AGRICULTURAL MECHANICS

The Agricultural Technology and Mechanical Systems Career Development Event (CDE) helps students develop technical knowledge and an ability to work with others to solve complex agricultural problems. The event is built around students learning and executing a "systems approach" – or the process of understanding how solving one problem influences others.

Individuals complete a written exam that covers five agricultural technology and mechanical areas: compact equipment, electricity, environment and natural resources, machinery and equipment and structures.

Students and teams that perform the highest in this CDE demonstrate a mastery of systems areas subject matter, effective communication skills, superior problem-solving techniques and an understanding of modern technology.

RULES AND REGULATIONS

1. A chartered FFA chapter may enter one team. A team may consist of **5 eligible members**. The score of the **4 high individuals** will be used to determine the team score. Anytime there are 2 members of the same chapter in any one practicum/station, they will not ever be allowed to meet together or communicate during the event. There will be no communication between any competitors during the events. Any infraction of this rule will be sufficient to eliminate the contestant from the event.

2. **Students must have the skills needed to participate in a safe and competent manner. **
3. Members are not required to wear Official dress.
4. The CDE will be developed from the following subject matter listed for each of the three subject matter areas:
   a. **AGRICULTURAL POWER AND MACHINERY**
   b. **AGRICULTURAL ELECTRIFICATION & SMALL POWER**
   c. **AGRICULTURAL CONSTRUCTION**

5. Each contestant must participate in the following events:

a. Skill activities will be outlined in September (see below for past rotational system outline). The Manufacturing model will be released in March of the CDE Year.
b. Written Examination of 25 questions and/or 5 problem solving questions will cover all subject matter areas as identified by the skill areas using the last three years of National Exams.

6. The CDE will be conducted as follows:

a. There will be a judges and advisors meeting before the contest starts.
b. Safety will be monitored by the superintendents, state staff, and industry representatives
c. Superintendents in collaboration with state staff & industry can dismiss students from a rotation for unsafe or incompetent actions, that student will then receive a Zero.
d. OA cutting torch bodies/heads are supplied and schools bring tips.
e. Each rotation will be 35 min including the test

7. Each contestant will be responsible for all personal safety equipment: safety glasses, welding helmet, welding gloves, welding jacket, closed toed leather shoes, and wearing long pants. Failure to have these materials when checking in/registering will result in students not being able to participate.

8. Each chapter is required to bring the following for each team member when appropriate for the practicum area: welding chipping hammer, brush, OA cutting tips, Tripod and transit, clipboard, torch head and either a 00 or 1 size tip, OA Goggles, Vice grips, Framing or speed square, compass, soapstone, drill bit, etc.

Failure to have these materials at the start of the event will result in students not being allowed to do the event that the equipment is needed for.

9. Contestants will be evaluated on performance in each of the following activities:

Written examination	50 points
Performance Skills at 50 points per area	300 points
TOTAL	350 points

The team standing will be based on 600 possible points earned by three contestants.

10. State Staff will work with the Career Development Advisory committee and/or Superintendent to identify the Agriculture Machine that will be the focus for the school year. Power options will be identified from the small, medium, large tractor power areas.

11. Safety: Industry values personnel who demonstrate safe attitudes and practices, individual and cooperative teamwork, high order thinking skills and problem solving, as well as the basic technical competencies associated with work.

Each contestant must follow recommended practices and work habits appropriate for the assigned activities.

- Any Contestant who fails to follow safety practices will be removed from that area of the event receiving a zero for contestants score. Contestants may rejoin in the next rotation.
- Second Safety offense will equal removal from the event completely with a zero score.

AGRICULTURAL POWER AND MACHINERY

1. Tractor Power – John Deere 5M Series
   a. Identify external parts of the tractor.
   b. Problem solving according to manufacturer's specifications
2. Agricultural Machinery – Towable Rears Fan Blast Sprayer
   a. Identify the parts of the current year's identified machine.
   b. Adjust and/or calibrate machinery.

