

Single Form Thread Milling Guide

Single Form Threadmills are the most versatile threading tool due to their ability to mill multiple pitch sizes. Since they are used in a helical interpolation environment, specific machining parameters are needed to avoid deflection and breakage. These tools can be used successfully in materials ranging from Aluminum to Steels.

Speeds & Feeds calculations:

- 1. Determine the correct SFM and Chip Load (IPT) for the cutter and material
- 2. Calculate the Speed (RPM) and Linear Feed (IPM)
- 3. Adjust Linear Feed to account for helical interpolation of internal or external threads
- 4. Determine correct number of radial passes at full axial depth

Example: Tool #901210 to machine a 4-40 internal thread in 17-4 stainless steel

- 1. From Speeds & Feeds chart (next page), SFM is 150 and Chip Load (IPT) is .00011
- 2. Calculate Speed (RPM) and Linear Feed (IPM)

RPM = (SFM x 3.82) / Cutter Diameter = (150 x 3.82) / .080 = 7162 Linear Feed (IPM) = RPM x IPT x Number of Flutes = 7162 x .00011 x 2

$$= 157$$

3. Adjust Linear Feed (use Table 1 to determine Major Thread Diameter)

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Adj Internal Feed = [(Major Thread Dia - Cutter Dia) / Major Thread Dia] x Linear Feed
= [(.112 - .080) / .112] x 1.57
= .45
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Adj External Feed = [(Major Thread Dia + Cutter Dia) / Major Thread Dia] x Linear Feed = [(.112 + .080) / .112] x 3.15 = 2.69

4. Determine Number of Radial Passes using Table 1

(Note: The number of passes should be based on the thread size of the tool, and not the machined part)

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For Easy Machinability= 2 Radial Pass at full Axial DepthFor Moderate Machinability= 3 Radial Passes at full Axial DepthFor Difficult Machinability= 4 Radial Passes at full Axial Depth
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Definitions:

Easy Machinability materials include Non-Ferrous alloys and Leaded Steels Moderate Machinability materials include 200/300/400 Stainless Steels and Steels up to 35 Rc Difficult Machinability materials include Inconel, Titanium and Steels 36-45 Rc

5. Conclusion

In this example, the tool would run at 7162 RPM, .45 IPM and make 3 Radial Passes

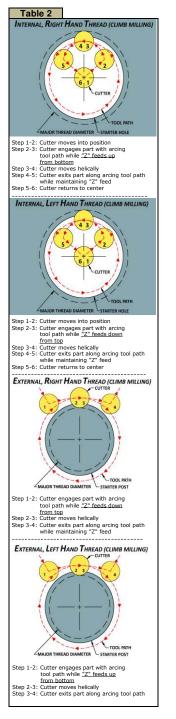
Setup & Use:

1. Check software and input proper feed values (Linear or Adjusted)

- 2. Choke up on tool
- 3. Minimize runout (consider entire system of spindle, collet, holders etc)
- 4. Minimize all vibration (consider tool holding, work holding, rpm "sweet spot" etc)
- 5. Break in tool by reducing feed rates by 25% on first 1-2 holes
- 6. Cutter should engage part using an arcing toolpath to avoid shock loading (see Table 2)
- 7. Climb mill for best finish and tool life (see Table 2)
- 8. Flush chips with coolant to avoid recutting

Table 1 Tool	Major	Numbe	er of Radial F	22226
Thread	Thread	Easy	Moderate	Difficult
Size	Diameter	Machinabilty	Machinabilty	Machinabilty
00	0.047	2	3	4
0	0.060	2	3	4
1	0.073	2	3	4
2	0.086	2	3	3
3	0.099	2	3	3
4	0.112	2	3	4
5	0.125	2	3	3
6	0.138	2	3	4
8	0.164	2	2	3
10	0.190	2	3	4
12	0.216	2	2	3
1/4	0.250	2	2	3
5/16	0.312	2	2	3
3/8	0.375	2	2	3
7/16	0.437	2	2	3
1/2	0.500	2	2	3
9/16	0.562	2	2	3
5/8	0.625	2	2	3
3/4	0.750	2	2	3
7/8	0.875	2	2	3
1	1.000	2	3	4

ches, the number of passes may be reduced by 1 pass.



