Western Technical College

31442306  Welding - Gas Metal Arc 1 (GMAW)

Course Outcome Summary

Course Information

<table>
<thead>
<tr>
<th>Description</th>
<th>The study of welding techniques and applications of the gas metal arc welding process using the short circuitry arc process in the flat and horizontal positions on ferrous materials (steel).</th>
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</thead>
<tbody>
<tr>
<td>Career</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>Cluster</td>
<td>Technical Diploma Courses</td>
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<tr>
<td>Instructional Level</td>
<td>Technical Diploma Courses</td>
</tr>
<tr>
<td>Total Credits</td>
<td>2</td>
</tr>
<tr>
<td>Total Hours</td>
<td>72</td>
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</tbody>
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Textbooks


Learner Supplies

Welding sateen jacket, welding work gloves (long leather gauntlet, short leather work gloves), welding helmet, leather cape and sleeves. **Vendor:** To be discussed in class. Required.

Tools: 25’ steel tape measure, metal combination square, and scribe. **Vendor:** To be discussed in class. Required.

Six inch leather steel toed work books - $75.00-150.00. **Vendor:** To be discussed in class. Required.

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** Campus Shop. Required.

Program Outcomes

1. Demonstrate industry recognized safety practices
2. Interpret welding drawings
3. Produce gas metal arc welds (GMAW)
4. Perform thermal cutting

Course Competencies

1. Demonstrate welding safety.
Assessment Strategies
1. Skill Demonstration

Criteria

You will know you are successful when
1. you identify personal protective equipment.
2. you put on and take off personal protective equipment correctly.
3. you identify electrical hazards.
4. you identify hot materials hazards.
5. you protect hearing.

Learning Objectives
1.a. Identify personal protective equipment.
1.b. Discuss electrical safety.
1.c. Identify electrical hazards.
1.d. Practice application of personal protective equipment.
1.e. Discuss noise hazards.
1.f. Identify hot material hazards.

2. **Demonstrate equipment maintenance**

Assessment Strategies
2.1. Skill Demonstration

Criteria

You will know you are successful when
2.1. you set up and shut down equipment and work area.
2.2. you identify maintenance requirements for various equipment.
2.3. you describe process for notifying instructor of broken equipment.
2.4. you identify solutions for maintenance problems.
2.5. you repair equipment as indicated.

Learning Objectives
2.a. set up and shut down equipment
2.b. Identify components that require operator maintenance.
2.c. Discuss conditions that could require maintenance or repair.
2.d. Determine possible maintenance solutions for an equipment malfunction.

3. **Explore GMAW process.**

Assessment Strategies
3.1. Written Product

Criteria

You will know you are successful when
3.1. you illustrate the GMAW process.
3.2. you identify equipment needed in the GMAW process, including component parts.

Learning Objectives
3.a. Study the theory of GMAW process.
3.b. Identify the component parts of the equipment used in the process.
3.c. Demonstrate proper set up and use of the equipment.

4. **Demonstrate padding/surfacing/restarts/crater fills on mild steel plate.**

Assessment Strategies
4.1. Skill Demonstration

Criteria

You will know you are successful when
4.1. you reference the WPS guidelines.
4.2. you locate correct material thickness and shear to size.
4.3. you meet weld quality as per AWS D1.1 or D1.3.
4.4. you demonstrate welding safety.
4.5. you demonstrate equipment maintenance.
4.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
4.a. Maintain proper lead and work angles.
4.b. Identify a good weld.
4.c. Read and use lab sheets
4.d. Tack weld parts correctly
4.e. Explore techniques in applying the weld.

5. **Weld a lap joint with fillet weld.**

Assessment Strategies
5.1. Skill Demonstration

Criteria
*You will know you are successful when*
5.1. you reference the WPS guidelines.
5.2. you locate correct material thickness and shear to size.
5.3. you meet weld quality as per AWS D1.1 or D1.3.
5.4. you demonstrate welding safety.
5.5. You demonstrate equipment maintenance.
5.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
5.a. Locate correct material thickness and shear to size.
5.b. Tack weld plate in proper position.
5.c. Identify a good weld.
5.d. Read and use lab sheets.
5.e. meet appropriate weld quality for AWS D1.1.

6. **Weld T-joint with fillet weld.**

Assessment Strategies
6.1. Skill Demonstration

Criteria
*You will know you are successful when*
6.1. you reference the WPS guidelines.
6.2. you locate correct material thickness and shear to size.
6.3. you meet weld quality as per AWS D1.1 or D1.3.
6.4. you wear PPE and follow all safety guidelines.
6.5. you set up, shut down and maintain equipment and work area.
6.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
6.a. Locate correct material thickness and shear to size.
6.b. Make a continuous weld after starting and stopping.
6.c. Identify a good weld.
6.d. meets appropriate weld quality per AWS D1.1.
6.e. weld circular fillet weld for pipe to plate.
6.f. Choose appropriate pipe schedule, diameter and length.

