



STRUCTURAL SYSTEMS

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ASSOCIATE SUPERINTENDENT CONTACT INFORMATION

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PURPOSE

The goal of the structural systems skill activity is to evaluate students' abilities in various skills related to storage, concrete, masonry, plumbing, electrical work, fabrication, construction, building materials, ventilation, heating, and air conditioning. In recent years, we have primarily concentrated on the area of fabrication.

Students should be familiar with measuring tools, understand common welding symbols, and be able to interpret shop drawings.

POSSIBLE ACTIVITIES FOR THE 2025 EVENT

- Contestants will be asked to produce weldments using the SMAW process during the 2025 event. No other welding processes will be used during the 2025 event.
- Read and interpret a working drawing
- Accurately use a measuring tool
- Fabricate, modify, or repair a metal part.
- Identify, interpret, and work from industry-standard welding symbols
- Complete weldments accurately according to standard welding procedure specifications (WPS)

EQUIPMENT THAT WILL BE USED FOR THE 2024 EVENT

- Lincoln Electric MP 215i machine will be used to complete weldments with one or more processes (SMAW, FCAW)
- [Click on this link to download the MP 215i pdf.](#)
- The Lincoln Electric MP 215i machine is capable of all three processes (SMAW, FCAW).
- Oxy-fuel processes will **not** be included in the 2024 skill.

COMPETENCIES

- Select arc welding machines and accessories.
- Read drawings and welding symbols.
- Accurately use a measuring tool
- Select, assemble and check welding equipment and supplies.
- Operate welding equipment and accessories for metal joining operations.

SPECIALIZED SAFETY EQUIPMENT

- Long sleeves must be worn when welding or oxy-fuel cutting. No open-toed or mesh-top footwear shall be worn during the event. Shoes with cloth tops that welding sparks can burn through are also not permitted.
- **Equipment for welding, such as welding helmets and gauntlet gloves, will be provided. However, students are permitted to bring their own if they choose. Equipment such as basic**

welding helmets or goggles with a minimum of a shade 10 lens, fire-resistant welding jackets/shirt, gauntlet style welding gloves, welding leathers, and hearing protection devices, in good condition may be brought by each team.

- Hooded shirts do not qualify as a welding jacket. **Participants without proper PPE and welding attire will not be allowed to weld.**

AGRICULTURE, FOOD AND NATURAL RESOURCES CONTENT STANDARDS

- CS.03.04.03.b. Assess and demonstrate appropriate operation, storage and maintenance techniques for AFNR tools and equipment.
- PST.01.03.01.b. Analyze the situation and determine the best welding and cutting process to be used in metal fabrication.
- PST.01.03.01.c. Evaluate the quality of metal fabrication procedures (e.g., SMAW, GTAW, fuel-oxygen and plasma arc torch, etc.).
- PST.01.03.02.b. Assess and select the proper electrode for use in various shielded metal arc welding situations
- PST.01.03.02.c. Construct and/or repair metal structures and equipment using metal-fabrication procedures.
- PST.04.02. Performance Indicator: Determine structural requirements, specifications and estimate costs for AFNR structures
- PST.04.03. Follow architectural and mechanical plans to construct, maintain and/or repair AFNR structures (e.g., material selection, site preparation and/or layout, plumbing, concrete/masonry, etc.).
- PST.04.03.01.c. Select materials for a project based upon an analysis of the project and the quality of the materials.

SUGGESTED RESOURCES

- General references specified for the Agricultural Technology and Mechanical Systems CDE
- Welding for Modern Agriculture, Morton, C., 2017, The James F. Lincoln Arc Welding Foundation, ISBN 978-0-937390-12-2.
- Agricultural Technical Systems and Mechanics by Koel, L. et al, 2013, American Technical Publishers, ISBN 978-0-8269-3663-9.
- Modern Welding 11th Edition, Althouse, A., et al, 2012, Goodheart-Willcox Company, Inc., ISBN 978-1605257952.
- [ATMS Structures Recommendations 2024](#)