

Evaluation Instructions

Turning: Between Centers

General Instructions

1. Make sure that the candidate has his/her own copy of the job print and job instructions, and understands the criteria for performance evaluation. Times indicated are guidelines and will not be part of the assessment.
2. Provide access to tools, equipment and materials as listed.
3. Identify each credentialing candidate's work upon completion.
4. Complete the evaluation of the candidate's project as soon as possible after completion. Be sure to complete the SPONSOR portion of the Performance Affidavit for successful projects.

Monitoring the Performance

1. Make sure that the steel shaft used to complete the project agrees with the specifications on the part print.
2. Always check to see that the credentialing candidate is applying work holding devices and tooling in a safe and secure manner.
3. Check that all personal protection and safety precautions are being employed. Stop any candidate from creating an unsafe condition. A candidate should not be allowed to start, continue, or return to a project until an unsafe condition is resolved. If the unsafe condition is of the credentialing candidate's making, the sponsor or trainer should require that the candidate to completely restart the project after the safety issue has been resolved and appropriate instruction has been given.

Completing the Performance Evaluation

1. Check to see that the candidate has provided proper cleanup of tools, equipment, and work areas.
2. Check to see that tools are returned to their proper storage locations.
3. Check to see that equipment is returned to an appropriate condition and setting.
4. Complete the evaluation worksheet and file it with your records.
5. Complete the Sponsor portion of the Performance Affidavit.
6. Send the part, part print and Performance Affidavit to MET-TEC for review.

Performance Standards

Turning: Between Centers

Materials:

Low Carbon Steel or 1215 CRS – 1.75” Diameter X 6.2”

Duty:

Set up and perform between centers turning for straight and tapered turning by offsetting the tailstock.

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 two straight diameters within +/- .001, an appropriate taper at each end of the part, and require a reversal of the part end for end.

Accuracy Level: +/- .015 on all fractions, and +/- .005 on all decimals unless otherwise specified on the part print. Diameters to be concentric within .001 TIR
Surface finish 63 microinches or better.

Assessment Equipment and Material:

Workstation: Standard workbench, a toolroom engine lathe, a three-jaw universal scroll chuck, or a four-jaw independent chuck. The lathe may have a quick-change gear box with the threads called for on the part print available from the gear box.

Material: Part matching the material requirements of the turning part print

Tooling: Tool post, right- and left-hand turning tools capable of turning to a square shoulder, drill chuck, centerdrill, external undercut tools, 45° chamfer tools, live center, dead center fitted to the spindle taper, magnetic base for a dial indicator, files, wrenches as necessary, and cutting fluids.

Measuring Instruments : Required micrometers, combination set, dial indicator, 6" rule, 6" vernier, dial, or electronic caliper, surface finish comparison plates, appropriate taper ring gages and Prussian blue, or taper micrometer, or sine bar and indicator.

Reference: Machinery's Handbook.

Performance Assessment Worksheet

Machining Level II: Turning Between Centers

INSTRUCTIONS: Rate the candidate's performance for the *Turning Between Centers* project according to the criteria below. The checklist below represents 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 not meet all specifications, the candidate must correct the deviation or redo the project.

Candidate Name _____

Evaluation Date _____

Performance Project : Turning Between Centers			
Evaluation Criteria		Pass	Fail
1. 1 1/8-12 UNF 3A RH thread Pitch diameter = 1.0709/1.0664	Pass = <i>right</i> hand and within tolerance Fail = not <i>right</i> hand and out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
2. $\varnothing 0.790 \pm .001$ Max: .791 Min: .789	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
3. $\varnothing 1.000 \pm 0.002$ Max: 1.002 Min: .998	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
4. $\varnothing .790$ concentricity to datum A-B with a TIR of .001	Pass = within TIR of .001 Fail = exceeds TIR of .001	<input type="checkbox"/>	<input type="checkbox"/>
5. $\varnothing 1.000 \pm .005$ Max: 1.005 Min: .995	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
6. $\varnothing 1.000$ concentric to datum A-B within a tolerance zone of .001(TIR of .001)	Pass = within specified TIR Fail = exceeds specified TIR	<input type="checkbox"/>	<input type="checkbox"/>
7. $\varnothing 1.654 \pm .001$ (datum D) Max. diameter: 1.655 Min. diameter: 1.653	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
8. Length $.40 \pm .015$ Max: .415 Min: .385	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
9. Length $3.700 \pm .005$ Max: 3.705 Min: 3.695	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>

