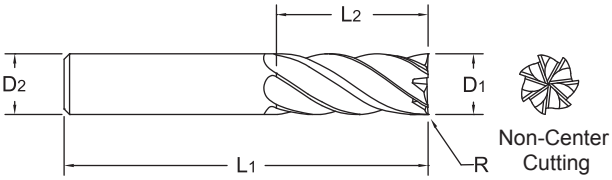
TuffCut® XR7 Series 180

Z7 | 38° | ALtima® Blaze

40% increase in productivity over a 5 flute tool.



- Designed specifically for Titanium, Inconel and similar materials.
- ALtima® Blaze coating for increased performance.

For Long and X-Long lengths see Series 180CB Chipbreaker on page 199.

ALtima® Blaze		Diameter D1			Shank D2 (h6)		OAL L1		Flute Length L2		Corner Radius R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
18023600B	18936		6	.2362		6		57		13		
18023601B	18938		6	.2362		6		57		13		0.5
18025000B	18900	1/4		.2500	1/4		2		3/8			
18025002B	18901	1/4		.2500	1/4		2		3/8		.015	
18025010B	18902	1/4		.2500	1/4		2-1/2		3/4			
18025012B	18903	1/4		.2500	1/4		2-1/2		3/4		.015	
18031500B	18944		8	.3150		8		63		19		
18031501B	18946		8	.3150		8		63		19		0.5
18037500B	18908	3/8		.3750	3/8		2-1/2		1/2			
18037502B	18909	3/8		.3750	3/8		2-1/2		1/2		.015	
18037504B	18932	3/8		.3750	3/8		2-1/2		1/2		.030	
18037510B	18910	3/8		.3750	3/8		2-1/2		1			
18037512B	18911	3/8		.3750	3/8		2-1/2		1		.015	
18037514B	18934	3/8		.3750	3/8		2-1/2		1		.030	
18039300B	18940		10	.3937		10		72		22		
18039301B	18942		10	.3937		10		72		22		0.5
18047201B	18501		12	.4724		12		84		32		0.5
18047203B	18503		12	.4724		12		84		32		1.0
18047205B	18505		12	.4724		12		84		32		2.0
18047207B	18507		12	.4724		12		84		32		3.0
18047209B	18508		12	.4724		12		84		32		4.0
18050000B	18512	1/2		.5000	1/2		3		5/8			
18050002B	18515	1/2		.5000	1/2		3		5/8		.015	
18050004B	18517	1/2		.5000	1/2		3		5/8		.030	
18050006B	18519	1/2		.5000	1/2		3		5/8		.060	
18050007B	18521	1/2		.5000	1/2		3		5/8		.090	
18050008B	18523	1/2		.5000	1/2		3		5/8		.125	
18050010B	18514	1/2		.5000	1/2		3		1-1/4			
18050012B	18516	1/2		.5000	1/2		3		1-1/4		.015	
18050014B	18518	1/2		.5000	1/2		3		1-1/4		.030	
18050016B	18520	1/2		.5000	1/2		3		1-1/4		.060	
18050017B	18522	1/2		.5000	1/2		3		1-1/4		.090	
18050018B	18524	1/2		.5000	1/2		3		1-1/4		.125	
18062500B	18532	5/8		.6250	5/8		3-1/2		3/4			
18062502B	18535	5/8		.6250	5/8		3-1/2		3/4		.015	
18062504B	18537	5/8		.6250	5/8		3-1/2		3/4		.030	

Inch	
D1	Tolerance
1/4 - 1.0	+.000/-.0011

Metric (mm)	
D1	Tolerance
12.00 - 20.00	+.000/-.028

Inch	
D2	Tolerance (h6)
.2363 - .3937	+0/-.00035
.3938 - .7087	+0/-.00043
.7088 - 1.000	+0/-.00051

Metric (mm)	
D2	Tolerance (h6)
12.00 - 18.0	+0/-.011
18.01 - 20.0	+0/-.013

Inch	
R	Tolerance
1/4 - 1	+.001/-.001

Metric (mm)	
R	Tolerance
6.0 - 20.0	+.025/-.025

ALtima® Blaze

Featuring high temperature hardness and oxidation resistance that provides extreme wear resistance under all machining conditions

Coating Properties	
Micro Hardness (HV)	3200
Max. Working Temperature	1100°C 2012°F
Friction Coefficient	0.35

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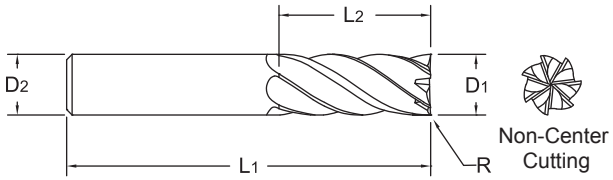
7 Flute