AGRICULTURAL ELECTRIFICATION and SMALL POWER

1. Electrical Circuits (every year)
   a. Install a single pole, 3-way, switch loop and switch duplex receptacle
   b. Wire a sub panel with breakers, and 240 outlet
2. Electric Motors (even year's) - 2024
   a. Interpret motor nameplate data.
   b. Identify motors and parts
3. Small Engine Power (odd years) - 2025
   a. Identify parts of a small engine

b. Troubleshoot, evaluate electrical, governor and carburetor parts

AGRICULTURAL CONSTRUCTION AND SOIL AND WATER CONSERVATION

1. Repair and Maintenance (odd years)
   a. Recondition hand tools such as twist drills, chisels and screwdrivers
   b. Plumbing: Identify pipe, valves and fitting type - 2025
2. Soil and Water Conservation (even year's)
   a. Set up and level the instrument
   b. Record field notes for differential leveling
3. Metal Fabrication (every year)

a. Arc weld basic joints (butt, lap, t-fillet, vertical up, vertical down, horizontal bead and multiple pass t-fillet) using E6011, E6010 or E7018 electrodes of at least 1/4" metal

b. Mig welding basic joints (butt, lap, t-fillet, vertical up, vertical down, horizontal bead and multiple pass t-fillet) using mild steel or flux core electrodes

c. Gas Cutting: Cut mild steel including pipe
d. Plasma Cutting: Cut mild steel including pipe

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.

Individual

If a tie exists between individuals, the combined highest individual/activities scores will break the tie(s). If still tied, the highest written examination score will be used to break the tie.

Potential Tractor Word Bank

1. 3 point hitch
2. 3-Point Attachment Arm
3. 4 way hazard / warning lights
4. Air Filter
5. Air Restriction Indicator
6. Air Ride Seat Control
7. Alternator
8. Altimeter
9. Amp Meter
10. Battery
11. Battery Box Cover
12. Belts
13. Block Heater Plug
14. Bucket Release
15. Carburetor
16. Chassis
17. Climate Control's
18. Clutch Pedal
19. Cooling Fan
20. Cylinder Head
21. Diesel Exhaust Fluid Reservoir
22. Differential Lock Peddle
23. Dip Stick
24. Distributor
25. Door Latch
26. Draft Control Lever / Dial
27. Draft Links
28. Draw Bar
29. Engine Block
30. Engine Oil Dipstick
31. Engine Oil Filter
32. Engine Oil Pressure Gauge
33. Engine Temp. Gauge
34. Exhaust Manifold
35. Exhaust Pipe Cover
36. Final Drive Fluid Drain Plug
37. Flasher Lights/Signals
38. Foot Throttle
39. Front Axle
40. Front Axle Oil Level Dipstick
41. Front Counter Weight
42. Front Hydraulic Hose
43. Front Hydraulic Manifold
44. Front Steering Rod
45. Front Wheel Assist Lever / switch
46. Fuel / Gas Tanks
47. Fuel Filter
48. Fuel Injectors
49. Fuel Lines
50. Fuel Sediment Bowl
51. Fuel Shut-Off
52. Gear Selection Levers
53. Glow Plugs
54. Grab Rail
55. Hand Primer
56. Hand Throttle
57. Hydraulic Cylinder
58. Hydraulic fluid fill cap.
59. Hydraulic fluid level (spy glass /
60. dipstick)
61. Hydraulic Remotes
62. Ignition Switch
63. Injector Pump
64. Instrument Panel
65. Intake Manifold
66. Inter Cooler
67. Jockey Seat
68. Key Switch
69. Light Switch
70. Loader Joy Stick
71. Motor Mounts
72. Oil Fill
73. Oil Fill Cap
74. Oil Filter
75. Power Steering
76. Power Take Off (lever or switch)
77. PTO Control Lever
78. PTO Safety Shield
79. PTO shaft (540 / 1000 RPM)
80. PTO Shield
81. Radiator
82. Rear PTO Shaft
83. Rear Spot Lights
84. Rear Wheel Weights
85. Remote Hydraulic Operation Levers (CVC
86. valves)
87. Right and Left Brake Peddle
88. Rock Shaft height control (3pt)
89. Rock Shaft Links
90. Rock Shaft Stop Adjustment
91. Rockshaft Lift Arms
92. ROPS
93. Sediment Bowl
94. SMV emblem
95. SMV Sign
96. Spark Plug
97. Starter
98. Sway bars / Blocks / Chains
99. Tachometer
100. Tire
101. Top / center link
102. Tractor Misc Parts:
103. Trailer Electrical Plug
104. Transmission
105. Transmission Oil Cap Air Ride Seat Control
106. Transmission Oil Level Dipstick
107. Transmission Oil Temp