Performance Project : Turning Between Centers

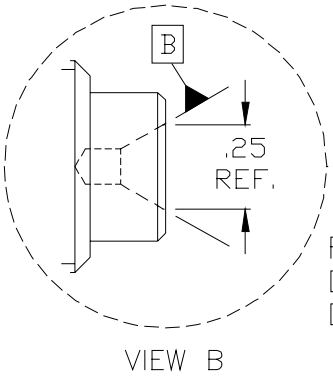
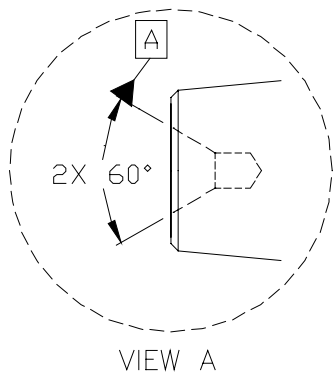
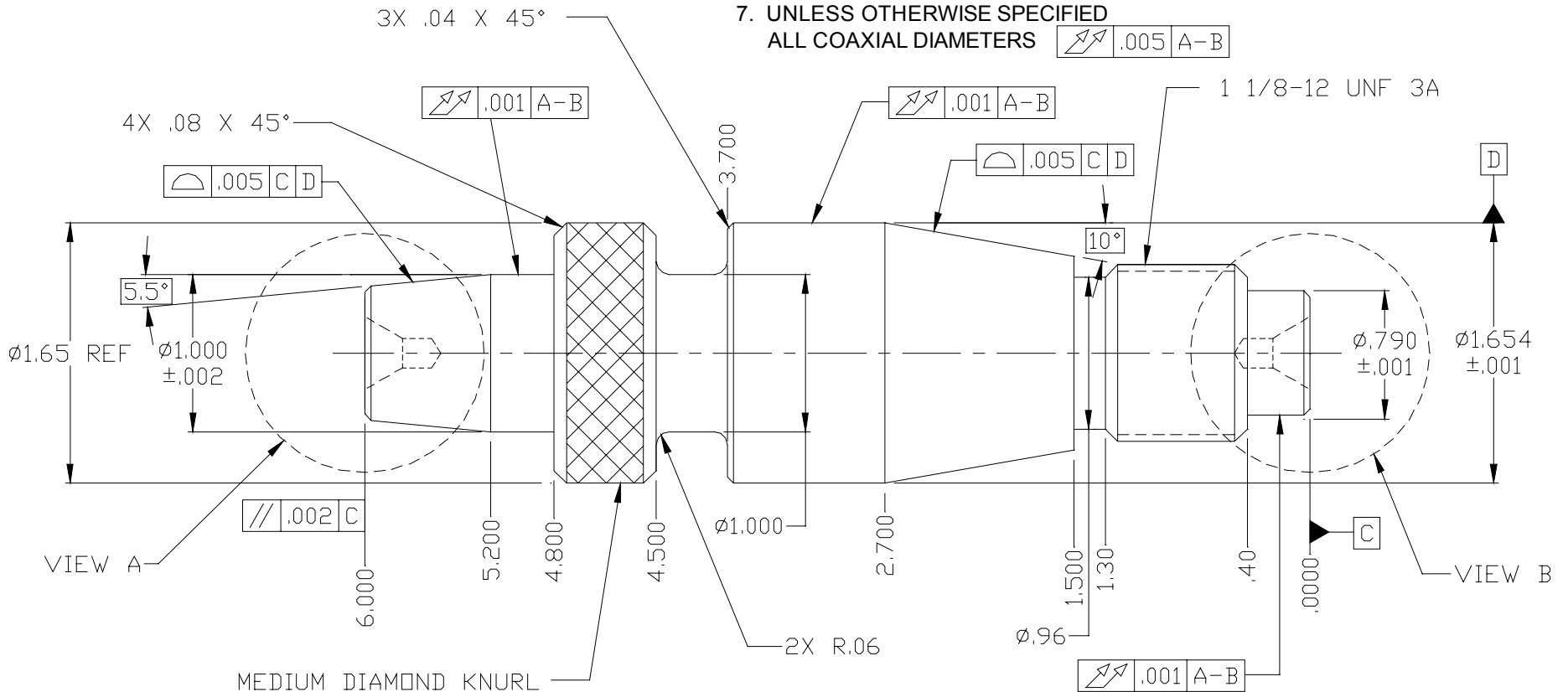
Evaluation Criteria		Pass	Fail
10. Length 4.500 ± .005 Max: 4.505 Min: 4.495	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
11. Length 4.800 ± .005 Max: 4.805 Min: 4.795	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
12. Length 6.000 ± .005 Max: 6.005 Min: 5.995	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
13. 6.000 end parallel to datum C within TIR of .002	Pass = within specified TIR Fail = exceeds specified TIR	<input type="checkbox"/>	<input type="checkbox"/>
14. Length 1.500 ± .005 Max: 1.505 Min: 1.495	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
15. Undercut diameter for thread Ø .96 ± .015 Max: .975 Min: .945	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
16. Diamond knurl – medium	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
17. Length 2.700 ± .005 Max: 2.705 Min: 2.695	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
18. Radius .06 (2 places) ± .015 Max: .075 Min: .045	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
19. Length 5.200 ± .005 Max: 5.205 Min: 5.195	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
20. 10° taper Max: 11° Min: 9°	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
21. 5.5° taper Max: 6.5° Min: 4.5°	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
22. Length 1.30 Max: 1.315 Min: 1.285	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>

