The Machining Data shown below, is considered to be "safe starting conditions" and may need to be adjusted to obtain optimal tool performance.

SFM (Surface Feed per Minute) can be adjusted between 30%-50% on coated tools (depending on materials and workholding).

For plunging applications in solid materials, reduce feed rates by approximately 50%. Slotting applications, reduce feed by 20%

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MATERIAL TYPES	SFM (Vc)				Cutter Diameter Chip Load per Tooth (Fz)			
	2 Flute (Stub / Std.)	2 Flute (Extra Lgth.)	3 / 4 Flute (Stub / Std.)	3 / 4 Flute (Extra Lgth.)	1/32 - 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1
Non-Ferrous Materials								
Aluminum / Aluminum Alloys								
2014, 2024, 2024, Aircraft Grade(s), 6061, 7075	300 - 500	300 - 500	300 - 500	300 - 500	.0010 - .0020	.0015 - .0040	.0020 - .0060	.0030 - .0116
Brass / Bronze								
High Lead Brass, Red Brass, Yellow Brass, Naval Brass, Low Silicon Brass	300 - 400	200 - 300	275 - 375	200 - 300	.0007 - .0015	.0010 - .0025	.0015 - .0035	.0020 - .0100
Copper / Copper Alloys								
Aluminum Bronze, Low Silicon Bronze Berylium Copper, Nickel Silver, Oxygen Free Copper	300 - 400	250 - 350	300 - 450	250 - 350	.0007 - .0015	.0010 - .0025	.0015 - .0035	.0020 - .0100
Composites								
Acrylics, Fiberglass,Glass Epoxy, Phenolics, Plastics	200 - 400	200 - 400	200 - 400	200 - 400	.0010 - .0020	.0015 - .0040	.0020 - .0060	.0030 - .0100
Graphites								
	122 - 1015	122 - 1015	122 - 1015	122 - 1015	.0005 - .0015	.0010 - .0020	.0020 - .0050	.0050 - .0080
Magnesium								
	300 - 500	300 - 500	300 -5 00	300 - 500	.0010 - .0020	.0015 - .0040	.0020 - .0060	.0030 - .0100
Cast Materials / Irons								
Aluminum								
	250 - 350	250 - 350	250 - 350	250 - 350	.0010 - .0020	.0015 - .0040	.0020 - .0060	.0030 - .0100
Ductile Iron								
	200 - 300	125 - 200	200 - 300	125 - 200	.0005 - .0015	.0010 - .0030	.0015 - .0040	.0020 - .0080
Gray Iron								
	225 - 325	175 - 250	250 - 350	175 - 250	.0010 - .0020	.0015 - .0040	.0020 - .0060	.0030 - .0100
Steels								
	225 - 325	175 - 250	250 - 350	175 - 250	.0010 - .0020	.0015 - .0040	.0020 - .0060	.0030 - .0100

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For plunging applications in solid materials, reduce feed rates by approximately 50%.

MATERIAL TYPES	Hardness (Rc)	SFM (Vc) 3 / 4 Flute (Stub / Std.)	SFM (Vc) 3 / 4 Flute (Extra Lgth.)	Cutter Diameter Feed (Inch/Tooth) 1/32 - 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1
Steels							
A36, 12L14	< 35	175 - 250	150 - 200	.0007 - .0015	.0010 - .0025	.0015 - .0040	.0030 - .0060
1100(s), 1200(s), 1300(s)	> 35	100 - 175	100 - 150	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
Medium Alloy Steels							
200, 250, 300, 86210	< 35	175 - 250	150 -200	.0007 - .0015	.0010 - .0025	.0015 - .0040	.0030 - .0060
	> 35	100 - 175	100 -150	.0005 - .0010	.0008 - .0020	.0010 -. 0030	.0020 - .0050
High Strength Tool Steels							
A2, D2, H11, H13, 01, S2,	< 30	150 - 225	125 - 175	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
4130, 4340, 5210, 6150	30-35	90 - 125	80 - 120	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040
	> 35	60 - 90	50 - 80	.0002 - .0004	.0003 - .0007	.0008 - .0015	.0010 - .0035
Stainless Steels							
Precipitation							
AF-71, AM-350, AM-355, pH Types,	< 35	150 - 250	100- 150	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
13/8, 15/5, 17-4, 15-7 Mo,	> 35	125 - 175	80- 150	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040
Austenic							
200 Series, 302, 302, 303	< 35	200 - 250	125 - 175	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
	> 35	150 - 200	100 - 150	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040
304, 310, 314, 316, 321, 330, 347, 348	< 35	90 - 125	80 - 120	.0005 - .0008	.0008 - .0020	.0010 - .0020	.0020 - .0050
	> 35	75 - 110	60 - 90	.0003 - .0005	.0005 - .0015	.0010 - .0015	.0010 - .0040
403, 410, 416, 420, 430F, 440C, 446	< 35	150 - 250	100 - 150	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
	> 35	125 - 175	80 - 150	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040
High Temperature Alloys							
Cobalt Base							
Air-Resist, Haynes 21, 25, 36,188,	< 35	150 - 250	100 - 150	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
HS-21, L-605, NASA CO-W-RE,	> 35	125 - 175	80 - 150	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040
Powdered Metals, Stellite, X-40							
Nickel Base							
A286, Hastelloy, Inconel-625, 718,	< 35	200 - 250	125 - 175	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
Invar, Kovar, Rene, Waspalloy	> 35	150 - 200	100 - 150	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040
Iron Base							
Carpenter 22-b3, Discaloy, Incoloy 800,	< 35	200 - 250	125 - 175	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050
802, Multimet N-155, Timkin 16-25-6	> 35	150 - 200	100 - 150	.0003 - .0005	.0005 - .0015	.0010 - .0020	.0010 - .0040

