

WELD 0005B - INTERMEDIATE SHIELDED METAL ARC WELDING (SMAW) - CAREER PATH

Catalog Description

Formerly known as WELD 25

Prerequisite: Completion with grade of "C" or better or concurrent enrollment in WELD 5A

Hours: 72 (18 lecture, 54 laboratory)

Description: Students expand on knowledge and skills gained to perform structural plate welding using Shielded Metal Arc Welding (SMAW or Stick). Oxyacetylene Cutting (OAC) and Air Carbon Arc Cutting (CAC-A) are also performed. Intended as an intermediate level welding course for students following a career path in structural or pipe welding fields. Students are advised that WELD 5A and WELD 5B can be taken at the same time. (not transferable)

Course Student Learning Outcomes

- CSLO #1: Apply knowledge of safety standards for both a learning environment and work site environment with focus on SMAW, plus CAC-C and track OFC cutting processes on plate.
- CSLO #2: Define terms related to this course: open groove, low hydrogen exposure limit, air carbon arc gouging, inclination of axis.
- CSLO #3: Demonstrate manipulative skills to prepare materials and deposit SMAW in 2G, 3G, 4G positions with both stringer and weaved techniques on carbon steel plate.

Effective Term

Fall 2019

Course Type

Credit - Degree-applicable

Contact Hours

72

Outside of Class Hours

36

Total Student Learning Hours

108

Course Objectives

Lecture Objectives:

1. Review, explain, discuss proper personal protective equipment used for safety when working in the welding lab.
2. Discuss and analyze correct safety practices when using the various types of welding or cutting equipment and general shop equipment such as grinders.

3. Recognize the SMAW welding techniques covered in this course to perform out of position welding, and expand the understanding of choosing the most effective technique.
4. Compare the changes needed when performing weave beading techniques compared to stringer beading techniques in out of position welding.
5. Describe and apply the concepts used in open root welding.
6. Explain Air Carbon Arc Gouging (CAC-C).
7. Explain the correct operation of an oxyacetylene track torch.
7. Review destructive tensile testing of welds.
8. Define weld discontinuities.
9. Translate welding symbols.
10. Relate welding symbols applications in structural plate.

Laboratory Objectives:

1. Use safe shop practices.
 - a. Employ the correct use of Personnel Protective Equipment in welding applications.
 - b. Correctly and safely operate the welding equipment.
2. Apply Shielded Metal Arc Welding techniques to successfully complete the following lab assignments;
 - a. 2G Bevel groove joint using E-7018 using stringer beading technique with 1/8" dia. electrode.
 - b. 3G at 90 deg. inclination of axis. Single-Vee Butt joint using E-7018 using stringer beading technique with 3/32 dia. electrode.
 - c. 3G at 90 deg. inclination of axis. Single-Vee Butt joint using E-7018 using stringer and weave beading technique with 1/8" dia. electrode.
 - d. 4G at 0 deg. inclination of axis. Single-Vee Butt joint using E-7018 using stringer beading technique with 3/32 dia. electrode.
 - e. 4G at 0 deg. inclination of axis. Single-Vee Butt joint using E-7018 using stringer and weave beading technique with 1/8" dia. electrode.
 - f. 3G at 90 deg. inclination of axis. Open root square butt joint on 1/8" material using E-6010 3/32" dia. electrode vertical down progression
 - g. 3G at 90 deg. inclination of axis. Open root square butt joint on 1/8" material using E-6010 3/32" dia. electrode vertical up progression
 - h. 4G at 0 deg. inclination of axis. Open root square butt joint on 1/8" material using E-6010 3/32" dia. electrode
 - i. 3G at 30 deg. inclination of axis. Open-root square butt joint on 1/8" material using E-6010 3/32" dia. electrode vertical down progression
 - j. 4G at 45 deg. inclination of axis. Open-root square butt joint on 1/8" material using E-6010 3/32" dia. electrode vertical up progression
3. Operate Air Carbon Arc gouging equipment.
4. Demonstrate correct operation of an oxyacetylene track torch.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

Methods of Evaluation

- Classroom Discussions
 - Example: Instructor facilitates group discussion on the SMAW open groove techniques for critical out of position welding, with lab application evaluation. Students are evaluated based on participation.
- Objective Examinations

- Example: Examination of the definitions of weld discontinuities and interpretation of welding symbols. Students will be evaluated based upon the accuracy of their answers.
- Skill Demonstrations
 - Example: Lab assignments in each welding position and joint configuration covered in this course. Students' work is evaluated and graded based on industry and AWS weld quality standards.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. With instructor demonstration and oversight, students will apply techniques of position welding to complete lab assignments.
2. Following class lecture, video presentation, and lab demonstration, instructor will supervise student practice in honing manipulative skills in each welding process application.

Lecture:

1. Instructor will lead a lecture and group discussion on the SMAW open groove techniques for critical welding.
2. Instructor will use slide show presentation, instructor created video, or lecture presentation on a learning platform to teach about best safety practices in the for personal protective equipment, the weld lab environment, and/or tools & equipment. Students will be given a scenario and expected to list the best safety practices that should be employed and explain why they should be used. Students will submit the assignment via text entry, file upload, video or audio recording.

Distance Learning

1. Instructor will use slide show presentation, instructor created video, or lecture presentation on a learning platform to teach about best safety practices in the for personal protective equipment, the weld lab environment, and/or tools & equipment. Students will be given a scenario and expected to list the best safety practices that should be employed and explain why they should be used. Students will submit the assignment via text entry, file upload, video or audio recording.

Typical Out of Class Assignments

Reading Assignments

1. Read the chapter in the textbook on using whip and pause technique to weld an open root groove along with provided handout on this lab assignment and be prepared to discuss in class.
2. Read the chapter in the textbook on techniques of Shielded Metal Arc Welding with open groove joint to achieve complete weld penetration in order to complete the welding assignment after a classroom discussion.
3. Research electrode manufactures web sites to determine tensile strength, and use to determine proper filler metal - base metal matching.

Writing, Problem Solving or Performance

1. Complete the review questions from chapter reading assignment on out of position SMAW.
2. Demonstrate performing various welds on lab assignments during each class meeting from.

Other (Term projects, research papers, portfolios, etc.)

Required Materials

- Modern Welding
 - Author: Althouse, Turnquist, Bowditch, Bowditch, & Bowditch
 - Publisher: Goodheart-Wilcox
 - Publication Date: 2020
 - Text Edition: 12th
 - Classic Textbook?:
 - OER Link:
 - OER:
- Welding Skills
 - Author: B. J. Moniz & R. T. Miller
 - Publisher: American Technical
 - Publication Date: 2010
 - Text Edition: 4th
 - Classic Textbook?:
 - OER Link:
 - OER:
- Welding: Principles and Applications
 - Author: Larry F. Jeffus
 - Publisher: Delmar / Cengage Learning
 - Publication Date: 2011
 - Text Edition: 7th
 - Classic Textbook?:
 - OER Link:
 - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.