

WHAT'S NEW TECHNOLOGIES & CAPABILITIES

KISTLER
measure. analyze. innovate.

Kistler Announces Further Expansion in Michigan and Mexico



Kistler is pleased to announce a new North American Technical Center in Michigan and a new Group Company in Mexico.

The new purpose built technical center houses service, repair, calibration, technical support and training facilities to enhance Kistler's high degree of support for the company's products. The building in Novi, MI will be completed in late October 2011 and fully operational by the end of 2011.

Technical Centers in key market areas are a specific growth strategy for Kistler. The presence of a Technical Center brings competence closer to the customer, providing faster response and a greater ability for Kistler to understand and support specific customer measurement needs. These Centers will be staffed by engineering personnel who will be able to communicate with the customers and gain a better understanding of measurement issues. In many cases, local solutions using standard Kistler products can be tailored at the Technical Center ensuring faster response time and on-going closer technical support.

Kistler has recently opened its latest group company in Mexico. This new sales and service support company is based in Monterrey which is a major area for automotive assembly operations. This new facility continues Kistler's strategy of supporting our global customers wherever their Manufacturing and R&D operations may be located. Over the last few years Kistler has expanded its presence in China, India, Brazil and Mexico, all important growth areas for assembly operations and the OEM supplier base.

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Vehicles: Durability and Dynamics:

The addition of Corrsys-Datron to the Kistler group has allowed Kistler to offer complete turn-key solutions to automotive testing customers. Kistler is now positioned to offer instrumentation of the highest quality and accuracy for measurements such as: slip-angle, dynamic camber angle, pitch and roll angles, steering input, fuel consumption, and many more. Complete systems tailored to your testing needs are available from experienced personnel that will deliver the results demanded by today's industry.



New Products for Vehicle Testing

New Microstar II: Microwave Speed and Distance Sensor

The measurement principle of the Corrsys-Datron Microstar II Sensor is based on the Radar-Doppler-Effect.



The sensor consists of a two-beam planar antenna and the new Corrsys-Datron electronics unit with CAN bus.

- Driving performance measurements
- Determination of longitudinal parameters
- Fuel consumption measurements
- Off-road measurements
- Monitoring the actual speed of off-road vehicles

CORREVIT® S-HR: Optical Speed/Slip Angle Sensor

Non-Contact Optical High-Resolution Sensor for slip-free measurement of longitudinal and transversal dynamics



- Accuracy of the unfiltered angle within the range of $\pm 15^\circ = 0.1^\circ$
- High-resolution slip angle measurement, 0.01; by enhanced measuring principle
- Working range of 250 ± 50 mm from test surface
- Applicable from 0.5 kph ... 250 kph
- Adjustable filter time for speed signal and angle up from $\pm 15^\circ$ (unfiltered, moving average 8 ... 512 ms)



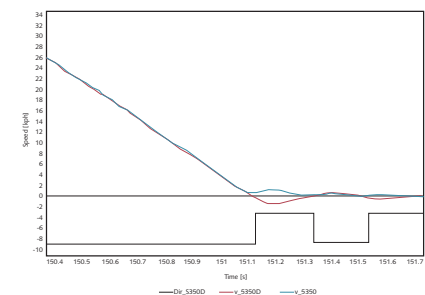
CORREVIT® Optical Sensors with Direction Detection

The new Correvit S-350D sensor is capable to detect driving direction - forward or backward - over the whole speed range.



It is ideally suited for applications such as parking maneuvers or tests with utility vehicles e.g. forklift trucks. The changes of directions are displayed via CAN bus as well as the analog and digital output.

- Excellent accuracy on all track surfaces, even under challenging conditions
- Lightweight design for easy handling
- Measurement frequency of 250 Hz
- Newest high-quality optoelectronic components and high-performance signal processing based on DSP and FPGA
- Durable technology ensures negligible service and maintenance requirements



RoaDyn® S6 “Compact” – New 6-Component Wheel Force Transducer (WFT) System

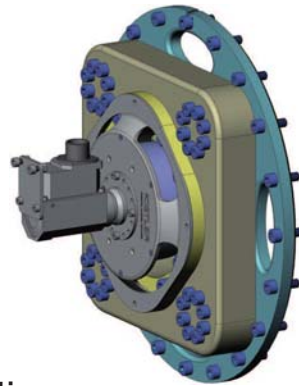
Kistler Expands RoaDyn® Product Line

The RoaDyn S6 Compact is a new family of 6-component wheel force transducers based on individual 3-component strain gage load cells. The RoaDyn S6 Compact is readily assembled and calibrated as a single sensor with standardized mechanical interfaces to the hub and to the rim.

