KISTLER

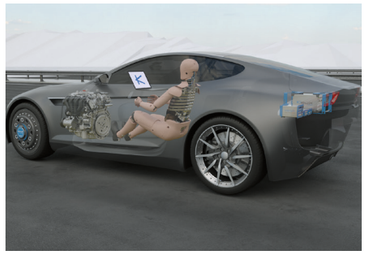
measure. analyze. innovate.

Joining Competence Center (JCC)

Plan with more certainty and improve cost control for your joining processes

Absolute Attention for tomorrow's world

Kistler develops solutions for challenges in measurement technology with a portfolio that comprises sensors, electronics, systems and services. We push the frontiers of physics in fields such as emission reduction, quality control, mobility and vehicle safety: our products deliver top performance to meet the standards of tomorrow's world, providing the ideal basis for Industry 4.0. This is how we pave the way for innovation and growth – for our customers, and with our customers.



Kistler: the byword for advances in engine monitoring, vehicle safety and vehicle dynamics. Our products deliver data that plays a key part in developing efficient vehicles for tomorrow's world.

Measurement technology from Kistler ensures top performance in sport diagnostics, traffic data acquisition, cutting force analysis and many other applications where absolutely reliable measurements are required despite extreme conditions.

By supporting all the stages in networked, digitalized production, Kistler's systems maximize process efficiency and cost-effectiveness in the smart factories of the next generation.

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The Kistler test workstation comprising the frame, NC joining module, control cabinet with measurement technology, control and data acquisition unit

Optimize and validate joining processes before commissioning

Industrial production never stops developing, so individual manufacturing processes have to meet ever-increasing requirements – and joining is a typical example. Joining processes are often performed in the automotive industry and many other sectors such as medical technology, white goods and the 3C market. Thanks to technology from Kistler, these processes can already be validated before the plant is commissioned.

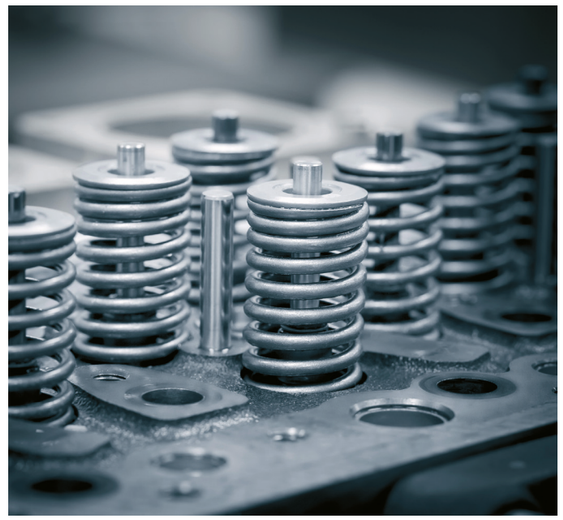
Introducing new products or processes often involves challenges and uncertainties about production and assembly. But at the same time, manufacturers have to adhere to target development times and budgeted costs. To help customers achieve these goals, Kistler offers them the opportunity of using a test workstation for flexible validation of assembly and testing processes on parts such as bearings, sealing rings, rotor packages, bushings and springs.

The Kistler test workstation comprises a press frame with a wide selection of joining modules, together with a control cabinet containing the measurement and data acquisition technology. The workstation's adjustable mechanical structure gives users plenty of flexibility to install tools; process evaluation based on force and displacement is both variable and transparent thanks to the maXYmos NC process monitoring and control system.

Your advantages
- Your joining processes are optimized and validated
- Measured values and process parameters are determined with high accuracy
- You save costs by avoiding over dimensioning
- You can plan your development work with greater certainty

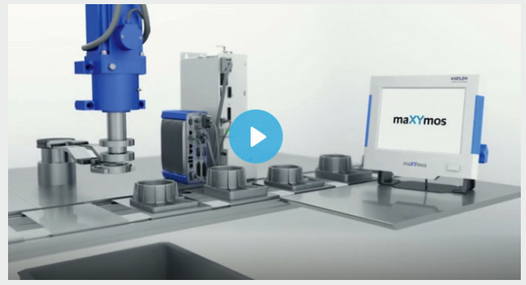
Customer goals
- Validate the feasibility of joining processes
- Process development and optimization
- Determine and reduce cycle times

