



Displacement measurement in tribology testers

Amongst other things, the Institute for Tribology and Energy Conversion on Machines (ITR) in Clausthal builds test rigs for testing the physical limits of plain bearings. In doing so, ITR utilises eddy current sensors from Micro-Epsilon for various measurement tasks. For example, a water test rig that simulates the friction forces on plain bearings for water lubrication and a Hydropuls®-tester that adjusts the load on automotive plain bearings has already been devised. The tribological, flow mechanics and rotor dynamic characteristics of the plain bearings are tested using a high-performance test rig, which obtains the maximum rotational speeds of the measuring shaft.

The position of the test bearing case and the relative movement between the rotor and the test bearing is detected by the test rig using eddy current displacement sensors. The bearing gap between bearing surface and rotor is also measured using eddy current sensors. For this, 22 channels are integrated in the test rig structure. The miniature eddyNCDT sensors with 0.5mm measuring range are used for this task, due to their high frequency response and resolution. Another important criterion is the small installation size. Therefore, it is possible to set up measuring points in very restricted installation spaces without any disruptive modification of the test design. The high environmental compatibility of the sensors is also crucial for the selection of eddy current sensors: oil or water in the measuring gap, high temperatures or strong electromagnetic interference fields.

Sensors are located in the housing in order to measure movements of the shaft. The sensors measure onto the plain bearing and monitor the lubrication film between housing and bearing. Integration in the bearing is also possible, whereby the lubrication gap between bearing and shaft is measured. Here, the sensors are continuously pressurised with water or oil. Corresponding pressures during a test run do not influence the measurement results.

Reasons for choosing the system

- Very compact sensor design
- Proven use on numerous test rigs
- High resolution and accuracy
- Not sensitive to dirt and electromagnetic fields

Ambient conditions

- Medium: Oil, water or air
- High pressures
- Very limited space installation options