108. Transmission Shuttle Lever
109. Turbo
110. Valve Cover
111. Washer Fluid Reservoir
112. Weights

Potential Mower Word Bank

1. Access Door
2. Amber/Red Light
3. Ballast
4. Bracket
5. Conditioner Belt idler Tensioning Spring
6. Conditioner Rolls
7. Conditioning Belt
8. Converging Disk Driver
9. Converging Disk Fit
10. Converging Drum
11. Cutterbar
12. Cutting Height Adjusting
13. Cylinder Lock
14. Disk
15. Disk Driver
16. Disk Scraper
17. Disks
18. Drawbar
19. Drawbar Extension
20. Drawbar Shield
21. Drive Belt
22. Driveline
23. Driveline Flange
24. Driven Plate
25. Dust Cover
26. End Yokes
27. Fixed Driveline (swivel tongue)
28. Float Link Pivots
29. Float Spring Adjuster
30. Float Spring Adjuster
31. Front Doors
32. Gear Case Drain, Check and Refill Plug
33. Gear Case Sheave
34. Guage Shoe
35. Guage Shoe Extension
36. Half Moon
37. Hydraulic Hoses
38. Hydraulic Tilt Control
39. Idler
40. Impeller
41. Impeller Drive Belt
42. Impeller Drive Belt tension
43. Impeller Sheave
44. Impeller Tines
45. Inboard Yokes
46. Jackstand
47. Knife
48. Knife Fitting Hole
49. Knife Hardware
50. Knife Retainer
51. Knives
52. Lift Cylinder
53. Lift Cylinder Lock
54. Limiter Block
55. Locking System for PTO
56. Lower Doors
57. Mower Conditioner hydraulics
58. Oil Reservoir
59. Overrunning Coupler (swivel tongue)
60. Pedestal Shaft Yoke (equal angle tongue)
61. Pedestal Shaft Yoke (equal angle tongue)
62. Phase Cylinder
63. Pin and Retaining Pin
64. Platform Drive Gear Case
65. Platform driveline with overrunning yoke
66. Platform Float
67. PTO
68. PTO Driveline
69. PTO Driveline Slip Clutch
70. PTO Support
71. Raise Doors
72. Retaining Pin
73. Roll Conditioner Drive Belt Tension
74. Roll Drive Case
75. Roll Driveline
76. Roll Pin
77. Roll Pivots (roll conditioner)
78. Roll Pressure and Spacing Adjust
79. Roll Speed Change
80. Safety Chain
81. Selective Control Valves
82. Serial Number Plate
83. Swath Board Lever
84. Swath Board Position (Lever)
85. Swath Valve
86. Sway Blocks
87. Sway Blocks
88. Swivel Hitch Gear Case
89. Swivel Tongue and Two Point Hitch
90. Tail Light
91. Telescoping Hook-Up Guards
92. Telescoping hook-up guards
93. Timing Mark
94. Tine
95. Tongue
96. Tool
97. Tractor Drawbar (standard hitch)
98. Transport Lock
99. Transport Lock Lever

100. Turn Limiters
101. Unified inch bolt and screw torque valves
102. Upper Yoke
103. V-belt - 60-4
104. Warning Light
105. Wear Shield
106. Wear Shield for Kife bolts
107. Wheel Arm
108. Wheel Arm Pivots
109. Wheel Hardware
110. Windrow width Adjust
111. Yoke Ears

Potential Small Engine Word Bank

1. Air Filter
2. Air Cleaner
3. Bearings
4. Blower Housing
5. Brake & Stop Switch
6. Camshaft
7. Carburetor
8. Compression Rings
9. Connecting Rod
10. Cooling Fan
11. Crankshaft Gasket
12. Crankshaft
13. Cylinder Head
14. Exhaust Valve
15. Flywheel
16. Flywheel Key
17. Fuel Tank
18. Gasket
19. Grommet
20. Intake Manifold
21. Muffler
22. Oil Rings
23. Piston
24. Pull Cord
25. Pulley Spring Assembly
26. Shroud
27. Spark Plug
28. Shroud
29. Timing Gear
30. Valve Spring
31. Valve

