Performance Standards
CNC Milling

Material

Aluminum or mild steel.

Duty

- Set up, program, and operate a CNC mill or machining center and manufacture a part within tolerance
- Work from a process sheet and part print.
- Understand the x, y, z Cartesian coordinate system.
- Create a tool set up sheet.
- Understand fundamental machine processing, feeds and speed, and select simple part.

Performance Standard

Write a program at the machine or off line. Setup the machining operation and perform standards given on mill operations (2.10) to develop a simple part (with linear and circular interpolations).

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

Assessment Equipment and Material:

Workstation: A standard workbench, a CNC mill with continuous path capability on 2½ axes.

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

Tooling: A 6" milling vise or greater, screws, studs, nuts, washers, and clamps sufficient to secure the vise, or the part to the table. Assorted parallels, ball peen, and composition hammers, assorted cutters and cutter adapters fitted to the machine spindle, files, magnetic base for indicators, soft jaws for the vise and assorted cutters.

Measuring Inst: Required micrometers, combination set, dial indicator, 6" rule, a 6" vernier, dial, or electronic caliper, adjustable parallels, edge finder, appropriate tools for determining squareness, and surface finish comparison standards.

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

Performance Assessment Worksheet
CNC Milling

INSTRUCTIONS: Rate the candidate's performance for the CNC Milling job according to the 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 not meet all specifications, the candidate/trainee must correct or redo the project.
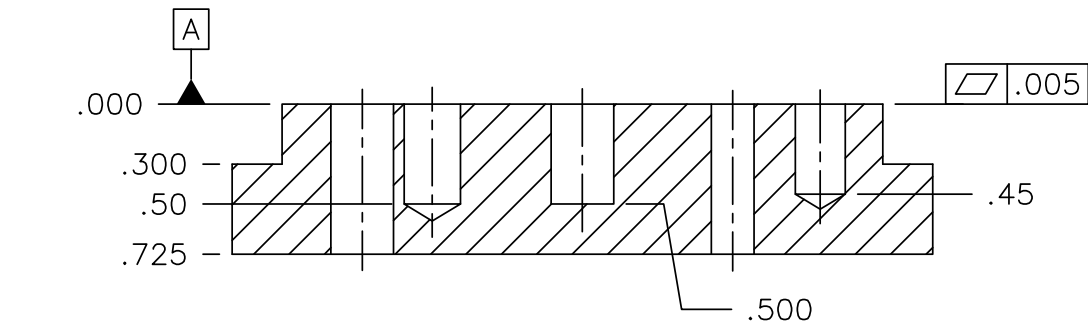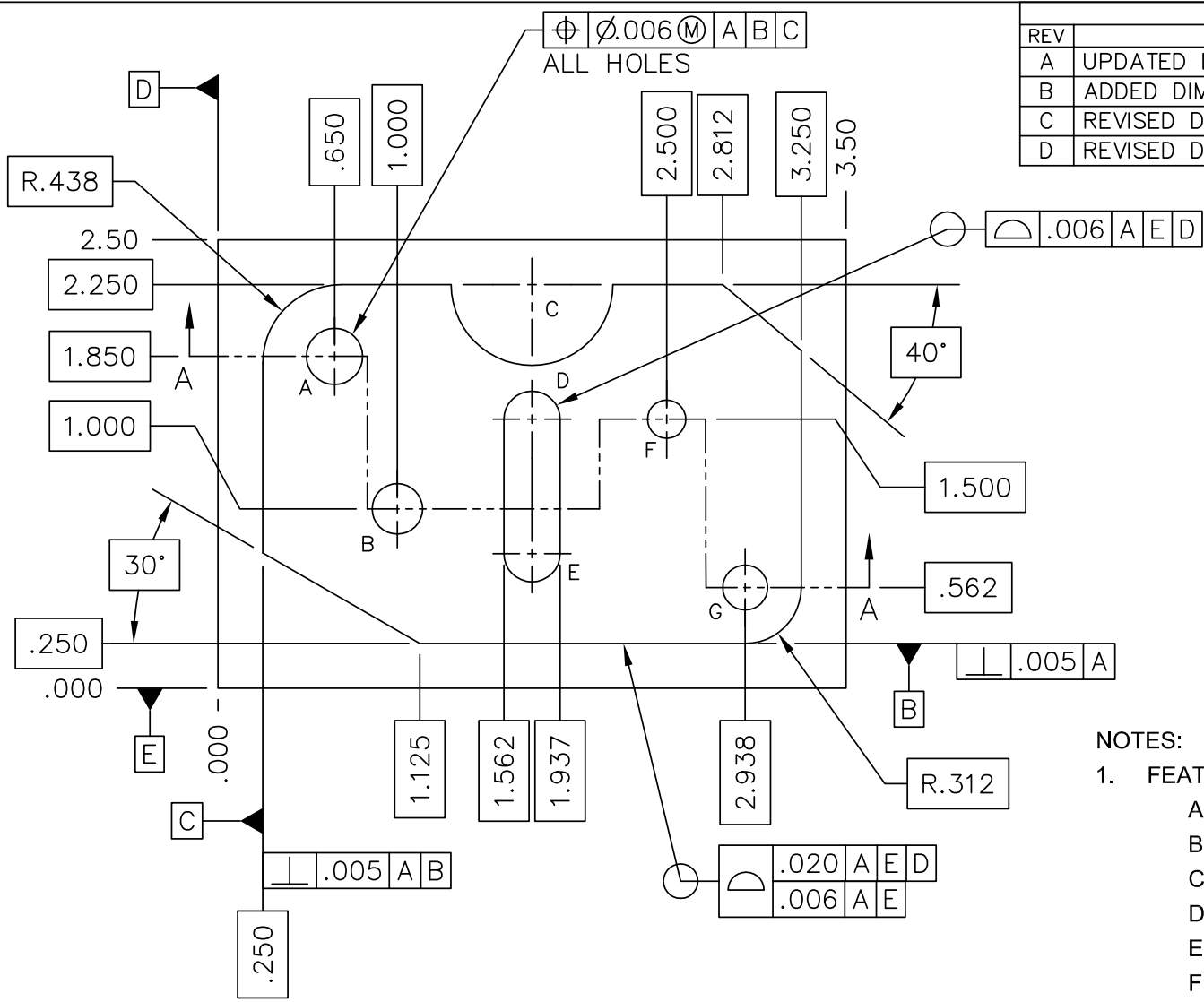
_____

