WLDG 2413: Welding Using Multiple Processes

Semester Hours: 4

Textbook: Modern Welding, Althouse, Turnquist, and Bowditch

Course Description: Instruction using layout tools and blueprint reading with demonstration and guided practices with some of the following welding processes: oxy-fuel gas cutting and welding, shield metal arc welding (SMAW), gas metal arc welding (GMAW), flux-cored arc welding (FCAW), gas tungsten arc welding (GTAW), or any other approved welding process.

Course Learning Outcomes: The student will identify proper safety equipment and tools and identify and select the proper welding process for a given application. The student will demonstrate skills training using more than one approved welding process; demonstrate ability to analyze situations and make decision using skills as taught concerning safety and electrode selections; and select the most economic and practical welding process for the given task.

Supplementary Material: Handout material
Videos

Performance Objectives:

1. Given instructions and practice the student will be able to setup and check for leaks on oxyacetylene station and use at least three types of plate beveling machines used in the industry. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by scoring the college minimum satisfactory grade on a written exam.

   A. Demonstrate how to assemble an oxyacetylene rig and to test for leaks by using soap and water. The student must strive to assemble the rig without leaks.
B. Prepare plate coupons for welding with an oxyacetylene torch and chain gear, and electric plate beveling machines.

C. Bevel plates to a 30 degree or 37 1/2 bevel and tack them together with a 1/8” gap within a 1/16” tolerance.

2. Given instructions and practice the student will be able to assemble and setup a welding station with the necessary equipment to perform flux-cored wire welding. Safety will be stressed. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by scoring the college minimum satisfactory grade on a written exam.

A. Describe the welding process and various uses.

B. Setup welding station and name each major component and explain what major part it plays in welding

C. Explain safety factors pertaining to eye protection, clothing, gloves, and safety shoes.

3. Given instructions and practice the student will be able to prepare metal (plate), select the proper wire, and wire stick out. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by scoring the college minimum satisfactory grade on a written exam.

A. Prepare plate with an oxyacetylene torch or iron worker.

B. Select the proper electrode wire using a number and letter classification chart.

C. Determine the proper visible stick out.

4. Given instructions and practice the student will be able to determine the welding procedure for mild steel in all the positions for plate. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by scoring the college minimum satisfactory grade on a written exam.

A. Select the wire and adjust the wire speed, voltage, and current.

B. Determine the type of joint, gap, and position that will be most economical.

5. Given instructions and practice the student will be able to determine the proper welding technique and weld in all positions on plate. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by scoring the college minimum satisfactory grade on a written exam.

A. Select the proper welding technique uphill, down-hill, perpendicular, push or pull,
or drag angle.

B. Weld on plates in all positions.

**Teaching Methods:**

1. Lecture on textbook
2. Films and filmstrips
3. Handout material
4. Transparencies in conjunction with lecture

**Evaluation Methods:**

1. Attendance
2. Lab tests and lab performance
3. Safety
4. Written exams

**Grading Policy:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Lecture Evaluation</td>
<td>20%</td>
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<tr>
<td>Practical Application (Lab)</td>
<td>80%</td>
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**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. Introduction
   
   A. Process description
   
   B. Required equipment
   
   C. Process safety

II. Welding Preparation
A. Choose the proper electrode (wire alloy)
B. Prepare the metal
C. Electrode extension (stick out)

III. Welding Procedure

A. Welding station check for safety
B. Select proper wire, position, and current

IV. Welding Technique

A. Set electrode stick out
B. Start the arc
C. Set the voltage
D. Set the wire feed speed
E. Use proper drag angle

V. Making the Weld

A. 1G and 2G
B. 3G and 4G