Western Technical College

31442301  Welding-Oxy Fuel Metals Joining

Course Outcome Summary

Course Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Introduction of gas welding and brazing techniques used to join metal pieces together.</th>
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<td>Career Cluster</td>
<td>Manufacturing</td>
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<tr>
<td>Instructional Level</td>
<td>Technical Diploma Courses</td>
</tr>
<tr>
<td>Total Credits</td>
<td>1</td>
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<td>Total Hours</td>
<td>36</td>
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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.

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

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

Program Outcomes

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

Course Competencies

1. **Light and adjust the oxy-acetylene torch to a neutral flame.**

   Assessment Strategies
   1.1. Skill Demonstration
Criteria

You will know you are successful when:
1.1. you adjust a neutral flame while welding or cutting.
1.2. you maintain a neutral flame while welding or cutting.
1.3. you wear PPE and follow all safety procedures.

Learning Objectives
1.a. Explore the parts of the oxy-acetylene torch.
1.b. Examine safety practices while lighting the oxy-acetylene torch.
1.c. Identify ways to adjust the oxy-acetylene torch.

2. Adjust the oxy-acetylene flame to a hotter or colder neutral flame.

Assessment Strategies
2.1. Skill Demonstration

Criteria

You will know you are successful when:
2.1. you adjust the torch to proper temperature neutral flame while welding different metal thicknesses.
2.2. you wear PPE and follow all safety procedures.

Learning Objectives
2.a. Determine correct temperature flame for welding various thicknesses of metal.
2.b. Examine how to adjust torch to a hotter and cooler neutral flame using incremental steps.

3. Weld beads using mild steel filler rod to produce welds with fusion and correct bead contour.

Assessment Strategies
3.1. Skill Demonstration

Criteria

You will know you are successful when:
3.1. you wear PPE and follow safety procedures.
3.2. you produce several weld beads of at least six inches long with equal size and smooth, uniform contour.
3.3. you perform fusion welds on light gauge steel while manipulating filler rod into the weld pool.
3.4. you adapt weld technique to achieve desired result.

Learning Objectives
3.a. Determine the correct temperature for welding various thicknesses of metal.
3.b. Examine technique for fusion welds on light gauge steel.
3.c. Discuss penetration and weld contour using sample welds.
3.d. Explain welding techniques to achieve desired result.

4. Weld a fillet weld on a tee joint with penetration, equal legs, and without overlap and undercut using mild steel filler rod.

Assessment Strategies
4.1. Skill Demonstration

Criteria

You will know you are successful when:
4.1. you weld tee joint from one side and crush the completed weldment on itself without cracking open.
4.2. you complete welds of equal size with smooth, uniform contour.
4.3. you wear PPE and follow all safety procedures.

Learning Objectives
4.a. Determine the correct temperature flame for welding various thicknesses of metal.
4.b. Discuss application of weld.
4.c. Explain welding techniques to achieve desired result.
4.d. Discuss penetration and weld contour using sample welds.

5. Weld a square butt joint, flat position on mild steel and obtain complete penetration.
Assessment Strategies
5.1. Skill Demonstration

Criteria

You will know you are successful when:

5.1. your welds are equal size with smooth, uniform contour.
5.2. you make one face and one root bending meeting AWS D1.1 (5.39) standards.
5.3. you wear PPE and follow all safety procedures.

Learning Objectives
5.a. Determine the correct temperature for welding various thicknesses of metal.
5.b. Discuss penetration and weld contour using sample welds.
5.c. Explain welding techniques to achieve desired result.
5.d. Examine how to test the face and root of the weld for proper fusion with a bend test.

6. Explore the process of brazing and braze welding.

Assessment Strategies
6.1. Written Objective Test

Criteria

You will know you are successful when:

6.1. you define brazing from braze welding.
6.2. you identify the equipment used in brazing and braze welding.
6.3. you list the steps in brazing and braze welding.
6.4. you list various techniques used to achieve the desired brazement on various metals.
6.5. you list the application of brazing and braze welding.
6.6. you list the advantages and disadvantages of brazing and braze welding.

