

INT112 LAB 3.1: LAYOUT

Student Name: _____

Student ID: _____

LAB OUTCOMES:

Upon completion of this lab procedure, the student should be able to:

1. Interpret a machine print.
2. Apply layout ink to a workpiece.
3. Utilize a surface plate, surface gage, height gage, and combination set to accurately determine the placement of layout lines.
4. Create accurate layout lines on a workpiece using a scribe.
5. Create accurate punch marks where appropriate.

LAB PROCESS:

Before entering the machine shop, ensure that you have observed all required safety procedures:

- Safety glasses on
- Closed-toed shoes
- No rings or other jewelry
- No loose-fitting clothing
- Long hair pulled back
- Not under the influence of any substance that dulls reaction time or judgement

Part 1:

1. Review the print on the last page of this lab. You will only be laying out this part, not actually producing it.
2. Get the workpiece from your instructor.
3. Clean the workpiece to remove any dirt, grease, or oil, which will interfere with the layout. Apply the layout dye evenly to the workpiece surface.
4. Locate your base line(s). Where would these be on your print?

5. Use the scribe and straightedge to draw the base line(s) on your part.
6. Locate the center points of the circles and arcs, relative to your base line(s). Use the scribe and straightedge to draw the center lines on your part.
7. Use the prick punch to mark the center of the circles and arcs on your part. Enlarge with a center punch if needed.
8. Use a divider to draw the circles and arcs on your part.
9. Use the scribe and straight edge to draw all other lines on your part.

Each line should only be drawn once, and should be clean and clear. If you make a mistake with the layout, use a solvent to remove the layout dye, reapply the dye, and re-scribe any lines or arcs needed.

The outcomes of this exercise (listed on page 1) specifies the skills that the Student must demonstrate to the Instructor. Once the Instructor is satisfied with the demonstration of Knowledge & Skills by the individual student, they will sign this document (for the student), then enter a 100% into the Hands-On Lab grade in Sakai.

I verify that this student has completed all of the requirements of this Hands-On Assessment:

Student Name: _____

Faculty Signature: _____ Date: _____

DOL DISCLAIMER:

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Performance Standards

Layout

Material

Cold rolled steel or low carbon steel .25" x 2" x 6.125" with add stock on left end.

Duty

Layout the location of hole centers and surfaces within an accuracy of $\pm .015$.

Performance Standard

Given a surface plate, surface gage, layout height gage, combination set, scribe, layout ink, prick punch, ball peen hammer, process plan, and part print, layout hole locations, radii, and surfaces matching the specifications.

Other Evaluation Criteria

1. Layout ink is applied to the surface appropriately.
2. Lines are struck once.
3. Intersections are clean and clear.
4. Punch marks are centered on intersections.

Accuracy Level: $\pm .015$ unless otherwise specified on the blueprint.

Assessment Equipment and Material

Workstation: Common workbench, a layout surface plate at least 12" X 18"

Material: A part matching the layout print, material: Cold rolled mild steel.

Tooling: A scribe, layout ink or a Magic Marker, prick punch, ball peen hammer, angle plate, C-clamps, parallel-closing clamps, magnifying glass.

Measuring Instruments: Combination set, radius gages, 6" dividers, surface gage, or layout height gage.

Reference: Machinery's Handbook.

Performance Assessment Worksheet Layout

INSTRUCTIONS: Rate the candidate's performance for the Layout job according to the nineteen (19) criteria below. The checklist below only 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/student must correct or redo the project.

