

# Agricultural Science II

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

**Unit:** II. Arc Welding

**Unit Objective:**

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

**Show-Me Standards:** 2.5, CA3

**References:**

*Agricultural Mechanics Unit for Agricultural Science II.* 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](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](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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### **Instructional Strategies/Activities:**

- Students will engage in study questions in lessons 1 through 5.
- Students will complete AS 1.1, Arc Welding Safety; AS 4.1, Identifying Ferrous Metals Using Spark Testing; AS 5.1, Welding a Butt Joint in the Horizontal Position; AS 5.2, Making a Downhill Fillet Weld; AS 5.3, Making an Uphill Fillet Weld; and AS 5.4, Welding a Butt Joint in the Overhead Position.
- Additional activities that relate to the unit objective can be found under the heading “Other Activities” in the following locations: p. II-5 (2, 3), p. II-24 (2), p. II-42 (1, 2), p. II-60, and p. II-74 (1, 3, 4).

### **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 out-of-position welds presented in the unit and discussed in class.

Assessment will be based on the ability to safely and correctly make out-of-position welds using a shielded metal arc welder.

### Agricultural Mechanics Unit for Agricultural Science II Unit II—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 out-of-position welds to perform.
  - 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](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.

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7. Present an appropriate award to the high-scoring team and individual, if desired.
8. NOTE: If desired, this activity can be combined with the performance-based assessment activities from Unit III, Oxyacetylene Welding, and Unit IV, Tool Sharpening and Reconditioning, to form a mini Agricultural Mechanics Career Development Event. 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.
  - d. Create a display board that identifies different metals and their characteristics. Have students contribute samples.

**Agricultural Mechanics Unit for Agricultural Science II  
Unit II—Arc Welding  
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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**Agricultural Mechanics Unit for Agricultural Science II  
Unit II—Arc Welding  
Scoring Guide**

Name \_\_\_\_\_

Assessment Area	Criteria	0 Points	1 Point	2 Points	3 Points	4 Points	Weight	Total
Positioning	Metal was properly positioned	Failed	Poor	Fair	Good	Excellent	X 5	
Electrode and Amperage Selection	Electrode was appropriate for the weld and amperage was correctly set	Failed	Poor	Fair	Good	Excellent	X 4	
Distortion	Welds are free of distortion	Failed	Poor	Fair	Good	Excellent	X 5	
Appearance	Weld appearance indicates correct speed of travel, amperage setting, and arc length	Failed	Poor	Fair	Good	Excellent	X 6	
Strength	Welds are strong and sound	Failed	Poor	Fair	Good	Excellent	X 5	
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 *
<b>TOTAL</b>								

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

Comments:





## Agricultural Mechanics II Score Sheet

Team Members	Arc Welding	Oxyacetylene Welding	Tool Sharpening/ Reconditioning	Score
<b>Team A</b>				
				<b>Total:</b>
<b>Team B</b>				
				<b>Total:</b>
<b>Team C</b>				
				<b>Total:</b>
<b>Team D</b>				
				<b>Total:</b>
<b>Team E</b>				
				<b>Total:</b>
<b>Team F</b>				
				<b>Total:</b>

