

Rotary Lip Seals: A Misaligned Approach

Xavier Borrás
University of Twente

Abstract:

Research on rotary lip seals have been carried out for more than 50 years. As often occurs in tribology, first the mechanical component is proven successful and later the engineers have to figure out why and how it is actually working. Rotary lip seals are not an exception. Up to the date, the working principle behind rotary lip seals remains unveiled and a handful of hypothesis are found in literature. Nevertheless, the generally accepted theory relies on the microscopic distortion of the surface asperities to explain the main characteristics observed in rotary lip seal, i.e. the presence of hydrodynamics and the upstream pumping. However, that theory assumes a perfectly concentric seal-shaft operation which, in practice, seldomly occurs. This research focuses on the large stern tube seals used in sailing vessels where misalignment is inevitable. Due to that, this study approaches rotary lip seals from a macroscopic standpoint and explores the consequences of a wedge formation when the seal-shaft nominal parallelism is lost.

Bio:

Xavier Borrás is a MSc Industrial Engineer specialized in sealing technology. He recognized early on the importance of focusing not only on the development of renewable energy sources, but also efficiently using the energy produced. It was no surprise he ended up in tribology. In 2012, Xavier obtained his MSc in Industrial Engineering at the Polytechnic University of Catalonia specializing in mechanics. He carried out his thesis on spring-supported thrust bearings for water turbines at the Luleå University of Technology. The model he developed was later used by Vattenfall Hydropower. Pursuing his passion for green technology, he moved to Gothenburg to work on the piston rod seals of a Stirling engine for solar power and landfill gas applications. Xavier joined the University of Twente in 2016 to develop a PhD on the performance of stern tube seals when operated with state-of-the-art environmentally acceptable lubricants. Between his passions there is a special place for testing skin tribology on the climbing wall. He still finds time to manage tribonet.org an informative blog about tribology with more than 10.000 visitors per month. You can reach him at f.borrasubirana@utwente.nl.