Candidate Name   Evaluation Date

Performance Project – CNC Milling

Evaluation Criteria		Pass	Fail
1. Overall Dimensions 　　　Length 3.50 ± .010 　　　Width 2.50 ± .010 　　　Thickness .725 ± .003	Pass = within tolerance Fail = out of tolerance	☐ ☐ ☐	☐ ☐ ☐
2. Profile tolerance within limits 　　　Position ± .006 　　　Depth .300 ± .003	Pass = within tolerance Fail = out of tolerance	☐ ☐	☐ ☐
3. Hole A　　Position ± .006 　　　　　　Diameter ± .002	Pass = within tolerance Fail = out of tolerance	☐ ☐	☐ ☐
4. Hole B　　Position ± .006 　　　　　　Diameter .281 ± .005 　　　　　　Depth .500 ± .010	Pass = within tolerance Fail = out of tolerance	☐ ☐ ☐	☐ ☐ ☐
5. Hole F　　Position ± .006 　　　　　　Diameter ± .002	Pass = within tolerance Fail = out of tolerance	☐ ☐	☐ ☐
6. Hole G　　Position ± .006 　　　　　　Diameter ± .005 　　　　　　Depth .45 ± .010	Pass = within tolerance Fail = out of tolerance	☐ ☐ ☐	☐ ☐ ☐
7. Slot D-E　　Position ± .006 　　　　　　Width .375 ± .002 　　　　　　Depth .500 ± .003	Pass = within tolerance Fail = out of tolerance	☐ ☐ ☐	☐ ☐ ☐

Performance Project – CNC Milling		Pass	Fail
Evaluation Criteria			
8. Break all sharp edges .015 max.	Pass = within tolerance Fail = out of tolerance	☐	☐
9. Surface finish 63 Ra microinches min.	Pass = within tolerance Fail = out of tolerance	☐	☐
END OF CNC MILLING 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.

SECTION A–A

Revisions

REV	DESCRIPTION	DATE	APPROVED
A	UPDATED DRAWING AND TITLE BLOCK	3/7/05	LW
B	ADDED DIMENSIONS FOR SLOT	4/21/05	LW
C	REVISED DIMENSIONS FOR SLOT	11/13/09	LW
D	REVISED DIMENSIONS	4/5/12	LW

⌖ ⌀.006 Ⓜ A B C
ALL HOLES

.650 1.000 2.500 2.812 3.250 3.50

R.438

2.50
2.250
1.850
1.000
30°
.250
.000
.250

40°
1.500
.562

⌓ .006 A E D

R.312

1.125 1.562 1.937 2.938

⏊ .005 A

B

⏊ .005 A B

C

⌓ .020 A E D
⌓ .006 A E

A

▱ .005

.000
.300
.50
.725
.45
.500

NOTES:

1.

FEATURE	SIZE	X	Y
A	.312 ±.002		
B	.281 ±.005		
C	R.450	1.750	2.250
D	R.1875	1.750	1.500
E	R.1875	1.750	.750
F	.213 ±.002		
G	.250 ±.005		

2. BREAK ALL SHARP EDGES: 1/64 MAXIMUM

3. SURFACE FINISH TO BE 63 MICROINCHES MAXIMUM

DO NOT SCALE DRAWING