

Principles of Welding: Introduction

Course Syllabus

Description: This course will include the classroom components of welding shop safety, shielded metal arc welding, oxy-acetylene welding, welding blueprints & symbols and other topics. The course will also include recommendations for “on-site” demonstrations that districts may want to facilitate and sponsor with local resources.

Unit 1: Welding Shop Safety

Goal: To recognize the importance of shop safety and apply it to school and workplace settings.

Description: When preparing to work in any welding shop, it is important for both students and instructors to be familiar with hazards and safety precautions in the shop. This production will address all aspects of shop safety, from the causes of the most common accidents in the shop to material handling safety to personal protective equipment. Follow along with Pete Stracener, Chairperson, Industrial Technology Department, Program Coordinator and Professor of Welding: Technology at South Plains College, as he discusses shop safety.

Objectives:

1. To identify safety precautions in the welding shop.
2. To explain the proper methods of material handling and disposal.
3. To describe personal protective equipment used in the welding shop.
4. To summarize the federal agencies and regulations which monitor shop and job site safety.

Unit 2: Mathematics in Welding

Goal: To explain systems and units of measurement and demonstrate proper measurement techniques.

Description: Measurement plays a crucial role in the architecture, construction and interior design industries. This presentation examines this role and describes the need for precise and accurate measurement. The U.S. customary system and the modern metric system are explained, and units of distance, weight and volume for each system are reviewed. Measurement techniques are also discussed and tips for proper measurement are provided. In addition, the process of drawing to scale is examined.

Objectives:

1. To identify the role of measurement in the construction industry.
2. To explain the U.S. customary system of measurement and recognize its units.
3. To explain the modern metric system of measurement and recognize its units.
4. To demonstrate proper measurement techniques.
5. To examine the process of drawing to scale.

Unit 3: Shielded Metal Arc Welding: Preparation & Safety

Goal: To describe the importance, types and processes of preparation and safety associated with shielded metal arc welding.

Description: This presentation features Pete Stacener, Chairperson, Industrial Technology Department, Program Coordinator and Professor of Welding Technology at South Plains College. Follow along as he explains the preparation and safety as it applies to shielded metal arc welding. After an introduction, Pete covers safety and equipment before moving into electrode selection and classification. Also covered is base metal preparation, types of joints and welds as well as the essentials of a good weld. We finish up with how to strike and arc and a section covering a pad of beads.

Objectives:

1. To define shielded metal arc welding.
2. To identify different types of preparation and safety involved in shielded metal arc welding.
3. To explain different equipment involved.
4. To identify electrode selection and classification.
5. To examine base metals preparation.
6. To describe different types of joints and welds.
7. To learn examples of a good weld.
8. To learn how to strike an arc.
9. To explain how to create a pad of beads.

Optional on-site activities to be facilitated by local district

- Arrange for students to visit a local welding shop to observe safety procedures
- Arrange for students to visit school facilities supporting welding activities
- Arrange to have a local welder to speak with students.
- Develop partnership with local town, county, or state maintenance shop.
- Development relationship with local arts community that utilizes welding

Unit 4: Shielded Metal Arc Welding: 6010 Electrodes

Goal: To be able to recognize the properties of the 6010 electrode and execute welding procedures using it.

Description:

This presentation features Pete Stacener, Chairperson, Industrial Technology Department, Program Coordinator and Professor of Welding Technology at South Plains College. Follow along as he explains and demonstrates the correct procedure for using the 6010 electrode in a number of different welding procedures. During this insightful presentation Mr. Stacener provides insight into different welding positions, as well as explaining the commonly seen mistakes which accompany the various positions and types of welds he performs.

Objectives:

1. To understand the safety procedures required to operate the welding machine and use the 6010 electrode.
2. To recognize the properties of the 6010 electrode and distinguish them from those of other electrodes.
3. To understand the procedure for different welding positions
4. To execute welds in the 1F, 1G, 2F, 2G, 3F, 3G, 4F and 4G positions.

Optional on-site activities to be facilitated by local district**Unit 5: Shielded Metal Arc Welding: 7018 Electrodes**

Goal: To be able to recognize the properties of the 7018 electrode and execute welding procedures using it.