This design allows adapting to particular vehicle by vehicle specific adapters to the rim or to the hub. These adapters can be provided by Kistler or can be produced by the customer. Even the operation on a test rig is possible with the same WFT provided with appropriate adapters.

Even though the RoaDyn S6 Compact is assembled as a single sensor it is still modular and can be adapted to various requirements and load classes by modification of mechanical parts and numbers of load cells

- Compact sensor for measuring F_x , F_y , F_z , M_x , M_y , M_z
- Linearity, hysteresis $<1\%$ FS
- Crosstalk $<0.5\%$ FS
- Digital slip ring transmission (max. 1000 kHz)
- Optional analog output
- Simplified user interface (web-interface)
- Prepared for Kistler Corrsys-Datron 2-axis and DCA interface brackets
- Adaptation support by local Kistler facilities



Applications

The RoaDyn Compact is available in three different load classes:

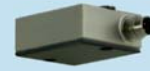
- RoaDyn S625 Compact: small and medium passenger cars (± 20 kN)
- RoaDyn S635 Compact: large passenger cars, SUV (± 35 kN)
- RoaDyn S650 Compact: SUV, vans etc.

The RoaDyn S6 Compact can be used for many different measurement tasks:

- Road load data acquisition
- Vehicle dynamics
- Tire testing on the road
- Durability testing on test rigs



Accelerometers for Dynamics, Ride, NVH



K-Beam® Accelerometer Capacitive MEMS, Single Axis Accelerometer, Type 8315A

A high sensitivity, low noise accelerometer for low-frequency vibration.

- Ranges: ± 2 , ± 10 , ± 30 , ± 50 , ± 100 , ± 200 g
- Freq. response: 0 ... 1000 Hz (5 %)
- Bipolar, single ended and differential
- Temperature range: -65 ... 250 °F



K-Beam® Accelerometer Cube, Capacitive MEMS, Triaxial Accelerometer, Type 8395A

A high sensitivity, low noise triaxial accelerometer for low-frequency vibrations in three axes (x, y, z)

- Ranges: ± 2 , ± 10 , ± 30 , ± 50 , ± 100 , ± 200 g
- Freq. response: 0 ... 1000 Hz (5 %)
- Bipolar, ± 4 V accelerometer output
- Temperature range: -65 ... 250 °F

Vehicles: Crash Safety Testing Solutions

Kistler, a provider of turnkey measurement solutions for the automobile industry, is now the leading supplier of crash testing safety solutions. We deliver standard and custom solutions that make a substantial contribution to the ongoing enhancement of occupant transportation safety and offer complete vehicle and component crash/blast testing systems, from sensors to application software.

The increasingly complex requirements of crash testing demand continuous optimization with user-friendly hardware and software. Our innovative products have enabled us to intelligently combine the individual components of the measuring chain, such as sensors, data acquisition systems and software. From a one-stop shop the user receives all of the seamlessly integrated plug & play components needed to make crash testing extremely straightforward and efficient. Our intelligent systems play an active part in crash test preparation, with their integrated self-testing and sensor detection preventing any loss of measurement data! Over the years, operation of off-board, on-board and in-dummy with sensor calibration laboratories within customer

facilities has enabled our engineers to accumulate a wealth of related know-how independent of any proprietary systems. Our application centers are therefore in a position to modify all types of dummies to all applicable standards and specifications. Kistler's portfolio, which encompasses standard and special solutions for a wide range of crash scenarios and specifications, is enhanced by mature software packages with years of proven reliability. Service and maintenance, supported by our test equipment management software, round off the comprehensive range of Crash & Safety products perfectly. Kistler's offering encompasses a wealth of other sensors, systems and custom solutions.