Candidate Name _____

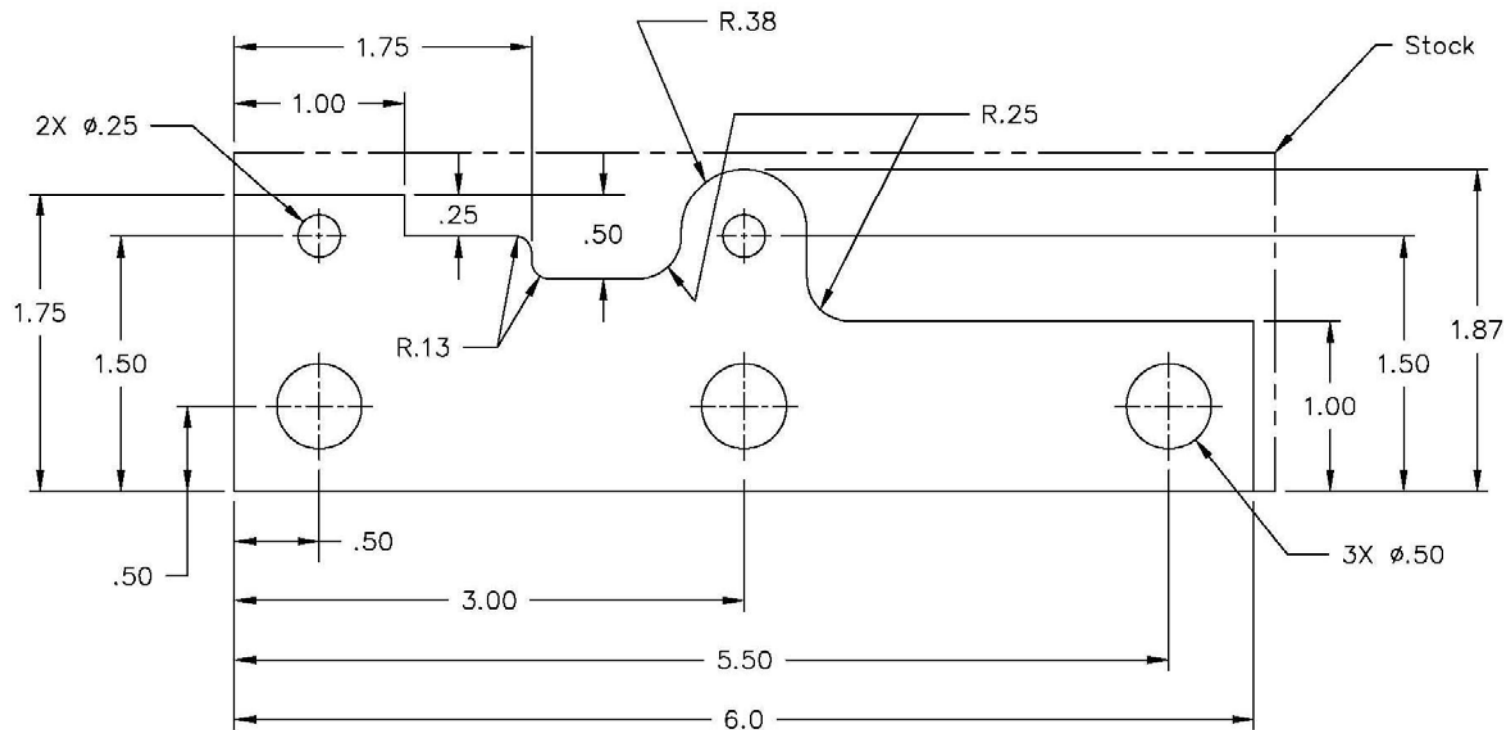
Evaluation Date _____

Performance Project – Layout			
Evaluation Criteria		Pass	Fail
1. Length: 6.032/5.968	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
2. Height: 1.765/1.735	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
3. Height: 1.885/1.855	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
4. Height 1.015/. 985	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
5. Radius: .38 ± .015	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
6. Radius: .25 ± .015	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
7. Location of hole #2: 3.015/2.985-x .515/. 485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
8. Location of hole #5: 3.015/2.985 x 1.515/1.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
9. Location of hole #1: .515/.485 x .515/.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>


Performance Project – Layout			
Evaluation Criteria		Pass	Fail
10. Location at hole #3: .515/.485 x 1.515/1.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
11. Location at hole #4: 5.515/5.485 x .515/.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
12 Length to step: 1.75 1.765/1.735	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
13. Length to step: 1.00 1.765/1.735 5	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
14. Step height .25 .265/.235 .50 .515/.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
15. Radius: .125 ± .015	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
16. Location of hole #2: 3.015/2.985-x .515/.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
17. Location of hole #5: 3.015/2.985 x 1.515/1.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
18. Intersections are struck once	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>
19. Location of hole #1: .515/.485 x .515/.485	Pass = within tolerance Fail = out of tolerance	<input type="checkbox"/>	<input type="checkbox"/>

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 candidate must also complete the performance in layout to be eligible for the related theory exam for the NIMS Credential in Job Planning, Benchwork, and Layout. When both performances have been successfully met, the sponsor should complete and send to NIMS only the completed signed Performance Affidavit

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



Notes:
BREAK ALL SHARP EDGES

 <p>UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994</p>		MACHINING SKILLS LEVEL I	
		Job Duty 2.2 Manual Operation, Layout	
DESIGNER	DK	11/01/01	MATERIAL
DWG CHK			COLD ROLL STEEL OR MILD STEEL
DWG APPD			
TOLERANCES		SCALE FULL	DWG.#98202 I SHEET 1 OF 1
.X ±.032 .XXX ±.005			
.XX ±.015 ANGLES ± 1 DEG.			
FRACTIONS ± 1/64			

DO NOT SCALE DRAWING

NIMS PROCEDURAL REQUIREMENTS

1. THIS IS A LAYOUT ONLY, DO NOT CUT PART PROFILE
2. CONSTRUCTION LINES FOR LAYOUT ARE PERMISSIBLE
3. LINES ARE STRUCK ONCE

4. INTERSECTIONS ARE CLEAN AND CLEAR
5. PUNCH MARKS ARE CENTERED ON INTERSECTIONS: ± .015
6. SUBMIT THIS PRINT AND WORKPIECE ALONG WITH THE PERFORMANCE AFFIDAVIT FOR EVALUATION