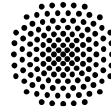


## Research Project: SmartSeal

Intelligent shaft seals through 3D-MID sensor integration

Contact: Christoph Olbrich, Simon Feldmeth



**University of Stuttgart**  
Institute of Machine Components

### Motivation

Rotary shaft lip-type seals often fail due to overheating when excessive frictional heat is generated in the contact area of the sealing system and/or this frictional heat is poorly transferred to the surroundings.

### Initial situation

To assess the risk of thermal damage, the temperature in the contact area has to be determined. So far it is determined either through complex simulations, rough approximation methods, or experimentally using complex measuring systems.

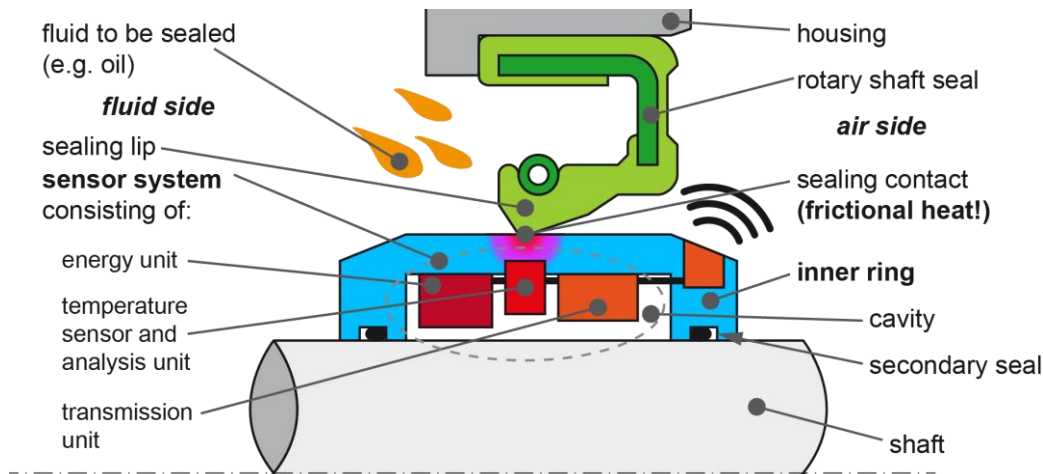
### Desired results

The goal of the research project is to integrate a sensor system into a shaft sleeve using 3D-MID technologies. This sensor system determines the temperature in the contact area of a shaft seal without compromising the sealing function. The measurement results are intended to be transmitted wirelessly and in real-time to an evaluation unit.

### Approach

The research project is conducted in collaboration with the Institute for Factory Automation and Production Systems (FAPS) at the Friedrich-Alexander-University in Erlangen-Nuremberg and is split into the following packages:

- Conceptualization of the sensor
- Determination of the temperature distribution in shaft sleeves through simulation and existing measurement devices to optimize sensor placement
- Production of prototypes using 3D-MID technologies and testing on the test bench under harsh operating conditions
- Design and integration of a signal conditioning and transmission unit for the sensor system
- Production of a complete functional prototype and testing on the test bench



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