Performance Project : Turning Between Centers			
Evaluation Criteria		Pass	Fail
23. Chamfer 0.08 x 45° (4 places) Max: .095 x 46° Min: .065 x 44°	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
24. Chamfers 0.04 x 45° (3 places) Max: .055 x 46° Min: .025 x 44°	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
25. Ø1.654 concentric to datum A-B within a .001 TIR	Pass = within the specified tolerance zone Fail = exceeds the specified tolerance zone	<input type="checkbox"/>	<input type="checkbox"/>
26. Surface finish	Pass = 63 microinches or better Fail = over 63 microinches	<input type="checkbox"/>	<input type="checkbox"/>
27. No sharp edges Broken edges not to exceed 1/64 th inches	Pass = no sharp edges with broken edges less than 1/64 th inches Fail = sharp edges or broken edges exceeding 1/64 th inches	<input type="checkbox"/>	<input type="checkbox"/>
28. Clamp marks, scratches	Pass = no marks or scratches Fail = marks and/or scratches	<input type="checkbox"/>	<input type="checkbox"/>
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. MAXIMUM TIME TO COMPLETE PART - 8 HOURS
2. FINISH ALL OVER 63 MICROINCHES MAX.
3. USE A #4 CENTERDRILL TO CREATE DATUM SIMULATIONS A AND B
4. BREAK ALL EDGES 1/64" MAX.
5. UNSPECIFIED INSIDE RADII ARE .030 MAX.
6. NO CLAMP MARKS OR SCRATCHES PERMITTED
7. UNLESS OTHERWISE SPECIFIED
ALL COAXIAL DIAMETERS $\sqrt{\text{.005}}$ A-B



REFERENCE CENTER DIMENSION FOR DATUM A AND B

DO NOT SCALE DRAWING

A		UPDATED DRAWING AND TITLE BLOCK	5/12/03	PW	
Level	Revision	Date	By	Chkd.	

		MACHINING SKILLS LEVEL II			
		Job Duty 2.3 Turning - Between Centers			
DESIGNER	DK	4/22/02	MATERIAL		
DWG CHK			1215 CRS or LOW CARBON STEEL		
DWG APPD			1.75 DIA. X 6.2		
TOLERANCES					
.X ±.032 .XXX ±.005					
.XX ±.015 ANGLES ± 1 DEG.					
FRACTIONS ± 1/64					
SCALE FULL		DWG.#986000 I		SHEET 1 OF 1	