

AGRICULTURAL WELDING

Revised 6/2016

Purpose and Standards

To evaluate the contestant's manipulative skills, general knowledge and professional presentation as these correlate to his/her preparation for employment in the broad field of welding (agricultural, industrial, or other).

Foundation Standards: Mathematics Algebra, 10, 13, 15 and Geometry 9, 10, 11. Technology 4.1, 4.2, 4.6. Problem Solving and Critical Thinking 5.1. Health and Safety 6.2, 6.4, 6.5. Ethics and Legal Responsibilities 8.3. Leadership and Teamwork 9.1, 9.2, 9.3.

Agricultural Mechanics Pathway Standards: B1.1, B1.2, B3.1-B3.3, B5.1-B5.5, B7.1-B7.5, B8.1-B8.4, B9.1-B9.7.

Scope of the Contest

Contestants will demonstrate their ability to perform jobs and skills that are reflective of those required in the welding industry. Specific competency areas will include the following:

Safety	*Shielded Metal Arc Welding (SMAW)	*Oxy Fuel Welding (OFW)
Measurement	*Gas Metal Arc Welding (GMAW)	*Cutting Processes
Blueprint Reading	*Flux Core Arc Welding (FCAW)	Weld Testing/ Inspection
Project Layout	*Gas Tungsten Arc Welding (GTAW)	

**A minimum of three, maximum of four, processes will be incorporated into the applied portion of the contest.*

The contest will consist of a four way rotation including the following events or contest areas:

- Welding Application - Hands on component
- Written Test - General knowledge component
- Weld Testing/Inspection - Evaluation/quality control component
- Job Portfolio/Application - Professional presentation component

Contestants

The team shall consist of three or four members. The scores of the three highest team members shall be used for the team score. All team members are eligible for individual awards. State Finals contest will consist of a preliminary round and a final round. The preliminary round will be held Friday and the final round will be held the following day. To qualify for the final round, a team must be in the top 20 teams after the preliminary round. The preliminary round will consist of the Written Test. In the preliminary round, in the case of a tie, the safety questions portion will be used as the tie breaker. The top 20 teams will be posted at the conclusion of the preliminary round tabulations. The top 20 teams will submit their Job Portfolio portion of the contest to be graded. Preliminary round scores will be added to the final round scores on Saturday.

Classes

Class	Individual Points	Team Points
Welding Application	200	600

Written Test	100	300
Weld Testing/ Inspection	50	150
Job Portfolio/ Application	50	150
Total	400	1200

Breaking of Ties

1. In the Agricultural Welding Contest, individual or team ties will be broken on the basis of the highest individual or team score using the written test score.
2. If a tie still exists, the individual or team portfolio score will be used to determine the high individual or team.

Sub-contest Awards

Sub-contest awards will be given for high teams and individuals in the following areas: Welding Application, Written Test, Weld Testing/Inspection, and Job Portfolio/Application.

Requirement of Host Institution

See equipment supplied by the host committee under Event Rules

Event Rules

- I. Each qualifying contestant will compete in all four events.
- II. Equipment supplied by the host committee:
 - A. All necessary welding machines
 - B. All consumables will be provided and contestants are required to utilize the provided materials
 - C. All instructions and procedure sheets with drawings
 - D. All materials for the host committee and judges
 - E. A four-function calculator for the Job Application rotation
- III. Equipment supplied by the contestant:
 - A. All PPE (Personal Protective Equipment)
 1. Safety glasses (approved ANSI Z87 with side-shields)
 2. Hearing and or ear protection
 3. Welding helmet/face shield/goggles with appropriate #5 - #7 filter lenses for the OFC and OFW processes
 4. Welding helmet with appropriate #10 - #12 filter lenses for the AW processes
 5. Leather gloves with gauntlets
 6. Appropriate leather welding jacket
 - B. Tools
 1. Tape measure
 2. Magnetic Square
 3. Soap Stone
 4. Combination Square
 5. 6" Steel Rule
 6. Chipping hammer
 7. Steel Brush
- IV. Contest uniform will consist of the following:
 - A. Long sleeve, button down, white cotton shirt
 - B. Black work pants
 - C. Closed toed, leather boots
 - D. Appropriate coveralls or leather work apron

