

# Agricultural and Industrial Diagnostics Career Development Event

Effective August 1, 2007

## Purpose

This Career Development Event (CDE) is an extension of the Agricultural Education classroom and laboratory. Additionally, this CDE serves as an authentic assessment designed to evaluate students' knowledge in recognizing and repairing malfunctions in agricultural and/or industrial power equipment. The skills Agricultural Education students employ in this CDE are the same skills required by agricultural and industrial technicians.

## Date and Location

District: Set annually by the respective District

State: Set annually by the Agricultural Education Service

## CDE Rules

1. A team consists of two individuals.
2. Each school may enter one team in the District CDE.
3. The first place District team will compete in the State CDE.
4. Two malfunctions will be placed on five different pieces of agricultural or industrial power equipment. Students will be expected to identify and repair these prescribed malfunctions. The malfunctions may include but are not limited to: fuel system, ignition system, electrical system, electronic system and hydraulic system. All malfunctions will simulate realistic failures to the extent possible by the contest officials.
5. Each team is allotted a maximum of twenty minutes per station.
6. The contest will use agricultural or industrial equipment that is over 30 horsepower and no more than ten years old.
7. The agricultural or industrial power equipment may be placed on a dynamometer upon the repair of the malfunction to determine the horsepower rating.
8. For uniformity between contestants, CDE officials will recheck all prescribed malfunctions.
9. The agricultural or industrial power equipment may be restarted after each team completes their time at that particular station.
10. Contestants are to locate, identify and repair malfunctions in order to restore proper operation. Under special circumstances, contestants may only have to locate and identify the malfunction.
11. A penalty will be imposed if an incorrect malfunction is diagnosed.
12. When all stations are ready, each station official will signal the event starter and event timer and a signal from the judges' platform will notify the teams to begin.
13. Contestants will not be required to remove the head or oil pan from any piece of equipment.
14. Non-contestants, including teachers, are not permitted in the CDE competition area. Any form of communication between non-contestants and contestants will result in disqualification of the team.
15. The CDE will be scored on proper diagnostic procedures, safety practices, the use of tools and equipment, and the sequence of diagnostic procedure. Credit will be awarded for unused time.
16. For safety purposes, contest officials must disable all power equipment (e.g. on jack stands, tires removed, on blocks, restrained, etc) to prevent accidental movement.
17. Contestants must supply their own hand tools. Contest officials are required to have specialty tools and equipment available (see suggested tool list). Portable test equipment is permitted.
18. Contestants must be dressed appropriately, including but not limited to clear, non-tinted safety glasses with side shields (Z87.1) and work shoes (no athletic or open-toed shoes are permitted).
19. Back-up equipment will be provided when possible. If none is available and equipment is disabled, all scores of all teams will be eliminated for the affected station.
20. Officials may indicate to students to consider specific systems.
21. Disqualification - contestants will lose all points at any station in which they have been disqualified. If the contestants are disqualified at two stations, the team is then disqualified from

the CDE. Reasons for disqualification include but are not limited to:

- a. Starting equipment while it is in gear
  - b. Breaking parts
  - c. Unsafe practices as determined by the judges
  - d. Communication with non-contestants
  - e. Removing of safety glasses without permission of judge
22. The CDE host must furnish fire extinguishers at each station.
23. The CDE host must post a work order at each station.
24. Prior to the start of each station, contestants will have three minutes to review the work order and to confer with the station judge on the pre-start up status (e.g. fluid levels)
25. At least 10 days prior to the date of the state CDE, the name of the school representing each district must be forwarded to the Agricultural Education Service by the District's CDE Advisory Committee member.

### Scoring

Five (5) Stations x 50 points.....	250 points
General Knowledge Exam (25 questions at one point each x two participants).....	<u>50 points</u>
Total Possible Team points.....	300 points

Ties scores will be broken by the highest combined team written test score and then by test score consistency and if need, the consistency between station scores.

### References

1. AAVIM Materials - Ohio Ag Ed Curriculum Materials Service Catalog, The Ohio State University.
2. John Deere Materials – Distribution Service Center, FOS Series, Tractors, Department F/WH, 1440 3<sup>rd</sup> Avenue, Moline, IL 61265

### Suggested Tools

This is a suggested list of tools. Students may request specialty tools to aid in diagnosing malfunctions.

