Mechanized Agriculture Industry Advisory Meeting
January 19th, 2024 @7:30am
COS Tulare B223

Meeting was called to order by Charlie Abee at 7:32 AM

Introductions and overview were conducted.

1) **Electronics and Electrical Systems**
    a. Ocsilliscope, pulse modulations: Piko scopes
    b. Schematics sprinkled through entire course (muscle memory)
    c. Multi-meter: speak it and display it
        i. Troubleshooting with multi-meter, not just how to use and what it reads
        ii. Relays- how they work?
    d. Troubleshooting is the main driver of course
        i. Laptop diagnostics & utilizing computer systems & OEM diagnostics tools
        ii. Relays, plugs/pins, wiring looms, controllers, ECU/ECMs, solenoids
    e. Solenoids
    f. Continuity – Chasing wires & tracking down broken wires in looms, utilizing multi-meter
    g. Schematics- how will students prove their understanding? How will practical application be implemented in the course? (Chad)
        i. Connectors info – testing for bad connectors & replacing them (diagnostics)
    h. CAN Bus: how & why they connect with each other
    i. Other:
        i. Solenoids -> elect over hydraulic & elect over pneumatic -> functionality, wiring & diagnostics
        ii. Sensors & comms to various controllers; ECM/ECUs; their functions & readings; wiring/connectors & diagnostics
        iii. Computer skills -> Excel, saving files & organizing files, generating reports, emails, etc.
        iv. GPS systems & Tractor Operators Center

2) **Power Equipment Service Industry**
    a. Computers, soft skills, employability certificate, OEM standards (ex: serial numbers, documentations details, pictures, accurate nots, bullet points)
    b. PTO, basic operating system
    c. Other:

i. Tires/Belts - direct vs friction drive; Track frames – idlers, mid rollers, drive wheels; Hi-Track vs low track; Wheel and track tractor spacing and gauge changes etc.
ii. Torque specs, torque & turn, etc.
iii. GPS systems & Tractor Opps Center (tractor Operator station, computer, display, etc.)
iv. Other Key Tractor Components: SCVs (service and functionality), PTOs, drawbar, 3pts, Ballast & Wheel Slip, Transmission types & functions, Poer management systems & settings, power beyond, controller settings
v. Writing service documents

3) Power Trains

a. CVT/IVT: hydrostatics
b. Hydrostatics drives -> include IVT, CVT, E23 (JD Powershift IVT combo trans)
c. When, where, why, timing, identify root cause
d. Verifying the repair
e. Complaint, cause, correction
f. Keeping eyes open for other needed repairs
g. Technician repair note each day after class (soft skills)
h. Lab write ups
i. GPS technology: Tremble, Raven, usage, troubleshooting, upgrades, CAN system
j. Muscle memory-take notes as removing parts, reverse order for reinstall
k. Schedule oil sampling- so important to gather these at the proper time. NOT after a repair. But consistent with the failure: water pump: EGR coolant sample
l. Fuel systems: failures fuel sample is a larger sample 12 oz (I think)
m. Engine/Power train- oil samples can be the difference between getting paid or not on a warranty clam
n. Hydrostatic transmissions
    i. In-depth review on Hydro ground drive systems, schematics, trouble shoot components
o. Connections -> various couple types (benefits of one over another per applications)
p. Effects of angle on shaft -> overhung load basics & how they relate to bearings & connection types

4) Power Equipment Air Conditioning and Heating Systems

a. Freon-where we been, where we at, where are we going**
b. Recovery machine, pressure systems
c. Pressures and temps
d. Manual gauges
e. Testing, troubleshooting, diagnosing and repairing AC systems

i. Manual gauges & recovery machines
ii. What are the pressures telling you and what's that mean (from troubleshooting standpoint)
iii. Refrigerant recovery and charging system -> different freon types

f. EPA 609 (requirement for other prognoses)
g. Troubleshooting
    i. Basics on what the system & readings are telling you (psi reading typ point to the issue)
    ii. Common failures -> plugged condenser, heater issues, no hot air, blower issue, etc.
h. Duncan Poly-AC Boards (need to schedule tour)

5) Power Equipment Diagnostic Testing and Fail Analysis

a. Knowledge of how to access OEM resources- where do you find specs?
b. One of the last courses taken*
c. Fluid samples: why important? What is it telling you?
d. Other:
    i. Questioning drivers/operators/owners to gather information
    ii. 3 C's concept -> complaint, cause & correction... retest
    iii. Troubleshooting on all systems: (using what they already learned in those courses)
        1. Engines
        2. Emission Systems
        3. A/Cs
        4. Powertrain
        5. Hydraulics
    iv. Fluid Sampling (reasons & importance)
        1. Type, proper procedures, contamination, timing
        2. Preventative failure – what elements are you seeing and what are they telling you?
            a. AI/Si - Dirt entry
            b. Ch/Fe/various metals
            c. Na – water or coolant in the engine?
            d. Fuel detection
            e. Etc.

