

Workpiece Material Group	ISO	Hardness	Coolant			Profiling (ae)		End Mill Diameter (inch)			
			• Preferred ○ Possible x Not Possible					3/8	1/2	5/8	3/4
						5%	10%	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.			
						2.30	1.67				
			Max.	Air	MMS	vc - SFM	fz - in/tooth				
Low Carbon Steels 1018, 1020	P	up to 28 Rc	•	•	•	1475	1150	.0039	.0047	.0060	.0078
Medium Carbon Steels 1140, 1145	P	28 to 38 Rc	•	•	•	1130	900	.0039	.0047	.0060	.0078
Alloy Steels 4140, 4145	P	28 to 44 Rc	•	•	•	1035	840	.0039	.0047	.0060	.0078
Die / Tool Steels A2, D2, H13, P20	P	28 to 44 Rc	•	•	•	900	725	.0039	.0047	.0060	.0078
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	•	x	○	675	545	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035
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	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321	M	up to 28 Rc	•	x	○	410	330	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035
Stainless Steel - Difficult to Machine 17-4 PH, PH13-8Mo, Nitronics	M		•	x	○	525	430	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035
Cobalt Chrome Alloys	M	over 28 Rc	•	x	○	410	325	.0020	.0031	.0033	.0035
Duplex (22%)	M		•	x	○	245	195	.0020	.0031	.0033	.0035
Super Duplex (25%)	M		•	x	○	245	195	.0020	.0031	.0033	.0035
High Temp Alloys	S	up to 42 Rc	•	x	x	180	150	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035
Inconel	S		•	x	x	180	150	.0010-.0016	.0010-.0016	.0010-.0017	.0011-.0018
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	.0010-.0016	.0010-.0016	.0010-.0017	.0011-.0018
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	.0039	.0047	.0060	.0078
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	.0031	.0039	.0047	.0078
Hardened Steels	H	40-50 Rc	•	○	○	610	495	.0024	.0030	.0040	.0048
Hardened Steels		50-55 Rc	•	○	○	510	410	.0016	.0018	.0024	.0028
Hardened Steels		>55 Rc	•	○	○	330	310	.0010	.0015	.0018	.0021



Made in USA  
ISO 9001:2008 Certified

Spindle Maximum - Should the calculated spindle speed be more than your actual spindle maximum, use this formula:  
(Calculated Feed x Spindle Maximum)/Calculated Speed.

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

# TuffCut® XT9

## 380 Series Recommended Cutting Data - Profile Milling Metric



Workpiece Material Group	ISO	Hardness	Coolant			Profiling (ae)		End Mill Diameter (mm)				
			● Preferred ○ Possible x Not Possible					8	10	12	16	20
						2.30	1.67	← 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	fz - mm/tooth					
Low Carbon Steels 1018, 1020	P	up to 28 Rc	●	●	●	450	350	.0800	.1000	.1100	.1500	.2540
Medium Carbon Steels 1140, 1145	P	28 to 38 Rc	●	●	●	345	275	.0800	.1000	.1100	.1500	.2540
Alloy Steels 4140, 4145	P	28 to 44 Rc	●	●	●	315	255	.0800	.1000	.1100	.1500	.2540
Die / Tool Steels A2, D2, H13, P20	P	28 to 44 Rc	●	●	●	275	220	.0800	.1000	.1100	.1500	.2540
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	●	x	○	205	165	.030-.040	.038-.050	.050-.078	.050-.083	.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	.030-.040	.038-.050	.050-.078	.050-.083	.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	.030-.040	.038-.050	.050-.078	.050-.083	.060-.099
Stainless Steel - Difficult to Machine 17-4 PH, PH13-8Mo, Nitronics	M	over 28 Rc	●	x	○	160	130	.030-.040	.038-.050	.050-.078	.050-.083	.060-.099
Cobalt Chrome Alloys	M		●	x	○	125	100	.0400	.0500	.0780	.0830	.0990
Duplex (22%)	M		●	x	○	75	60	.0400	.0500	.0780	.0830	.0990
Super Duplex (25%)	M		●	x	○	75	60	.0400	.0500	.0780	.0830	.0990
High Temp Alloys	S	up to 42 Rc	●	x	x	55	45	.030-.040	.038-.050	.025-.040	.025-.043	.030-.050
Inconel	S		●	x	x	55	45	.020-.030	.025-.040	.025-.040	.025-.043	.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	.020-.030	.025-.040	.050-.078	.050-.083	.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	.0800	.1000	.1100	.1500	.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	.0650	.0800	.1100	.1500	.2540
Hardened Steels	H	40-50 Rc	●	○	○	185	150	.0500	.0600	.1016	.1168	.1524
Hardened Steels		50-55 Rc	●	○	○	155	125	.0300	.0400	.0610	.0762	.0889
Hardened Steels		>55 Rc	●	○	○	100	95	.0200	.0250	.0457	.0559	.0635

### 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.

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

$$\text{(Calculated Feed} \times \text{Spindle Maximum)} / \text{Calculated Speed.}$$

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