

Evaluation Instructions

Machining Level II – CNC Turning

General Instructions

1. Make sure that the candidate has his/her own copy of the part print, 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 the tools, equipment and materials as suggested on the next page.
3. Identify each candidate's work upon completion and permanently mark all parts.
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 block used to complete the project agrees with the specifications on the part print.
2. Always check to see that the candidate is using the workholding 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 the project until an unsafe condition is resolved. If the unsafe condition is of the candidate's making, the evaluator or sponsor should require that the candidate completely restart the project after the safety issue has been resolved and appropriate instruction has been given.

Completion of the Performance Evaluation

1. Check to see that the candidate has provided proper cleanup of tools, equipment and work area.
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 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 CNC Turning

Materials:

CRS or Low Carbon Steel 1.5” Diameter X 6.3”

Duty:

Operate a CNC lathe.

Performance Standard:

Given a CNC lathe create a qualified CNC Program, setup and operate the lathe, change tool values as necessary, replace and qualify tooling as necessary.

Accuracy Level: Match the requirements of the part print. 63 microinch finish

Assessment Equipment and Material:

Workstation: A standard workbench, a CNC turning center of adequate capacity, a three-jaw universal scroll chuck, and a four-jaw independent chuck.

Material: A part matching the material requirements of the CNC turning part print, material: cold rolled steel.

Tooling: 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 part print, a drill chuck, center drill, external undercut tools, live center, dead center fitted to the spindle taper, magnetic base for a dial indicator, files, wrenches as necessary.

Measuring Inst: Required micrometers, combination set, thread pitch gages, center gage, pitch micrometer, thread ring gages, dial indicator, 6" rule, a 6" vernier, dial, or electronic caliper, surface finish comparison standards, appropriate taper ring gages and Prussian blue, or taper micrometer, or sine bar and indicator.

Reference: Machinery's Handbook, operator's manual for the machine tool.

Performance Assessment Worksheet

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INSTRUCTIONS: Rate the candidate’s performance for the *CNC Turning* 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 – CNC Turning			
Evaluation Criteria	Measurement Tool	Pass	Fail
1. Thread 5/8 – 18 UNF 3A Pitch diameter: Max: .5889 Min: .5854	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
2. \varnothing 0.7500 \pm .001 (right side of R.670) Max: .7510 Min: .7490	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
3. \varnothing 1.0236 \pm .001 Max: 1.0246 Min: 1.0226	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
4. \varnothing 1.1810 \pm .001 (Datum A) Max: 1.1820 Min: 1.1800	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
5. \varnothing .945 \pm .005 Max: .950 Min: .940	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
6. Length 6.22 \pm .015 Max: 6.235 Min: 6.205	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
7. \varnothing .750 \pm .005 Max: .755 Min: .745	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>

Performance Project – CNC Turning

Evaluation Criteria	Measurement Tool	Pass	Fail
8. R.078 ± .005 Max: .083 Min: .073	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
9. Ø .475 ± .005 Max: .480 Min: .470	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
10. R. 591 Max: .596 Min: .586 Location of R.591 3.0504 ± .001 Max: 3.0514 Min: 3.0494	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
11. .15 ± .020 (undercut width) Max: .170 Min: .130	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
12. Lengths 1.8750 ± .001 and .7000 ± .001	Pass = within specified tolerance zone Fail = exceeds specified tolerance zone	<input type="checkbox"/>	<input type="checkbox"/>
13. .08 X 45° (2 places) Max: .095 X 46° Min: .065 X 44°	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
14. .04 X 45° Max: .055 X 46° Min: .025 X 44°	Pass = within tolerance Fail = exceeds tolerance	<input type="checkbox"/>	<input type="checkbox"/>
15. Location of R.670: 1.2890 ± .001 Max: 1.2900 Min: 1.2880	Pass = within specified tolerance Fail = exceeds specified tolerance	<input type="checkbox"/>	<input type="checkbox"/>
16. Surface finish 63 microinches maximum	Pass = surface finish 63 microinches or better Fail = surface finish exceeds 63 microinches	<input type="checkbox"/>	<input type="checkbox"/>
17. R.670 Max: .675 Min: .665	Pass = within specified tolerance zone Fail = exceeds specified tolerance zone	<input type="checkbox"/>	<input type="checkbox"/>
18. No sharp edges, all outside corner radii are .020/.010	Pass = within the tolerance range Fail = sharp edges, exceed the tolerance range	<input type="checkbox"/>	<input type="checkbox"/>