7. **Weld outside corner.**

Assessment Strategies
7.1. Skill Demonstration

Criteria
*You will know you are successful when*
7.1. you reference the WPS guidelines.
7.2. you Locate correct material thickness and shear to size.
7.3. you meet weld quality as per AWS D1.1 or D1.3.
7.4. you wear PPE and follow all safety guidelines.
7.5. you set up, shut down and maintain equipment and work area.
7.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
7.a. Illustrate the parts of the weld, including the angles and how they are measured.
7.b. Explore techniques to achieve the desired weld.
7.c. Identify the application of the weld.
7.d. Examine the acceptance criteria for a completed weld.

8. **Weld a pipe to plate.**

Assessment Strategies
8.1. Skill Demonstration
8.2. Written Product

Criteria
You will know you are successful when
8.1. you reference the WPS guidelines.
8.2. you Locate correct material thickness and shear to size.
8.3. you meet weld quality as per AWS D1.1 or D1.3.
8.4. you wear PPE and follow all safety guidelines.
8.5. you set up, shut down and maintain equipment and work area.
8.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
8.a. Illustrate the parts of the weld, including the angles and how they are measured.
8.b. Explore techniques to achieve the desired weld.
8.c. Identify the application of the weld.
8.d. Examine the acceptance criteria for a completed weld.

9. **Weld a lap 2F-3F down.**

Assessment Strategies
9.1. Skill Demonstration
9.2. Written Product

Criteria
You will know you are successful when
9.1. you reference the WPS guidelines.
9.2. you Locate correct material thickness and shear to size.
9.3. you meet weld quality as per AWS D1.1 or D1.3.
9.4. you wear PPE and follow all safety guidelines.
9.5. you set up, shut down and maintain equipment and work area.
9.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
9.a. Illustrate the parts of the weld, including the angles and how they are measured.
9.b. Explore techniques to achieve the desired weld.
9.c. Identify the application of the weld.
9.d. Examine the acceptance criteria for a completed weld.

10. **Weld a lap joint (16 ga).**

Assessment Strategies
10.1. skill demonstration
10.2. Written Product

Criteria
You will know you are successful when
10.1. you reference the WPS guidelines.
10.2. you Locate correct material thickness and shear to size.
10.3. you meet weld quality as per AWS D1.1 or D1.3.
10.4. you wear PPE and follow all safety guidelines.
10.5. you set up, shut down and maintain equipment and work area.
10.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
10.a. Illustrate the parts of the weld, including the angles and how they are measured.
10.b. Explore techniques to achieve the desired weld.
10.c. Identify the application of the weld.
10.d. Examine the acceptance criteria for a completed weld.

11. **Weld corners with fillet weld.**

**Assessment Strategies**
11.1. Skill Demonstration

**Criteria**

You will know you are successful when
11.1. you reference the WPS guidelines.
11.2. you Locate correct material thickness and shear to size.
11.3. you meet weld quality as per AWS D1.1 or D1.3.
11.4. you wear PPE and follow all safety guidelines.
11.5. you set up, shut down and maintain equipment and work area.
11.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
11.a. Identify a good weld.
11.b. Shut down and clean-up.
11.c. Locate correct material thickness and shear to size if necessary.
11.d. Weld outside corner with 100% penetration.
11.e. Weld outside and inside corner.
11.f. meets appropriate weld quality per AWS D1.1.

12. **Weld a flat groove with backing**

**Assessment Strategies**
12.1. Skill Demonstration

**Criteria**

You will know you are successful when
12.1. you reference the WPS guidelines.
12.2. you Locate correct material thickness and shear to size.
12.3. you meet weld quality as per AWS D1.1 or D1.3.
12.4. you wear PPE and follow all safety guidelines.
12.5. you set up, shut down and maintain equipment and work area.
12.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
12.a. Set-up machine.
12.b. Locate material thickness shear to size and bevel material to 22.5 degrees.
12.c. Tack weld joint in proper position using a backing strip.
12.d. Perform a multiple pass weld fling groove joint full with slight crown in the flat position.
12.e. Use destructive testing technique by cutting out two coupons, grind and polish weld off.
12.f. Bend coupon 1 to expose face.
12.g. Bend coupon 2 to expose root.
12.h. Identify a good weld and understand how to "read" coupons for soundness.
12.i. Shut down all equipment.
12.j. Read and use lab sheets

13. **Weld a 2 G square butt/back gouge.**
Assessment Strategies
13.1. Skill Demonstration

Criteria

You will know you are successful when
13.1. you reference the WPS guidelines.
13.2. you Locate correct material thickness and shear to size.
13.3. you meet weld quality as per AWS D1.1 or D1.3.
13.4. Weld meets etching requirements IAW AWS D1.1
13.5. you wear PPE and follow all safety guidelines.
13.6. you set up, shut down and maintain equipment and work area.
13.7. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
13.a. Set-up equipment.
13.b. Proper use of tacking material using an open root technique.
13.c. Weld Side 1 in 2G position filling completely with slight crown.
13.e. Weld Side 2 in same manner.
13.f. Cut joint in half.
13.g. Grind, polish and macro-etch.
13.h. Understand how to check fusion and penetration.
13.i. Shut equipment down.

