

MSc Assignment

Development of Hybrid Aqueous Slewing Bearing for Offshore Applications



The extreme lifting capacity of today's offshore cranes is putting high demands on mechanical components, especially on rotating machinery such as bearings. For instance, Huisman's two biggest cranes with the highest lifting capacity in the world (Heerema Sleipnir) can lift up to 20.000 tons. Each crane is supported by the world's largest segmented slewing bearing with its diameter of 30m. Currently such bearing is all-steel bearing lubricated with grease. Due to the bearing operating under high load and low speed conditions, relatively high re-

greasing intervals are needed for reliable operation, ultimately leading to high grease demand. In addition, all-steel bearings show many tribological issues when operating in boundary/mixed lubrication conditions. In contrast, hybrid bearings have shown to outperform all-steel bearings at such conditions. Furthermore, hybrid bearing can operate grease-free e.g., completely dry at very low speeds or even under water lubrication if properly designed.

Approach To design and understand the optimal hybrid slewing bearing a detailed tribological investigation is required including a literature review on (hybrid) slewing bearing design, challenges, and requirements, followed by experimental investigation at University of Twente. Laboratory level tests will be performed on a contact or component level under dry and (sea) water conditions. Friction, wear, and corrosion of contacting surfaces 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 (hybrid) slewing bearings.
- Design challenges and requirements.
- Select suitable testing methods.
- Perform tribological tests and post-test analyses.
- Investigate the underlying physical principles.
- Discussing the results and writing a scientific report.

**Contact:**

PE Tribology R&D and Guest Researcher at UT Dr. Aleks Vrčec, email: avrcek@huisman-nl.com
Prof.dr.ir. M.B. de Rooij: m.b.derooij@utwente.nl