System Solutions for Crash Measurement...

The addition of KT Automotive and MSC Automotive makes Kistler a leading provider of crash safety measurement systems. Kistler offers a one-stop shop for complete systems for vehicle and related component crash tests, thereby making an important contribution to ongoing safety enhancement. Sensors, data acquisition systems and application software from one source provide the user with all the links of the crash measurement chain. This seamless integration greatly facilitates straightforward, efficient, plug and play crash testing. By combining piezoelectric sensors with powerful data acquisition systems, Kistler offers their customers significant added value.

...from Sensor to Application Software

As a reliable partner of the Kistler Group, KT Automotive GmbH has been developing, manufacturing and marketing crash test data acquisition systems for many years. KT Automotive is a long-established crash measurement specialist, with about 70% market share in this product segment. The spectrum of products is enhanced by services extending as far as complete responsibility for test equipment operation. KT Automotive, a former division of aerospace and technology company Kayser-Threde, is integrating Munich, Shanghai and Detroit facilities as a Product Center of the Kistler Group. MSC Automotive GmbH was fully integrated into the Kistler Group by being merged with Kistler-IGeL GmbH in Schoenaich, Germany. MSC is a leading provider of systems for crash dummy instrumentation, and develops and produces the associated force sensors and accelerometers. In its second division (service and measurement) this company handles custom strain gauge applications for durability or vehicle safety, and calibrates sensors and measuring systems – often as an on-site service for customers.



From Off-Board to On-Board to In-Dummy and Beyond...

Kistler is the only partner capable of supplying complete integrated solutions where all components work seamlessly together. In-Dummy DAS has become very popular over the last few years and Kistler has been working with customers and component suppliers to make sure that our In-Dummy solutions work with existing Software and Hardware solutions deployed throughout the world.

| | Microdau | nxt32 |
|----------------|----------|-------|
| H3-5th | x | |
| H3-50th | x | |
| H3-95th | x | |
| BIORID | x | x |
| Q6 | x | |
| Q3 | x | |
| Q1.5 | x | |
| Q1 | x | |
| ES-2 | x | |
| ES-2re | x | |
| World-SID 50th | x | |
| World-SID 5th | x | x |
| SID-IIs | x | x |

| Technical data | K3870 nxt32 | K3831 Microdau |
|--------------------------|-------------|----------------|
| Channels | 32 | 3 |
| Sample Rate, Record Time | kHz | 100K Hz, 100s |
| Bridge excitation | V | 2.5, 5 |
| Size, LxVxH | mm | 25x54x85 |
| Mass | grams | 200 |
| | | 36x10x20 |
| | | 5 |



Type K3870: Centralized In-dummy DAQ system with non volatile flash data memory for maximum data security With Lion battery



Type K3831: Distributed In-dummy DAQ system with non volatile flash data memory for maximum data security.

