WLDG 2447  Advanced Gas Metal Arc (GMAW) Welding

Semester Hours  4

Textbook  Gas Metal Arc Welding Handbook, William H. Minnick

Course Description  Advanced topics in Gas Metal Arc Welding (GMAW). Includes welding in various positions.

Course Learning Outcomes:  The student will exhibit expertise in various welding positions on pipe; describe safety rules and equipment use; and describe the effects of welding parameters in GMAW. The student will weld various joint designs and diagnose welding problems and perform visual inspection.

Supplementary Material  Filmstrips
Handout material
Videos

Performance Objectives:

1. Given instructions and practice, the student will be able to name the various shielding gases, methods of metal transfer, and components of a gas metal arc welding station. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by written exams.
   
   A. Name the four most common shielding gases used in GMAW.
   
   B. Name four methods of GMAW metal transfer.
   
   C. Name the main components of the (GMAW) outfit.

2. Given instructions and practice, the student will select shielding gases for various metals and setup a GMAW station. This knowledge will be evidenced by laboratory demonstrations, completion of assignment sheets, and by written exams.
   
   A. Select the proper gas or gas mixture necessary to shield various metals while welding with the GMAW process.
   
   B. Adjust gas or gas mixture and flow rate necessary to shield the arc while welding with the GMAW.

3. Given instructions and practice, the student will be able to setup a GMAW station and make the necessary adjustments such as current, wirefeed, voltage, and gas flow necessary to weld on various sizes of mild steel.
A. Safely assemble the components such as welding machine, wirefeeder, flowmeter, gun control system, and setup a complete (GMAW) outfit.

B. Inspect welding station for safety hazards; such as electrical shock, arc flash, and ventilation.

4. Given instructions and practice, the student will make welds on pipe nipples in the 2G, 5G, and 6G positions using the uphill, push and pull methods of welding on mild steel, and aluminum. This knowledge will be evidenced by laboratory demonstrations completion of assignment sheets, visual inspection test, destruction test according to American Welding Society Welding Codes, and by scoring the college minimum satisfactory grade on a written exam.

   A. Set machine and weld pipe nipples in the 2G position.
   
   B. Set machine and weld pipe nipples in the 5G position.
   
   C. Set machine and weld pipe nipples in the 6G position.

**Teaching Methods:**

1. Individual and group instructions in the lab.

2. Group of four or five students will work together on lab projects.

3. Individual and group instruction in the classroom.

**Evaluation Methods:**

1. Attendance

2. Lab tests and lab performance

3. Destructive method using a guided bend tester

4. Written Exams

**Grading Policy:**

Lecture Evaluations 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 or she feels it necessary. Three (3) times tardy will count as one (1) absence. The attendance record starts the first day of class beginning of each semester. 

**NO EXCEPTIONS!**

**Reference Materials:**

The WLDG Department Library  
The College Library  
Tutors (Available on request)

**Course Outline:**

I. Shielding Gases  
   A. Argon  
   B. Helium  
   C. Nitrogen  
   D. Carbon dioxide  
   E. Mixed Gases

II. Metal Transfer  
   A. Short circuiting arc transfer  
   B. Globular transfer  
   C. Pulsed Arc  
   D. Spray transfer

III. (GMAW) Outfit  
   A. Welding machine  
   B. Shielding gas cylinder  
   C. Flowmeter and regulator  
   D. Wire reel  
   E. Wirefeed drive motor  
   F. Control system  
   G. Manually held gun

IV. Gas Selection for Various Metal  
   A. Gas combination for low carbon steel (mild)  
      B. Gas combination for high carbon steel  
   C. Gas combination for stainless steel  
   D. Gas combination for aluminum

V. Setup Welding station  
   A. Assemble components  
   B. Adjust Variables  
   C. Check for safety  
VI. Practice GMAW Welding  
   A. 2G position  
   B. 5G position  
   C. 6G position
# WELDING TECHNOLOGY
## COMPETENCY PROFILE
(ret.8/10)

<table>
<thead>
<tr>
<th>STUDENT</th>
<th>COURSE</th>
<th>WLDG 2447</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>INSTRUCTOR</th>
<th>SEM./YEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### RATING SCALE:

- **4** **Skilled:** Can work independently with no supervision.
- **3** **Moderately Skilled:** Can perform job completely with limited supervision
- **2** **Limited Skill:** Requires instruction and close supervision.
- **1** **No Exposure:** No experience or knowledge in this area.

<table>
<thead>
<tr>
<th><strong>COMPETENCY</strong></th>
<th><strong>RATING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 3 2 1</td>
</tr>
</tbody>
</table>

- Identifies all personal and welding safety procedures.
- Identifies components and explains function.
- Identifies, selects, and safely handles shielding gases.
- Adjusts current, feed rate, and gas flow.
- Identifies, selects, wire electrode.
- Identifies welding problems, their causes, and takes corrective action.
- Identifies the five basic joint designs.
- Identifies, selects joint design for job task, and prepares metal.
- Makes V-groove, butt joint, pipe weld in the horizontal test position. (2G)
- Makes V-groove, butt joint pipe weld in the vertical test position. (5G)
- Makes V-groove, butt joint, pipe weld in the vertical 45 deg. (Arkansas bellhole) position. (6G)
- Prepares weld for test.
- Passes visual test.
- Passes Destructive test.