Diesel Hydraulics

This course is designed to provide students with in-depth knowledge and skills for servicing diesel hydraulic systems. Safety and proper tool use are emphasized throughout this course. As part of this course, students participate in servicing activities associated with hydraulic systems. This course must follow the guidelines and standards set forth by Automotive Service Excellence (ASE) and National Automotive Technicians Education Foundation (NATEF) minimum standards. Workplace Employability Skills Task lists should be incorporated into the diesel Program.

Career and technical student organizations are integral, co-curricular components of each career and technical education course. These organizations serve as a means to enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and broaden opportunities for personal and professional growth.

Safety

Students will:

1. Identify and practice general shop safety rules and procedures.
   - Utilizing safe procedures for handling of tools and equipment.
   - Identifying and using proper placement of floor jacks and jack stands.
   - Identifying and using proper procedures for safe lift operation.
   - Utilizing proper ventilation procedures for working within the lab/shop area.
   - Identifying marked safety areas.
   - Identifying the location and the types of fire extinguishers and other fire safety equipment.
   - Demonstrating knowledge of the procedures for using fire extinguishers and other fire safety equipment.
   - Identifying the location and use of eye wash stations.
   - Identifying the location of the posted evacuation routes.
   - Complying with the required use of safety glasses, ear protection, gloves, and shoes during lab/shop activities.
   - Identifying and wearing appropriate clothing for lab/shop activities.
   - Securing hair and removing jewelry for lab/shop activities.
   - Demonstrating awareness of the safety aspects of supplemental restraint systems (SRS), electronic brake control systems, and hybrid vehicle high voltage circuits.
   - Demonstrating awareness of the safety aspects of high voltage circuits (such as high intensity discharge (HID) lamps, ignition systems, injection systems, etc.).
   - Locating and demonstrating knowledge of material safety data sheets (MSDS).

Tools and Equipment

2. Identify tools and their usage in automotive applications.
   - Identifying standard and metric designation.
   - Demonstrating safe handling and use of appropriate tools.
- Demonstrating proper cleaning, storage, and maintenance of tools and equipment.
- Demonstrating proper use of precision measuring tools
  Examples: micrometer, dial-indicator, dial-caliper

**Hydraulic Systems**

3. Identify system type (closed and open) and verify proper operation.

4. Read and interpret system diagrams and schematics.

5. Perform system temperature, pressure, flow, and cycle time tests; determine needed action.

6. Verify placement of equipment /component safety labels and placards; determine needed action.

**Pumps**

7. Identify system fluid type.

8. Identify causes of pump failure, unusual pump noises, temperature, flow, and leakage problems; determine needed action.

9. Determine pump type, rotation, and drive system.

10. Remove and install pump; prime and/or bleed system.

11. Inspect pump inlet for restrictions and leaks; determine needed action.

12. Inspect pump outlet for restrictions and leaks; determine needed action.

**Filtration/Reservoirs**

13. Identify type of filtration system; verify filter application and flow direction.


15. Identify causes of system contamination; determine needed action.

16. Take a hydraulic oil sample for analysis.

17. Check reservoir fluid level and condition; determine needed action.

18. Inspect and repair or replace reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines.

**Hoses, Fittings, and Connections**

19. Diagnose causes of component leakage, damage, and restriction; determine needed action.
20. Inspect hoses and connections (length, size, routing, bend radii, and protection); repair or replace as needed.

21. Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers’ specifications; use proper procedures to avoid contamination.

22. Inspect and replace fitting seals and sealants.

**Control Valves**
23. Pressure test system safety relief valve; determine needed action.

24. Perform control valve operating pressure and flow tests; determine needed action.

25. Inspect, test, and adjust valve controls (electrical/electronic, mechanical, and pneumatic).

26. Identify causes of control valve leakage problems (internal/external); determine needed action.

27. Inspect pilot control valve linkages, cables, and PTO controls; adjust, repair, or replace as needed.

**Actuators**
28. Identify actuator type (single/double acting, multi-stage/telescopic, and motors).

29. Identify the cause of seal failure; determine needed repairs.

30. Identify the cause of incorrect actuator movement and leakage (internal and external); determine needed repairs.

31. Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage; determine needed action.

32. Remove, repair, and/or replace actuators in accordance with manufacturers’ recommended procedures.

33. Inspect actuators for dents, cracks, damage, and leakage; determine needed action.

34. Purge and/or bleed system in accordance with manufacturers’ recommended procedures.