



Die Grinder Project Manufacturing Process Sheets

Olin College of Engineering
MEC 1000
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Spring 2007

MEC1000

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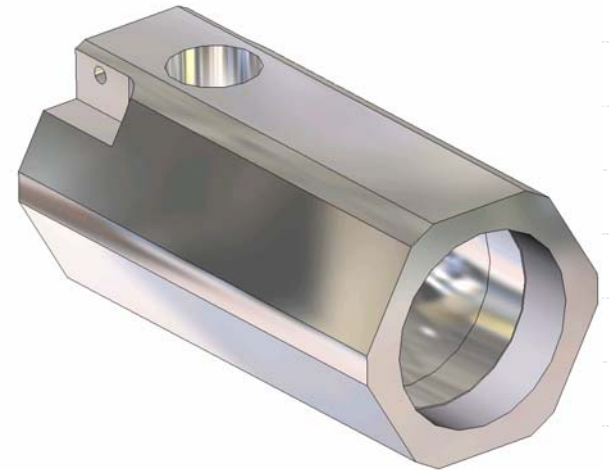
100101 Lever

1. Injection mold with ABS material.
2. Clamp lever in mill vise.
3. Ensure ears are aligned properly to quill axis.
4. Cross drill 2 thru holes.



100100 Housing, Die Grinder

1. Cut 1 3/8 hex stock to length for at least 1" of chuck grip + part length + chuck clearance.
2. Turn ID features first (omit the threads and thread minor dia).
 - A. Drill 1.064-1.065 bore undersize to about 15/16
 - B. Using bore bar, bore 1.064-1.065 ID to 1.055
 - C. Using grooving tool, bore 1.135 dia undercut
 - D. Final machine 1.064-1.065 bore using bore bar.
3. Turn the OD to 1.500. This will be an interrupted cut.
4. Part-off .030 long.
5. Measure, re-chuck and face to length.
6. Drill and tap ¼ NPT on lathe. Do not drill too deep!
7. Drill .188 cross hole in mill.
8. Ream .499-.500 hole. Drill first with 7/16 2 flute center-cutting end mill.
9. Mill the two open pockets
10. Drill the .188 internal hole.
11. Drill and ream .094-.095 hole.



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100102 Bearing Cap

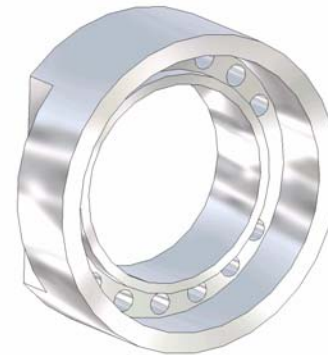
Side 1 – CNC Mill This Part!

- Cut 1.50 dia stock 2" long
- Setup on mill and face off end
- Flip over, setup on parallels and face.
- Drill .675 ID
- Program 1.150 OD, .996 ID and .746 OD and machine. Be careful when using small end mill.
- Deburr.
- Saw or part off on lathe .05 long.

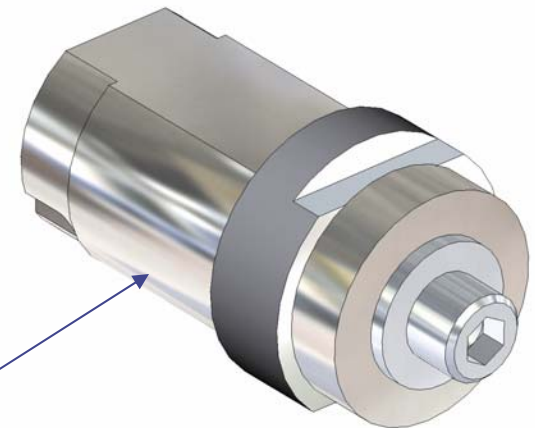
Side 2 – CNC Mill This Part

- Setup in mill using custom machined jaws.
- Program hole pattern using. Spot drill, then thru drill.
- Deburr.
- Mill Flats.
- Using threading fixture, CNC threads on lathe.

