Research Project Alternative Shaft Surfaces

Influence of shaft surface structures on the function of a radial shaft seal

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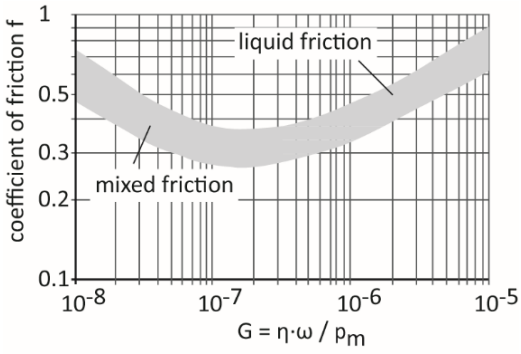
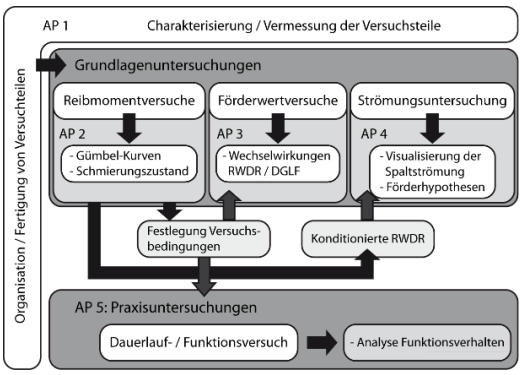
Belt-ground surface with closed structures running around the circumference



Lubrication condition of the sealing system by means of Gümbel number diagram



Solution path

Motivation

Shaft countersurfaces in the radial shaft seal system are plunge ground as standard. With the aim of reducing costs in shaft production, newer, faster and more cost-effective manufacturing processes are increasingly being used.

Background

With these "new" surfaces, problems often occur with radial shaft seals in the form of leakage and shortened service life due to increased wear, for example. The causes and mechanisms leading to these problems have not yet been sufficiently investigated. Therefore, in this research project the influence of such manufacturing processes (e.g. superfinishing, vibratory grinding, belt grinding, roller turning, roller burnishing, peeling, tangential and rotational turning) on the resulting surface topography and on the functional behavior is investigated. The investigations of the functional behavior include analyses of the lubricant film structure, conveying and wear behavior as well as tests on the function of the tribological system radial shaft seal.

Expected results

- Identifying and explaining physical mechanisms of operation between sealing ring and alternatively manufactured shaft surfaces
- Determination of application parameters for reliable sealing with alternatively manufactured sealing mating surfaces
- Establishing an investigation methodology for testing the suitability of a surface as a sealing mating surfaceZiel des

Approach (für Lösungsweg)

- Extensive metrological analysis of the old-manufactured seal mating surfaces
- Investigation of the frictional torque caused, the wear and conveying behavior as well as op-tical investigation of the flow in the sealing gap
- Correlation of the surface parameters with the test results to determine application limits