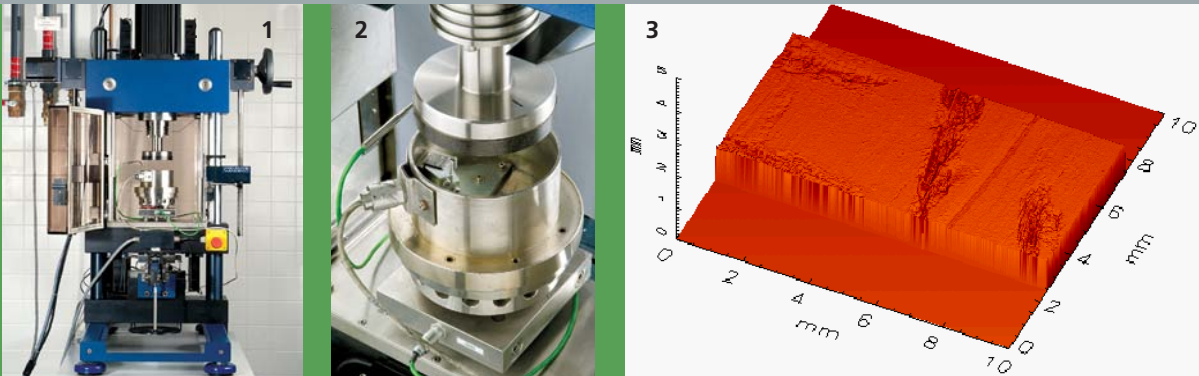




FRAUNHOFER INSTITUTE FOR MANUFACTURING TECHNOLOGY
AND ADVANCED MATERIALS IFAM, BRANCH LAB DRESDEN



- 1 High performance tribometer
- 2 Block on disk test set-up for testing of clutch facings and brake pads
- 3 3D topography image of a friction lining after testing

SINTERED MATERIALS FOR TRIBOLOGICAL APPLICATIONS

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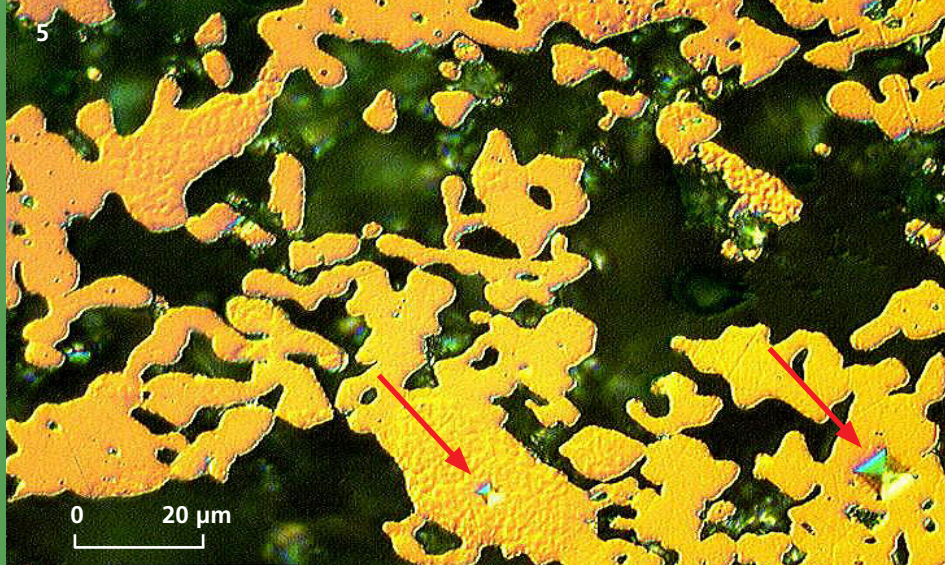
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Tribology

Tribology is the science and technology of interacting surfaces in relative motion. It includes the study and application of friction, wear and lubrication considering the overall system. Tribological stresses appear often in conjunction with high temperatures, chemically aggressive media or dynamic loads. This results in the requirement for various, often even contradictory material properties. Today, a wide range of high-quality materials for tribological applications is available, ranging from polymer compounds to metals and ceramics. All these materials have advantages, but also limitations.

Competence

Many years of experience in the field of manufacturing and application of powder metallurgical materials for tribological applications are enriched by the possibility of deeper tribological investigations at Fraunhofer IFAM Dresden. A testing laboratory with two high performance tribometers for model as well as component tests is available. The flexibility in the choice of the geometry of the sample and the test parameter allows a pre-selection or evaluation of material combinations for special tribo-systems already in model experiments. This can reduce the expense of aggregate or test bench trials and, therefore, the total test costs.



Tribological Testing Conditions

- Test set-up pin on disk, block on disk, ball on disk, ring on disk, ring on ring
- Test load up to 5000 N
- Max. torque 10 Nm
- Rotation left/right up to 8000 rpm
- Heating up to 250 °C
- Tests under inert gas, liquid lubricants, abrasive slurries and increased humidity
- Friction couple cyclic detachable, combination with speed ramps possible
- Possibility to overlay the rotation with vibration (10 bis 100 Hz)
- Stop-brakes by electronic simulation of a rotating mass
- Oscillation from 1° to 350°

Measured Data

- Torque
- Rotation speed
- In situ measurement of the total amount of wear
- Normal force
- Sliding distance and time
- Intensity of noises
- Temperature
- Humidity

Advantages

- Various testing programs for the respective application
- Cost efficient evaluation of material under near practical and reproducible test conditions
- Testing of manifold sample dimensions and real components possible
- Cost efficient material evaluation

Sample Geometries

- Pins from 4 to 20 mm and balls of 6, 8 and 10 mm diameter, rings up to 112 mm diameter
- Other geometries using individual sample holders possible

Service Offer

The development of materials for tribological applications is one of the research activities of the Dresden powder metallurgy. Through the choice of various alloys as matrix material, but also by the

possibility of integrating a defined pore structure, hard phases and/or lubricants, the powder metallurgical process offers an exceptional potential for the production of customized materials for tribological applications.

We rely on extensive experience in the solution of your tribological material problem.

We offer you

- Material developments for tribological applications
- Production of structured and highly porous friction coatings for applications under oil lubrication conditions
- Technological development of powder metallurgical coatings for special geometries of parts
- Assessment of tribological damage cases and analysis of wear mechanisms
- Materials and surface analysis (metallography, phase analysis, scanning electron microscopy, 3D topography measurement)
- Advice on the optimal material usage from tribological point of view
- Testing of stop braking and coupling operations of materials for clutches and brakes including oil lubrication conditions
- Material test of tribo couples by bidirectional movement (oscillation), e.g. materials of hinges, piston/cylinder, bearings
- Testing of materials for wear protection with stress by abrasive media