Oregon FFA State Ag Mechanics CDE

Drill Bit Sharpening
(50pts)

Member Name:_____ Contestant #: _____

Chapter:_____

- Cutting Edge (10pts) _____
- Heel (10pts) _____
- Dead Center (10pts) _____
- Cuts (10pts) _____
- Safety (10pts) _____

Total Points:_____/50

State Ag Mechanics Surveying

Contestant Name: _____Contestant #: _____Chapter _____

A. Using a tripod, level, and grade rods placed on the course, determine the difference in elevation between Benchmark A and Benchmark B. Use the space below for field notes and write your answer in the space provided at the bottom. Report your answer to the nearest hundredth of a foot (0.00)

Station	Back Sight	Height of Instrument	Fore Sight	Elevation

Difference in elevation_____(35 pts, -1 pt for +/- every 0.01)

B. You have decided to pour a 20'x30' concrete pad and need the ground level to start with. You want all elevations to match the elevation of the corner at rod #1. On the lines below, indicate how much material you would add or remove to the nearest hundredth.

Corner #2 Add/Remove_____(5 pts, -1 pt for +/- every 0.01)
Corner #3 Add/Remove_____(5 pts, -1 pt for +/- every 0.01)
Corner #4 Add/Remove_____(5 pts, -1 pt for +/- every 0.01)

For Scoring Use Only:

Total Section A	Total Section B	Total A + B	(A+B)/2	Final Score

Oregon FFA State Ag Mechanics CDE
Welding Rubric
(50pts)

Contestant Name: _____Contestant #: _____Chapter _____

5 Components of Visual Inspection:

Circle one

Flat Face: Examine the face of the weld.

Yes No • Is the_ weld face flat or slightly convex?
A concave weld *can cause* centerline *cracking and a convex* weld *can cause the weld* to *weaken at the* toes.

Proper Placement: Look at the placement of the weld.

Yes No • Is the weld centered between the two pieces to be joined?
Yes No • Are the weld beads stacked from bottom to top?
A weld *that* is too *high* or too *low* in *the* weld joint *will* be *weaker.*

Fairly Uniform: Determine if **the weld is uniform and the proper size.**

Yes No • Is the weld uniform from beginning to end?
Yes No • Are the weld legs equal in size?
A weld with legs *that are* too small can *cause* the weld to *be undersized and* possibly too *weak.*
A weld with legs that *are* too big *will be oversized and may cause* too *much heat and* distortion.

Good Wash-In: Examine how well the weld is washed in.

Yes No • Is the weld washed in smoothly at each of the toes?
A weld with too little *wash-in often appears raised up with jagged* edges *along the* toes.
A weld with too *much wash-in has undercut that can cause a crack* to *form.*

Follow Weld Procedures: Reference WPS

Yes	No	Was the power source set up correctly?
Yes	No	Is the completed weld test cleaned, free of slag and spatter?

