

# General Solid Carbide Milling Guide

## Fractional

Type	Rc Hardness	MILLING SFM (Vc)					CHIPLOAD PER FLUTE (Fz)				
		2 flute stub / std.	2 flute extra length	3 & 4 flute stub / std.	3 & 4 flute extra length	Diamond Coated	1/32" - 1/8"	1/8" - 1/4"	1/4" - 1/2"	1/2" - 1"	1" - 1-1/4"
<b>COBALT BASE ALLOYS</b>											
Powdered Metal, Stellite, Hs-21, Haynes 25/188, X-40, L-605	< 35	-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
<b>NICKEL BASE ALLOYS</b>											
Invar, Kovar, Inconel-625/718, Waspalloy, Rene, Hastalloy, A286	< 35	-	-	125 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	70 - 115	70 - 100	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
<b>IRON BASE ALLOYS</b>											
Incoloy 800-802, Multimet N-155, Timkin 16-25-6, Carpenter 22-b3	< 35	-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
<b>MONEL</b>											
Monel - 65% Nickel		175 - 300	125 - 175	175 - 300	125 - 175	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
<b>TITANIUM ALLOYS</b>											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si		200 - 300	125 - 250	200 - 300	125 - 250	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
		-	-	175 - 225	150 - 200	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
<b>STAINLESS STEELS</b>											
13/8, 15/5, 17-4, pH Types	< 35	-	-	150 - 250	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	80 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
Inox, 200 Series, 300 Series	< 35	-	-	200 - 250	125 - 175	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	150 - 200	100 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
304L, 316L, Nitronic 50, Inox	< 35	-	-	90 - 125	80 - 120	-	.0005" - .0008"	.0008" - .0015"	.0010" - .0020"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	75 - 110	60 - 90	-	.0003" - .0005"	.0005" - .0010"	.0010" - .0015"	.0010" - .0030"	.0020" - .0040"
400 Series	< 35	-	-	150 - 250	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	> 35	-	-	125 - 175	80 - 150	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
<b>HIGH STRENGTH TOOL STEELS</b>											
4140, 4340, 6150, 5210, A2, D2, P20, H11, H13, S2, O1	< 30	-	-	150 - 225	125 - 175	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
	30 - 38	-	-	90 - 125	80 - 120	-	.0003" - .0005"	.0005" - .0015"	.0010" - .0020"	.0010" - .0030"	.0020" - .0040"
	> 38	-	-	60 - 90	50 - 80	-	.0002" - .0004"	.0003" - .0007"	.0008" - .0015"	.0010" - .0025"	.0015" - .0035"
<b>MEDIUM ALLOY TOOL STEELS</b>											
200, 250, 300, 8620	< 35	-	-	175 - 250	150 - 200	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
	> 35	-	-	100 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
<b>CARBON STEELS</b>											
Platinum, A36, 12L14, 1000's, 1100's, 1300's	< 35	-	-	175 - 250	150 - 200	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0040"	.0030" - .0050"	.0040" - .0060"
	> 35	-	-	100 - 175	100 - 150	-	.0005" - .0010"	.0008" - .0020"	.0010" - .0030"	.0020" - .0040"	.0030" - .0050"
<b>CAST MATERIAL</b>											
Steel		225 - 325	175 - 250	250 - 350	175 - 250	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Ductile Iron		200 - 300	125 - 200	200 - 300	125 - 200	-	.0005" - .0015"	.0010" - .0030"	.0015" - .0040"	.0020" - .0060"	.0030" - .0080"
Gray Iron		225 - 325	175 - 250	250 - 350	175 - 250	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Aluminum		250 - 350	250 - 350	250 - 350	250 - 350	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
<b>ALUMINUM</b>											
Aircraft Grade (6061, 7075)	Standard Speed	300 - 500	300 - 500	300 - 500	300 - 500	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0150"
	High Speed	<i>(SEE HIGH SPEED ALUMINUM CHART - PAGE 196)</i>									
<b>MAGNESIUM</b>											
		300 - 500	300 - 500	300 - 500	300 - 500	-	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
<b>COPPER</b>											
Copper Alloys		300 - 400	250 - 350	300 - 450	250 - 350	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"	.0040" - .0100"
<b>BRASS, BRONZE</b>											
Brass, Aluminum/Bronze, Low Silicon Bronze		300 - 400	200 - 300	275 - 375	200 - 300	-	.0007" - .0015"	.0010" - .0025"	.0015" - .0035"	.0020" - .0080"	.0040" - .0100"
<b>COMPOSITE MATERIAL</b>											
Glass Epoxy, Fiberglass, Plastics		200 - 400	200 - 400	200 - 400	200 - 400	200 - 500	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"
Graphite, G10		<i>(SEE GRAPHITE CHART - PAGE 202)</i>				300 - 1000	.0010" - .0020"	.0015" - .0040"	.0020" - .0060"	.0030" - .0100"	.0050" - .0100"

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**

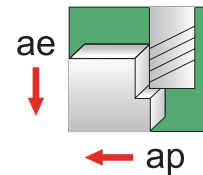
# Speed and Feed Recommendations for Diamond Coated End Mills in Graphite

## Fractional

DIAMETER	RPM	CHIPLOAD PER FLUTE (Fz)
1/32" - 1/16"	15,000 - 35,000	.0005" - .0010"
1/16" - 1/8"	8000 - 31,000	.0008" - .0015"
1/8" - 3/16"	8000 - 31,000	.0010" - .0020"
3/16" - 1/4"	8000 - 25,000	.0010" - .0020"
1/4" - 5/16"	6000 - 23,000	.0020" - .0040"
5/16" - 3/8"	6000 - 20,000	.0020" - .0040"
3/8" - 1/2"	6000 - 20,000	.0030" - .0050"
1/2" - 5/8"	4500 - 15,000	.0050" - .0060"
5/8" - 3/4"	4500 - 12,000	.0060" - .0070"
3/4" - 1"	4500 - 12,000	.0070" - .0080"

Generally, tools will run at maximum RPM in relation to the corresponding parameters below:

	SLOTING	PROFILING
Axial (ae)	5% of Dia.	1xD
Radial (ap)	1xD	10% of Dia.



## Metric

DIAMETER	RPM	CHIPLOAD PER FLUTE (Fz)
1.0 - 3.0	15,000 - 35,000	.015 - .030
3.0 - 6.0	8000 - 31,000	.030 - .050
6.0 - 10.0	6000 - 31,000	.050 - .100
10.0 - 12.0	6000 - 25,000	.080 - .130
16.0 - 20.0	4500 - 15,000	.130 - .150
20.0 - 25.0	4500 - 12,000	.150 - .200

**These recommendations are suggested for use primarily in graphite cutting applications. Rigid work holding, machine stability and part integrity are critical!**

**NOTE - ABOVE ARE STARTING PARAMETERS ONLY. HIGHER RESULTS MAY BE ACHIEVED WITH OPTIMUM CONDITIONS.**