

Focuser - Manufacturing Procedure

- 1) **Cut a piece of 1-8 low carbon steel threaded rod to a length of 2.63" on the bandsaw. (6:56)**

Tools used: Combination square

Lathe Operations:

Mount stock in a 1" collet in a 5C collet chuck on the lathe with 1" stick-out.

- 2) **Face one side to clean. (8:15)**

Tools used: 6" rule, HSS turning tool, digital readout, coolant

Flip part around and remount with 1" stick-out.

- 3) **Face opposite side to clean. (10:09)**

Tools used: 6" rule, HSS turning tool, digital readout, coolant

Remove part, measure length with dial caliper, remount with 1" stick-out.

- 4) **Face to 2.5" overall length. (10:35)**

Tools used: 6" rule, HSS turning tool, digital readout, dial caliper, coolant

- 5) **Turn $\varnothing.83"$ to $.39"$ from end. (11:23)**

Tools used: HSS turning tool, digital readout, 0-1" micrometer, coolant

- 6) **Cut $\varnothing.80" \times .07"$ wide groove at $.32"$ from end of part. (13:32)**

- Visually align point of chamfering tool to end of part, zero digital readout, position tool $.32"$ from end of part, feed tool in X axis until it lightly touches off on $\varnothing.83"$ turned surface, set digital readout to actual measured value of turned surface, plunge to just under $\varnothing.80"$, move tool to $.39"$ from end of part with carriage handwheel, retract tool, measure and recut if necessary.

Tools used: HSS chamfering tool, digital readout, dial caliper, heavy cutting oil

- 7) **Cut $.02" \times 45^\circ$ external chamfer. (17:24)**

Tools used: HSS chamfering tool, digital readout, heavy cutting oil

- 8) **Form fine diamond knurls. (17:43)**

- Adjust knurling rollers square to part surface, move along Z axis to position knurling rollers over surface to be knurled, align pivot of knurling tool to center of rotation of spindle, feed tool in X axis to position knurling rollers over center of rotation of spindle, hand-tighten clamp nut to touch off knurling rollers on part surface, tighten carriage lock, apply oil, tighten clamp nut one wrench flat ($1/6^{\text{th}}$ turn), turn on spindle (slow speed) and then turn off after a few revolutions. Repeat, adjusting clamp nut in increments of one-half to one flat at a time, until knurls are fully formed. Apply oil frequently to flush away swarf. Loosen clamp nut and carriage lock, retract tool.

Tools used: Clamp-style knurling tool with fine diamond rollers, adjustable wrench, heavy cutting oil

- 9) **Spot hole for 5/8-18 UNF 2B threads. (22:54)**

Tools used: #4 HSS center drill, drill chuck, coolant

- 10) **Pilot drill for 5/8-18 UNF 2B threads all the way through part. (30:19*)**

Tools used: $1/4"$ HSS twist drill, drill chuck, coolant

- 11) **Drill for 5/8-18 UNF 2B threads through part. (23:10)**

Tools used: $37/64"$ HSS twist drill, morse taper adapter, coolant

- 12) **Tap 5/8-18 UNF 2B threads through part. (24:27)**

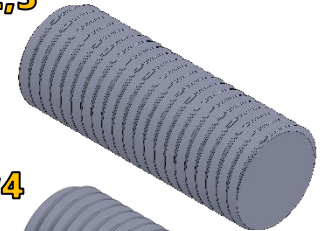
Tools used: 5/8-18 UNF HSS plug tap, tap handle, spring-loaded tap guide, drill chuck, heavy cutting oil

WATCH THE VIDEO!

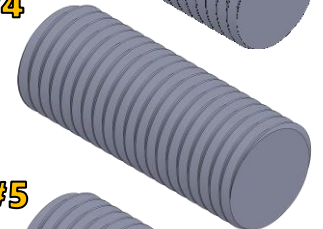


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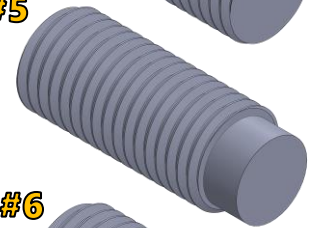
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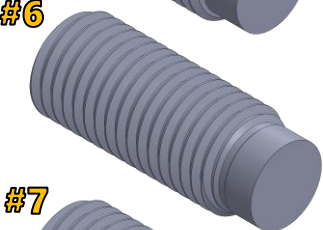
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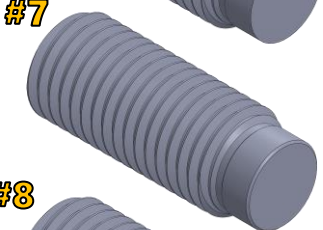
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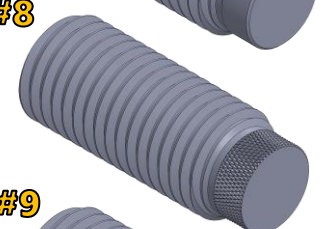
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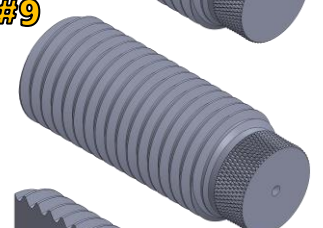
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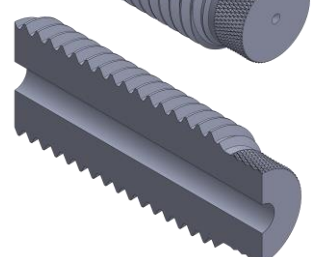
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#10



13) Bore \varnothing .694" to .56" from end. (25:27)

Tools used: 3/8" boring bar with CCMT 2(1.5)1 carbide insert, digital readout, 0-1" micrometer, telescoping gage (size A), coolant

14) Cut .04" X 45° internal chamfer. (28:18)

Tools used: HSS chamfering tool, digital readout, heavy cutting oil

15) Tap 3/4-16 UNF 2B threads .3" deep. (28:39)

Tools used: 3/4-16 UNF HSS plug tap, tap handle, spring-loaded tap guide, drill chuck, heavy cutting oil

Flip part around and remount with 1" stick-out.

16) Cut .04" X 45° internal chamfer. (29:42)

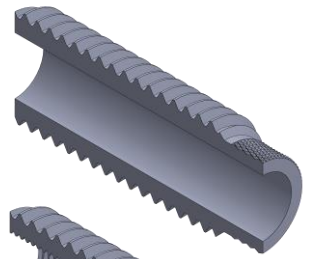
Tools used: HSS chamfering tool, digital readout, heavy cutting oil

17) Cut .10" X 45° external chamfer. (29:53)

Tools used: HSS chamfering tool, digital readout, heavy cutting oil

*Pilot drill step was added to the manufacturing procedure after recording demonstration, but is discussed in a supplement at the end of the video.

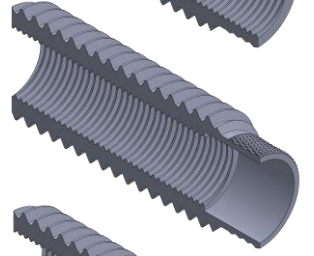
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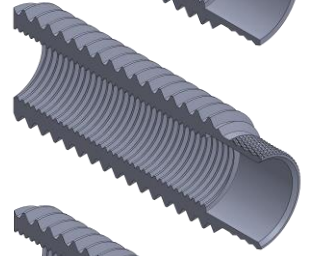
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