Performance Standards
Turning Between Centers

Material

Mild steel or low carbon steel ∅1.00 x 5.15"– saw enough material to face both ends and center drill.

Duty

Setup and carry out between centers turning operations for straight turning.

Performance Standard

Given raw material, process plan, part print, hand, precision, and cutting tools, as well as access to an appropriate turning machine and its accessories, produce a part matching the process plan and the part print specifications using appropriate trade techniques and speeds and feeds. The part specified should have at least three diameters within +/-.002, one UNC external thread , one UNF external thread, and require part be turned end for end to complete.

Other Evaluation Criteria

1. Finishes are at least 125 Ra microinches.
2. No sharp edges.

Accuracy Level: +/- .015 on all fractions, +/-.005 on all decimals unless otherwise specified on the part print. Diameters to be coaxial within .002 total run out.

Assessment Equipment and Material

Workstation: A common workbench, an engine lathe of 14"X 30" minimum capacity, a three-jaw universal scroll chuck, or a four-jaw independent chuck. The lathe must have a quick change gear box with the threads pitch called for on the blueprint available from the gear box.

Material: A part matching the material requirements of the turning print, material: Mild steel.

Tooling: Tool post, right and left hand turning tools capable of turning to a square shoulder, an external threading tool matched to the profile of the thread called out on the turning blueprint, a drill chuck, combination drill and countersink, drive dog, grooving/ parts tools, 45° chamfer tools, live center, dead center fitted to the spindle taper, magnetic base for a dial indicator, files, wrenches as necessary.

Measuring Instruments: Required micrometers, combination set, thread pitch gages, center gage, thread ring gages, dial indicator, 6" rule, 6"vernier, dial, or electronic caliper, surface finish comparison plates.

Reference: Machinery's Handbook

Performance Assessment Worksheet
Turning Between Centers

INSTRUCTIONS: Rate the candidate's performance for the Turning Between Centers job according to the twelve (12) criteria below. The checklist below represents only a listing of criteria to be evaluated. It is ***not*** a sequence of process steps or a process plan for making the part. For each item, check the box under Pass or Fail accordingly.

Remember, NIMS requires that **all** specifications must be met within the allowable tolerance limits. If the part does part does not meet all specifications, the candidate must correct or redo the project.

Candidate Name Evaluation Date

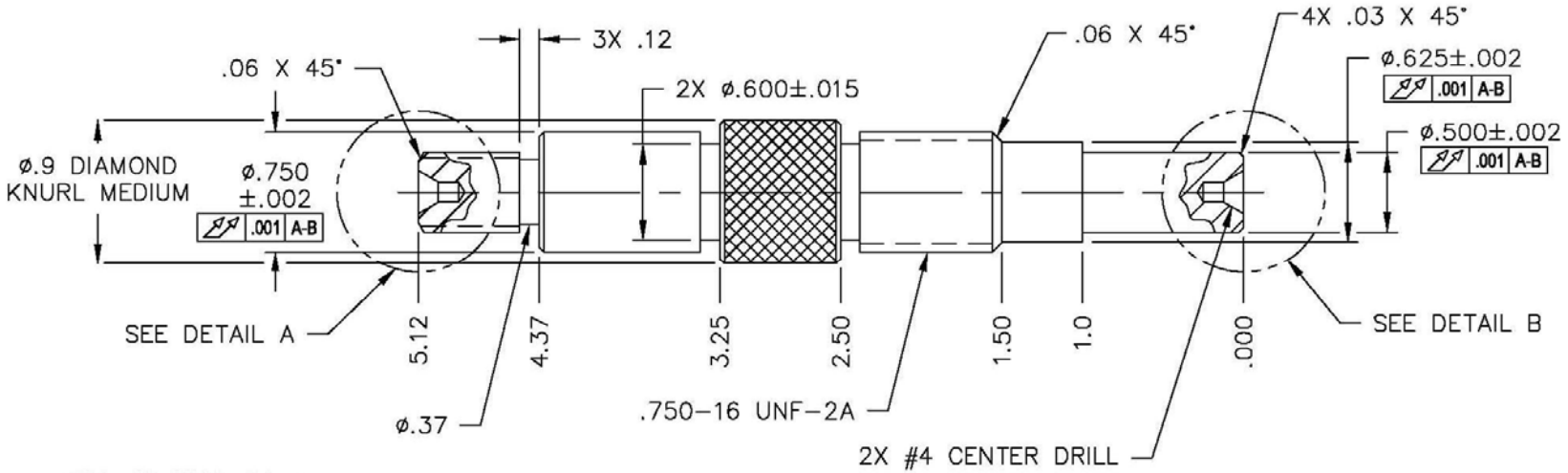
Performance Project – Turning Between Centers **Evaluation Criteria**		**Pass**	**Fail**
1. ∅.500 ± .002 ∅.625 ± .002 ∅.750 ± .002	Pass = within tolerance Fail = out of tolerance	❒	❒
2. Diameters of grooves adjacent to the knurl: .600 ± .015 (2 places)	Pass = within tolerance Fail = out of tolerance	❒	❒
3. Total runout on specified diameters within .001 TIR as specified to combined datums A - B Diameters circled 1, 2, 3. TIR of coaxial dia's .010	Pass = within tolerance Fail = out of tolerance	❒	❒
4. 5.12 ± .015 Overall Length	Pass = within tolerance Fail = out of tolerance	❒	❒
5. 3.25 ± .015 Length 4.37 ± .015 Length	Pass = within tolerance Fail = out of tolerance	❒	❒
6. 2.50 ± .015 Length 1.0 ± .032	Pass = within tolerance Fail = out of tolerance	❒	❒
7. .500 – 13 UNC – 2A Pitch diameter tolerance .4435/.4485	Pass = within tolerance Fail = out of tolerance	❒	❒
8. 750 – 16 UNF – 2A Pitch diameter tolerance: .7029/.7079	Pass = within tolerance Fail = out of tolerance	❒	❒
9. Groove width: .12 ± .015 (3 places) Groove diameter: ∅.37 ± .015	Pass = within tolerance Fail = out of tolerance	❒	❒

