



2020 State Contest

MECHATRONICS

Description

Mechatronics is a career and educational discipline that combines the industrial skills of mechanics, electronics and computer-based controls with a team-oriented approach to problem-solving. Skilled Mechatronic technicians are required for the maintenance, repair, and operation of modern automated manufacturing systems. Because of the popularity of PLC controls in the industry, *new for 2020 is the addition of PLC exercises for schools at the secondary level (see below)*

Note: Please check the SkillsUSA National website for updated contest information and the SkillsUSA National Technical Standards <http://updates.skillsusa.org>

Eligibility (Team of 2)

Open to active SkillsUSA members enrolled in Mechatronics technology programs as the occupational objective. Where this program is not yet available, students may compete if they are enrolled in industrial electricity, fluid power technology, programmable logic controls (PLC) technology or industrial automation programs

Clothing Requirements

Class C: Contest Specific — Manufacturing/Construction Khaki Attire

- Official SkillsUSA khaki short-sleeve work shirt and pants
- Black, brown or tan leather work shoes
- Note: Safety glasses must have side shields or goggles (prescription glasses may be used only if they are equipped with side shields. If not, they must be covered with goggles).

[Clothing Classifications](#)

Knowledge Performance

The contest will include a 50- to-100-question written knowledge exam assessing general knowledge of Mechatronics technology. Questions pertaining to mechanics, industrial electricity, fluid power systems (pneumatic and hydraulic) and programmable controllers will be included.

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Skill Performance

The contest includes an oral assessment and multiple challenges, including but not limited to a troubleshooting and construction project. Teams of two contestants, in a timed event, will accurately and neatly perform system troubleshooting and repair a faulty machine system. In this event, general interdisciplinary knowledge of the individual technologies and interactions in an integrated system will be examined by the judges.

Contest Guidelines

1. The contest is a team-oriented event. Teams will consist of two contestants from the same school in the same division.
2. The contest will consist of various tasks selected from the list of standards and competencies as determined by the SkillsUSA Championships technical committee. Committee membership includes Festo Corp.
3. Teams can freely choose who performs tasks separately or together.
4. Contestants will be rotated through identical stations with time limits determined by the national technical committee.
5. The judging criteria and the points assigned will be determined by the difficulty of the task assigned.
6. The oral examination assesses the team's ability to effectively communicate the operation and behavior of Mechatronics systems or subsystems and to analyze a circuit diagram.
7. Contestants will be tested on familiarity with ISO symbols, interpretation of relationships between components, and ability to develop sequential operations.
8. Teams competing at the college/ postsecondary level will be required to write a PLC program. This necessitates each college/postsecondary team to provide its own PLC assembly and programming device/software (e.g., laptop computers or hand-held programming devices).

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Requirements for College/Postsecondary Team (new for 2020)

Supplied PLC Assemblies In addition to the previous list, the following are supplied by college/postsecondary contestants only:

1. One (1) PLC assembly. Teams competing at the college/ postsecondary level will be required to write a PLC program. This necessitates each college/postsecondary team to provide its own PLC assembly and programming device/software (e.g., laptop computers or hand-held programming devices). The PLC assembly must meet the following requirements:

- a. Power supply: The PLC must be capable of operation at 24VDC, or 120VAC. All 120VAC units must be wired ahead of time to an in-line ground-fault interrupter device and standard (NEMA 5-15P) 120VAC line cord. All 120VAC wiring must meet PLC manufacturer's requirements and follow standard industry practice. Judges reserve the right to disallow the use of any contestant-supplied equipment that presents a safety hazard. No line cords or 120VAC wiring devices will be supplied at the contest.
- b. PLC shall have a minimum of 16 digital inputs and 16 digital outputs.
- c. Input shall be 24VDC Sinking (inputs shall be activated by application of a +24VDC signal to the input terminal).
- d. Output shall be 24VDC Sourcing (outputs shall supply a +24VDC signal to the load when activated). All loads will be returned to the ground. Output capacity shall be no less than 0.5A, each.

Equipment and Materials Supplied by contestants

1. All competitors must create a one-page résumé and submit a hard copy to the technical committee chair at orientation. Failure to do so will result in a 10-point penalty.
2. A PLC or logic controller, including all necessary software and computer to program, said device. The controller must have a minimum of six (6) digital inputs and four (4) digital outputs. Input shall be 24VDC Sinking (inputs shall be activated by application of a +24VDC signal to the input terminal). Output shall be 24VDC Sourcing (outputs shall supply a +24VDC signal to the load when

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activated). All loads will be returned to the ground. Output capacity shall be no less than 0.5A, each. Check with your local vendor for suitable alternatives.

Equipment and Materials Supplied by SkillsUSA California

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