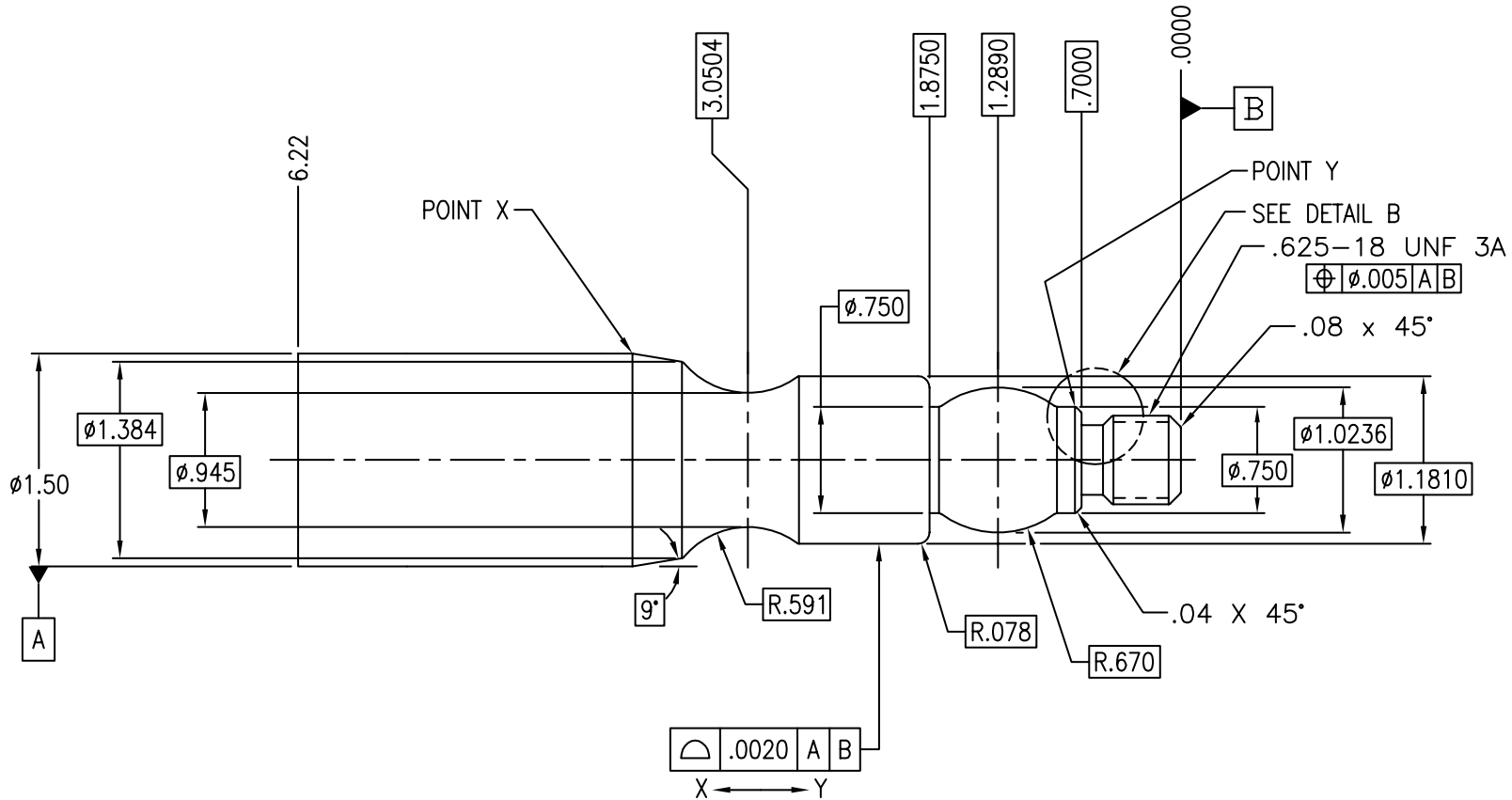
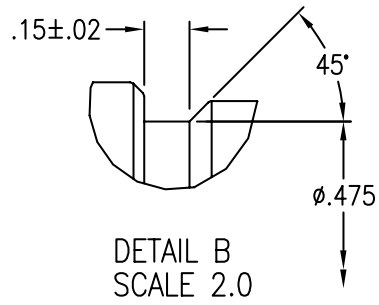
Performance Project – CNC Turning

Evaluation Criteria	Measurement Tool	Pass	Fail
19. All inside corner radii are .030 maximum	Pass = all inside corner radii .030 or less Fail = corner radii exceed .030	<input type="checkbox"/>	<input type="checkbox"/>
20. No burrs	Pass = no burrs Fail = burrs	<input type="checkbox"/>	<input type="checkbox"/>
21. Written program correct, final contour cut has to be long hand with no canned cycles	Pass = written program produces the part Fail = written program cannot produce the part	<input type="checkbox"/>	<input type="checkbox"/>

END OF CNC TURNING 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.

REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
A	UPDATED DRAWING AND TITLE BLOCK	3/7/05	LW
B	UPDATED DIMENSIONS	5/23/05	LW
C	UPDATED DIMENSIONS	11/9/05	LW
D	UPDATED DIMENSIONS	4/5/12	LW



Notes:

1. REMOVE ALL BURRS
2. ALL INSIDE CORNER RADII ARE .030 MAX
3. ALL OUTSIDE CORNER RADII ARE .010 - .020
4. CENTER PERMISSIBLE.
5. SURFACE FINISH ALL OVER: 63 ✓

		MACHINING SKILLS LEVEL II	
		Job Duty 2.22 & 2.23 CNC Programming and Operation - Turning	
DESIGNER	DK	4/22/02	MATERIAL COLD ROLL STEEL OR LOW CARBON STEEL 1.5 DIA. X 6.3 INCHES
DWG CHK			
DWG APPD			
TOLERANCES		SCALE 3/4	DWG.#986002 I
.XXX ±.005 .XXXX ±.0010 .XX ±.01 ANGLES ± 1 DEG.			SHEET 1 OF 1

DO NOT SCALE DRAWING