TECHNICAL UPDATE

The Hidden Costs and Dangers of Using Low Value Hydraulic Oil

Hydraulics are a part of everyday life; there is hardly a machine that operates without hydraulic power, including agricultural and construction machinery, conveyors, machine tools and process industry machinery, such as food, steel and paper manufacturing machines, even through to the aviation and aerospace industry.

In machinery such as this, high pressure hydraulic oil is circulated through the machine to the various hydraulic motors and cylinders. It is directly controlled by valves, distributed through hoses and tubes and then re-circulated via a filter mechanism back into the circuit.

The oil is the most important element in the hydraulic system and the key to ensuring the most cost effective utilisation of these assets.

Despite the critical nature of hydraulic oil, it is often viewed as a commodity item, with equal technical performance from the plethora of suppliers. In times of high oil prices, it is natural to explore the low cost options offered by suppliers. However, low cost hydraulic oil, especially those formulated from poor base oil or recycled material, will detrimentally affect the performance of a hydraulic system and actually add costs to your business.

The most important elements of a hydraulic system are:

- ✓ Pumps and motors
- ✓ Hydraulic cylinders
- ✓ Valves
- ✓ Circuit components (fluid tanks, filter systems, pressure tanks, etc)
- ✓ Seals, gaskets and elastomers

Hydraulic oil is designed to perform a key function within each of these elements to ensure optimum efficiency of machinery.

Pumps & Motors

Pumps and motors are used in hydraulic systems to transfer energy and are subject to great hydraulic stress of up to 700 bar pressure. As a result, the hydraulic fluid is designed to protect drive components and bearings from wear and corrosion and to reduce friction and energy requirements. Prevention of wear and accumulation of deposits provides for more efficient pumps and motors (longer life), less drag in the system and therefore less energy consumption. Poor quality hydraulic oils don't provide this protection and therefore add cost to the process.

Hydraulic Cylinders

Hydraulic cylinders transform hydraulic pressure into linear movement which then perform the mechanical work. Hydraulic oil is used to seal and lubricate the piston and guides, avoid "stick slip", minimise wear and avoid corrosion. Low cost hydraulic oil may possibly contain low values of anti-wear additives, increasing the propensity for scratching on the cylinders, reducing performance and increasing energy requirements. Incompatibility with seal materials may also cause costly leaks, lack of lubrication and ultimately system failure. FUCHS is a partner to leading seal manufacturers and additive manufacturers to ensure optimum performance and compatibility.

Valves

Valves are mechanisms that control the direction and flow of a hydraulic medium from a pump or pressure valve. The hydraulic oil in the valve is required to dissipate heat, reduce wear, minimise friction and avoid corrosion. As companies look to gain greater efficiencies from machinery, through longer fluid change intervals and higher thermal loads, hydraulic fluids must ensure that no deposits are formed in the narrow valves tolerances. Low cost oils show increased gumming, poor valve performance, reduced machinery performance and increased energy consumption.

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Circuit Components

These include fluid tanks, filter systems, pressure tanks and pipework. The hydraulic fluid must be compatible with all the materials used in these elements, including all coatings and paint finishes.

Seals, Gaskets and Elastomers

Every seal or elastomer in the hydraulic system is fully or partially exposed to the hydraulic fluid when the system is in operation. The hydraulic oil can influence the seal material insofar as it causes shrinkage or swelling. Elastomeric seals are influenced chemically by temperature, oxygen, water, additives and the oxidation by-products of the hydraulic fluid. It is therefore vital that the seals and hydraulic oil are compatible, whilst also protecting against wear, dissipating heat, reducing friction and avoiding the accumulation of deposits in crevices.

Conclusion

Hydraulic oil is much more than just a lubricant; it is a critical element in the efficient utilisation of machinery assets, performing a variety of functions including cleansing, cooling and protecting systems. Opting for a low cost alternative threatens the integrity of machinery and potentially adds cost to business processes.

With modern machinery, the integrity of the oil is even more important. Modern hydraulic systems with lower system volumes, increased pressures and higher temperatures, mean that the hydraulic oil must be circulated quicker; creating greater stress on the oil and increasing the necessity for a high quality fluid.

Only by using a quality fluid can companies ensure that they minimise energy consumption, maximise maintenance intervals, minimise component wear and replacement cost, maximise machine life and ensure the lowest "total cost" associated with lubricants. Low cost hydraulic oils may appear to offer cost saving potential, but the total cost is much more than just pence per litre. Low value hydraulic oil is a false economy!

FUCHS is the world's largest independent lubricant company and a specialist in the area of hydraulic oils. FUCHS understand how critical a hydraulic fluid is and only uses the finest quality base oils and additives to provide long term protection for your most valuable assets. FUCHS does not believe in compromising on quality and performance for our products, or for your machinery.

The primary functions of a hydraulic oil are:

- ✓ Transferring pressure and motion
- ✓ Transferring forces and movements when used as a lubricant
- ✓ Minimisation of wear to sliding surfaces under boundary friction conditions
- ✓ Minimisation of friction
- ✓ Protection of components against corrosion
- ✓ Dissipation of heat

All this whilst showing:

- ✓ High ageing and thermal stability
- ✓ Inactivity to materials
- ✓ Compatibility with metals and elastomers
- ✓ Good air separation
- ✓ Low foaming
- ✓ Good filterability
- ✓ Good water release
- ✓ Good shear stability

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