

Project #105

Straight Center

(8/6/13 wrr)

Project Description:

The straight center is a project which has a straight diameter at one end and a 60-degree point at the other. This tool is used as a centering device for tapping on a milling machine or as a headstock center when it is chucked in a three-jaw chuck or collet. The close diameter tolerance on the straight diameter is called out so this tool can be used with a collet holder on the mills or lathes. You are required to think about the process sequencing (process sheet) that takes place when making a part. Should the large or small diameter be machined first? How should the part be held? Does the part setup make a difference in production or quality? How will this geometric symbol affect my setup/process? Finishes, geometric symbols, precision turning of diameters and lengths are some of the challenges on this part.

Project Objectives:

After you have completed this project, you should be able to:

1. Adjust the compound rest to any degree within a 360-degree circle.
2. Cut angles and tapers using the compound rest.
3. Determine complementary angles on the lathe axes.
4. Achieve a diameter size tolerance of +/- .005.
5. Measure to the 4th decimal place with a 0-1" vernier micrometer
6. Setup a spring collet system.

Note: All parts need to be free of burrs, bluing and must have the student's clock number along with their name or initials engraved on the part before it's graded. Unidentified parts will not be graded.

References/ Study Material:

Precision Machining Technology textbook:

Section 3, Unit 1, pg. 202-231, Understanding Drawings

Machine Tool Study Guide: Information on geometric tolerance of Run Out, pg. 105-3

Online Tasks: **MS-30**, Cutting Tapers with the Compound Rest, 20 minutes

Additional Tooling: Surface finish comparison gage

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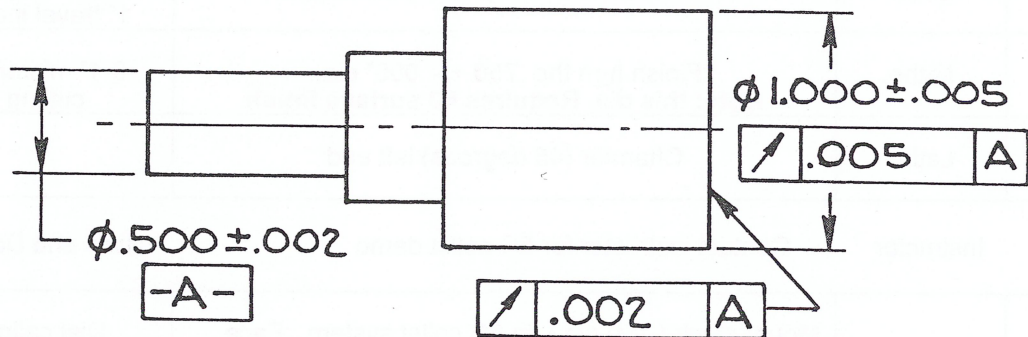
RUNOUT

DEFINITION:

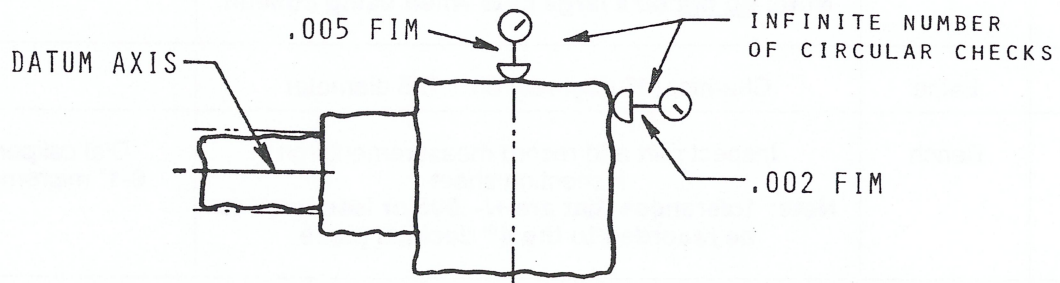
RUNOUT IS A COMPOSITE TOLERANCE USED TO CONTROL THE FUNCTIONAL RELATIONSHIP OF ONE OR MORE FEATURES OF A PART TO A DATUM AXIS. IT IS AN AXIS TO A SURFACE CONTROL.