Sensors

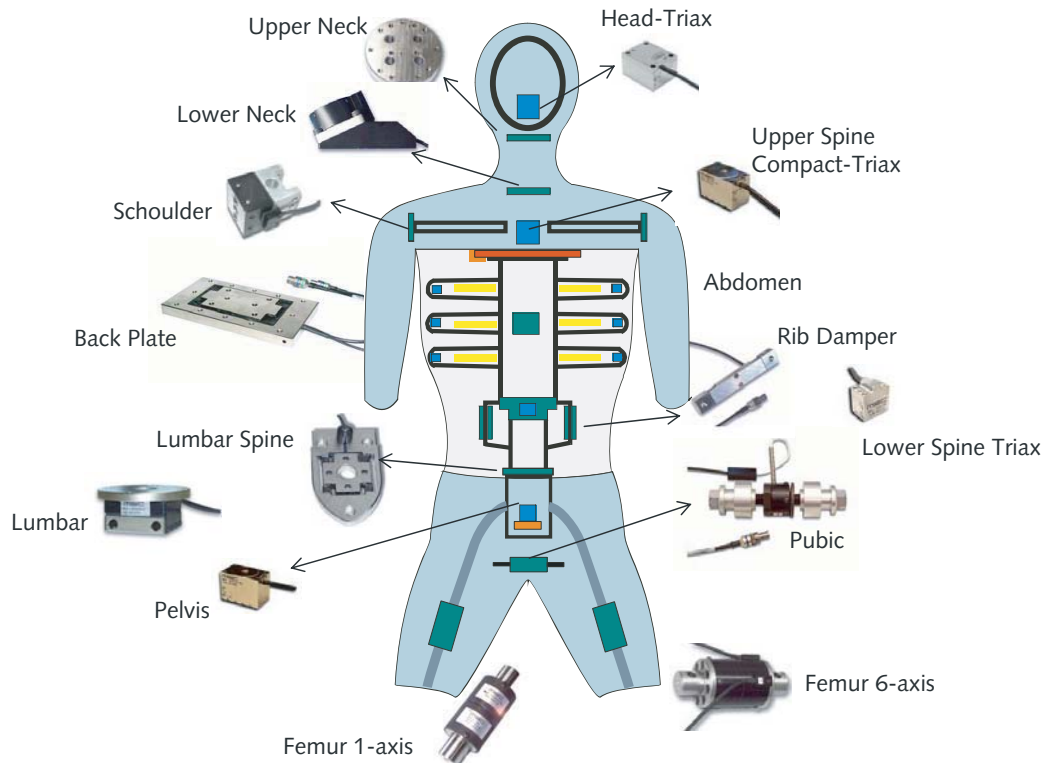
- Acceleration (PE, PR)
- Load Cells
- Angular Rate
- Angle
- Temperature
- Pressure

Data Acquisition

- Off-Board
- On-Board
- In-Dummy (Distributed, Centralized, and Hybrid)

Software

- Sensor Calibration
- Test Preparation
- Test Execution
- Report Generation



Engines: Combustion Analysis

KiBox® ToGo – New Features

KiBox has quickly established itself as the Combustion Analyzer of choice for Engineers involved in the complex task of calibrating modern vehicle systems including ECU development.



The application engineer demands a supporting tool with a high level of functionality and processing power for use in the vehicle during and after the measuring run. KiBox continues to meet these requirements and adds new capability with the Cockpit Software v.1.3.0.

KiBox Cockpit Software v.1.3

The new software is compatible with both new and existing KiBox systems and offers numerous enhancements. All real-time calculated values are transmitted via the CAN bus for use with CAN hardware supporting the DBC standard. The system can trigger a data capture via the ETAS INCA interface, with the KiBox serving as a fully integrated INCA subsystem.

- Standalone KiBox operation
- Improved CAN data output with a CANdb-Editor
- Introduction of 3 user levels
- Real-time combustion noise calculation
- Support for Windows 7 and INCA 7

Kistler Type 2105 mini current clamp

Existing current clamps are not well suited to space or environmental constraints of engine test-

ing. Kistler's new Type 2105 current clamp and amplifier addresses these concerns. With its small size and robust construction, the 2105 is ideal for measuring injection or ignition timing in the engine bay or on a test-bed.



- Compact and easy to install
- Modular external amplifier design, stackable up to 8 units.
- Amplifier base unit provides single multiplexed output from all clamps
- Powered by vehicle or auxiliary battery

Exhaust Gas Pressure Sensor Type 4049A

Introducing a new 10 bar measuring range for the 4049A Series of compact water cooled exhaust pressure sensors. Exhaust pressures in turbo charged engines with exhaust gas temperatures of $>1000^{\circ}\text{C}$ can now be accurately measured using the new Kistler Type 4049A10S.



- Small compact and rugged M14 sensor
- Suitable for gas temperatures over 1000°C
- Digital Temperature compensation
- Sensor temperature signal

Peak Meter Type 2516B

The type 2516B engine peak meter is a rugged measuring instrument for monitoring engines with speeds up to 4000 rpm. The instrument measures and stores up to 100 pressure cycles from which it calculates pAvg, pMax, pMin and standard deviation. It retains the simplicity of the original 2516A but has added features to enhance its usability and flexibility for the user.