Customer benefits
- Minimized risks thanks to increased process knowledge
- Lower process design costs – and faster commissioning
- Better product quality, more reliable planning and increased productivity

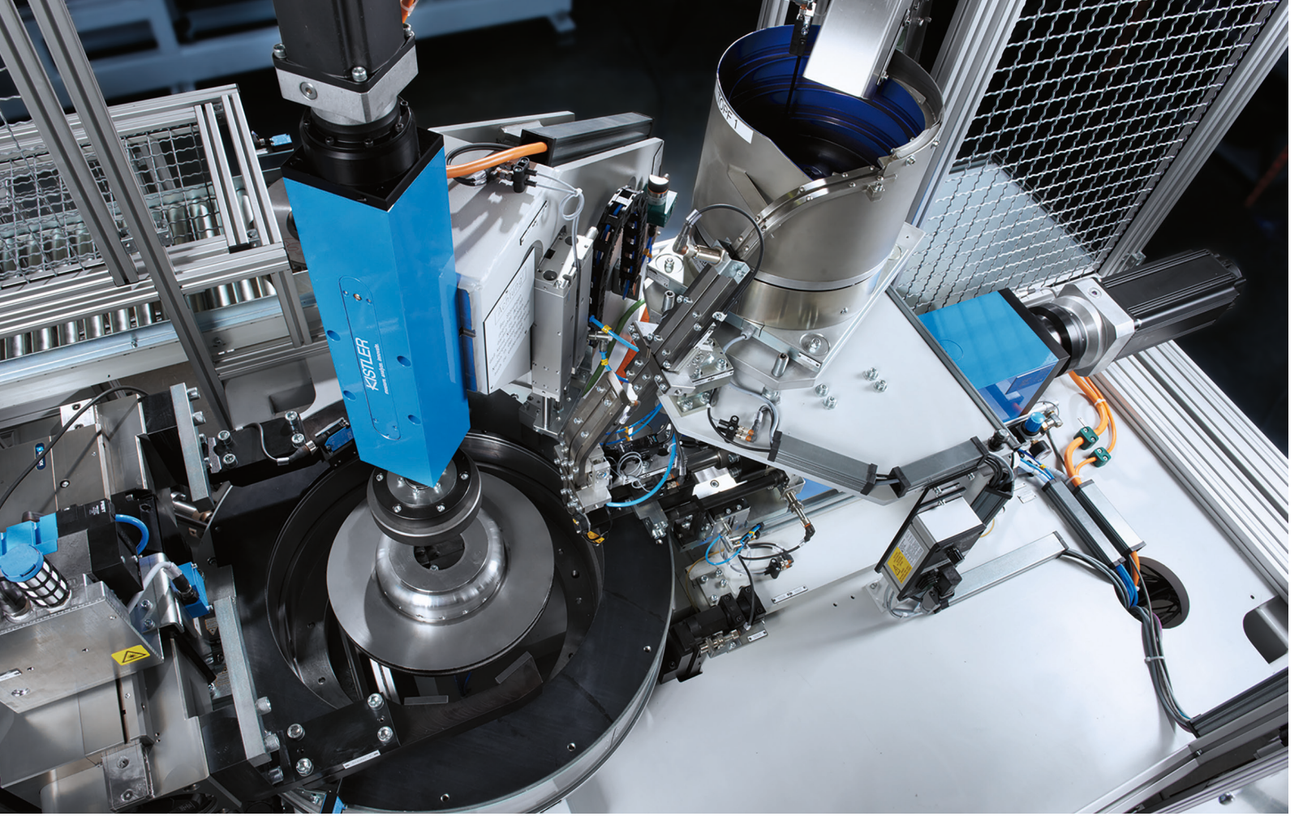


Force-displacement monitoring with maXYmos NC
As tests are carried out on the workstation, the force and displacement sensing technology integrated into the joining module transmits the measurement data to maXYmos NC, the process monitoring and control system from Kistler.