THERE ARE TWO TYPES OF RUNOUT CONTROL, CIRCULAR RUNOUT AND TOTAL RUNOUT. THE TYPE USED IS DEPENDENT UPON DESIGN REQUIREMENTS AND MANUFACTURING CONSIDERATIONS. CIRCULAR RUNOUT IS NORMALLY A LESS COMPLEX REQUIREMENT THAN TOTAL RUNOUT.

CIRCULAR RUNOUT



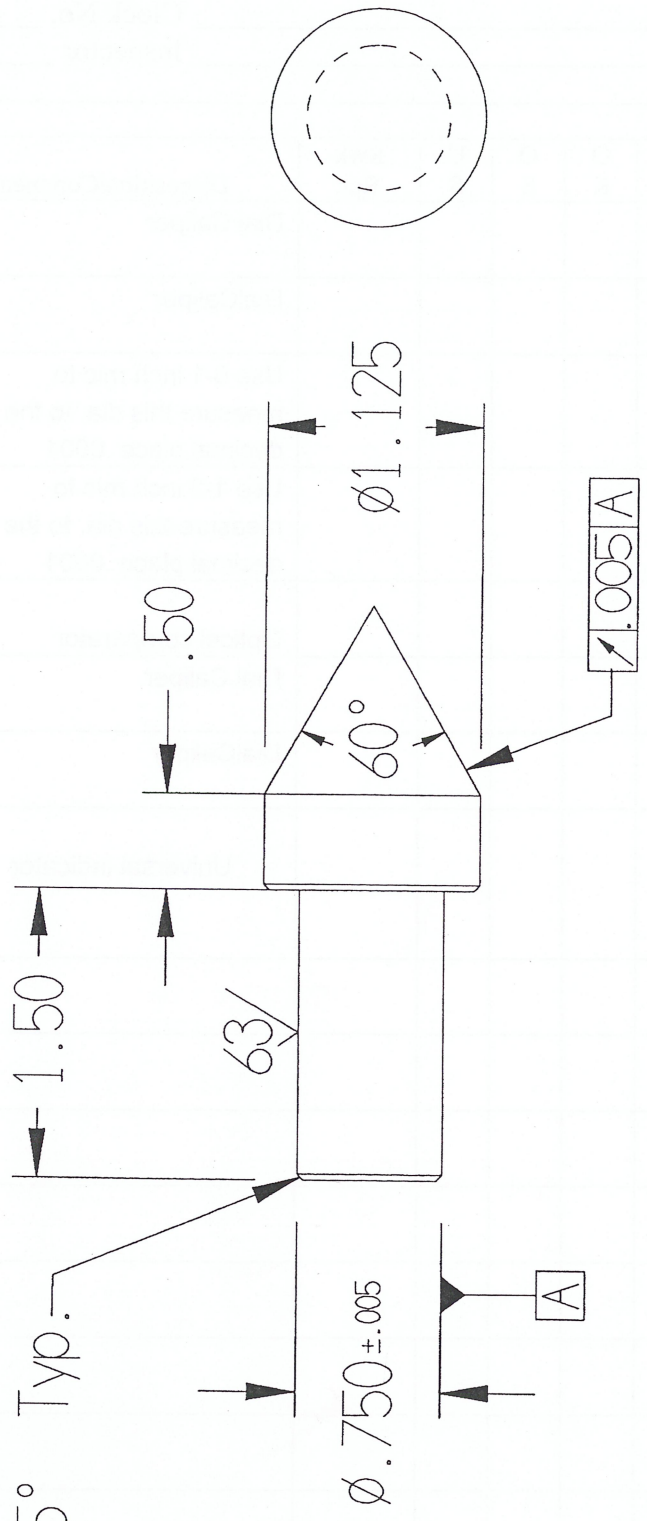
CIRCULAR RUNOUT PROVIDES CONTROL OF CIRCULAR ELEMENTS OF A SURFACE. THE TOLERANCE IS APPLIED INDEPENDENTLY AT ANY CIRCULAR MEASURING POSITION AS THE PART IS ROTATED 360° . WHERE APPLIED TO SURFACES CONSTRUCTED AROUND A DATUM AXIS, CIRCULAR RUNOUT MAY BE USED TO CONTROL THE CUMULATIVE VARIATIONS OF CIRCULARITY AND COAXIALITY. WHERE APPLIED TO SURFACES CONSTRUCTED AT RIGHT ANGLES TO THE DATUM AXIS, CIRCULAR RUNOUT CONTROLS CIRCULAR ELEMENTS OF A PLANE SURFACE (WOBBLE). THIS WILL ALLOW THE SURFACE TO BE CONCAVE OR CONVEX.



