



Mahr | Engineered Solutions

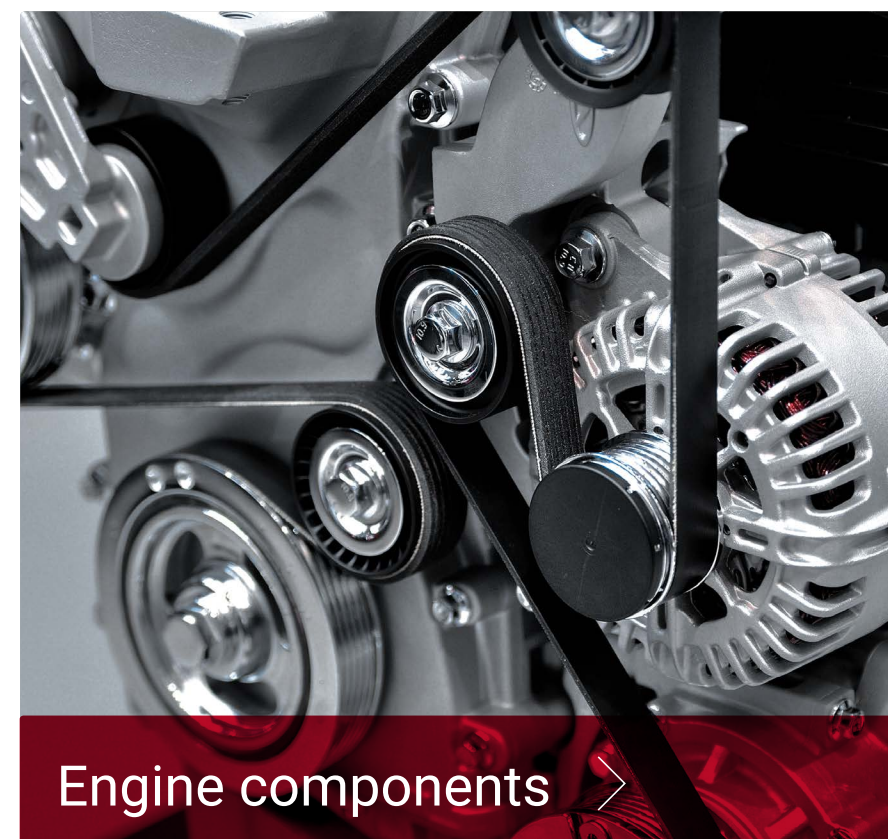
Measuring solutions that are as individual as your measuring task

With Engineered Solutions, Mahr consolidates its extensive product expertise to design customized measuring stations for customers around the world. These range from manually operated devices through to fully automated, robot-loaded solutions for inline measurement.



For Engineered Solutions **your preferences** are our benchmark

Many years of experience combined with a large portfolio of different system solutions makes Engineered Solutions the expert contact for individual measuring tasks. From your initial inquiry through to commissioning at your premises, Engineered Solutions works alongside you to develop a comprehensive solution for your workpiece. Together we can find the right technology for your measuring task.



Transmission components and **gears**

Manual

Manual
**universal
measuring
station**

Manual | MarSurf Engineered

Individual
and accurate
**positioning
with air bearings**

Manual | MarSurf Engineered

Folding gage for
gears

Manual | Mahr MWF

Gage for dimension
over balls for
gears

Manual | Mahr MWF

Semi-automatic
measuring
station for **gear
measurements**

Automatic | MarSurf Engineered

Fully automatic
measuring station
for **complex parts**

Automatic | MarSurf Engineered

Roughness
measuring
station for **gear
measurements**

Automatic | MarSurf Engineered

Measurement
automation for
inner races

Automatic | Mahr MWF

Measuring device
for **gears**

Automatic | Mahr MWF

Semi-automatic
measuring device
for **rotor disks**

Automatic | Mahr MWF

Automatic

Shafts and other rotationally symmetrical parts

Manual

Manual
universal measuring station

Manual | MarSurf Engineered

Individual and accurate
positioning with air bearings

Manual | MarSurf Engineered

Manual measuring station for
rotationally symmetrical parts

Manual | MarSurf Engineered

Transmission gage for **secondary shaft transmissions**

Manual | SMPR

Gage for dimension over balls for **shafts**

Manual | Mahr MWF

Measuring device for **camshafts**

Manual | Mahr MWF

Measuring device for **crankshafts**

Manual | Mahr MWF

Fully automatic **crankshaft measuring station**

Automatic | MarSurf Engineered

Measurement automation for **dynamic measurements**

Automatic | Mahr MWF

MarShaft Scope 750 plus with **robot loading**

Automatic | MarShaft Engineered

Automatic

Mechanical engineering and precision parts

Manual

Manual
**universal
measuring
station**

Manual | MarSurf Engineered

Fully automatic
measuring station
for **complex parts**

Automatic | MarSurf Engineered

Measuring
device for
battery connectors

Manual | Mahr MWF

MarShaft
Scope 750 plus
with **robot loading**

Automatic | MarShaft Engineered

Automatic

Fuel injection and engine components

Manual

Individual and accurate **positioning with air bearings**

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Mobile solutions for large workpieces

Manual | MarSurf Engineered

Measuring device for **oil pump housings**

Manual | Mahr MWF

Measuring device for **distribution rails**

Manual | Mahr MWF

Fully automatic measuring station for **complex parts**

Automatic | MarSurf Engineered

Semi-automatic measuring station for **fuel injection components**

Automatic | MarSurf Engineered

Measuring device for **cylinder crankcases**

Manual | Mahr MWF

Measuring device for **cylinder heads**

Manual | Mahr MWF

Measuring device for **connecting rods**

Manual | Mahr MWF

Fully automatic measuring station for **small workpieces**

Automatic | MarSurf Engineered

Fully automatic roughness measuring station for **engine components**

Automatic | MarSurf Engineered

Fully automatic measuring station for **pallet measurement of fuel injection components**

Automatic | MarSurf Engineered

Automatic

Components for **electromobility**

Manual

Manual
**universal
measuring
station**

Manual | MarSurf Engineered

Fully automatic
measuring station
for **complex parts**

Automatic | MarSurf Engineered

Automatic
inspection of
brake disks

Automatic | SMPR

Measuring
device for **battery
connectors**

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Fully automatic
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workpieces**

Automatic | MarSurf Engineered

MarShaft
Scope 750 plus
with **robot loading**

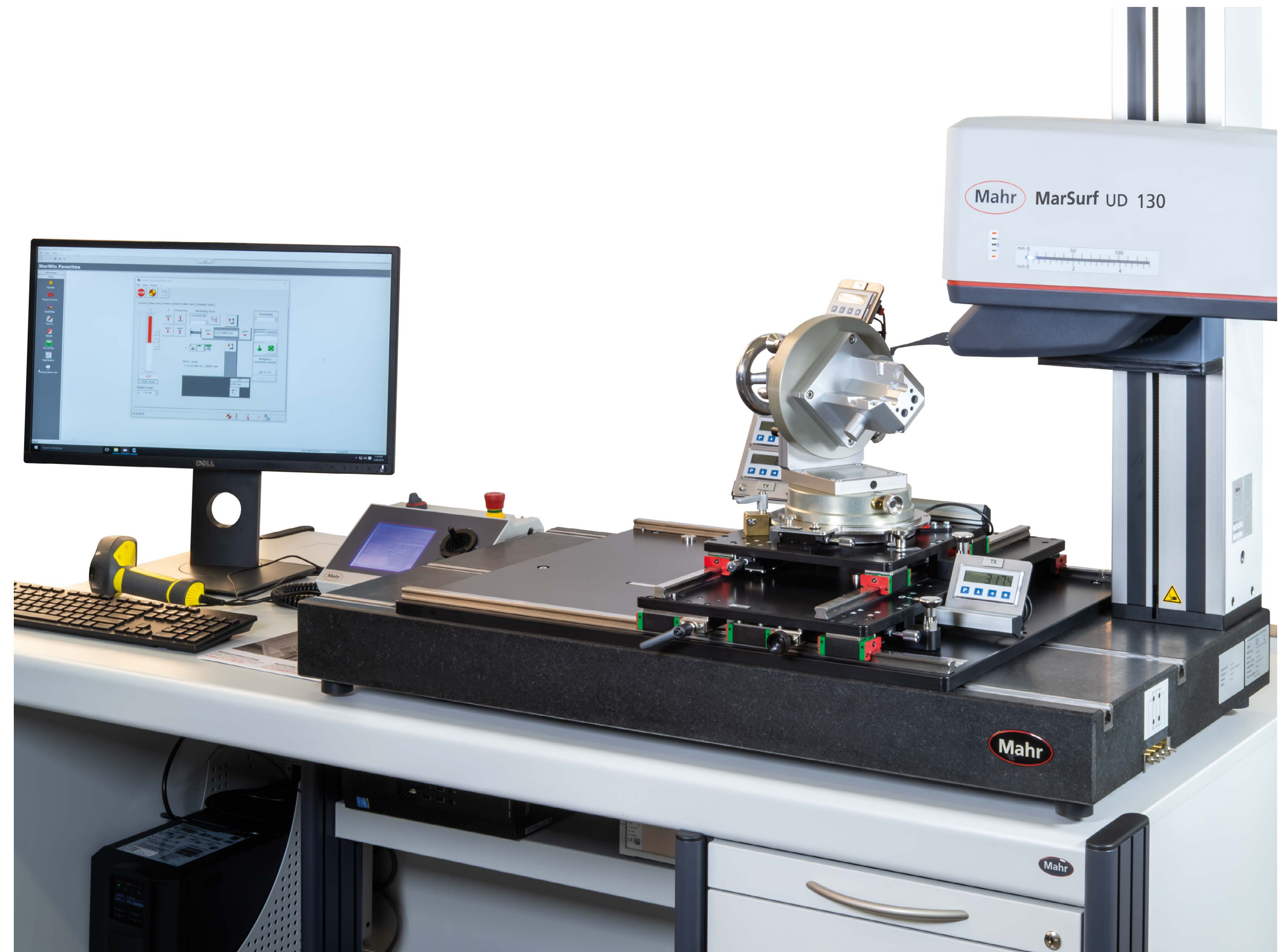
Automatic | MarShaft Engineered

Automatic

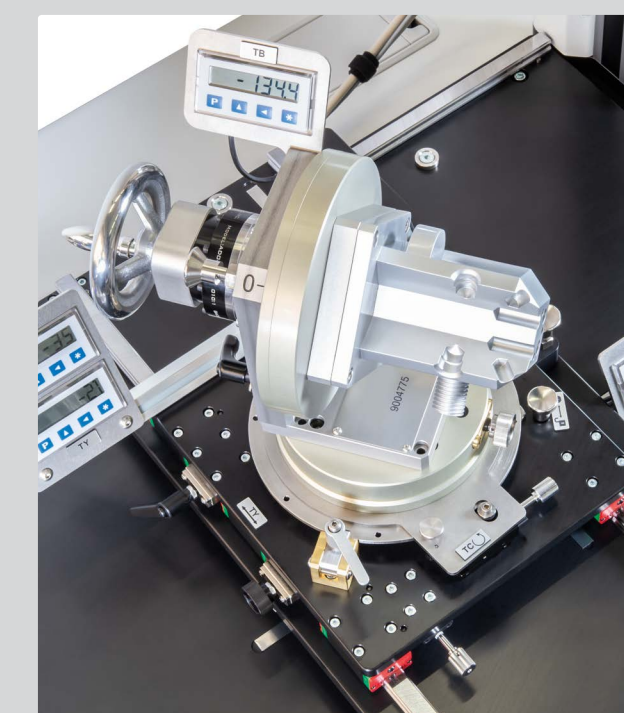
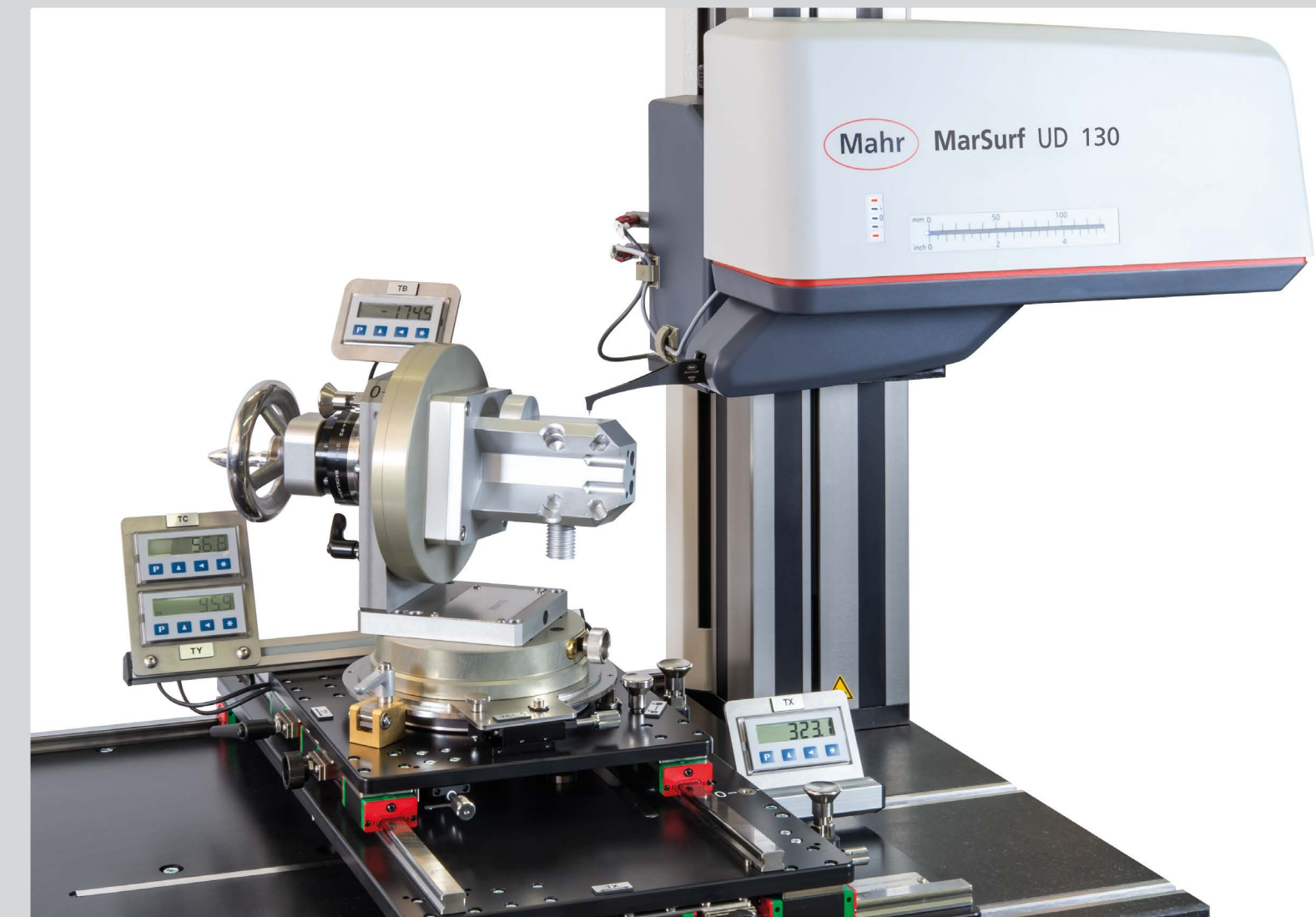
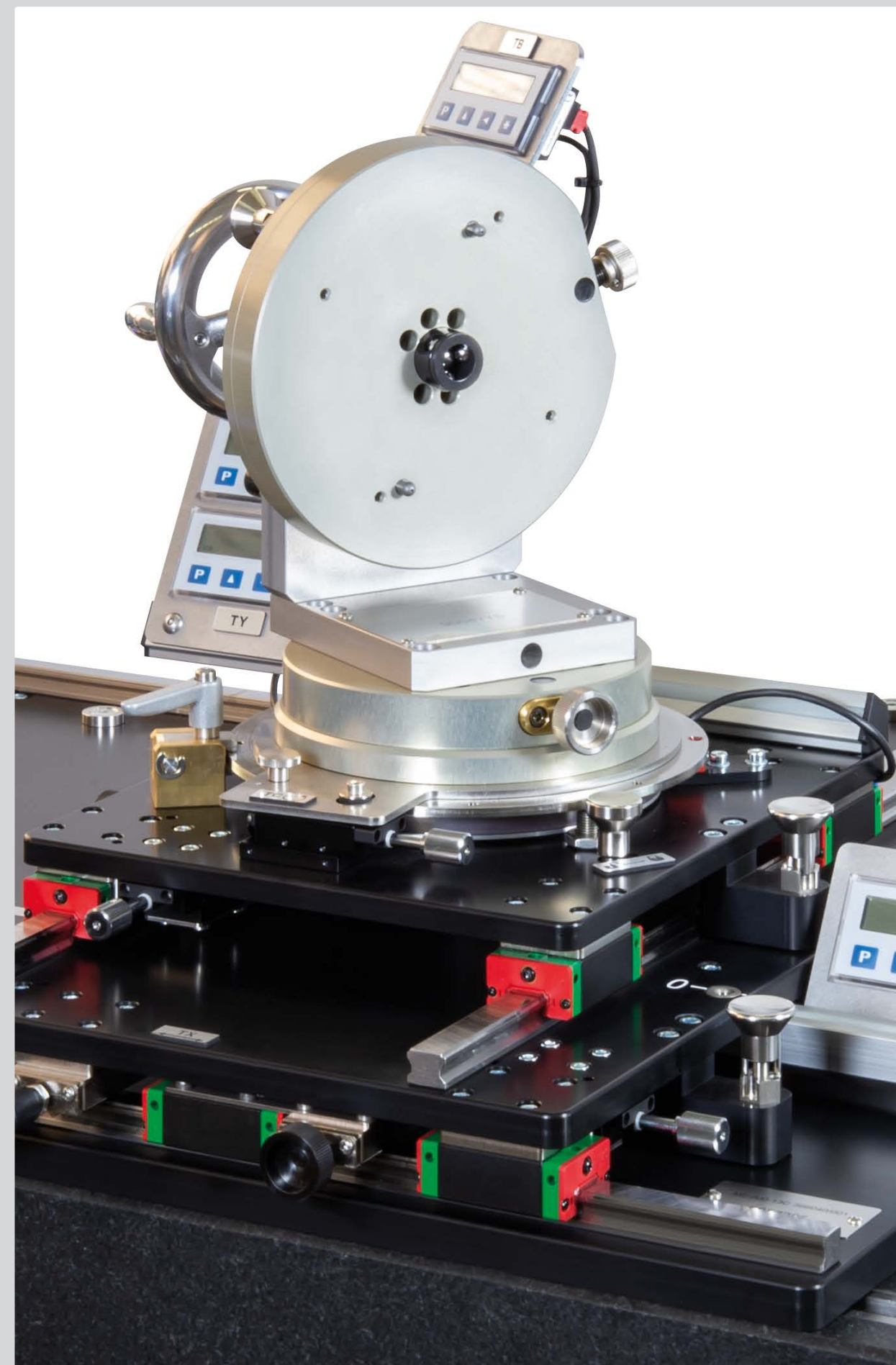
Manual **universal** **measuring station**

With its positioning axes, the **MarSurf Engineered Series 001** manual universal measuring station offers efficient and flexible measurement of a wide variety of workpieces. Even workpieces that are too big for the CT 300 XY table can be measured with this measuring station.

- Positioning system can be mounted on standard measuring stations (with large granite plate)
- Existing systems can be upgraded
- Positioning is supported by digital displays on all axes
- Optional: one or two swivel axes (TA or TA/TB) with standard quick-change interface



Gallery



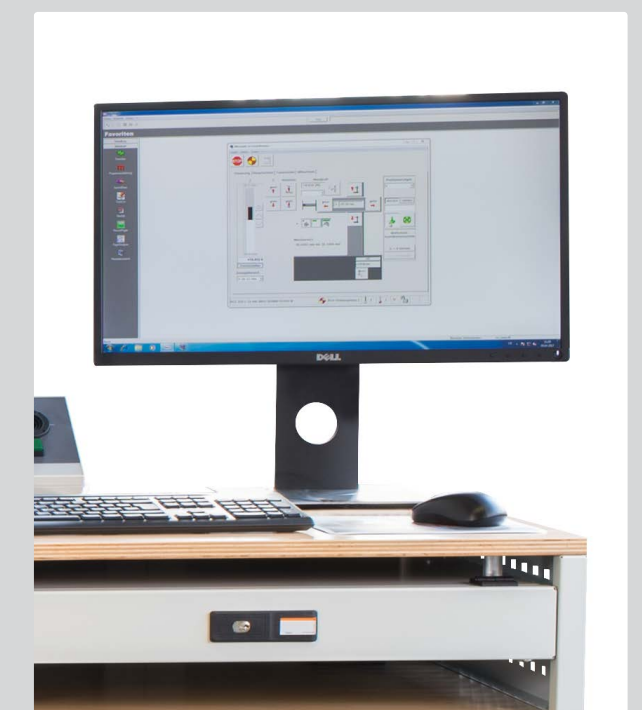
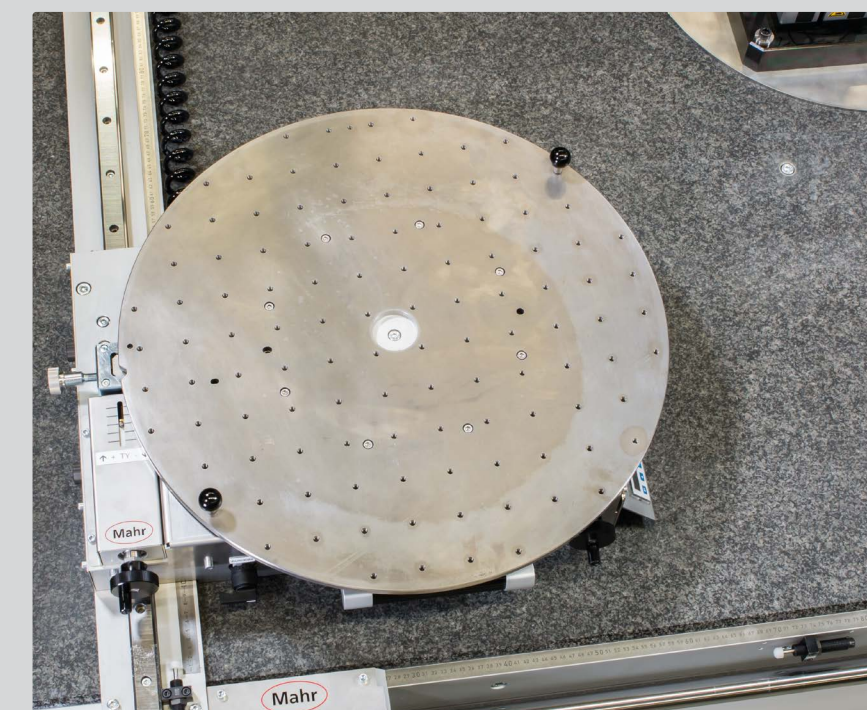
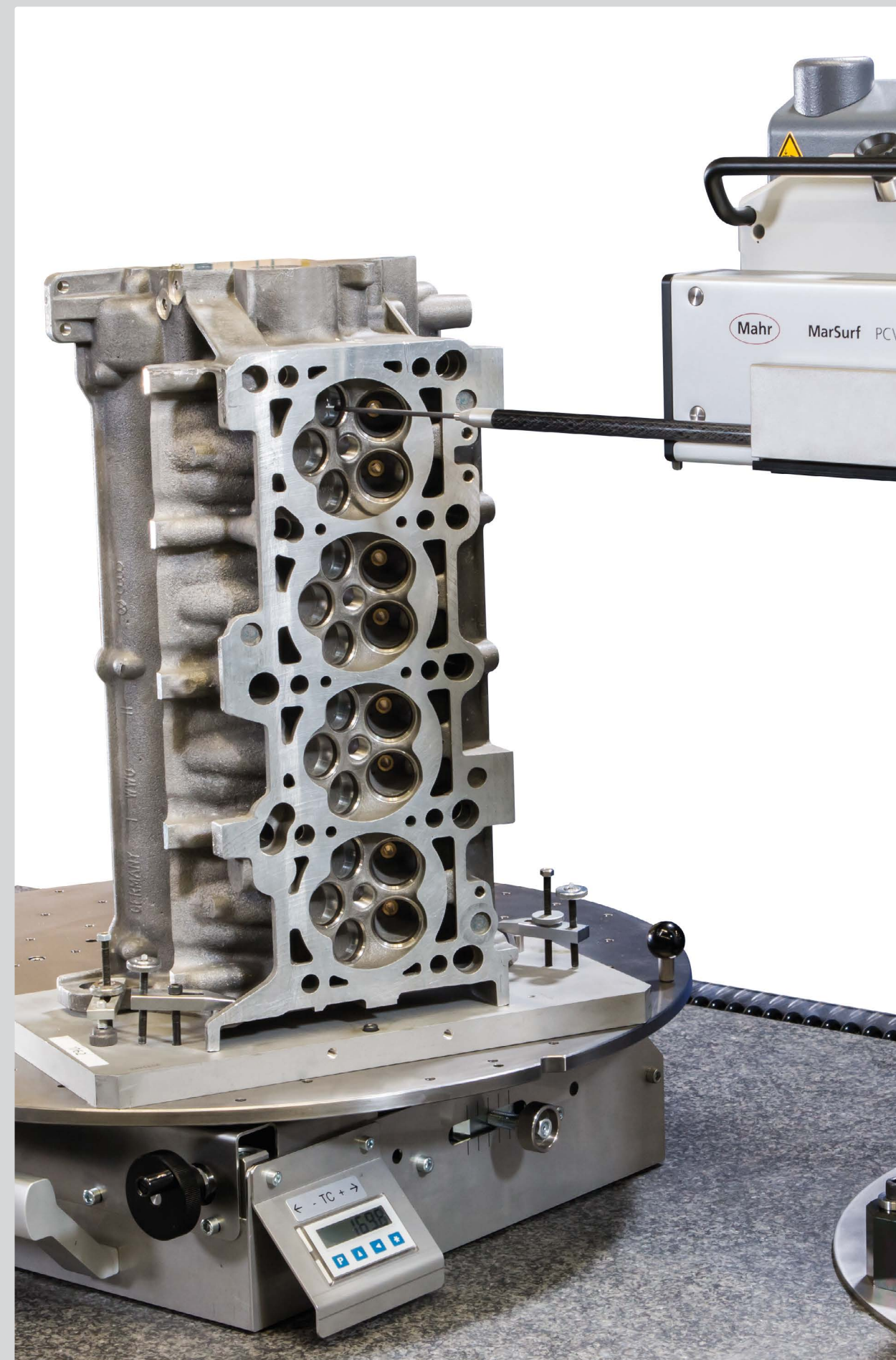
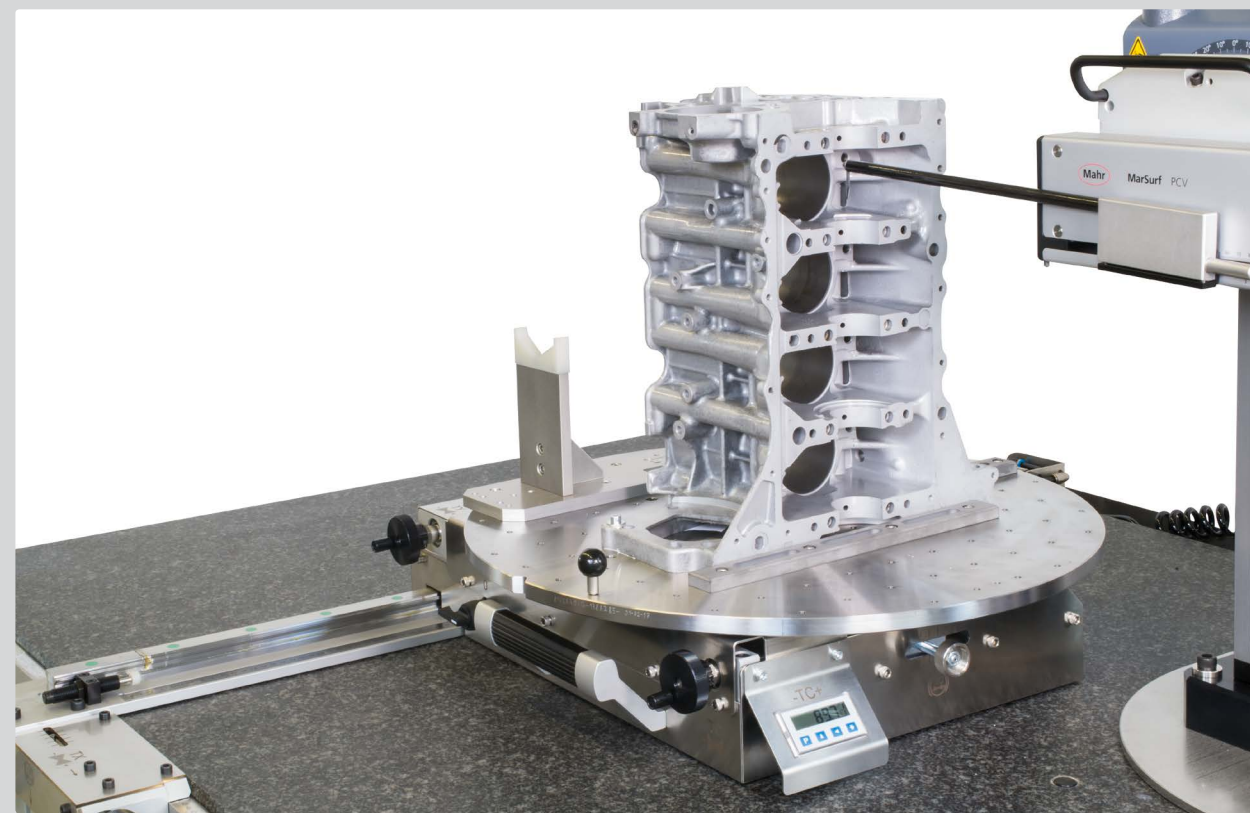
Individual and accurate positioning with air bearings

