# Project #104C

8/6/13 ~~wrr~~

Two-Step Turning

## Project Description:

The Two-Step Turning project 104C is the first project to be completed on a lathe. This project has been designed to challenge the student but not to over whelm them. Using a South Bend Lathe, three-jaw chuck, tool holder, tool bit, dial caliper, and micrometer the student will turn, face, and measure this project until it meets the blueprint specifications. This project will also be used in 2nd semester as a setup/location tool.

## Project Objectives:

After completing the two-step turning, you should be able to:

1. Identify a lathe's components and operate the lathe safely using a checklist
2. Safely and correctly operate the South Bend engine lathe to turn two diameters, face a piece of steel, and chamfer the ends to blueprint specs.
3. Properly set up an engine lathe with a standard high-speed tool bit and holder.
4. Calculate the lathe rpm when cutting low carbon steel.
5. Change and operate a three-jaw chuck on the engine lathe.
6. Determine if the dial graduations on the engine lathe move in a direct or conventional relationship.
7. Select the proper feed rate for rough and finish turning on the engine lathe.
8. Use a micrometer and a dial caliper to measure your work piece.
9. Use a profilometer or comparison gauge to determine the surface finish achieved during the turning process.

**References/ Study Material:**

Precision Machining Technology textbook: None

Machine Tool Study Guide: Lathe Operation Checklist pg. 104-10

Online Tasks: **MS-24A**, Using a Three-Jaw Chuck, 25 min.

**MS-24B**, Facing and center drilling, 15 min.

# Lathe Operation Checklist

Directions: With an instructor present use this checklist as a guide to complete the activates listed below.

| Activity | South Bend Lathe | Note/Questions |
|---|---|---|
| 1. Locate all lubrication points and lube daily | | How many lube points are there? |
| 2. Engage belt lever and turn machine on/turn machine off **Note: remove any chucks or collets from the spindle before you start.** | | Belt lever should be placed in the release (UP) position at the end of each class period. |
| 3. Turn spindle forward/reverse | | Not all Southbend lathes have this capability |
| 4. Adjust RPM-pulleys (1-4) High and Low options | | Not all south bends have High and Low speed options |
| 5. Locate backgear lever and backgear pin: put lathe in back gear | | |
| 6. Move carriage R-L by hand | | Carriage to be positioned to the far right at the end of each use. |
| 7. Move cross slide IN-OUT by hand | | |
| 8. Move compound rest IN-OUT by hand | | |
| 9. Unlock and swivel compound rest--retighten | | Compound rest to be set 30 degrees to the right after each use. |
| 10. Unlock tailstock - move on ways and relock | | |
| 11. Locate power feed clutch | | |
| 12. Locate half-nut lever and stud gears | | |
| 13. Power feed carriage left and right | | Always release power feed clutch before stopping the machine |
| 14. Power feed cross slide in and out | | |
| 15. Adjust feed selector for .005 feed and .010 feed | | |
| 16. Is the cross slide graduated direct or conventional? | Dir. Con. | Direct = Diameter<br>Conventional = Radius |
| 17. Is the compound rest graduated direct or conventional? | Dir. Con. | |
| 18. Mount a three jaw chuck on to the lathe spindle. | | Place wood on the bed ways before trying to mount the chuck. |
| 19. **Start the first lathe project! Turn to page 104 -11, this is the process sheet for project #104C (two step turn project)** | | |

# Process Sheet #104C

| Operation No. | Machine | Description | Tools | Speeds/ Feeds |
|---|---|---|---|---|
| 10 | Instructor | Complete the lathe operations checklist with an instructor present! **Instructor Initial and Date: _____** | | |
| 20 | Horizontal Bandsaw | Stock size 7/8" diameter or larger x 4 1/8" | Multi pitch blade | 180 SFPM |
| 30 | Lathe | Mount stock in 3-jaw chuck with 2 1/2" of material out of the jaws. Face off end to clean up. | 3-jaw chuck, left hand tool holder | 314 rpm/ 270 rpm .003 - .010 |
| 40 | Lathe | Layout a line 2 1/8" from the end that was just faced off. | Hermaphrodite caliper | 314 rpm/ 270 rpm |
| 50 | Lathe | Rough turn the ¾" dia., past the 2 1/8" line. **Note: make sure your tool has enough clearance when you are that close to the chuck.** | 0-1" micrometer | 314 rpm/ 270 rpm .010 - .020 |
| 60 | Lathe | Finish turn the 3/4 " dia. | 0-1" micrometer | 418 rpm .003 - .010 |
| 70 | Lathe | Cut 1/16" x 45 degree chamfer. Offset compound rest 45 degrees to the right, past parallel or 135 degrees from perpendicular to the diameter. Ask for help if needed! | Dial caliper | 418 rpm hand feed |
| 80 | Lathe | Mount stock in 3-jaw chuck with 2 1/2" of material out of the jaws. Face off 2nd end to clean up, measure and cut to 4.00" length. | Dial caliper & 1" travel indicator | You Calculate! |
| 90 | Lathe | Layout a line 2" from the end that was just faced off. | Hermaphrodite caliper | You Calculate! |
| 110 | Lathe | Rough turn the 5/8" dia. .010 over high limit (.650) and stay 1/32 to 1/16 short of the 2" line. **Note: make sure your tool has enough clearance when you are that close to the chuck.** | 0-1" micrometer & 1" travel indicator | You Calculate! |
| 120 | Lathe | Finish turn the 2" long length. | Dial caliper & 1" travel indicator | You Calculate! |
| 130 | Lathe | Finish turn the 5/8" dia., | 0-1" micrometer | You Calculate! |
| 140 | Lathe | Cut 1/32" x 45 degree chamfer. | Dial caliper | You Calculate! |
| 150 | Lathe | Deburr part | File | You Calculate! |
| 160 | Bench | Inspect part and record measurements on inspection sheet | Dial caliper & 0-1" micrometer | |
| 170 | Bench | Engrave your name/initials and number on your part | Electric engrave | |