6) Emission System

a. Need to add curriculum

7) Hydraulics

*Absolutely key in Ag industry, hydraulic boards are great, but get machines to work on

a. Key to curriculum
b. Different open systems, closed system, understanding importance
c. Understanding pressure and flow
d. Work on real tractors and implements*
e. What generates heat
f. Temp Guns- find issues
g. Hydrostatic drive values/ground drives
h. Use of flow meters, understanding flow rate
i. Component I.D.- different sizes, shapes, find it on the schematics then find it on the machine
j. Hydraulic Pumps Positive and Variable Displacement
    i. Different types – gear, vane, piston, hydrostat, bent axis
k. Pressure Control Valves -> relief settings and types & how they function & tie in troubleshooting
l. Other:
    i. Hydro Ground Drives – in-depth review of these systems *very key for Ag industry
        1. Charge PSI & Case Drains
        2. Closed vs open loop combo
    ii. Open vs closed loop systems
    iii. Flow vs Pressure basics -> what dictates them, how they related to each other, troubleshooting them via gauges, tachometer gun for testing speeds, etc.
    iv. Actuator types -> motor, cylinders, rotary actuators; how they affect Flow & PSI; different from pump
    v. Temperature and heat generation, where does it come from, how & its importance.

8) Diesel Engines

a. Theory and Operation
    i. Different configurations
b. Difference between Tier 1 vs Tier V Engine
    i. Emissions-particulate
c. Delta College has a solid Fuel & Emissions course
d. Heavier emissions curriculum
    i. Emission systems – SCR, EGR, PCV
    ii. Emission Systems -> different components, their functions, troubleshooting, etc.
        1. DPF, DOC, SCR, High Pressure common rail, series or variable turbos, EGR, etc.
        2. Delta PSI & Delta temp sensors codes and wiring

3. Regens and different levels

e. Fuel
    i. Fuels, fuel systems & alternative fuel types (LPG, Bio, Renewable, hydrogen, etc)
        1. Injectors, common rail (high pressure common rail), pressures, injector pumps, supply pumps, filtration, etc.
f. Lubrication System -> oil types, weights, purposes, sampling
g. Cooling System -> Thermostats, overheating, types of coolers, head gaskets, cooling ports & oil/water jackets in the block, operating temps and ranges, fan drives (& different types), Air to Air coolers, EGR systems
h. Engine Electrical Systems -> Sensors, ECU/ECM
    i. Most service calls are fuel and emissions and sensors (related issue)
i. Internal Engine Components
    a. Top & bottom end, pistons & rings, heads, gaskets, valves, cam & crank shaft, etc.
i. Incorporate small compact diesel engines

9) The advisory committee unanimously approved the curriculum with the emphasis to include their suggestions in course outlines. The committee also recommends the Skill Certificate Equipment Technician Level 1, Certificate of Achievement in Equipment Technician Level 2 and Associate's Degree in Equipment Technician.

10) Bakersfield College

a. Doing Top Tech CNH training program
    i. Level one training
    ii. Linder proposed
    iii. Review Curriculum
    iv. Possible Tour

11) Additional

a. Suggestion: adding farm power course, into certificates/AS
b. Pre-requisites: soft skills, computer skills, expectation (realistic ones), showing up on time & ready to work, talking to supervisors and being on the same page, staying off your phone.
c. Laptop navigation- tutorial LRC?? OEM standards for laptop use (is this available?)
d. Add Ag computers to certificate: email, saving file, flash drives, word, attaching files
e. Soft skills: time management, showing up on time, work expectations/durable skills
f. Tips for soft skills:

i. Interviewing the operator-finding out what went wrong, when it went wrong, and how it went wrong
ii. Verify the complaint- operate the machine and see the mode or mechanism of failure
iii. Identify the root course-trouble shooting, failure analysis, any additional casualty parts?
iv. Make the repair
v. Verify the repair

g. Service Reports: complaints, cause, correction
h. Causes start @7am/8am- all day course, 8-hour work expectations
i. Suggestion- second year T-TH all day
j. Employability certificate-tied to attendance

Meeting was adjourned at 9:00 AM