Agricultural Science I

Curriculum Guide: *Agricultural Mechanics Unit for Agricultural Science I*

Unit: V. Arc Welding

Unit Objective:

Students will apply principles of shielded metal arc welding by making common flat position welds as part of a welding contest.

Show-Me Standards: 2.5, CA3

References:

Agricultural Mechanics Unit for Agricultural Science I. University of Missouri-Columbia, Instructional Materials Laboratory, 2002.

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

ESAB Knowledge Centre. ESAB. Accessed November 25, 2003, from http://www.esab.com/.

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

Lincoln Electric. Accessed November 18, 2003, from http://www.lincolnelectric.com/.

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

Miller Electric. Accessed November 18, 2003, from http://www.millerwelds.com/.

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.

Instructional Strategies/Activities:

- Students will engage in study questions in lessons 1 through 3.
- Students will complete AS 1.1, Arc Welding Safety Presentation; AS 3.1, Running a Bead Using a Shielded Metal Arc Welder; AS 3.2, Welding a Butt Joint in Steel Plate in Flat Position; AS 3.3, Welding a Butt Joint in Round Stock in Flat Position; AS 3.4, Welding a Lap Joint in Steel Plate in Flat Position; and AS 3.5, Welding a Tee Joint in Steel Plate in Flat Position.
- Additional activities that relate to the unit objective can be found under the heading "Other Activities" in the following locations: p. V-5 (2, 3), p. V-21 (2, 3), and p. V-37 (2, 3, 5).

Performance-Based Assessment:

Students will be divided into groups. The groups will represent teams and will participate in a welding contest that is similar to the welding portion of the Agricultural Mechanics Career Development Event. Each student will use a shielded metal arc welder to make common flat position welds presented in the unit and discussed in class.

Assessment will be based on the ability to safely and correctly perform common welding procedures using a shielded metal arc welder.

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Unit V—Arc Welding
Instructor Guide

The instructor should assign the performance-based assessment activity at the beginning of the unit. Students will work toward completing the activity as they progress through the unit lessons. The assessment activity will be due at the completion of the unit.

1. Use or adapt the activity sheets found in the unit to assess student competency at welding. 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.**

2. For the performance-based assessment activity, have students apply the skills and procedures discussed in the unit by participating in a welding contest.

3. Divide the class into groups and assign students a series of welding procedures to perform, such as welding a butt joint, lap joint, and tee joint in steel plate in flat position.
   a. Each student should perform all of the assigned procedures.
   b. Assign students welding procedures that they have mastered as part of the instructional activities for this unit.

4. This activity will help prepare students for the arc welding portion of the Agricultural Mechanics Career Development Event.
   a. Explain or review event guidelines as needed.
   b. Refer to the *Missouri CDE Handbook* for guidelines regarding the Agricultural Mechanics Career Development Event. 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.

5. Have students perform the assigned welding procedures.
   a. Performance in the welding contest will determine the student's individual score.
   b. Combine the individual scores of the group members to determine the team score for each group.

6. The final assessment score will be based on the ability to safely and correctly perform the assigned welding procedures.

7. Present an appropriate award to the high-scoring team and individual, if desired.

8. NOTE: The following units in this curriculum guide also include material and competencies that are addressed by the Agricultural Mechanics Career Development Event: Unit I, Common Hand Tools; Unit IV, Tool Sharpening and Reconditioning; and Unit VI, Oxyfuel Cutting. Some or all of the performance-based assessment activities for these units could be combined to form a mini Agricultural Mechanics Career Development Event, if desired. To conduct a mini Agricultural Mechanics Career Development Event, maintain the same student groups for all of the performance-based assessment activities. An expanded score sheet is included at the end of each of these units that can be used to track individual and group performance in the mini CDE.

9. ADDITIONAL ACTIVITIES:
   a. Create a display board using correctly made examples of each type of weld to be performed by the class. Have students compare their welds with the correctly made examples.
   b. Create a display board using the students' best welds. Possible display board themes include the following: each student's best weld, the best example of each type of weld performed by the class, and the best weld of the week.
   c. Perform destructive tests to check the strength and soundness of welds students have made.

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Student Handout

1. The instructor will divide the class into groups and give you a series of welds to perform in a welding contest.

2. Your group will compete in the contest as a team.

3. Perform the assigned welds.
   - ❑ 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 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.

4. Your final assessment score will be based on your ability to safely and correctly perform the assigned welding procedures.

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Scoring Guide

Name _____

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Electrode and Amperage Selection	Electrode was appropriate and amperage was correctly set for all welds	Failed	Poor	Fair	Good	Excellent	X 5	
Distortion	Welds are free of distortion	Failed	Poor	Fair	Good	Excellent	X 6	
Appearance	Appearance indicates correct speed of travel, amperage setting, and arc length for all welds	Failed	Poor	Fair	Good	Excellent	X 7	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 7	
Safety and Work Habits	**Student followed all safety precautions**	**Passed**				**Failed**	**X (-25)**	Negative Points *
	Student followed all assigned procedures	**Excellent**	**Good**	**Fair**	**Poor**	**Failed**	**X (-10)**	Negative Points *
TOTAL								

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

Comments:

Agricultural Mechanics I Score Sheet

Team Members	Tool ID	Tool Sharpening/ Reconditioning	Arc Welding	Oxyfuel Cutting	Score
Team A					
					Total:
Team B					
					Total:
Team C					
					Total:
Team D					
					Total:
Team E					
					Total:
Team F					
					Total: