Western Technical College

31442325  Welding - Tungsten Inert Gas 2 (TIG)

Course Outcome Summary

Course Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Instruction in tungsten inert gas welding of ferrous and non ferrous metals in the flat, vertical and overhead positions as well as on pipe. ASME and AWS requirements are used as guidelines.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Career Cluster</td>
<td>Manufacturing</td>
</tr>
<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>
</tr>
</tbody>
</table>

Textbooks


Learner Supplies

Welding sateen jacket, welding work gloves (long leather gauntlet, short leather work gloves, TIG welding 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.

Success Abilities

1. Apply mathematical concepts.
2. Demonstrate ability to think critically.
3. Use effective communication skills.
4. Use technology effectively.

Program Outcomes

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

Course Competencies

1. **Weld outside corner using stainless steel.**

   **Assessment Strategies**
   1.1. Skill Demonstration

   **Criteria**

   *Criteria - Performance will be satisfactory when:*
   1.1. learner demonstrates how to align and tack weld material needed with 100% proficiency within 15 minutes.
   1.2. learner demonstrates how to maintain proper torch angle.
   1.3. learner produces two welds with slight crown with a 90% proficiency.
   1.4. learner will be able to understand acceptable welding beads according to AWS standards.
   1.5. learner will understand set-up and shutdown of welding equipment.

   **Learning Objectives**
   1.a. Use of foot control.
   1.b. Watch color of weld to determine if amperage is correct.
   1.c. Weld without the use of filler.
   1.d. Fill crater.
   1.e. Identify a good weld.
   1.f. Read and use lab sheets
   1.g. Weld to size

2. **Weld lap joint using stainless steel.**

   **Assessment Strategies**
   2.1. Skill Demonstration

   **Criteria**

   *Criteria - Performance will be satisfactory when:*
   2.1. learner demonstrates proper alignment and tacking of material with 100% proficiency within 15 minutes.
   2.2. learner demonstrates proper torch angle with use of .045 or .062 filler.
   2.3. learner produces two complete welds with slight crown.
   2.4. learner will produce welds with 95% proficiency.
   2.5. learner will be able to understand acceptable welding beads according to AWS standards.
   2.6. learner will understand set-up and shutdown of welding equipment.
   2.7. Read and use lab sheets

   **Learning Objectives**
   2.a. Use of foot control.
   2.b. Watch color of weld to determine if amperage is correct.
   2.c. Weld with filler as necessary.
   2.d. Fill craters.
   2.e. Wrap corners.
   2.f. Identify a good weld.
   2.g. Weld to size

3. **Weld lap T-joint overhead position using CRS.**

   **Assessment Strategies**
   3.1. Skill Demonstration

   **Criteria**
Criteria - Performance will be satisfactory when:

3.1. learner will demonstrate proper alignment, tacking and positioning of mild steel in the overhead position with 100% proficiency.
3.2. learner will demonstrate proper torch angle with the use of filler.
3.3. learner will complete 1 combination joint with a 95% proficiency.
3.4. learner will be able to understand acceptable welding beads according to AWS standards.
3.5. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
3.a. Use of foot control.
3.b. Find a comfortable position to weld as smooth as possible.
3.c. Weld single passes wrapping corners.
3.d. Weld achieving a smooth flat bead with use of filler.
3.e. Identify a good weld.
3.f. Weld to size
3.g. Read and use lab sheets

4. Weld stainless steel tube autogenous.

Assessment Strategies
4.1. Skill Demonstration

Criteria - Performance will be satisfactory when:

4.1. learner demonstrates cutting, aligning and tacking tubing together with 100% proficiency with 20 minutes.
4.2. learner demonstrates torch angle and speed to maintain complete penetration.
4.3. learner welds 1 tube with complete penetration and achieves a flat smooth weld with 95% proficiency.
4.4. learner will be able to understand acceptable welding beads according to AWS standards and demonstrations.
4.5. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
4.a. Use of foot control.
4.b. Use of foot control.
4.c. Watch color to help determine if amperage is correct.
4.d. Use and set-up purge.
4.e. Maintain tungsten distance to control size of weld.
4.f. Identify a good weld.
4.g. Set root gap to correct dimensions
4.h. Read and use lab sheets

5. Weld aluminum pad .250” thick.

Assessment Strategies
5.1. Skill Demonstration

Criteria - Performance will be satisfactory when:

5.1. learner demonstrates use of alternating current.
5.2. learner demonstrates how to hold torch and feed filler wire in leading edge of puddle.
5.3. learner arranges weld beads by use of a padding technique.
5.4. learner produces 10 beads with 100% proficiency.
5.5. learner demonstrates proper use of amperage.
5.6. learner will be able to understand acceptable welding beads according to AWS standards.
5.7. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
5.a. Use of alternating current.
5.b. Use of foot control.
5.c. Importance of cleaning material.
5.d. Understanding thermal conductivity of aluminum.
5.e. Proper technique of balling tungsten.
5.f. Use of filler.
5.g. Filling all craters.
5.h. Weld to size
5.i. Read and use lab sheets

6. **Weld outside corner using aluminum.**

Assessment Strategies
6.1. Skill Demonstration

Criteria

*Criteria - Performance will be satisfactory when:*

6.1. learner demonstrates proper shearing, aligning, cleaning and tacking of material needed with 100% proficiency within 15 minutes.
6.2. learner will produce four (4) weld joints completely filled with 100% proficiency.
6.3. learner will produce two (2) welds with filler and two (2) welds without filler.
6.4. learner will be able to understand acceptable welding beads according to AWS standards.
6.5. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
6.a. Use of foot control.
6.c. Welding with and without filler.
6.d. Weld joints achieving a slight crown.
6.e. Construct a horizontal weld with no undercut on face.
6.f. Identify a good weld.
6.g. Weld to size