Side 1



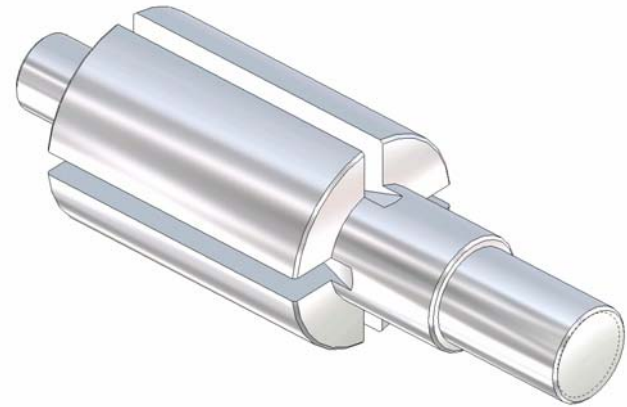
Side 2



CNC lathe threading fixture

100103 Spindle

1. Cut 1.00" dia stock=overall length+2"
2. Turn all diameters on threaded end including .688 dia. Turn this dia about 0.15" longer than specified
3. Deburr
4. Thread 5/16-24 using die and die holder
5. Check to make sure bearing slips over shaft on threaded end
6. Using a collet, flip part, hold on .688 dia and turn remaining material to .9375" dia.
7. Deburr
8. Using a collet block and slitting saw, machine the four R1.500 slots.
9. Deburr
10. Using collet in lathe, chuck on the .688 dia and part off .030" long, face to length and deburr.
11. Turn the .2500-.2505 shoulder. Bearing must press fit on this shaft.
12. Deburr



100104 BEARING CUP, INPUT

CNC Pedestal Mill this Part

Setup 1

- Cut 1.250 dia stock = part length+1".
- Pedestal machine the OD and all features shown in Setup 1 using CNC
 - For the 4FI .0938 carbide end mill.
 - Speed=3800rpm,
 - Feed <= 2.5 ipm
 - DOC <=.03
 - For the 2FI .03125 carbide end mill
 - Speed=3800rpm,
 - Feed <= 2.5 ipm
 - DOC <=.005

Setup 2.

- Setup in mill using custom machined jaws
- Circular Interpolate .6245-.6250 C'Bore
- Csink hole

Setup 1.

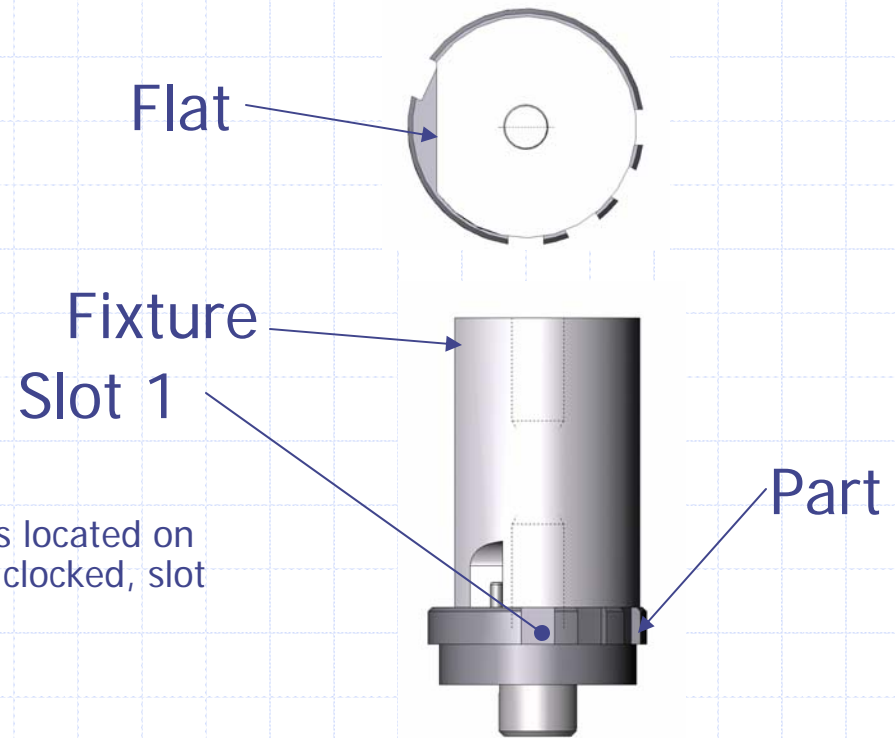


Setup 2.