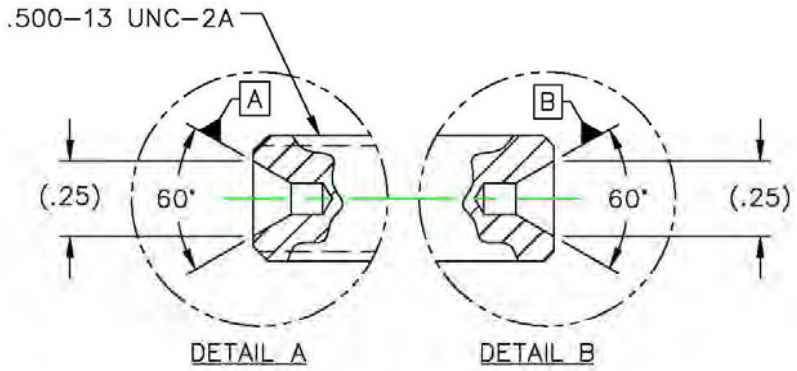
Performance Project – Turning Between Centers **Evaluation Criteria**		**Pass**	**Fail**
10. Diamond knurl- no flakes ∅.9 ± .032	Pass = within tolerance Fail = out of tolerance	❒	❒
11. Surface finish	Pass = 125 Ra microinches or better Fail = over 125 Ra microinches	❒	❒
12. Sharp edges: .015 max.	Pass = radii less than .015 Fail = sharp edges, radii greater than .015	❒	❒
END OF TURNING BETWEEN CENTERS EVALUATION			

It is important to note that the part must be 100% within the tolerances listed on the print. The criteria listed here are a guide for instructors and supervisors. Not every dimension is included in this guide. Nonetheless, the completed part must be 100% within the specifications of the print. The print takes precedence over this guide when the parts are inspected by the MET-TEC committee. *The* ***part print*** *and the* ***Performance Affidavit*** *should be sent along* ***with the part*** *to the MET-TEC for evaluation. Send to NIMS only the completed Performance Affidavit, signed by the MET-TEC members. A copy of the Performance Affidavit should be retained in the candidate's file documenting completed performance for this credential.*

NOTES:
1. FINISH ALL OVER TO 125
2. BREAK ALL SHARP EDGES .015 MAX
3. UNLESS OTHERWISE SPECIFIED,
   ALL COAXIAL DIAMETERS ⌀ .010 A-B

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	UPDATED DRAWING AND TITLE BLOCK	3/7/05	LW





DO NOT SCALE DRAWING

NIMS®

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M–1994

TOLERANCES
.X ±.032 .XXX ±.005
.XX ±.015 ANGLES ± 1 DEG.
FRACTIONS ± 1/64

MACHINING SKILLS LEVEL I

Job Duty 2.3
Turning Between Centers

DESIGNER	DK	11/15/01	MATERIAL
DWG CHK			COLD ROLL STEEL OR MILD STEEL
DWG APPD			
SCALE FULL	DWG.#98601 I		SHEET 1 OF 1

NIMS PROCEDURAL REQUIREMENTS

1. SUBMIT THIS PRINT AND WORKPIECE ALONG WITH THE PERFORMANCE AFFIDAVIT FOR EVALUATION