Features and technical data of the test workstation
- Measurement range from a few newtons up to 100 kN
- Joining stroke: up to 400 mm
- Traverse speed: up to 700 mm/s
- Variable installation – height up to 700 mm, depth up to 600 mm
- Mounting plate on movable table
- Process control with the maXYmos NC Sequence Editor
- Process evaluation based on a wide choice of different evaluation objects (EOs)
- Option to use external sensors
- Measurement results are exported in various data formats



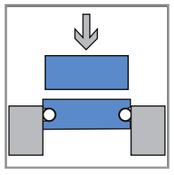
Monitor the joining process with Kistler – watch online now!
View our animation to experience convincing first-class solutions from Kistler – the surest route to 100 percent quality in your production:
www.kistler.com/nc-joining



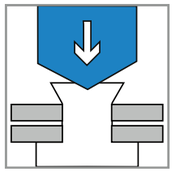
Application for riveting a lightweight brake disk with the help of force-displacement monitoring

A universal solution for every industry

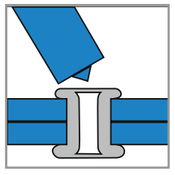
Joining processes are performed in many sectors, ranging from the automotive, electrical and electronic industries to medical technology and watchmaking. Engineers make use of a vast range of joining techniques such as press-fitting, caulking, clipping or rolling – and joining systems from Kistler can test and optimize all of these processes prior to commissioning on the machine.