Process Sheet #105

Operation No.	Machine	Description	Tools	Speed/Feed
10	Horizontal Bandsaw	Stock size 1 1/4" diameter or larger x 3 1/8" long	Multi pitch blade	180 SFPM
20	Lathe	Mount stock in 3-jaw chuck with 2" of material out of the jaws. Face off end to clean up	3-jaw chuck, left hand tool holder	270 rpm .003 - .010
30	Lathe	Layout a line 1.50" from the end that was just faced off.	Hermaphrodite caliper	270 rpm
40	Lathe	Rough turn the .750" dia. .020 over high limit (.770) and stay 1/32 to 1/16 short of the 1.50" line. Note: make sure your tool has enough clearance when you're that close to the chuck.	0-1" micrometer & 1" travel indicator	270 rpm .010 - .020
50	Lathe	Finish turn 1.50" length to specification.	Dial caliper & 1" travel indicator	418 rpm .003 - .010
60	Lathe	Finish turn the .750 +/- .005" dia., Note: this dia. Requires 63 surface finish	0-1" micrometer, cutting oil	418 rpm .003 - .010
70	Lathe	Chamfer (45 degrees) left end		418 rpm
80	Instructor	Contact instructor for 5C collet demo	Initials and Date: _____	
90	Lathe	Mount stock (.750 dia.) in 5C collet system. Face part to 1.50" from existing shoulder. Note: do not take large cuts when using collets!	Dial caliper & 1" travel indicator	You Calculate!
100	Lathe	Finish turn 1.125 dia to specification	Dial caliper & 1" travel indicator	You Calculate!
110	Lathe	Layout a line .50" from the existing shoulder.	Hermaphrodite caliper	
120	Lathe	Rough and finish turn the 60 degree angle. Note: do not take large cuts when using collets!	Dial caliper	You Calculate!
130	Lathe	Chamfer (45 degrees) on 1.125 diameter		You Calculate!
140	Bench	Inspect part and record measurements on inspection sheet Note: tolerances that are +/- .005 or less need to be recorded to the 4th decimal place	Dial caliper & 0-1" micrometer	
150	Bench	Engrave your name/initials and number on your part	Electric engrave	

1/32 x 45° Typ.



NOTES: Unless otherwise specified
 TOLERANCES: Fractional: +/- 1/64
 Decimal: .XX +/- .015
 Decimal: .XXX +/- .010
 Decimal: .XXXX +/- .005

Title:

Straight Center

MAT'L MILD STEEL

SCALE: FULL

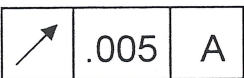
DWG. NO:

REV: 3/7/06

CVTC

Straight Center

Operator _____ Clock No. _____
 Date handed in: _____ Inspector _____
 Grade _____

Dimension	Checks	O K	O S	U S	Rwk Rpr	Disposition/Comment	Function Y/N
1.50 +/- .015						Dial Caliper	
.50 +/- .015						Dial Caliper	
.750 dia. +/- .005						Use 0-1 inch mic to measure this dia. to the 4 th decimal place .0001	
1.125 dia. +/- .010						Use 1-2 inch mic to measure this dia. to the 4 th decimal place .0001	
60 degree +/- 30'						Optical comparator	
1/32 x 45 degree						Dial Caliper	
1/32 x 45 degree						Dial Caliper	
						Universal indicator	
63 surface finish							
FAO 125							
Deburr							