With its positioning table mounted on air bearings, the **MarSurf Engineered Series 002** measuring station offers simple yet accurate manual positioning of heavy workpieces.

- Three positioning axes, each with coarse and fine adjustment
- Rotary table (\varnothing 600 mm) with M6 fastening thread, clearance 50 mm, for holding the workpieces
- Multiple measuring tasks can be performed on one measuring station
- Wide variety of drive unit options



Gallery



Manual measuring station for rotationally symmetrical parts

The **MarSurf Engineered Series 004** measuring station is designed for measuring large truck crankshafts or similar large rotationally symmetrical workpieces.

- Up to a length of 1600 mm and diameters of 300 mm
- Workpiece loaded by crane and laid in vee-blocks on the measuring station
- Drive unit positioned by means of a manual positioning system aligned to the measuring axis/vee-blocks
- Accurate positioning is monitored by means of attached digital displays
- Components can be rotated manually to allow access to as many measuring positions as possible



Gallery



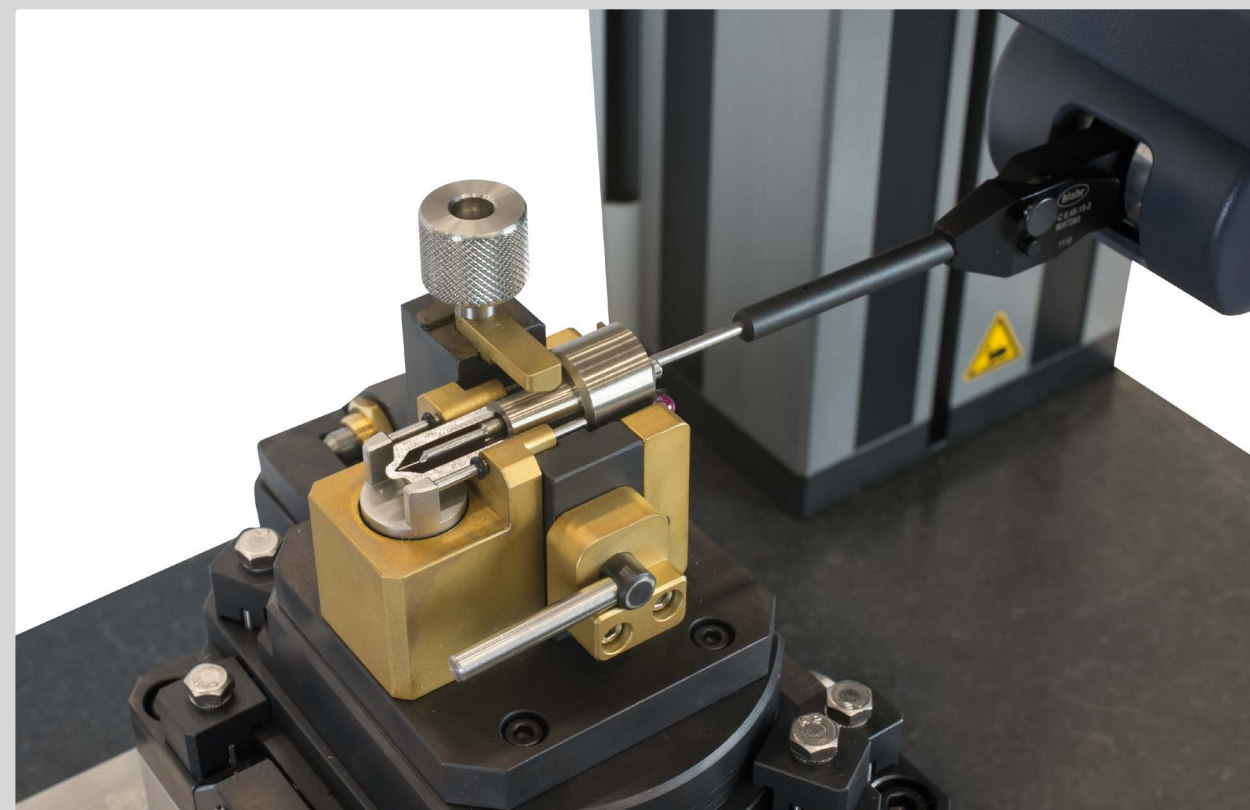
Semi-automatic measuring station for **fuel injection components**

The **MarSurf Engineered Series 501** measuring station is suitable for measuring nozzles in various types of nozzle bodies.

- The full length of the tapered nozzle seat can be reached, from blind hole to guide diameter
- Roughness on the valve seat angle, half angle of the valve seat, roughness in the guide bore, and other contours in the nozzle, as well as depths
- Extra-small stylus tip (total height 0.45 mm) enables measurements to be made in a blind hole diameter of approx. 0.6 mm
- Special software routine for contacting up to the blind hole in a series of steps



Gallery



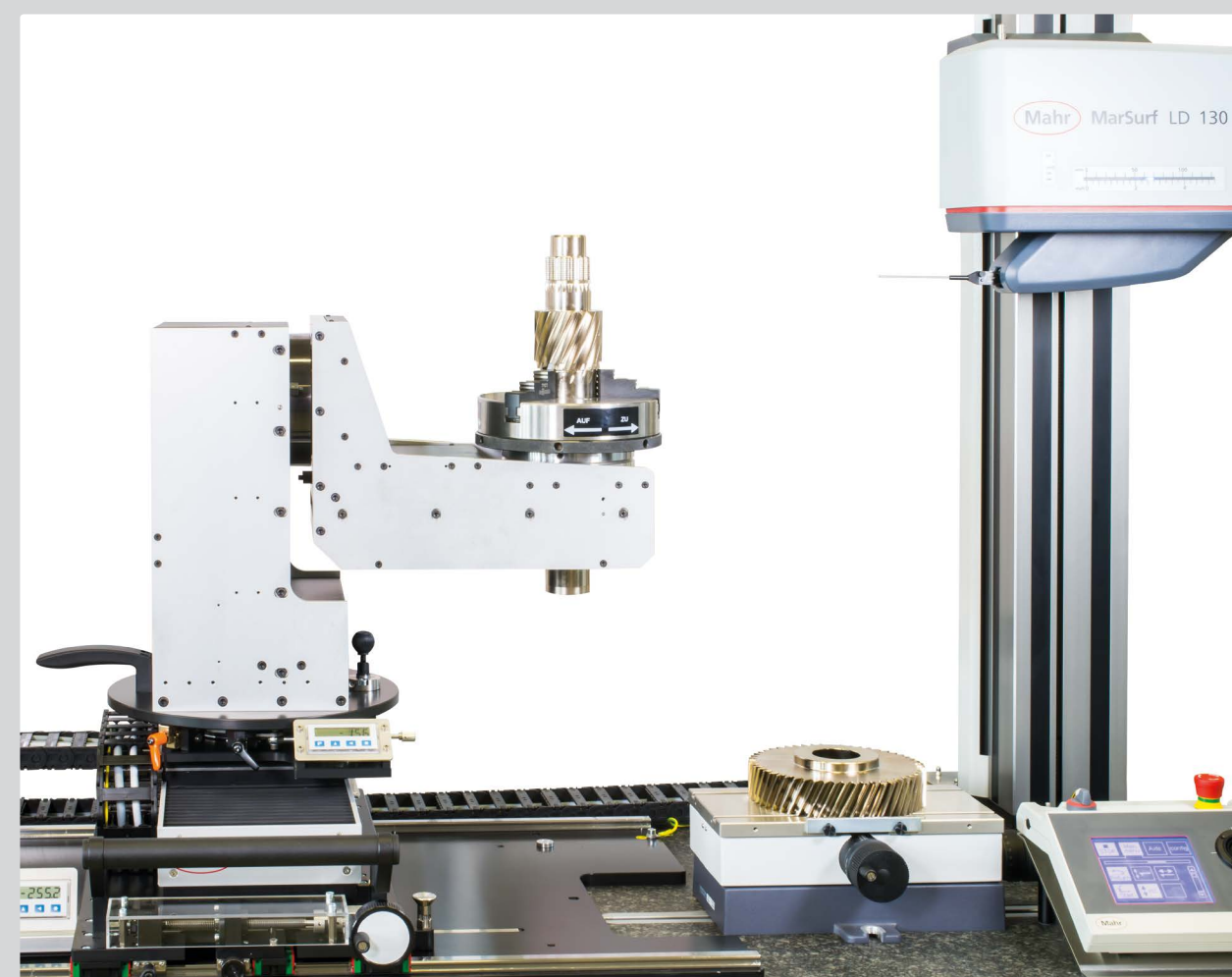
Semi-automatic measuring station for **gear measurements**

The **MarSurf Engineered Series 503** measuring station can be used for partly automated roughness measurements on tooth flanks or in tooth gaps.

- Roughness measurement possible on external teeth and helical teeth
- Measuring routine starts with manual tooth gap setting/search to define the start point for the measurement
- Only the number of teeth and the angle of the helical teeth have to be entered in the support program
- The automated TB-axis cycles automatically to the next tooth according to the tooth pitch of the gear



Gallery



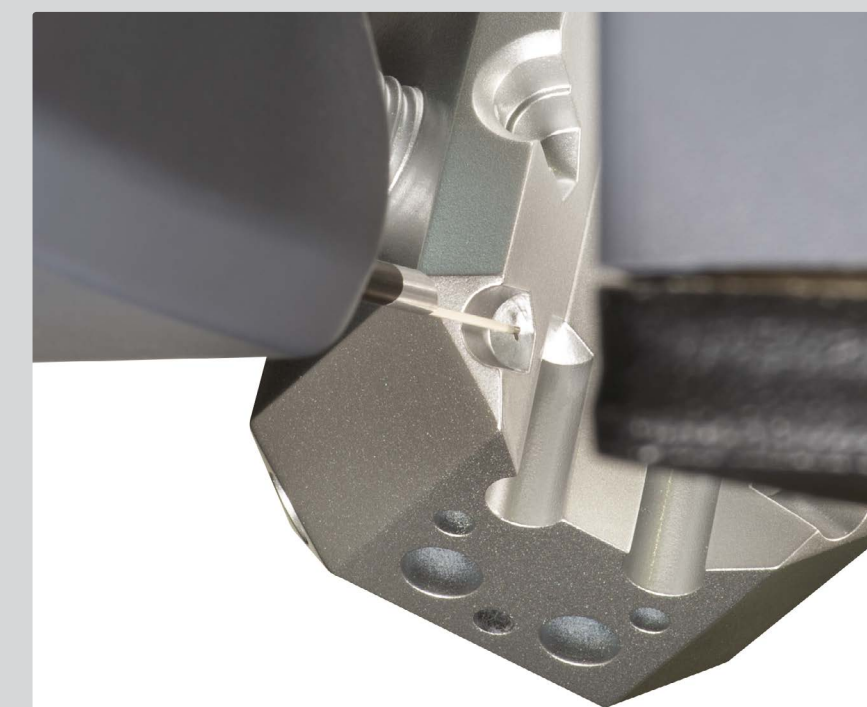
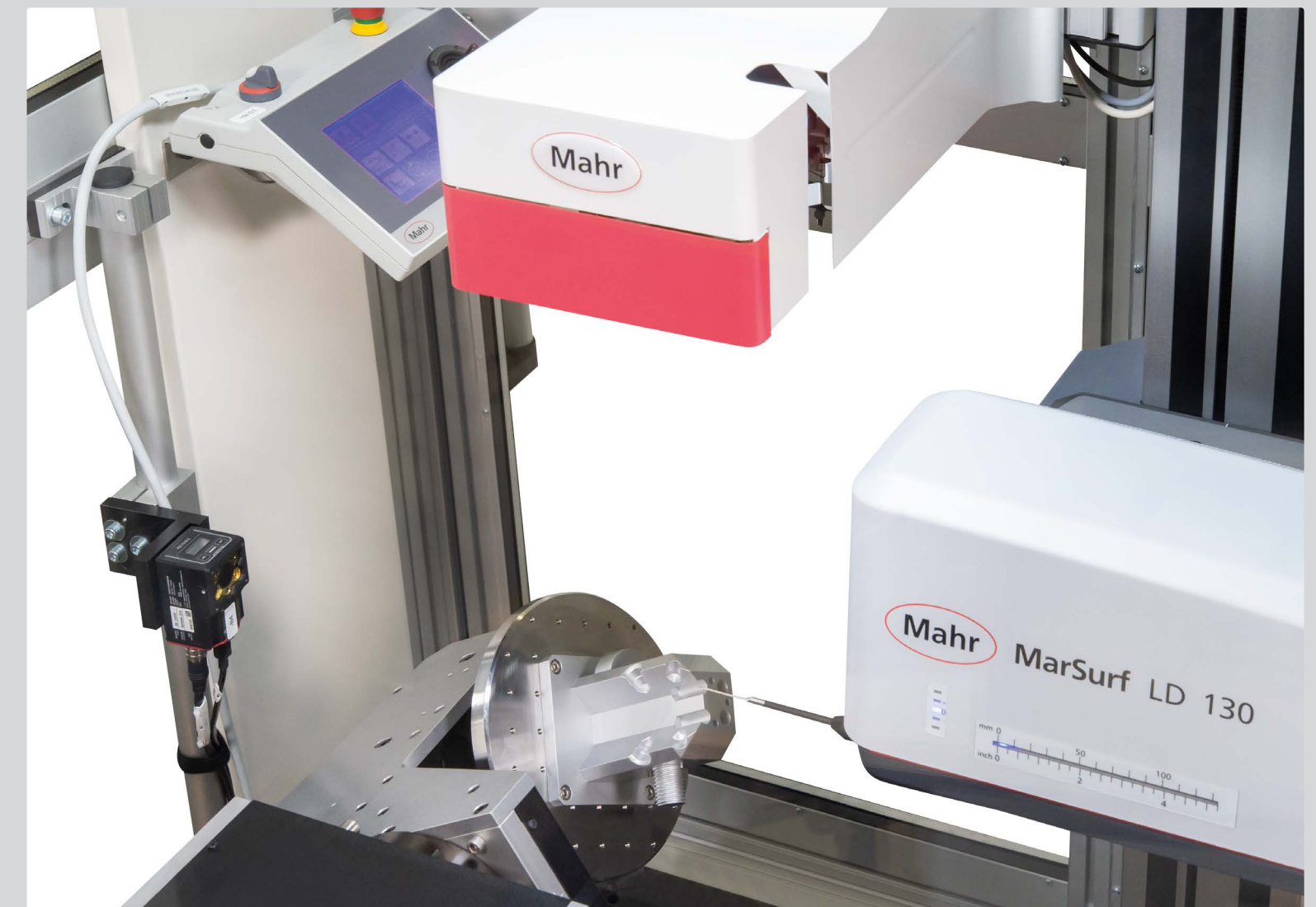
Fully automatic measuring station for **complex parts**

The **MarSurf Engineered Series 1000** measuring station has three linear and two rotation axes for workpiece positioning. Ideal for small workpieces weighing up to around 10 kg and with a volume of up to 1 liter, e.g. nozzle bodies or axle components.

- Reproducible measurement and a fully automated measuring routine allow for fast and accurate positioning
- A wide variety of workpieces can be reproducibly fixed using the pneumatic zero-point clamping system
- Even measurements that are difficult to set manually are achieved fully automatically
- Automatic probe arm change minimizes operator influence on the measuring results



Gallery



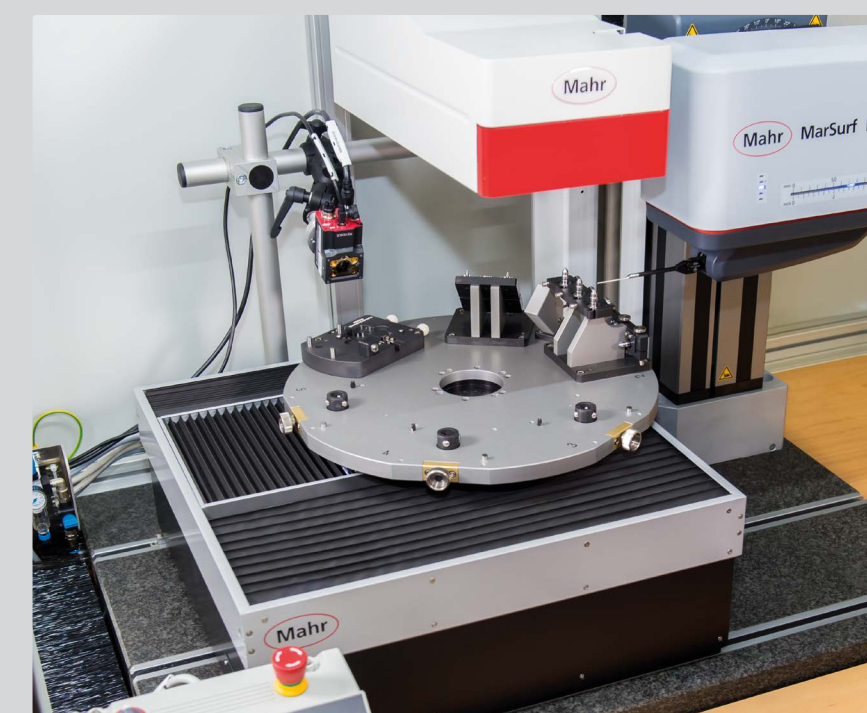
Fully automatic measuring station for **pallet measurement of fuel injection components**

The **MarSurf Engineered Series 1100** measuring station comprises up to 6 special individual devices that can be positioned using a turntable.

- Ideal for fully automatic, high-precision measurement of roughness and contour parameters on small workpieces
- Up to ten probe arms can be switched in automatically with the automatic probe arm changer
- No additional setup of the measuring station necessary during operation
- Pallet measurement: Measurement of multiple identical workpieces in one setup (multi-holders)



Gallery



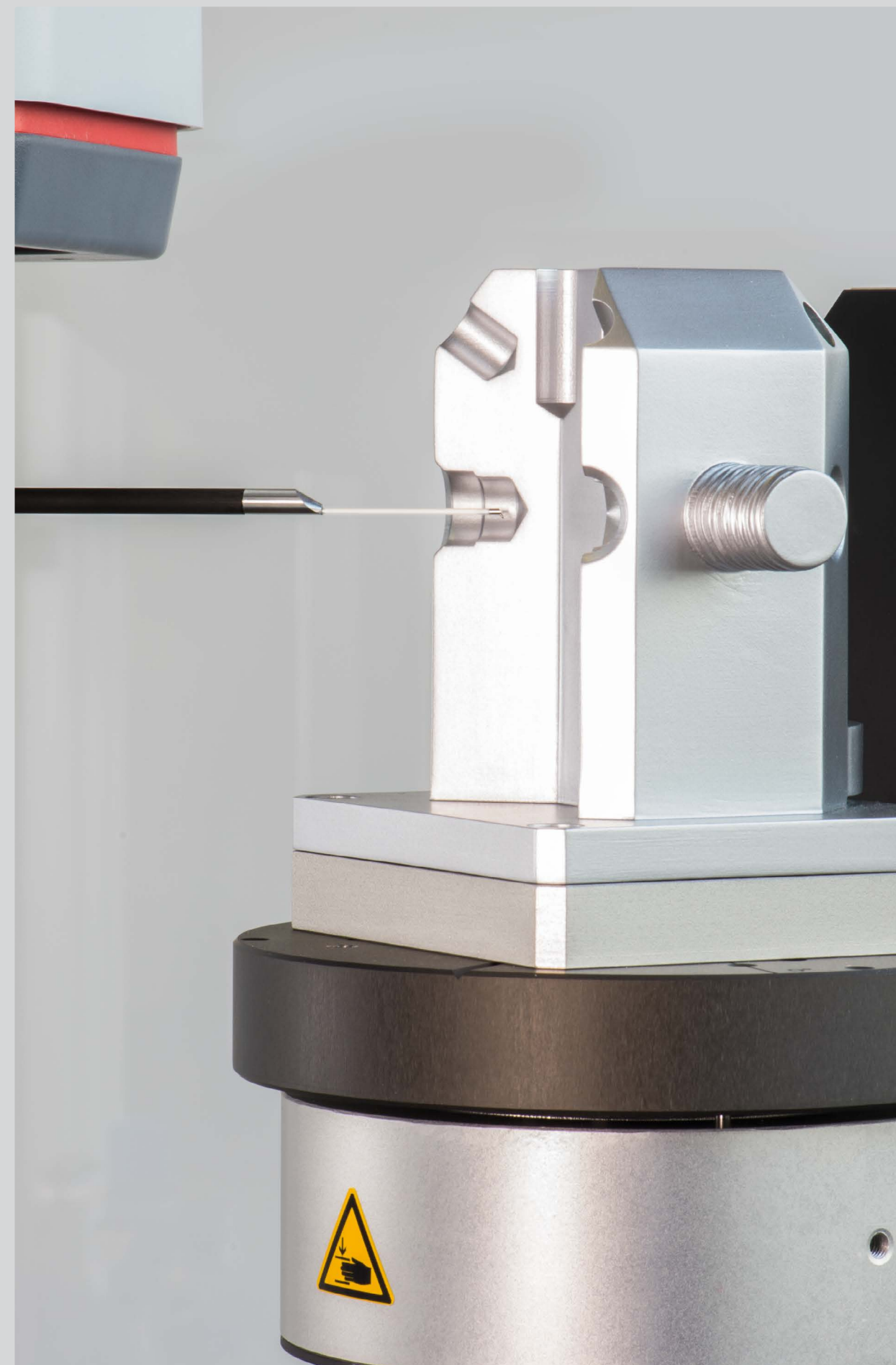
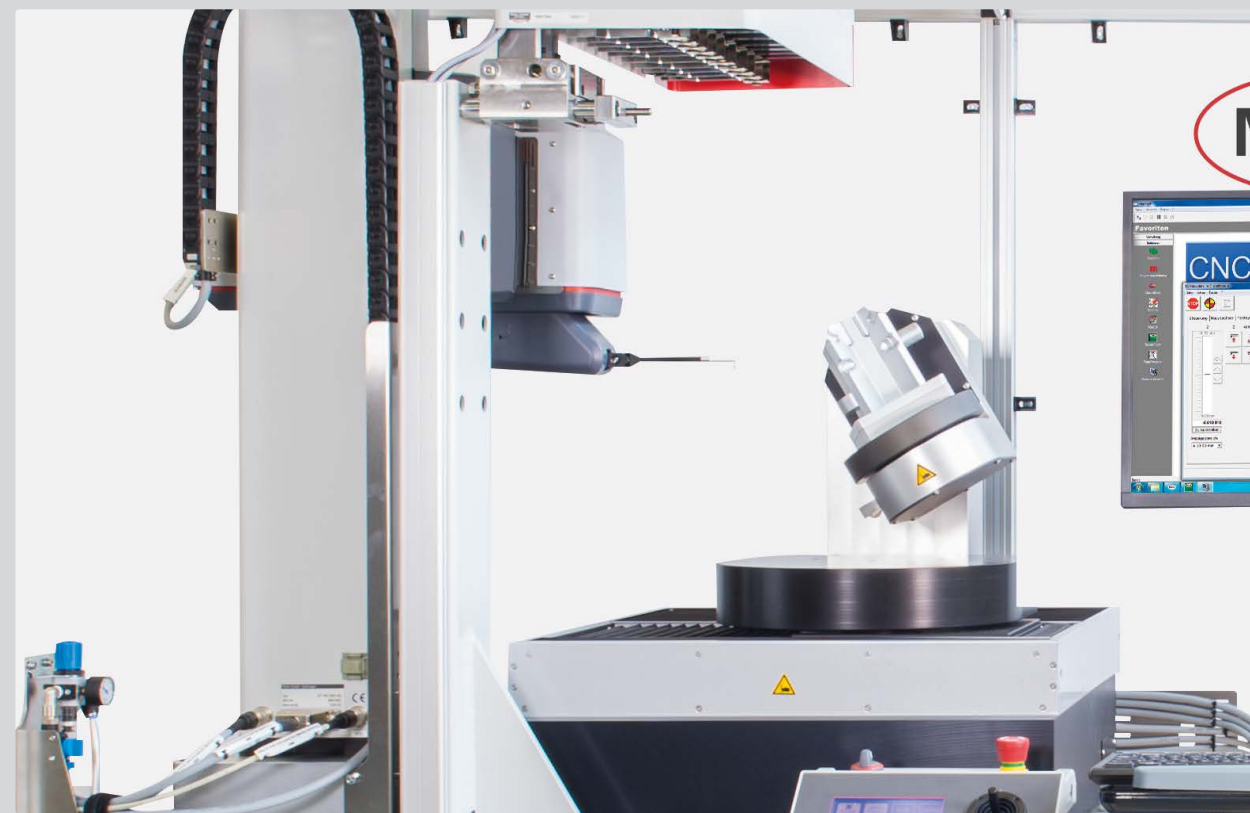
Fully automatic measuring station for **small workpieces**

With its fully automatic process, the **MarSurf Engineered Series 1200** measuring station offers maximum economic efficiency and flexibility for the measuring room or alternatively for the production environment.