- E. FFA jacket and tie not to be used during the contest, but required to receive awards at award ceremony
- V. Contestants must correctly use the welding equipment during the contest. Equipment set up and operation is essential to the welder's ability to function in the workplace. Students are expected to be familiar with a variety of machines and to be able to set up machines for the given process. Contest personnel will be available to assist in unusual complications that may arise associated with equipment set up.
- VI. At the time of the contest, plans and instructions will be provided to contestants.
- VII. Time limits will be set for each rotation and announced at the contest site.
- VIII. The sponsoring school has the option to include safe work habits as part of the scorecard of up to 10% of the total points possible in that specific skill event. After a warning, the sponsoring school reserves the right to remove any contestant that violates accepted safety practices that endanger him/her or others in the contest.
- IX. No unauthorized notes, printed materials, or tools may be used in any portion of the contest. Contestants found in violation will be disqualified from contest.
- X. Portable, cordless, rechargeable, battery powered tools may not be used in the contest.
- XI. While the contest is in progress, contestants shall not communicate with anyone but the judges. Any observed communications other than with the judges may result in disqualification of the individual or team.
- XII. Completed projects will be evaluated visually and may include nondestructive and/or destructive testing.

Contest Area Descriptions:

- XIII. Welding Application (200 points)
 - A. *Overview:* Contestants will be supplied plan sets at the contest site which outline the hands-on portion of the contest. These plan sets will be basic, three view, shop drawings which incorporate welding symbols and procedures. Contestants will be required to interpret the drawings and weld symbols to configure their projects following the described welding symbols, procedures and measurements. Projects will be submitted at the end of the prescribed time period for evaluation by the judges. A total of four process areas will be completed scored at 50 points per process.
 - B. *Welding Processes:* As outlined in the Contest Scope, there are six processes described as competency areas for the contestants. They are SMAW, GMAW, FCAW, GTAW, OFW and the Cutting Processes. The possible cutting processes include Plasma Arc Cutting (PAC), Oxy-fuel Cutting (OFC), and Air Carbon Arc Cutting/Gouging (CAC). Contestants will have projects which incorporate four of the six processes. Cutting may comprise a maximum of one of the four required exercises. Rotations will be set up by the host committee.
 - C. *Base Metals:* Contestants may weld mild steel, aluminum and/or stainless steel.
 - D. *Filler Metals:* Contestants should be able to weld with a variety of filler metals.
 - E. *Welding Positions and Joints:* Contestants will weld in the flat (1G and 1F), horizontal (2G and 2F), vertical (3G and 3F) and overhead (4G and 4F) positions.
 - F. *Possible Joint Configurations:* Joint configurations will include square butt or prepared groove, lap and T fillet, pipe to plate or pipe to pipe joints.
 - G. *Welding Equipment/Machines:* Welding equipment may be obtained from a variety of sources and may include transformer, transformer/rectifier and/or inverters.
 - H. An example plan set is included in appendix A.

XIV. Written Test (100 points)

A. A written test shall include questions and/or problems from the following areas:

1. Safety 10 points
2. Shielded Metal Arc Welding (SMAW) 10 points
3. Oxy Fuel Welding (OFW) 10 points
4. Gas Metal Arc Welding (GMAW) 10 points
5. Flux Core Arc Welding (FCAW) 10 points
6. Gas Tungsten Arc Welding (GTAW) 10 points
7. Cutting Processes 10 points
8. Welding Symbols 10 points
9. Weld testing, inspection and metallurgy 10 points
10. Welder Certification 10 points

B. The test may be true-false and multiple choice in any combination. The test will be comprised of 50 questions valued at 2 points per question.

