2021 MICHIGAN SKILLS USA CHAMPIONSHIPS

WELDING
TASKS & MATERIAL

Purpose:
To evaluate each contestant's preparation for employment and recognize outstanding performance

RESUME:

Each student must submit a one-page resume with the welded part. This is the only time that resumes can be turned in. Failure to do so will result in a 10 point penalty.

Clothing Requirement
1. Required 100 percent cotton, fire resistant work pants, protective welder's clothing including welder's hat or skullcap, leather cape with sleeves or fire resistant welding coat or sleeves, leather gauntlet welding gloves (for other than GTAW), leather welding gloves for GTAW, high-top (6" minimum height) leather shoes and welder's helmet. All outer clothing must be fire-resistant. Industrial quality safety glasses with side shields or safety goggles that meet OSHA Z87.1+.

Eligibility
Open to active Skills USA-VICA members enrolled in programs with welding as the occupational objective.

Equipment and Materials:
1. Supplied by the **technical committee**:
    1. All necessary materials to complete the weldment.
    2. All instructions and procedure sheets with drawings.
2. Supplied by the **contestant**:
    a. All equipment and filler metals necessary to complete the project.
    b. Hearing and/or ear protection.
    c. Welding helmet with appropriate filter plate/ lens and protective cover plate/lens for the arc process(s) being performed.
    d. Welding helmet/face shield/goggles with appropriate #5/#7 filter plate/lens and protective cover plate/lens for OFC. (Safety glasses must be able to be worn underneath.)
    e. Spare spatter and filter lenses/plates for arc welding helmet and oxyacetylene goggles
    f. Calculator
    g. Lead pencil and/or ballpoint pen
    h. Soap stone
    i. Scribe
    j. Combination square set
    k. Tape measure-Min. 10'
    l. Fillet weld gauge
    m. 16-ounce ball peen hammer
    n. Center punch
    o. 6-inch side cutting pliers or diagonal cutting pliers
    p. 6-inch standard slip lock pliers
    q. Chipping hammer with or without wire brush
    r. Stainless steel wire brush
    s. Tungsten GTAW 3/32 or 1/8 electrodes for DC- and AC welding – **pre-sharpened** (**can be re-sharpened**).
    t. Flat or Half Round, Bastard cut type- Metal Hand File- 12" - 14" length.
    u. 2 – vise grip type pliers
    v. 1 page resume

Specific Rules for Contest Participants

1. Contestants must correctly use the welding equipment during the contest. The contest Proxy may stop a contestant at any section of the contest if they deem a contestant's manner to be hazardous to either themselves or others. Such stoppage shall disqualify the participant for that section of the contest. If the contestant is warned a second time, he or she will be disqualified as a contest participant.
2. Contestants will be assigned a contest number for use during the welding contest. The contest judges will know the contestants by their assigned number only.
3. While the contest is in progress, there shall be no communication between the contestants or between the contestants and anyone else except as directed by the contest proxy.
4. The welding contest will be of a performance nature.
5. All terms and definitions and welding symbols will be in accordance with the current editions of ANSI/ AWSA3.0 (Terms and Definitions) and ANSI/ AWSA2.4 (Symbols).
6. Time limits will be established on the contest procedure sheets for all segments of the test.
7. Evaluation of the completed project will be judged visually. Nondestructive and/or destructive tests may be used to complete the project evaluation.
8. Welding and cutting operation instructions will be specified in drawings and procedure sheets provided to the contestants.
9. Reference – base metal may include, but is not limited to Mild Steel, Stainless Steel, and Aluminum.

Scope of the Contest

1. Contestants will demonstrate their ability to perform jobs and skills selected from the following list of competencies as determined by the Skills USA Championships Technical Committee.

   a. Safety
   1. Demonstrate personal safety.
   2. Demonstrate general shop safety.
   3. Demonstrate gas, electrical and chemical safety.
   4. Demonstrate knowledge of proper actions to be taken in an emergency.

   b. Measurements
   1. Identify basic metal working tools used in measuring.
   2. Use visual measuring tools to accurate of 1/16 of an inch.
   3. Employ the components of a combination square set.
   4. Use layout and marking tools as required.

   c. Blueprint Reading
   1. Use information found in the title block of the drawing.
   2. Read and understand three-dimensional drawings.
   3. Identify the basic views used in blueprints including assembly, detail and fit-up drawings.
   4. Identify common types of lines, abbreviations and symbols in accordance with national drawing standards –ANSI.
   5. Identify basic welding symbols and components of a symbol (such as arrow, reference line, tail, size or length) in accordance with the national welding symbols standards – AWS.

   d. Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (GMAW), Flux Cored Arc Welding (FCAW), Gas Tungsten Arc Welding (GTAW)
   1. Demonstrate safety procedures for each process.
   2. Demonstrate the ability to correctly set up power sources, related welding equipment, and do basic process and equipment troubleshooting for each process.
   3. Correctly identify base metal prior to welding.
   4. Set up and shut down equipment.

