WLDG 1417  
Introduction to Layout and Fabrication

Semester Hours:  
4

Textbooks:  
Pipewelders and Pipefitters Handbook  
Templet: Development for the Pipe Trades

Course Description:  
A fundamental course in layout and fabrication related to the welding industry. Major emphasis on structural shapes and use in construction.

Course Learning Outcomes:
The student will identify welding symbols; identify and select measuring instruments and tools for fabricating projects; recognize correct layout and fabrication terminology; and identify structural shapes and materials.

Supplementary Material:  
Filmstrips  
Videos  
handout materials

Performance Objectives:

1. Given instructions and practice the student will be able to name and use the drafting instruments and also, the various tools such as Curv-O-Mark Contour Marker, Centering Heads, Radius Markers, Universal Levels, Flange Two Hole Pins, and Wrap-a-Rounds. The student will also demonstrate how to read a ruler and blueprints that are used for fabricating and laying out metal weldments in the welding and pipefitting industry. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and scoring the college minimum satisfactory grade on a written exam.

   A. Name ten welding pipe fittings and six shapes of iron.
   B. Explain plate and pipe fitting terms in English and slang.

2. Given instructions and practice the student will be able to do the Template and Layout method to fabricate a two piece 90 degree turn, a three piece 90 degree turn, a 90 and 45 degree lateral on equal and unequal diameter pipes. Also, the student will layout a orangepeel and blunthead bullplug.
A. Develop templates and layout for tube turns, Ys, and laterals within a 1/8" positive, negative tolerance.

B. Develop templates and layout for flanges, bullplugs, reducers, and rolling miters within a 1/8" positive negative tolerance.

3. Given instructions and practice the student will develop templates for plate with the proper marks for drilling holes, break, and cuts. This knowledge will be evidenced by laboratory demonstration, completion of assignment sheets, and by scoring the college minimum satisfactory grade.

   A. Develop templates for boxes, frustrums, and hoppers showing where to notch or break the metal or where to drill holes using the proper identification mark. Dimensions will be allowed a 1/8" positive, negative variance.

   B. Make soapstone marks and cut metal with cutting torch, bandsaw, or iron shear.

Teaching Methods:

1. Handout material
2. Lecture on textbook
3. Films and filmstrips
4. Demonstrations
5. Individual and group instructions in the lab

Evaluation Methods:

1. Attendance
2. Written exams
3. Classroom work
4. Lab work
5. Tolerance of finished work
Grading Policy:

Lecture Evaluation 20%
Practical Application (Lab) 80%

Attendance Policy:

Students must attend all classes. Excessive absenteeism will have a detrimental effect on the student grade. Students can be dropped from classes for excessive absenteeism. The instructor will call roll at the beginning and end of each class or any time he/she feels it necessary. Three (3) times tardy will count as one (one) absence. The attendance record starts the first day of class beginning of each semester.

Course Outline:

I. Layout Tools
   A. Framing square
   B. Levels
   C. Protractor
   D. Wrap-a-round
   E. Contour Marker

II. Develop Template and Layout on pipe
   A. 90 and 45 degree tube turn
   B. 90 and 45 degree lateral
   C. Orange peel bull plug
   D. Blunt head bull plug
   E. Reducers
   F. 90 degree tee (saddle)

III. Develop Template and Layout on plate
   A. Boxes
   B. Frustrums
   C. Hoppers

IV. Dimensions
   A. Center to center
   B. Fractions to decimals
   C. Tolerance
   D. Overall measurement
   E. Plumb and level degrees

V. Preparing and Measuring Material
   A. Select proper material for project
B. Select dimensions to be used  
C. Build project  
D. Evaluate project  

VI. Making the cut  
   A. Use of the cutting torch  
   B. Use of saw  

VII. Tack weld a Weldment  
   A. Two-hole a flange on a pipe with elbow on opposite end  
   B. Tack weld 45 degree elbow on a pipe with a flange on opposite end  
   C. Square flange on pipe  
   D. Use level and plumb on pipe fittings  

VIII. Repair Methods  
   A. Identify rejection  
   B. Remove and re-do rejections  
   C. Re-weld  
   D. Re-evaluate
### WELDING TECHNOLOGY
### COMPETENCY PROFILE

**STUDENT** ___________________________  **COURSE** WLDG 1417

**INSTRUCTOR** ___________________________  **SEM./YEAR** ___________________________

**RATING SCALE:**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Skilled:</th>
<th>Moderately Skilled:</th>
<th>Limited Skill:</th>
<th>No Exposure:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Can work independently with no supervision.</td>
<td>Can perform job completely with limited supervision</td>
<td>Requires instruction and close supervision.</td>
<td>No experience or knowledge in this area.</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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</table>

<table>
<thead>
<tr>
<th><strong>COMPETENCY</strong></th>
<th>Rating</th>
<th>Rating</th>
<th>Rating</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifies basic drafting instruments and explains uses.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Identifies basic layout tools.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Knows of and uses a measuring tape.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Identifies ten common structural metal shapes.</td>
<td>4</td>
<td>3</td>
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<td>1</td>
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<tr>
<td>Demonstrates ability to select, use and care for hand tools.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Identifies ten welding pipe fittings.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Develop template for a flat pan.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Develop template for cones, hoppers, boxes.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Develop template for a two piece 90 deg. tube turn (pipe)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Develop template for a two piece 45 deg. tube turn (pipe)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Develop template for a three piece 90 deg. tube turn (pipe)</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Develop template for a branch and header (90 deg. tee) on equal and unequal diameter pipe.</td>
<td>4</td>
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<tr>
<td>Develop template for a branch and header (45 deg. lateral) on equal and unequal diameter pipe.</td>
<td>4</td>
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<tr>
<td>Develop template for a blunt head.</td>
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<tr>
<td>Develop template for an orange peel.</td>
<td>4</td>
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<tr>
<td>Develop templates for a concentric and eccentric reducers.</td>
<td>4</td>
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<td>2</td>
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<tr>
<td>Develop template for a true wye branch connection.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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<tr>
<td>Develop template for a combination offset.</td>
<td>4</td>
<td>3</td>
<td>2</td>
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