

THE FUTURE OF LUBRICANTS (3)

The application of GERnano® in greases and pastes

The lubrication of plane bearings is normally done by greases which hold a few advantages against the usage of normal oil.

The application of GERnano® in oils, has been explained already in two other publications. (The future of lubricants 1 and 2)

The special advantages of greases in plane bearings is that no extensive heat is generated. Grease protects against corrosion, doesn't flow, hold its geometric form, that means wear is minimized and therefore a trouble free lubrication. However, the disadvantage of the use of grease in plane bearings is that its load capacity cannot be calculated in a reliable manner.

The life-span of plane bearings is substantially longer than the grease used in that same bearing. Especially at high loads, the recommended working temperatures are lower than the could be. However the actual wear of the bearing is mainly directed by vibrations, heat and other factors.

The behaviour of grease lubricated radial bearings is minutely described. (see W.J. Barz: Lubricating Greases, edition 500, Expert press) It describes that the type of grease and its characteristics have a special significance when used in bearings. The amount of lubricant and the service intervals are determined by the operating and environmental conditions.

However the most suitable grease should be determined by a sound field test.

In closed plain bearings, the life-span of the grease is mainly influenced by the operating temperatures. The life-span of lubrication with grease is normally around 20.000 operating hours at a temperature of 70 °C. However if the temperature raises up to 110 °C, the life-span reduces to around 3.000 operating hours and under very special conditions even below 300 operating hours. If we set the nominal rpm (n) in relation to the maximum rpm (N) the result is only 25%.

$$n / N = < 25\%$$

The goal now is to improve this relation. In that way the life-span will also increase and failures will be minimized. This will lead, especially in machines and aggregates, to substantial economic advantages.

Plastically deformable greases exist of two different components: Basic oil (65-95%) and thickening agents (5 – 35%). An increase of the lubricious characteristics can only be reached if we improve both the components at the same time. When we create a mixture of these components together with GERnano®, the elastic tension increases, and this new mixture holds improved characteristics.

The insertion of nano-particles in the thickening agent, leads to an additional, unchangeable binding component in the structure of the grease. At the same time an orderly structure of macro-molecules is formed (build from nano-particles and the oil molecules) and gives the oil additional features and ensure a better integration in the thickening agent. The admixture of GERnano® in greases starts a process of regeneration of its own structure, whereby the lubrication characteristics are guaranteed in a much broader pressure and temperature range and thus increases its lifecycle.

The consistent structure created by GERnano® gives the "new" grease long lasting characteristics:

- Expansion of the temperature range which increases the efficiency at lower as well as at higher temperatures.
- Substantially increased life-span.
- Improved adhesion and decrease of the friction inside the grease.
- A reduction of the resinification tendency.
- Reduction of the internal energy losses, wear and tear and vibration inside the plain bearings.

By the application of GERnano® the frictional surfaces are modified, the surface-tension as well as the electro-chemical corrosion are reduced. Hydrogen embrittlement of the bearing parts will be reduced.

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!