



**Iowa SkillsUSA**

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# 2019 Welding Sculpture Contest

Friday, April 26, 2019

## **CLOTHING REQUIREMENT**

At the State contest, competitors will not be required to wear official SkillsUSA clothing. However, the presentation is a professional presentation, therefore contestants should dress professionally and may be deducted points if not dressed appropriately.

## **ELIGIBILITY**

Open to active SkillsUSA members enrolled in career and technical programs with welding or metal trades as the occupational objective.

## **EQUIPMENT AND MATERIALS**

1. Supplied by the technical committee:
  - a. All necessary information for the judges and technical committee
  - b. One 4-foot table
2. Supplied by the contestant:
  - a. All competitors must create a one-page résumé and submit the résumé at the contest orientation.
  - b. Student-designed and produced sculpture

## **SCOPE OF THE CONTEST**

The contest consists of three parts:

1. Evaluation of the sculpture
2. Notebook
2. Interview (All contestants will be asked the same questions, determined by the judges, before the start of the contest.)

## **Knowledge Performance**

There will be a skill-related written test to evaluate student knowledge of basic welding and cutting processes. General questions about GMAW, GTAW, SMAW, PAC and OFC will be included on this test.

## **Skill Performance**

The contest is designed to assess the ability of the competitor to design and produce a sculpture of that design, as well as answer questions in a brief interview related to all aspects of his or her creation of the design.

## **Contest Guidelines**

### **Sculpture Design and Workmanship**

1. Materials used must be ferrous or nonferrous metals. The sculpture must be an original and creative work of the student.
2. Sculptures may be welded, brazed or soldered, depending on the material used.
3. Projects are to be left unpainted, including primers and other coatings. (Exception: sculptures may be clear coated.)
4. All copyright laws must be followed in the creation of the design.
5. The sculpture must be one continual piece, not multiple pieces unconnected.
6. The sculpture cannot exceed the maximum size of 18" height x 12" width x 18" length and cannot exceed a weight of 150 lbs.

## Notebook

1. A notebook must be placed with the sculpture prior to judging. It must contain pictures and supporting evidence (e.g., receipts). It must include a brief description of the project and processes used to develop the sculpture.
2. The first page of the notebook must be the table of contents. The notebook must include a letter certifying that the sculpture was designed and constructed by the student. The letter must contain an itemized list of all expenses. The letter must identify the school, city, state and local advisor. The letter must identify the student to be interviewed, division (high school or college/postsecondary), and the letter must be signed by the local administrator.
3. Any welds that are hidden or ground must be documented through photographs with captions in the notebook.
4. A photograph of the student with his or her sculpture at regional and state competitions must be provided to ensure the same sculpture has been used throughout SkillsUSA contests.

## Interview

The student will participate in a three- to five minute interview. Questions from the judges will be related (but not limited) to sculpture, creation, inspiration, materials, processes and workmanship.

## Items Evaluated Possible Points

### Sculpture (450 points)

Metal Working (Fitting and Techniques)	100
Welding (100 points total)	
Fit-up	25
Function of welds	25
Amount of welds	25
Quality of welds	25
Cutting (50 points total)	
Function of cuts	25
Quality of cuts	25
<i>Note: No extra credit or deductions for CNC cutting</i>	
Design/Creativity (200 points total)	
Level of difficulty	50
Creative use material/process	50
Creativity	100

### Notebook (2–3" tabbed binder) (400 points total)

Table of contents	25
Verification letter (150 points total)	
School letterhead	25
Verification student made	25
Itemized list of expenses	25
ID school, city, state, advisor	25
Approximate time in each process	25
Letter signed by administrator	25
Photographs with captions (minimum 5)	100
<i>Note: If welds are ground or removed, photo documentation of original welds must be provided.</i>	
Receipts for materials	50
Drawings (50 points total)	
Concept drawing(s)	25
Drawings — approximate dimensions	25
Supporting documents	50
(e.g., additional photos of process, design, cutting, welding, forming, explanation of creative use of process, etc.)	

**Interview (100 points total)**

Greeting and closing	25
Knowledge of project	25
Self confidence	25
Q&A (sample questions provided)	25

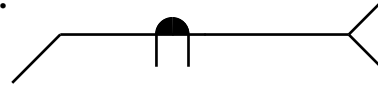
**Written Test (50 points total) 50****Penalties**

Workmanship: exceeds size limits	-50
Workmanship: exceeds 150 lbs.	-50
Workmanship: paint/finish	-50
Résumé	-10
Clothing	-10

**Total Possible Points 1,000**

1. **Alternating Current (AC) is used to GTA weld Aluminum because:**
  - A. The electrode positive portion of the AC current cycle provides cleaning action at the Aluminum surface
  - B. Aluminum conducts AC better than DC
  - C. AC power supplies are generally less expensive than DC power supplies
  - D. The electrode negative portion of the AC current cycle provides cleaning action at the Aluminum surface
  - E. None of the above
  