- The automatic probe arm changer (optional) allows for maximum automation and fully automatic processing of a wide variety of measuring tasks
- The high measuring and positioning speeds of the MarSurf LD 130 as a contour and roughness measuring instrument offer time savings of up to 50%
- Automatic alignment and positioning of workpieces by means of two linear axes and three rotation axes
- No manual setup of workpiece holders required



Gallery



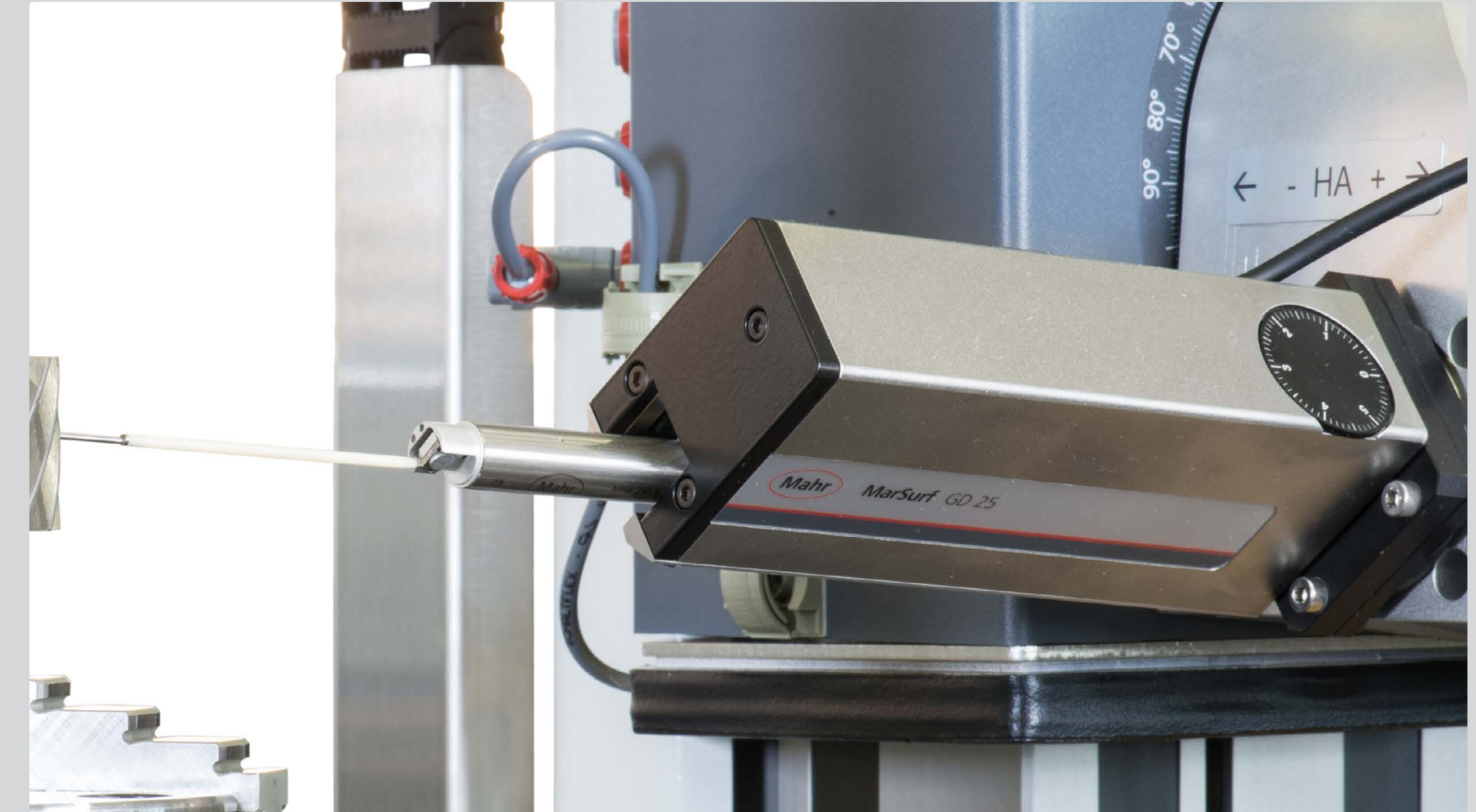
Roughness measuring station for **gear measurements**

The **MarSurf Engineered Series 1300** measuring station can be used for fully automatic roughness measurements on tooth flanks.

- Skidless probe system for accurate measurement of roughness parameters – even for teeth with module 1
- Workpiece positioning and the program sequence are carried out fully automatically, with no user intervention
- “Gear” family program – simple, user-friendly roughness measurement on external teeth
- Measurement of a wide variety of tooth systems with no programming knowledge required



Gallery



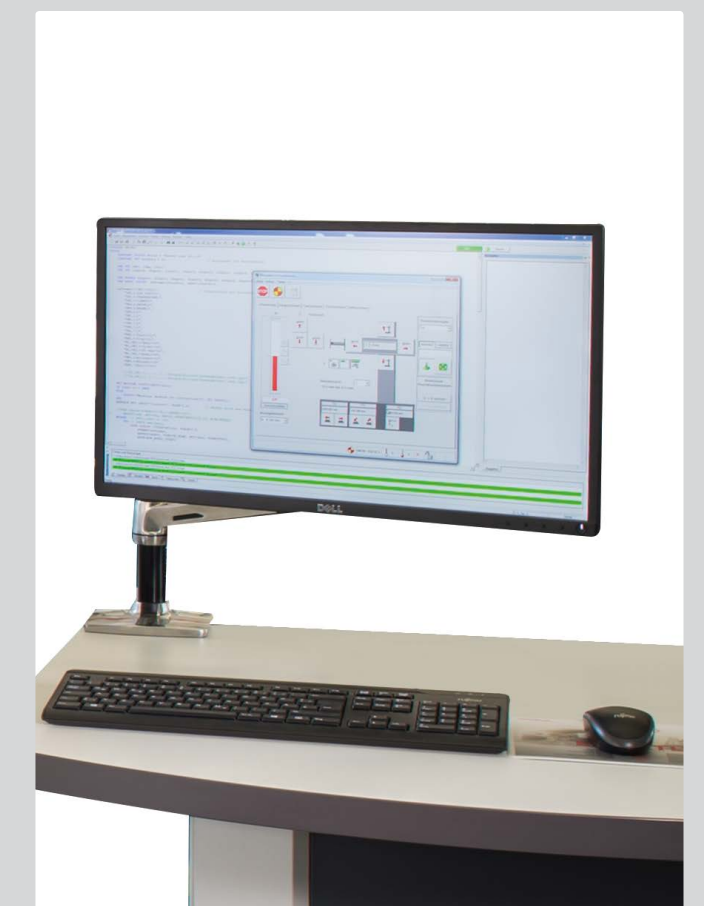
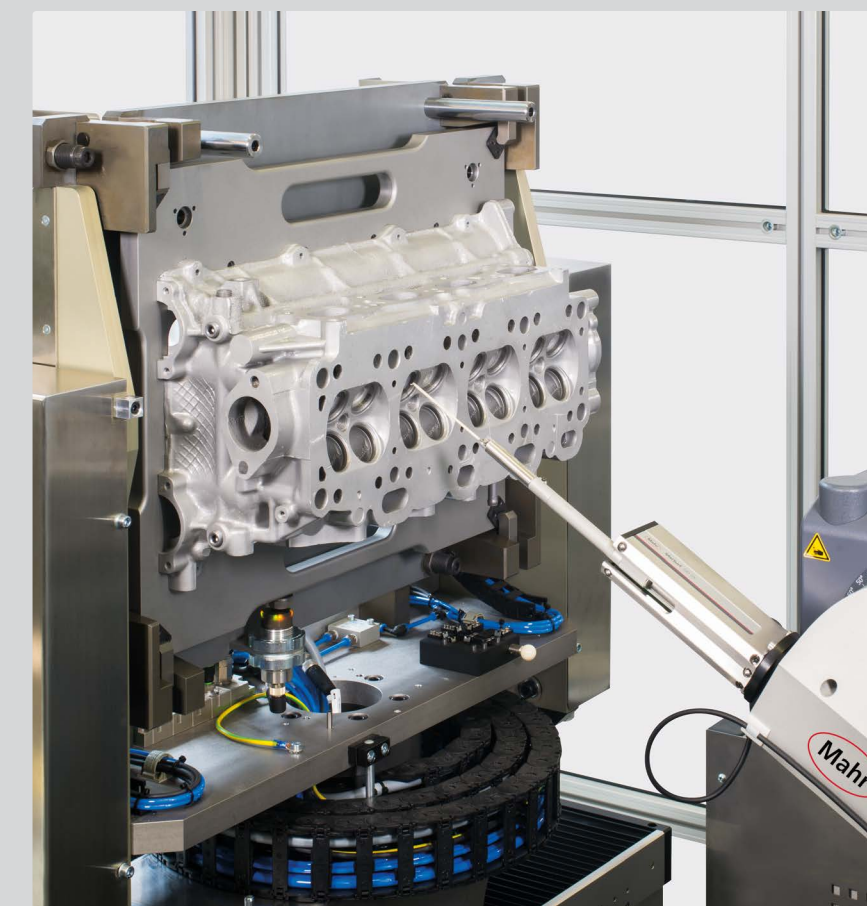
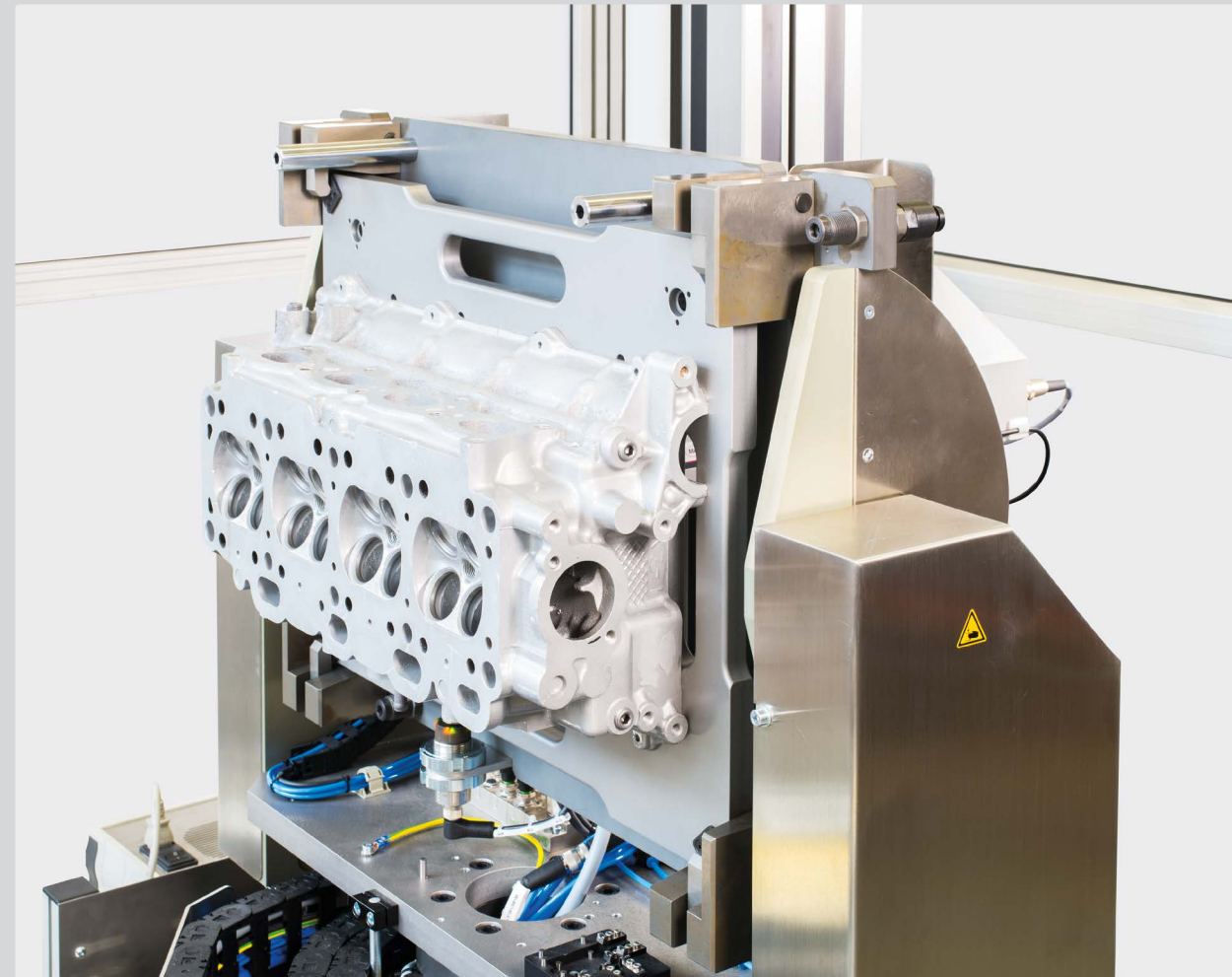
Fully automatic roughness measuring station for engine components

The **MarSurf Engineered Series 2020** measuring station is designed for fully automatic roughness measurement on cylinder heads and blocks.

- Suitable for typical measuring tasks such as valve seats, sealing faces, and bearing shells
- No manual setup of workpiece holders required
- Workpieces are fixed automatically, increasing operating safety and minimizing operator intervention times for setting up the machine
- Alternative: similar measuring station for roughness and contour measurement available with the MarSurf LD130 drive unit



Gallery



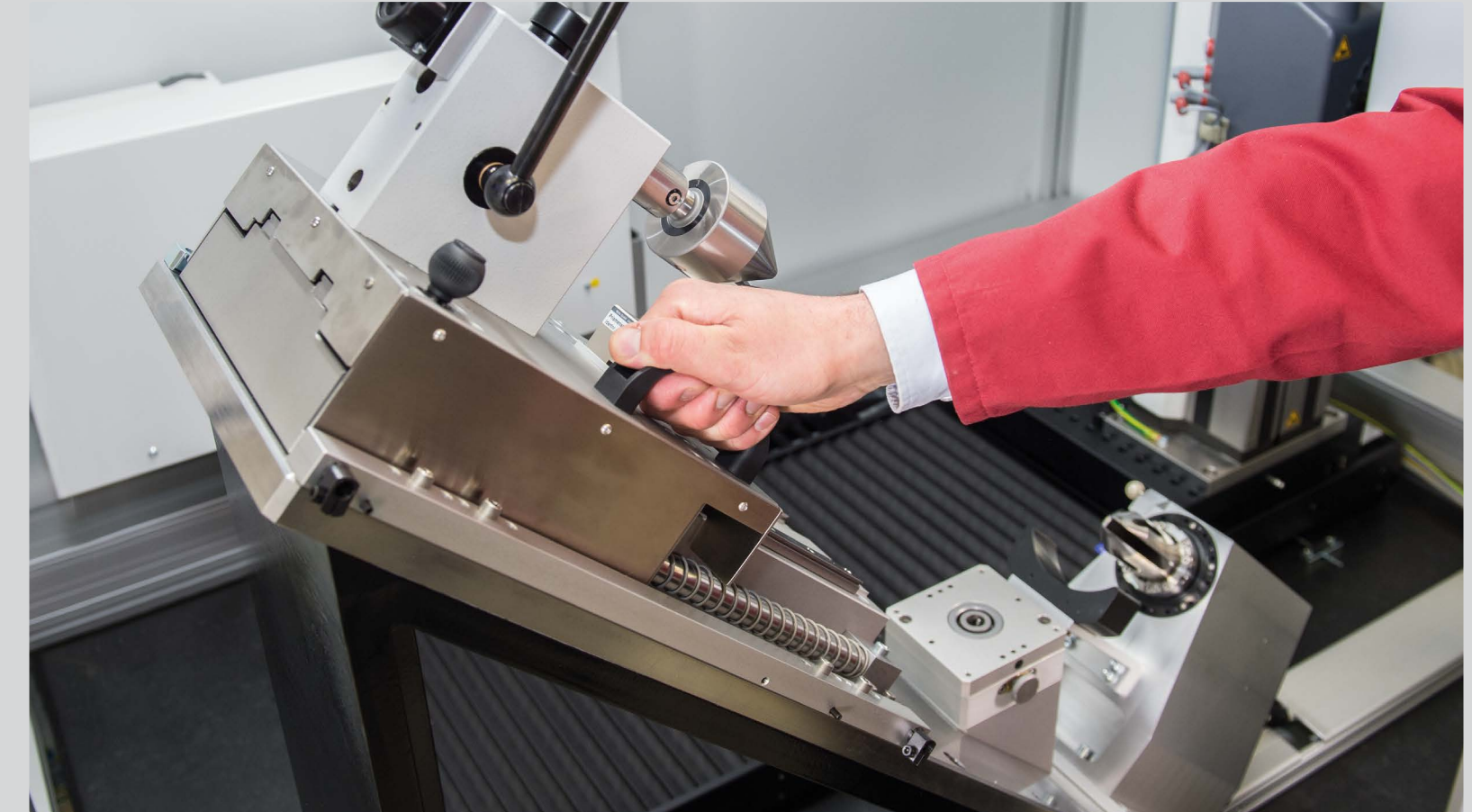
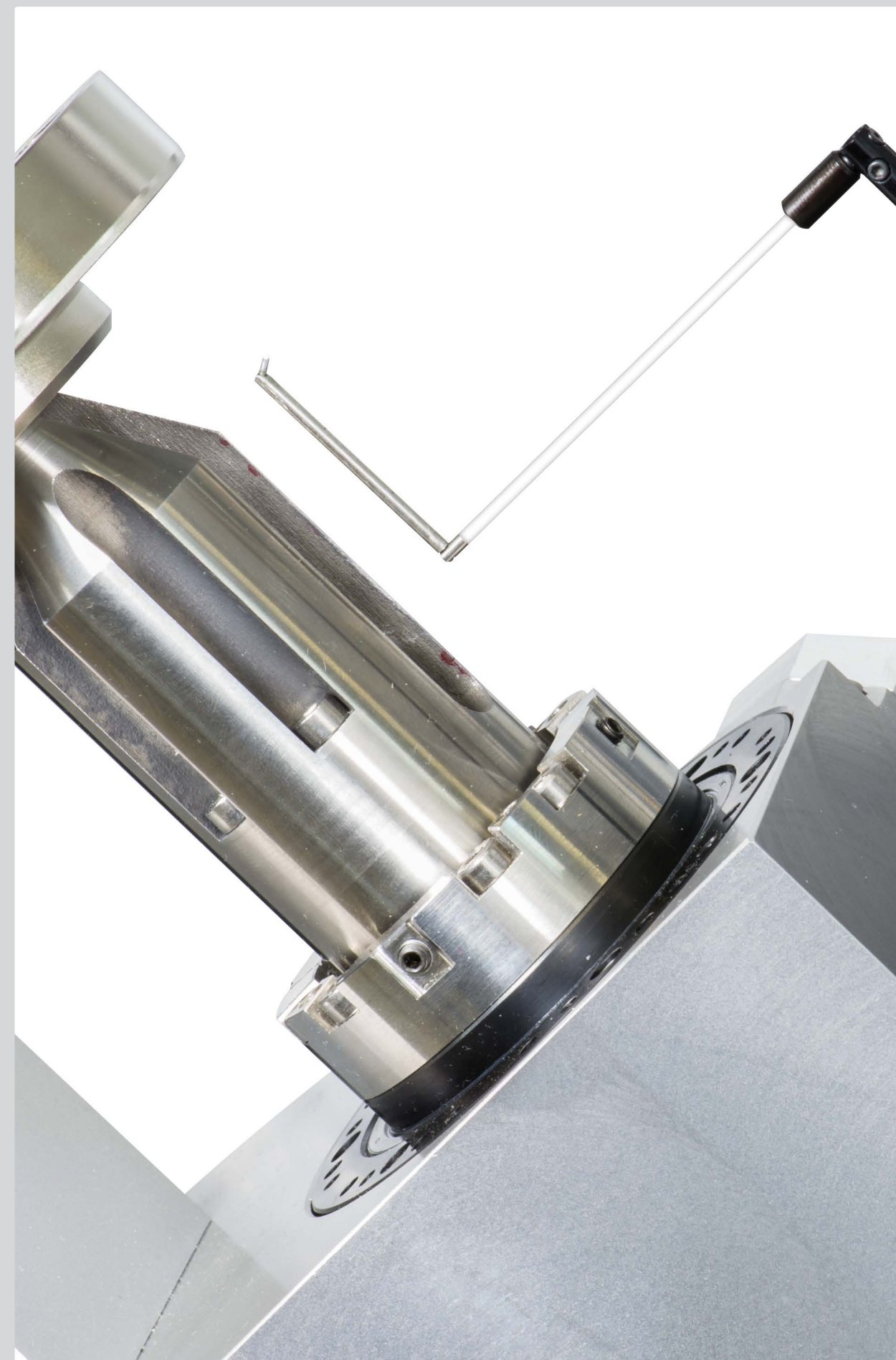
Fully automatic **crankshaft measuring station**

The **MarSurf Engineered Series 3100** measuring station is designed specifically for fully automatic measurement of roughness and contour features on crankshafts and camshafts.

