051	.064	.076
			MXDCR		5							
			MXDCL		12							
Hardened Steels A2 / 52100	H	45 to 55 Rc	MXDSR		5	15	.005	.010	.018	.023	.028	.036
			MPDCS		2	25	—	.010	.018	.023	.028	.036
			MXDCR		5							
			MXDCL		12							
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	MXDSR		5	40	.013	.025	.038	.051	.064	.076
			MPDCS		2	90	—	.025	.038	.051	.064	.076
			MXDCR		5							
			MXDCL		12							
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	MXDSR		5	38	.013	.025	.038	.051	.064	.076
			MPDCS		2	70	—	.020	.030	.040	.050	.059
			MXDCR		5							
			MXDCL		12							
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	MXDSR		5	18	.005	.010	.018	.023	.028	.036
			MPDCS		2	25	—	.010	.018	.023	.028	.036
			MXDCR		5							
			MXDCL		12							

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

Twister® Micro XD

Recommended Cutting Data MPDCS / MXDSR / MXDCR / MXDCL Series - Metric (continued)

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	vc- m/min	Drill Diameter (mm)					
							0.5	1.0	1.5	2.0	2.5	2.95
							f - mm/Rev					
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	MXDSR		5	45	.013	.025	.038	.051	.064	.076
			MPDCS		2							
			MXDCR		5	100	—	.025	.038	.051	.064	.076
			MXDCL		12							
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	MXDSR		5	45	.013	.025	.038	.051	.064	.076
			MPDCS		2							
			MXDCR		5	75	—	.025	.038	.051	.064	.076
			MXDCL		12							
Titanium 6Al-4V	S	up to 40 Rc	MXDSR		5	20	.013	.025	.038	.051	.064	.076
			MPDCS		2							
			MXDCR		5	70	—	.010	.015	.020	.025	.030
			MXDCL		12							
High Temp Alloys Inconel / Hastelloy / Waspeloy / Nickel Based Alloys - Monel	S	up to 40 Rc	MXDSR		5	18	.005	.010	.018	.023	.028	.036
			MPDCS		2							
			MXDCR		5	47	—	.010	.015	.020	.025	.030
			MXDCL		12							

Recommended Peck Depths For MXDSR Solid Drilling by Diameter*

Diameter	Peck Depth
0.50 mm	.2 x Diameter
1.00 mm	.3 x Diameter
1.50 mm	.6 x Diameter
2.00 mm	.8 x Diameter
2.50 mm	1.0 x Diameter
2.95 mm	3.0 x Diameter

*Peck depths can vary by material type.

Recommended Machine Requirements

High Pressure Pump System (1,000 psi / 68.9 bar)

Coolant filtration of 10 microns or better

Total runout of .0004" (.01mm) Max. at drill tip

For best MXDCL performance, the following steps are recommended:

- When Drilling with the MXDCL, drill a pilot hole 1.5 - 2 x diameter deep using a MPDCS drill.
- Insert MXDCL into pilot hole at a low speed (300-500 RPM) stopping short of the pilot hole bottom.
- Start coolant flow and increase speed to recommended RPM.
- Feed to full depth. (Pecking may be required for standard coolant pressure. Follow the MXDSR peck depth chart. To prevent drill whip and corner damage, do not retract all the way out of hole while pecking.)
- After reaching desired depth, reduce speed (300-500 RPM) before retracting from the hole at a feed of 2-4 times the drilling feed.

Note: Under optimal conditions (high pressure coolant), one shot drilling may be accomplished with the MXDCL

ISO 9001:2015 Certified

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

For product information, call your local distributor.

