

KISTLER

measure. analyze. innovate.



MEASURED PERFORMANCE

AUGUST 2024 ISSUE

Product news

Piezoelectric sensors –
essential for measuring systems

Success Stories

Kistler is making its mark in the space
flight, medical and aviation industries

Sustainability

Well on track for
CO₂ neutrality

THE COURAGE TO CHANGE PERSPECTIVE

What if ... measurement technology could open up new perspectives – if we could discover groundbreaking solutions simply by looking at things from a different angle! And ... suppose we view global challenges as incentives for progress? Kistler takes on the challenge of bringing up the right questions – and making the answers visible. Changing perspectives, and breaking through entrenched ways of thinking – that means opening the way for new ideas to emerge.

Kistler's innovative products give our customers reliable data as the basis for their pioneering developments. Here at Kistler, we are absolutely committed to helping companies and research partners exploit their innovative strengths to the full.

So – what if measurement technology became the game changer? See how Kistler responds to this challenge in a video that shows what our company is doing to help our customers succeed.



Information about Kistler and our image video



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EDITORIAL



Dear readers, dear innovators

Innovation means implementing ideas that offer people added value. All that's needed for an innovative solution is often just a change of perspective. But: the new perspective must always be the customers' perspective as well!

We deliver added value by making processes and operations transparent so they can be optimized and improved – processes for researching material properties, and methods for ensuring the quality of production processes, to take just two examples. Understanding is the basis for innovation. We've been committed to this principle for 60 years, at 60 locations throughout the world.

Measurement technology starts with the sensor that captures data. But our customers demand more: they want information that is application-specific and meaningful. Software and artificial intelligence transform data into valuable information. Just recently, our software development facility in Slovakia found the ideal location – in Bratislava's greenest high-rise building: where innovation meets sustainability.

Everything's going electric, and it looks like the combustion engine in its existing form has had its day. But here at Kistler, we don't quite believe that's true. Drones, electric airplanes and e-vehicles are throwing up new challenges for young engineers – and, of course, for measurement technology manufacturers as well. We're happy to tackle these challenges. For instance, we've acquired a start-up to measure thermodynamic loads on batteries.

The trend to replace hydraulic machines with electric versions is gaining momentum. We lead the market with our wide range of electrical joining systems. On page 15, read how a study by the Ostfalia University of Applied Sciences proves that electro-mechanical joining systems are superior to other solutions when it comes to saving energy and reducing CO₂.

We're getting older and older. And our infrastructure is also aging. Structural Health Monitoring – SHM – is the byword for a new emerging market that focuses on extending the service lifetimes of system-critical structures such as bridges. Measurement technology plays a key role here.

Kistler has been growing continuously for decades; once again in 2023, we were able to grow by well over 7 percent – and we created 120 new jobs. Innovation begins in the mind. Kistler is looking for talents who can think ahead – because: Innovators work with Kistler.

We are living in an uncertain world. What held true yesterday is outdated today. But: you can rely on us and this year too, you can be sure that Kistler will be bringing new products to market featuring the very latest technology.

Rolf Sonderegger
CEO of the Kistler Group

KEY FIGURES
2023

Sales
in CHF million
465

Growth after currency-
related adjustments
in percent
14.2

New jobs created
120

Research
and Development
in CHF million
40.7

HIGHLIGHTS

Kistler has visions, and we set ambitious goals for ourselves. Recent events pinpoint the areas where our company intends to play a pioneering role, and where our aim is to continue expanding or defending our market leadership.

1 Bridges – sensitive key elements of the infrastructure
As many as 5,000 bridges on Germany’s autobahns and trunk roads are so dilapidated that they need to be refurbished or rebuilt as quickly as possible. In the USA and other countries too, several thousand bridges have been allowed to fall into disrepair. This is putting the safety of users and important supply chains at risk.