Learning Objectives
6.a. Contrast brazing from braze welding.
6.b. Identify the equipment used in brazing and braze welding.
6.c. Outline the steps in brazing and braze welding.
6.d. Explore techniques used to achieve the desired brazement on various metals.
6.e. Identify the application of brazing and braze welding.
6.f. List the advantages and disadvantages of brazing and braze welding.

7. Braze weld a pad of brass on mild steel plate with uniform beads and consistent adhesion between the bead and the plate.

Assessment Strategies
7.1. Skill Demonstration

Criteria

You will know you are successful when:

7.1. you produce several bronze weld beads of at least 4" long with equal size and a smooth, uniform contour.
7.2. you wear PPE and follow safety procedures.

Learning Objectives
7.a. Examine how to prepare metal for braze welding (degrease, scratch the surface, flux).
7.b. Explore techniques to achieve the desired weld on various metals.
7.c. Identify the application of the weld.
7.d. Examine the acceptance criteria for a completed weld.

8. Weld a square butt joint using brass rod and obtain bonding between the brass and base metal.

Assessment Strategies
8.1. Skill Demonstration

Criteria
You will know you are successful when:

8.1. you produce several weld beads of at least 6" long with equal size, a smooth uniform contour and flow of brass to the backside of the joint.
8.2. you select the proper tip and flame temperature to adjust to different thicknesses of metal.
8.3. you wear PPE and follow safety procedures.

Learning Objectives
8.a. Explore techniques to achieve the desired weld on various metals.
8.b. Identify the application of the weld.
8.c. Examine the acceptance criteria for a completed weld.

9. **Braze weld a fillet weld on a tee joint and obtain equal legs on the fillet and proper bonding to the base metal.**

Assessment Strategies
9.1. Skill Demonstration

Criteria
You will know you are successful when:

9.1. you completely weld the tee joint from one side and crush the completed brazed tee on itself without it cracking open.
9.2. you complete welds of equal size and smooth, uniform contour.
9.3. you wear PPE and follow safety procedures.

Learning Objectives
9.a. Explore techniques to achieve the desired weld.
9.b. Identify the application of the weld.

10. **Braze weld a fillet weld on a lap joint and obtain bonding between the base metal and the brass.**

Assessment Strategies
10.1. Skill Demonstration

Criteria
You will know you are successful when:

10.1. you produce welds that are equal size with a smooth, uniform contour.
10.2. you wear PPE and follow all safety procedures.

Learning Objectives
10.a. Discuss application of weld.
10.b. Explain welding techniques to achieve desired result.

11. **Prepare the metal for silver brazing lap, socket and nut to plate joints.**

Assessment Strategies
11.1. Skill Demonstration

Criteria
You will know you are successful when:

11.1. you demonstrate proper joint fit up.
11.2. you demonstrate correct metal preparation.
11.3. you wear PPE and follow all safety procedures.

Learning Objectives
11.a. Demonstrate techniques to achieve desired result.
11.b. Discuss how to prepare metal for silver brazing.

12. **Choose the correct silver brazing rod and flux to produce joints on steel, copper and dissimilar metals.**

Assessment Strategies
12.1. Skill Demonstration
Criteria

You will know you are successful when:
12.1. you choose the proper fluxes and filler metal for brazing application.
12.2. you apply the proper fluxes and filler metal for brazing application.
12.3. you wear PPE and follow all safety procedures.

Learning Objectives
12.a. Identify silver brazing allow an flux that can be used by referencing a chart provided by the instructor.
12.b. Examine which flux can be used with various base metals.
12.c. Demonstrate techniques to achieve desired outcome.

13. Correctly heat and apply the silver brazing rod to produce uniform bonding of the filler rod and base metal.

Assessment Strategies
13.1. Skill Demonstration

Criteria

You will know you are successful when:
13.1. you produce a brazed joint that contains the correct amount of filler metal and heat input to facilitate bonding.
13.2. you wear PPE and follow all safety procedures.

Learning Objectives
13.a. Examine welding tips as they relate to the job with metal thicknesses and conductivity.
13.b. Discuss how to apply the flame uniformly to heat the metal to the brazing temperature without overheating the flux or the base metal.
13.c. Illustrate how to add the silver brazing rod uniformly around the joint snd sweat the silver through it.