Hydraulic System Diagnostics

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Case Drain flows from Motors and Pumps
Compensate pump or load up motor and measure case drains. Use flow meters to measure flow or low pressure gage or pressure transducer in the case measuring pressure that will increase with additional flow passing thru the same size drain line. These flows can vary for PC pumps being the highest when the pump come off of compensation, then high during compensation and lower as system pressure reduces.

Amp Draw of electric motor used with PC pumps
When PC pump are compensated, the electric motor amp draw is low. As leakage in the system increases, the amp draw will increase. Use amp meters or ampere transducers for measurements.

Excessive Noise from pumps
Cavitation and Aeration will increase the noise level of a pump getting louder as the pressure goes up. Cavitation increases the vacuum while aeration lowers the intake vacuum. Find air bubbles in tank for aeration and little to none for cavitation. Visual inspection of oil or photo optics to detect.
Diagnostic Indicators to Consider & Measure

Incorrect Pump flow

Swash plate position can be monitored for position that reads the angle indicating the GPM output. Using a position indicator, flow meter and pressure transducer can determine the operating condition of the pump.

Slow Motors

Measure case drain, same as pumps when under load or install gages in case to monitor case pressure. If the motor doesn’t have a case drain, look for a connection you can use to measure the flow with encoders or flow meters. Tachometers can measure RPM’s.

Pressure spikes

Use a poor mans gage set-up consisting of a dry gage without a snubber, a leak proof check and release ball valve. Cycle unit several times and the gage will settle down reading the maximum spike. Pressure transducers do a better job seeing the pattern.
Position of proportional valve spools, flow controls and cylinders
   LVDT, restrictive, and Temposonic type for devices can measure the spool position as well as the cylinder position.

Excessive Leakage in components
   Heat build up is a good indicator of leaking components. Infrared sensing guns, thermo transmitters can point out defective units.

Slow cycles
   Stop watches, part counters with programmable parameters.

Changes in Pre-charge gas pressures in accumulators
   Gages, pressure transducers, observing point when pump pressure starts to climb slowly or when discharging, the point where it suddenly drops to “0”. Sudden drop in fluid level could mean lose of pre-charge.
Fluid levels
Sight glass, float switches, level feedback transducers, can indicate external leaks, loss of accumulator pre-charge, position of a hidden cylinder’s position (higher or lower based on cylinders position).

Oil temperature changes compared to same ambient conditions
Temperature gages, infrared sensors, temperature transducers, can indicate leaking and failing components.

Filters
Pressure transducers, gages, differential pressure switches. They can indicate when to change if observed when flow is going thru them. Charting frequency of change outs can indicate if something is failing.

Oil Samples
Use history to chart changes. On line Particle counters. Can detect trends and developing problems.
Diagnosing load sense systems

Load Sense for Fixed Volume Pumps
Diagnosing load sense systems

Set Max Compensator to 2700 PSI
Set Load Sense to 300 PSI