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Lubricant Expo & The Bearing
Show on stand 872.



Improving longevity and sustainability of tribologically stressed systems

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3 Functional performance of used lubricants – Qualification of lubricants with regard to their service life in terms of acceptable energy losses and damage risks – in comparison to the phosphorus content from chemical analysis

Both the selection and optimisation of friction systems offer potential for reducing friction losses and improving service life. The parameters “coefficient of friction” and “wear coefficient” as functional characteristics are a useful source of information. These values can be determined by tribologists in the laboratory with manageable effort within a short time and allow statements to be made about the functional performance of the materials and operating materials under consideration.

Functional performance of used lubricants

As already mentioned in Sequence 1 ([📄 Read more](#)), the friction and wear protection behaviour of used lubricants in their application in the field plays a significant role with regard to a sustainable and CO₂-neutral future. In the present application, used lubricants from wind turbines are compared in a quick screening test with regard to their wear protection and friction behaviour. A higher coefficient of friction stands for efficiency losses of the wind turbine, whereas higher wear indicates poorer wear protection and thus a higher risk of damage to gear and bearing components in the wind turbine.

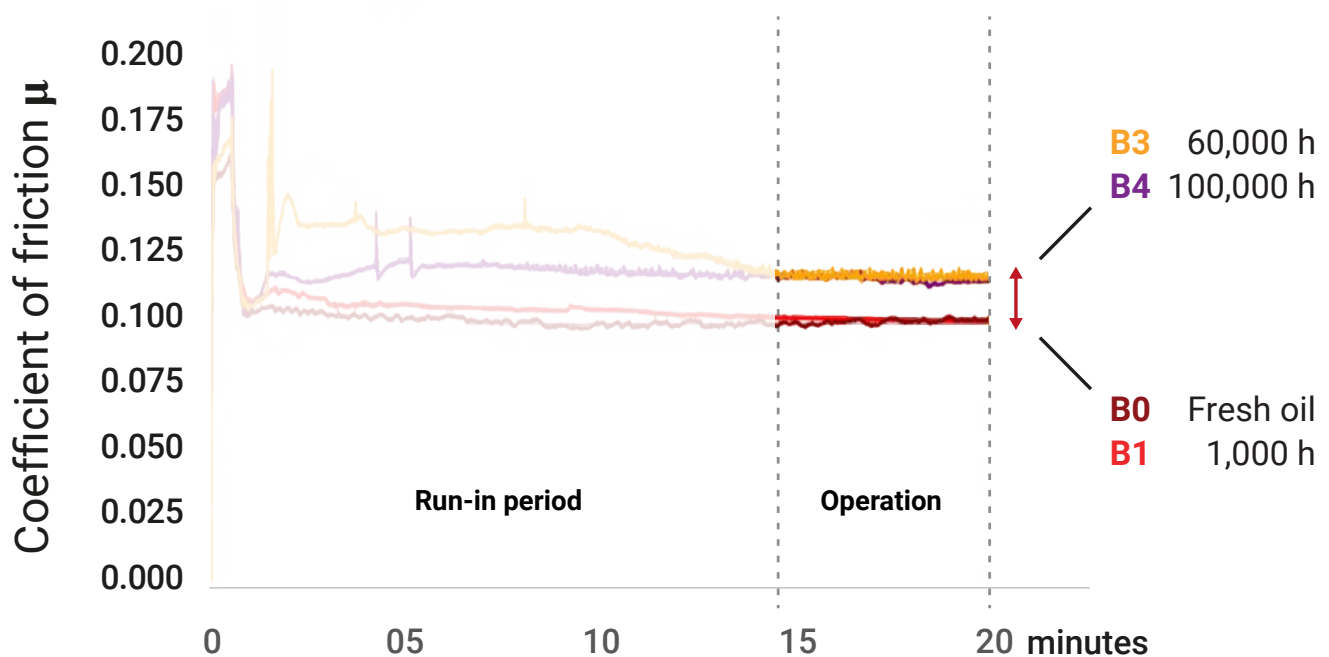
Technology

The ETS - Easy Tribology Screener - (Optimol Instruments) is an easy-to-use benchtop tribometer. By means of real-time measurement of coefficient of friction CoF and wear depth in high precision, the ETS shows the performance of a tribological collective even during the test ([📄 Read more](#)).

