

Contact proportions

Kinematic

The test bench enables differentiated investigations of friction pairings by a combination of the three possible sliding motion rates and the effective surface pressures. In the current configuration, the test bench with an effective diameter of the pin-and-disc contact of 144 mm correlates with the kinematic proportions and the contact pressure of the UD-ratio of the big radius of a variator with chain.

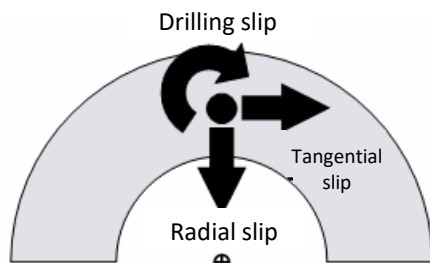
Variation of the sliding motion rates

The three sliding motion rates in direction and velocity can be combined within the test bench specific limits for different operating states.

- Tangential slip max. 15 m/s
- Radial slip max. 0.8 m/s
- Drilling slip max. 6000 rpm

Pressure

Through the application of a simple cylindrical pin with a variable crowning at the contact area, the contact pressure as a function of the effective axial force can be adjusted. By reduced power capacity of the test bench mechanics through smaller crowning, big contact pressures for overload or performance limits can be realized. Furthermore, the contact geometry can be varied or changed.



Contact

Karlsruhe Institute of Technology (KIT)
IPEK ▪ Institute of Product Engineering

Dipl.-Ing. Sascha Ott
Managing Director

Campus Süd, Building 50.33

Gotthard-Franz-Straße 9 | 76131 Karlsruhe

Phone +49 721 608-43681

Mail sascha.ott@kit.edu

www.ipek.kit.edu



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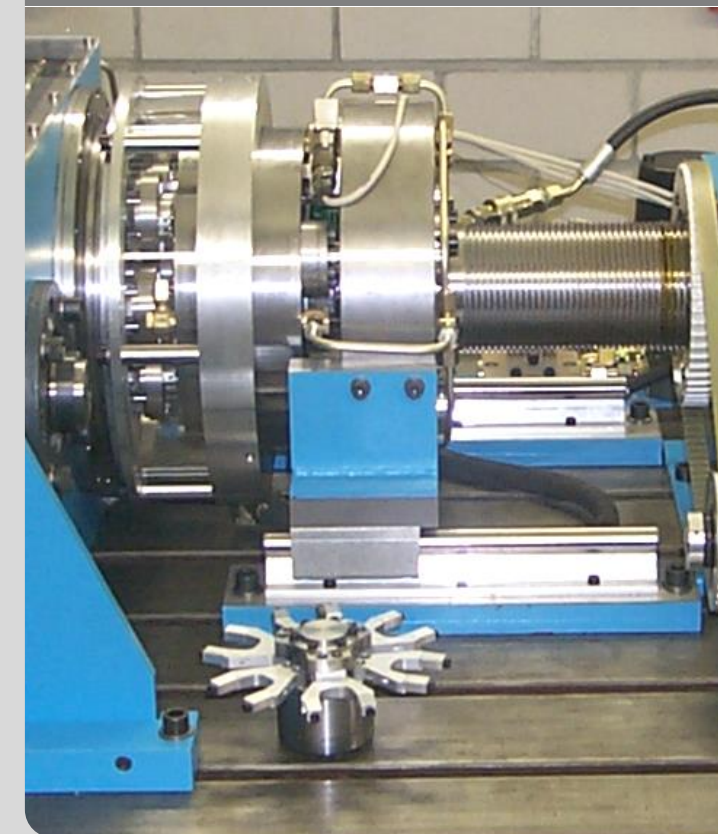
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MSP

Multi Slip Test Bench

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Test bench and components

Structure

The test bench is used to examine wet friction systems, for example traction drives. The test bench enables through a multidimensional pin-and-disc attempt for the differentiated consideration of the occurring slip shares, radial-, tangential- and drilling slip, whereby the influence of the occurring slip types on the friction coefficient behavior can be examined in detail.

The kinematic of the pin-and-disc contact is created through a planetary gearbox, whereby the slip direction and the slip velocity can be adjusted separately. Each of the in total six contact pins changes three times a test bench rotation between power-, transmission- and recovery phase. Thus, at a low speed of 2000 rpm, contact times can be adjusted as they occur by 6000 rpm. The axial pressure is made by a hydraulic system, which supplies six hydraulic cylinders with in each case a contact pin. The specific oil supply of the hydraulic cylinder is made by a control disk, known by axial piston pumps. A linear adjustment unit is operated by an auxiliary drive, which realizes on the one hand a wear compensation for the pin-and-disc contact and on the other hand provides an opportunity to open and close the test bench for the assembly.

Measurement and control

Control, data collection

The test bench is controlled by a real time PC system, which can be adjusted flexibly to the requirements. The data collection and control is made up to 1 kHz, using specific 16-bit A/D and D/A converter cards. The high precision measurement enables a detailed online and offline examination of the friction pairs under the given parameters. If required, the measurement is made by a High-Speed Data-Logger at up to 100 kHz.

Measurement

- Input and output speed
- Pressure of the load unit (pins on the input side)
- 3 axial force sensors (discs on the output side)
- Torque of the output side up to 100 Nm (telemetric)
- Oil temperature at the input and output
- Travel ranges of the adjustment unit
- Wear of the testing pair indirect over the change of the way
- For the measurement of speed and pressure, exactly sensors are available for different measurement ranges. The torque is recorded by a telemetric, contactless measuring flange

Control

- Speed and torque
- Differential speed (slip)
- Contact pressure
- Oil temperature
- Oil volume flow

Technical specifications

- Contact pressure of each pin 2000 N (hydraulic generated)
- Input and output speed up to 2000 U/min (correspond to 6000 rpm by the original CVT)
- Input and output torque of 50 Nm (65 Nm) (correspond 800 Nm (1000 Nm) by the original CVT)
- Contact pressure of 700 N/mm² by R120
- Variable contact pressure through the change of the crowning
- Oil temperature up to 100°C
- Oil volume flow up to 2 l/min