C. The questions for the written test will come from the *Welding Skills* textbook written by Moniz. The latest two editions will be used.

XV. Weld Testing/Inspection (50 points)

A. *Overview*: Contestants will evaluate weld samples utilizing visual testing methods (VT). Weld samples will be evaluated and compared to sections of the AWS D1.1 code for acceptability or rejection. Weld samples and appropriate code sections will be provided by the host committee. Contestants will also need to be familiar with common nondestructive testing (NDT) methods. This contest area will be a practical lab exercise whereby the contestants visit stations and provide responses on an answer sheet provided by the host committee. This will consist of 25 questions valued at 2 points per question.

B. *Nondestructive Testing (NDT)*: Contestants should be able to identify common NDT methods by photograph or real physical examples. The following methods may be included in this contest area: Visual Testing (VT), Dye Penetrant testing (PT), Ultrasonic Testing (UT), Radiographic Testing (RT) and Magnetic Particle Testing (MT). Questions will include both visual identification, as well as some basic knowledge questions about the testing methods.

C. *Visual Testing (VT)*: Contestants should be able to identify and measure the following surface indications: various forms of porosity, overlap/cold lap, undercut, cracks and inclusions. Upon identification, students should be able to measure these indications and reference the appropriate code section to determine whether the indication is an actual defect that would constitute rejection and repair. Code examples will be provided by the host committee and be based on the AWS D1.1 Structural Welding Code.

XVI. Job Portfolio and Application (50 points)

A. *Overview*: All contestants will submit a prepared job portfolio to the judging committee. Additionally, contestants will fill out a sample job application on site as one of the rotations. The job application will include basic personal information and five basic math problems, which could include addition, subtraction, multiplication and dividing whole numbers, fractions, and decimals. All math problems will relate to the welding industry. Host school will provide four-function calculators.

- B. *Portfolios*: (40 points) Portfolios will consist of the following components: Title Page, Table of Contents, Letter of Introduction, Resume, Letter of Recommendation, and Work Samples. All portfolios are to be prepared on plain white paper and stapled in the upper left hand corner. No specialty paper, fonts or portfolio covers will be accepted. Work samples should not exceed three actual samples and photos should not exceed three pages. Work sample pages will use the state proficiency photo page template with a maximum 50 word write-up which may include; project description, equipment used, materials used and any special procedures.

Rubric:

	Points Allowed	Excellent	Good	Fair	Poor
Title Page	2	2 Points <ul style="list-style-type: none"> • Student Name • Chapter Name • Advisor Name • Contest Name/ Location • Date of Contest • All Above Information Centered. 	1 Point <ul style="list-style-type: none"> • Missing any information in column one 		
Table of Contents	2	2 Points <ul style="list-style-type: none"> • Must Include- <ul style="list-style-type: none"> • Letter of intro • Resume • Letter of recommendation • Work samples 	1 Point <ul style="list-style-type: none"> • Missing any information in column one 		
Letter of Introduction	10	9-10 Points <ul style="list-style-type: none"> • No Spelling or Grammatical Errors • Well Stated • Unique, Descriptive Letter • Visually Appealing • Follows Business Format • Signed and dated 	7-8 Points <ul style="list-style-type: none"> • 1-2 Spelling or Grammatical Errors • Well Stated • Descriptive Letter • Visually Appealing • Follows Business Format 	5-6 Points <ul style="list-style-type: none"> • 3-4 Spelling or Grammatical Errors • Vaguely Stated • Generic Letter • Does Not Follow Business Format 	1-4 Points <ul style="list-style-type: none"> • More than 4 Spelling or Grammatical Errors • Poorly Stated • Information Not Applicable to Position • Does Not Follow Business Format
Resume	10	9-10 Points <ul style="list-style-type: none"> • No Spelling or Grammatical Errors • Visually Appealing • Logically Organized • Contains Relevant, Descriptive Information • Follows Business Format 	7-8 Points <ul style="list-style-type: none"> • 1-2 Spelling or Grammatical Errors • Visually Appealing • Organized • Contains Relevant Information • Follows Business Format 	5-6 Points <ul style="list-style-type: none"> • 3-4 Spelling or Grammatical Errors • Lacks Visual Appeal • Lacks Organization • Lacks Some Relevant Information • Does Not Follow Business Format 	1-4 Points <ul style="list-style-type: none"> • More than 4 Spelling or Grammatical Errors • Lacks Visual Appeal • Disorganized • Irrelevant Information • Does Not Follow Business Format
Letter of Recommendation	5	5 Points <ul style="list-style-type: none"> • Dated current letter of recommendation (Current Year) Included in portfolio with valid signature 	1 Point <ul style="list-style-type: none"> • Missing any information in column one/out of date. 		