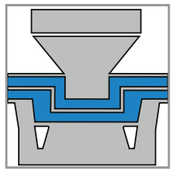
Press-fitting



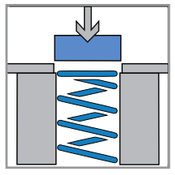
Caulking



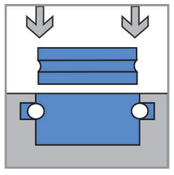
Riveting



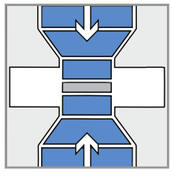
Clinching



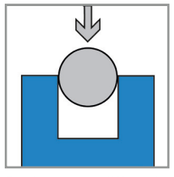
Spring testing



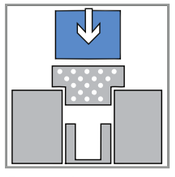
Snap-in



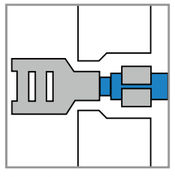
Embossing



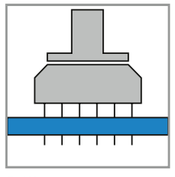
Sealing, press-fitting of ball bearings



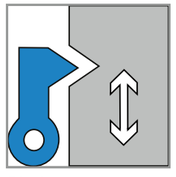
Compression



Crimping

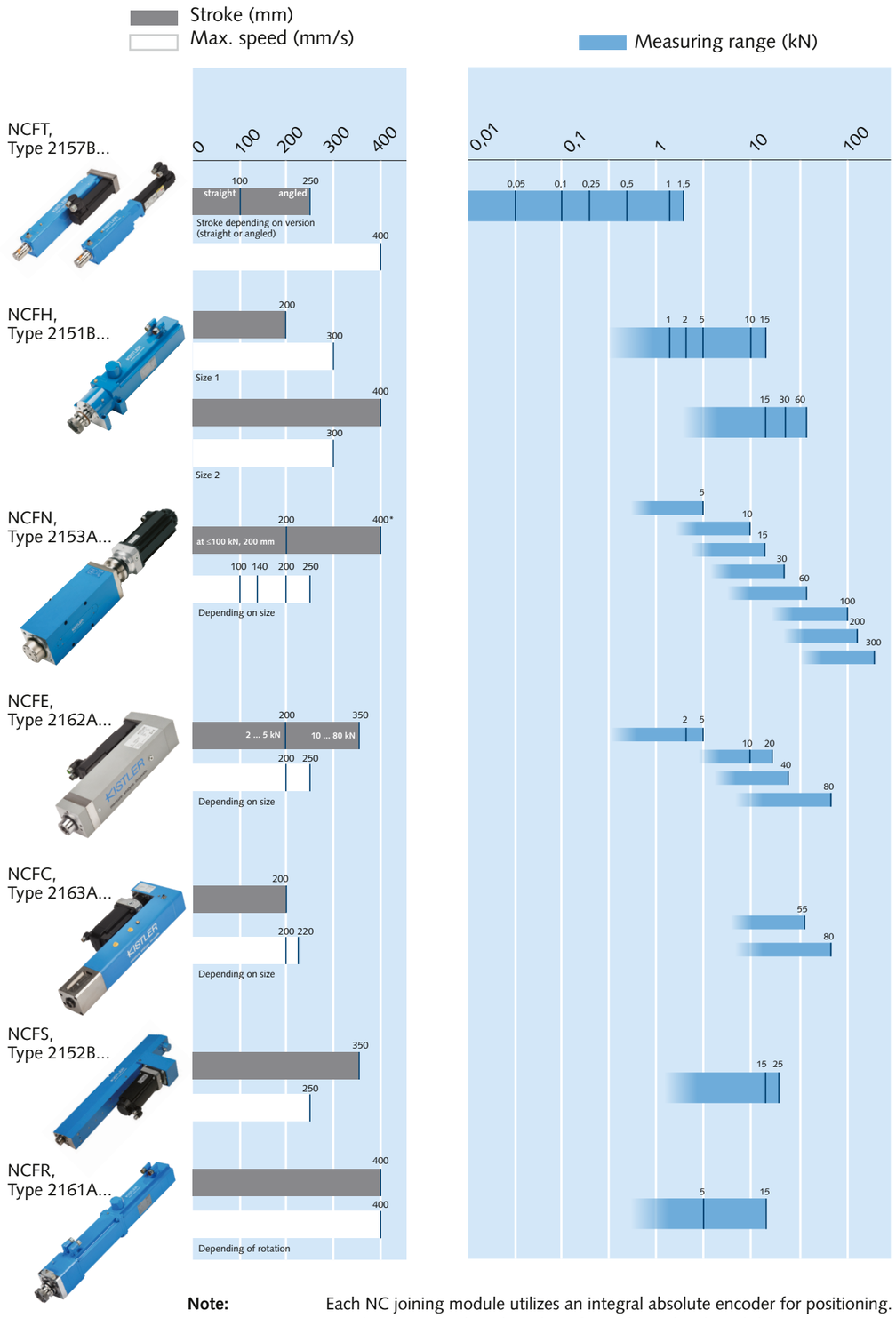


Setting force



Clipping

Overview NC Joining Modules

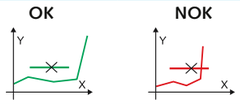
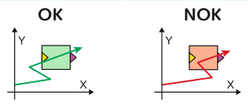
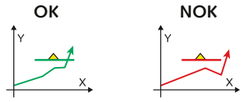
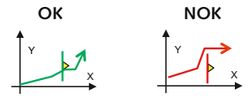
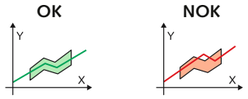
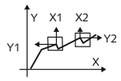
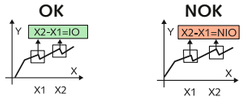
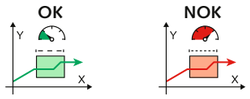
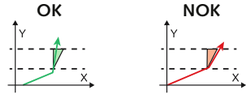
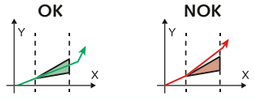
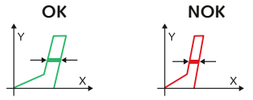
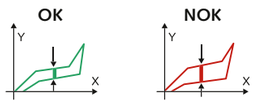
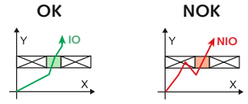
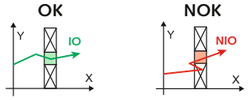
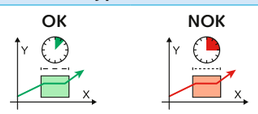
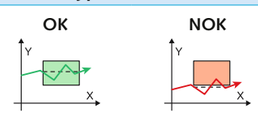
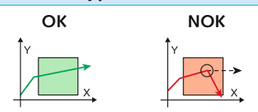
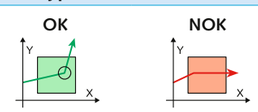
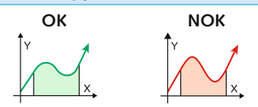
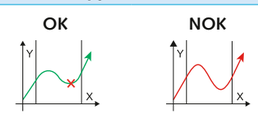


