

Single Form Threadmilling Guide for Hardened Steels

Threading in hardened steel is a very challenging application. 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.

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 #993130-C6 to machine a 8-32 internal thread in steel hardened to 52 HRc.

- 1. From Speeds & Feeds chart (next page), SFM is 130 and Chip Load (IPT) is .00023.
- 2. Calculate Speed (RPM) and Linear Feed (IPM)

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
                  = [(.164 - .120) / .164] \times 3.81
                  = 1.02
Adj External Feed = [(Major Thread Dia + Cutter Dia) / Major Thread Dia] x Linear Feed
                   = [(.164 + .120) / .164] \times 3.81
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For steels with a hardness of 46-55 HRc, use 3-4 Radial Passes.

4. Determine Number of Radial Passes using the Speeds & Feeds chart (next page).

Note: Radial Passes are based on the coarsest pitch by thread size. For finer pitches, the number of passes may be reduced by 1 pass.

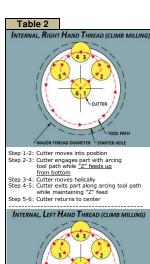
5. Conclusion

In this example, the tool would run at 4138 RPM, 1.02 IPM and make 3-4 Radial Passes

Setup & Use:

- 1. Check software and input proper feed values (Linear or Adjusted)
- 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								
Thread	Major Thread							
Size	Diameter							
0	0.060							
1	0.073							
2	0.086							
3	0.099							
4	0.112							
5	0.125							
6	0.138							
8	0.164							
10	0.190							
12	0.216							
1/4	0.250							
5/16	0.312							
3/8	0.375							
7/16	0.437							
1/2	0.500							
9/16	0.562							
5/8	0.625							
3/4	0.750							
7/8	0.875							
1	1.000							

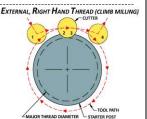




Step 1-2: Cutter moves into position Step 2-3: Cutter engages part with arcing tool path while "Z" feeds down from top

Step 3-4: Cutter moves helically Step 4-5: Cutter exits part along arcing tool path while maintaining "Z" feed

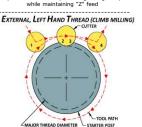
Step 5-6: Cutter returns to center



Step 1-2: Cutter engages part with arcing tool path while "Z" feeds down from top

Sten 2-3: Cutter moves helically

Step 3-4: Cutter exits part along arcing tool path



Step 1-2: Cutter engages part with arcing tool path while "Z" feeds up from bottom

Step 2-3: Cutter moves helically

Step 3-4: Cutter exits part along arcing tool path



Product Table: Thread Milling Cutters - Single Form for Hardened Steels

Characteristics: Medium Reach

Series: 9931xx-C6

Product Notes:

Recommended Depths of Cut (Radial Passes) are based on the coarsest pitch by thread size. For finer pitches, the number of passes may be reduced by 1 pass.

General notes:

All posted speed and feed parameters are suggested starting values that may be increased given optimal setup conditions.

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.

Material	Hardness (HRc)	SFM	Chip Load (IPT) By Cutter Diameter										Depth of Cut		
			0.047	0.062	0.078	0.093	0.125	0.187	0.250	0.312	0.375	0.500	0.625	0.750	Radial Passes
Hardened Steels	46-55	130	.00008	.00011	.00014	.00017	.00023	.00034	.00045	.00075	.00090	.00120	.00150	.00180	3-4
	56-68	80	.00007	.00009	.00011	.00013	.00018	.00027	.00036	.00060	.00072	.00096	.00120	.00144	4-5