Description:

This presentation features Pete Stacener, Chairperson, Industrial Technology Department, Program Coordinator and Professor of Welding Technology at South Plains College. Follow along as he explains and demonstrates the correct procedure for using the 7018 electrode in a number of different welding procedures. During this insightful presentation Mr. Stacener provides insight into different welding

positions, as well as explains the commonly seen mistakes that accompany the various positions and types of welds he performs.

Objectives:

1. To understand the safety procedures required to operate the welding machine and use the 7018 electrode.
2. To recognize the properties of the 7018 electrode and distinguish them from those of other electrodes.
3. To understand the procedure for different welding positions
4. To execute welds in the 1F, 1G, 2F, 3F, 3G, 4F and 4G positions.

Optional on-site activities to be facilitated by local district

Unit 6: Career Connections

Goal: To review multiple welding related careers

Description: During this unit students will review nine Career Connection videos. After viewing all career connections videos students will complete a short report addressing the following:

1. Give a brief description of the career described in the interview
2. Describe some of the most rewarding aspects this career offered the interviewee. Explain other rewarding aspects of this career.
3. Describe some of the most challenging aspects this career offered the interviewee. Describe any additional challenges this career might offer.
4. Based on your personal view, what are some of the other rewarding aspects and challenges that could be offered by the career described in the video?
5. Describe some of the skills/traits an employee would need to possess to be successful in this career.
6. What advice did the interviewee offer for students interested in his/her career?

Unit 7: Oxy-Acetylene Welding: Safety & Introduction, Set-Up & Safety

Goal: To learn basic instruction in the proper installation and setup of an oxy-acetylene welder and be able to safety set-up, change tips, use and clean an oxy-fuel welding machine..

Description: Welding students receive a thorough introduction to oxy-acetylene equipment necessary for successful welding and cutting. Live-action footage includes setup and safety; proper care of equipment; name, purpose and installation of each piece of equipment; and demonstration of the correct, safe way to set up a station for operation, including setting up working pressures. This presentation also features Mary Jo Emerick, Adjunct Welding Professor and AWS CWI/CWE at Austin Community College and the Tech V Welder/Inspector and AWS CWI/CWE at the University of Texas. Follow along as she explains and demonstrates the correct procedure for safely preparing and using oxy-fuel welding machinery. During this presentation, insight into different welding tips, fuel types and flame types are shown.

Objectives:

1. To identify the chemicals used in oxy-acetylene welding.
2. To identify the necessary equipment.
3. To follow the required procedures.
4. To understand the safety procedures required to operate the oxy-fuel welding machine.
5. To understand the specific fuel types associated with oxy-fuel welding.
6. To understand how to use and change the different tips used in oxy-fuel welding.

Optional on-site activities to be facilitated by local district

Unit 8: Oxy-Acetylene Welding: Oxy-Fuel Cutting

Goal: To recognize the properties of oxy-fuel cutting, setup of equipment and executing correct welding procedures while maintaining proper safety practices.

Description: This presentation features Mary Jo Emerick, Adjunct Welding Professor and AWS CWI/ CWE at Austin Community College and the Tech V Welder/ Inspector and AWS CWI/CWE at the University of Texas. Follow along as she explains and demonstrates the correct procedure for safely preparing and using oxy-fuel cutting machinery. During this presentation, insight into different welding tips, fuel types, flame types and different welding positions are shown. She also explains the commonly seen mistakes which accompany oxy-fuel cutting and various positions and types of welds used in the industry.

Objectives:

1. To understand the safety procedures required to operate the oxy-fuel cutting machine.
2. To understand the uses and applications of oxy-fuel cutting.
3. To understand the procedure for different welding positions.
4. To execute oxy-fuel cutting for free hand lettering, removing tacks, weld gouging and cutting out a slot.

Optional on-site activities to be facilitated by local district

Unit 9: Measurement in Construction

Goal: To explain systems and units of measurement and demonstrate proper measurement techniques.

Description: Measurement plays a crucial role in the architecture, construction and interior design industries. This presentation examines this role and describes the need for precise and accurate measurement. The U.S. customary system and the modern metric system are explained, and units of distance, weight and volume for each system are reviewed. Measurement techniques are also discussed and tips for proper measurement are provided. In addition, the process of drawing to scale is examined.

Objectives:

1. To identify the role of measurement in the construction industry.
2. To explain the U.S. customary system of measurement and recognize its units.
3. To explain the modern metric system of measurement and recognize its units.
4. To demonstrate proper measurement techniques.
5. To examine the process of drawing to scale.