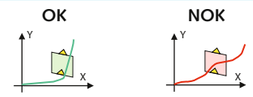
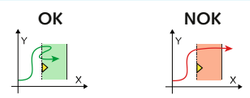
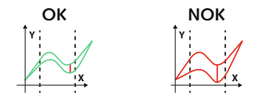
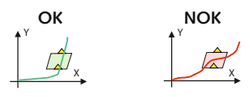
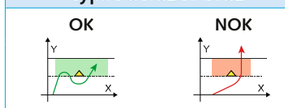
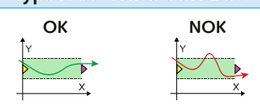
Note: Each NC joining module utilizes an integral absolute encoder for positioning. See the corresponding data sheet for additional technical data.

* Special versions with a stroke of up to 1,000 mm, max. force range of 600 kN or angled design are available on request

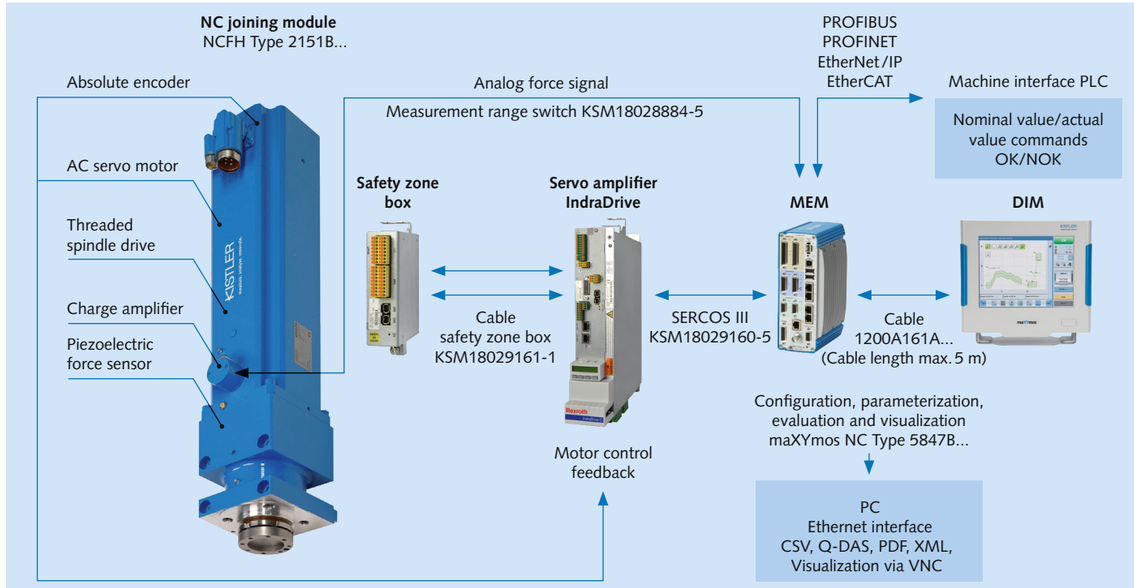
Well equipped for every application

Users can choose from a wide range of evaluation objects (EOs) to assess the joining process. Every process – no matter how simple or complex – can be evaluated with up to ten different EOs. Setting and teaching the EOs is fast and straightforward, either on a PC or via touchscreen.