Action is needed to prevent a bridge accident like the one at Genoa (Italy) in 2018. Kistler’s systems are the solution of choice both for bridge monitoring and bridge protection. Reliable data about the actual loads on bridges makes it possible to plan maintenance measures precisely, and identify overloaded vehicles so their access can be restricted even before they cross a bridge. In mid-April 2024, Kistler presented the complete Structural Health Monitoring solution to trade visitors and the general public at Intertraffic, the leading trade fair for infrastructure, traffic management, safety and parking in Amsterdam.

Kistler’s unique Structural Health Monitoring and Weigh In Motion portfolio offers comprehensive solutions for condition monitoring of sensitive infrastructure. The full potential of digitalization can be exploited when SHM is combined with KiTraffic

Digital – our new digital platform that is the most advanced and accurate Weigh In Motion (WIM) system on the market.

The trade show in Amsterdam was a total success for Kistler! The model of a bridge vividly explained what Structural Health Monitoring is – and it attracted huge numbers of visitors as well as journalists, leading to widespread media coverage.

2 20,000 m² for the Smart Factory
On August 30, 2023 Kistler signed the contract to acquire a plot of land in Winterthur. It is adjacent to our company’s existing headquarters. This area of almost 20,000 m² is where our Smart Factory will be built – a hub of cutting-edge production and logistics.

Thanks to the deployment of cutting-edge technology and the availability of specialists, this Smart Factory will become the innovation and production center of the future. To achieve this goal, the factory will combine state-of-the-art processes with a high level of automation. We also aim to create the world’s largest production facility for piezoelectric sensors. Kistler believes in Switzerland as a business location, and our investment in Winterthur is based on this conviction – so the conditions for future growth will be created.



3 Plenty of space for close collaboration

Kistler has created an ideal space where teams – employees as well as experts from colleges, universities and research institutions – can collaborate, swap ideas and drive innovations ahead. At the new Sensor Technology Center, the focus is on crystal research. To manufacture sensor elements, Kistler grows its own crystals that combine unique sensitivity with extreme temperature resistance.

The center was inaugurated on April 3, 2024 with partners from universities and research institutes located throughout Switzerland. Guests were given a tour of the premises as well as the Research & Technology department's newly designed showcases. With the Sensor Technology Center, Kistler has created space for modern collaborative work.

4 Speakers, guests – and the crash test dummy

Kistler has set up a calibration laboratory for crash test dummies at its site in Shanghai (China). The opening ceremony on September 15, 2023 was attended by over 20 automotive safety expert as well as laboratory managers from leading local automotive safety testing organizations and OEMs. The celebrations included a presentation of Kistler products and solutions,

and CEO Rolf Sonderegger offered insights into Kistler's planned commitment to the vehicle safety business in China. A highlight of the event came when guests were able to witness a demonstration of crash test dummy calibration in the new calibration laboratory. Kistler is the one-stop shop for customers in China, offering everything from sensors, THOR dummies, data acquisition and analysis to calibration services and local support.

5 Ready to serve our customers – 24/7

myKistler is Kistler's online customer portal that offers comfortable 24/7 access from any device to information about over 3,000 products. Our online offering includes clearly structured product documentation with comprehensive technical data, CAD views, availability details, prices – and much more besides. Numerous useful shopping basket functions make purchasing decisions and online shopping easy.

Customers in Europe and the USA can already take advantage of myKistler, and we are continuously making the portal accessible to new markets. Over 5,000 customers are already using the platform for product evaluation, planning and budgeting for their projects. By registering, users gain access to an impressive customer experience.

