Western Technical College

31442313  Welding - Shielded Metal Arc 2 (SMAW)

Course Outcome Summary

Course Information

- **Description**: The study of welding techniques and applications for the vertical and overhead positions, to include welding metallurgy, metal properties, identification, effects of heat, pre and post weld heat treatments.

- **Career Cluster**: Manufacturing

- **Instructional Level**: Technical Diploma Courses

- **Total Credits**: 2

- **Total Hours**: 72

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 shielded metal arc welds (SMAW)
4. Perform thermal cutting

Course Competencies

1. Explore types of joints and positions.
Assessment Strategies
1.1. Written Objective Test

Criteria

You will know you are successful when:
1.1. you identify the 5 types of joints.
1.2. you identify various configurations with given examples.
1.3. you utilize the AWS system to determine joint positions.
1.4. you define the symbols and letters used in the AWS system.
1.5. you correlate joint design to welds used.

Learning Objectives
1.a. Explore the five basic types of joints.
1.b. Identify various joint configurations.
1.c. Explore the AWS system, including symbols and letters used.
1.d. Explore relationship between joint design and weld application.

2. Investigate metallurgy.

Assessment Strategies
2.1. Written Objective Test
2.2. Blacksmithing Project

Criteria

You will know you are successful when:
2.1. you identify various metals.
2.2. you describe characteristics of various metals at different temperatures.
2.3. you utilize the iron, carbon diagram as metal changes temperature.
2.4. you describe the effects of carbon content on materials.
2.5. you describe the effect of alloys in steels.
2.6. you produce a functional tool for use.
2.7. you produce the tool by following a heat treatment process.
2.8. you wear PPE and follow all safety procedures.

Learning Objectives
2.a. Explore how metals are made.
2.b. Examine the use and application of metals in industry.
2.c. Identify the physical and chemical properties of metal.
2.d. Examine identification of metals using numbering systems and testing methods.
2.e. Discuss heat treatment of metals.

3. Weld 3F Lap Joint, Downhill progression, 7ga material, E6010 1/8"

Assessment Strategies
3.1. Skill Demonstration

Criteria

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

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

4. Weld 3F Lap Joint, Uphill progression, 7ga material, E6010.
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 wear PPE and follow all safety guidelines.
4.5. you set up, shut down, and maintain equipment and work area.
4.6. you adjust, re-do, and complete welds after feedback, if necessary.

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

5. **Weld T Joint 3F uphill progression, multipass 3/8" fillet. E6010**

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 wear PPE and follow all safety guidelines.
5.5. you set up, shut down, and maintain equipment and work area.
5.6. you adjust, re-do, and complete welds after feedback, if necessary.

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

6. **Weld T Joint 3F uphill progression, 3 pass, 3/8" fillet. E7018**

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

7. **Weld T Joint 3F Weave, 3 pass, uphill travel, 1/2" fillet, E7018**

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 3G Single V Groove, open root, E6010, fill cover E7018**

Assessment Strategies

8.1. Skill Demonstration

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 3G Single V Groove closed root with backing, 1" plate, E7018**

Assessment Strategies

9.1. Skill Demonstration

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 4G Lap Joint, 3/16" material, E6010**

Assessment Strategies

10.1. Skill Demonstration

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 4G Open Root Single V Groove, 1" plate, E6010 root, E7018 fill and cover**

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

12. **Weld 4G Closed Root Single V Groove, 1" plate, E7018**

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