Success Story
COMET

XTribology
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Industrial lubricants and special solutions

The Steel Industry – an Extreme Workplace for Lubricants

Also lubricants play a critical part in safe and efficient operation of steelworks. To ensure smooth operation, lubricants must withstand the most adverse conditions, such as extreme temperature changes, aggressive atmospheres, or large quantities of steam and dust. By selecting suitable lubricants, operating times can be extended many times over.

"Extremophile" Lubricants

The steel industry is a major economic factor in Europe. In order to ensure a competitive production in Austria, an efficient operation of plants with reduced service needs is mandatory.

Fig. 1: Sinter wagon (on the right) in operation

Use of lubricant oils and greases guarantees functionality of moving parts, such as in motors, pumps, gears, and bearings. Lubrication reduces energy consumption by minimizing friction, ensures plannable maintenance intervals by decreasing wear and corrosion, and provides cooling. Suitable lubricants thereby significantly contribute to minimal downtime and optimised maintenance procedures.

Under normal environmental conditions, the lubrication task appears easy. Within steelworks, however, there can be found a multitude of lubricating positions in extreme environments, which rapidly stress the lubricant up to and beyond the limits of its endurance. The stresses can occur in a variety of ways. In steelworks, these are primarily extreme temperature changes, chemically aggressive atmospheres, or large quantities of contaminating water (vapour) and dust. The common denominator is the negative effect on the functionality of a lubricant, and thereby on the entire plant.

Aging causes loss of lubricity. To avoid damage by aged lubricant, the lubricant must be replenished or replaced. Both cause costs by increased personnel deployment in addition to procurement as well as disposal efforts. The goal, therefore, is a maximised operating period at full level of functionality.

Fig. 2: Damaged bearing by coked lubricant grease (top bearing) and new freshly greased bearing (bottom bearing)

Benchmarking in the Laboratory

For correct selection of lubricating oils and greases the selection criteria and testing methods must be determined on a laboratory scale. The evaluation methods for greases in wheel bearings of sinter wagons, as well as oils in the sealing system of gas containers, were developed at AC²T.

Comprehensive knowledge of the operating conditions is essential for the correct evaluation, in order to enable safe and efficient operation by employing suitable lubricants. For wheel bearings of sinter wagons, short-term peak temperatures were identified as a major stress factor. Furthermore, field studies indicated the impact and importance of proper sealing. Resistance to humid, aggressive atmosphere is crucial for the sealant oils of gas containers.

Based on system analysis, application specific laboratory methods were developed. The results permit comparative performance evaluation and thereby well-founded selection criteria for the employed lubricants.

For instance, maximum operating temperature of greases could be differentiated via the coking behaviour (Fig. 3).

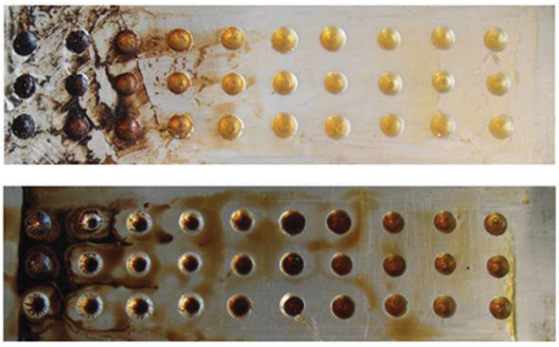

Fig. 3: Coking behaviour of a bad grease (top) and a good grease (bottom)

Benchmarking of several greases in the laboratory revealed 2 best candidates where one was selected for a field test to evaluate the laboratory results.

Impact and effects

The first application in a sinter wagon proved during the field test the extension of the operating period without replenishment from previously few months to 15 months. Additional technical measures by one of the project partners could further increase the operating time. Grease consumption and downtime could be reduced to approx. 1/6th, without increasing the probability of failure.
In the case of the sealant oil the immense effect of proper evaluation methods can be shown similarly. Through the targeted selection of an alternative product the operating time of the sealant oil could be increased by a factor of 3.

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