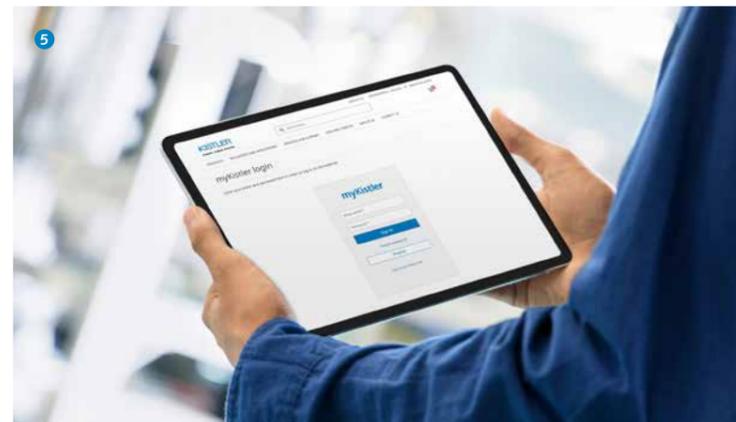
6 Green on the outside and blue on the inside

Kistler's new site in Bratislava was ready for us to occupy in September 2023. Our offices are housed in one of Slovakia's most sustainable buildings, located close to the city center. The Bratislava site is the Kistler Group's software hub. This is where over 120 acknowledged specialists develop the latest software solutions, always focusing on the goal of improving customers' processes and products – on the basis of enlightening analyses and improved transparency thanks to dynamic measurement technology.

The high-rise building has first-class ecological attributes, and the interior design of the Kistler offices encourages dialog and agile teamwork. With this state-of-the-art concept, Kistler aims to foster collaboration, creativity and innovation, while strengthening team spirit and improving our employees' wellbeing. Meeting rooms and the catering area also provide inspiring venues for customers and visitors. The Kistler offices have won two prestigious awards: CBRE Slovakia's Innovative Office of the Year 2023, and the BIG SEE Interior Design Award 2024.

Experiencing digitalization

The experts in our Innovation Lab combine the forward-looking scientific know-how that typifies Kistler's Smart Services with relevant application know-how. Customers can make use of the multi-faceted expertise available at the Kistler Innovation Lab to take full advantage of their potential for the digital transformation. Physical and digital processes are becoming increasingly intermeshed. Digitalization of the value chain is unlocking countless new possibilities and opportunities. But these developments are still in their infancy: in more and more sectors of industry, the coming years will see quantum leaps in the development of new solutions thanks to machine learning, data science, and artificial intelligence.



PRODUCT STORIES

Kistler is a global market leader in dynamic measurement technology. Customers in industry and research can take advantage of Kistler's customized sensors, measuring systems and services to improve their products and optimize their manufacturing operations.

Overview of outstanding market launches in 2023 and the first months of 2024



Most accurate Weigh In Motion (WIM) system



KiTrafic Digital is a unique system for monitoring vehicle weights and tires – with market-leading accuracy. It measures the wheel, axle and gross weight of road vehicles as well as their speed, and provides a varied range of information on tires.

The KiTrafic Digital system comprises Lineas Digital sensors, with accuracy certified to the standard of the International Organization of Metrology (OIML).

Universal charge amplifier with Ethernet



Kistler's new ICAM-B multi-purpose charge amplifier is suitable for almost all applications with piezoelectric sensors. This is a universal industrial charge amplifier with a wide measuring range, web-based user interface, comprehensive signal conditioning and Ethernet connectivity. In modern manufacturing environments, the ICAM-B (5073B) plays a critical role in production control and monitoring based on measurement data. Application areas include micromechanics, the medtech sector and the semiconductor industry.



4,000 precise tests per minute



Optical quality inspection with the new compact KVC 621 SE automated testing system is ideal for mass-produced stamped parts thanks to its rapid throughput times. Integrated safety concepts guarantee that the testing process is absolutely reliable: thanks to rigorous PLC monitoring of the individual processes and the handshake, the automated system records and tests every single workpiece – so manufacturers can always count on maximum product quality.



Laboratory charge amplifier with up to eight channels



The LabAmp 5166A is a universal laboratory charge amplifier used to measure force, acceleration, pressure, reaction torque, and strain. It features integrated data acquisition and can be used wherever dynamic signals are measured with differential piezoelectric sensors. The Kistler LabAmp allows low-noise measurements with flexible signal conditioning, and it supplies high-quality digitized data direct to the computer for further analysis.