- Typical features: Main and pin bearings, cheeks, recesses and also centering bores on the end faces
- Tilted crankshaft position and pivoting drive unit ($\pm 45^\circ$) mean that only two clamping positions are required
- Reliable measuring results from complex and challenging measuring tasks, with no operator influence
- Alternatively, a measuring station can also be designed for larger shafts of length up to approx. 1500 mm



Gallery



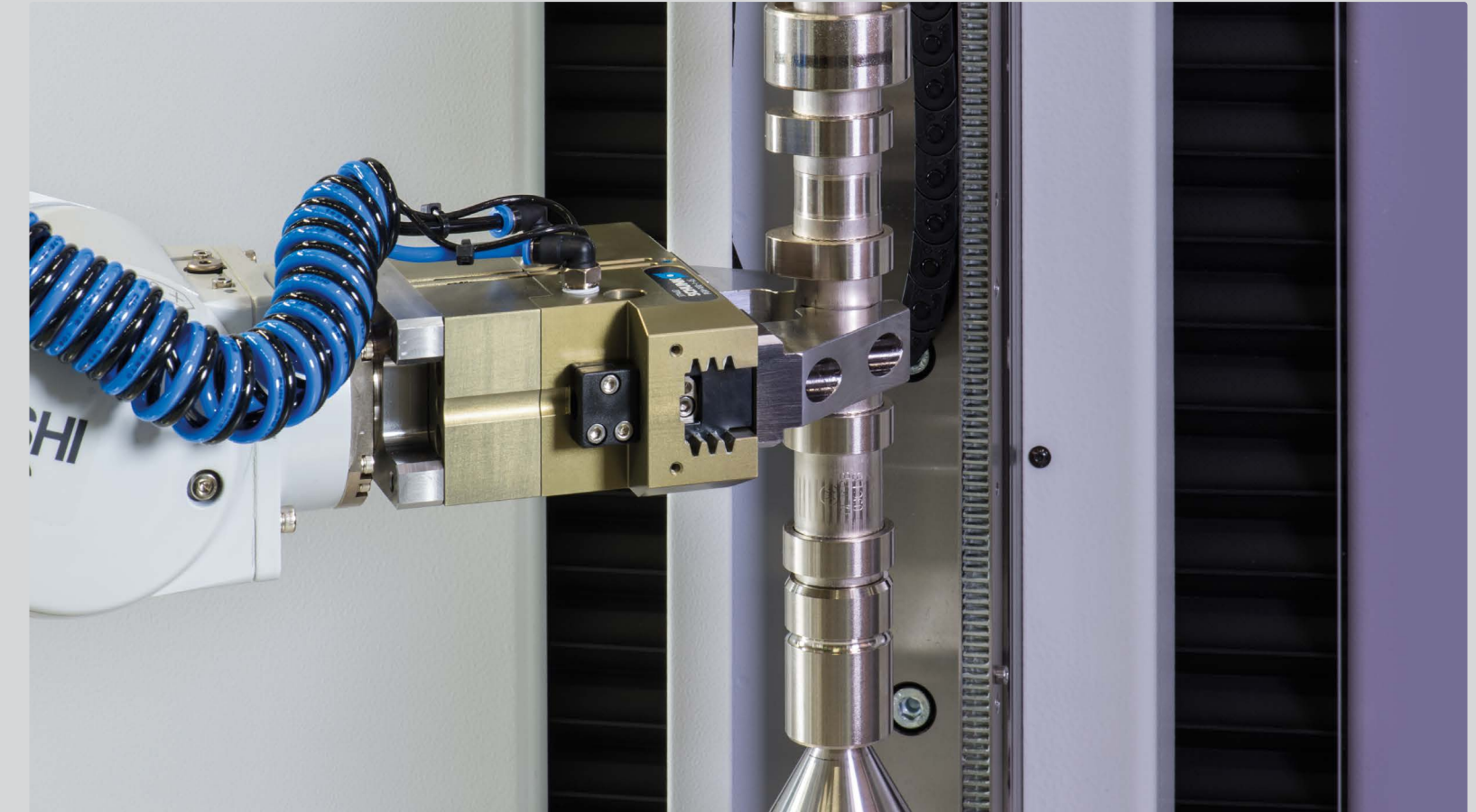
MarShaft Scope 750 plus with robot loading

The **MarShaft Scope 750 plus** measuring instrument from Mahr offers robot loading and automated measurement.

- Fully automated quality assurance, without operator influence, round the clock
- Measuring process integrated into the existing production environment, through fully automatic robot loading and the proven performance features of the MarShaft Scope family
- If an additional measuring machine is needed, the robot can transfer the workpiece to different stations
- With the fieldbus interface in the MarWin platform software, measuring stations from all product groups can be easily integrated into the production process



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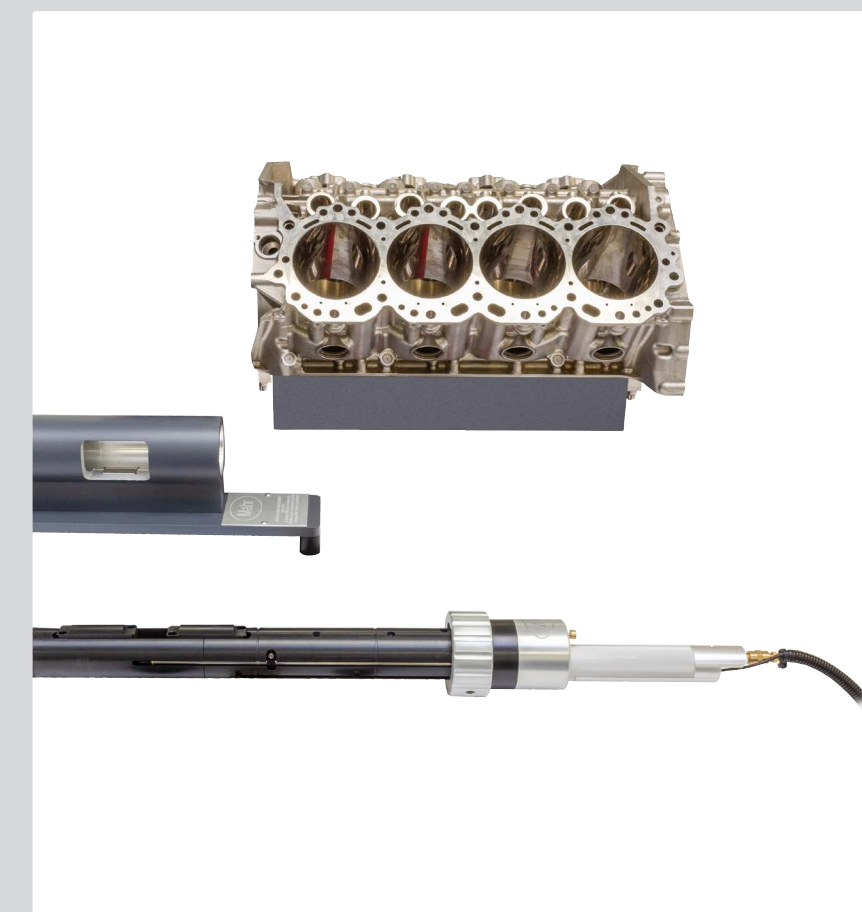
Mobile solutions for large workpieces

If the workpieces are too large for conventional measuring instruments or if the measuring point cannot be reached, then the MarSurf Engineered portfolio offers a number of specially designed gages for mobile use in production or in the measuring room.

- Simple and intuitive to use
- Can be used for measurements that are impossible with conventional measuring instruments
- Suitable for bore diameters between approx. 6 mm and 170 mm and bore depths between approx. 5 mm and 1000 mm
- Plug gages designed for various diameters and depths (depending on the application)



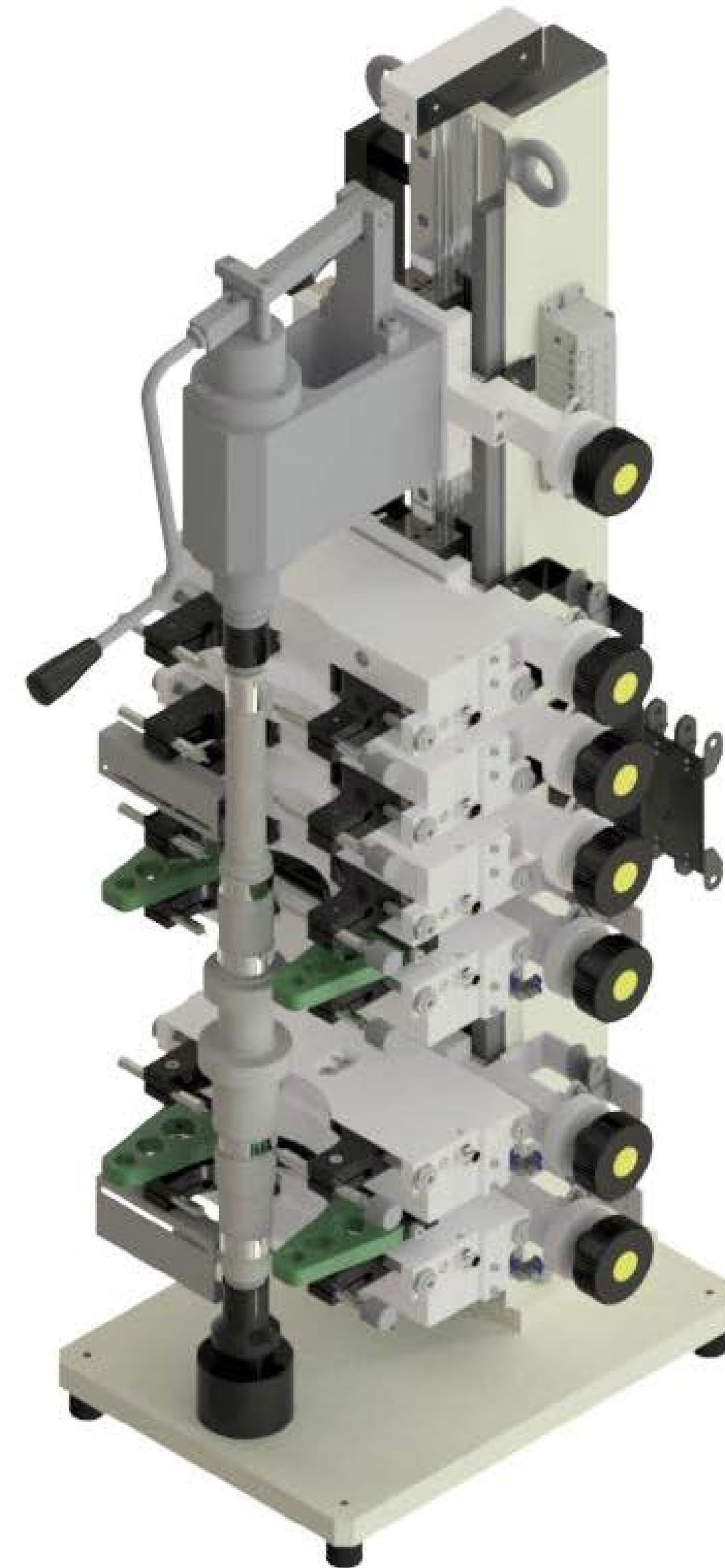
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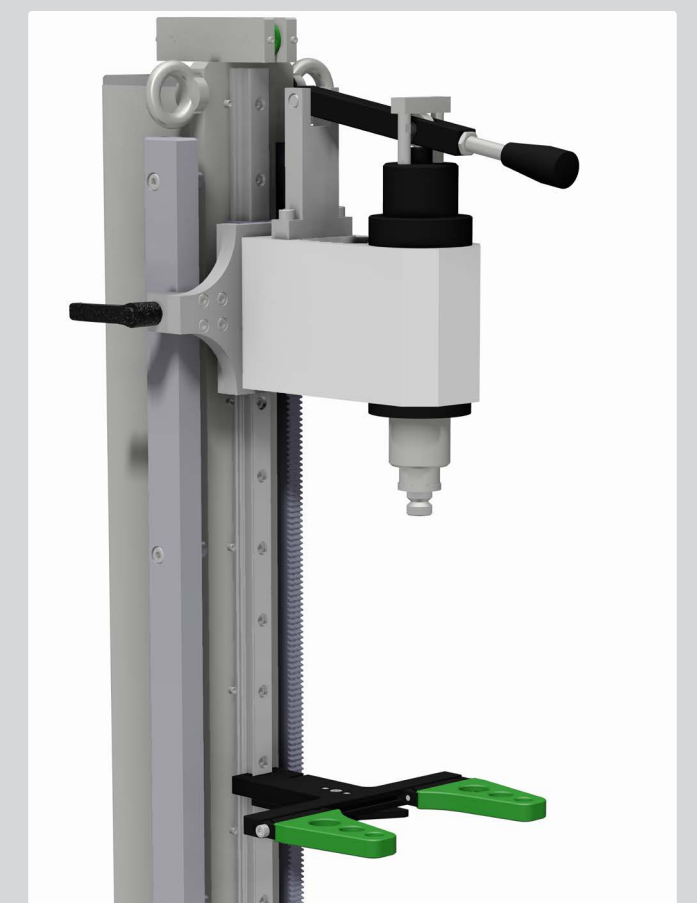
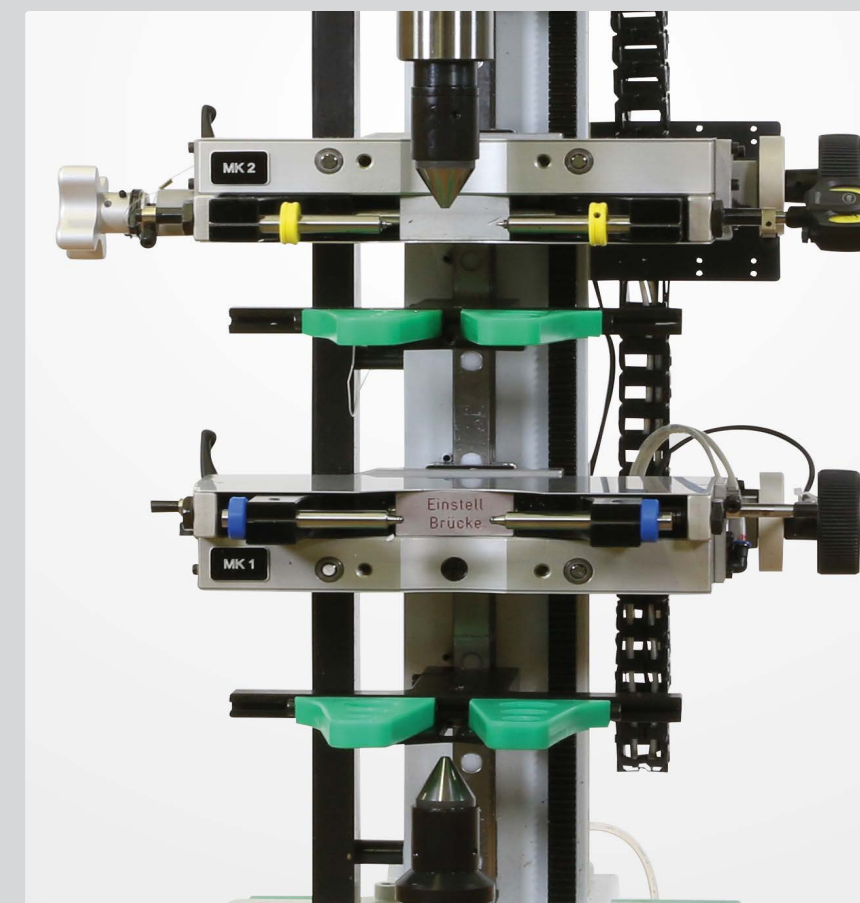
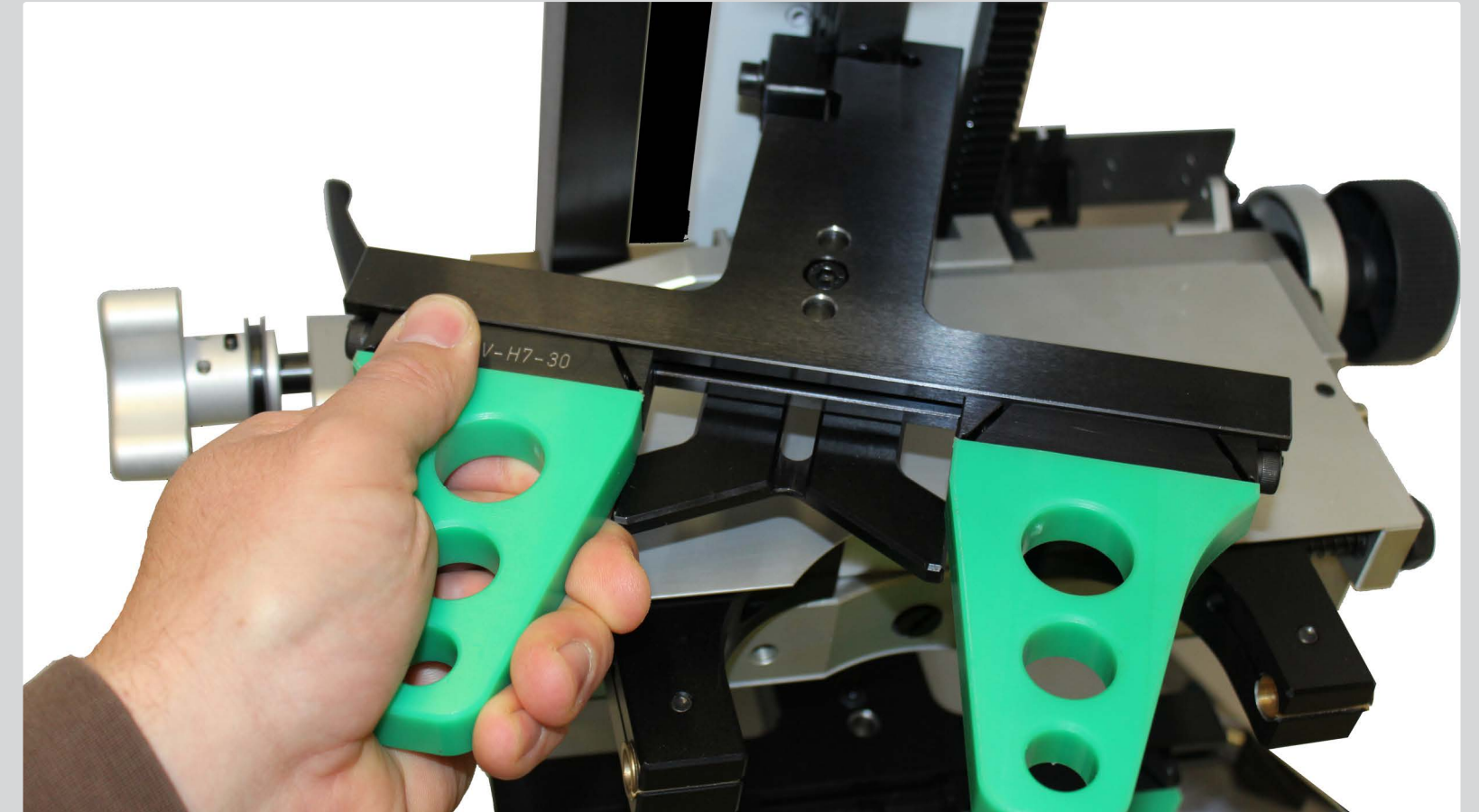
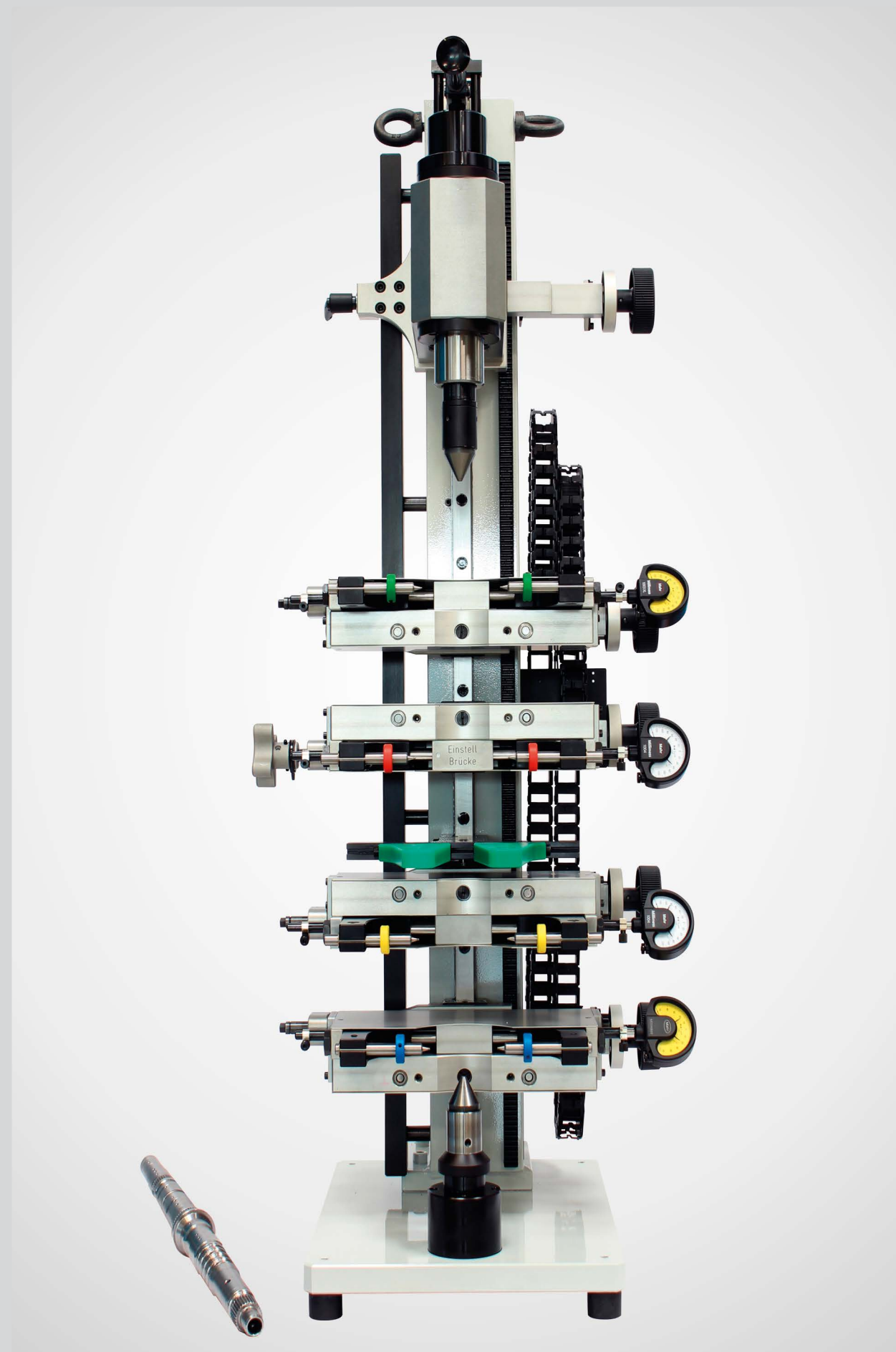
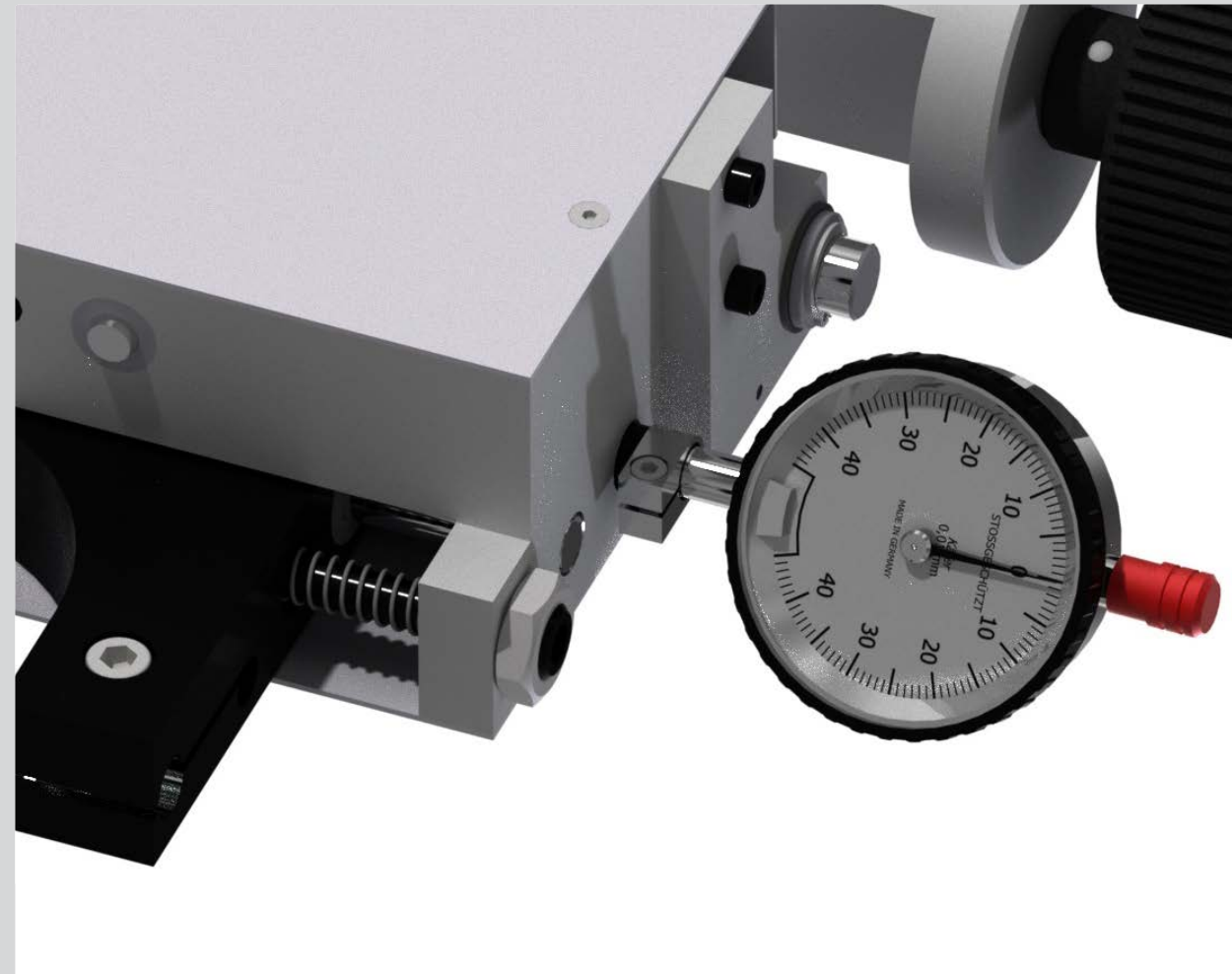
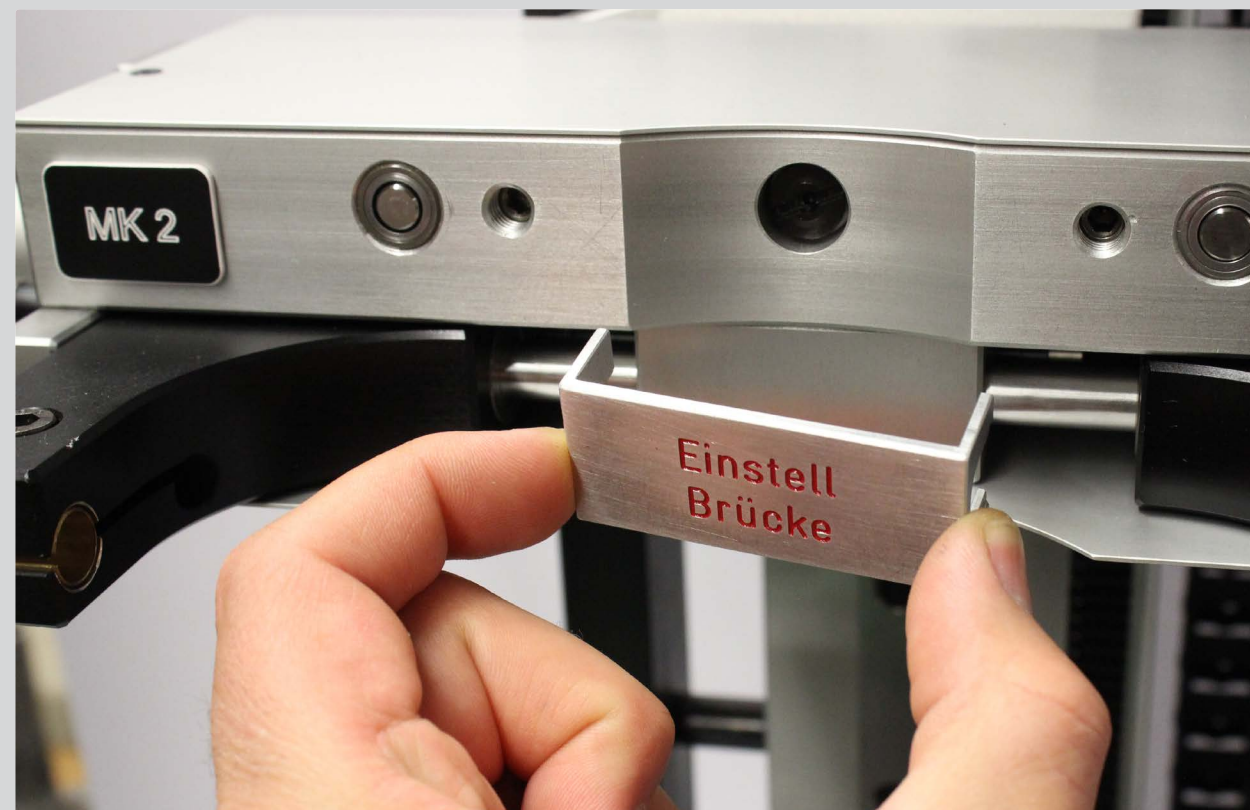
Gage for dimension over balls for **shafts**

The gage for dimension over balls for shafts can be used to measure the dimension over balls, diameters and radial run-outs on shafts.

