

# GARR TOOL Milling Guide for Drill Mills

## \* Chamfering \*

TECHNICAL

ISO Material	HRC	SFM (Vc) 154M, 154MA 152M, 152MA	CHIPLOAD PER TOOTH (Fz)							
			1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
<b>COBALT BASE ALLOYS</b>										
Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	60 - 90	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"
	> 40	50 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"
<b>NICKEL BASE ALLOYS</b>										
Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	55 - 90	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"
	> 40	45 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"
<b>IRON BASE ALLOYS</b>										
A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40	55 - 90	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"
	> 40	50 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"
<b>TITANIUM ALLOYS</b>										
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si	< 40	100 - 150	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0025" - .0035"
	> 40	90 - 120	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"
<b>5553 / Beta Titanium</b>										
			.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"
<b>STAINLESS STEELS</b>										
13/8, 15/5, 17-4, pH Types	< 40	100 - 150	.0003" - .0006"	.0003" - .0007"	.0006" - .0009"	.0008" - .0012"	.0013" - .0018"	.0010" - .0020"	.0012" - .0025"	.0012" - .0020"
	> 40	80 - 100	.0002" - .0004"	.0002" - .0006"	.0003" - .0007"	.0004" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0016"	.0013" - .0017"
	< 40	150 - 225	.0002" - .0006"	.0005" - .0008"	.0008" - .0015"	.0010" - .0018"	.0010" - .0018"	.0015" - .0025"	.0018" - .0028"	.0022" - .0032"
	> 40	125 - 220	.0003" - .0005"	.0003" - .0007"	.0005" - .0010"	.0008" - .0012"	.0009" - .0015"	.0013" - .0018"	.0013" - .0018"	.0017" - .0025"
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	150 - 200	.0007" - .0010"	.0009" - .0015"	.0009" - .0014"	.0011" - .0015"	.0013" - .0018"	.0015" - .0025"	.0020" - .0035"	.0030" - .0046"
	> 40	100 - 150	.0004" - .0008"	.0006" - .0010"	.0007" - .0011"	.0008" - .0012"	.0009" - .0015"	.0012" - .0020"	.0018" - .0030"	.0024" - .0042"
<b>400 Series - 403, 405, 420, 455</b>										
			.0004" - .0008"	.0006" - .0010"	.0007" - .0011"	.0008" - .0012"	.0009" - .0015"	.0012" - .0020"	.0018" - .0030"	.0024" - .0042"
<b>HIGH STRENGTH TOOL STEELS</b>										
A2, D2, P20, H13, S7, O1	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"
	> 40	100 - 150	.0003" - .0005"	.0003" - .0008"	.0005" - .0010"	.0005" - .0010"	.0005" - .0010"	.0010" - .0015"	.0012" - .0018"	.0015" - .0022"
<b>MEDIUM ALLOY TOOL STEELS</b>										
4140, 4340, 52100, 6150, 8620	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"
	> 40	100 - 150	.0003" - .0005"	.0003" - .0008"	.0005" - .0010"	.0005" - .0010"	.0005" - .0010"	.0010" - .0015"	.0012" - .0018"	.0015" - .0022"
<b>CARBON STEELS</b>										
1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"
<b>CAST MATERIAL</b>										
Ductile Iron	< 40	175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
	> 40	175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
Gray Iron	< 40	175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"
<b>NON-FERROUS</b>										
Aluminum (6061, 7075)	< 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	> 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	< 40	250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
	> 40	200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
Magnesium	< 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
Copper	< 40	250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
Brass, Bronze	< 40	200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"
<b>COMPOSITE (non-ISO)</b>										
Glass Epoxy, Fiberglass, Plastics	< 40	200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"