MATERIAL TYPES	SFM (Vc) 2 Flute (Stub / Std.)	2 Flute (Extra Lgth.)	3 / 4 Flute (Stub / Std.)	3 / 4 Flute (Extra Lgth.)	Cutter Diameter Chip Load per Tooth (Fz) 1/32 - 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1
Hardened Materials								
Monel								
Monel - 65% Nickel	175 - 300	125 - 175	175 - 300	125 - 175	.0007 - .0015	.0010 - .0025	.0015 - .0040	.0030 - .0060
Titanium Alloys								
ASTM 1, 2, 3, Commercially Pure, 6Al-25N-4Zr-2Mo-Si, 6Al-4V	200 - 300	125 - 250	200 - 300	125 - 250	.0007 - .0015	.0010 - .0025	.0015 - .0040	.0030 - .0060
Beta Titanium, 5553	–	–	200 - 300	125 - 200	.0005 - .0010	.0008 - .0020	.0010 - .0030	.0020 - .0050

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	2 Flute (Stub / Std.)	2 Flute (Extra Lgth.)	3 / 4 Flute (Stub / Std.)	3 / 4 Flute (Extra Lgth.)	1.0 - 3.0	3.0 - 6.0	6.0 - 12.0	12.0 - 25.0
Non-Ferrous Materials								
Aluminum / Aluminum Alloys								
2014, 2024, 2024, Aircraft Grade(s), 6061, 7075	90 - 150	90 -1 50	90 - 150	90 - 150	.025 - .050	.035 - .100	.050 - .150	.075 - .250
Brass / Bronze								
High Lead Brass, Red Brass, Yellow Brass, Naval Brass, Low Silicon Brass	90 - 120	60 - 90	75 - 115	60 - 90	.020 - .040	.025 - .065	.040 - .090	.050 - .200
Copper / Copper Alloys								
Aluminum Bronze, Low Silicon Bronze Berylium Copper, Nickel Silver, Oxygen Free Copper	120 - 150	75 - 105	90 - 135	75 - 105	.0007 - .0015	.025 - .065	.040 - .090	.050 - .200
Composites								
Acrylics, Fiberglass,Glass Epoxy, Phenolics, Plastics	60 - 120	60 - 120	60 - 120	60 - 120	.025 - .050	.035 - .100	.050 - .150	.075 - .250
Graphites								
	90 - 200	90 - 200	90 - 200	90 - 200	.025 - .050	.035 - .100	.050 - .150	.075 - .250
Magnesium								
	90 - 150	90 - 150	90 - 150	90 - 150	.025 - .050	.035 - .100	.050 - .150	.075 - .250
Cast Materials / Irons								
Aluminum								
	75 - 105	75 - 105	75 - 105	75 - 105	.025 - .050	.035 - .100	.050 -.150	.075 - .250
Ductile Iron								
	60 - 90	35 - 60	60 - 90	35 - 60	.015 - .035	.025 - .075	.035 -.100	.050 - .200
Gray Iron								
	70 - 100	50 - 75	75 - 105	50 - 75	.025 - .050	.035 - .100	.050 -.150	.075 - .250
Steels								
	70 - 100	50 - 75	75 - 105	50 - 75	.025 - .050	.035 - .100	.050 -.150	.075 - .250

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