

## AG 220 - AGRICULTURAL POWER TECHNOLOGY

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COURSE DESCRIPTION: A course designed to develop skills in selection, operation and maintenance of small air-cooled engines, multi-cylinder engines, hydraulics, electric motors, and agricultural machinery and tractors.

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| UNITS OF INSTRUCTION                    | MINUTES OF INSTRUCTION |
|---|------------------------|
| Safety                                  | 235                    |
| Small Gasoline Engines                  | 1,880                  |
| Electric Motors                         | 235                    |
| Electrical Controls and Sensing Devices | 235                    |
| Agricultural Tractors                   | 940                    |
| Agricultural Machinery                  | 470                    |
| Hydraulics                              | 235                    |
| TOTAL MINUTES                           | 4,230                  |

### A. Safety

1. Identify safety equipment necessary for agricultural power technology
2. Apply basic laboratory safety practices
3. Describe safety practices necessary when using electrical equipment
4. Apply safety practices when using tractors, machinery or hydraulics

### B. Small Gasoline Engines

1. Identify the operating principles of the two-stroke and four-stroke cycle engine
2. Explain the function and operating principles of the fuel, lubrication, governor, and ignition systems
3. Select engine repair parts from manufacturer's parts catalog
4. Locate data in manufacturer's mechanics manual
5. Identify the use and function of engine repair tools
6. Select, safely store and use fuels and lubricants
7. Use engine overhaul equipment
8. Use engine measuring and testing tools and equipment
9. Assemble and adjust the fuel and ignition systems
10. Properly operate, adjust, check the ignition timing, engine speed, and carburetor adjustments of a small engine
11. Trouble-shoot and replace items such as piston rings, valves, needle valves, gaskets and ignition parts
12. Service and repair assessor equipment

### **C. Electric Motors**

1. Select motors based on type of application
2. Interpret motor nameplate data
3. Interpret motor wiring connection diagrams
4. Identify motor parts
5. Service the electric motor
6. Connect motor drives
7. Identify methods of providing motor protection
8. Select proper overcurrent protection
9. Trouble-shoot electric motor circuits
10. Wire a dual voltage motor to power source
11. Change the direction of motor rotation
12. Check running amperage and voltage of an electric motor

### **D. Electrical Controls and Sensing Devices**

1. Identify types of controls by nomenclature and use, including thermostats, humidostats, photoelectric cells, magnetic relays, timers, pressure switches, and time delay equipment
2. Set controls, such as timers and switches, for the desired performance
3. Use low voltage electrical control equipment
4. Interpret wiring diagrams
5. Select controls for electric motors from supply catalogs
6. Connect, start, and stop magnetic motor controllers
7. Install a timer circuit
8. Install a thermal delay relay control
9. Install a low voltage motor control system
10. Install switch control for starting 115 & 230 volt motors
11. Install a sensing device such as thermostat, humidostat, photoelectric cell, etc.

### **E. Agricultural Tractors**

1. Identify and describe the operating principles of internal combustion engines-- both spark ignition and diesel
2. Identify the daily service and care operations from the operator's manual
3. Identify the safe tractor operation practices for field and highway conditions
4. Identify the operating principles of the air cleaning, fuel and oil filtering and engine cleaning systems
5. Select, safely store and use fuels and lubricants for gasoline, LPG and diesel tractors
6. Identify the function and operating principles of tractor clutches, transmission, control systems, including brakes
7. Interpret the circuit diagram of the electrical and fuel injection systems of a diesel tractor

8. Interpret Nebraska Tractor Test information
9. Conduct pre-operation inspection of a farm tractor
10. Start, operate and stop the tractor engine properly
11. Use ignition test equipment including dwell meters, tachometers, and timing devices
12. Test and service the battery and battery circuit
13. Adjust drive belts
14. Service the cooling system
15. Test and service the charging and cranking systems
16. Install diesel fuel filters and bleed the fuel system
17. Adjust control linkages including brakes, clutches, and safety disconnects
18. Properly pack front wheel bearings

## **F. Agricultural Machinery**

1. Identify the locally used machinery in terms of tillage, seeding, cultivation, chemical application, and harvesting equipment
2. Identify safe machinery operating practices
3. Describe the operating and calibration principles of:
  - a. tillage equipment
  - b. planters
  - c. grain drills
  - d. field sprayers
  - e. fertilizer applicators
  - f. balers
  - g. combines
  - h. other specialized equipment
4. Locate adjustment data in operators' manuals
5. Identify and compute harvest losses
6. Determine field capacity of machinery
7. Prepare machinery for storage
8. Install, adjust, and service belt and chain drives
9. Make hitch adjustments on pull-type and mounted tillage tools

## **G. Hydraulics**

1. Identify the parts and functions of the hydraulic systems
2. Service hydraulic components
3. Operate and service hydraulically controlled machines