Each yes answer equals 10 points, for a total of 80 points. Weld score

Safety (20pts)_____

Total Score (100 pts) _____

Grand Total (Total Score divided by 2) _____/50

ALIGNMENT TO AFNR CONTENT STANDARDS & OREGON EMPLOYABILITY SKILLS

- Employability 01. Adhere to workplace practices
- Employability 02. Exhibit personal responsibility and accountability
- Employability 03. Practice cultural competence
- Employability 04. Demonstrate teamwork and conflict resolution
- Employability 05. Communicate clearly and effectively
- Employability 06. Employ critical thinking to solve problems
- Employability 07. Demonstrate creativity and innovative thinking
- Employability 08. Demonstrate fluency in workplace technologies
- Employability 09. Plan, organize, and manage work
- Employability 10. Make informed career decisions
- CRP.02.01 Use strategic thinking to connect and apply academic learning, knowledge and skills to solve problems in the workplace and community.
- CRP.02.02 Use strategic thinking to connect and apply technical concepts to solve problems in the workplace and community.
- CRP.04.01 Speak using strategies that ensure clarity, logic, purpose and professionalism in formal and informal settings.
- CRP.04.02 Produce clear, reasoned and coherent written and visual communication in formal and informal settings.
- CRP.04.03 Model active listening strategies when interacting with others in formal and informal settings.
- CRP.08.01 Apply reason and logic to evaluate workplace and community situations from multiple perspectives.
- CRP.08.02 Investigate, prioritize and select solutions to solve problems in the workplace and community.
- CRP.08.03 Establish plans to solve workplace and community problems and execute them with resiliency.
- CRP.11.01 Research, select and use new technologies, tools and applications to maximize productivity in the workplace and community.
- CRP.12.01 Contribute to team-oriented projects and builds consensus to accomplish results using cultural global competence in the workplace and community.
- CRP.12.02 Create and implement strategies to engage team members to work toward team and organizational goals in a variety of workplace and community situations (e.g., meetings, presentations, etc.).
- CS.01.02 Examine technologies and analyze their impact on AFNR systems.
- CS.03.02 Develop and implement a plan to maintain and improve health, safety and environmental compliance and performance.
- CS.03.03 Apply health and safety practices to AFNR workplaces.
- CS.03.04 Use appropriate protective equipment and demonstrate safe and proper use of AFNR tools and equipment.
- CS.04.01 Identify and implement practices to steward natural resources in different AFNR systems.
- ESS.01.01 Analyze and interpret laboratory and field samples in environmental service systems.
- ESS.01.02 Properly utilize scientific instruments in environmental monitoring situations (e.g., laboratory equipment, environmental monitoring instruments, etc.).
- ESS.03.01 Apply meteorology principles to environmental service systems.
- ESS.03.02 Apply soil science and hydrology principles to environmental service systems.
- ESS.04.02 Manage safe disposal of all categories of solid waste in environmental service systems.
- ESS.04.04 Compare and contrast the impact of conventional and alternative energy sources on the environment and operation of environmental service systems.
- ESS.05.01 Use technological and mathematical tools to map land, facilities and infrastructure for environmental service systems.
- ESS.05.02 Perform assessments of environmental conditions using equipment, machinery and technology.
- FPP.01.01 Analyze and manage operational and safety procedures in food products and processing facilities.
- FPP.01.02 Apply food safety and sanitation procedures in the handling and processing of food products to ensure food quality.

- NRS.01.04 Apply ecological concepts and principles to aquatic natural resource systems.
- NRS.01.05 Apply ecological concepts and principles to terrestrial natural resource systems.
- NRS.02.04 Examine and explain how economics affects the use of natural resources.
- NRS.03.02 Demonstrate cartographic skills, tools and technologies to aid in developing, implementing and evaluating natural resource management plans.
- PS.01.03 Develop and implement a fertilization plan for specific plants or crops.
- PS.03.02 Develop and implement a management plan for plant production.
- PS.03.05 Harvest, handle and store crops according to current industry standards.
- PST.01.02 Apply physical science and engineering principles to design, implement and improve safe and efficient mechanical systems in AFNR situations.
- PST.01.03 Apply physical science principles to metal fabrication using a variety of welding and cutting processes (e.g., SMAW, GMAW, GTAW, fuel-oxygen and plasma arc torch, etc.).
- PST.02.01 Perform preventative maintenance and scheduled service to maintain equipment, machinery and power units used in AFNR settings.
- PST.02.02 Operate machinery and equipment while observing all safety precautions in AFNR settings.
- PST.03.01 Troubleshoot, service and repair components of internal combustion engines using manufacturers' guidelines.
- PST.03.02 Service electrical systems and components of mechanical equipment and power systems using a variety of troubleshooting and/or diagnostic methods.
- PST.03.03 Utilize manufacturers' guidelines to diagnose and troubleshoot malfunctions in machinery, equipment and power source systems (e.g., hydraulic, pneumatic, transmission, steering, suspension, etc.).
- PST.04.01 Create sketches and plans for AFNR structures.
- PST.04.02 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.04.04 Apply electrical wiring principles in AFNR structures.
- PST.05.02 Prepare and/or use electrical drawings to design, install and troubleshoot electronic control systems in AFNR settings.
- PST.05.03 Apply geospatial technologies to solve problems and increase the efficiency of AFNR systems.