



## EXPECT THE UNEXPECTED

A customer of Hercules recently related an experience he had while repairing a hydraulic cylinder off of a piece of construction equipment. His story may help others.

A cylinder came into the shop and was not functioning properly. The repair shop determined that it was bypassing at the piston seal.

Upon disassembly and inspection, it was determined that the urethane seals on the piston had deteriorated and were bypassing. It appeared to be a simple repair of replacing the seals.

The cylinder was repaired, tested and placed back into service; another satisfied customer.

However, several days later the customer returned the same cylinder with the same complaint. Disassembly and inspection of the cylinder revealed the piston seals had basically turned to "goo" – according to the repairman.

At this point the repairman began asking the customer more questions about the machine. The repairman recalled reading an article about how urethane seals can deteriorate in the presence of high water concentrations.

Upon further investigation, the repairman determined that the heat exchanger had a leak in it. The heat exchanger was under higher pressure than the reservoir so the water/glycol mixture in the heat exchanger was leaking into the hydraulic oil and contaminating the hydraulic system. This water/glycol mixture contamination caused the deterioration of the urethane seals when combined with the heat generated by the hydraulic system. Remember, contamination may not be just dirt, sand, etc., it may also be air, moisture and fluids not compatible with the hydraulic fluid and /or seal compounds.

In reviewing the compatibility chart in the technical section of the Hercules Seal Catalog (pages 927 – 929) it shows that urethane provides "unsatisfactory" performance when used in water and "unsatisfactory" when used in anti-freeze.

Below is a picture of a urethane o-ring used in high concentration of water. As the percentage of water in a fluid increases, the effective operating temperature of urethane material drops significantly. So,

when a urethane seal is used in the presence of water, glycol and/or other substances with which it is not compatible in the presence of heat generated by the hydraulic system, the urethane material deteriorates rapidly.

