

# Agriculture Mechanics CDE

## High School (rev. May 2022)

### Purpose

The Agricultural Mechanics CDE selects and awards those students and teams that demonstrate: (1) mastery of the subject matter and skills common to the systems areas; (2) effective communication skills; (3) superior problem solving techniques; (4) an understanding of modern technology; (5) the ability to function as individuals and as team members working together.

### Eligibility

This event is open to all high school FFA chapters and FFA members in good standing. Members that have participated in a previous national event or previous state winning teams in this area are ineligible.

This event will be held during the Delaware FFA June CDE Week.

### Event Procedures

Due to the high cost of holding this event, a \$40 deposit is required per team to be submitted to the Department of Education at John G. Townsend, 401 Federal Street, Suite 1, Dover, DE 19901 by May 15. If a deposit is not received by May 15, the team will not be eligible to participate in the CDE. Checks are to be made payable to Delaware FFA. Checks will be returned following review of participation in the CDE.

#### A. Team Make-Up

Teams will consist of four members. Team ranking is determined by combining the scores of the four students from each team.

#### B. Equipment

##### 1. Needed- Safety Materials Students Must Provide.

Participants must adhere to the safe practices and work habits appropriate when performing required activities. Participants are responsible and must provide all personal safety equipment including:

- a. Industrial-quality eye protection: INDIVIDUALS MUST WEAR STYLE B (SEE BELOW) INDUSTRIAL-QUALITY EYE PROTECTION during the team activity and the skill/problem solving activities. Those with prescription eyewear that is not Style B must also wear safety glasses or goggles while participating in this event. Safety glasses do not have to be worn while completing the written exam. Acceptable spectacles or goggles must adhere to the American National Standard Practice for Occupational and Education Eye and Face Protection, Z87.1-1979 (or Z87.1-1968) and revisions approved by ANSI. Descriptions of style A, B, and C Industrial Quality Eye Protection are as follows:
  - i. Style A: NOT ACCEPTABLE for use in the event. These are safety spectacles without side shields. They are for limited-hazard use requiring only frontal protection. The addition of accessory side shields that are not firmly secured does not upgrade style A to a style B or C.
  - ii. Style B: ACCEPTABLE—Safety spectacles with wire mesh, perforated plastic or non-perforated side shields. The side shields shall be tapered, with an anatomical periphery extending at least halfway around the circumference of the lens frame. Industrial-quality eye protection for those not wearing prescription glasses shall be style B.
  - iii. Style C: NOT ACCEPTABLE for use in the event. Safety spectacles with semi-or flat-fold shield that must be firmly secured to the frame. Style C glasses do not provide maximum protection from the top and bottom angles.

- b. Clothing: Each individual shall furnish and wear appropriate clothing such as long pants and FFA t-shirt cotton shirt, coveralls, etc. for this event. Clothing must be in good repair and fit properly. Oversized or loose fitting clothing is dangerous around agricultural equipment and is not allowed. Long-sleeve welding jackets must be worn when welding or oxy-fuel cutting. No open-toed footwear shall be worn during the event. Participants must have helmets, shields, gloves, hearing protection, etc.
- c. Other Materials: Each participant must have a clipboard, two sharpened No. 2 pencils and a non-programmable electronic calculator. Calculators used in this event should be battery operated and silent.

**2. Participants will not be allowed to possess any personal electronic devices (i.e. cell phones, smart watches, air pods, etc) other than those approved by event officials. Participants who possess personal electronic devices without prior approval of the event officials will be disqualified from the event.**

**Tools:**

Basic Tools: socket set and wrenches, nut drivers, screwdrivers, torx screw drivers, pliers, and anything else you may need in disassembling the engine. Make sure you bring all specialty tools that are needed to fix the engine. Here is a list of specialty tools you may need:

Flywheel holder	Flywheel puller
Valve spring compressor	Spark tester
Flat feeler gauge	Compressor tester
Torque wrench	Spark plug gap adjuster

**Event Format**

The FFA Agricultural Mechanics Career Development Event is divided into the following five systems areas. Each system includes a broad range of information and performance skills common to agricultural technology and mechanical systems.

1. **Machinery and Equipment Systems:** repair and maintenance, materials handling, processing, adjustments, metal fabrication:
  - Torch Cutting:
    - ◇ 2 Students of the team will individually cut project with an Oxy-Acetylene or Plasma Cutting torch
  - 2022 **Plasma Cutting**
  - Welding:
    - ◇ The same 2 students that did the torch cutting will individually complete a SMAW or GMAW weld project (6011 welding electrode- 1/8" diameter) on 1/4" metal. When student is ready to complete scored weld, they are ONLY allowed to complete ONE PASS.
  - 2022 **SMAW Welding**
2. **Energy Systems:** mechanical power, chemical power, wind power, solar power, hydraulic power, engine operation, maintenance, trouble-shooting, repair
  - Engine Trouble Shooting & Work Order
    - 2 Students of the team will troubleshoot an engine together.
    - Even though there is a time limit, students do not gain or lose points on how quickly they fix the engine (there are no extra points for being the first to start the engine). Teams are scored by accurately finding and fixing the problems. They are also scored on whether or not the engine runs.
    - When the engine is "bugged" most problems are external. Be prepared to check the head gasket, valve-tappet clearance, ignition, carburetion, etc. You will not have to remove the sump for any of the problems.

