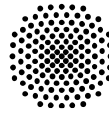


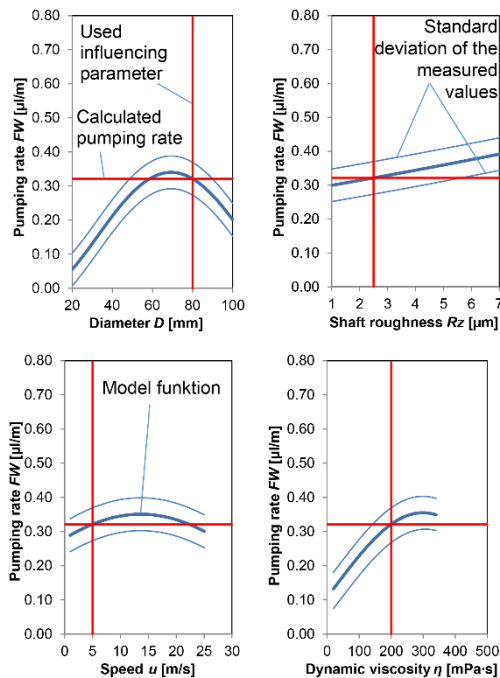
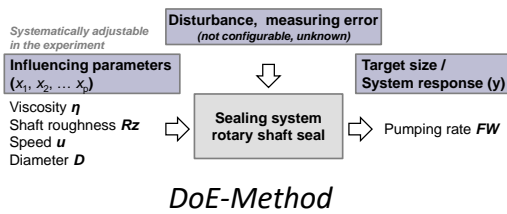
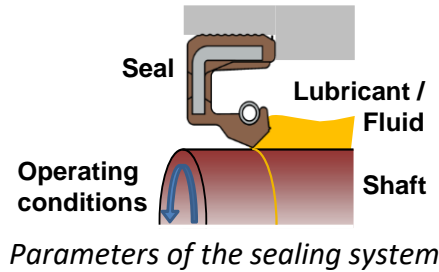
Research Project: Calculable Sealing Quality II

Computational Estimation of the Sealing Quality of Rotary Shaft Seals considering System Parameter Influences II

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Description of the pumping rate with the empirical calculation model

Background

Rotary shaft seals are complex tribological systems (seal, lubricant/fluid, shaft surface, operating conditions). The design of a rotary shaft seal requires a lot of experience and a high experimental effort. Essentially, the back pumping capability of the system determines the sealing performance. The back pumping capability can be measured and specified by the pumping rate. Thus, the pumping rate is an appropriate characteristic to describe the sealing performance or the sealing quality and can be used in system design.

Project Goal

The project goal was to optimise and to extend the empirical model for calculating the pumping rate for mineral oils, which was developed in the predecessor project (IGF-No.: 16402 N/1). Special focus was placed on synthetic oils and practically relevant operating conditions (e.g. internal pressure, static and dynamic misalignment, low temperature range).

Results

- Empirical models for pumping rate calculation by pumping rate measurements and statistical evaluation by means of „DoE“ (design of experiments) for sealing systems with:
 - Lead free, plunge ground shafts
 - Diameter between 20 and 100 mm
 - Standard NBR/FKM seals (Freudenberg)
 - Mineral oils and synthetic oils based on polyglycol and polyalphaolefin
- The long-term behaviour of pumping rate over 1000 h with synthetic oils: no clear statement about damage progress or life span
- Pumping against pressure: pumping rates tend to decrease, as pressure increases up to 0.5 bar
- Static and dynamic misalignment up to 0.3 mm: various, weak tendencies depending on misalignment and oil-elastomer combination
- Low temperature: pumping rates tend to decrease, as temperatures decrease down to -20 °C

Supported by:



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