2. **Which type of power supply is used for the SMAW process?**
  - A. DCEP
  - B. DCEN
  - C. Constant Voltage
  - D. Constant Current
  
3. **Acetylene gas becomes unstable at what pressure?**
  - A. 3 PSI
  - B. 8 PSI
  - C. 15 PSI
  - D. 75 PSI
  
4. **Which one of the following is a ferrous metal?**
  - A. aluminum
  - B. copper
  - C. magnesium
  - D. mild steel
  
5. **The selection of the correct filter plate shade number depends on the:**
  - A. Brightness of the sun in the weld area
  - B. Type of shielding gas in use
  - C. Amount of current being used
  - D. Type of filler metal being used
  - E. All of the above

6. The weld symbol drawn below indicates:



- A. A full-penetration square groove weld
  - B. A fillet weld with melt-through permitted
  - C. A Butt weld with the arrow side ground flush
  - D. A fillet weld with the arrow side ground flush
7. **When GTA welding Carbon Steel plate, the Tungsten electrode should be:**
- A. Located well inside the cup
  - B. Balled
  - C. Pointed at the tip
  - D. Ground in such a fashion as to leave grind marks around the tip
  - E. None of the above
8. **Which of the following are functions of the coating on SMAW electrodes:**
- A. Alloying
  - B. De-Oxidization
  - C. Shielding
  - D. All of the above
  - E. None of the above
9. **When using an Oxy-Acetylene torch, the oxygen cylinder valve should be opened all the way.**
- A. True
  - B. False
10. **The primary reason some suppliers coat their GMAW filler wire with copper is to:**
- A. Aid in deoxidizing the weld metal in the weld pool
  - B. Help smooth out the feeding of the wire
  - C. Improve electrical transfer at the contact tip
  - D. Prevent rusting of the filler wire

11. **Potential hazards relating to electric arc welding include:**
  - A. Heat
  - B. Radiation
  - C. Toxic gasses
  - D. All the above
  
12. **The size of a coated electrode is determined by the**
  - A. overall diameter
  - B. amperage setting
  - C. core diameter
  - D. AWS classification of electrodes
  
13. **If the Tungsten electrode turns blue after GTA welding, you should:**
  - A. Increase amperage
  - B. Increase preflow
  - C. Increase postflow
  - D. Decrease amperage
  
14. **When experiencing 'arc blow' during SMAW welding, one possible remedy could be:**
  - A. Use a full length electrode
  - B. Shorten the arc length
  - C. Change to DCEN from AC current
  - D. Whip the electrode
  
15. **When Oxy-Fuel cutting, a general rule is that the torch angle should vary according to:**
  - A. Type for fuel gas used
  - B. Size of tip used
  - C. Pressure settings
  - D. Thickness of metal to be cut

16. Which of the following is not an advantage of the Gas Metal Arc Welding process?
- A. Higher deposition rates compared to other welding methods
  - B. Relatively easy process for beginners to learn
  - C. Suitable for ferrous alloys
  - D. Suitable for nonferrous alloys
  - E. None of the above
17. Undercutting is a condition that occurs when
- A. welding current is too high
  - B. welding travel speed too slow
  - C. welding current is too low
  - D. arc length is too short
18. The distance through a fillet weld, from the face to the root is called the:
- A. Leg
  - B. Stem
  - C. Throat
  - D. Heart
19. The proper current type for most welding of Stainless Steels with the GTAW process is:
- A. DCEN
  - B. DCEP
  - C. Pulsed AC
  - D. None of the above
20. Which of the following SMAW electrodes are not suitable for use in all positions?
- A. E6011
  - B. E6018
  - C. E7024
  - D. E7018

21. Argon and helium gases are
- A. inert
  - B. reactive
  - C. reducing
  - D. oxidizing
22. In GMAW welding, shielding of the molten metal is accomplished through the use of:
- A. Granular Flux
  - B. Coating generated gas
  - C. Slag
  - D. Inert and reactive gasses
23. The safest clothing materials to wear in a welding environment are:
- A. Asbestos and Kevlar
  - B. Cotton and Wool
  - C. Nylon and Rayon
  - D. Polyester and Nylon
24. Which of the following is not considered a type of joint?
- A. Butt
  - B. T
  - C. Fillet
  - D. Corner
  - E. Edge
25. A green paint band on a GTA electrode indicates:
- A. Pure Tungsten electrode
  - B. Thorium
  - C. Lanthanum
  - D. Zirconium



26. **When using the SMAW process, as the arc length increases, the current does what?**
- A. Increases
  - B. Decreases
  - C. Initially increases then subsequently decreases
  - D. Initially decreases then subsequently increases
  - E. None of the above
27. **The flux on a SMAW electrode is broken down by the heat of the welding arc to produce,**
- A. Slag that reacts with the molten weld metal to reduce contaminants
  - B. Shielding gases to protect the molten weld from contaminating gases
  - C. A and B
  - D. None of the above.
28. **Which of the following shielding gasses is the most economical to use for GMAW welding of Carbon Steel with the short circuiting transfer method?**
- A. Argon
  - B. Carbon Dioxide
  - C. 98% Argon, 2% Oxygen mix
  - D. 75% Argon, 25% Carbon Dioxide mix
29. **An acceptable method of shielding yourself from the light from an electric arc while tackwelding is to:**
- A. Simply close your eyes while tackwelding
  - B. Hold your hands in front of the arc
  - C. Squint your eyes tightly while tacking
  - D. None of the above are acceptable
  - E. All of the above are acceptable