- Fittings depending on measuring task, or modifiable as a special device for specific workpieces
- Pneumatically controlled measuring elements



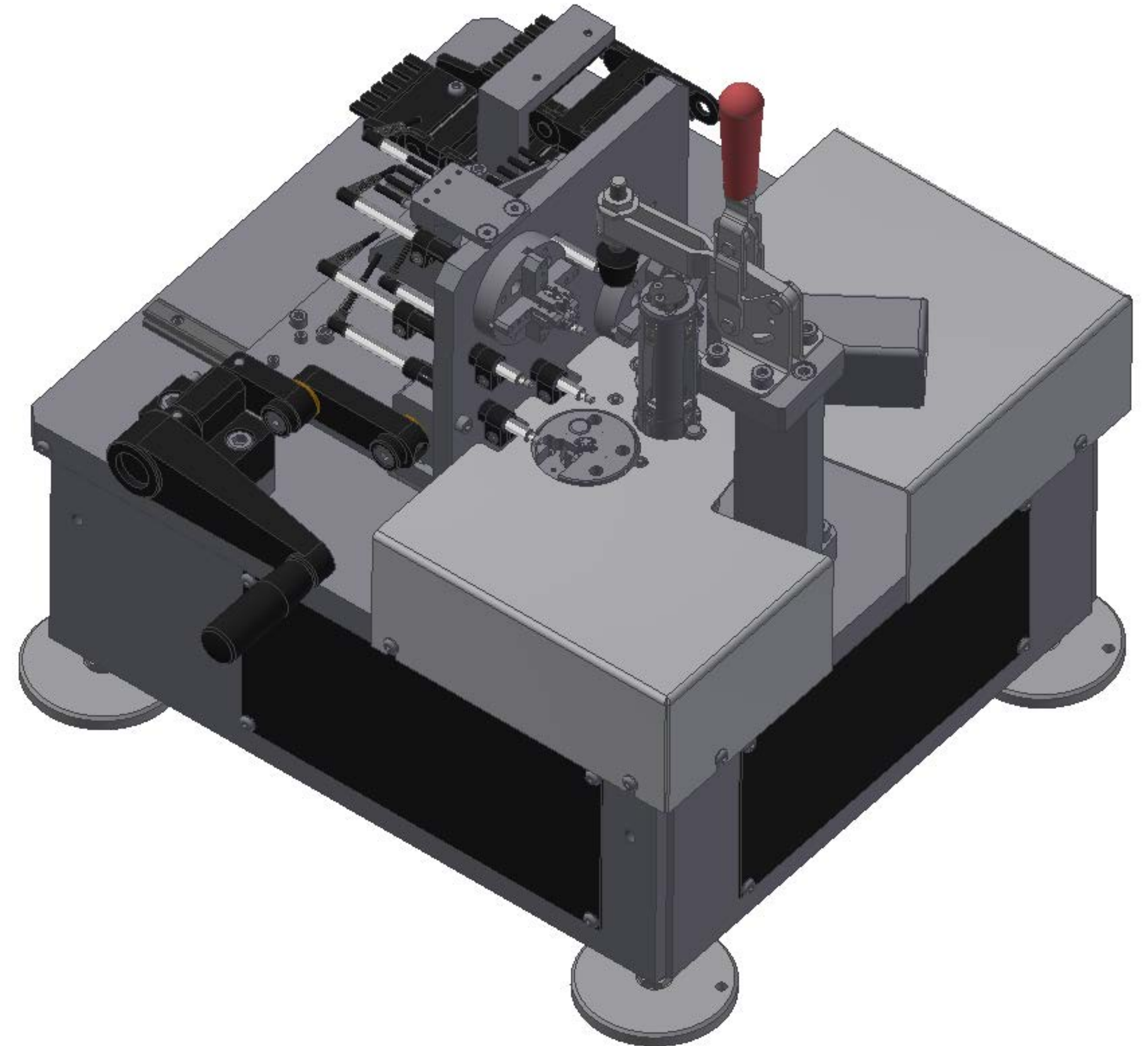
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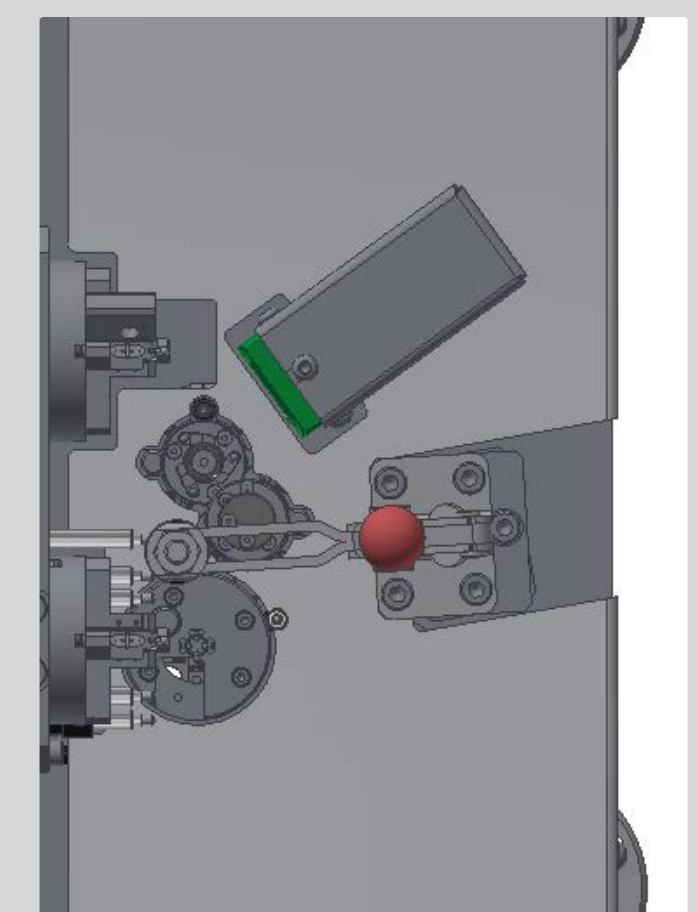
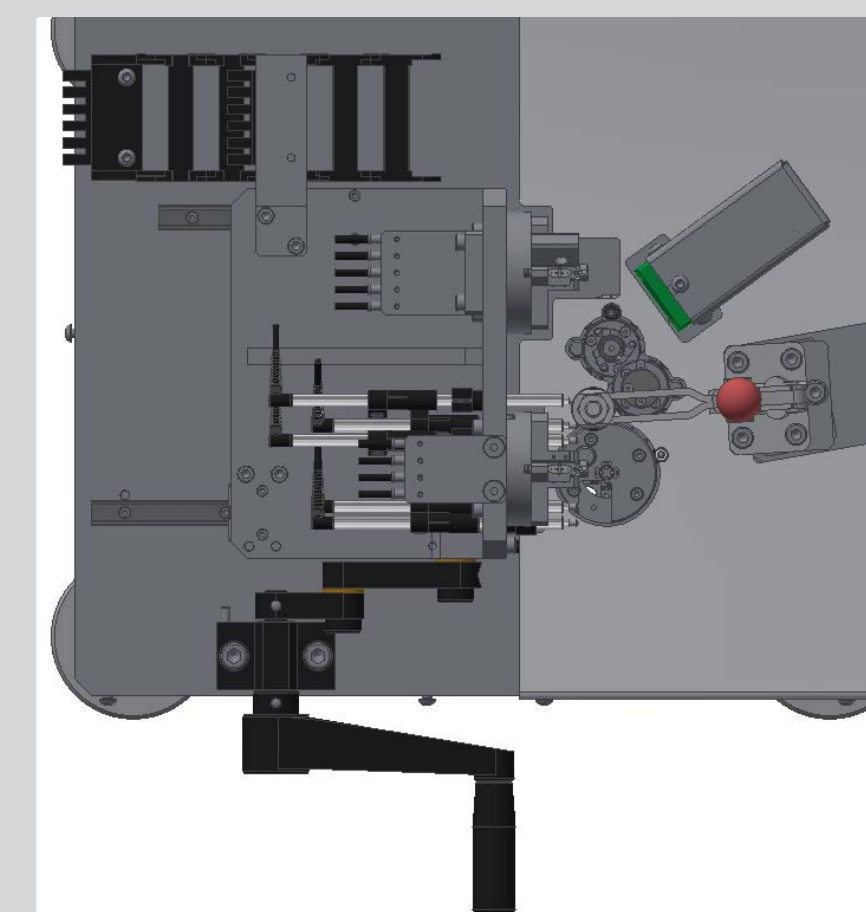
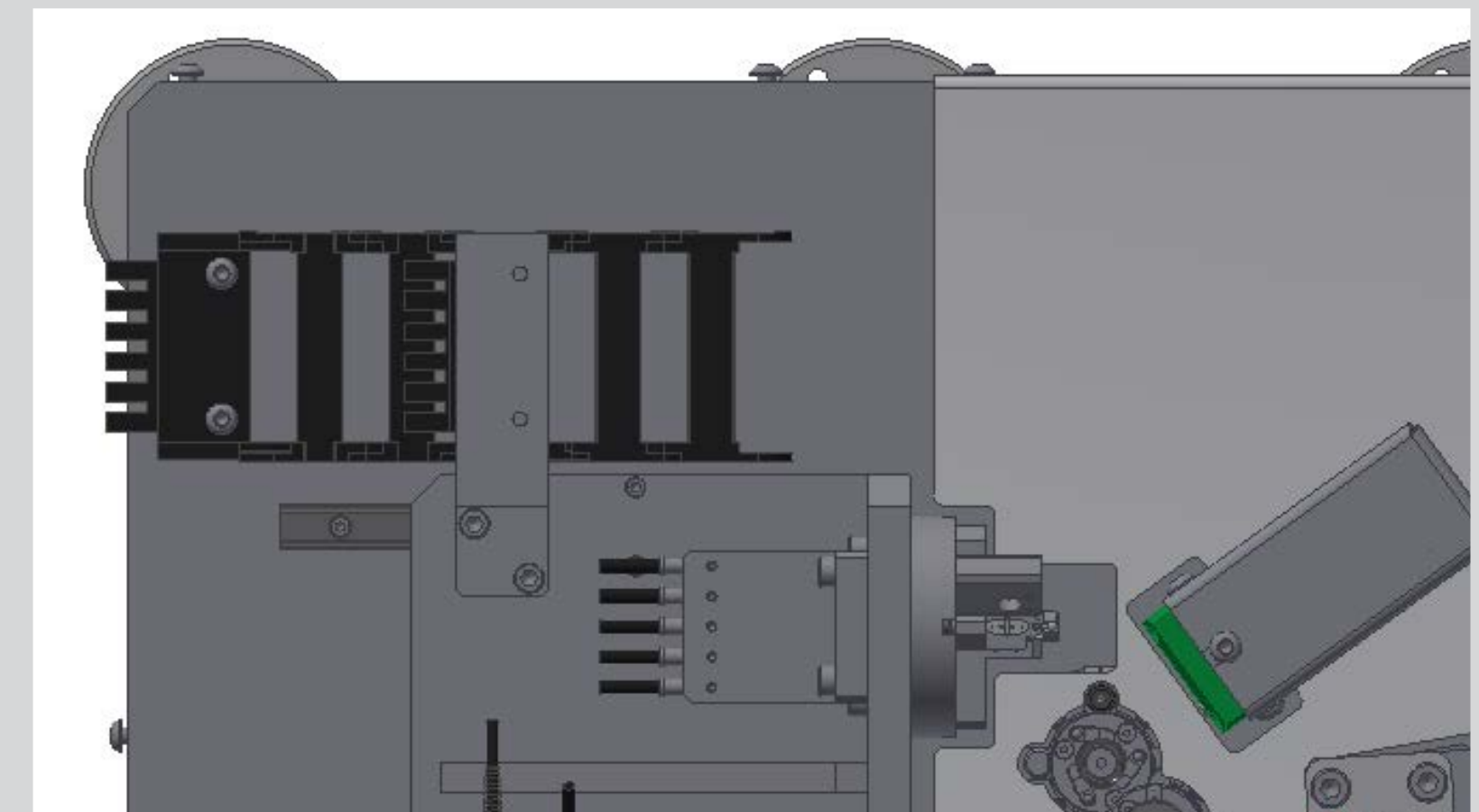
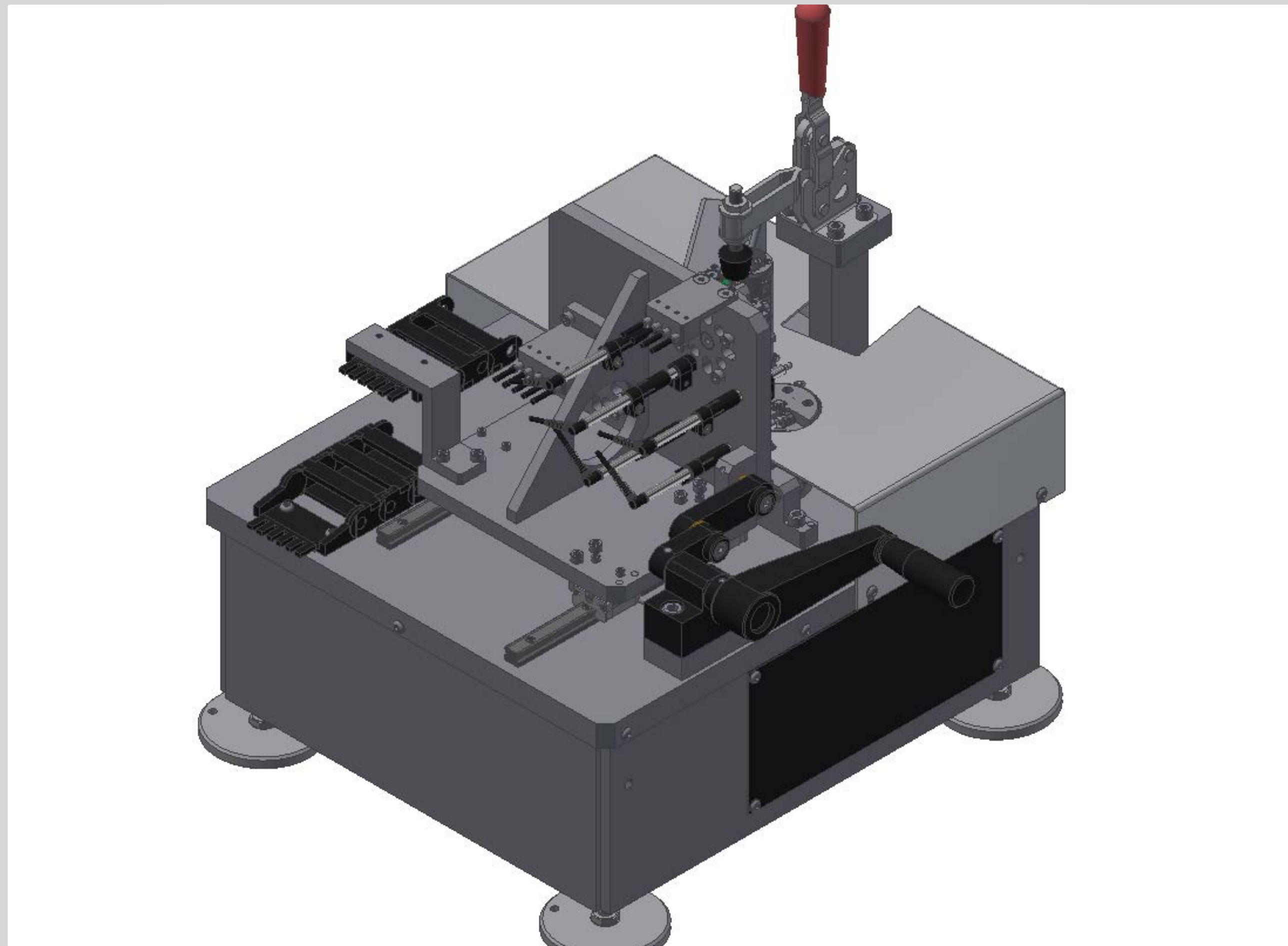
Measuring device for **oil pump housings**

The measuring device for oil pump housings is an easy-to-use solution for measuring bores and depths.

- Move the measuring head to the workpiece with just one movement
- Special mandrel for clamping and centering the workpiece
- For extra security, a clamp presses down on the workpiece