Mobile measurement and data acquisition



The new 5811A handheld family comprises user-friendly in-field measurement devices with an integrated charge amplifier. They enable users of piezoelectric sensors to carry out process parameter verification and quality controls at any location. Measured values as well as measurement curves are displayed directly on the touchscreen.

The new 5811A handheld devices cater to increasingly complex needs in various industrial sectors, offering unique performance and signal quality.



SUCCESS STORIES

For Kistler, success comes when teams and technology interact to drive innovations ahead. Guaranteed measurement accuracy helps to gain insights from data. Kistler is growing to meet the challenges its customers face – in zero-defect production, spaceflight, aviation and beyond.



Meeting the requirements for medical device manufacturing
As regards standards and regulations, the requirements in medical device manufacturing are far higher than in other sectors of industry. EVCO has equipped two of its sites with ISO Class 8 Clean Rooms, and it relies on MDR- and FDA-compliant quality assurance from Kistler for its production of medtech devices and pharmaceutical products. ComoNeoMULTIFLOW makes it possible to perform hot runner balancing for multi-cavity molds based on precise cavity pressure measurement. The MULTIFLOW function detects the different filling statuses in each cavity, and automatically adapts the temperature of the injection nozzles. EVCO is currently using the Kistler system for zero-defect manufacturing of a component for a medical diagnostic kit. But in principle, all EVCO's molds are now prepared for Kistler sensors. Thanks to the portable ComoNeo, EVCO is now able to use the system flexibly for different projects.

Partnership inspires new solutions and projects
This unique solution has helped EVCO to achieve zero-defect production. As well as eliminating challenges with core shift, the use of ComoNeo has ramped up productivity and reduced cycle times. Given these convincing results and overall customer satisfaction, EVCO and Kistler have decided to enter into a strategic partnership. With Kistler's help, EVCO is convinced that it can offer its customers solutions for needs they didn't even know they had.

Partnership for excellence in plastics processing



EVCO Plastics is a world-renowned market leader in the injection molding sector. This family-run US business operates over 260 injection molding machines. EVCO offers excellence in injection molding – with state-of-the-art technology, tight tolerances and high quality requirements.

For a project in the medical sector, EVCO has opted for cavity pressure sensors from Kistler in combination with the ComoNeo process monitoring system – and in this application, ComoNeo's MULTIFLOW function plays a particularly important part.

What is cavity pressure?

In injection molding, the cavity pressure – the pressure inside the mold, which is filled with liquid plastic – is a decisive indicator of the quality of the molded part that is being produced.



Looking into the past of the universe



The James Webb Space Telescope is one of the most ambitious and complex space exploration projects in human history – and for this challenging venture, NASA relied on Kistler to supply measurement technology for FLVT (Force Limited Vibration Testing) and mechanical tests.

The outstanding sensitivity of the James Webb Space Telescope makes it capable of picking up light from the early times of the universe – theoretically, as long as 13.5 billion years ago. But the Space Telescope can also 'take a look' around our neighborhood to advance planetary and exoplanet research, for example.

Kistler accelerometers in space

The space industry is an extremely challenging sector in terms of new product development and quality control. Equipment is exposed to demanding environments typified by extreme temperature ranges – down to 25 Kelvin in the case of the James Webb Space Telescope, for example – as well as severe pressure fluctuations and high shock and vibration levels.

The alignment of the mirror elements for the James Webb Space Telescope must be absolutely exact. This level of precision is attained by 132 actuators capable of positioning at nanometer level – and unwanted vibrations also have to be taken into account. Six different Kistler accelerometer types were used in the various vibration tests, including devices in our 8793A500 series that are now part of the telescope in space.

Tested for research in orbit

Some of the scientific instruments underwent what is known as Force Limited Vibration Testing (FLVT) with 28 Kistler force transducers. Extremely accurate force measurement is the basis for the Closed Loop Control System (CLC) used in these tests, with multi-channel laboratory amplifiers (5080A) from Kistler integrated in the measuring chain. The CLC setup made it possible to avoid overtesting, and the danger it could present for the valuable instruments under test.

