

# LOW ENERGY POLYMER DISSOLVING

The increasing demand for high-quality lubricants, scarcity of energy resources and changing market conditions are forcing lubricants manufacturers to look for new opportunities and processes to remain competitive with their products or to produce novel high-quality products. Customers active in the lubricants production field can now use a new, patented process: the LEPD (LEPD = Low Energy Polymer Dissolving) for gentle lube oil blending.

Light and heavy lube oils have different viscosities depending on the temperature. So-called multigrade oils were developed to ensure optimum viscosity across a wide range of operating temperatures. These multigrade oils combine good cold start properties with a good viscosity at high temperatures. This is achieved by adding viscosity index improvers (VI improvers). VI improvers are additives that improve the viscosity/temperature behavior of oils.

Polymers such as polymethacrylates, styrene-butadiene copolymers, etc. which are usually provided as solid polymer bales, are used as VI improvers. Based on the state of the art, these solid polymers are mechanically shredded in mixers and then dissolved in the lube oil. The polymers are exposed to very high shearing forces and temperatures of more than 100 °C. In addition, the required residence time is up to seven hours, which may lead to aging and turbidity of the lube oil and requires additional use of antioxidants.

With LEPD EDL offers a new, patented process for dissolving viscosity improvers. The innovation is that VI improvers are gently dissolved in the base oil without mechanical shredding. Compared to the state of the art, the advantages are significant – both in terms of plant operation and resulting product properties.

## TECHNICAL FEATURES

In the patented process, the polymer is gently dissolved in the base oil at a pressure of up to 10 bar and at temperatures below 100 °C in a liquefaction chamber under inert gas. The lube oil flows through the liquefaction chamber, thus getting enriched with polymer up to more than 50%. The enriched lube oil is mixed with other lube oil so that a polymer content of approx. 10% is achieved.



Fig. 1: LEPD pilot plant of EDL based in Leipzig, during the assembly

## ECONOMIC EFFICIENCY

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- Lower heat input due to lower process temperature
- Approx. 50% energy savings in the process compared to conventional plants
- Cost savings since additives such as antioxidants are not required
- Approx. 30% savings in time compared to the conventional process

## BENEFITS FOR CUSTOMERS

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- High dissolving rate under pressure at low temperatures
- Low dissolving time and gentle mixing
- No risk of turbidity and coking in the dissolving process
- High qualities of the final oil products
- Better lubricating properties of the product since the polymer chain structure is not modified during the gentle dissolving process.



Fig. 2: Final product



Fig. 3: LEPD pilot plant of EDL based in Leipzig

## APPLICATION TESTS ON SITE

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EDL offers a skid-mounted test facility on a rental basis to perform tests at customer's premises. This allows customers to test their own lube oil formulations conveniently on site. The test results obtained can easily be transferred to an industrial scale. Thus, customers get a guarantee for plant design and planning as well as for the requested product quality.