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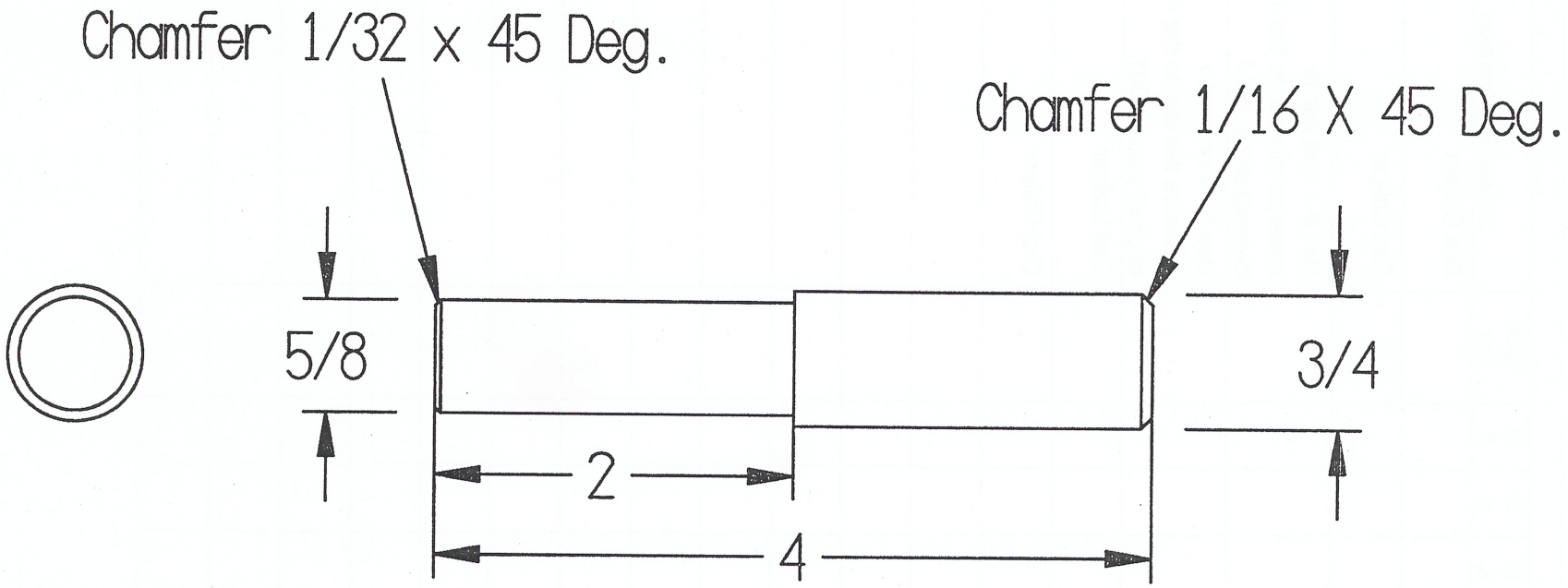


NOTES: Unless otherwise specified
TOLERANCES: Fractional: +/- 1/64
Angular +/-30'
FAO 125
Decimal: .XX +/- .015
Decimal: .XXX +/- .010
Decimal: .XXXX +/- .005

| | |
|---|---|
| Title: Two Step Shaft | |
| MAT'L MILD STEEL | SCALE: FULL |
| DWG.NO: | REV: 3/7/06 |

CVTC

# Two Step Turn

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

| Dimension | Checks | O K | O S | U S | Rwk Rpr | Disposition/Comment | Function Y/N |
|---|---|---|---|---|---|---|---|
| 4 +/- .015 | | | | | | Dial Caliper | |
| 2 +/- .015 | | | | | | Dial Caliper | |
| 5/8 dia. +/- .015 | | | | | | Use 0-1 inch mic to measure this dia. to the 4th decimal place .0001 | |
| 3/4 dia.+/- .015 | | | | | | Use 0-1 inch mic to measure this dia. to the 4th decimal place .0001 | |
| 1/32 x 45 degree | | | | | | Dial Caliper | |
| 1/16 x 45 degree | | | | | | Dial Caliper | |
| | | | | | | | |
| FAO 125 | | | | | | | |
| Deburr | | | | | | | |
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