The James Webb Space Telescope – with its mirror measuring around seven meters by six, which operates entirely in the infrared spectrum – can look deeper into the past of the universe than any previous telescope, as it travels on its pre-determined orbit around the sun.

Motorized CO₂-free travel through the skies



At the Swiss Federal Institute of Technology in Zurich (ETH Zurich), dedicated students are developing CO₂-free power-trains for small aircraft. A Kistler torque sensor is being used in the project for an electric aircraft, and our 4080BT pressure and temperature transmitter has a key role in development work on the hydrogen fuel cell plane. Emission-free flight is literally taking off! Decarbonization presents a huge technical challenge for the aviation industry – especially for large aircraft and long-haul flights. With over 100,000 commercial flights per day, air traffic is responsible for 2.5 percent of CO₂ emissions caused throughout the world. As well as sustainable aviation fuel (SAF) and potential alternative fuels for turbines such as hydrogen or liquid methane, approaches are under way to develop electric drives powered by batteries or hydrogen fuel cells. But with longer flight durations and larger passenger capacities, it is becoming increasingly difficult to find adequate replacements for the high energy density of kerosene and aviation gasoline (AvGas).

Cellsius, a Swiss team of young engineers, is providing impressive proof that this is already possible for small aircraft and short-haul flights. Founded in 2022 with its focus on sustainable aviation, the Cellsius association offers final-year Bachelor's degree students the opportunity to test and expand their knowledge and skills on real aircraft. Cellsius has succeeded in building the world's first licensed four-seater electric aircraft designed by students. At an early stage of the project, a torque sensor from Kistler was obtained to assist with designing the motor and developing the power electronics. It is an integral part of the test stand at the ETH site in Dübendorf, where the hangars, take-off and landing strips are located.



PEOPLE & CULTURE

Kistler is only as strong as its culture – and it is our corporate values that provide the basis for our culture. Our employees embrace these values and bring them alive. Above all, our corporate values shape the way we work together, and they determine our company's success.

Cornerstones

To achieve the Kistler goals, a transformation is needed. For this reason, we have added six Cornerstones to our corporate culture that aim to influence mindsets and attitudes. These Cornerstones define the approach to work that we seek to achieve, and they identify areas where further development is needed. 'Focus & Simplicity' is one of these Cornerstones. It's about staying focused on what is important, and finding simple solutions quickly. So a results-oriented working approach means not dwelling for long on internal issues and problems. All resources – of time as well as energy – should be used to concentrate on external challenges.

From Cornerstone to motto for the year

'Focus & Simplicity' is such an important approach that Kistler declared this Cornerstone as its annual motto for 2023 and 2024. The ability to focus and simplify complexity is a fundamental factor in developing innovative solutions. The company also regards 'Focus & Simplicity' as essential so we can continue developing in line with our strategy. And Kistler can only achieve its ambitious goals and bring planned changes to an efficient conclusion if we practice 'Focus & Simplicity'.

Another reason why this principle is so very important is that Kistler must have a solid basis for its innovative strength. This is the only way we can keep our focus on customers' needs, and implement 'Customer Centricity' – another of our six Cornerstones. At the end of the day, satisfied customers are what counts! And at Kistler, satisfied customers are sometimes the outcome of a good corporate culture. Thanks to long years of service contributed to the company by many employees, we have accumulated an enormous stock of specialist knowledge from our activities all over the world. Our customers benefit from the unique consulting expertise of our sales force, to take just one example.

Succeeding as a team

One outstanding attribute that all our employees share is the ability to work with a high level of independence, and they all shoulder responsibility in their own areas. Ultimately, however, getting along together as a team is crucial to achieving sustainable success – both as an individual and as a company. Being a global team player requires a mindset that is open to the world. Kistler is promoting this skill with a program launched in 2024. Employees can work at a different international location for a defined period of time. This program aims not only to improve intercultural skills and build a global network, but also to broaden personal horizons and foster personal as well as professional growth. Kistler doesn't just need good people – we need the best: and ultimately, we want the most innovative people to want to work with our company. That's what we mean by our mission: 'Innovators work with Kistler!'



