BAKER COLLEGE
STUDENT LEARNING OUTCOMES

DSL 2910 Hydraulic Systems and Repair
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Assess General Hydraulic System Operation 1
   a. Identify system type (closed and open).
      i. Verify proper operation.
   b. Interpret system diagrams and schematics.

2. Assess General Hydraulic System Operation 2
   a. Perform system temperature, pressure, flow, and cycle time tests.
      i. Determine needed action.
   b. Verify placement of equipment /component safety labels and placards.
      i. Determine needed action.
3. Evaluate Hydraulic Pumps 1
   a. Identify system fluid type.
   b. Identify causes of pump failure, unusual pump noises, temperature, flow, and leakage problems.
      i. Determine needed action.
   c. Determine pump type, rotation, and drive system.

4. Evaluate Hydraulic Pumps 2
   a. Remove pump.
   b. Install pump.
      i. Prime and/or bleed system.
   c. Inspect pump inlet for restrictions and leaks.
      i. Determine needed action.
   d. Inspect pump outlet for restrictions and leaks.
      i. Determine needed action.

5. Examine Hydraulic Filtration/Reservoirs (Tanks)

a. Identify type of filtration system.
   i. Verify filter application and flow direction.
b. Service filters and breathers.
c. Identify causes of system contamination.
   i. Determine needed action.
d. Take a hydraulic oil sample for analysis.
e. Check reservoir fluid level and condition.
   i. Determine needed action.
f. Inspect reservoir, sight glass, vents, caps, mounts, valves, screens, supply and return lines.
   i. Service as needed.

6. Evaluate Hydraulic Hoses, Fittings, and Connections
   a. Diagnose causes of component leakage, damage, and restriction.
      i. Determine needed action.
   b. Inspect hoses and connections (length, size, routing, bend radii, and protection).
      i. Service as needed.
   c. Assemble hoses, tubes, connectors, and fittings in accordance with manufacturers' specifications.
      i. Use proper procedures to avoid contamination.
   d. Inspect fitting seals and sealants.
      i. Replace as needed.

7. Evaluate Hydraulic Control Valves
   a. Pressure test system safety relief valve.
      i. Determine needed action.
   b. Perform control valve operating pressure and flow tests.
      i. Determine needed action.
   c. Test valve controls (electrical/electronic, mechanical, and pneumatic).
      i. Adjust valve controls.
   d. Identify causes of control valve leakage problems (internal/external).
      i. Determine needed action.
   e. Inspect pilot control valve linkages, cables, and PTO controls.
      i. Perform needed action, i.e. adjust, repair, or replace as needed.
8. Examine Hydraulic Actuators
   a. Identify actuator type (single/double acting, multi-stage/telescopic, and motors).
   b. Identify the cause of seal failure.
      i. Determine needed repairs.
   c. Identify the cause of incorrect actuator movement and leakage (internal and external).
      i. Determine needed repairs.

d. Inspect actuator mounting, frame components, and hardware for looseness, cracks, and damage.
   i. Determine needed action.
e. Perform needed action, i.e. remove, repair, and/or replace actuators in accordance with manufacturers' recommended procedures.
f. Inspect actuators for dents, cracks, damage, and leakage.
   i. Determine needed action.
g. Bleed system in accordance with manufacturers' recommended procedures.
h. Purge system in accordance with manufacturers' recommended procedures.

Big Ideas

Path of fluid flow through the hydraulic system
Hydraulic pump functions
Hydraulic reservoir functions
Hydraulic control valve functions
Hydraulic actuator functions

Essential Questions

1. What forces drive the flow/pressure relationship in a mobile hydraulic system?
2. How is mechanical energy converted to fluid energy and back to mechanical energy in a mobile hydraulic system?

These SLOs are approved for experiential credit.

Effective: Summer 2021