

Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume II*

Unit: II. Oxy-Gas and Other Cutting/Welding Processes

Unit Objective:

Students will apply principles of oxy-gas cutting and welding and other processes, such as air carbon-arc cutting and plasma-arc cutting, by using the equipment to perform welds and cuts, identifying welding and cutting equipment, and answering questions about related equipment and procedures.

Show-Me Standards: 1.10, CA3

References:

Agricultural Construction Volume II. University of Missouri-Columbia, Instructional Materials Laboratory, 1989.

Agricultural Construction Volume III. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

American Welding Society. Accessed November 18, 2003, from <http://www.aws.org/>.

Hobart Institute of Welding Technology. Accessed November 17, 2003, from <http://www.welding.org/>.

Hypertherm, Inc. Accessed December 16, 2003, from <http://www.hypertherm.com/>.

Machinery Safety: Welding. National Ag Safety Database. Accessed November 17, 2003, from http://www.cdc.gov/nasd/menu/topic/machinery_welding.html.

Missouri CDE Handbook. Accessed November 14, 2003, from http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.

Missouri FFA Agricultural Mechanics Career Development Event. Accessed November 19, 2003, from <http://web.missouri.edu/~pavt0689/statecon.html>.

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Victor. Thermadyne. Accessed December 16, 2003, from <http://www.thermadyne.com/vec/index.asp?div=vec>.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 10.
- Students will complete JS 2.1, Lighting, Adjusting, and Shutting Down the Torch; JS 4.1, Oxy-Acetylene Welds in the Flat Position; JS 4.2, Oxy-Acetylene Welding in the Horizontal Position; JS 4.3, Oxy-Acetylene Welding in the Vertical Position; JS 4.4, Oxy-Acetylene Welding in the Overhead Position; JS 5.1, Hardsurfacing With Oxy-Acetylene; JS 6.1, Welding Cast Iron; JS 7.1, Braze Welding; JS 8.1, Making Beveled Cuts; JS 8.2, Cutting Holes With Oxy-Gas; JS 9.1, Arc-Air Cutting; and JS 9.2, Plasma-Arc Cutting.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. II-6 (1, 2, 3), p. II-12, p. II-26 (1, 2, 3), p. II-37 (1, 2), p. II-112 (2), and p. II-131 (2).

Performance-Based Assessment:

Students will use the oxyacetylene, air carbon-arc, or plasma-arc outfit to perform a series of welds and cuts determined by the instructor. They will also identify parts of the welding and cutting equipment and answer questions about related equipment and procedures. This activity is modeled on the oxyacetylene portion of the Agricultural Mechanics Career Development Event.

Assessment will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.

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The instructor should explain the performance-based assessment activity format at the beginning of the unit. Students will work toward completing the competencies necessary to perform the activity as they progress through the unit material. The assessment activity will be due at the completion of the unit.

1. Explain the performance-based assessment activity format at the beginning of the unit: At the completion of the unit, students will perform a series of welds and cuts, identify welding and cutting equipment, and answer questions about welding and cutting equipment and procedures. Welds and cuts will be determined by the instructor and announced at the time of the performance-based assessment activity.
2. Use or adapt the job sheets found in the unit to assess student competency at welding and cutting with the oxyacetylene outfit and cutting with air carbon-arc and plasma-arc equipment. Review or supplement these activities as needed, based on student mastery of the procedures and equipment the students will be using. **NOTE: Students should only complete this performance-based activity if they have mastered all the relevant competencies and have the instructor's permission to perform the activity.**
3. Assign the performance-based assessment activity. The student handout can be used as an outline for the activity or adapted as desired.
 - a. Because this unit focuses on oxyacetylene procedures, the activity, as it is written, also focuses on oxyacetylene procedures and equipment. Add or substitute air carbon-arc or plasma-arc equipment and procedures as needed. For additional air carbon-arc and plasma-arc cutting information and activities, see also *Agricultural Construction Volume III, Unit I—Oxy-Gas and Other Cutting/Welding Processes: Arc Cutting and Plasma-Arc Cutting*.
 - b. Information and directions for the student handout as it is currently written are listed at the end of this instructor guide.
 - c. Section II requires some advance setup by the instructor.

