







TuffCut® XR7

180 / 180N / 180CB Recommended Cutting Data - Profile Milling Inch

Workpiece Material Group	ISO	Hardness	Coolant			Profiling (ae)			End Mill Diameter					
			● Preferred ○ Possible x Not Possible						1/4	3/8	1/2	5/8	3/4	1
						2.3	1.67	1.15	← Multiply fz by this Factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.					
			Max.	Air	MMS	vc - SFM								
Low Carbon Steels 1018, 1020	P	up to 28 Rc	●	●	●	1475	1150	980	.0024	.0039	.0047	.0060	.0078	.0100
Medium Carbon Steels 1140, 1145	P	28 to 38 Rc	●	●	●	1130	900	840	.0024	.0039	.0047	.0060	.0078	.0100
Alloy Steels 4140, 4145	P	28 to 44 Rc	●	●	●	1035	840	765	.0024	.0039	.0047	.0060	.0078	.0100
Die / Tool Steels A2, D2, H13, P20	P	28 to 44 Rc	●	●	●	900	725	615	.0024	.0039	.0047	.0060	.0078	.0100
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	●	x	○	675	545	425	.0010-.0015	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035	.0024-.0039
Stainless Steel - Austenitic 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	●	x	○	525	430	400	.0010-.0015	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035	.0024-.0039
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321	M	up to 28 Rc	●	x	○	410	330	295	.0010-.0015	.0015-.0020	.0020-.0031	.002-.0033	.0022-.0035	.0024-.0039
Stainless Steel - Difficult to Machine 17-4 PH, PH13-8Mo, Nitronics	M	over 28 Rc	●	x	○	525	430	395	.0010-.0015	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035	.0024-.0039
Cobalt Chrome Alloys	M		●	x	○	410	325	295	.0015	.0020	.0031	.0033	.0035	.0039
Duplex (22%)	M		●	x	○	245	195	180	.0015	.0020	.0031	.0033	.0035	.0039
Super Duplex (25%)	M		●	x	○	245	195	180	.0015	.0020	.0031	.0033	.0035	.0039
High Temp Alloys	S	up to 42 Rc	●	x	x	180	150	130	.0010-.0015	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035	.0024-.0039
Inconel	S		●	x	x	180	150	130	.0006-.0010	.0010-.0016	.0010-.0016	.0010-.0017	.0011-.0018	.0012-.0020
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	●	x	x	375	350	330	.0006-.0010	.0010-.0016	.0010-.0016	.0010-.0017	.0011-.0018	.0012-.0020
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	●	○	○	1625	1295	870	.0024	.0039	.0047	.0060	.0078	.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	●	○	○	675	540	510	.0012	.0031	.0039	.0047	.0078	.0100
Hardened Steels	H	40-50 Rc	●	○	○	610	495	325	.0014	.0024	.0030	.0040	.0048	.0064
Hardened Steels		50-55 Rc	●	○	○	510	410	280	.0008	.0016	.0018	.0024	.0028	.0038
Hardened Steels		>55 Rc	●	○	○	330	310	280	.0006	.0010	.0015	.0018	.0021	.0028







Spindle Maximum - Should the calculated spindle speed be more than your actual spindle maximum, use this formula:

$$\text{Spindle Maximum} = \frac{(\text{Calculated Feed} \times \text{Spindle Maximum})}{\text{Calculated Speed}}$$

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

TuffCut® XR7

180 / 180N / 180CB Recommended Cutting Data - Profile Milling Metric

Workpiece Material Group	ISO	Hardness	Coolant			Profiling (ae)			End Mill Diameter (mm)			
			● Preferred ○ Possible x Not Possible						12	16	18	20
						2.3	1.67	1.15	← Multiply fz by this Factor based on ae. When finishing, use the standard fz per chart below. Only add chip thinning when roughing or semi-finishing.			
			Max.	Air	MMS	vc - m/min						
Low Carbon Steels 1018, 1020	P	up to 28 Rc	●	●	●	450	350	300	.1100	.1500	.1900	.2540
Medium Carbon Steels 1140, 1145	P	28 to 38 Rc	●	●	●	345	275	255	.1100	.1500	.1900	.2540
Alloy Steels 4140, 4145	P	28 to 44 Rc	●	●	●	315	255	230	.1100	.1500	.1900	.2540
Die / Tool Steels A2, D2, H13, P20	P	28 to 44 Rc	●	●	●	275	220	185	.1100	.1500	.1900	.2540
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	●	x	○	205	165	130	.050-.078	.050-.083	.055-.088	.060-.099
Stainless Steel - Austenitic 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	●	x	○	160	130	120	.050-.078	.050-.083	.055-.088	.060-.099
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321	M	up to 28 Rc	●	x	○	125	100	90	.050-.078	.050-.083	.055-.088	.060-.099
Stainless Steel - Difficult to Machine 17-4 PH, PH13-8Mo, Nitronics	M	over 28 Rc	●	x	○	160	130	120	.050-.078	.050-.083	.055-.088	.060-.099
Cobalt Chrome Alloys	M	over 28 Rc	●	x	○	125	100	90	.0780	.0830	.0880	.0990
Duplex (22%)	M	over 28 Rc	●	x	○	75	60	55	.0780	.0830	.0880	.0990
Super Duplex (25%)	M	over 28 Rc	●	x	○	75	60	55	.0780	.0830	.0880	.0990
High Temp Alloys	S	up to 42 Rc	●	x	x	55	45	40	.025-.040	.025-.043	.027-.045	.030-.050
Inconel	S	up to 42 Rc	●	x	x	55	45	40	.025-.040	.025-.043	.027-.045	.030-.050
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	●	x	x	115	105	100	.050-.078	.050-.083	.055-.088	.030-.050
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	●	○	○	495	395	265	.1100	.1500	.1900	.2540
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	●	○	○	205	165	155	.1100	.1500	.1900	.2540
Hardened Steels	H	40-50 Rc	●	○	○	185	150	100	.1016	.1168	.1310	.1524
Hardened Steels		50-55 Rc	●	○	○	155	125	85	.0610	.0762	.0857	.0889
Hardened Steels		>55 Rc	●	○	○	100	95	85	.0457	.0559	.0628	.0635

Spindle Maximum - Should the calculated spindle speed be more than your actual spindle maximum, use this formula:

$$\frac{\text{Calculated Feed} \times \text{Spindle Maximum}}{\text{Calculated Speed}}$$

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.