Series 180 Continued

Z7 | 38° | ALtima® Blaze



ALtima® Blaze		Diameter D1			Shank D2 (h6)		OAL L1		Flute Length L2		Corner Radius R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
18062506B	18539	5/8		.6250	5/8		3-1/2		3/4		.060	
18062507B	18541	5/8		.6250	5/8		3-1/2		3/4		.090	
18062508B	18543	5/8		.6250	5/8		3-1/2		3/4		.125	
18062510B	18534	5/8		.6250	5/8		3-1/2		1-1/4			
18062512B	18536	5/8		.6250	5/8		3-1/2		1-1/4		.015	
18062514B	18538	5/8		.6250	5/8		3-1/2		1-1/4		.030	
18062516B	18540	5/8		.6250	5/8		3-1/2		1-1/4		.060	
18062517B	18542	5/8		.6250	5/8		3-1/2		1-1/4		.090	
18062518B	18544	5/8		.6250	5/8		3-1/2		1-1/4		.125	
18062901B	18509		16	.6299		16		92		42		0.5
18062903B	18510		16	.6299		16		92		42		1.0
18062905B	18511		16	.6299		16		92		42		2.0
18062907B	18513		16	.6299		16		92		42		3.0
18062909B	18527		16	.6299		16		92		42		4.0
18075000B	18570	3/4		.7500	3/4		4		1			
18075002B	18573	3/4		.7500	3/4		4		1		.015	
18075004B	18575	3/4		.7500	3/4		4		1		.030	
18075006B	18577	3/4		.7500	3/4		4		1		.060	
18075007B	18579	3/4		.7500	3/4		4		1		.090	
18075008B	18581	3/4		.7500	3/4		4		1		.125	
18075009B	18583	3/4		.7500	3/4		4		1		.190	
180750012B	18585	3/4		.7500	3/4		4		1		.250	
18075010B	18572	3/4		.7500	3/4		4		1-1/2			
18075012B	18574	3/4		.7500	3/4		4		1-1/2		.015	
18075014B	18576	3/4		.7500	3/4		4		1-1/2		.030	
18075016B	18578	3/4		.7500	3/4		4		1-1/2		.060	
18075017B	18580	3/4		.7500	3/4		4		1-1/2		.090	
18075018B	18582	3/4		.7500	3/4		4		1-1/2		.125	
18075019B	18584	3/4		.7500	3/4		4		1-1/2		.190	
180750112B	18586	3/4		.7500	3/4		4		1-1/2		.250	
18078701B	18528		20	.7874		20		102		52		0.5
18078703B	18529		20	.7874		20		102		52		1.0
18078705B	18530		20	.7874		20		102		52		2.0
18078707B	18531		20	.7874		20		102		52		3.0
18078709B	18533		20	.7874		20		102		52		4.0
18010000B	18597	1		1.0000	1		4		1			
18010002B	18599	1		1.0000	1		4		1		.015	
18010004B	18601	1		1.0000	1		4		1		.030	

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Series 180 Continued

ALtima® Blaze		Diameter D1			Shank D2 (h6)		OAL L1		Flute Length L2		Corner Radius R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
18010006B	18603	1		1.0000	1		4		1		.060	
18010007B	18615	1		1.0000	1		4		1		.090	
18010008B	18607	1		1.0000	1		4		1		.125	
18010009B	18609	1		1.0000	1		4		1		.190	
180100012B	18611	1		1.0000	1		4		1		.250	
18010010B	18598	1		1.0000	1		4		1-1/2			
18010012B	18613	1		1.0000	1		4		1-1/2		.015	
18010014B	18602	1		1.0000	1		4		1-1/2		.030	
18010016B	18604	1		1.0000	1		4		1-1/2		.060	
18010017B	18606	1		1.0000	1		4		1-1/2		.090	
18010018B	18608	1		1.0000	1		4		1-1/2		.125	
18010019B	18616	1		1.0000	1		4		1-1/2		.190	
180100112B	18612	1		1.0000	1		4		1-1/2		.250	

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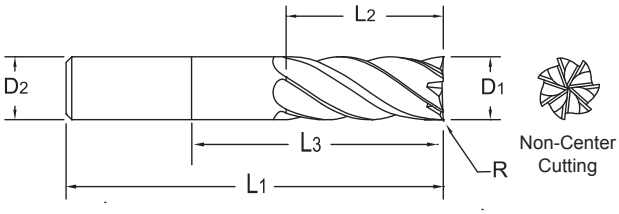
7 Flute

TuffCut® XR7 Series 180N

Z7 | 38° | ALtima® Blaze | N

40% increase in productivity over a 5 flute tool.



- Designed specifically for Titanium, Inconel and similar materials.
- ALtima® Blaze coating for increased performance.