	Points Allowed	Excellent	Good	Fair	Poor
Work Samples	6	<p>6 Points</p> <ul style="list-style-type: none"> • Three work samples @ 2 points each • Work samples should not exceed three actual samples and color photos should not exceed three pages. Work sample pages will use the state proficiency photo page template with a maximum 50 word write-up which may include; project description, equipment used, materials used and any special procedures. 	<p>1-5 Points</p> <ul style="list-style-type: none"> • Spelling Errors • Pictures out of Focus • Pictures not in color • Exceeds 50 words • Does not include information required in column one. 		

C. *Job Application:* (15 points) A sample job application will be completed as one of the rotations at the contest site. These applications are intended to reflect the practice of handwriting an application as is found in many vocational/trade situations. Contestants should be able to write legibly and fully complete an application for employment. References, education and work history may be prepared prior to the contest and utilized while completing this application. The job application will be 10 points and 5 points will be designated to the math calculations.

Rubric:

Job Application Form	10	<p>9-10 Points</p> <ul style="list-style-type: none"> • No Errors • Neat and Legible • Complete • Follows Instructions • Contains Relevant, Descriptive Information • Consistent with Resume and Letter of Introduction 	<p>7-8 Points</p> <ul style="list-style-type: none"> • 1-2 Errors • Neat and Legible • Complete • Follows Instructions • Contains Relevant Information • Consistent with Resume and Letter of Introduction 	<p>5-6 Points</p> <ul style="list-style-type: none"> • 3-4 Errors • Illegible • Incomplete • Follows Most Instructions • Lacks Relevant Information • Inconsistent with Resume and Letter of Introduction 	<p>1-4 Points</p> <ul style="list-style-type: none"> • More than 4 Errors • Illegible • Incomplete • Does Not Follow Instructions • Lacks Relevant Information • Inconsistent with Resume and Letter of Introduction
Math Calculations	5	<ul style="list-style-type: none"> • One point per calculation 			

Contest Reference Material

<p>The Procedure Handbook of Arc Welding, by Lincoln Electric Company, Cleveland, Ohio. www.lincolnelectric.com The Lincoln Electric Company 22801 St. Clair Ave. Cleveland, OH 44117 Phone: 216-481-8100</p>	<p>AWS A3.0 (Terms and Definitions) and AWS A2.4 (Symbols), American Welding Society. www.aws.org American Welding Society 550 N.W. LeJeune Road Miami, Florida 33126 Phone: 800-443-9353 or 305-443-9353</p>
<p>The Educational Instructor's Package, by Miller Electric Manufacturing Co. www.millerwelds.com Miller Electric Manufacturing Co. 1635 W. Spencer St. P.O. Box 1079 Appleton, WI 54912-1079 Phone: 920-734-9821 Miller.</p>	<p>Welding Skills, by Moniz www.atplearning.com American Technical Publishers 10100 Orland Parkway #200 Orland Park, IL 60467 Phone: 708-957-1100</p>