CO₂-NEUTRAL

Sustainability is also measurable. At Kistler, we firmly believe that measurement leads to knowledge – and that knowledge is the key to change. Our company also upholds this conviction when it comes to sustainability, and we shoulder responsibility for a careful and mindful approach to resources and the environment.



CO₂-neutral by 2030

To assess our sustainability, Kistler has set itself the goal of achieving CO₂ neutrality for the entire group of companies by 2030. Production should already be CO₂-neutral at our six largest German plants by 2025. This relates to emission categories (Scopes) 1 and 2 as defined in the Greenhouse Gas Protocol. Measures are focused mainly on electricity and mobility, which together account for almost three quarters of Kistler's total carbon footprint.

2023 climate footprint

Kistler has completed its review for the 2023 year, and we can report encouraging results: as compared to 2022, worldwide CO₂ savings amounting to 33.1 percent were achieved.

This equates to emissions totaling 2,294 metric tons of CO₂ (compared to 3,429 metric tons in 2022). This reduction has mainly been achieved by switching over to green electricity and purchasing green electricity certificates.

Step by step to CO₂ neutrality

Last year, all our sites in Germany were supplied exclusively with green electricity. Other Kistler sites purchased green electricity certificates to compensate for their yearly power consumption in 2023. To make mobility more sustainable, Kistler is switching the company's vehicle fleet over to e-vehicles, and we are expanding our network of e-charging stations at Kistler sites. And we are doing even more to reduce our carbon footprint by converting the building infrastructure to heat pumps and photovoltaic (PV) systems.

Kistler joining system – with proven sustainability

Sustainability is making its way into industrial sites – and into Kistler's product portfolio. With the electromechanical joining system, for example, manufacturers can lower their acquisition and subsequent operating costs as well as reduce their CO₂ consumption. A commissioned study proves that the electromechanical joining system from Kistler operates with the highest efficiency in terms of pure joining work: it saves up to 5.9 times more energy compared to the hydraulic version, and up to 20.7 times more than the pneumatic variant.

Comparative energy study of joining systems

Electromechanical joining system



Reduction in number of NOK parts^A

Reduction of CO₂ emissions^C
2.6t

Reduction of overall operating costs^B

Possible energy savings^D
93%

Energy requirement
471 kWh

CO₂ emission
193 kg

All data is for 6,000 operating hours.

Hydraulic joining system



Energy requirement
2,792 kWh

CO₂ emissions
1,144 kg

All data for 6,000 operating hours

Pneumatic joining system



Energy requirement
6,864 kWh

CO₂ emissions
2,814 kg

General test conditions

- Efficiency of compressed air generation: standard pneumatic system (175 Wh/m³)
- Conditions: 15 kN, 180 mm stroke

- A Precise process control
- B As compared to hydraulic systems (depending on the process and the technology used)
- C Reduction of annual CO₂ emissions
- D Energy saving as compared to conventional systems (up to 93 percent for the pneumatic system and 83 percent for the hydraulic system)

The Kistler Group is pioneer and global market leader in dynamic measurement technology for pressure, force, torque, and acceleration. As a partner for industry, research and development, we help our customers to drive technological innovations ahead. In this way, we play an essential part in making production processes more efficient and ensuring a sustainable future.

We are a family-run Swiss company, founded in 1959, and we have wide-ranging expertise at our disposal in diverse industrial sectors and applications. Day after day, at over 60 sites, more than 2,000 employees devote their entire know-how and passion to developing customized solutions throughout the value chain – solutions that respond to today's megatrends. This approach has earned us the trust of customers all over the world. To put it simply: Innovators work with Kistler.

Kistler Group

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