- USB port for communication.
- Rechargeable battery and charger
- Rugged waterproof case
- Up to 20 cylinders displayed



Interchangeable M8 Sensors

Type 6041B – Water Cooled PiezoStar® Combustion Pressure Sensor

The smallest water-cooled combustion pressure sensor available has been upgraded to meet the demands of modern combustion engine research. Utilizing the PiezoStar crystal sensitivity has doubled enhancing the signal resolution while a new package design has improved the short term errors attributed to thermal strain. The 6041B is particularly well suited to thermodynamic investigations on diesel engines and gasoline engines where heavy knock is prevalent.



- High sensitivity; ~ 40 pC/bar
- Durable – long service life
- Cooling optimized for signal quality
- High accuracy

6045A – PiezoStar® Combustion Pressure Sensor

Interchangeable with the Type 6041 the 6045A is an un-cooled high performance combustion pressure sensor well suited for thermodynamic research. The new 6045AU20 version utilizes a reinforced diaphragm offering increased protection for heavy knock and applications where cylinder pressures regularly exceed 300 bar.



- High sensitivity ~ 45 pC/bar
- Durable – long service life
- 300 bar measuring range
- Flush mount high performance

Test and Measurement

Pressure



Piezoresistive Pressure Sensors

- Ranges -14.7 ... 5000 psi
- Gauge, absolute, differential
- 0.1 and 0.05 % FS accuracy
- 0.1 % FS stability per year
- Temp. comp. -40 ... 250 °F
- Fast response time
- mV, V and mA options
- Intrinsically Safe

Force



SlimLine Force Sensors for Valve Spring Measurements

- 0 ... 3 kN to 0 ... 80 kN
- Small
- Sealed case (rated at IP65)
- Integral Viton® cable
- Flexible mounting
- Compressive, tensile (preloaded)



Load Washer Force Sensors for Dynamic Measurements

- 0 ... 7.5 kN to 0 ... 400 kN
- Small
- High rigidity
- Large dynamic range
- Compressive, tensile (preloaded)

Torque



Torque Measurement Flange

- Slim, ideal for test beds
- Digital and non-contact
- 0.05% FS linearity
- Maintenance free
- Compact flange to flange
- RS-232C



Multi Purpose Torque Sensor

- Ranges from 1 ... 1000 Nm
- Speed up to 10000 rpm
- High frequency response
- Contact free signal transmission
- Shaft end
- Integral speed measurement

Acceleration



Miniature PiezoBeam® Modal Single/Triaxial Accelerometer

- -40 ... 150 °F operation
- Smallest PiezoBeam
- Ground isolated mounts
- Lightweight, hermetically sealed
- Low noise
- TEDS option



Miniature PiezoStar® Triaxial Accelerometer for Structural Analysis/NVH

- Ranges: up to ±500 g
- 5-40 threaded hole
- Low temp. sensitivity
- Temperature (<330 °F)
- High frequency response



PiezoStar® Triaxial Accelerometer for Structural Analysis/NVH

- ±50 and ±500 g
- TEDS option
- Hermetic Titanium
- Very low temp. sensitivity
- Low base strain sensitivity
- Low mass



Calibration: Capabilities in Novi Michigan

Although Kistler is known as an innovative, long standing manufacturer of world-class sensors, our local calibration service in Novi, MI also receives the highest marks.

The calibration of your engine combustion sensors and vehicle dynamics equipment, is performed at our Novi facility with utmost care and precision. Our standard prompt service is exceptional, minimizing your downtime. The Kistler Calibration Laboratory in Novi is in conformance with the requirements of ANSI/NCSL Z540-1-199 and is fully accredited to ISO/IEC 17025.

For extended service coverage for all Kistler sensors, the Kistler Calibration Laboratory in Amherst, NY is in conformance with the requirements of ANSI/NCSL Z540-1-1994, MIL-STD-45662A, ISO 9001:2000 and is fully accredited to ISO/IEC 17025.

Kistler Expanding in Mexico

New Kistler office in Mexico

Kistler is pleased to announce the opening of Kistler Instruments S de R.L. de C.V., based in Monterrey NL. This latest group company continues Kistler global strategy of placing group companies in countries where our major customers have their operations. Kistler provides sensors and instrumentation that are used in both R&D and critical manufacturing operations. Kistler Mexico will provide local sales and service support for our global customers who have established operations in Mexico.



Kistler Instruments S de RL de CV.

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