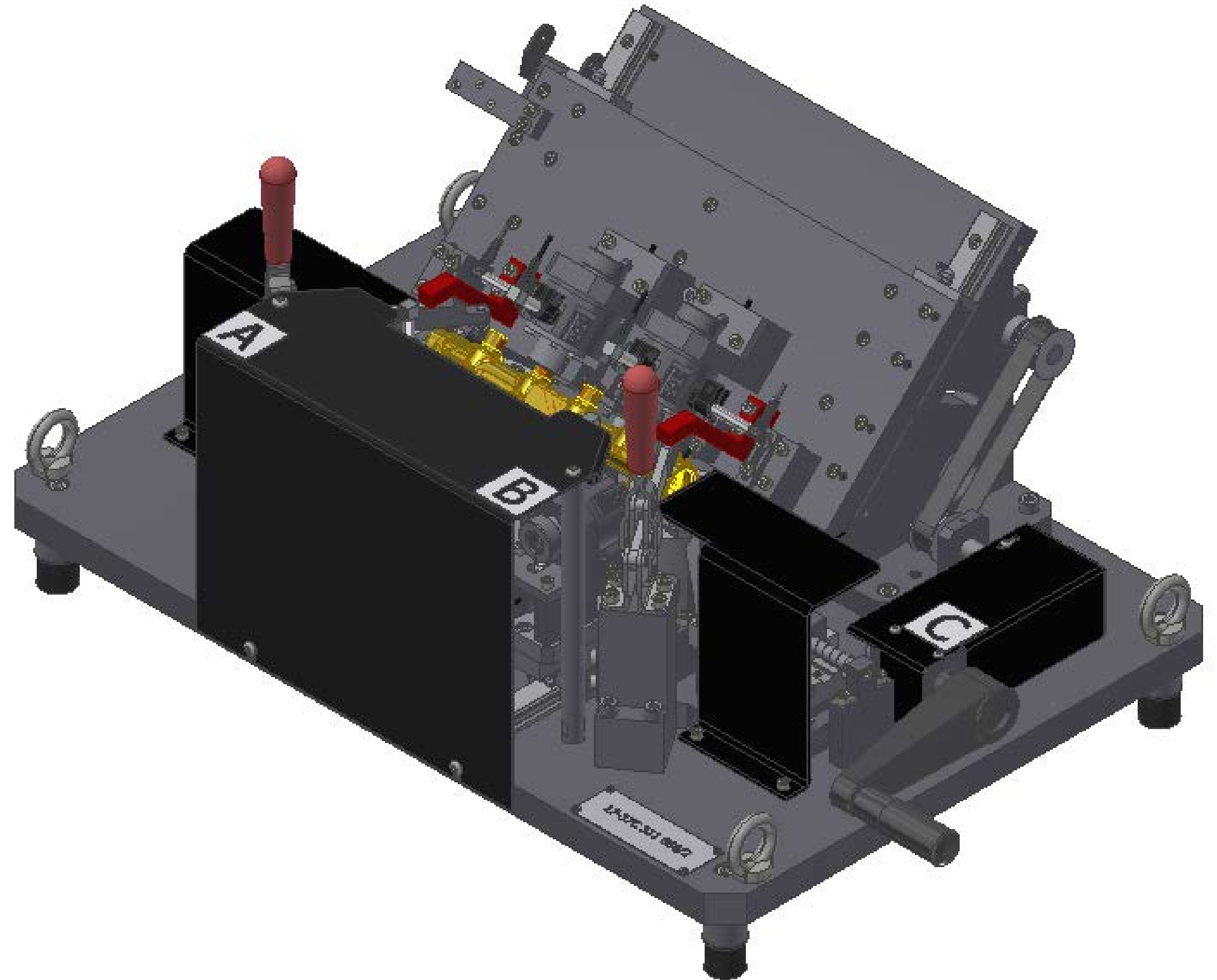
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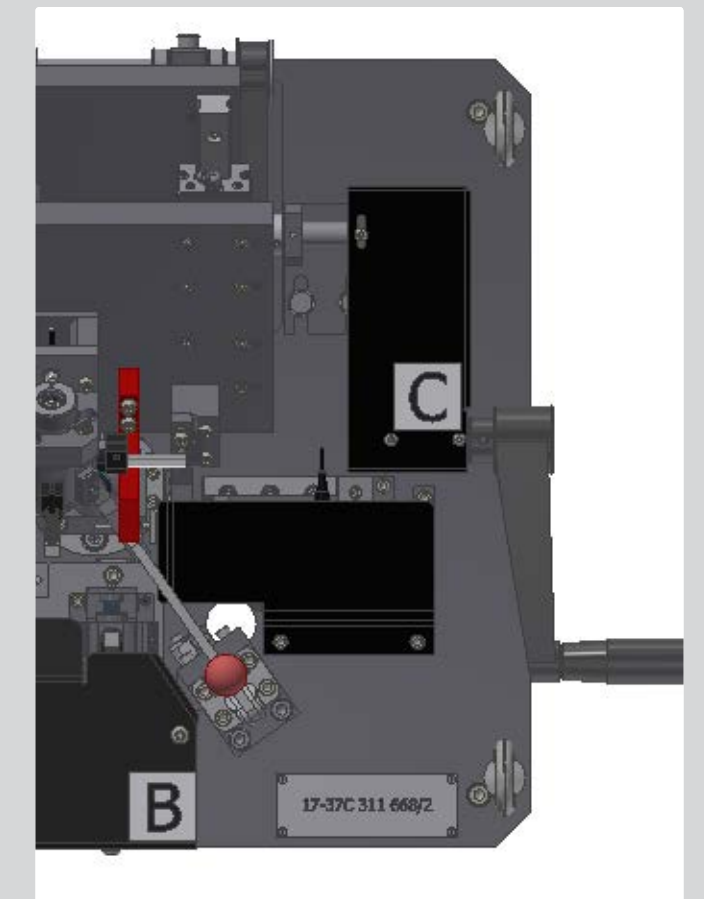
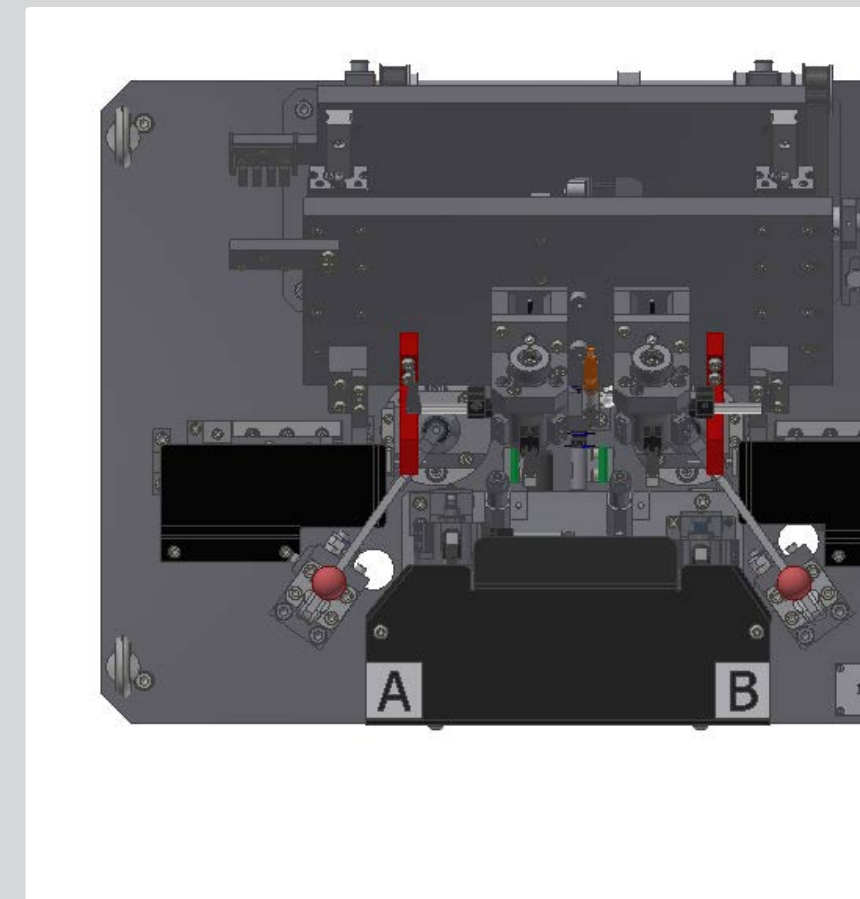
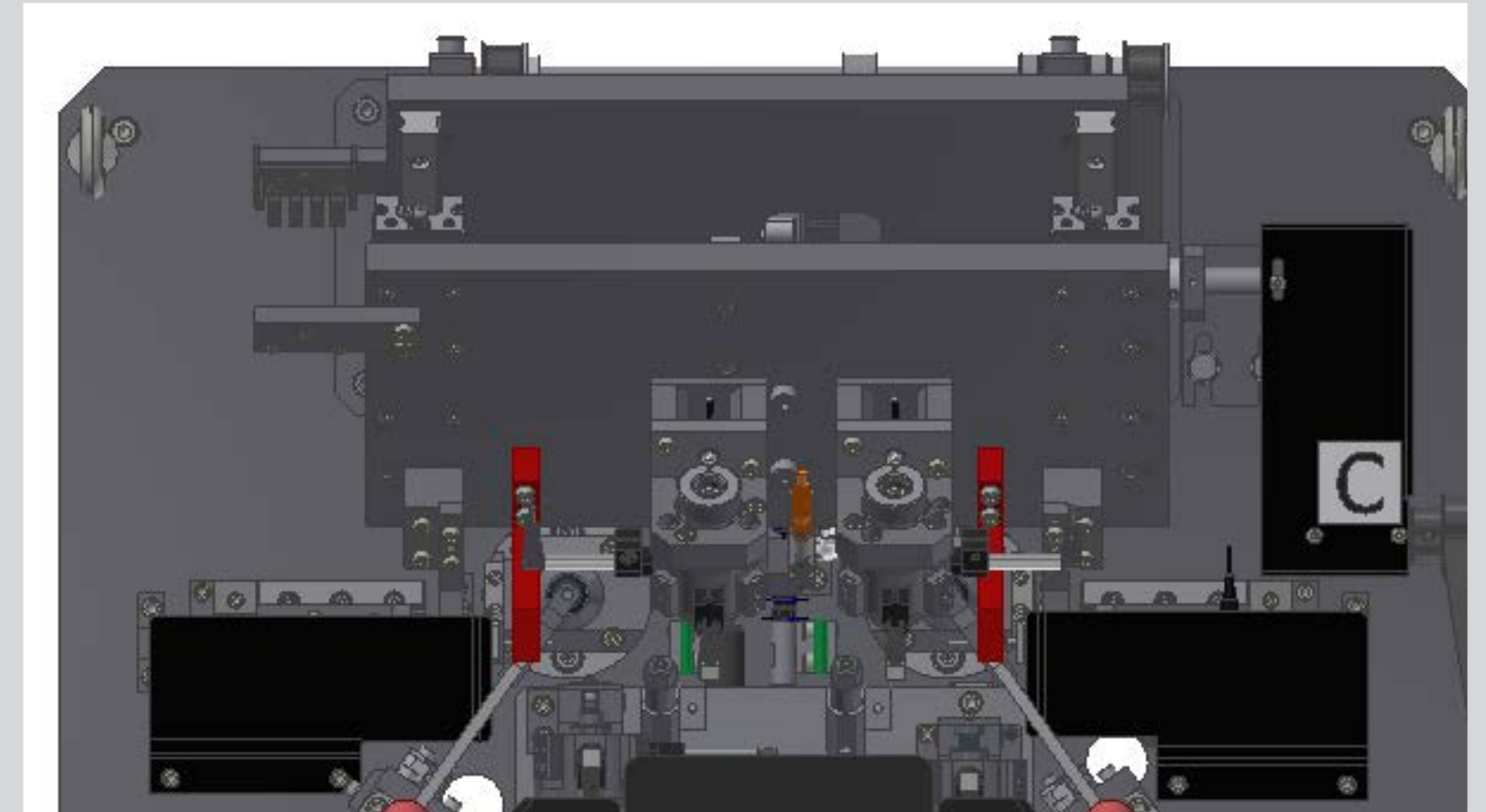
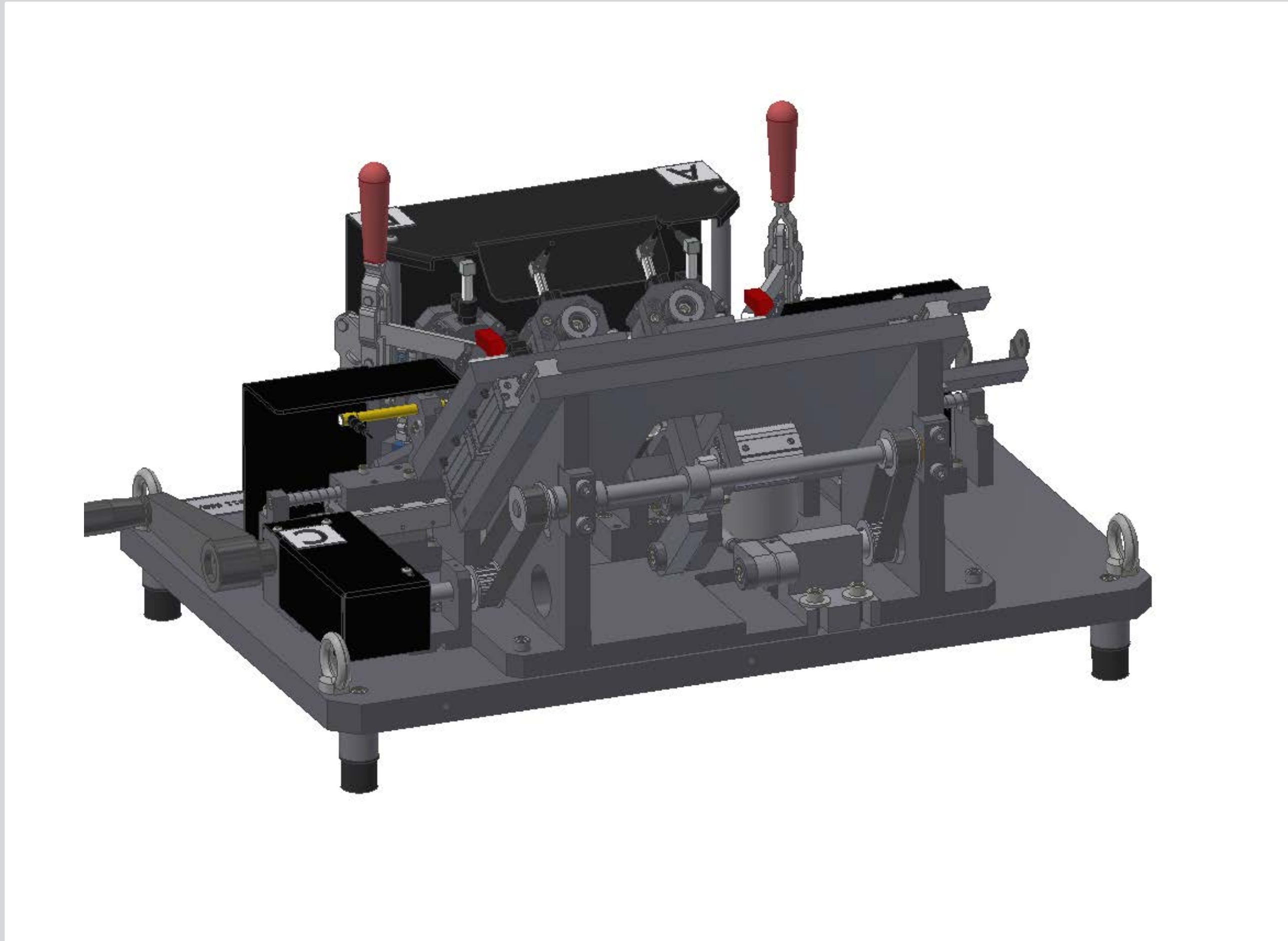
Measuring device for **distribution rails**

The measuring device for distribution rails covers a number of measuring tasks with a single device. For example, you can measure individual distances or positions on the workpiece.

- Mechanical feed of entire device by means of a hand crank
- Workpiece fixing with two clamping elements



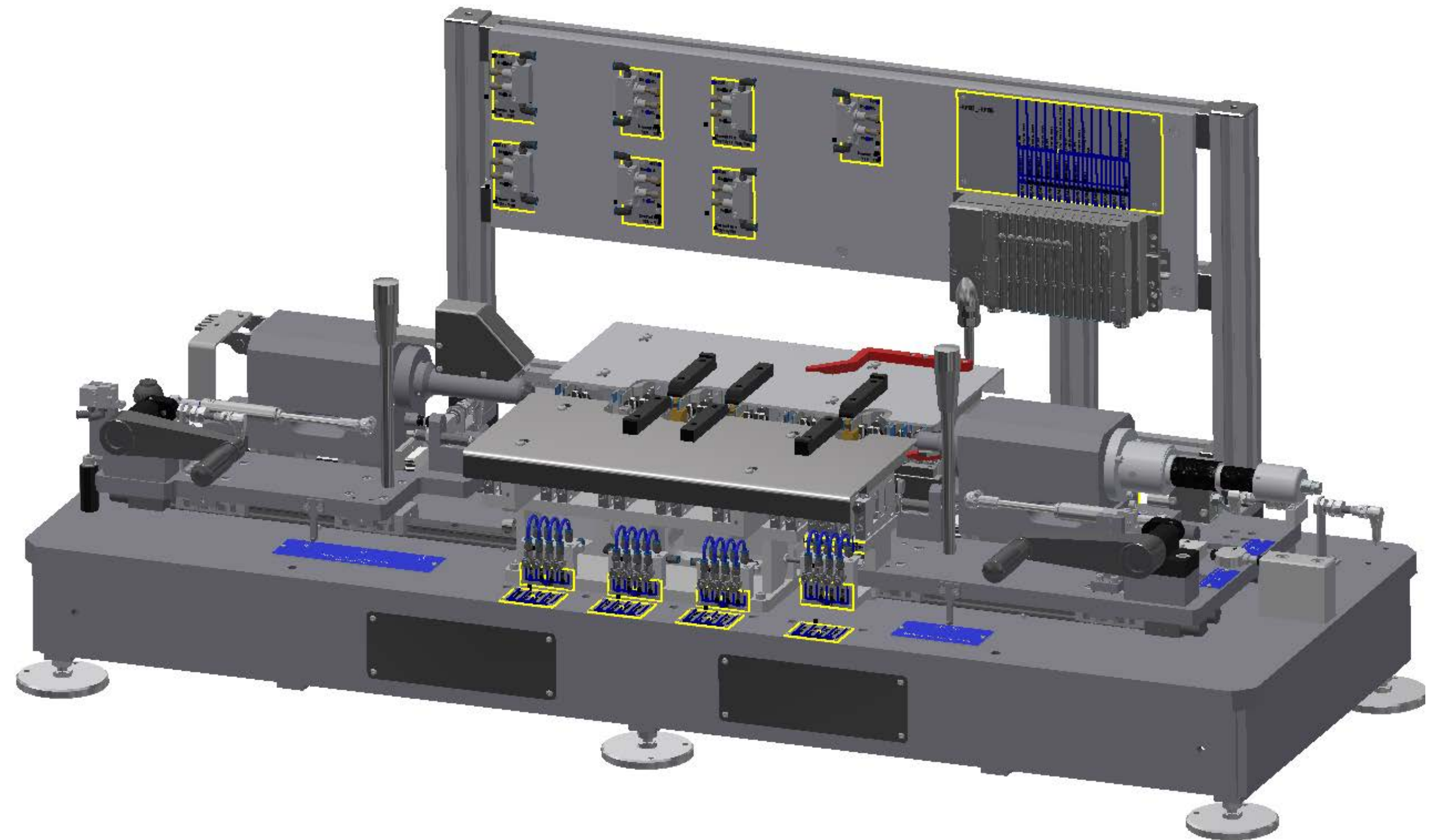
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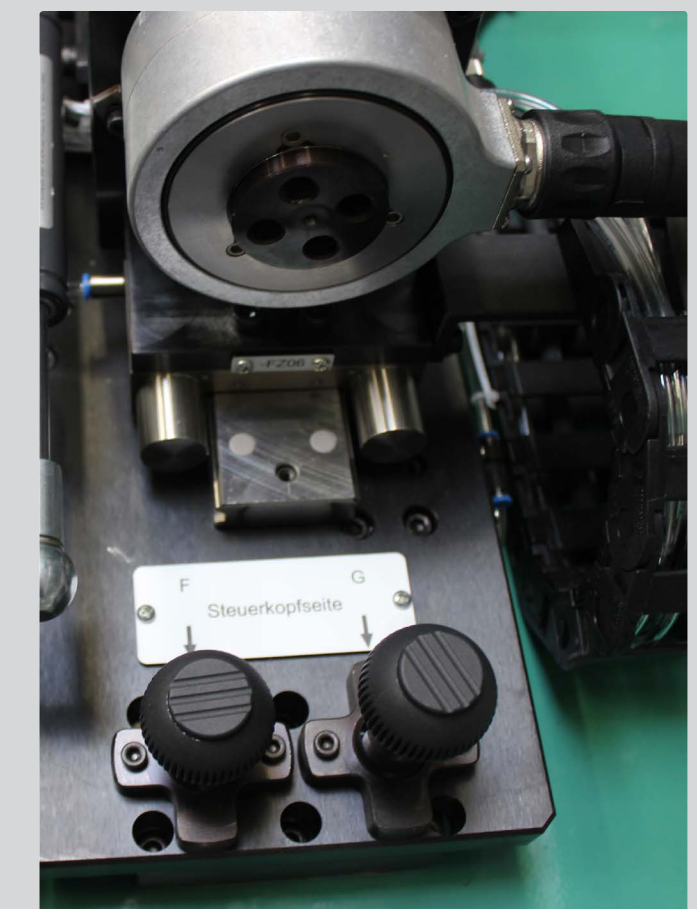
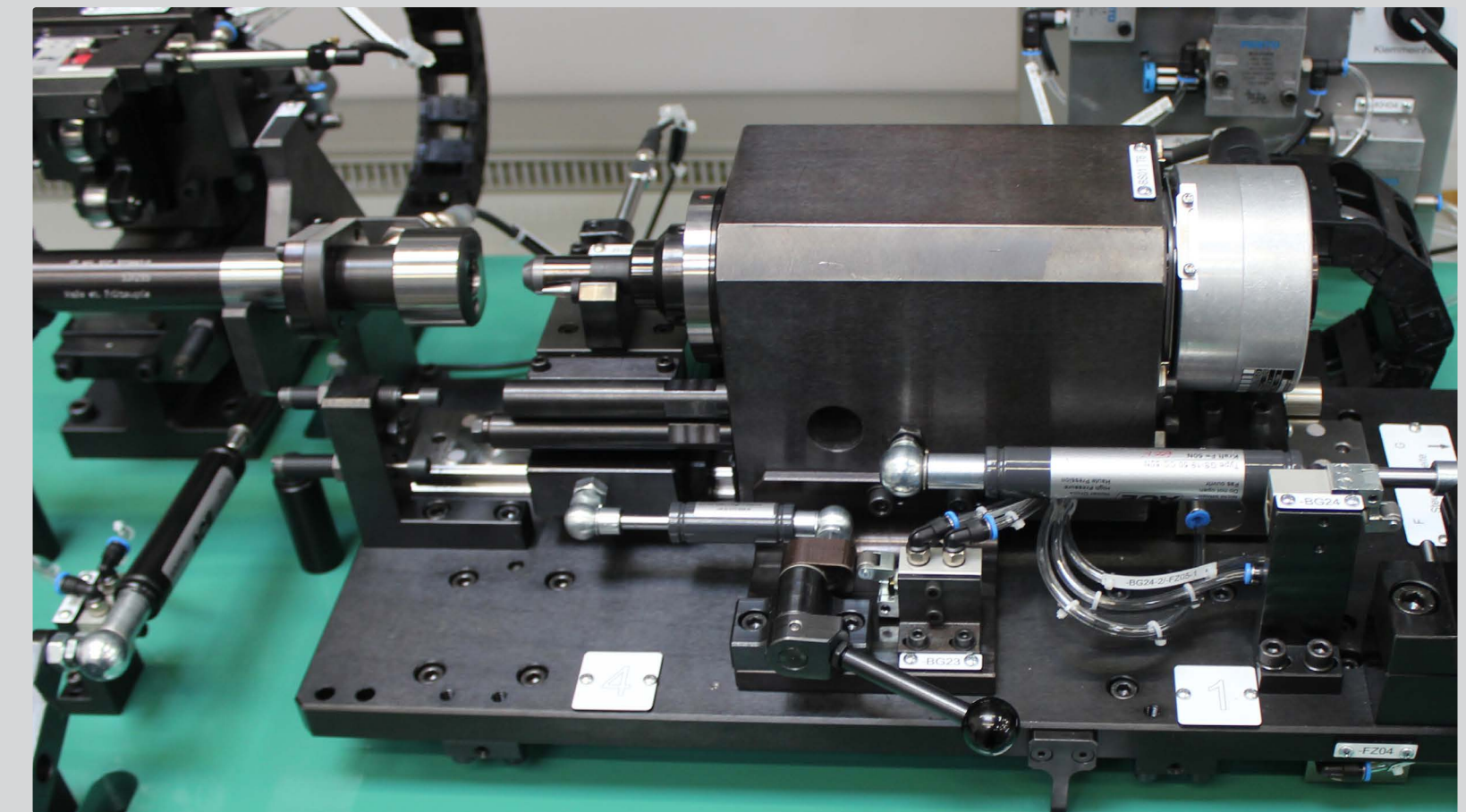
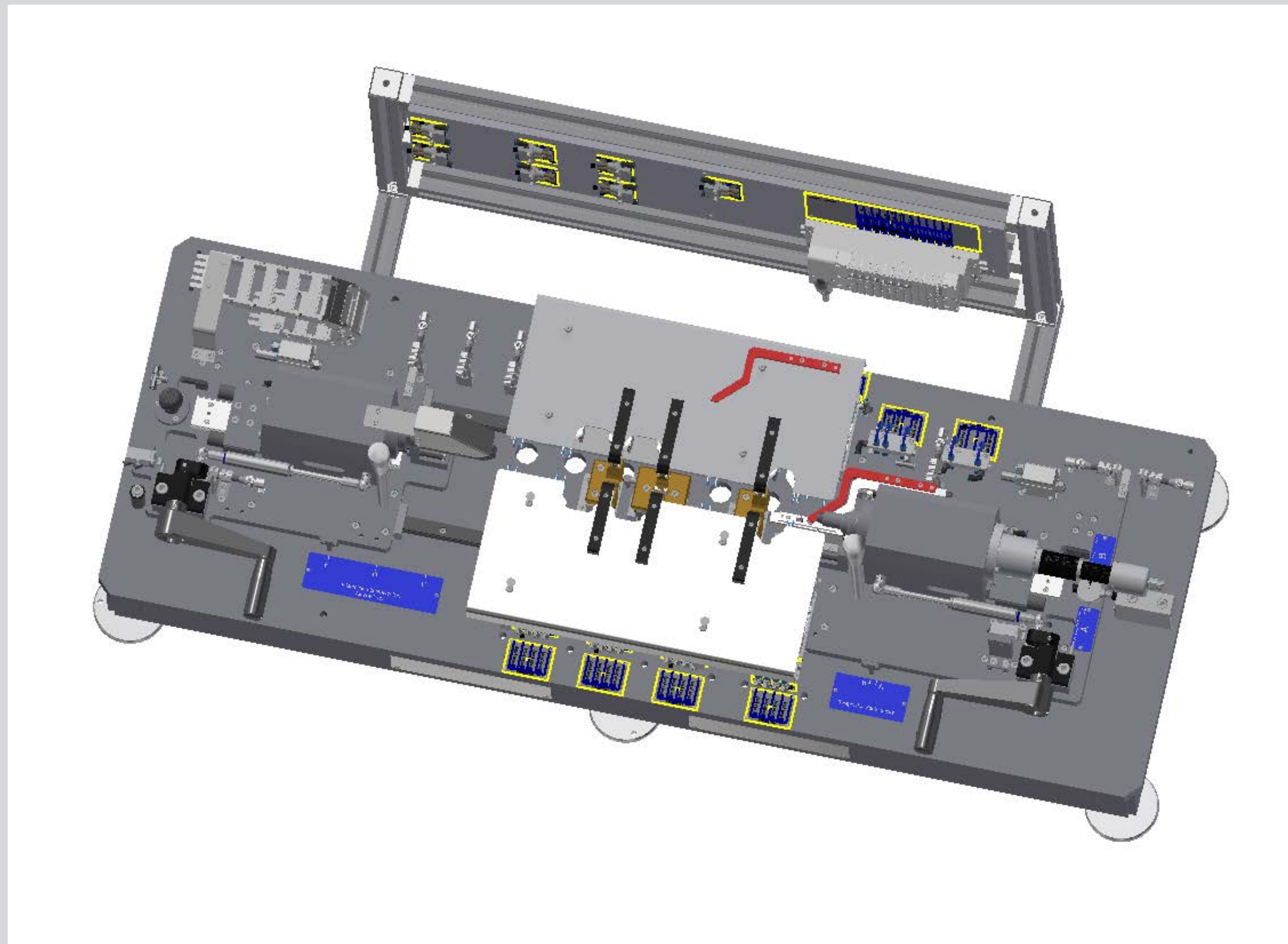
Measuring device for **camshafts**

This measuring device is used for measuring lengths and diameters of various camshaft types. Dynamic measurement enables measurements to be taken over the entire circumference.

