CRB test rig

Film thickness measurement in grease lubricated cylindrical roller bearings

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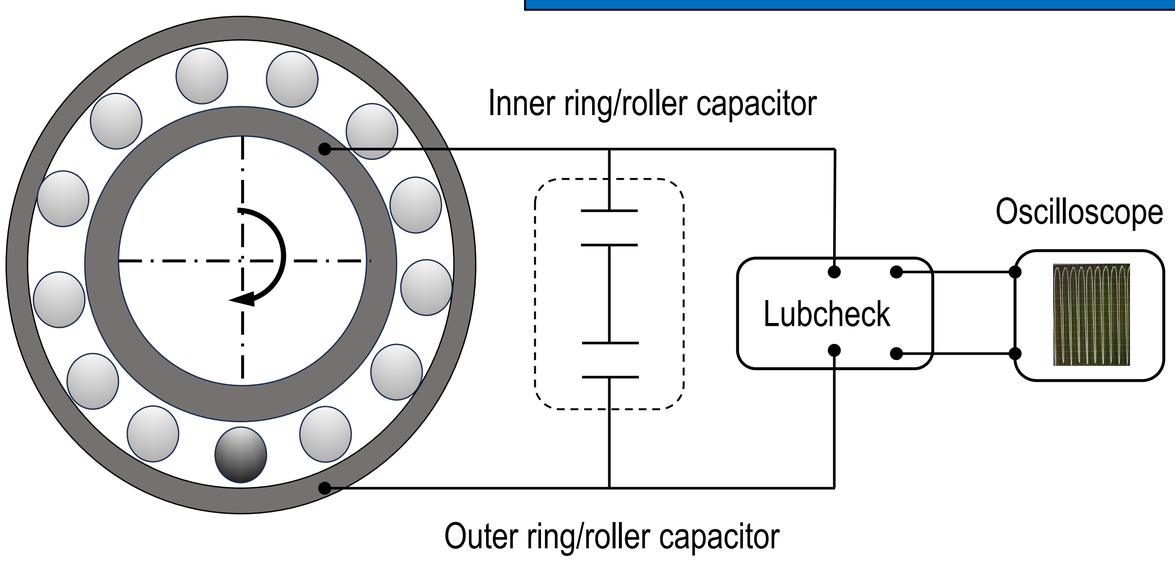
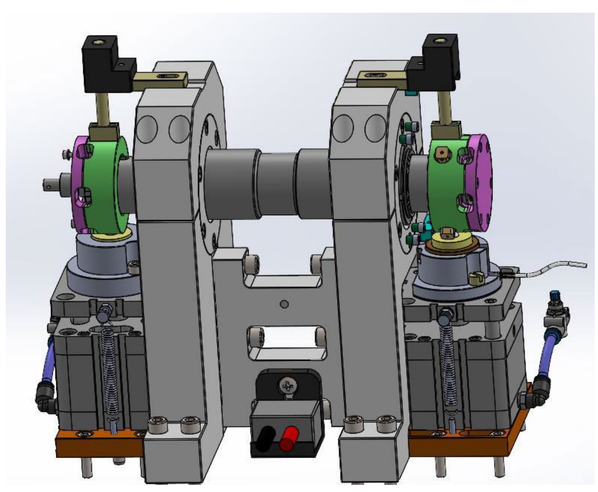
Working principle and schematic





Schematic of CRB test rig

The CRB test rig is designed to measure the film thickness in grease lubricated cylindrical roller bearings (CRBs) via an electrical capacitance method with *Lubcheck*.

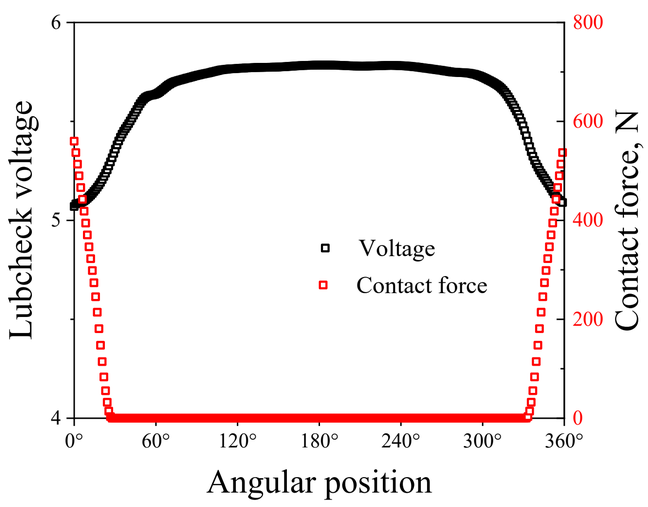
The speed range is 0—7500rpm, and the load range is 0—3500N.

The shaft is supported by two cylindrical bearings at each end to minimize shaft bending which causes misalignment of the roller inside the CRB.

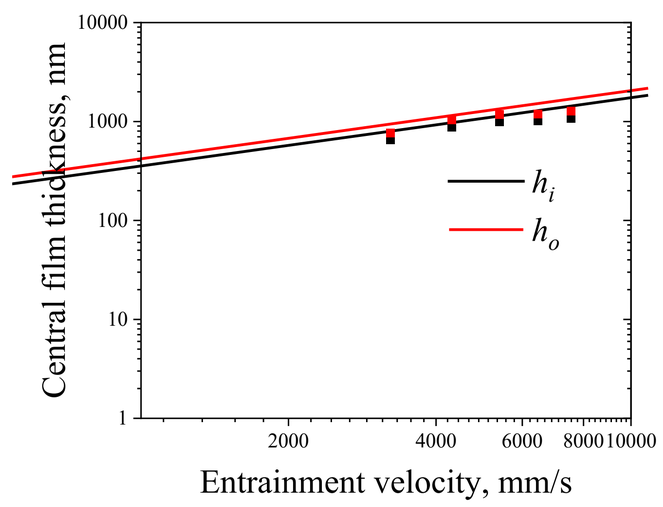
The inner ring of the test bearing is isolated from the rest of the bearing using ceramic rollers.

Bearing temperature is controlled using heated/cooled air flow.

Results and discussion



Lubcheck voltage and contact force distribution at different angular position



Comparison between measured and calculated film thickness at highest loaded point

A cylindrical roller bearing can only bear radial loads, which leads to different contact loads on the rollers.

As such, the film thickness along the bearing circumference is different.

To study the film thickness at the roller-ring interface of the test bearing, one of the ceramic rollers is replaced with a steel roller.

Then the *Lubcheck* signal (depicting film thickness) corresponding to the circumferential location of the steel roller helps achieve this goal.

The contact force distribution due to the radial load is symmetric in the bearing.

The film thickness is also symmetric assuming the same entrainment velocity at different angular positions.

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