The line must not be crossed. Otherwise: NOK and NO-PASS real-time signal.	**Type NO-PASS** OK NOK 	Entry and exit as specified. No violation of "closed" sides is permitted. Each side can be defined as an entry or exit.	**Type UNI-BOX** OK NOK 
The line must be crossed once. Monitoring of an X-value at the point of intersection.	**Type LINE-X** OK NOK 	The line must be crossed once in a specified direction. Monitoring of a Y-value at the point of intersection.	**Type LINE-Y** OK NOK 
The measured curve must not violate the upper and lower lines of the envelope curve band. This evaluation object is quickly learned thanks to trend tracking.	**Type ENVELOPE CURVE** OK NOK 	Box detects significant curve features and their XY coordinates in the expectancy range. These can be used as reference points for other EOs or as an input for the CALC object.	**Type GET-REF** 
The object references two selectable process values and performs calculations and evaluations with them, e.g. to calculate the X-difference between two ripples.	**Type CALC (CALCULATION)** OK NOK 	The evaluation criterion is the speed between the entry and exit points in a special box.	**Type SPEED** OK NOK 
Evaluates gradient dX/dY between two horizontal lines.	**Type GRADIENT-X** OK NOK 	Evaluates gradient dX/dY between two vertical lines.	**Type GRADIENT-Y** OK NOK 
Evaluates the X-hysteresis between a forward and a reverse curve on a horizontal line.	**Type HYSTERESIS-X** OK NOK 	Evaluates the Y-hysteresis between a forward and a reverse curve on a vertical line.	**Type HYSTERESIS-Y** OK NOK 
Entry and exit as specified. A violation of the closed sides delivers a real-time signal and stops the sequence.	**Type TUNNELBOX-X** OK NOK 	Entry and exit as specified. A violation of the closed sides delivers a real-time signal and stops the sequence.	**Type TUNNELBOX-Y** OK NOK 
The evaluation criterion is the time between the entry and exit points in a special box.	**Type TIME** OK NOK 	Evaluates the average of all Y-values in the box region.	**Type AVERAGE** OK NOK 
Generates NOK and online signal in case of sudden gradient change within an expectancy range (box), e.g. in case of tool breakage, and stops the sequence	**Type BREAK** OK NOK 	A defined gradient change is expected inside the box and can be used as a further switching condition in the sequence.	**Type BEND (INFLEXION)** OK NOK 
The area under the curve is determined and evaluated.	**Type INTEGRAL** OK NOK 	If the curve path is within the defined region, the system checks for the presence of a digital signal.	**Type DIG-IN** OK NOK 

Entry and exit as specified. No violation of "closed" sides is permitted. Each side can be defined as an entry or exit.	**Type TRAPEZOID-X[1)]** OK NOK 	Entry and exit as specified. No violation of "closed" sides is permitted. Each side can be defined as an entry or exit.	**Type TRAPEZOID-Y[1)]** OK NOK 
If the curve path is within the defined region, the maximum force offset between forward and reverse curves is determined and verified.	**Type DELTA-Y** OK NOK 	Evaluates the displacement end range and determines the max. value. The curve must reach the X-region. The upper limit must not be reached.	**Type DISPLACEMENT RANGE** OK NOK 
Evaluates the force end range and determines the max. value. The curve must reach the Y region. The upper limit must not be reached.	**Type FORCE RANGE** OK NOK 	Evaluates passage of the curve through the box. The curve must pass through the whole box in the preset direction. The curve is evaluated over the entire region of the box.	**Type PASS-THROUGH BOX** OK NOK 