Test methodology and results

In the application described, oil samples with different operating times of the same product are compared with regard to friction coefficients and wear volumes.

It can be clearly shown that from a certain ageing condition - see here coefficients of friction of B3 and B4 – from around 60,000 operating hours - the friction level is significantly increased.



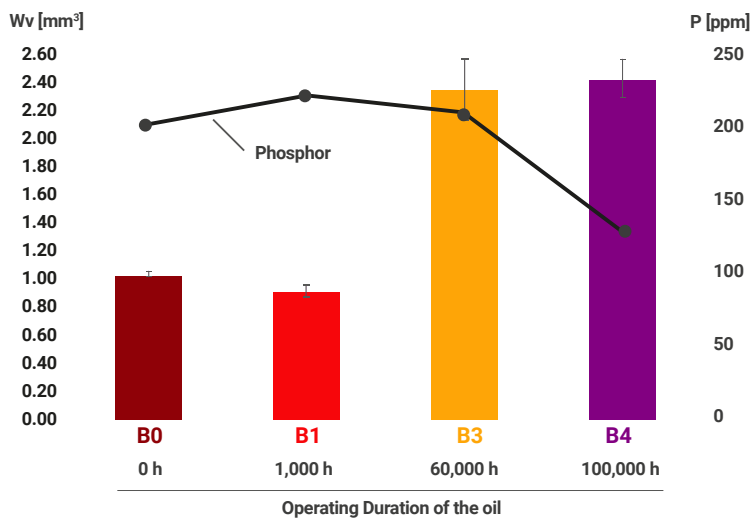
Comparison of the friction coefficients of oil samples of an identical gear oil at different operating hours.
 Samples: Gear oils, ISO VG 320 from wind turbine. ETS Test parameters:

- Running in 30 s at 50 N
- load = 300 N
- temp. = 120° C
- stroke = 2 mm
- frequency = 35 Hz
- **time = 20 Min.**

Likewise, the wear measurement after the end of the test also shows a clear differentiability and a significant increase in wear from B3 with approx. 60,000 operating hours (figure below).

A common assessment of oils in this context is the phosphorus content. Phosphorus is an additive component in almost all types of oil; among other things, it serves to reduce wear and friction. A decreasing phosphorus content is often used as an indication of a decline in the functionality of the oils. In the comparison of values of the used oils below, oil B3 would still be usable after about 60,000 operating hours, while the measured values for friction and wear already reveal the decreasing functionality. The direct measurement of friction and wear is therefore essential for the correct evaluation of the oils.

Wear values of all 4 gears oil – after 20 minutes



Comparison of the wear results of oil samples of an identical gear oil at different operating hours

For further information on this topic and/or your individual question, please contact us!

About Optimol

Optimol is a leading international company for the development and distribution of tribological model testing systems and test benches. We are a reliable partner for our customers with innovative technology, tried-and-tested solutions, competent advice and comprehensive services. With the world-renowned SRV® test system, we have created the industry standard for tribological model testing.

To find out more about tribology and Optimol: *Improving longevity and sustainability of tribologically stressed systems*

- 1 How tribometry contributes to net zero emissions - Selection of sustainable, low friction tribo-systems - Future moves and requirements for tribometric test methods
- 2 Save time and costs in product R&E and QA - Facing the challenges with ETS
- 3 **Functional performance of used lubricants - Qualification of lubricants with regard to their service life in terms of acceptable energy losses and damage risks**
- 4 Design of new nontoxic and water-resistant greases for water mixer taps
- 5 Reducing fretting wear in wind turbine bearings and gearboxes
- 6 Pre-qualification of materials with regard to fluid compatibility and reduction of fretting wear in the electric drive train in the stator-hairpin-housing system