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4. This activity will help prepare students for the oxyacetylene portion of the Agricultural Mechanics Career Development Event.
 - a. Refer to the *Missouri CDE Handbook* for guidelines regarding Career Development Events. The *Missouri CDE Handbook* is available from the Missouri Department of Elementary and Secondary Education at http://www.dese.mo.gov/divcareered/ag_cde_guidelines.htm.
 - b. Previous years' agricultural mechanics events can be found at <http://web.missouri.edu/~pavt0689/statecon.html>, accessed July 7, 2003.
5. Have students turn in their welds and cuts and completed handouts.
6. The final assessment score will be based on the ability to safely and correctly perform the assigned procedures and on the accuracy of responses to the identification and written assessment portions of the activity.
7. **ADDITIONAL ACTIVITY:** Create a display board using the students' work. Possible display board themes include the following: each student's best work using the oxyacetylene outfit, the best example of each type of procedure performed by the class, and the best work of the week.

Section I: Welding and Cutting

1. Have students perform a series of welds and cuts that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the oxyacetylene, air carbon-arc, or plasma-arc outfit or items of related equipment that have been discussed in class.
2. Label the parts or items with tags A through J.
3. Have students identify the parts on their handouts.

Section III: Written Assessment

1. Have students answer questions about oxyacetylene, air carbon-arc, or plasma-arc procedures, equipment, or safety. Multiple-choice and short-answer questions are suggested.
2. The answers to the questions on the student handout are listed below.

Answers to Written Assessment:

1. c
2. b

3. a
4. Students should list four of the following:
 - a. Use tongs or pliers to handle hot metal.
 - b. Never point the torch toward another person when lighting it.
 - c. Never hand another person a hot piece of metal or a hot torch.
 - d. The word "HOT" should be written on metal that cannot be moved to a storage area to warn other students not to touch it.
 - e. Keep hands away from the flame.
5. Students should list the following:
 - a. By the tip size stamped on the torch end of each tip
 - b. By the drill size listed in the manufacturer's information
 - c. By the diameter of the hole in the end of the tip

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Student Handout

Section I: Welding and Cutting

Directions:

1. The instructor will give you a series of welding and cutting procedures to perform.
2. Perform the assigned welds and cuts.
 - Wear appropriate safety equipment at all times.
 - Follow all assigned safety procedures. You can lose points for not following safety precautions and other assigned procedures.
 - Inspect the equipment, materials, and work area to ensure safe and correct operation.
 - Perform the welds and cuts using the assigned procedure.
 - Inspect your work.
 - Follow shutdown and cleanup procedures and return all equipment and materials to their assigned places.
 - Turn in your work to the instructor.
3. Complete sections II and III of the activity and turn your completed handout in to the instructor.
4. Your final assessment score will be based on your ability to safely and correctly perform the assigned procedures and on the accuracy of your responses to the identification and written assessment portions of the activity.

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Section II: Identification

Directions:

Go to the identification station. Write the names of the tagged parts or items in the spaces below. Be sure to write each name next to its correct tag letter.

- | | |
|----|----|
| A. | F. |
| B. | G. |
| C. | H. |
| D. | I. |
| E. | J. |

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. Open the acetylene tank valve _____ so it can be shut off quickly.
 - a. 1 full turn
 - b. 3/4 turn
 - c. 1/2 turn
 - d. all the way
2. Which of the following should be used to properly light the torch?
 - a. Match
 - b. Spark lighter
 - c. Cigarette lighter
 - d. Another lit torch
3. To weld a butt joint in the horizontal position with an oxyacetylene outfit, which choice is the correct work angle and travel angle?
 - a. 5- to 10-degree work angle and a 5- to 10-degree travel angle
 - b. 15-degree work angle and a 20-degree travel angle
 - c. 5-degree work angle and a 15-degree travel angle
 - d. 10-degree work angle and a 20-degree travel angle

Complete the following short-answer questions.

4. List four ways to avoid burns when using oxyacetylene equipment. (Each answer is worth 1 point for a maximum value of 4 points.)
 - a.
 - b.
 - c.
 - d.

5. List three methods to identify torch tips. (Each answer is worth 1 point for a maximum value of 3 points.)
 - a.
 - b.
 - c.

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Scoring Guide

Name _____

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Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total	
Torch Adjustment	Torch was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 3		
Cuts	Cuts are correctly made and uniform	Failed	Poor	Fair	Good	Excellent	X 7		
Welds	Welds are uniform, free of distortion, and strong and sound	Failed	Poor	Fair	Good	Excellent	X 10		
Safety and Work Habits	Student followed all safety precautions	Passed				Failed	X (-20)	Negative Points *	
	Student followed all assigned procedures	Excellent	Good	Fair	Poor	Failed	X (-8)	Negative Points *	
TOTAL									/80 pts.

Assessment Area		Total
Section II: Identification		
Section III: Written Assessment		
TOTAL		/20 pts.

Final Assessment Total _____/100 pts.
 *Overall combined score cannot be lower than 0.

Comments: