

## Media Release

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### INSPECTpro for transparent in-process testing of bolted joints

INSPECTpro, the new portable measurement and evaluation instrument from Schatz, a Kistler Group company, offers a convenient way to test torque and rotation angle on bolted joints. This system provides graphic analyses of assembly processes to ensure that bolted joint assemblies meet optimum quality standards.

The software and hardware of the INSPECTpro torque and angle instrument provide easy random-sample testing, process capability testing and graphical process analysis in assembly operations to ensure optimal quality of bolted joint assembly. The versatile instrument is equally suited a wide variety of quality assurance applications including random-sample testing, testing drivers and torque wrenches, testing joint components, and determining the process capability of already assembled bolted joints in combination with handheld torque/angle sensors up to 5,000 Nm.

#### Analysing torque and clamping force

The key parameter in the assembly process for bolted joints is the clamping force, which is the force generated by the bolts to hold the assembled parts together. The clamping force must be high enough to ensure that the joint will not come loose due to relative motion of the bolted joint.

However, the clamping force is not measured directly in production but is deduced from the torque. The bolt friction, such as the friction present with the correct lubrication, has a major effect on the relationship between torque and clamping force. In case of doubt, the INSPECTpro allows the friction figures to be measured quickly and easily on the assembly line to verify that they are correct.

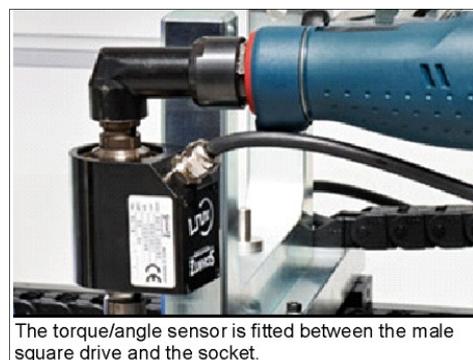


The torque, angle and clamping force need to be measured to check the bolt friction

#### Random-sample testing in bolted joint assembly processes

The torque/angle sensor is fitted between the male square drive and the socket. Random-sample testing is performed in bolted joint assembly processes to monitor the interaction between the assembly tool (driver) and the bolt. For these tests a torque/angle sensor is fitted between the male square drive and the socket. This enables measurement of the achieved torque and/or angle as well as graphic analysis of the torque versus angle curve of the entire bolting process.

This in-process testing during assembly is the most effective way to verify the overall assembly process to meet VDE Guideline 2862 for random-sample testing as the minimum requirement for identifying bad bolted joints.



The torque/angle sensor is fitted between the male square drive and the socket.

## Torque wrench calibration

Torque wrench calibration monitors click-type and indicating torque wrenches, important instruments for checking the quality of bolted joints in the assembly process. Like all instruments, torque wrenches of both types must be calibrated at regular intervals to ensure that the assembly tool is fit for purpose and may continue to be used.

Test procedures to determine measurement uncertainty and calibration intervals are specified in the ISO 6789 standard.



A hand crank mechanism is used to apply the torque for testing a handheld torque wrench.

## Determining the process capability in bolted joint assembly

To monitor a bolted joint assembly as part of random-sample testing, finished joints are tested for correct bolt assembly using a handheld torque/angle sensor.

The retightening torque is measured to check whether the interaction between the driver, the bolt or nut and the bolted parts has yielded the desired result. Process capability testing represents the cumulative effect of a series of factors that play a role in the quality of bolted joints. Proof of process capability is the final stage in ensuring reliable bolt assembly.



The torque is measured when the bolt starts turning. The process analysis is determined by the turn-further-torque and break-away torque.

The INSPECTpro has a unique modular function architecture that allows users to configure the instrument according to their needs. The newly developed INSPECTpro is a portable measurement and analysis instrument for torque, rotation angle and clamping force. Both battery power, using an easy to change rechargeable lithium-ion battery located in the rotary joint of the INSPECTpro, for on-site use and a mains adapter for use in the lab or workshop makes the instrument suitable for a wide range of uses. The 7.7-inch TFT colour touch display unit can be pivoted on the base unit in increments of 10° from 0° to 100°.

The features and functions of this innovative portable measuring system make it ideal for faster and more effective testing, while at the same time offering extensive analysis and measurement results.

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## About the Kistler Group

Kistler is the global leader in dynamic measurement technology for measuring pressure, force, torque and acceleration. Cutting-edge technologies provide the basis for Kistler's modular solutions.

Customers in industry and science benefit from Kistler's experience as a development partner, enabling them to optimize their products and processes so as to secure a sustainable competitive edge. The owner-managed Swiss company's unique sensor technology plays a key role in the evolution of automobile development and industrial automation, as well as in numerous emerging sectors. With a broad knowledge of applications and its absolute commitment to quality, Kistler is making an important contribution to the further development of current megatrends. This includes topics such as electrified drive technology, autonomous driving, emission reduction and Industry 4.0.

Some 1,850 employees at 61 locations worldwide are dedicated to developing new solutions and offer customized service for individual applications. Since its founding in 1959, Kistler Group has grown along with its customers, generating sales of CHF 358 million in 2016. Approximately 10 % of this went back into research and technology—and thus into achieving better results for all our customers.