- Can be reset for different camshafts
- Easy to operate



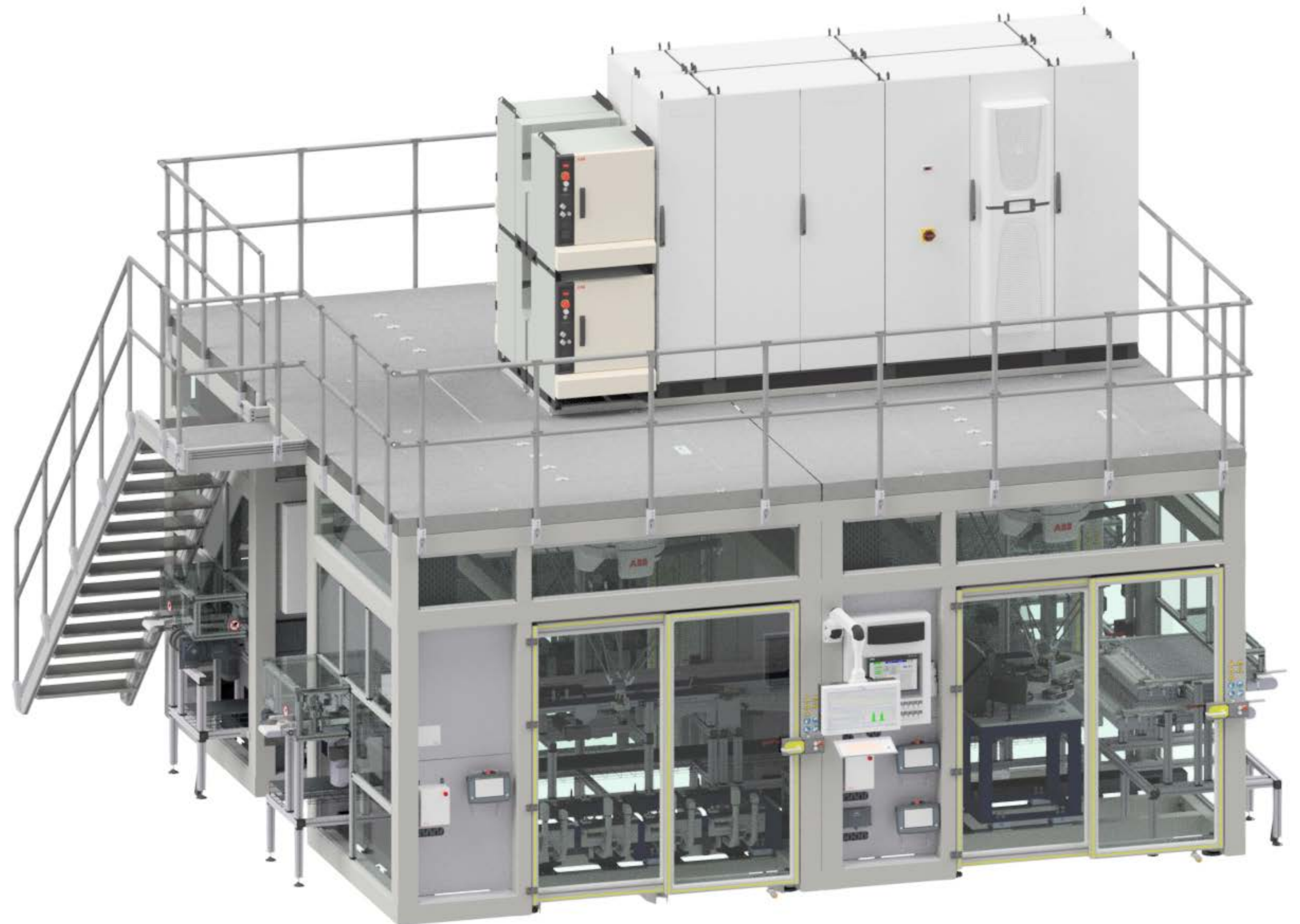
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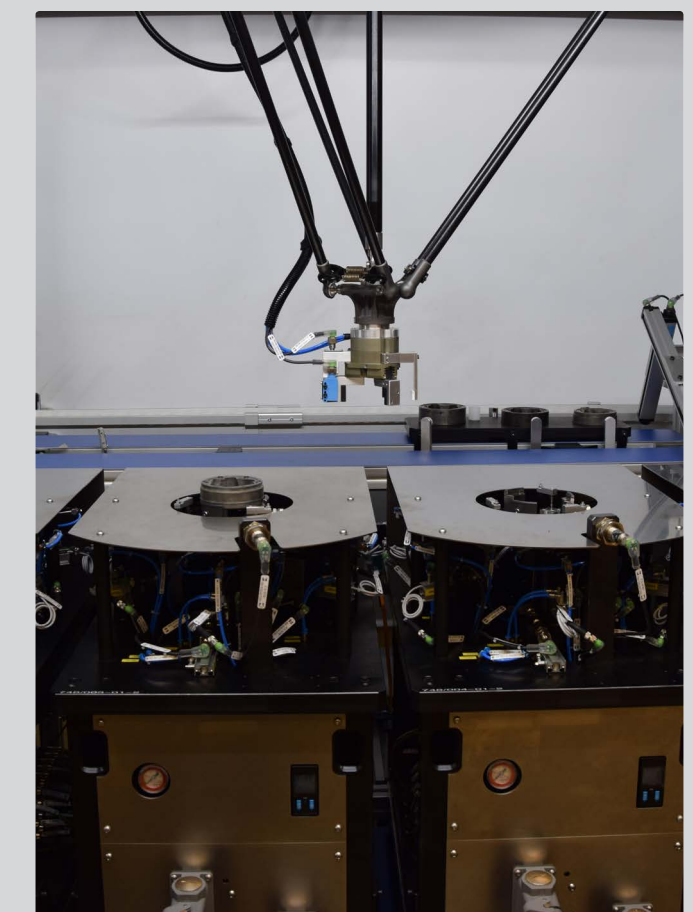
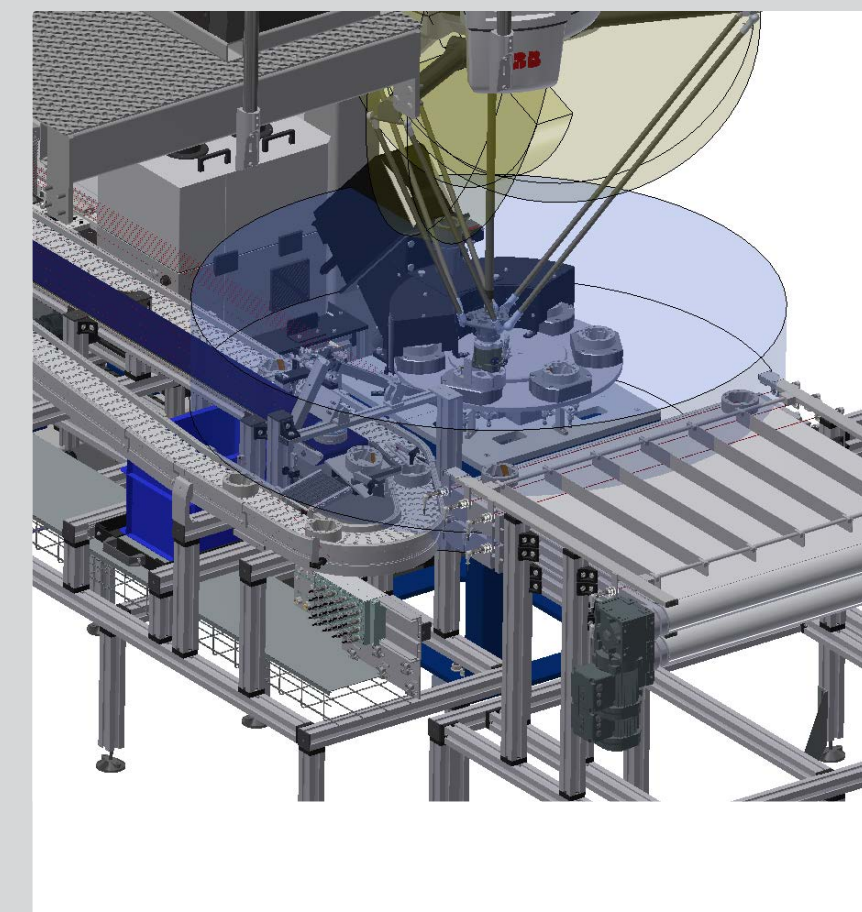
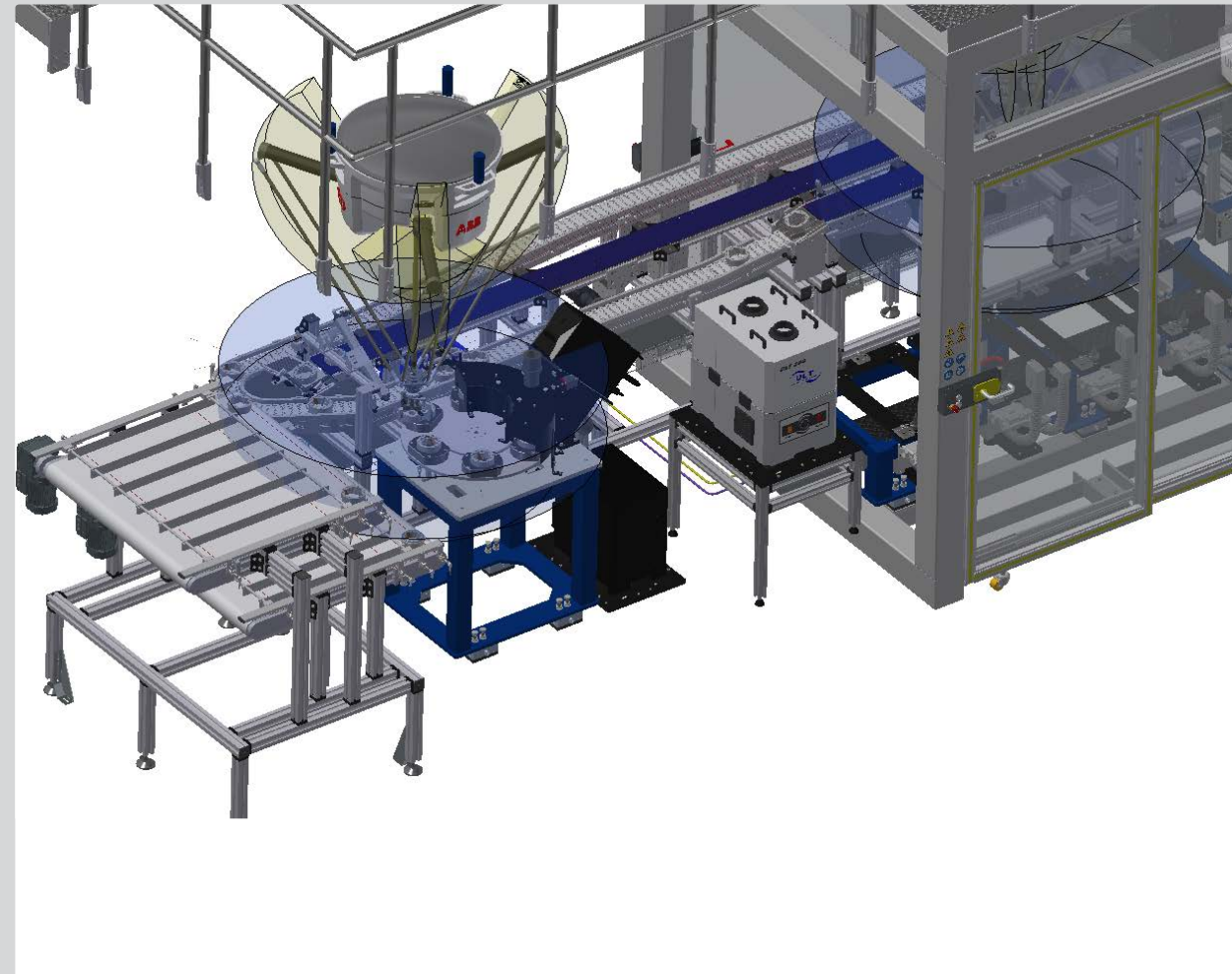
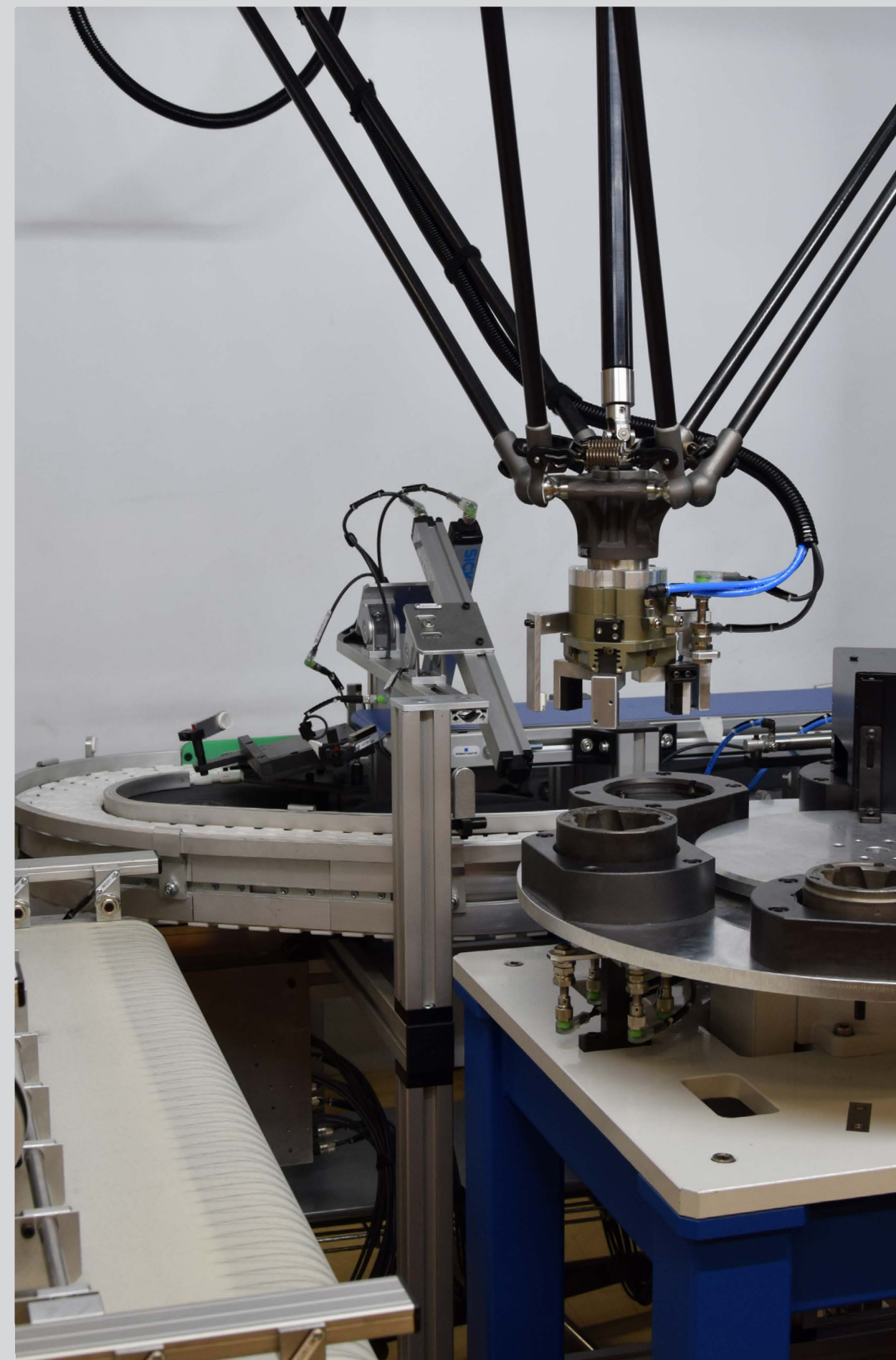
Measurement automation for **inner races**

Fully automated measuring and sorting process for inner races. 100% measurement divides the workpieces into eight classes. Once the workpieces have been measured, they are laser-engraved and sorted by class. The workpieces are fed into the system by conveyor belt and transferred to the measuring stations by a robot. After measurement, the robot moves the workpieces onto another conveyor belt for engraving. The components are then sorted into their eight classes.

- Cycle time 5 seconds when all four measuring cells are operating
- Two component types can be measured simultaneously (100% measurement with division into eight classes)



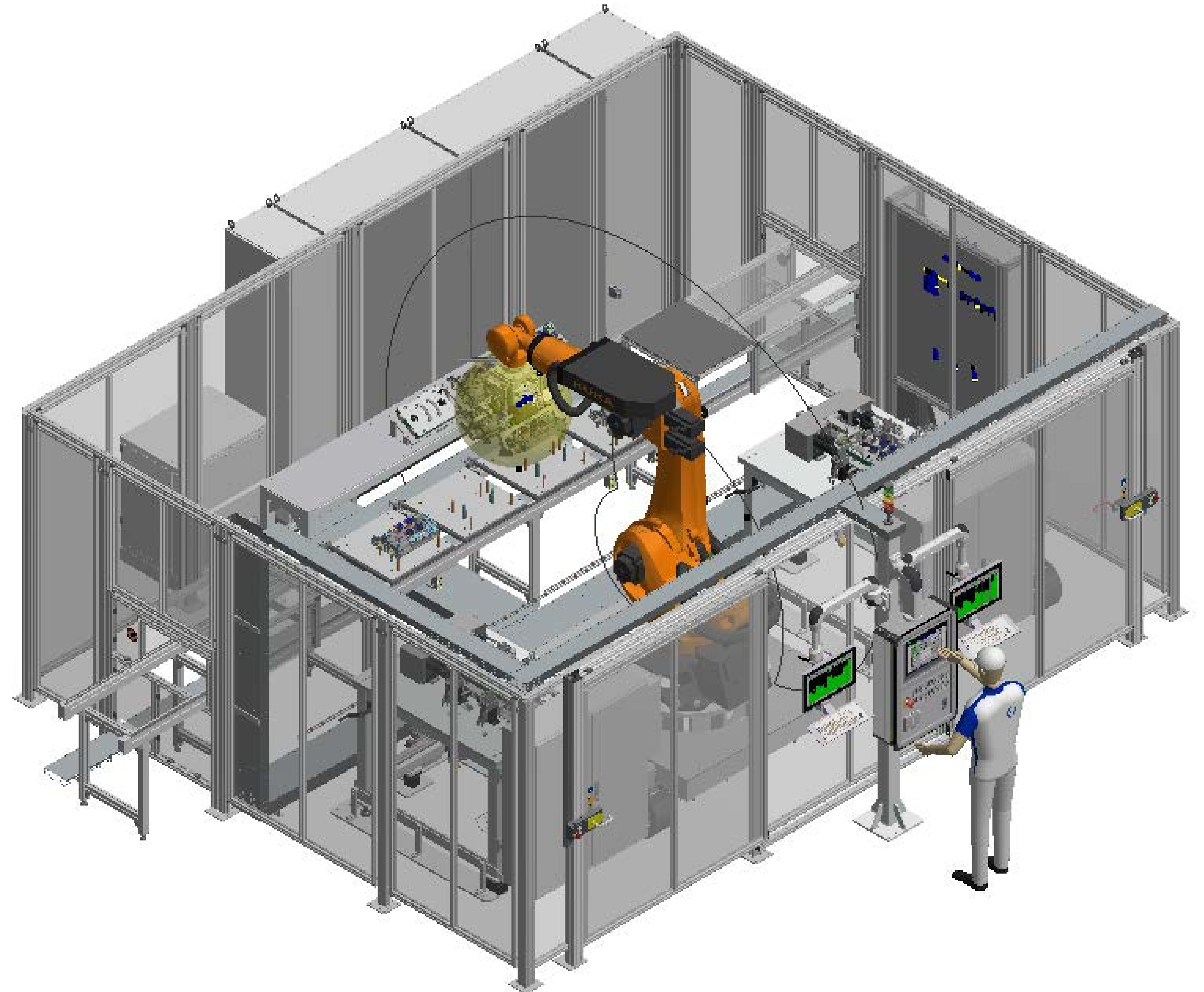
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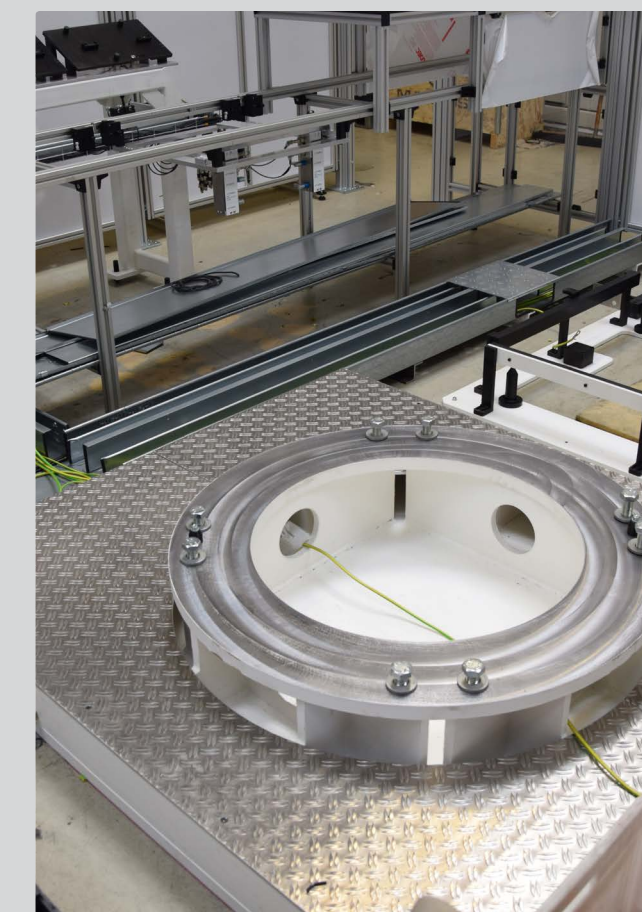
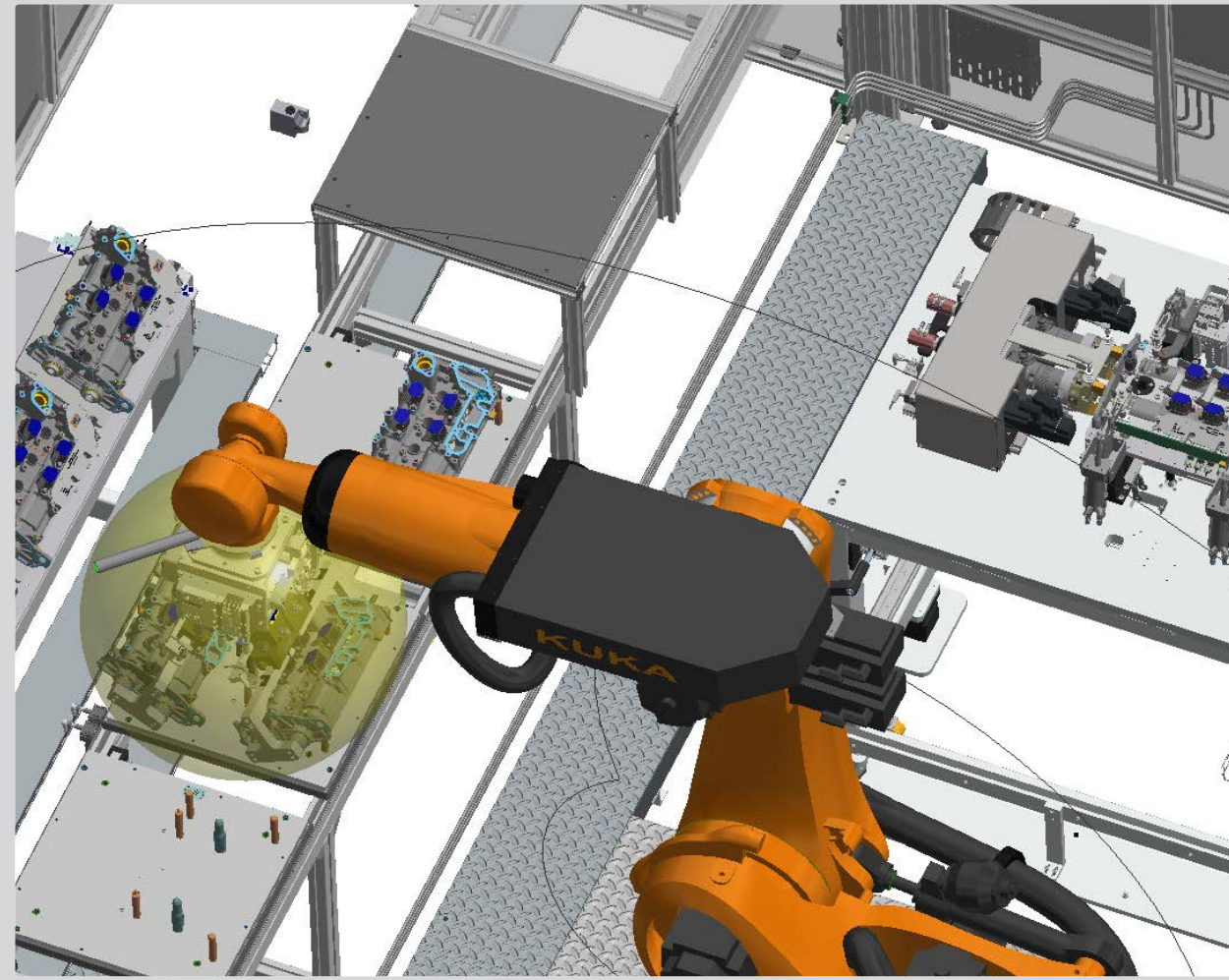
Measurement automation for **dynamic measurements**

This measuring station measures camshafts dynamically inside the housing. The relative positions of the individual cams are measured. A robot lifts the workpieces from a conveyor belt and places them in the measuring devices. The drive unit of the devices grasps the cam ends and rotates them. The measuring elements approach and record the measured values.