5. Select the correct type of filler metal and size of electrode based on the base material.
6. Prepare base material for welding.
7. Start, stop and restart stringer beads on the base material in the flat, horizontal, vertical up and down and overhead positions.
8. Weld a lap and T-joint joint with a single pass and multi pass, fillet weld on the base material in flat, horizontal, vertical up and down and overhead positions.
9. Weld a butt joint with a single pass, square groove weld on the base material in the flat, horizontal, vertical up and down and overhead positions.
10. Weld a butt joint with a single pass, V-groove weld on the base material in the flat, horizontal, vertical up and down and overhead positions.
11. Weld a butt joint with a partial joint penetration, single pass, double V-groove weld on the base material in the flat, horizontal, vertical up and down and overhead positions.
12. Weld a butt joint with a multiple pass, double groove weld on the base material in the flat, horizontal, vertical up and down and overhead positions.
13. Weld 2 inch through 6 inch diameter, schedule 40, pipe, single/multiple pass fillet weld in the 2F and 5F positions.
14. Weld a plug weld in the flat position.

f. Oxygen Fuel Cutting (OFC)

1. Demonstrate safety procedures for OFC.
2. Demonstrates ability to correctly set up OAC equipment for cutting and do basic process troubleshooting.
3. Correctly identifies base metal prior to cutting.
4. Set up and shut down equipment for cutting carbon steel plate.
5. Select correct tip size and gas pressure for cutting carbon steel plate (1/4-inch to ½-inch thickness).
6. Prepare carbon steel for cutting.
7. Cutting operations will be specified in drawings and procedure sheets provided to the contestants.
8. Properly light, adjust the flame, and shut down the OFC equipment.
9. Use a straight edge and soaps stone for laying out the prescribed pattern.
10. Make a square cut on carbon steel in flat, horizontal and vertical positions.
11. Make a bevel cut (45-degree angle) on carbon steel plate in the flat, horizontal and vertical positions.
12. Pierce a hole in carbon steel in the flat, horizontal and vertical position.
13. Make a cut on carbon steel pipe in flat, horizontal, and vertical positions.
14. **No cutting guides allowed**

Judging Criteria

The contestant will be evaluated on the competencies based on the following rating system. The technical committee according to the difficulty of the assigned task will establish point values for each item. Final judging of the welded projects will be evaluated using the following:

a. Visual Inspection Criteria:

1. Dimensional accuracy, including distortion. Reference the notes concerning the allowable tolerances on the print
2. Conformity to drawing requirements including determination of whether all welds have been completed and whether the finished welds conform to the required size and contour.
3. Visual examination of the welds for:
   i. Cracks
   ii. Undercut
   iii. Overlap
   iv. Crater fill
   v. Spatter
   vi. Arc strikes
   vii. Porosity
   viii. Convexity and reinforcement
   ix. Tungsten inclusions
   x. Inadequate joint penetration
   xi. Surface irregularities
   xii. Other irregularities

b. Welding equipment may be obtained from a variety of manufacturers and may include transformers, rectifiers and/or inverters.

c. Filler metals will be compatible with the metals being welded and will be detailed on the contest procedure sheet. Instructions to the contestants will define more specifically the filler metals that may be used. Below is a suggested list of electrodes and filler metal types and sizes:

4. Shielded Metal Arc
   - xiii. E 6010 – 1/8-inch diameter
   - xiv. E7018 – 3/32-inch, 1/8 inch diameter
5. Gas Metal Arc
   - i. E70S-3 (or -6) .035 - .045 diameter (75% Ar 25% CO2 Shielding Gas)
6. Gas Tungsten Arc
   - xv. 3/32-inch, 1/8-inch diameter
   - xvi. ER70S-2 – 1/16-inch – 1/8-inch diameter
   - xvii. ER4043 – 3/32-inch and 1/8-inch diameter
   - xviii. ER308L – 1/16-inch, 3/32-inch diameter

d. Cutting and Welding Tip Sizes:

7. Oxyacetylene Cutting
   - xix. Cutting tip sizes: 0 – 1 (Victor or Harris equipment)
   - xx. Welding tip sizes: 0 – 3 (Victor or Harris equipment)
   - xxi. Equipment
     - (i) CC/CV machines
     - (ii) GMAW – CV only
     - (iii) SMAW – CC
     - (iv) GTAW– CC

2021 Contest Summary

The 2021 Welding Overall contest will be completed independently at the participant's current High School location. The welding prints and components will be shipped out per the timeline provided below, carried out under full supervision of the instructor, and returned to the address provided. See timeline below for further information.

- March 23, 2021 Orientation meeting for Instructors via Zoom, WebEx, etc
- March 23, 2021 Prints and materials to ship out to participants
- March 29, 2021 Orientation/Kickoff for participants via Zoom, WebEx, etc
- April 5, 2021 Official start date for project
  - Students not permitted to open project package until this date!
  - Students will not be required to video record themselves during the event.
  - 2 week timeline is provided to accommodate various Spring Break schedules.
- April 19, 2021 Completed Projects due back to GRCC facility for Judging
  - There will be no exceptions for this due date- late projects will be disqualified.
- April 22, 2021 Project Judging by SKILLS technical team