Agricultural Construction

Curriculum Guide: *Agricultural Construction Volume III*

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

Unit Objective:

Students will apply principles of air carbon-arc cutting and plasma-arc cutting by using the equipment to make cuts, identifying 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.

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 lesson 1.
- Students will complete JS 1.1, Air Carbon-Arc Cutting; and JS 1.2, Plasma-Arc Cutting.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following location: p. 8 (2).

Performance-Based Assessment:

Students will use the air carbon-arc or plasma-arc outfit to make a series of cuts determined by the instructor. They will also identify parts of the 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.

Agricultural Construction Volume III
Unit I—Oxy-Gas and Other Cutting/Welding Processes
Instructor Guide

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 cuts, identify cutting equipment, and answer questions about cutting equipment and procedures. 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 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. For additional air carbon-arc and plasma-arc cutting information and activities, see also *Agricultural Construction Volume II*, Unit II—Oxy-Gas and Other Cutting/Welding Processes.
   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.

4. This activity is modeled on 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 finished cutting assignments 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 air carbon-arc or plasma-arc cutting outfit, the best example of each type of procedure performed by the class, and the best work of the week.

Section I: Cutting

1. Have students perform cutting procedures that they have mastered as part of the instructional activities for this unit.

Section II: Identification

1. Select ten parts of the 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 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. a

2. c

3. Students should list the following:
   a. Any nonferrous metal
   b. Stainless steel
   c. Carbon steel

4. Students should list five of the following:
   a. Observe all safety procedures. Always point the torch away from the body and toward the workpiece.
   b. Wear safety glasses with a side shield and use a face shield or helmet.
   c. Wear the proper lens shade based on the machine's amperage capabilities.
   d. Wear leather gloves and shoes to protect extremities from burns or other injuries.
   e. Wear clothing made of tightly woven material and keep clothing dry.
   f. Button shirt collars, cuffs, and front pockets. Do not wear cuffed pants.
   g. Protect against excessive noise: add room acoustics, reduce intensity of noise, and wear ear muffs or ear plugs.
   h. Avoid flammable gases, vapors, dusts, and liquids. Keep flammable materials 35 ft from the cutting area or in flame-proof containers.
   i. Keep the work area dry.
   j. Avoid inhaling fumes. Keep the work area well ventilated. Wear an air-supplied respirator if necessary.
   k. Remove coatings that can emit toxic fumes.
   l. Replace worn cables and broken connections to avoid electrical shock.
   m. Ensure equipment is properly grounded.
   n. Chain nitrogen cylinders to an upright, stable support; put a protector cap on a cylinder before moving it; and remove faulty regulators and send them to the manufacturer for repair.
   o. Use recommended wires or ferrules to connect hoses to fittings.
   p. Keep hoses off the ground to prevent damage; examine hoses for leaks; do not let hoses become tangled; and replace worn or damaged hoses.
   q. Replace worn electrodes and nozzles.

Agricultural Construction Volume III
Unit I—Oxy-Gas and Other Cutting/Welding Processes
Student Handout

Section I: Cutting

Directions:

1. The instructor will give you a series of cutting procedures to perform.

2. Perform the assigned 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 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.

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.

B.

C.

D.

E.

F.

G.

H.

I.

J.

Section III: Written Assessment

Circle the letter that corresponds to the correct answer.

1. When using a plasma-arc cutting outfit using less than 300 amps, which lens shade should be used by the operator?

   a. 9
   b. 10
   c. 11
   d. 12

2. Which of the following is ***not*** an advantage of plasma-arc cutting?

   a. Clean—uses clean, dry air
   b. Safer than oxy-fuel gas cutting
   c. An arc welding machine can be used
   d. Can be used for shape cutting

Complete the following short-answer questions.

3. List three types of metal that can be cut using plasma-arc equipment. (Each answer is worth 1 point for a maximum value of 3 points.)

   a.

   b.

   c.

4. List five safety precautions to follow when plasma-arc cutting. (Each answer is worth 1 point for a maximum value of 5 points.)

   a.

   b.

   c.

   d.

   e.

Agricultural Construction

Agricultural Construction Volume III
Unit I—Oxy-Gas and Other Cutting/Welding Processes
Scoring Guide

Name _____

Assessment Area Section I	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Equipment Setting	Equipment was properly adjusted	Failed	Poor	Fair	Good	Excellent	X 5	
Cuts	Cuts are correctly made and uniform	Failed	Poor	Fair	Good	Excellent	X 15	
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	[redacted]	/20 pts.

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

- **Comments:**