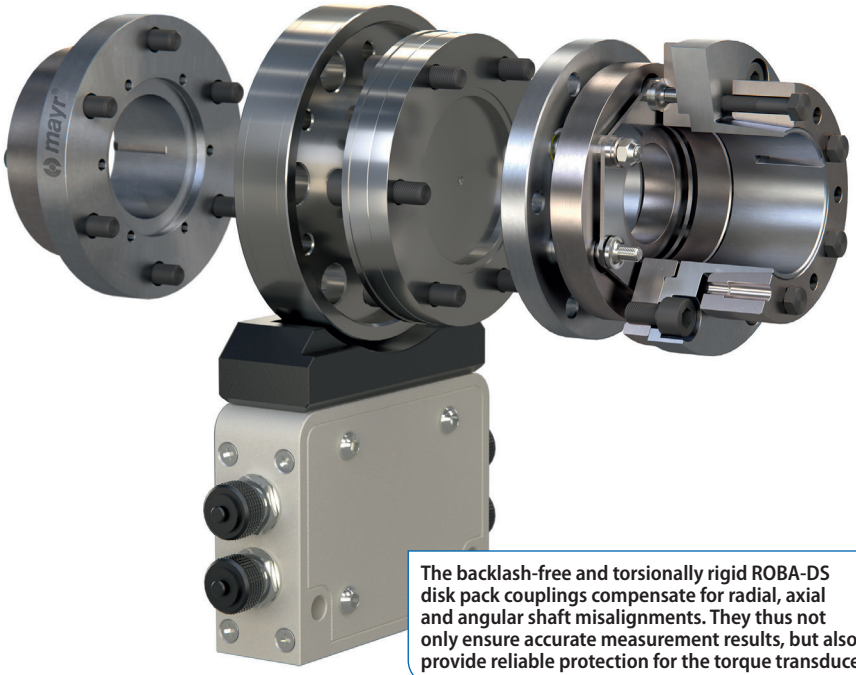
Mayr Provides Shaft Couplings for Torque Transducers in FZG Worm Gear Test Stands

Mayr Power Transmission



The backlash-free and torsionally rigid ROBA-DS disk pack couplings compensate for radial, axial and angular shaft misalignments. They thus not only ensure accurate measurement results, but also provide reliable protection for the torque transducer.

The Gear Research Center (FZG) at the Technical University of Munich has been conducting efficiency and wear tests on worm gears since its foundation. For reliable and accurate measurement results, the connection of the measuring shafts used is of particular importance.

For this purpose, FZG relies on the ROBA-DS shaft misalignment compensation couplings by Mayr Power Transmission, which have been specially adapted for torque transducers. These couplings are precise, backlash-free and torsionally rigid and they compensate for any occurring misalignments.

Whether in conveyor technology, extruders, elevators, actuating drives or steering gears for vehicles — worm gears are used in a wide range of applications. They are low-noise and low-vibration in operation and enable high gear ratios in a small installation space.

"At the Gear Research Center (FZG) of the Technical University of Munich, this gearing is constantly being tested and we are continuously further developing calculation approaches for the efficiency and the load-bearing capacity," said M.Sc. Philipp Norgauer, a member of staff at the chair of machine elements. This requires tests that are carried out on specially adapted worm gear test stands.

"In the tests, the efficiency is determined by means of performance difference measurement at the input and output of the test gear unit," added Norgauer. "For accurate measurement results, the connection of the gear shafts and the measuring shafts used is of particular importance. The measuring shafts must be bearing-supported free of parasitic forces to achieve the required measurement accuracy."

Compensation of shaft misalignment

For this reason, shaft misalignment compensation couplings by Mayr Power Transmission are used together with the torque transducer or measurement flange, as they minimize the interference parameters affecting the measurement flange. Such interference parameters or so-called parasitic forces frequently occur due to alignment errors in the drive line. This means, misalignments between the input and the output sides occur in almost all applications. The existing radial, angular and axial shaft misalignments lead to bending moments as well as radial and axial forces on the measurement flange. Usually, all misalignments occur simultaneously. Even the most precise alignment of the shaft train — even using the state-of-the-art laser alignment equipment available today — can only provide limited relief. In addition, the misalignments through existing tolerances in the size accuracy of the components used and through external influences, for example the temperature, cannot be completely eliminated.

This is why torsionally rigid shaft misalignment compensation couplings such as the ROBA-DS 9110/9210 disk pack couplings are indispensable accessories for torque transducers. These couplings transmit the torque backlash-free and with extreme torsional rigidity, and compensate for existing radial, axial and angular shaft misalignments. They therefore not only ensure accurate measurement results, but also provide the best possible protection for the measurement flange, the mechanically weakest link in the drive line, thus ensuring a long service lifetime. In addition to their high running smoothness and low mass moment of inertia, the couplings are characterized by a high balance quality; and they are particularly robust and resistant.

