

**Boosting Pump
and Drive
Efficiency.**



**Flexible Solutions for
Highest Precision at the
Pump Test Bench**

Determination of Pump Efficiency with Kistler KiTorq Measuring
Flange System

The new development test bench at Moog GmbH in Böblingen, Germany, is used for testing the efficiency of pumps and drives. The ultimate goal: to develop optimized systems that will permanently cut pump users' operating costs. Kistler's high-precision torque sensors are deployed on the test bench to ensure that pump efficiency is determined with the utmost accuracy.

Sophisticated testing and simulation procedures are fundamentally important in the automotive and aerospace industries, as well as in forming processes, plastics processing and the renewable energy sector. In all these applications, they can boost the efficiency of drives – and therefore complete systems, such as pumps. Targeted efficiency improvements lead to lower energy consumption. The results: costs are cut significantly and companies can strengthen their market positioning over the long term. With its innovative concepts for precise, reliable, low-cost and environment-friendly testing, Moog offers optimal solutions for a wide variety of different markets and industrial applications.

Requirements for the New Pump Test Bench: Maximum Precision, Simple Handling

Moog develops and produces hydraulic pumps for use throughout the world in sectors, such as plastics processing or metal forming, and for wind turbines. The development center for these pumps is located at the firm's Böblingen site. To optimize its processes for determining pump efficiency in the future, Moog GmbH commissioned FMB Blicke to install a new test bench for initial and ongoing hydraulic pump development. The objects under test are piston pumps that are powered by the electrical drive in the test bench. After set points for pressure, flow rate and speed have been defined for the test object, efficiency is calculated on the basis of the actual torque measured.

Dynamic stressing of the specimens during testing can place an additional load on the power train. To achieve clear measurement results in every series of tests, a sturdy sensor that can also measure accurately was defined as one of the key criteria. To ensure that measurements would meet the high standards on the new pump test bench in other respects, the Böblingen-based company defined several additional specifications for the sensor technology: the second requirement, for instance, was the ability to read



Kistler KiTorq Type 4550A, installed in the test rig

out the torque signals digitally via an EtherCAT interface. In addition, the client wanted the option of using multiple measuring ranges so that different pumps could be tested with minimum loss of time, i.e. without converting the test bench. Straightforward inventory management for spare parts was also defined as a prerequisite in advance.

'Kistler's sensor technology meets our specifications in their entirety. As well as high accuracy and an EtherCAT interface, Kistler offers many other benefits – including the possibility of covering different measurement ranges with just one stator and several rotors.'

Karl-Heinz Rebstock, Head of Automation Technology at FMB Blicke

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Moog radial piston pump (sizes 19 und 250 cm³/U)

The Right Answer: KiTorq from Kistler

After a thorough review of the alternative solutions, it emerged that the requirements defined in advance were precisely fulfilled by sensor technology from Kistler. Mr. Karl-Heinz Rebstock, Head of Automation Technology at FMB Blicke, comments: 'Kistler's sensor technology meets our specifications in their entirety. As well as high accuracy and an EtherCAT interface, Kistler offers many other benefits – including the possibility of covering different measurement ranges with just one stator and several rotors.'

Eventually, the client opted for three KiTorq Type 4550A torque measuring flanges with measuring ranges of 500 Nm, 2 000 Nm and 3 000 Nm. The advantages of the Kistler sensor technology used at Moog are now clear to see on the test bench: thanks to the rigid design and high resolution of the sensors, pump components can be tested and adjusted with great precision. Another benefit: each of the measuring flanges is equipped with an integrated EtherCAT interface. This ensures trouble-free transmission of measurement data, even during operation in contaminated environments (especially where oily air or severe temperature fluctuations are present). With this interface, there is no longer any need for other external interface modules in the switch cabinet. This saves installation space and further outlay on cabling. Measurements for different pumps are also possible thanks to the option of a second measuring range – a field where Kistler has many years of experience. This feature saves even more time and money because it reduces the need to convert the test bench. The design of the test bench delivers additional added value: the short rotor allows major savings on space and costs. And finally, the sensor is exceptionally simple and economical to install and operate thanks to its ringless stator design.

Mr. Karl-Heinz Rebstock, Head Automation Technician at FMB Blicke, is convinced by Kistler's reliable, high-precision sensor technology: 'These sensors play a valuable part in ensuring that Moog's development center in Böblingen will maintain its optimal standing on the global market as time goes on.'

Precise Torque Measurement at the Test Bench

Flexibility, stability, and precision are the most important elements when measuring highly dynamic torques at the test bench. With its modular KiTorq System, Kistler offers the right solution concept.



Thanks to its compact size, the KiTorq System offers maximum flexibility – and is ideally suited for test bench applications in confined spaces.



With the integrated EtherCAT interface, all torque measurement values can be directly integrated into the evaluation without an additional measuring card.

Benefits of Torque Measurement with Kistler KiTorq

- Precise measurement in rotating drives and structural elements
- Simplified installation with contactless digital signal transmission
- Modular concept for maximum compatibility
- Flexible interfaces for user-friendly evaluation

Further Information on These Products

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