30. When two members are in the same plane with their edges meeting the joint is termed a:
- A. Corner joint
  - B. Lap joint
  - C. Butt joint
  - D. Tee Joint
31. When the electrode holder is connected to the positive (+) terminal on a Direct Current power supply, it is called:
- A. Direct Current Straight Polarity (DCSP)
  - B. Direct Current Reverse Polarity (DCRP)
  - C. Direct Current Direct Deposit (DCDD)
  - D. Direct Current Indirect Polarity (DCID)
32. Which of the following popular SMAW electrodes is classified as low-hydrogen?
- A. E6011
  - B. E6024
  - C. E7014
  - D. E7028
  - E. None of the above
33. When selecting a cutting tip for Oxy-Acetylene cutting, one should consider:
- A. Use the cleanest, newest tip available
  - B. How fast does the job need to be done
  - C. The thickness of the metal being cut
  - D. All of the above
34. What metal will a plasma cutter cut?
- A. stainless steel
  - B. aluminum
  - C. carbon steel
  - D. All of the above

35. **When selecting a dark filter lens for a welding helmet, the higher the lens number is, the more arc light is blocked out.**  
A. True  
B. False
36. **Before opening the cylinder valves on Oxy-Fuel cylinders, the regulator adjusting screws should be turned in all the way.**  
A. True  
B. False
37. **Oxygen can be used for shielding gas when GMAW or GTAW welding, in an emergency.**  
A. True  
B. False
38. **Low hydrogen electrodes should be stored in a (an):**  
A. Electric Oven  
B. Electrode oven  
C. A cool, dry place  
D. A warm, humid place  
E. Both (A) and (B) above
39. **What is the name for the opening produced during a cutting operation?**  
A. Drag line  
B. Slag  
C. Kerf  
D. Wraparound  
E. None of the above
40. **The stringer bead weld is made with appreciable transverse oscillation.**  
A. True  
B. False

41. **Electric Arc welding performed with proper safety equipment presents great safety hazards.**  
A. True  
B. False
42. **On a completed groove weld, the surface of the weld on the side where the welding was performed is called the :**  
A. Crown  
B. Weld reinforcement  
C. Weld Face  
D. Root Face  
E. None of the above
43. **Using the GTAW process, Aluminum can be successfully welded using DCSP.**  
A. True  
B. False
44. **When welding with the SMAW process, increasing the arc gap tends to have what effect on the molten pool?**  
A. Heat up  
B. Cool down  
C. No effect- Molten Pool remains at the same temperature  
D. None of the above
45. **When welding with an Oxy-Acetylene torch, the hottest part of the flame is:**  
A. The tip of the inner cone  
B. The yellow area of the flame  
C. The blue area of the flame  
D. None of the above
46. **"Arc Blow" is not found when using AC arc welding power sources.**  
A. True  
B. False

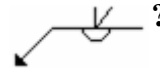
47. Oil or grease, used as a lubricant around Oxy-Fuel equipment, is very hazardous.
- A. True
  - B. False
48. Amperage (amp) is a measurement of the current in the welding circuit.
- A. True
  - B. False
49. Welding or cutting on zinc plated (galvanized) steel may cause
- A. metal fume fever
  - B. air quality problems
  - C. a rust resistant surface
  - D. A and B
50. The minimum protective shade number to be used for GMAW or FCAW processes is
- A. #7
  - B. #8
  - C. #10
  - D. #12
51. What metal will a plasma cutter cut?
- A. stainless steel
  - B. aluminum
  - C. carbon steel
  - D. All of the above
52. To safely light an oxy-fuel torch, a \_\_\_\_\_ should be used.
- A. Match
  - B. Friction spark lighter
  - C. Butane lighter
  - D. Welding arc

53. Acetylene cylinders should be
- A. stored and used in an upright position
  - B. used as leg for a steel bench
  - C. used as roller to move a heavy load
  - D. Heated to get all the acetylene out of the tank.

54. The most common inspection method for welding is
- A. dye penetrant inspection
  - B. visual inspection
  - C. Magnetic particle inspection
  - D. X-ray inspection

55. The "60" in E 6010 electrode specification stands for:
- A. Pounds of electrodes per can
  - B. Minimum current setting
  - C. Tensile Strength
  - D. All of the above

56. What type of weld does this welding symbol refer to ?



- A. Fillet With Backing
- B. Square Groove With Backing
- C. Bevel Groove With Backing
- D. Bevel Groove Without Backing
- E. Square Groove Without Backing



**PRACTICE WRITTEN TEST**  
**AWS Iowa Section**