No restrictions for nominal torques

"For all ROBA-DS disk pack couplings, the nominal torques stated in the catalog can be used without restrictions," explained Ralf Epple, product

manager at Mayr Power Transmission. "A reduction in the nominal torque due to misalignment, overall load configuration or balancing requirements is not necessary."

The couplings are compact and unite both high performance density and absolute backlash-free function: Design details such as the blasting of the disks and the use of specially-shaped collar bushings provide a backlash-free flow of force with excellent force flow density between the input and output. The ROBA-DS disk pack couplings transmit torques up to the nominal torque absolutely backlash-free and with a consistently high torsional rigidity. The specified shaft misalignments can be 100% utilized without affecting the transmittable torque.

Integration in almost any test stand and drive constellation

"The connection of the ROBA-DS couplings and the measurement flanges to the shaft train generally takes place backlash-free via high-quality shrink disk hubs," Epple continued. "Various coupling designs specially tailored to the different test stand requirements and flexible combination options permit the integration of measurement flanges in almost any test stand and drive constellation."

The standard designs of the ROBA-DS measurement flange coupling cover a speed range from 8,000 to 30,000 rpm, depending on the size. New additions to the portfolio are mass-optimized measurement flange couplings made of aluminum or titanium for high-speed applications.

"It is our ultimate goal to produce couplings that are compact and of high-performance density," said Epple. "The geometric basis must be right. There is no point in simply designing a large coupling in aluminum or titanium, when a compact steel version, which is more rigid and can handle more alternating loads, may be better suited to the application."

It's crucial, therefore, that customers should always consider the application when selecting the coupling and the material. Here, however, it is always necessary to weigh up between the material properties, e.g. weight, rigidity or fatigue strength, and the final customer application, i.e. the actual speeds, load alterations, load cycles, bearing distances and bore diameters. And last but not least, of course, the price/performance ratio also counts. **PTE**

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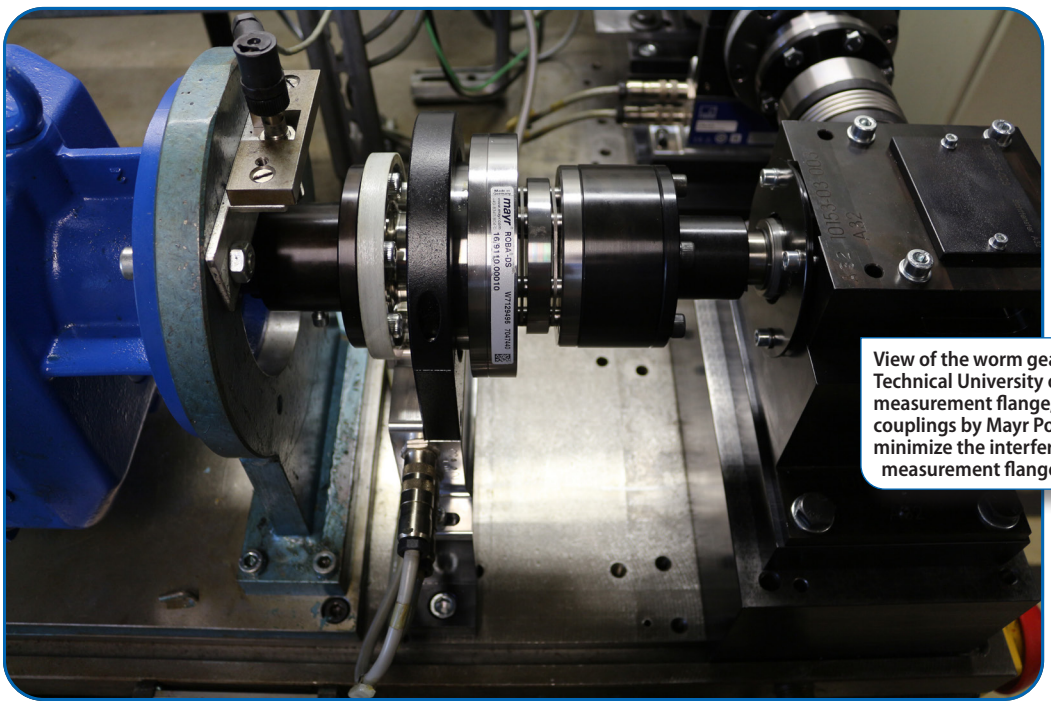

View of the worm gear test stand of the FZG at the Technical University of Munich: Together with the measurement flange, shaft misalignment compensation couplings by Mayr Power Transmission are used. They minimize the interference parameters affecting the measurement flange.