Recommended Cutting Data XD ≤ 1/4 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter						Drill Diameter					
						1/64	1/16	1/8	5/32	3/16	1/4	1/64	1/16	1/8	5/32	3/16	1/4
						vc - SFM						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	2XDSS		3			390	380	370	360	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	405	400	390	380	370	360						
			2XDSCS		3			660	650	640	630						
			2XDSCR		5			660	650	640	630						
			2XDCL		7+			595	580	560	540						
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	2XDSS		3			330	320	310	300	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	350	340	330	320	310	300						
			2XDSCS		3			575	550	540	500						
			2XDSCR		5			575	550	540	500						
			2XDCL		7+			430	420	410	400						
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, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS		3			200	190	190	185	.0004-.0008	.0008-.0012	.0014-.0030	.0024-.0040	.003-.005	.0035-.0060
			2XDSR		5	210	200	200	190	190	185						
			2XDSCS		3			250	240	230	220						
			2XDSCR		5			250	240	230	220						
			2XDCL		7+			225	220	215	205						
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS		3			350	340	330	320	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	360	355	350	340	330	320						
			2XDSCS		3			550	500	475	450						
			2XDSCR		5			550	500	475	450						
			2XDCL		7+			450	425	400	380						
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS		3			140	135	130	125	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	150	145	140	135	130	125						
			2XDSCS		3			300	290	280	270						
			2XDSCR		5			300	290	280	270						
			2XDCL		7+			280	270	260	250						
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS		3			140	130	120	110	.0004-.0012	.001-.002	.0020-.0033	.0024-.0035	.0030-.0043	.0031-.0050
			2XDSR		5	160	150	140	130	120	110						
			2XDSCS		3			265	250	240	230						
			2XDSCR		5			265	250	240	230						
			2XDCL		7+			190	180	170	160						
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS		3			85	80	75	70	.0004-.0012	.001-.002	.0014-.0033	.0016-.0035	.002-.004	.0023-.0043
			2XDSR		5	100	90	85	80	75	70						
			2XDSCS		3			115	100	95	90						
			2XDSCR		5			115	100	95	90						
			2XDCL		7+			100	100	95	95						
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS		3			130	125	120	115	.0004-.0012	.001-.002	.003-.004	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	150	140	130	125	120	115						
			2XDSCS		3			230	220	210	200						
			2XDSCR		5			230	220	210	200						
			2XDCL		7+			210	190	180	170						
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	2XDSS		3			480	470	460	430	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	500	490	480	470	460	430						
			2XDSCS		3			660	640	620	600						
			2XDSCR		5			660	640	620	600						
			2XDCL		7+			500	490	480	470						
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	2XDSS		3			280	270	260	250	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	300	290	280	270	260	250						
			2XDSCS		3			400	480	460	440						
			2XDSCR		5			400	480	460	440						
			2XDCL		7+			350	340	330	320						

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

Recommended Cutting Data X^D ≥ 5/16 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter						Drill Diameter					
						5/16	3/8	1/2	9/16	5/8	3/4	5/16	3/8	1/2	9/16	5/8	3/4
						vc - SFM						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	2XDSS	●	3	350	340	320	300	275	265	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	350	340	320	300	275	265						
			2XDSCS	●●	3	620	600	575	550	525	500	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	620	600	575	550	525	500						
			2XDCL		7+	520	500	480	460	440	430						
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	2XDSS	●	3	290	280	270	265	260	260	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	290	280	270	265	260	260						
			2XDSCS	●●	3	475	450	425	400	325	315	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	475	450	425	400	325	315						
			2XDCL		7+	375	350	325	315	300	280						
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, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS	●	3	185	180	180	175	175	170	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	185	180	180	175	175	170						
			2XDSCS	●●	3	210	210	200	200	190	190	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	210	210	200	200	190	190						
			2XDCL		7+	200	190	190	180	180	170						
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS	●	3	310	300	275	250	225	200	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	310	300	275	250	225	200						
			2XDSCS	●●	3	400	390	380	370	330	320	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	400	390	380	370	330	320						
			2XDCL		7+	375	370	350	325	310	300						
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS	●	3	120	115	110	105	100	95	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	120	115	110	105	100	95						
			2XDSCS	●●	3	260	250	240	240	230	220	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	260	250	240	240	230	220						
			2XDCL		7+	240	230	220	220	200	200						
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS	●	3	110	105	105	100	100	95	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDSR		5	110	105	105	100	100	95						
			2XDSCS	●●	3	220	200	190	180	170	155	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDSCR		5	220	200	190	180	170	155						
			2XDCL		7+	150	140	130	130	125	125						
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS	●	3	65	60	55	50	45	40	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.009-.010
			2XDSR		5	65	60	55	50	45	40						
			2XDSCS	●●	3	85	85	80	80	75	75	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.009-.010
			2XDSCR		5	85	85	80	80	75	75						
			2XDCL		7+	90	90	85	85	75	75						
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS	●	3	110	105	100	100	90	90	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			2XDSR		5	110	105	100	100	90	90						
			2XDSCS	●●	3	190	180	170	160	150	150	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			2XDSCR		5	190	180	170	160	150	150						
			2XDCL		7+	160	150	140	130	120	120						
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	2XDSS	●	3	410	400	390	370	360	350	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	410	400	390	370	360	350						
			2XDSCS	●●	3	580	560	550	550	525	500	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	580	560	550	550	525	500						
			2XDCL		7+	460	450	440	430	410	400						
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	2XDSS	●	3	240	230	220	210	200	190	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	240	230	220	210	200	190						
			2XDSCS	●●	3	400	375	350	300	275	250	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSCR		5	400	375	350	300	275	250						
			2XDCL		7+	300	270	250	240	220	200						

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

For product information, call your local distributor.

