

# THE FUTURE OF LUBRICANTS (8)

## A dynamic self organisational process of the matter, as solution to overcome thresholds among common lubricants.

The requirements for new developed engines and gearboxes, etc. come across borders when we speak about the most important construction element, the lubricants. In a way, it limits the technical headway.

A nanotechnical product is already available to solve this problem. It is a universal control system that adapts the physical parameters of the lubricants to the real requirements under the most difficult operating conditions.

Lubricants to date are an addition of various components, which are specially composed according to their application. These should then guarantee the best lubricating properties in a wide range of different thermodynamic requirements for each friction parameter of the mechanism.

However, different thermodynamic conditions prevail in all stress areas determined by the design considering the external influences of each pair of frictional parts. The very demanding task of ensuring the best lubrication for all frictional areas (for example of a transmission) is not achieved by the existing lubricants.

The «best frictional conditions» guaranteed by the manufacturer deteriorate even after a short operation of the lubricant. The performance of the machine decreases, the wear increases, etc.

The solution of this fundamental task is to find a control mode for the parameters of the lubricant, which ensures the optimum lubrication in the different frictional areas of an engine or gearbox.

This task has been tackled by interdisciplinary cooperation between several branches of science, such as physical chemistry, solid state physics, colloid chemistry, nanotechnology, petroleum chemistry, tribology and others. The solution was unexpected. So far, the principle of „no hard materials“ had to be used in the production of the lubricants. The key to the problem is the use of modified nanomaterials, their dimensions correspond to those of oil molecules.

### The result is the GERnano® product.

GERnano is a world novelty. It is an autonomous product that can be used in all aggregates and lubricants. It is universal, can be used in all lubricants made from petroleum raffins. GERnano is a self-regulating lubricant that adapts itself to the different frictional areas.

The self-regulating capability of GERnano ensures the optimization of the parameters of lubricants in the event of changing thermodynamic conditions and loads in the different frictional areas of an aggregate.

The direction of optimization is aimed at the viscosity, heat capacity, detachment of deposits and the stabilization of the applied oil.

This ensures the stability of the hydrodynamic friction in different friction pairs of an aggregate over its entire performance and speed range. This adaptation process takes place by way of structural transformation. This is continuous, is not interrupted, and continuously assures the self-organizing equilibrium balance of the lubricant molecules into three-dimensional structures of different sizes. This directly affects the viscosity of the lubricant as well as its heat capacity (working temperature).

This process of self-organization is initiated by the modified nanoparticles of GERnano®.

A dynamic process of self-organization of the matter, while maintaining the balance, means that the forming structures are unstable and are constantly undergoing a change process. This process is affected by the following parameters:

- Life span of the structures.
- Time required for the formation of the structure, as well as its decay.
- The size of structures, as well as their proportions and quantity.

The total number of structured parts in the entire lubricant depends on changes in the thermodynamics (temperature, pressure and speed) in the frictional areas. The intervals that initiate the self-organization process are 1000 times faster (see Lubricants of the Future No. 5) than the response of the mechanics to this process. Thus, the self-organization is always able to deal with the changes in the friction areas.

GERnano is effective in all lubrication systems and frictional areas. It is non-destructible and there is no chemical reaction with the components of the lubricant used.

The application of GERnano can be carried out both for new and older aggregates which are in operation. When changing lubricants, GERnano is also removed so that a new application is necessary.

How differs the use of GERnano from previous lubricants and what are the additional properties of GERnano?

- Durable and thorough cleaning of the machines of deposits, regardless the operating condition of the lubricant.
- Adaptation of the local viscosity in the different frictional areas.
- Extensive increase of the heat capacity.
- Modification of frictional surfaces that minimizes wear and corrosion.
- Reduction of lubricant consumption.
- Reduction of the emissions in combustion engines.
- Vibration and noise reduction.

### Other advantages:

- Easy to use
- Fuel consumption reduction
- Extension of service-intervals