

FUTURE LUBRICANTS (2)

The application of GERnano in hydraulic-oils

In hydraulic-systems the use and application of the oils, especially the viscosity/temperature behaviour in comparison with lubrication in other machinery, has a more important significance.

Practical experience and issues in hydraulic systems

The last few years, hydraulic-systems have improved substantially. High-performance systems with hydraulic engines have been build. All these systems and its components have significant service requirements. The use of oil on the frictional surfaces should minimize the frictional losses. The diversity of the applied lubricants is large and the reliability of the hydraulic systems is becoming more important. The failure statistics show that 70% of the failures are related to the inferior state of the hydraulic oils.

The condition of the oil worsens due to:

- High temperatures
- Increased acidification of the oil
- Worsening viscosity due to high temperatures
- Contamination by abrasion, sludge, water-contents, foam formation, etc.

The wear of pumps, valves, and hydraulic cylinders is mainly caused by the poor lubrication characteristics of the hydraulic-oils, as well as the lacquer deposits on metal parts and the increased deterioration of the oil.

These effects cause additional heat which, on its turn, reduces performance

of the machine or engine parts and causes premature damage of the seals and also wear of the hydraulic tubing and hoses. Also, a higher temperature will cause an increased surficial tension of the frictional surfaces.

E.g. piston rods will discharge more hydraulic oil. When the working temperature of the hydraulic oil reaches more than 60°C, the lifespan of oil will decrease by a factor two when the temperature increase with an additional 10°C. Apart from that, the viscosity reduces, the oil losses increase, the performance decreases, the lubrication characteristics are worsening. In general the wear and tear increases, and the corrosive deterioration of the frictional surfaces and sealing will increase.

The oil temperature is crucial for a reliable performance of a hydraulic system.

The use of alternative oils or additives in order to optimize the performance of the oil won't improve the situation. The problems remain.

The solution is called „ floating crystals“

The way to go in improving the life-span of hydraulic oils is the change of the oil structure.

This can be achieved by the build-up of three-dimensional macro-structures and the adding of supra-molecular floating crystals. Their presence in oils starts a self-organizing process in the oil and gives the oil new characteristics.

This is achieved by GERnano®. GERnano® improves the performance parameters of the oil, lengthens the service intervals, reduces oil losses and increases the life-span of the oil.

GERnano® is an electrical polarized Nano-powder.

By testing various electrical polarized Nano-materials made of metal-oxides, we found in liquid hydrocarbons (e.g. Oil) the emerging of disperse system. In these oils, three-dimensional molecules are formed by self-organisation. These three-dimensional molecules consist of nanoparticles plus the attached oil-molecules. Macrostructures are formed (Colloid active substances), which display a surface cleaning effect due to their disperse structure. This results in non-linear effects like the improvement of the oil-viscosity as well as the increase of the oil-heat capacity.

Furthermore, an oil-regeneration process was observed, which also reconstructed the damaged oil-chains by the build-up of three dimensional oil molecules.

3 What is GERnano® and what is the effect of GERnano®

- GERnano® is a general purpose Nano-technical product, that through the self-organisation of the substances in oils, greases and pastes, leads to the build-up of a variety of macromolecular structures.
- The application of GERnano® ensures that the local viscosity of the oil in the friction zones increases, which leads to a substantial reduction of the oil-losses in pumps and valves. The line pressure increases to a nominal extend, the hydrodynamic friction zone is expanded and so the frictional losses reduced.
- GERnano leads to an atypical increase of the heat capacity of the oil. The working temperature falls up to 20°C. In the thermodynamic zones, a sturdy and damage free condition is given.
- GERnano® modifies the frictional surfaces and its surficial tension reduces. The wear lessens and GERnano® protects the frictional surfaces for electro-mechanical corrosion. The oil consumption reduces. The life-span of the lubricants can be increased up to three times.

The application of GERnano® in fluid carbon refineries doesn't alter the chemical and physical characteristics of the oil. The manufacturers certified specifications of the oil remain unchanged after the application of GERnano®.

ATTENTION: The application of GERnano® is only recommended in mineral or synthetic oil refineries. GERnano® should not be applied in hydrous and glycol containing oils!