ALtima® Blaze		Diameter D1			Shank D2 (h6)		OAL L1		Flute Length L2		Neck Length L3		Corner Radius R	
Tool No.	EDP	Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
18047203NB	18500		12.0	.4724		12.0		120		30		60		1.0
18047205NB	18502		12.0	.4724		12.0		120		30		60		2.0
18047207NB	18504		12.0	.4724		12.0		120		30		60		3.0
18047209NB	18506		12.0	.4724		12.0		120		30		60		4.0
18050024NB	18526	1/2		.5000	1/2		4		1-1/4		2-1/8		.030	
18062524NB	18546	5/8		.6250	5/8		4		1-1/4		2-1/8		.030	
18062903NB	18548		16.0	.6299		16.0		150		40		80		1.0
18062905NB	18550		16.0	.6299		16.0		150		40		80		2.0
18062907NB	18552		16.0	.6299		16.0		150		40		80		3.0
18062909NB	18554		16.0	.6299		16.0		150		40		80		4.0
18075024NB	18588	3/4		.7500	3/4		5		1-7/8		3		.030	
18078713NB	18590		20.0	.7874		20.0		150		50		100		1.0
18078715NB	18592		20.0	.7874		20.0		150		50		100		2.0
18078717NB	18594		20.0	.7874		20.0		150		50		100		3.0
18078719NB	18596		20.0	.7874		20.0		150		50		100		4.0
180100205NB	18614	1		1.0000	1		6		3		4		.045	

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Inch	
D1	Tolerance
1/2 - 1.0	+.000/-.0011

Metric (mm)	
D1	Tolerance
12.00 - 20.00	+.000/-.028

Inch	
D2	Tolerance (h6)
.5000 - .7087	+0/-.00043
.7088 - 1.000	+0/-.00051

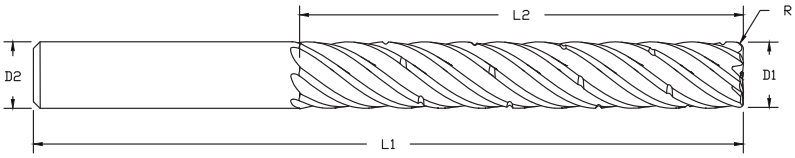
Metric (mm)	
D2	Tolerance (h6)
12.00 - 18.0	+0/-.011
18.01 - 20.0	+0/-.013

Inch	
R	Tolerance
1/4 - 1	+.001/-.001

Metric (mm)	
R	Tolerance
6.0 - 20.0	+.025/-.025

TuffCut® XR7 Series 180CB Chipbreaker

- Long and X-Long lengths now with chipbreaker.
- Higher feed rates allowed.
- Cutting forces minimized resulting in straighter walls on long axial engagements.
- Chatter reduced or eliminated.
- Prolongs life of tool by reducing re-cutting of chips.
- Creates shorter chips that can be evacuated more easily.
- Corner Radius provides a stronger corner for less wear during roughing or finishing.




Non-Center Cutting

ALtima® Blaze		Diameter D1		Shank D2 (h6)	OAL L1	Flute Length L2	Corner Radius R
Tool No.	EDP	Inch	Decimal	Inch	Inch	Inch	Inch
180L2500B	18904	1/4	.2500	1/4	3	1-1/4	
180L2504B	18913	1/4	.2500	1/4	3	1-1/4	.030
180X2500B	18906	1/4	.2500	1/4	4	1-3/4	
180X2504B	18915	1/4	.2500	1/4	4	1-3/4	.030
180L3750B	18912	3/8	.3750	3/8	4	1-1/2	
180L3754B	18917	3/8	.3750	3/8	4	1-1/2	.030
180X3750B	18914	3/8	.3750	3/8	4	2-1/2	
180X3754B	18919	3/8	.3750	3/8	4	2-1/2	.030
180L5000B	18916	1/2	.5000	1/2	4	2	
180L5004B	18921	1/2	.5000	1/2	4	2	.030
180X5000B	18918	1/2	.5000	1/2	5	3	
180X5004B	18923	1/2	.5000	1/2	5	3	.030
180L6250B	18920	5/8	.6250	5/8	5	2-1/4	
180L6254B	18925	5/8	.6250	5/8	5	2-1/4	.030
180X6250B	18922	5/8	.6250	5/8	6	3	
180X6254B	18927	5/8	.6250	5/8	6	3	.030
180L7500B	18924	3/4	.7500	3/4	5	2-1/4	
180L7504B	18929	3/4	.7500	3/4	5	2-1/4	.030
180X7500B	18926	3/4	.7500	3/4	6	3	
180X7504B	18931	3/4	.7500	3/4	6	3	.030
180L1000B	18928	1	1.0000	1	5	2-1/4	
180L1004B	18933	1	1.0000	1	5	2-1/4	.030
180X1000B	18930	1	1.0000	1	6	3	
180X1004B	18935	1	1.0000	1	6	3	.030