100105 Bearing Cup, Exhaust

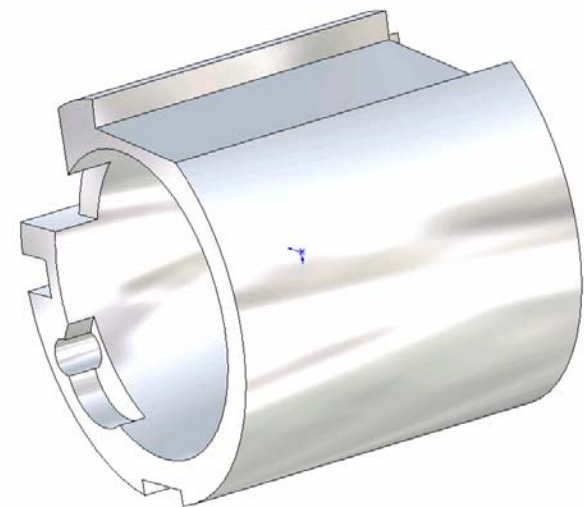
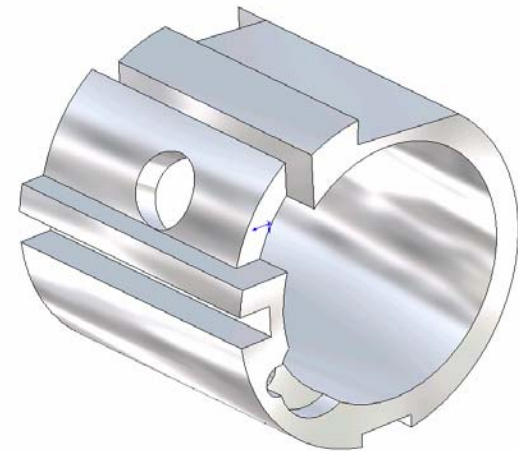
1. Cut Stock Part length + 1"
2. On lathe, drill .500 thru.
3. Bore. .550-.552 ID
4. Bore .8755-.876 ID
5. Turn ODs
6. Deburr
7. Part Off .030" Long
8. Face to length
9. Deburr
10. On Mill, drill and Ream .0625 hole
11. Press in 1/16 pin
12. Mount to machining Fixture – Ensure pin is located on the proper surface as shown. When Pin is clocked, slot 1 is perpendicular flat on fixture.
13. Program slots using .125 end mill
14. Using rotary indexer, mill slots
15. Deburr



***BE SURE YOUR PART FITS THE FIXTURE
Prior to removing from lathe!**

100108 VANE HOUSING

1. Cut Stock to part size + 1"
2. Turn 1"OD by .75 long.
3. Transfer part to 5C index fixture and hold on 1" OD using collet
4. Machine all external radial features
5. Turn part to length
6. Machine features on ends using mill. Use the flat machined in step 4 to index the part.
7. Using custom machined collet, Drill and bore eccentric ID on Lathe.



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100110 VALVE STEM

1. Turn part on lathe

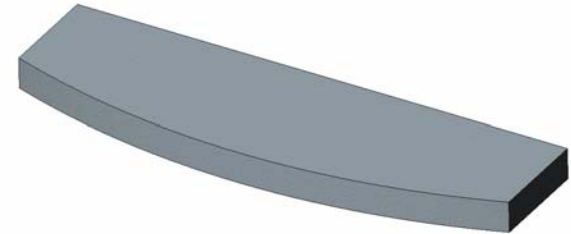


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100112 Vane

1. Program profile on 2-axis CNC mill.
2. Pattern profile to make 4 parts
3. Holding stock in vise, cut parts being sure not to hit vise or parallels

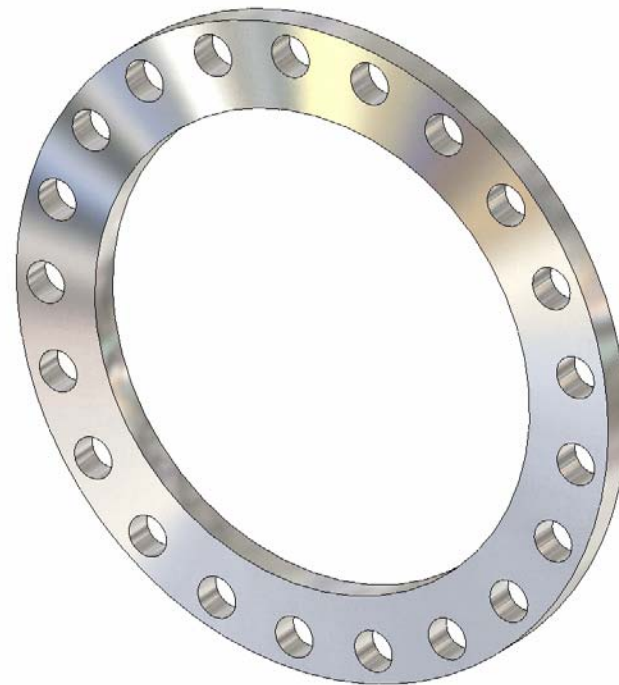


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100113 Washer, Vented

- CNC Mill



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100115 VALVE BODY

1. Chuck in lathe, turn OD, leave 1 " of extra stock for secondary operations
2. Drill .213-.216 dia
3. Using endmill or bore bar, machine .375-.377 bore
4. Using collet block, drill cross holes.