Recommended Cutting Data X^D ≤ 6mm - Metric

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	Drill Diameter (mm)						Drill Diameter (mm)						
						0.05	1.5	3	4	5	6	0.05	1.5	3	4	5	6	
						vc - m/min						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	2XDSS	●	3			119	116	113	110	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5	123	122	119	116	113	110							
			2XDSCS	●	3			201	198	195	192			.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5			201	198	195	192							
			2XDCL		7+			181	177	171	165							
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	2XDSS	●	3			101	98	94	91	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5	107	104	101	98	94	91							
			2XDSCS	●	3			175	168	165	152			.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5			175	168	165	152							
			2XDCL		7+			131	128	125	122							
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, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS	●	3			61	58	58	56	.010-.020	.020-.030	.036-.076	.061-.102	.076-.127	.089-.152	
			2XDSCR		5	64	61	61	58	58	56							
			2XDSCS	●	3			76	73	70	67			.036-.076	.061-.102	.076-.127	.089-.152	
			2XDSCR		5			76	73	70	67							
			2XDCL		7+			69	67	66	62							
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS	●	3			107	104	101	98	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5	125	120	107	104	101	98							
			2XDSCS	●	3			168	152	145	137			.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5			168	152	145	137							
			2XDCL		7+			137	130	122	116							
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS	●	3			43	41	40	38	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5	50	48	43	41	40	38							
			2XDSCS	●	3			91	88	85	82			.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5			91	88	85	82							
			2XDCL		7+			85	82	79	76							
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS	●	3			43	40	37	34	.010-.030	.025-.051	.051-.076	.061-.089	.089-.102	.076-.127	
			2XDSCR		5	49	46	43	40	37	34							
			2XDSCS	●	3			81	76	73	70			.051-.076	.061-.089	.089-.102	.076-.127	
			2XDSCR		5			81	76	73	70							
			2XDCL		7+			58	55	52	49							
High Temp Alloys Nimionics, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS	●	3			26	24	23	21	.010-.030	.025-.051	.036-.089	.036-.089	.051-.102	.061-.127	
			2XDSCR		5	30	27	26	24	23	21							
			2XDSCS	●	3			35	30	29	27			.036-.089	.036-.089	.051-.102	.061-.127	
			2XDSCR		5			35	30	29	27							
			2XDCL		7+			30	30	29	29							
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr-4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS	●	3			40	38	37	35	.010-.030	.025-.051	.076-.102	.102-.152	.127-.178	.140-.229	
			2XDSCR		5	46	43	40	38	37	35							
			2XDSCS	●	3			70	67	64	61			.076-.102	.102-.152	.127-.178	.140-.229	
			2XDSCR		5			70	67	64	61							
			2XDCL		7+			64	58	55	52							
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	2XDSS	●	3			146	143	140	131	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5	152	149	146	143	140	131							
			2XDSCS	●	3			201	195	189	183			.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5			201	195	189	183							
			2XDCL		7+			152	149	146	143							
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	2XDSS	●	3			85	82	79	76	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5	91	88	85	82	79	76							
			2XDSCS	●	3			122	146	140	134			.076-.127	.102-.152	.127-.178	.127-.203	
			2XDSCR		5			122	146	140	134							
			2XDCL		7+			107	104	101	98							