Structure of an electromechanical NC joining system, using NCFH as an example



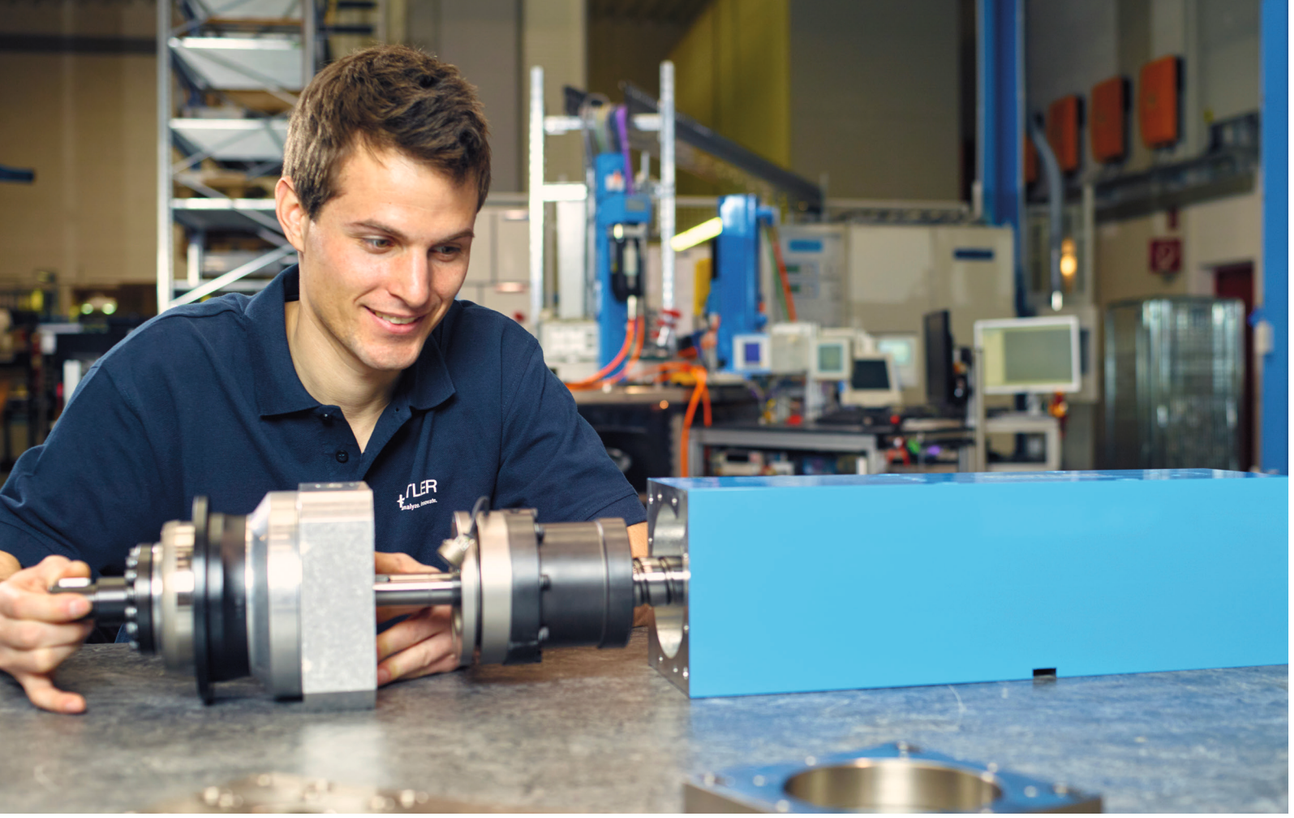
Operating principle of an NC joining system with NC joining module NCFH, Type 2151B... and maXYmos NC, Type 5847B...

Sequencer mode

The maXYmos NC controls the NC joining module via the servo amplifier with the help of integrated sequence control (sequencer mode). An independent sequence can be defined for each of the programs. The sequence can be configured freely with the help of the elements described here. Measurement and evaluation take place in the main routine. The three sub-routines can be used to define other sequences and execute them independently of the main routine. A total of up to 255 elements can be placed per program.

Q-DAS is registrated trademark of the Q-DAS GmbH.
VNC is a registered trademark of RealVNC Ltd.

An independent sequence can be defined for each of the programs (up to 128 in number).



From professional advice on all aspects of joining to speedy deliveries of spare parts: Kistler's comprehensive range of services and training is at your disposal across the globe.

Service and applications backed by specialist expertise

Kistler delivers premium services that correspond to Kistler's high-quality product solutions and are optimally coordinated with each other.

Take advantage of the strengths of Kistler's Joining Competence Center (JCC) to avoid increased commissioning costs or achieve lasting optimization of your production.

As well as performing tests, our joining system experts will work with you anywhere in the world to analyze your processes and identify improvements or new possibilities for your production facility. Precise measurement values are the essential basis for evaluating joining processes to achieve the right quality and optimal costs – for example, by avoiding unnecessary over dimensioning of plants and systems.

You're welcome to contact the Joining Competence Center directly with your inquiries – simply email us at **Service@kistler.com**.

Our experienced specialists in validating assembly processes will be happy to advise you – we'll accompany you on your journey towards increased productivity, improved quality and process reliability in production.