14. **Weld a v-groove open root in the horizontal position.**

Assessment Strategies
14.1. Skill Demonstration

Criteria

You will know you are successful when
14.1. you reference the WPS guidelines.
14.2. you Locate correct material thickness and shear to size.
14.3. you meet weld quality as per AWS D1.1 or D1.3.
14.4. Bend test meets requirements of AWS D1.1
14.5. Prepare and bend root and face welds IAW AWS D1.1
14.6. you wear PPE and follow all safety guidelines.
14.7. you set up, shut down and maintain equipment and work area.
14.8. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
14.a. Set-up machine.
14.b. Proper use of equipment to bevel material.
14.c. Tack weld joint in proper position.
14.d. Perform a multiple pass weld filling groove joint full, with slight crown in the horizontal position.
14.e. Use of destructive testing technique by cutting out two coupons, grind and polish weld off.
14.f. Bend coupon 1 to expose face.
14.g. Bend coupon 2 to expose root.
14.h. Identify a good weld and understand how to "read" coupons for soundness.
14.i. Shut down all equipment.

15. **Weld both sides of a 4' long lap joint with three stops/restarts and side two with zero stops/restarts.**

Assessment Strategies
15.1. Skill Demonstration

Criteria

You will know you are successful when
15.1. you reference the WPS guidelines.
15.2. you Locate correct material thickness and shear to size.
15.3. you meet weld quality as per AWS D1.1 or D1.3.
15.4. you wear PPE and follow all safety guidelines.
15.5. you set up, shut down and maintain equipment and work area.
15.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
15.a. Set-up machine.
15.b. Locate correct material and tacking correctly.
15.c. Weld side 1 filling joint completely in the 2F position with a slight crown without stopping or starting.
15.d. Weld side 2 in same manner with three starts and stops.
15.e. Identify a good weld.

16. **Weld final combination lap/T-joint.**

Assessment Strategies
16.1. Skill Demonstration

Criteria

You will know you are successful when
16.1. you reference the WPS guidelines.
16.2. you demonstrate how to set machine and get material ready with a 100% proficiency within 15 minutes.
16.3. you complete weld in 1 hour or less.
16.4. you construct weld joints completely filled.
16.5. you Locate correct material thickness and shear to size.
16.6. you meet weld quality as per AWS D1.1 or D1.3.
16.7. you wear PPE and follow all safety guidelines.
16.8. you set up, shut down and maintain equipment and work area.
16.9. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
16.a. Set-up machine without use of digital meters.
16.b. Locate correct material thickness and shear to size.
16.c. Wrap and weld all joints completely filling with slight crown.
16.d. Identify a good weld.
16.e. Read and use lab sheet

17. **Weld v-grooves.**

Assessment Strategies
17.1. Skill Demonstration

Criteria

You will know you are successful when
17.1. you reference the WPS guidelines.
17.2. you Locate correct material thickness and shear to size.
17.3. you meet weld quality as per AWS D1.1 or D1.3.
17.4. you wear PPE and follow all safety guidelines.
17.5. you set up, shut down and maintain equipment and work area.
17.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
17.a. Locate correct material thickness and shear to proper size.
17.b. Identify a good weld.
17.c. Read and use lab sheets
17.d. Meet appropriate weld quality criteria per AWS D1.1.
17.e. Weld a flat groove (1G) closed root.
17.f. Weld a horizontal (2G) open root.

18. **Weld square edge grooves.**

Assessment Strategies
18.1. Skill Demonstration
Criteria

You will know you are successful when
18.1. you reference the WPS guidelines.
18.2. you locate correct material thickness and shear to size.
18.3. you meet weld quality as per AWS D1.1 or D1.3.
18.4. you wear PPE and follow all safety guidelines.
18.5. you set up, shut down and maintain equipment and work area.
18.6. you adjust, re-do and complete welds after feedback if necessary.

Learning Objectives
18.a. Locate correct material thickness and shear correct size.
18.b. Align plates to 90 degrees with use of magnets.
18.c. Fill weld joint up with a slight crown.
18.d. Identify a good weld.
18.e. Read and use lab sheets
18.f. Meet appropriate weld quality as per AWS D1.1.