



Western Technical College

31442315 Welding - Tungsten Inert Gas 1 (TIG)

Course Outcome Summary

Course Information

Description	The study of welding techniques on mild steel and applications of the gas-tungsten arc welding process which will also include set up, troubleshooting and tungsten selection on ferrous materials (steel).
Career Cluster	Manufacturing
Instructional Level	Technical Diploma Courses
Total Credits	2
Total Hours	72

Textbooks

No textbook required.

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 boots - \$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. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience
5. Live Responsibly: Embrace Sustainability
6. Live Responsibly: Foster Accountability
7. Refine Professionalism: Act Ethically
8. Refine Professionalism: Improve Critical Thinking
9. Refine Professionalism: Participate Collaboratively
10. Refine Professionalism: Practice Effective Communication

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. Prepare welding station for TIG welding on mild steel with DC Electrode Negative.

Assessment Strategies

- 1.1. Skill Demonstration

Criteria

You will know you are successful when

- 1.1. you select the program and/or settings that will allow you to TIG weld with Direct Current Electrode negative.
- 1.2. you connect ground and torch to the correct lugs.
- 1.3. you select, turn on, and set the correct flow rate of the shielding gas.
- 1.4. you connect foot pedal (if applicable).
- 1.5. you set Amperage, High Frequency, and Balance (if applicable).
- 1.6. you assemble torch with the correct consumables and electrodes.
- 1.7. you troubleshoot any equipment malfunction and take corrective action.

Learning Objectives

- 1.a. Identify correct connection of all applicable leads, hoses, and cables.
- 1.b. Explore the difference between Constant Current and Constant Voltage power supplies.
- 1.c. Explore the difference between DC Electrode Positive, DC Electrode Negative, and AC TIG welding.
- 1.d. Identify power supply settings that are pertinent to TIG welding and what effects adjusting them has on the process.
- 1.e. Identify what gases and their flow rates should be used for DCEN TIG welding ferrous metals.
- 1.f. Explore types of available electrodes, their characteristics, and their correct usage.
- 1.g. Identify available consumables for DCEN TIG torches, their characteristics, and correct usage.

2. Prepare weld joint.

Assessment Strategies

- 2.1. Demonstration

Criteria

You will know you are successful when

- 2.1. you identify the weld joint designated in the work instructions.
- 2.2. you locate specific materials used for weld coupons.
- 2.3. you shear and/or cut materials for weld joint (if applicable).
- 2.4. you align and tack weld the material together into the correct weld joint configuration.
- 2.5. you position the weld joint correctly according to the work instructions.

Learning Objectives

- 2.a. Identify different types of materials used for weld coupons
- 2.b. Identify the five different weld joints and six welding positions.
- 2.c. Identify the characteristics of fillet welds and groove welds
- 2.d. Determine how the applicable weld joints could be fit up to weld fillet welds
- 2.e. Determine how the applicable weld joints could be fit up to weld groove welds
- 2.f. Tack welding technique
- 2.g. Fit up tolerance specifications
- 2.h. Verify movement capability prior to starting a weld.

3. Produce fillet welds on mild steel using TIG process in all positions for applicable joints.

Assessment Strategies

- 3.1. Skill Demonstration

Criteria

You will know you are successful when

- 3.1. You produce fillet welds that meet the minimum weld standard on 2F T joints.
- 3.2. You produce fillet welds meet the minimum acceptance criteria on 2F Lap joints.
- 3.3. You produce fillet welds meet the minimum acceptance criteria on 1F Corner joints.

Learning Objectives

- 3.a. Explore hand motion and weld puddle manipulation technique for TIG welding.
- 3.b. Identify how work and travel angles influence the shape of the weld.
- 3.c. Describe how work and travel angles change depending on weld position and joint design.
- 3.d. Identify the effect of gas flow rate on the weld puddle.
- 3.e. Adjust gas flow rate for different positions and joint designs.
- 3.f. Practice a variety of fillet welds.

4. Produce groove welds on mild steel using TIG process in all positions for applicable joints.

Assessment Strategies

- 4.1. Skill Demonstration

Criteria

You will know you are successful when

- 4.1. You produce welds that meet the minimum acceptance criteria on 1G on joints.
- 4.2. You produce welds that meet the minimum acceptance criteria on 2G on joints.
- 4.3. You produce groove welds on a butt joint on pipe in the rotated 1G position using pulsed TIG.

Learning Objectives

- 4.a. Explore hand motion and weld puddle manipulation technique for TIG welding.
- 4.b. Describe how work and travel angles influence the shape of the weld.
- 4.c. Identify how work and travel angles change depending on weld position and joint design.
- 4.d. Set up pulsed TIG welding.
- 4.e. Practice a variety of groove welds.

5. Perform autogenous welds on mild steel.

Assessment Strategies

- 5.1. Demonstration

Criteria

You will know you are successful when

- 5.1. You produce welds that meet the minimum acceptance criteria without using filler wire in 1F position on joints.
- 5.2. You produce welds that meet the minimum acceptance criteria without using filler wire in 1G position on joints.
- 5.3. You produce welds that meet the minimum acceptance criteria without using filler wire in 2F position on joints.
- 5.4. You produce welds that meet the minimum acceptance criteria without using filler wire in 1G position on joints.

Learning Objectives

- 5.a. Define the differences between an autogenous weld and non-autogenous.
- 5.b. Explore the different joint configurations which will produce a satisfactory autogenous weld
- 5.c. Identify characteristics of a satisfactory autogenous weld
- 5.d. Determine when it is appropriate to perform an autogenous weld

6. Perform weld inspection.

Assessment Strategies

- 6.1. Demonstration

Criteria

You will know you are successful when

- 6.1. You identify visual weld defects.
- 6.2. You identify visually satisfactory welds.
- 6.3. You check fillet weld size using the correct fillet gauge.
- 6.4. You check groove weld reinforcement using a bridge cam gauge.
- 6.5. You perform the applicable destructive testing method.

Learning Objectives

- 6.a. Find and interpret visual acceptance criteria in the code book
- 6.b. Read a bridge cam gauge
- 6.c. Read a fillet gauge
- 6.d. Find and interpret destructive testing acceptance criteria in the code book
- 6.e. Identify common weld defects
- 6.f. Explain causes of common weld defects and how to correct them
- 6.g. Repair visual weld defects