Flashlight

Jumper wire

Digital multi-meter with a minimum of 10M $\Omega$  impedance (e.g. Fluke 88 Automotive Meter)

Battery: terminal puller and cleaners

Socket Sets:

- Standard: 3/16" through 1 1/8"
- metric: 7mm through 24 mm
- 6 & 12 point: regular & deep-well
- Ratchets: 1/4", 3/8", 1/2" and extensions

Torx wrench set and 14 Pc. Hex Key Set

Screwdrivers: 3/16" x 4"; 5/16" x 8"; #1 Phillips; #2 Phillips

Combination Wrench Set: 3/16" through 1 1/8"

Measurement: Feeler Gauge, Spark Plug Gauge, Standard Tire Gauge

Hammers: Plastic Tip, 16 Oz. Ball-Peen Hammer

Pliers: 6" Long Nose, 10" Locking, Diagonal Sidecut

5 Pc. Punch & Chisel Set

3/4" x 16' Tape Measure

Safety Glasses - non-tinted with side shields (Z87.1)

Miscellaneous: plastic drip pan, shop towels

### Supplemental Guidelines for District CDE

1. The district chairperson will select a District CDE committee. This committee is responsible for conducting the District CDE.
2. The committee will work with area tractor dealers and farmers in conducting the District CDE under the same rules as used for the State CDE.
3. Any District not conducting an elimination CDE may not enter a team in the State CDE.

# Agricultural and Industrial Diagnostics Scorecard

Team: \_\_\_\_\_ Tractor: \_\_\_\_\_

*Instructions:* Points are awarded to teams for the following categories and tasks completed. Maximum points per item are listed, but fewer points may be awarded.

**Safety (10 points)**

**Points Scored**

- 1. Safety glasses (2) \_\_\_\_\_
- 2. Safety procedures (2) \_\_\_\_\_
- 3. Safe equipment operation (neutral, park, etc.) (2) \_\_\_\_\_
- 4. Communication between judges & team members (2) \_\_\_\_\_
- 5. Cleanliness (2) \_\_\_\_\_

**Total Safety Points** \_\_\_\_\_

**Use of Tools/Equipment (10 points)**

- 1. Proper use of tools (2) \_\_\_\_\_
- 2. Proper use of the service manual/related material (4) \_\_\_\_\_
- 3. Proper use of diagnostic equipment (4) \_\_\_\_\_

**Total Tools/Equipment Points** \_\_\_\_\_

**Diagnostics (30 points)**

- 1. Verification of complaint (2) \_\_\_\_\_
- 2. Diagnostic procedure (6) \_\_\_\_\_
- 3. Location of problem # 1 (5) \_\_\_\_\_
- 4. Proper repair of problem # 1 (5) \_\_\_\_\_
- 5. Location of problem # 2 (5) \_\_\_\_\_
- 6. Proper repair of problem # 2 (5) \_\_\_\_\_
- 7. Explanation of faults to the scorer (2) \_\_\_\_\_

**Total Diagnostics Points** \_\_\_\_\_

**Subtotal Points** \_\_\_\_\_

*Instructions:* This section may **deduct** points for unsafe or unapproved diagnostic or repair methods. This includes unsafe oil or fuel handling techniques. Point deductions may be up to the maximum listed for each.

**Unsafe or Unapproved Methods in (15 points)**

- 1. Fuel systems (5) \_\_\_\_\_
- 2. Hydraulic/oil systems (5) \_\_\_\_\_
- 3. Electrical systems (5) \_\_\_\_\_

**Total Points Deducted for Unsafe or Unapproved Methods** { - \_\_\_\_\_ }

**Bonus Points:**

One point for each unused full minute (under 20 minutes) per station. Equipment must operate per judge's satisfaction before time points are allowed.

Time Started \_\_\_\_\_ Time Finished \_\_\_\_\_ Unused Minutes \_\_\_\_\_

**Total Bonus Points** \_\_\_\_\_

Judges: \_\_\_\_\_

**Total Station Points**

Judges: \_\_\_\_\_