



## Contamination Issues In Outdoor Hydraulic Systems

MIKE LAWRENCE

*Eaton Fluid Power Training*

By most accounts, 70%-80% of all non-hose related failures that occur in a hydraulic system are attributable to fluid contamination. Systems that won't generate pressure, contain weeping cylinder seals, slow down when under pressure, or have valves that won't seal, are all symptoms of fluid contamination.

The components most susceptible to contamination in the Structural Moving industry are:

**Pumps:** A pump rotating at 20-30 times per second while trying to maintain clearances of 1/2 to 5 microns (a micron is a thousandth of a millimeter) is susceptible to ANY particulate matter that is in the fluid. Abrasion and erosion will quickly place a pump in a weakened condition, unable to generate flow when subjected to a high back pressure.

**Relief Valves:** Erosion and pitting damage of the valve sealing surfaces leads to a valve that leaks, which in turn will rob your system of useful power that could be used to lift the structure. Varnish and sludge lead to erratic operation, which leads to someone fiddling with the setpoint. Before you know it, the system is out of adjustment, which could lead to damage and/or injury.

**Flow Dividing Valves:** These devices operate in a fine hydraulic balance, and any silt or varnish buildup will disrupt that relationship. The end result being that

flows are no longer being split properly and your structure may tilt.

**Cylinder Seals:** It is clear that a leaky cylinder piston and rod seal would result in a non-uniform lift. Luckily, the materials used to manufacture today's seal and pistons are extremely tolerant of the harsh environment in which the jacks are utilized. The true damage will not arise from a chemical attack attributed to sick fluid, but rather the abrasion occurring to the chromed rod and the resultant tearing of the seals.

Three of the most prevalent contributors to fluid contamination are:

**Dirty, moist air** entering the reservoir via the reservoir fill cap, which acts as a breather as well. Remember that the reservoir fluid level is going up and down as jacks are extended and retracted. This results in a reservoir breathing action. The air coming in must be adequately filtered and dried, or problems will arise (rust, emulsified oil, etc.).

**Ingressed contamination:** dirt, air, and water enter the system via cylinder seals and hose Quick Disconnect fittings. New components are a major culprit of contamination as well; fresh cut hoses that haven't been adequately cleaned and flushed, and hydraulic components being installed without an emphasis on cleanliness.

**New oil!** Fresh oil out of the barrel can easily be 8-12 times filthier than your hydraulic system cleanliness requirements allow. Fluid should always be transferred into your hydraulic system via a 10-micron filter at the least (3-mi-

cron is preferred). Barrel storage is a major culprit in new fluid contamination as well. A barrel stored right-side-up in the rain is destined for water contamination via the 'plugged' bungholes.

There are many procedures the user of these hydraulic jacking systems can do to minimize the contamination of their systems, thus increasing the life of their equipment. Regardless of your dedication to keeping a clean system, contamination issues will happen. The environment in which you work guarantees that! But increasing awareness of how the contamination gets in, should help you take a common sense approach to reducing the wear and tear on your system, as well as reducing downtime:

Clean those QD fittings long before connecting them. Better yet, take steps to keep them as clean as possible in the first place (use caps or plugs and put them on before you throw the hoses down into the mud!).

Either buy fluid that is guaranteed to have a fluid cleanliness level of at least ISO 18/13, or filter the oil into your reservoir as described earlier in this article. Fluid transfer products are available at your local Eaton or Vickers hydraulics dealer.

Keep the dirty, moist air out of your reservoirs. There are products available at a reasonable price from your local Vickers or Eaton hydraulics dealer, that will help towards this end.

Taking these steps involves an investment of time and money. Consider it an investment in an annuity with a high rate of return. Like the guy in the Fram commercials said, "Pay now, or pay later!" 