

## MSc Assignment

### Grease performance of heavily loaded slow-moving rolling and sliding contacts

A rolling element bearing is mostly lubricated with grease (~80%) which is composed of a base oil, thickener, and additives. Typically, around 30% of bearing's empty space is filled with grease if the bearing operates in medium to high-speed conditions. However, when the bearing operates in low-speed conditions, the complete bearing's empty space can be filled with grease. Huisman designs one of the biggest rolling element bearings (thrust bearing) in the world e.g., with the outer diameter of 30 meters. In this case, one bearing needs at least 1000 liters of grease. Furthermore, re-greasing intervals are prescribed to remove contaminated grease (wear debris, water, etc.) from the bearing, which further increases annual consumption of grease by factor of 2 or 3 more from the initial filling. Therefore, it is extremely important to understand what the best grease for such bearing is in order to minimize or completely eliminate re-lubrication intervals to ultimately reduce grease consumption and thereby reduce environmental impact and CO2 footprint.

**Approach** To understand, investigate, and select the best grease performance a detailed tribological investigation is required at University of Twente. This includes experimental investigation of multiple state-of-the-art fully formulated ExxonMobil greases. Laboratory level tests will be performed on a contact level (rolling/sliding and sliding contact). Friction and wear of contacting surfaces lubricated with different greases will be evaluated and analyzed using various techniques. In addition, the underlying physical principles will be investigated through tribological and metallurgical examinations.

#### Research group & Company

The **Surface Technology and Tribology** (STT) group will organize the research with a focus on surfaces and interfaces in an engineering context, as well as degradation mechanisms occurring at these surfaces and interfaces. The researcher will closely collaborate with **Huisman Equipment BV**, Schiedam, the Netherlands. Huisman will provide required support, knowledge, and materials for successful completion of this investigation as well as provide support for researcher's future career. In addition, company visits and work at Huisman is possible.

#### Tasks:

- Perform literature review on greases.
- Select suitable testing methods.
- Perform tribological tests.
- Perform surface analyses.
- Investigate the underlying physical principles.
- Discussing the results and writing a scientific report.



#### Contact:

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