					ŀ	lardness	: ≤ 28 Ro	; (≤ 271 ∣	HBn)					
MATERIAL	SFM							y Cutter Di						
	0	0.047	0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750	
ALUMINUM ALLOYS														
Casting (2xx, 5xx, 7xx, 8xx)	750	.00009	.00009	.00012	.00015	.00018	.00024	.00050	.00068	.00103	.00124	.00165	.00206	.00248
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000													
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750			.00013							.00149	.00186		
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700	.00008	.00011		.00016	.00022	.00045	.00061	.00093	.00111				
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650												.00223	
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475													
Wrought - 5%-8% Si (4xxx)	1000													
Wrought - 8%-12% Si (4xxx)	800													
MAGNESIUM ALLOYS	1500	.00009	.00012	.00015	.00018	.00024	.00050	.00068	.00103	.00124	.00165	.00206	.00248	
ZINC ALLOYS	800	.00003	.00012	.00013							.00100	.00200	.00240	
COPPER ALLOYS High Coppers - 90%+ (C1xxxx)	225													
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500													
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225												.00207	
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500	.00009	.00011	.00014	.00017	.00023	.00041	.00055	.00086	.00104	.00138	.00173		
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500									1				
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225													
Cast Copper Alloys (C83300-C86200, C86400-C87900, C9200-C95800, C97300-C97800, C99400-C99700)	550													



Speeds & Feeds

Product Table: Thread Milling Cutters - Single Form - UN Threads Characteristics: 3XL Reach Series: 9012xx

Please note:

All posted speed and feed parameters are suggested starting values that may be increased given optimal setup conditions. Chip loads reflect uncoated cutters and may be increased 5%-10% if coated. For ferrous materials with hardness ≤ 28 Rc, chip loads can be increased 3%-5%.

If you require additional information, Harvey Tool has a team of technical experts available to assist you through even the most challenging applications. Please contact us at **800-645-5609** or **Harveytech@harveyperformance.com**.

WARNING: Cutting tools may shatter under improper use. Government regulations require use of safety glasses and other appropriate safety equipment in the vicinity of use.

		Hardness: 29-37 Rc (279-344 HBn)													Hardness: 38-45 Rc (353-421 HBn)											
MATERIAL	SFM							By Cutter Di						SFM						.oad (IPT) B						
	0	0.047	0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750	0	0.047	0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750
CARBON STEELS																										
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	.00007	.00009	.00011	.00013	.00018	.00040	.00054	.00084	.00101	.00135	.00169	.00203	-	-	-	-	-	-	-	-	-	-	-	-	-
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 51xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	200	.00007	.00009	.00011	.00013	.00018	.00040	.00054	.00075	.00090	.00120	.00150	.00180	-	-	-	-	-	-	-	-	-	-	-	-	-
STAINLESS STEELS																										
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	.00007	.00009	.00011	.00013	.00018	.00040	.00054	.00084	.00101	.00135	.00169	.00203	-	-	-	-	-	-	-	-	-	-	-	-	-
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	200	.00007	.00009	.00011	.00013	.00018	.00027	.00036	.00056	.00068	.00090	.00113	.00135	100	.00006	.00008	.00010	.00011	.00015	.00023	.00031	.00048	.00057	.00077	.00096	.00115
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	.00007	.00009	.00011	.00013	.00018	.00027	.00036	.00051	.00061	.00081	.00101	.00122	90	.00006	.00008	.00010	.00011	.00015	.00023	.00031	.00043	.00052	.00069	.00086	.00103
TOOL STEELS																										
A, L, O, P, W series	200	.00007	.00010	.00012	.00015	.00020	.00030	.00040	.00066	.00079	.00106	.00132	.00158	100	.00006	.00008	.00011	.00013	.00017	.00025	.00034	.00056	.00067	.00090	.00112	.00135
D, H, M, T, S series	200	.00007	.00009	.00011	.00013	.00018	.00027	.00036	.00060	.00072	.00096	.00120	.00144	90	.00006	.00008	.00010	.00011	.00015	.00023	.00031	.00051	.00061	.00082	.00102	.00122
TITANIUM ALLOYS	150	.00007	.00010	.00012	.00015	.00020	.00030	.00040	.00058	.00069	.00092	.00116	.00139	75	.00006	.00008	.00011	.00013	.00017	.00025	.00034	.00049	.00059	.00079	.00098	.00118
HIGH TEMP ALLOYS																										
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	.00006	.00008	.00010	.00012	.00017	.00025	.00033	.00049	.00059	.00078	.00098	.00117	50	.00005	.00007	.00009	.00010	.00014	.00021	.00028	.00041	.00050	.00066	.00083	.00099