Lathe Test Process Plan

John Bush

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Rough Stock

1. Select 316L stainless steel round bar, $\phi = 4.0$", length max/min = $2'/8$".

Bandsaw

2. If necessary, cut off $2'$ of bar.

Manual Lathe

3. Load in 3-jaw chuck with 6.25" stickout.
4. Set spindle speed to 200 RPM and feed rate to 2.0 IPM.
5. Face material.
6. Drill center with $\frac{5}{8}$" twist drill to depth 6.250".
7. Bore inner diameter to depth 2.000". Bore to final inner diameter $\phi = 2.000" \pm 0.009"$.
8. Turn outer diameter 6.10" to flange's final outer diameter $\phi = 3.875"$.
9. Create shoulder at 5.625" and turn outer diameter to final outer diameter $\phi = 3.000" \pm 0.030"$.

Bandsaw

10. Cut off part at widest shoulder to length of 6.100".

Manual Lathe

11. Chuck into 3-jaw chuck and face cutoff end to final length $6.000" \pm 0.013"$.

Layout

12. Mark ends with layout die and layout locations for drilling. Scribe wider end with center head. Clamp into V-block such that the scribed line is parallel to the surface plate. Use surface guage to scribe a parallel line on the narrow end. This creates a plane through the center of the part, allowing us to align drilled holes on opposing sides of the part. Use hermaphrodite calipers to scribe narrow face 0.250" from inner diameter. The radial line and bisecting lines mark the locations of two holes to drill. Mark off the remaining holes with dividers set to length 1.768". Similarly, on the wider face, use the calipers to scribe 0.325" from outer diameter. Mark off remaining holes with dividers set to 2.475". Thus four holes on each face should be radially aligned.

13. Use calipers and square to confirm hole positions are in accordance with part plan.

Drill Press

14. Secure part in vise and drill holes in narrow face. Set drill to 800 RPM. Spot and drill with F (0.257") twist drill to depth 1.250". Countersink 90.0° to 0.059" for countersink radius $\phi = 0.375$". Tap with 5/16-18 UNC - 1B to depth 0.750", (or 13.5 turns). Repeat for all four holes.

15. Reverse part and secure in vise, and drill holes in wider face. Set drill to 700 RPM. Spot and drill through holes with K twist drill. Repeat for all four holes.

16. Conduct additional deburring as needed. (Presumably this was conducted as needed throughout process.)

Table 1: Inspection Report

Dimension	Value	Max	Min	Actual	In Tol?
Length	6.000”	6.013”	5.987”		
Outer Diameter	3.000”	3.030”	2.970”		
Inner Diameter	2.000”	2.009”	1.991”		