No lubricant b/c brass

Eyepiece Retainer – Manufacturing Procedure

WATCH THE VIDEO!

https://youtu.be/Ap8o-toxKag

1) **Grab a piece of ø1.0" OD 360 brass round bar with a length of 1.5"-12". Cut a piece from larger stock on bandsaw if necessary.** *(9:51)*
Tools used: Combination square

Feed rate → IPR
roughing 0.008" - 0.011"
finishing 0.003" - 0.005"
Turning Cut ← Z axis
Facing Cut ↑ X-axis

Lathe Operations:

wheel chuck

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

400 2) **Face one side to clean. (The stock piece may have been used before you, so you may need to remove the remnants of the previous machining operations.)** *(11:39)* 0.01-0.02"
Tools used: 6" rule, HSS turning tool, digital readout

600-1000 3) **Spot ø.56 hole.** *(12:25)* then remove tools for
Tools used: #4 HSS center drill, drill chuck

714 4) **Drill ø.56 hole .44" deep.** *(12:52)*
Tools used: 9/16" HSS twist drill, drill chuck, morse adapter

400 5) **Turn major diameter of 3/4-16 UNF 2A threads .44" from end.** *(15:37)* turn 0.01"-0.02"
Tools used: HSS turning tool, digital readout, 0-1" micrometer measure outter ø → set as x-axis

738 6) **Cut ø.65" X .25" wide thread relief groove .2" from end of part.** *(17:19)*

- **Visually align right side of part-off tool to end of part using 6" rule as a straight edge, zero digital readout, position right side of tool .2" from end of part, feed tool in X axis until it lightly touches off on major diameter for 3/4-16 threads, set digital readout to actual measured value of major diameter, plunge to ø.65", retract tool, move tool to .325" from end of part with carriage handwheel, plunge to ø.65", retract tool.**

Tools used: 6" rule, part-off blade with carbide insert, digital readout, dial caliper

320 7) **Cut .04" X 45° external chamfers on major diameter of 3/4-16 UNF 2A threads.** *(20:23)*
Tools used: HSS chamfering tool, digital readout

320 8) **Break inside edge .015" max.** *(21:20)*
Tools used: HSS chamfering tool, digital readout

(640) 9) **Cut 3/4-16 UNF 2A threads.** *(21:38)* pitch: $\frac{1}{16} = 0.0625$"

- **Visually align vee form of carbide threading insert to part using center gage, feed tool in X axis until it lightly touches off on major diameter for 3/4-16 threads, set digital readout to actual measured value of major diameter, set quick change gear box on lathe to cut 16 TPI threads, position tool at the start of the threaded section and dial in a cut of .010" on the X axis using the DRO, engage the halfnut at the appropriate position indicated by the leadscrew chasing dial to take a first pass on the threads, stop the tool inside the thread relief groove, double check the lathe is cutting the correct TPI threads using a thread pitch gage, take successive cuts of .010" per pass to a diameter of approx. ø.690" (.015" over the minor diameter), measure the pitch diameter using a pitch micrometer, *make sure tool is in the same X axis position where it took the last pass* and enter the measured pitch diameter for the X axis in the DRO, take successive cuts until the measured pitch diameter is between ø.703"-.708".**

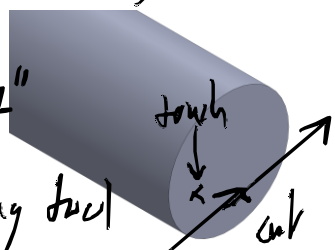
[slowest F] ✓ 3/4" nominal ø

use auto-feed!

Tools used: Threading tool with carbide insert, digital readout, center gage, thread pitch gage, 14-18 TPI pitch micrometer

1231 10) **Part off at .19" length.** *(35:03)*
Tools used: 6" rule, part-off blade with carbide insert, digital readout

#2



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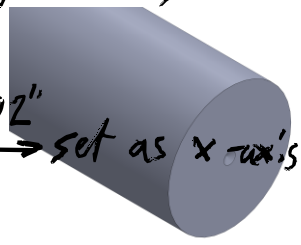

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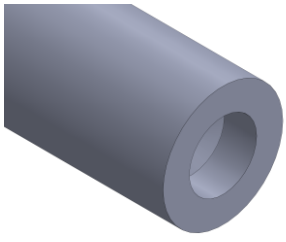

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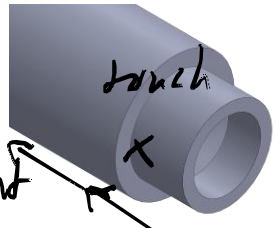

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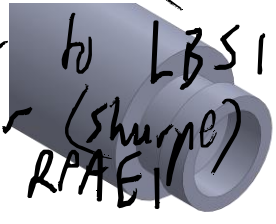

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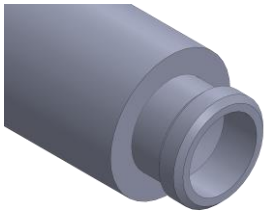


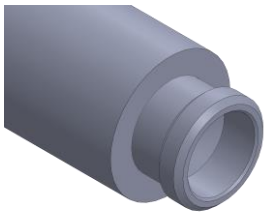
0.718

.688 0.706 725 747

22

Milling Machine Operations:

#8



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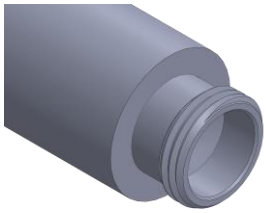
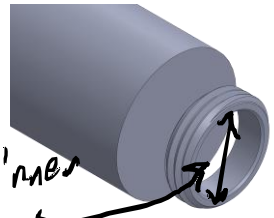


#10



Install mill vise on table and ensure it is properly aligned to the table travel.
Clamp part in vise on a 1 1/2" parallel with flat surfaces between jaws.

YDC **11) Cut .063" wide X .031" deep slot.** *(36:14)*
Tools used: ø1.5" X 1/16" thick slitting saw, 1/2" R8 collet, digital readout

Check quiz for step 9 & 13

2,5 | HSS turning $\frac{4\times100}{1} = 400$

4 | 9/16 HSS twist drill $\frac{4\times100}{0.56} \approx 714$

6 | Carbide parting $\frac{4\times120}{0.65} = 738$

7,8 | HSS chamfering $\frac{4\times60}{0.75} = 320$

9 | Carbide threading $\frac{4\times120}{0.75} = 640$, but do @ or close to slowest speed

10 | Carbide Parting tool $\frac{4\times200}{0.65} \approx 1231$

11 | HSS slitting saw $\frac{4\times150}{1.5} = 400$

0.56" ≈ 9/16" inner ϕ

#11

≈3/4" extend

0.19"

ϕ nominal

Major ϕ 0.739-.749

Pitch ϕ 0.703-0.706

Minor ϕ (0.674)

reference dimension

important r what we want to cut for w/ threads

Interesting / Learning / Important

↳ How to machine external screw threads

0.725
0.021
0.746

Uncertain Tools) Part off blade w/ carbide insert
Threading tool w/ carbide inserts

4] no need for pilot drill
Move quill w/ 9/16 twist drill to 1" mark
Adjust tail stock to part till drill tip connects w/ part
Drill in 7/16" (7 graduations) → 7/16 = 0.4375 ≈ 0.44

5] Turn clean 0.01" – 0.02" ^ 3.5/8
measure, set x-axis to value
Cut to major ϕ range (0.739 – 0.749)
rough cut to ~0.01" above 0.749"
measure again
final cut just to under 0.749"
Measure again, reset x-axis to that value