Close-up of chipbreaker grind

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Inch	
D1	Tolerance
1/4 - 1.0	+.000/-.0011

Inch	
D2	Tolerance (h6)
.2363 - .3937	+0/-.00035
.3938 - .7087	+0/-.00043
.7088 - 1.000	+0/-.00051

TuffCut®

End Mill Icon Glossary

Z3 Number of Flutes

Center Cutting

Lengths

Coatings

ALtima® | TiAlN | TiCN | TiN | Fordlube | CERAedge®

30° Helix Angle

Ball Nose

Neck Relief

N

Corner Radius

Shank

HB
DIN6535 Shank/DIN

Chipbreaker

Chipbreaker

Workpiece Material Group

P Steels

M Stainless Steels

K Cast Iron

S Special Alloys

H Hardened Steels (35-65Rc)

N Non-Ferrous

Coolant Max. Maximum Coolant

Coolant MMS Minimal Coolant

Cutting Calculations And Definitions			Metric	U.S.
ae	=	Width of cut, radial depth of cut	(mm)	(inch)
ap	=	Depth of cut, axial depth of cut	(mm)	(inch)
Dc	=	Cutter diameter	(mm)	(inch)
f	=	Feed per revolution	(mm/rev)	(IPR)
fz	=	Feed per tooth	(mm/tooth)	(IPT)
zn	=	Number of teeth	Number	
n	=	RPM	(rev/min)	(rev/min)
Q	=	Metal removal rate	(cm^3/min)	(in^3/min)
vc	=	Cutting speed	(m/min)	(SFM)
vf	=	Feed speed	(mm/min)	(IPM)
Dw	=	Working diameter	(mm)	(inch)

Formulas

Inch
RPM (n) = SFM (vc) x 3.82/Tool Diam.
IPM (vf) = RPM (n) x IPR (f)

Conversion Inch to Metric
SFM (vc) to m/min (vc) = SFM (vc) x .3048
IPM (vf) to mm/min (vf) = IPM (vf) x 25.4

Metric
RPM (n) = m/min (vc) x 318.057/Tool Diam.
mm/min (vf) = RPM (n) x mm/Revolution (f).

Conversion Metric to Inch
m/min (vc) to SFM (vc) = (m/min)/.3048
mm/min (vf) to IPM (vf) = (mm/min)/25.4

Made in USA

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.

TuffCut® XR7

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

Inch

Workpiece Material Group	ISO	Hardness	Coolant • Preferred o Possible x Not Possible			Profiling (ae)			End Mill Diameter					
						5%	10%	25%	1/4	3/8	1/2	5/8	3/4	1
						5.0	2.3	1.8	← 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			fz - in/tooth					
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	o	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	o	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	o	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	o	525	430	395	.0010-.0015	.0015-.0020	.0020-.0031	.0020-.0033	.0022-.0035	.0024-.0039
Cobalt Chrome Alloys	M		•	x	o	410	325	295	.0015	.0020	.0031	.0033	.0035	.0039
Duplex (22%)	M		•	x	o	245	195	180	.0015	.0020	.0031	.0033	.0035	.0039
Super Duplex (25%)	M		•	x	o	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	•	o	o	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	•	o	o	675	540	510	.0012	.0031	.0039	.0047	.0078	.0100
Hardened Steels	H	40-50 Rc	•	o	o	610	495	325	.0014	.0024	.0030	.0040	.0048	.0064
Hardened Steels		50-55 Rc	•	o	o	510	410	280	.0008	.0016	.0018	.0024	.0028	.0038
Hardened Steels		>55 Rc	•	o	o	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: (Calculated Feed x Spindle Maximum)/Calculated Speed

TuffCut® XR7

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

Metric

Workpiece Material Group	ISO	Hardness	Coolant • Preferred o Possible x Not Possible			Profiling (ae) 5%	10%	25%	End Mill Diameter (mm) 12	16	18	20
						5.0	2.3	1.8	← 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	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	o	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	o	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	o	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	o	160	130	120	.050-.078	.050-.083	.055-.088	.060-.099
Cobalt Chrome Alloys	M		•	x	o	125	100	90	.0780	.0830	.0880	.0990
Duplex (22%)	M		•	x	o	75	60	55	.0780	.0830	.0880	.0990
Super Duplex (25%)	M		•	x	o	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		•	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	•	o	o	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	•	o	o	205	165	155	.1100	.1500	.1900	.2540
Hardened Steels	H	40-50 Rc	•	o	o	185	150	100	.1016	.1168	.1310	.1524
Hardened Steels		50-55 Rc	•	o	o	155	125	85	.0610	.0762	.0857	.0889
Hardened Steels		>55 Rc	•	o	o	100	95	85	.0457	.0559	.0628	.0635

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