JCC offers these services:

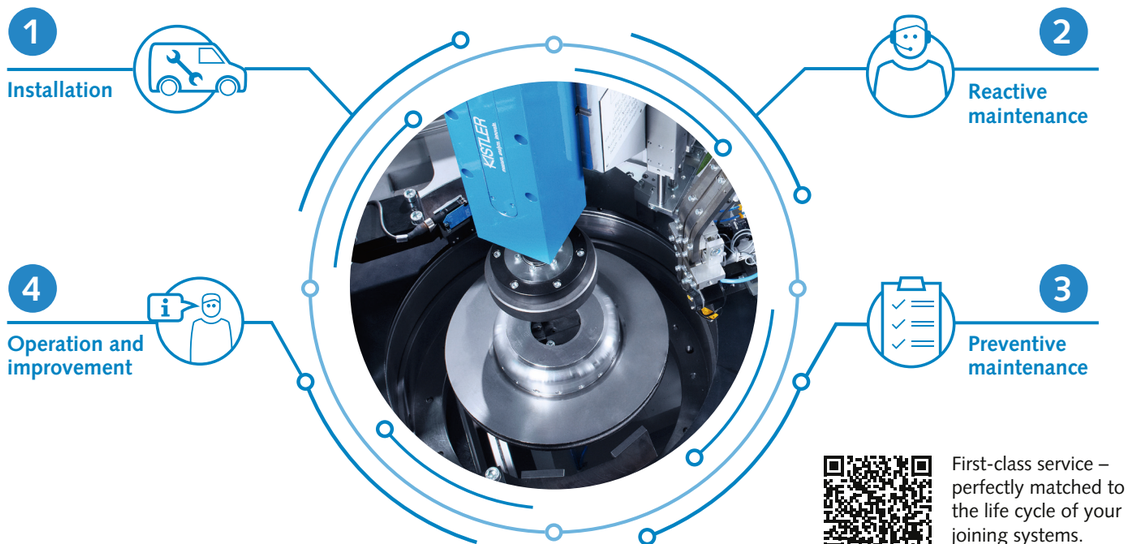
- Advisory support and system selection
- Process simulation and determination of cycle time
- Practical tests, including evaluation
- Process analysis and optimization

Kistler service at a glance

- Consultation
- Support during the commissioning of systems
- Process optimization
- Periodic onsite calibration of sensors
- Education and training events
- Development services

Your reliable partner throughout the entire life cycle

Who knows their products better than the manufacturer? Original Service from Kistler is the comprehensive service solution directly from the world market leader in dynamic measurement technology. We deliver service quality on a par with our proven products and system solutions. At the same time, we offer graduated service packages to provide you with the right solution for your needs.



First-class service – perfectly matched to the life cycle of your joining systems.
Service brochure

Installation

Kistler ensures that your solution is ready to operate on site. We support you through the installation process; we make sure that the joining system is optimally configured on commissioning, and we determine the parameters for the maXYmos process monitoring system. Our qualified professionals support you with their know-how so you select the right solution, and they assist you with on-site instruction for technical staff.

- Joining Competence Center
- Installation
- Commissioning

Reactive maintenance

Kistler is excellently equipped and always ready to respond to emergencies and unscheduled plant outages. We offer rapid response times and straightforward solutions for common problems in industrial production processes – and we will assist you on site if need be.

- Rapid response 24/7 (hotline)
- Access to emergency stock
- Unscheduled maintenance

Preventive maintenance

Precise measurement solutions are the only guarantee of error-free production. Regular inspections, calibrations and machine capability analyses (MCA) also ensure long-term protection for your investment and a high level of process reliability. Periodic maintenance and lubrication are the reliable way to reduce downtime and error rates to the minimum.

- Inspection
- Calibration
- Scheduled maintenance

Operation and improvement

When it comes to joining system solutions, our experts have a wealth of technical know-how – so they can support you with optimizing your plant. The machine capability analysis (MCA) of your joining system is the basis for a detailed examination of the measuring chain to boost your plant's performance. To ensure that joining systems are handled reliably, we offer training in the classroom and directly on the machine.

- Training
- Advisory support
- Optimization

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