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Data acquisition on a new level

The entire measuring chain from a single source

RWTH Aachen tests new KiDAQ data acquisition system

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Kistler's KiDAQ modular integrated data acquisition system lets users explore new ground in the design of complex measuring chains commonly found in research and development. An initial look at the system and how it can be used in cutting force measurement was taken by the machine tool laboratory of RWTH Aachen University.

RWTH Aachen's machine tool laboratory is one of Germany's leading research institutes in the machine tool sector. Four chairs are devoted to research in the fields of production systems and factory planning, the technology of manufacturing processes, process monitoring and quality management. Not only does the institute conduct basic research, it also cooperates with leading companies across the globe to foster innovation and blaze a trail into new technological worlds. Kistler's partnership with the laboratory dates back almost 50 years and stems from the high performance of the company's piezoelectric measurement technology.

Given their high precision very wide measurement range – (from a few newtons to a meganewton) and high resilience even in demanding ambient conditions, piezoelectric (PE) sensors are predestined for implementation scenarios with high requirements. They are ideal for use in highly dynamic force measurements, for example on machine tools that mill grooves into turbine blades. The laboratory also uses PE dynamometers for combined force and torque measurements when conducting complex modal analyses.

From sensor to cloud

The new KiDAQ data acquisition system was specially created with cloud applications in mind. Thanks to its modular integrated approach complex distributed measuring chains with many different sensors (force, pressure, acceleration, torque etc.) can be easily configured and put into operation. Kistler's ecosystem of coordinated software and hardware components is based on an open design so that the sensors and equipment from third-party manufacturers can also be integrated. Based on the available cloud network IoT applications are also possible.

Sascha Kamps is a development engineer for process monitoring in the laboratory's production technology cluster and has already had the opportunity to test the new KiDAQ data acquisition system:

The data acquisition system KiDAQ can be extended with measurement modules and units at any time

"Having a technology leader in piezo sensor systems like Kistler, now offering their own data acquisition system couldn't be more welcome as it takes a lot of the effort out of setting up a measuring chain. In view of its modular universal approach and new features, I think the system is going to be an attractive alternative to current systems not only in the area of cutting force measurement, but also in many other fields of research."

Automatic calculation of measurement uncertainty

KiDAQ's nerve center is the data acquisition unit that can be equipped with measuring modules for more than 20 different measurands. Depending on the measuring application requirements, three housing versions are available: a DIN rail (top-hat rail), portable and rack (with or without bracket). In the top-performing rack version for extensive measurements with many measuring points and a high number of channels, up to 13 measuring modules can be integrated. They can be configured and managed by the newly developed KiStudio Lab software. KiStudio Lab clearly maps the

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RWTH Aachen University takes a first look at the data acquisition system KiDAQ

entire measuring chain; it is operated intuitively and offers extensive, customizable analysis functions and graphical representation options. An innovative feature is the function for automatically calculating measurement uncertainty. This is a key criterion in quality assurance as it shows how closely the measuring result reflects the measurand value. As Kamps explained: "Calculating measurement uncertainty always involves a lot of effort and is mostly neglected in practice or replaced by empirical values. Integrating this function into KiDAQ is a very useful innovation in my opinion. In the lab, many researchers are only employed temporarily to gain further qualifications so inevitably historical knowledge is lost within the space of a few years. A user-friendly system like KiDAQ that provides users with information on measurement uncertainty couldn't have come at a better time." Kistler has filed a patent on the process for determining measurement uncertainty.

Synchronized distributed measurement system

Consistency, transparency and interoperability with Industry 4.0 was important to the design. KiConnect technology is the nerve center of the new ecosystem and ensures easy synchronous integration of all components whether the sensors are from Kistler or the equipment is from other manufacturers, like the cameras for optical data acquisition. "At the laboratory we naturally use measuring systems from many different manufacturers. KiDAQ is ideal when it comes to setting up complex test benches and demonstrators for Industry 4.0 because it simplifies data acquisition and lets us get started faster", adds Kamps.

All connected components are automatically synchronized through the Precision Time Protocol (PTP) so that measurements are real time, reducing the risk of measurement results being misinterpreted due to delayed data transmission. Since distance is not an issue, distributed measuring chains can also be configured. All measurement values are collected in an open cloud-based soft-ware platform accessible by API interfaces to business partners so they can develop their own measurement applications. "As scientists, we regard the holism combined with the openness of the system in a very positive light. Although it is too soon to make predictions before the market launch, KiDAQ certainly has what it takes to be a big hit in measurement technology", concludes Kamps.

Taking PE measurement technology to new heights

Based on a modular data acquisition device available in three versions, the Kistler KiDAQ measurement technology ecosystem provides an innovative, high-performance environment for the setup of complex measuring chains with piezoelectric sensors. Designed for use in research, development and laboratory work, the system is universal, modular and open. With its cloud link it can be deployed anywhere with any technology and through PTP creates a logical and synchronous measuring chain which can be easily controlled with the KiStudio Lab software.

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