- Each of the 2 students will individually complete a work order related to engine trouble-shooting.

**Engines:** Two team members will trouble shoot a Briggs and Stratton horizontal small engine (please make sure you start your engine before the CDE and it is in good running condition). Please bring a manual. Each team is responsible for their own engine, tools, and parts.

**Engine:** Model: 130G32-0022-F1  
**Parts: (each team needs to bring their own parts)**  
 Gasket Set: 591565  
 Sparkplug: 491055S  
 Operators Manual (optional)  
 Flywheel Key

4. **Structural Systems:** structures, storage, concrete, masonry, plumbing, electrical, fabrication, construction, building materials, ventilation, heating, air conditioning, or surveying  
**2022 Plumbing and Electrical:** 2 Students of the team will complete a problem and implementation evaluation skills to determine the best solution to the problem. This may be done using a computer and/ or outside.

**Written examination**

Each student completes an examination that consists of 25 problem solving/multiple-choice questions. There are 10 questions from each of the five agricultural technology and mechanical systems areas. Students will have 30 minutes to complete this portion of the career development event. The written exam is comprised of questions from the last three available years of National FFA CDE exams where available.

**Work Order**

Each individual will be expected to complete a work order based off of a scenario provided to them the day of the contest.

**Team Activities**

The individuals on each state team will work together and be evaluated as a team while solving multi-system agricultural problem(s) selected from the skills and problem solving of the five system competency areas. The specific problem scenario is presented to the team on the day of the event. Team members will utilize the materials and equipment provided to solve the problem(s) and prepare a computer generated report. Teams will organize themselves, assign duties and complete tasks together or separately depending on individual skills and abilities. Each team will receive a score, and each team member will receive one-fourth of the total team activity score.

Agricultural technology and mechanical systems theme for the career development event is on a five year rotation and is published and distributed by the National FFA Organization and posted at the following web site:  
<http://web.missouri.edu/~schumacher1/natcon.html>

**Themes**

The schedule for Agricultural Mechanics Systems themes for Delaware are:

2021	Animal Production Systems
2022	Processing Systems
2023	Plant Production Systems
2024	Integrated Pest Management

## Scoring

Event participants are evaluated as follows:

Members	Format	Total Poss. Points
4	Written Examination (25 points/member)	100
4	Team Activity (See theme for year) (25 points/member)	100
2	Small Engine Troubleshooting (50 point each/member)	100
2	Work Order (50 point each/member)	100
2	Welding (GMAW) (50 points/member)	100
2	Oxy Fuel Cutting (50 points/member)	100
2	Electrical Wiring (50 points/member)	100
2	Plumbing (50 points/member)	100
	Total Points	800

CEV Multimedia. LTD.

6. *Agricultural Engineering Technology*. (ASABE) Springer Science + Business Media, LLC.
7. *Mechanics in Agriculture*. Prentice Hall.
8. *Agricultural Mechanics Fundamentals and Applications*. Delmar and Thompson
9. *Modern Agricultural Mechanics*, V3. Prentice Hall.
10. *Developing Shop Safety Skills*. American Association for Vocational Instructional Materials.
11. *Power Tool Safety and Operation*. Hobar Publications.
12. *Practical Farm Buildings*. Prentice Hall.
13. *National Electrical Code* (latest edition). NFPA.
14. *Ag Wiring Handbook*. Rural Electricity Resource Council.
15. *Mechanical Technology in Agriculture*. Prentice Hall.
16. Industry websites

## Tiebreakers

### Team

The team activity scores will be used to break a tie associated with the team rankings. If a tie still exists, the combined written exam scores will be used to break the tie.

## Awards

Awards will be presented to individuals and/or teams based upon their rankings at the State Fair FFA Awards Breakfast. The first place team will represent Delaware at National Convention. The second place team will represent Delaware at the Big E.

## References

This list of references is not intended to be all-inclusive. Other sources may be utilized, and teachers are encouraged to make use of the very best instructional materials available. The following list contains references that may prove helpful during event preparation.

1. National FFA Core Catalog—Past CDE Material (<http://shop.ffa.org/cde-qas-c1413.aspx>)
2. Information specific to each annual event is available on the National FFA Agricultural Technology and Mechanical Systems Career Development Event web page