7. **Weld lap joint using aluminum.**

Assessment Strategies
7.1. Skill Demonstration

Criteria

*Criteria - Performance will be satisfactory when:*

7.1. learner demonstrates proper shearing, aligning, cleaning and tacking of material needed with 100% proficiency.
7.2. learner produces two welds with equal legs with 100% proficiency.
7.3. learner will demonstrate proper torch and filler welds.
7.4. learner will fill joint completely with slight crown.
7.5. learner will be able to understand acceptable welding beads according to AWS standards.
7.6. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
7.a. Use of foot control.
7.b. Understanding effects of thermal conductivity while welding.
7.c. Produce clean smooth welds with filler.
7.d. Get hot starts.
7.e. Fill all craters.
7.f. Identify a good weld.
7.g. Clean up area.
7.h. Weld to size
7.i. Read and use lab sheets

8. **Weld lap T-joint using aluminum.**

Assessment Strategies
8.1. Skill Demonstration

Criteria
Criteria - Performance will be satisfactory when:

8.1. learner demonstrates proper shearing, cleaning, aligning and tacking of proper material with 100% proficiency within 15 minutes.
8.2. learner welds one complete joint with 100% proficiency.
8.3. learner produces welds with equal legs and slight crown.
8.4. learner will wrap corners and fill craters.
8.5. learner will be able to understand acceptable welding beads according to AWS standards and demonstrations.
8.6. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
8.a. Use of foot control.
8.b. Understanding effects of thermal conductivity while welding.
8.c. Achieve good hot starts.
8.d. Produce smooth welds with filler.
8.e. Filler craters and produce equal legs.
8.f. Identify a good weld.
8.g. Weld to size
8.h. Read and use lab sheets


Assessment Strategies
9.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

9.1. learner demonstrates proper shearing, cleaning, aligning and tacking of proper material with 100% proficiency within 15 minutes.
9.2. learner demonstrates proper use of torch and filler angles.
9.3. learner demonstrates proper weld sequence.
9.4. learner demonstrates proper direction of travel in corners.
9.5. learner will produce one complete joint with 95% proficiency.
9.6. learner will have 2-3 hour labs.
9.7. learner will be able to understand acceptable welding beads according to AWS standards.
9.8. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
9.a. Use of foot control.
9.b. Understand effects of thermal conductivity while welding vertical up.
9.c. Weld all joints filling completely using filler.
9.e. Produce hot starts and fill craters.
9.f. Use of correct torch and filler angles.
9.g. Identify a good weld.
9.h. Weld to size
9.i. Read and use lab sheets


Assessment Strategies
10.1. Skill Demonstration

Criteria

Criteria - Performance will be satisfactory when:

10.1. learner demonstrates proper shearing, cleaning, aligning and tacking of proper material with 100% proficiency within 15 minutes.
10.2. learner demonstrates control of amperage and thermal conductivity to produce completely fill joints and no melt-thru.
10.3. learner produces one complete joint with clean smooth beads with 90% proficiency.
10.4. learner will be able to understand acceptable welding beads according to AWS standards.
10.5. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
10.a. Use of foot control.
10.b. Understand effects of thermal conductivity while welding.
10.c. Understand importance of speed of travel.
10.d. Produce clean smooth welds with equal legs.
10.e. Weld with filler as needed without melting into back of plates.
10.f. Fill craters and wrap corners.
10.g. Identify a good weld.
10.h. Weld to size
10.i. Read and use lab sheets

11. **Weld pad using argon, helium and aluminum.**

Assessment Strategies
11.1. in a safe environment.

Criteria

*Criteria - Performance will be satisfactory when:*

11.1. learner arranges weld beads by use of padding technique.
11.2. learner produces five (5) beads with argon.
11.3. learner produces five (5) beads with helium.
11.4. learner demonstrates use of gas lens.
11.5. learner will produce ten (10) beads in a pad with 90% proficiency.
11.6. learner will be able to understand acceptable welding beads according to AWS standards.
11.7. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
11.a. Use of foot control.
11.b. Use of travel speed.
11.c. Understand differences between argon and helium and how they affect the weld ability.
11.d. Use of increase in amperage and filler size.
11.e. Use of gas lens with 5/32" tungsten.
11.f. Fill craters.
11.g. Identify visual appearance of the welds.
11.h. Weld to size
11.i. Read and use lab sheets

12. **Weld pressure vessel.**

Assessment Strategies
12.1. Skill Demonstration

Criteria

*Criteria - Performance will be satisfactory when:*

12.1. learner demonstrate proper shearing, aligning and tacing mild steel and stainless steel to form a rectangular box without outside corners.
12.2. learner produces welds which are smooth and neat looking with filler.
12.3. learner produces welds with 100% proficiency.
12.4. learner will be able to understand acceptable welding beads according to AWS standards.
12.5. learner will understand set-up and shutdown of welding equipment.

Learning Objectives
12.a. Use previous knowledge.
12.b. Produce welds or vessel that are perfect and will not leak.
12.c. Construct a vessel that will hold minimum 90 lbs. of water pressure.
12.d. Understand the strengths of mild and stainless steels.
12.e. Use 309 filler for dissimilar materials.
12.f. Identify good, sound leak-proof welds.
12.g. Weld to size
12.h. Read and use lab sheets