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

# GARR TOOL Drilling Guide for Drill Mills

## \* Through Hole \*

TECHNICAL

ISO Material	HRC	SFM (Vc) 152DA	CHIPLOAD PER TOOTH (Fz)								
			1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"	
<b>COBALT BASE ALLOYS</b>											
Haynes 25/188, Stellite 21, Cobalt Chrome	< 40	60 - 90	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"	
	> 40	50 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"	
<b>NICKEL BASE ALLOYS</b>											
Inconel-625/718, Waspaloy, Invar, Rene, Hastelloy, Monel	< 40	55 - 90	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"	
	> 40	45 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"	
<b>IRON BASE ALLOYS</b>											
A286, Discaloy, Haynes 556, Carpenter 22, Greek Ascology	< 40	55 - 90	.0004" - .0008"	.0004" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0018"	.0015" - .0030"	.0020" - .0030"	.0025" - .0035"	
	> 40	50 - 80	.0003" - .0006"	.0003" - .0006"	.0003" - .0008"	.0005" - .0010"	.0008" - .0015"	.0010" - .0015"	.0015" - .0025"	.0015" - .0020"	
<b>TITANIUM ALLOYS</b>											
Commercially Pure, 6Al-4V, Astm 1/2/3, 6Al-25N-4Zr-2Mo-Si	< 40	100 - 150	.0003" - .0008"	.0005" - .0012"	.0005" - .0012"	.0008" - .0015"	.0010" - .0015"	.0013" - .0020"	.0018" - .0025"	.0025" - .0035"	
	> 40	90 - 120	.0003" - .0008"	.0004" - .0010"	.0004" - .0010"	.0005" - .0012"	.0008" - .0014"	.0010" - .0016"	.0010" - .0020"	.0015" - .0025"	
<b>STAINLESS STEELS</b>											
13/8, 15/5, 17-4, pH Types	< 40	100 - 150	.0003" - .0006"	.0003" - .0007"	.0006" - .0009"	.0008" - .0012"	.0013" - .0018"	.0010" - .0020"	.0012" - .0025"	.0012" - .0020"	
	> 40	80 - 100	.0002" - .0004"	.0002" - .0006"	.0003" - .0007"	.0004" - .0008"	.0007" - .0012"	.0008" - .0015"	.0010" - .0016"	.0013" - .0017"	
	< 40	150 - 225	.0002" - .0006"	.0005" - .0008"	.0008" - .0015"	.0010" - .0018"	.0010" - .0018"	.0015" - .0025"	.0018" - .0028"	.0022" - .0032"	
	> 40	125 - 220	.0003" - .0005"	.0003" - .0007"	.0005" - .0010"	.0008" - .0012"	.0009" - .0015"	.0013" - .0018"	.0013" - .0018"	.0017" - .0025"	
300 Series, 304L, Nitronic 50, Duplex, Super-Austenitic	< 40	150 - 200	.0007" - .0010"	.0009" - .0015"	.0009" - .0014"	.0011" - .0015"	.0013" - .0018"	.0015" - .0025"	.0020" - .0035"	.0030" - .0046"	
	> 40	100 - 150	.0004" - .0008"	.0006" - .0010"	.0007" - .0011"	.0008" - .0012"	.0009" - .0015"	.0012" - .0020"	.0018" - .0030"	.0024" - .0042"	
<b>400 Series - 403, 405, 420, 455</b>											
400 Series - 403, 405, 420, 455	< 40	150 - 200	.0007" - .0010"	.0009" - .0015"	.0009" - .0014"	.0011" - .0015"	.0013" - .0018"	.0015" - .0025"	.0020" - .0035"	.0030" - .0046"	
	> 40	100 - 150	.0004" - .0008"	.0006" - .0010"	.0007" - .0011"	.0008" - .0012"	.0009" - .0015"	.0012" - .0020"	.0018" - .0030"	.0024" - .0042"	
<b>HIGH STRENGTH TOOL STEELS</b>											
A2, D2, P20, H13, S7, O1	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	
	> 40	100 - 150	.0003" - .0005"	.0003" - .0008"	.0005" - .0010"	.0005" - .0010"	.0005" - .0010"	.0010" - .0015"	.0012" - .0018"	.0015" - .0022"	
<b>MEDIUM ALLOY TOOL STEELS</b>											
4140, 4340, 52100, 6150, 8620	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	
	> 40	100 - 150	.0003" - .0005"	.0003" - .0008"	.0005" - .0010"	.0005" - .0010"	.0005" - .0010"	.0010" - .0015"	.0012" - .0018"	.0015" - .0022"	
<b>CARBON STEELS</b>											
1000's - 1018, 1020, 12L14	< 40	150 - 200	.0003" - .0008"	.0005" - .0010"	.0010" - .0015"	.0012" - .0020"	.0012" - .0020"	.0014" - .0024"	.0018" - .0026"	.0020" - .0028"	
<b>CAST MATERIAL</b>											
Ductile Iron	< 40	175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	
	> 40	175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	
Gray Iron	< 40	175 - 225	.0008" - .0012"	.0010" - .0015"	.0015" - .0025"	.0015" - .0025"	.0020" - .0030"	.0025" - .0035"	.0035" - .0045"	.0035" - .0045"	
<b>NON-FERROUS</b>											
Aluminum (6061, 7075)	< 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	> 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	< 40	250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	> 40	200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
Magnesium	< 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
	> 40	300 - 500	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
Copper	< 40	250 - 450	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
Brass, Bronze	< 40	200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	
<b>COMPOSITE (non-ISO)</b>											
Glass Epoxy, Fiberglass, Plastics	< 40	200 - 400	.0006" - .0010"	.0008" - .0014"	.0012" - .0020"	.0014" - .0028"	.0020" - .0030"	.0035" - .0048"	.0050" - .0060"	.0058" - .0070"	

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