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

Recommended Cutting Data XD ≥ 8mm - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter (mm)							Drill Diameter (mm)							
						8	10	12	14	16	18	20	8	10	12	14	16	18	20	
						vc - m/min							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	2XDSS	●	3	107	104	98	91	84	81	77	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDSR	●	5	107	104	98	91	84	81	77								
			2XDSCS	●	3	189	183	175	168	160	152	145								
			2XDSCR	●	5	189	183	175	168	160	152	145	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	158	152	146	140	134	131	125								
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	2XDSS	●	3	88	85	82	81	79	79	75	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDSR	●	5	88	85	82	81	79	79	75								
			2XDSCS	●	3	145	137	130	122	99	96	92								
			2XDSCR	●	5	145	137	130	122	99	96	92	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	114	107	99	96	91	85	81								
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, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS	●	3	56	55	55	53	53	52	49	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDSR	●	5	56	55	55	53	53	52	49								
			2XDSCS	●	3	64	64	61	61	58	58	55								
			2XDSCR	●	5	64	64	61	61	58	58	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	61	58	58	55	55	52	49								
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS	●	3	94	91	84	76	69	61	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	●	5	94	91	84	76	69	61	55								
			2XDSCS	●	3	122	119	116	113	101	98	94								
			2XDSCR	●	5	122	119	116	113	101	98	94	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	114	113	107	99	94	91	87								
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS	●	3	37	35	34	32	30	29	28	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	●	5	37	35	34	32	30	29	28								
			2XDSCS	●	3	79	76	73	73	70	67	64								
			2XDSCR	●	5	79	76	73	73	70	67	64	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	73	70	67	67	61	61	58								
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS	●	3	34	32	32	30	30	29	27	.11-.15	.13-.23	.18-.25	.21-.27	.22-.31	.25-.33	.30-.37	
			2XDSR	●	5	34	32	32	30	30	29	27								
			2XDSCS	●	3	67	61	58	55	52	47	45								
			2XDSCR	●	5	67	61	58	55	52	47	45	.11-.15	.13-.23	.18-.25	.21-.27	.22-.31	.25-.33	.30-.37	
			2XDCL	●	7+	46	43	40	40	38	38	36								
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS	●	3	20	18	17	15	14	12	11	.08-.13	.11-.15	.12-.17	.14-.19	.16-.21	.18-.25	.17-.24	
			2XDSR	●	5	20	18	17	15	14	12	11								
			2XDSCS	●	3	26	26	24	24	23	23	22								
			2XDSCR	●	5	26	26	24	24	23	23	22	.09-.13	.11-.15	.12-.17	.14-.19	.16-.21	.18-.25	.17-.24	
			2XDCL	●	7+	27	27	26	26	23	23	22								
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS	●	3	34	32	30	30	27	27	25	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	●	5	34	32	30	30	27	27	25								
			2XDSCS	●	3	55	55	52	49	46	46	44								
			2XDSCR	●	5	55	55	52	49	46	46	44	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDCL	●	7+	49	46	43	40	37	37	35								
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	2XDSS	●	3	125	122	119	113	110	107	102	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	●	5	125	122	119	113	110	107	102								
			2XDSCS	●	3	177	171	168	168	160	152	145								
			2XDSCR	●	5	177	171	168	168	160	152	145	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	140	137	134	131	125	122	117								
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	2XDSS	●	3	73	70	67	64	61	58	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	●	5	73	70	67	64	61	58	55								
			2XDSCS	●	3	122	114	107	91	84	76	72								
			2XDSCR	●	5	122	114	107	91	84	76	72	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDCL	●	7+	91	82	76	73	67	61	58								

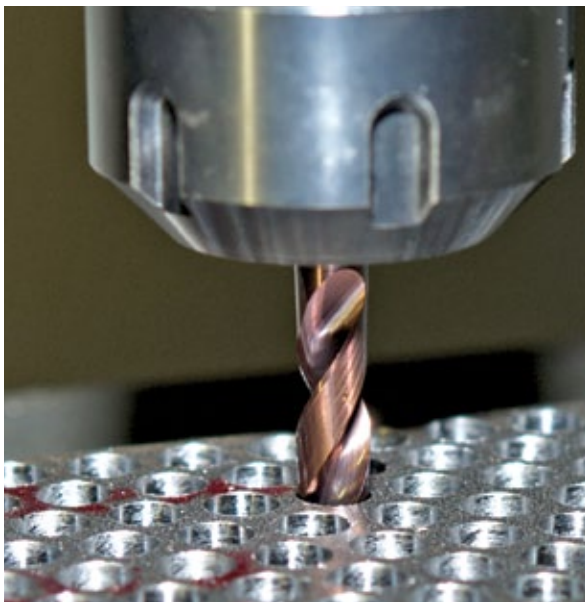
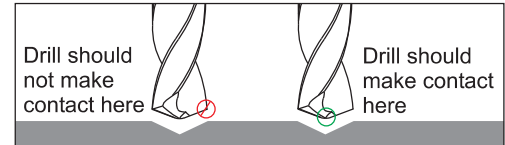
Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

Series 2XDCE Technical Information

Process For Successful Deep Hole Drilling:

1. Start by producing a 1.5 x diameter to 3 x diameter pilot hole using a coolant or non-coolant pilot drill. Typically this tool will have a point angle the same as or greater than the deep hole drill. Run this drill at 100% of the final drill speed and 1/2 the normal IPM (mm/min).
2. Retract and tool change to the final deep hole (2XDCE M.A. Ford[®] Series) drill.
3. Rapid to clearance plane and enter the pilot hole at 25% (don't exceed 400 to 500 RPM (n)) of the final speed and 1 to 2 IPM (25.4 to 50.8 mm/min). This will help with true position by eliminating drill whip. Once into the hole, turn on the coolant and advance to the material start. At this point, you can add a dwell to clear any chips that have been left from the previous drill and let the spindle get to full speed. Increase the speed and feed to final drilling parameters.
4. Drill one shot to the final hole depth or through.
5. Should you experience any squeaking you may need to retract the drill and increase your feed. Chip packing is occurring and will need to be addressed.
6. Once through the material, it may be necessary to reduce the RPM (n) to eliminate breakage of the drill due to drill whip. Then retract to the clearance plane.



