Research Project:
Wetting Mechanisms and Rod Seals

Influence of wetting mechanisms on the tribological behavior of reciprocating rod seals

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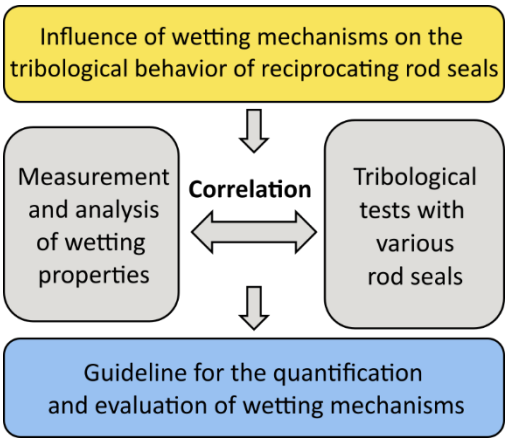
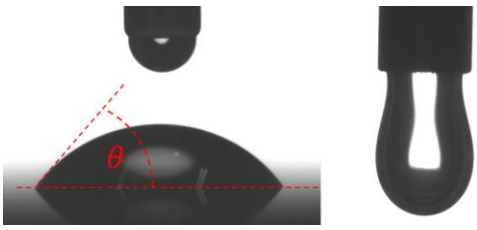
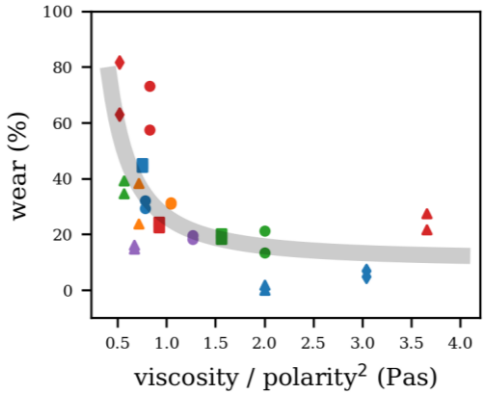


Approach



Analysis of wetting properties



Wear Tests

Motivation

The chemical composition of lubricants influences the operating behavior of reciprocating rod seals. Biodegradable or flame-retardant lubricants behave differently than conventional mineral lubricants, even though they have the same viscosity. The reason for that is assumed to be the wetting properties of the sealing system which influence the lubrication conditions. Empirical studies on rotary shaft seals have already shown an influence of wetting mechanisms on friction, leakage and wear. Up to now, specifying suitable combinations of oils (lubricants) and sealing materials still requires time-consuming and costly empirical tests of trial-and-error.

Approach

In this research project, correlations between the operating behavior of rod seals and various wetting properties were investigated experimentally. The research work carried out can be divided into three parts: analysis of wetting properties, friction measurements, wear tests.

Conclusions

A significant influence of the lubricant's wetting properties on friction and wear of rod seals has been found.

The friction behavior of the sealing systems can be mapped as a function of viscosity and sliding speed. It is remarkable that silicone oils and sealing rings with lower surface energy resulted in lower friction.

A new parameter including the viscosity and polarity of oil is proposed to predict the wear of rod seals. With low viscosities and high polarities, the wear of rod seals increases significantly.

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