Machine Requirements

High Pressure Pump System (1,000 psi/68.9 bar)
Machine runout of .0003" (.008mm) Max.

Due to the conditions of equipment, tool holders, and conditions beyond M.A. Ford[®]'s control, your results may vary.

Should your application require more in depth discussion or a special tool, please contact M.A. Ford[®]'s Application Engineering Department at 563-391-6220 / 800-553-8024.



Recommended Cutting Data XD 2XDCE - Inch

Workpiece Material Group	ISO	Hardness	TYPE	DEPTH	vc - SFM	Drill Diameter				
						3/16	1/4	5/16	3/8	1/2
						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		12-25X	345	.0030	.0040	.0080	.0090	.0100
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 35 Rc		12-25X	265	.0030	.0040	.0080	.0090	.0100
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, A128, D2, D3, D4, D5, D7	P	28 to 35 Rc		12-25X	265	.0030	.0040	.0080	.0090	.0100
Hardened Steels	H	35-45 Rc		12-25X	115	.0006	.0009	.0020	.0024	.0030
Hardened Steels		45-55 Rc			80					
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc		12-25X	300	.0030	.0040	.0080	.0090	.0100
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc		12-25X	180	.0030	.0040	.0080	.0090	.0100
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc		12-25X	130	.0020	.0030	.0060	.0080	.0100
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc		12-25X	65-80	.0009	.0014	.0025	.0030	.0033
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc		12-25X	150	.0016	.0024	.0050	.0060	.0060
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		12-25X	400	.0030	.0050	.0080	.0090	.0100
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		12-25X	265	.0030	.0050	.0080	.0090	.0100
Non-Ferrous - Al < 14% Si	N		12-25X	500	.0043	.0070	.0110	.0138	.0149	
Non-Ferrous - Al > 14% Si	N		12-25X	350	.0043	.0070	.0110	.0138	.0149	
Non-Ferrous - Brass	N		12-25X	400	.0030	.0040	.0110	.0130	.0140	
Non-Ferrous - Cu/Cu Alloys/Magnesium	N		12-25X	300	.0030	.0040	.0110	.0130	.0140	



Made in USA

ISO 9001:2015 Certified

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

For product information, call your local distributor.

Recommended Cutting Data XD 2XDCE - Metric

Workpiece Material Group	I S O	Hardness	T Y P E	D E P T H	vc - m/min	Drill Diameter (mm)						
						5	6	7	8	9	10	12
						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		12-25X	105	.088	.106	.127	.193	.215	.238	.254
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 35 Rc		12-25X	80	.088	.106	.127	.193	.215	.238	.254
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, A128, D2, D3, D4, D5, D7	P	28 to 35 Rc		12-25X	80	.088	.106	.127	.193	.215	.238	.254
Hardened Steels	H	35-45 Rc		12-25X	35	.020	.022	.027	.046	.053	.060	.066
Hardened Steels		45-55 Rc			25							
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc		12-25X	90	.090	.105	.127	.193	.215	.238	.254
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc		12-25X	55	.090	.105	.127	.193	.215	.238	.254
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc		12-25X	40	.090	.105	.127	.193	.215	.238	.254
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc		12-25X	20-25	.030	.035	.048	.051	.071	.078	.085
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc		12-25X	45	.050	.060	.071	.098	.127	.140	.152
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		12-25X	120	.100	.120	.140	.200	.215	.240	.254
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		12-25X	80	.100	.120	.140	.200	.215	.240	.254
Non-Ferrous - Al < 14% Si	N			12-25X	150	.140	.170	.195	.280	.314	.350	.378
Non-Ferrous - Al > 14% Si	N				105	.140	.170	.195	.280	.314	.350	.378
Non-Ferrous - Brass	N				120	.088	.106	.127	.279	.314	.350	.378
Non-Ferrous - Cu/Cu Alloys/Magnesium	N				90	.088	.106	.127	.279	.314	.350	.378

Safety Note

Always wear the appropriate personal protective equipment such as safety glasses and protective clothing when using solid carbide or HSS cutting tools. Machines should be fully guarded. Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.