- 150,000 measured values recorded in a single camshaft rotation
- Fully automated measuring process



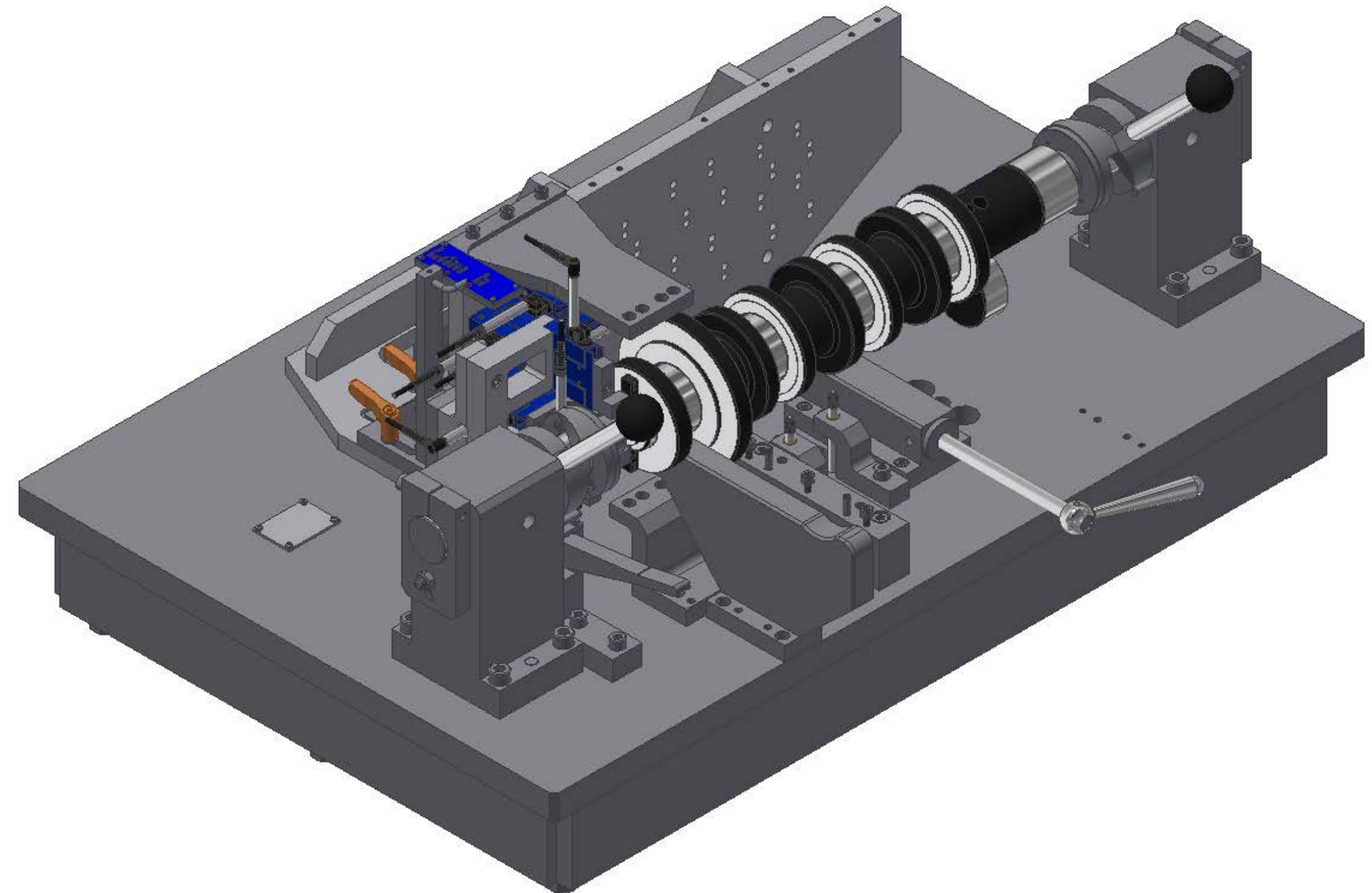
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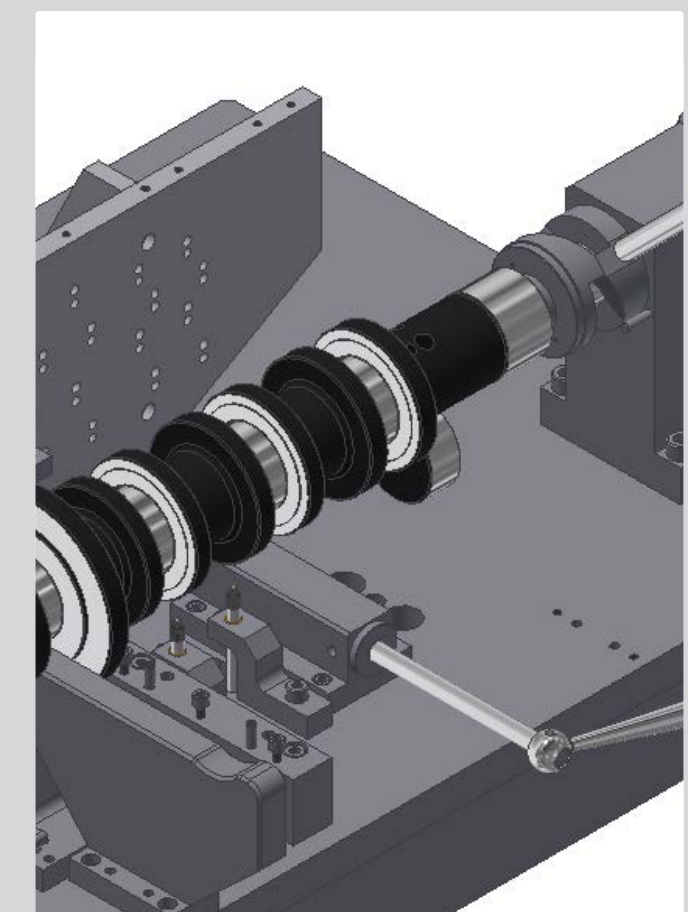
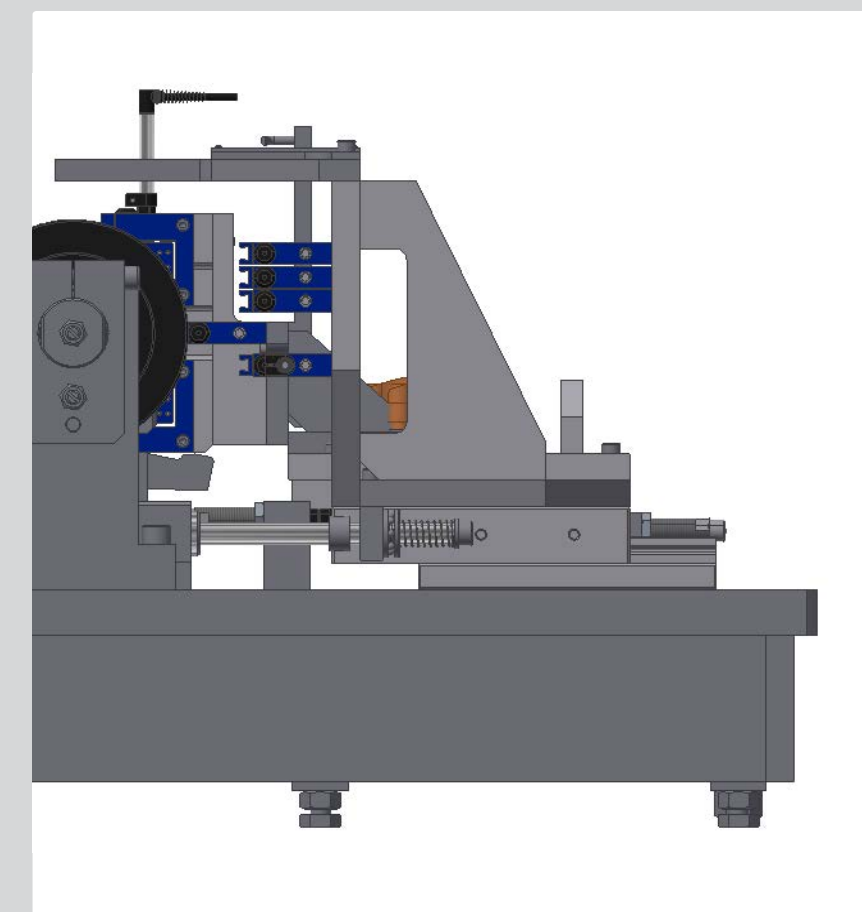
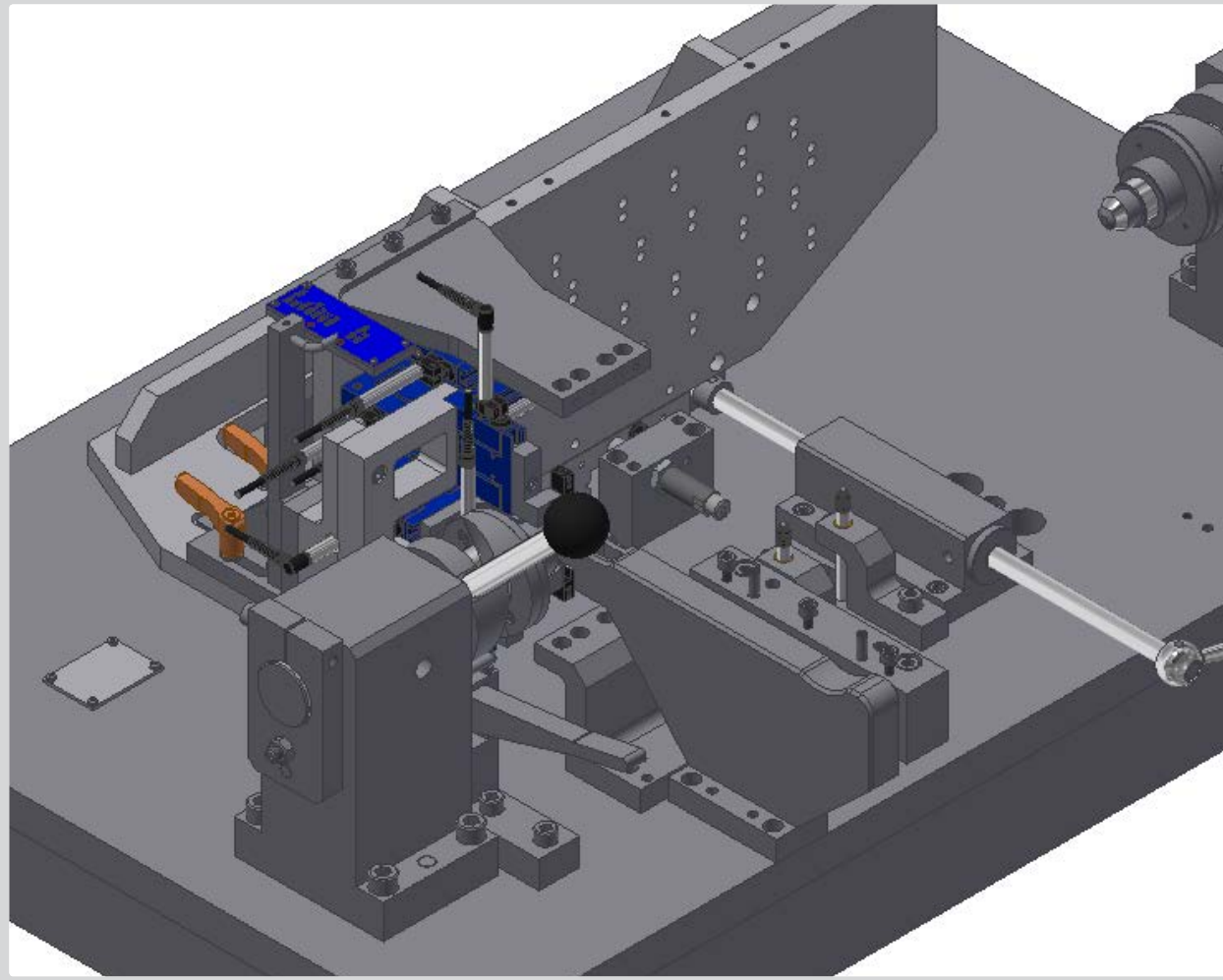
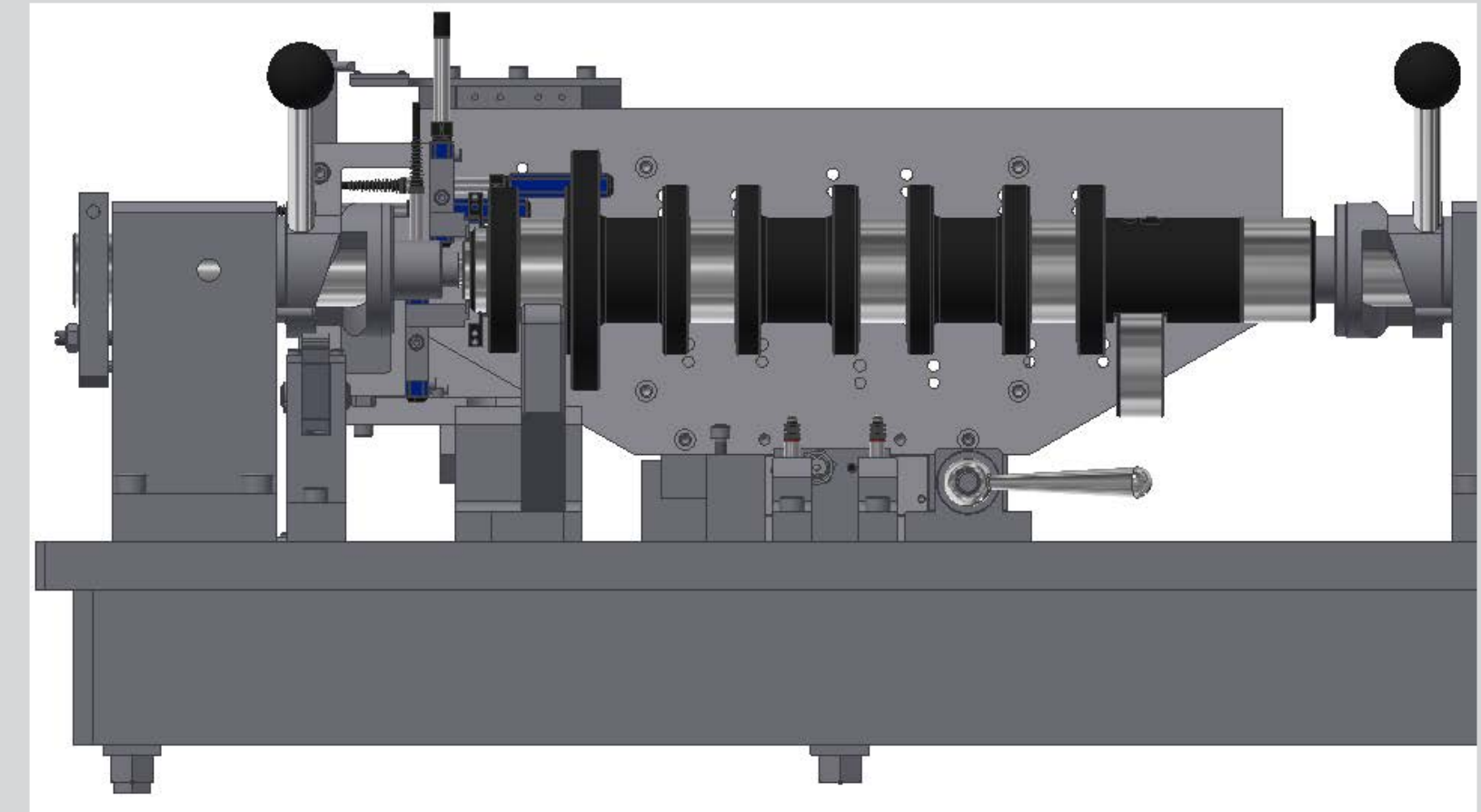
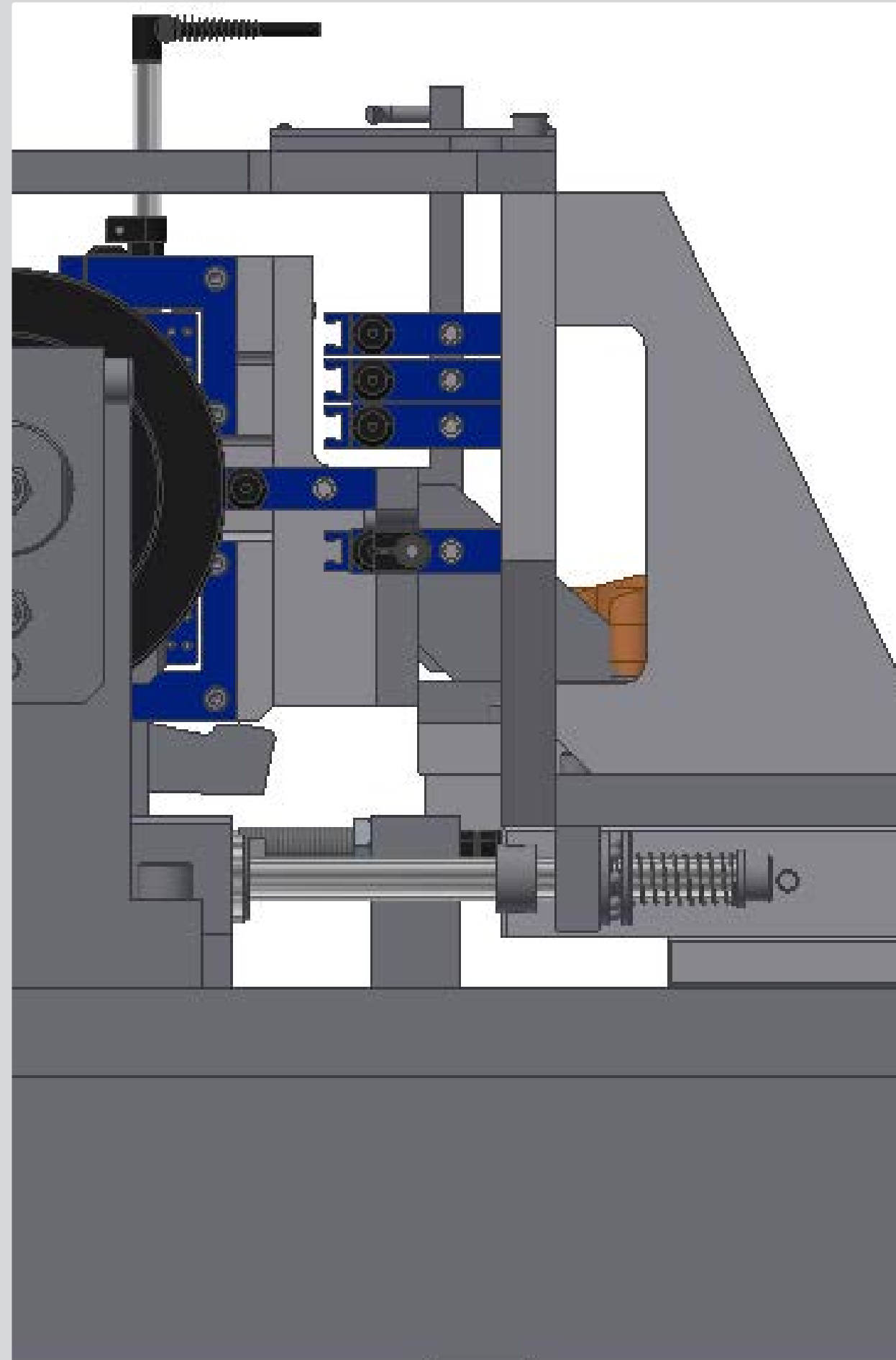
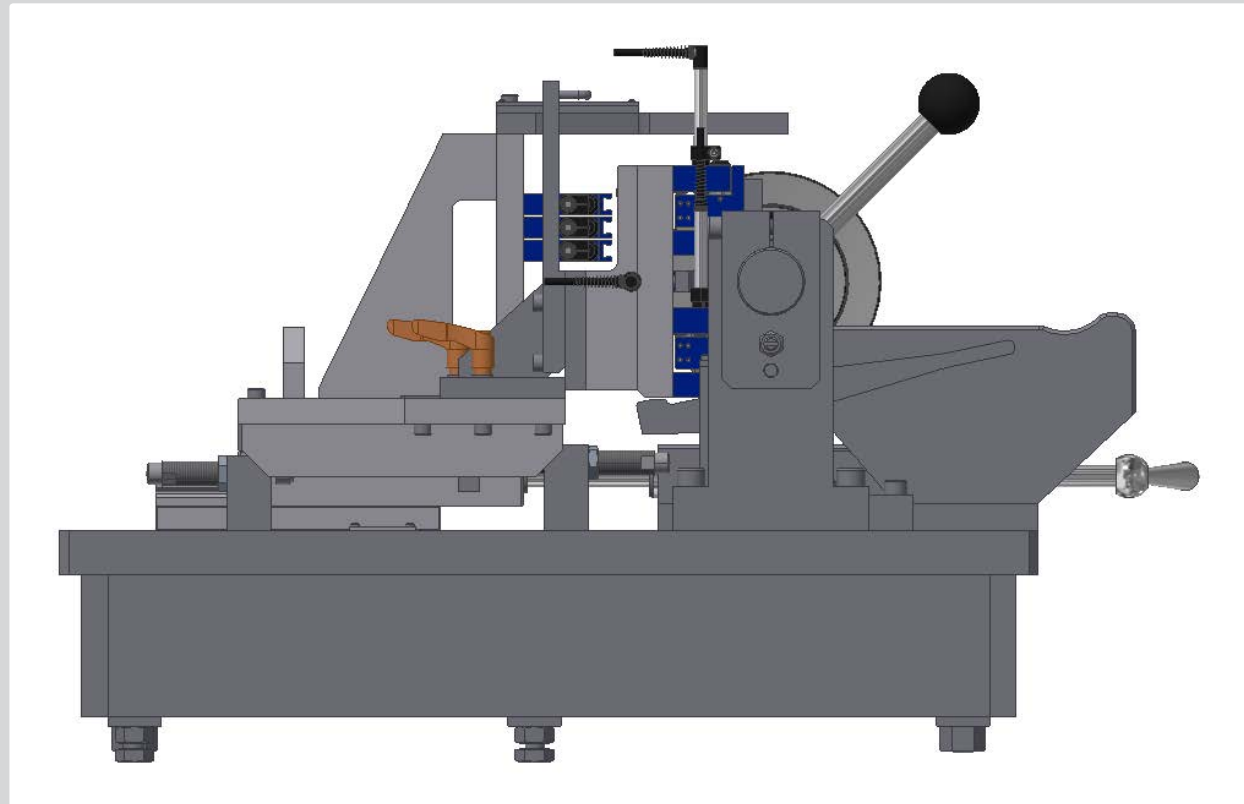
Measuring device for **crankshafts**

This measuring device measures the distances between the counterweights and the length of the crankshaft. It can be converted for different crankshaft types, with a choice of two lifting heights and various length settings.

- Mechanical centering
- Adjustable to different crankshaft types



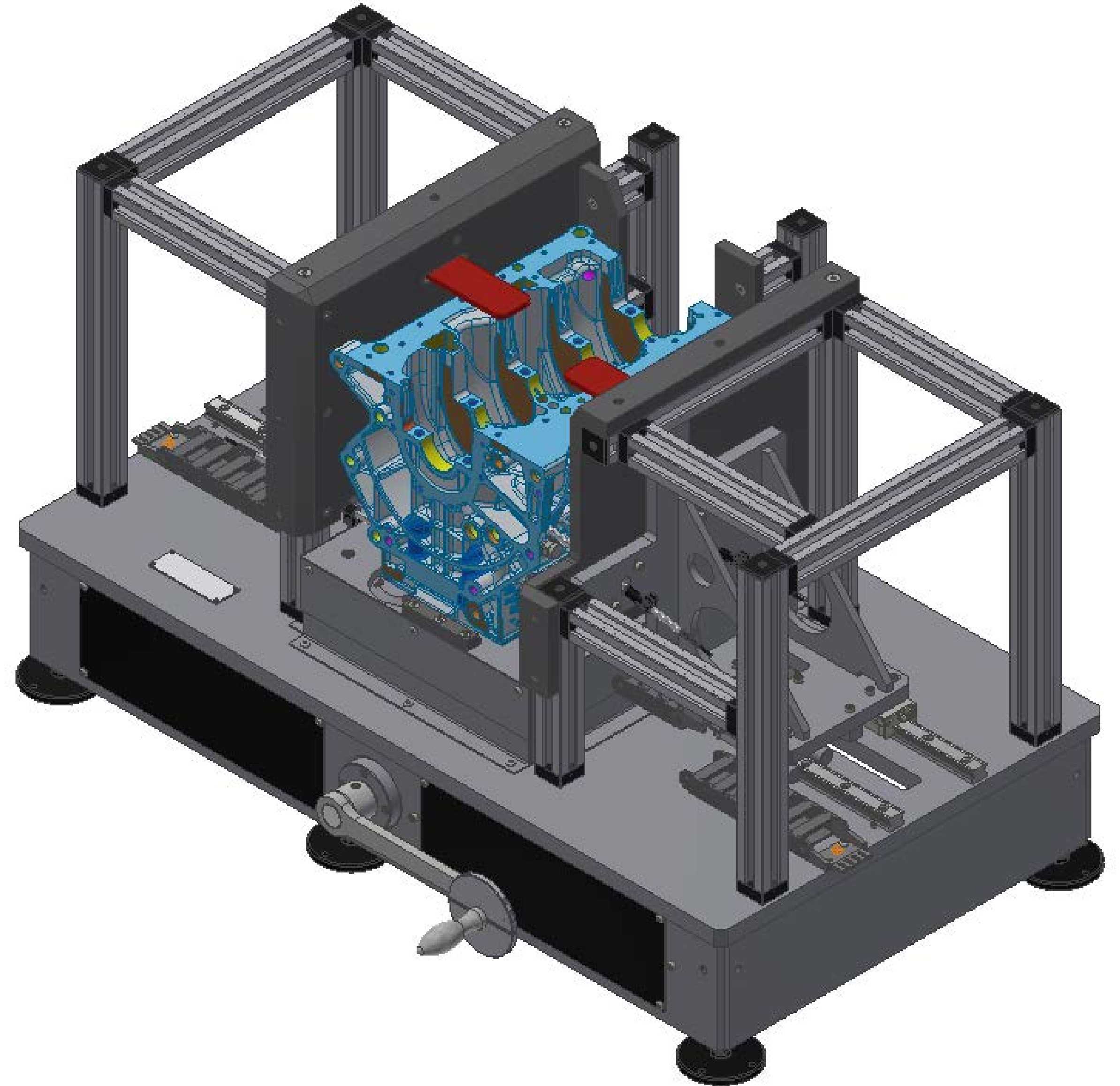
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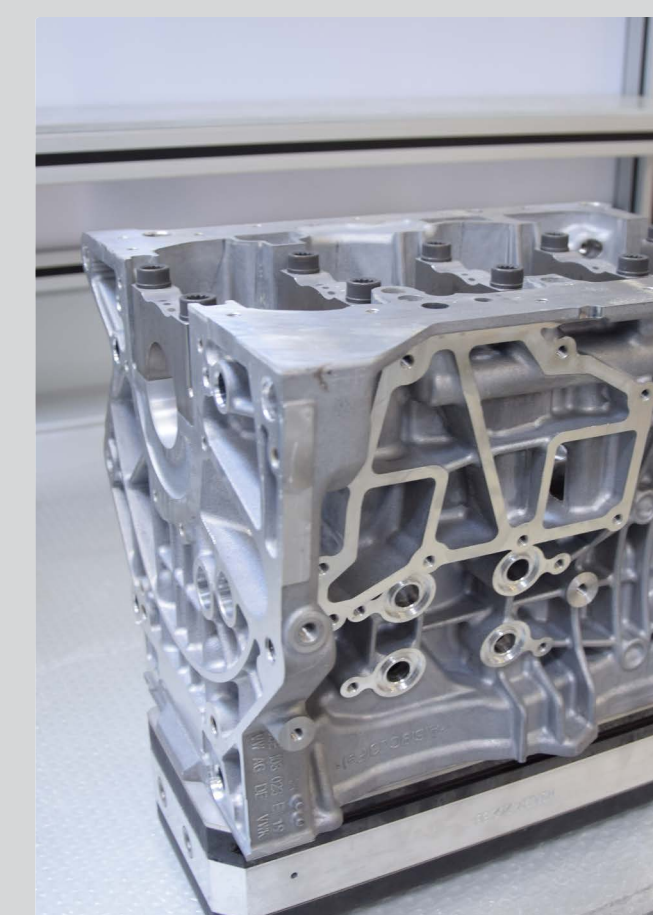
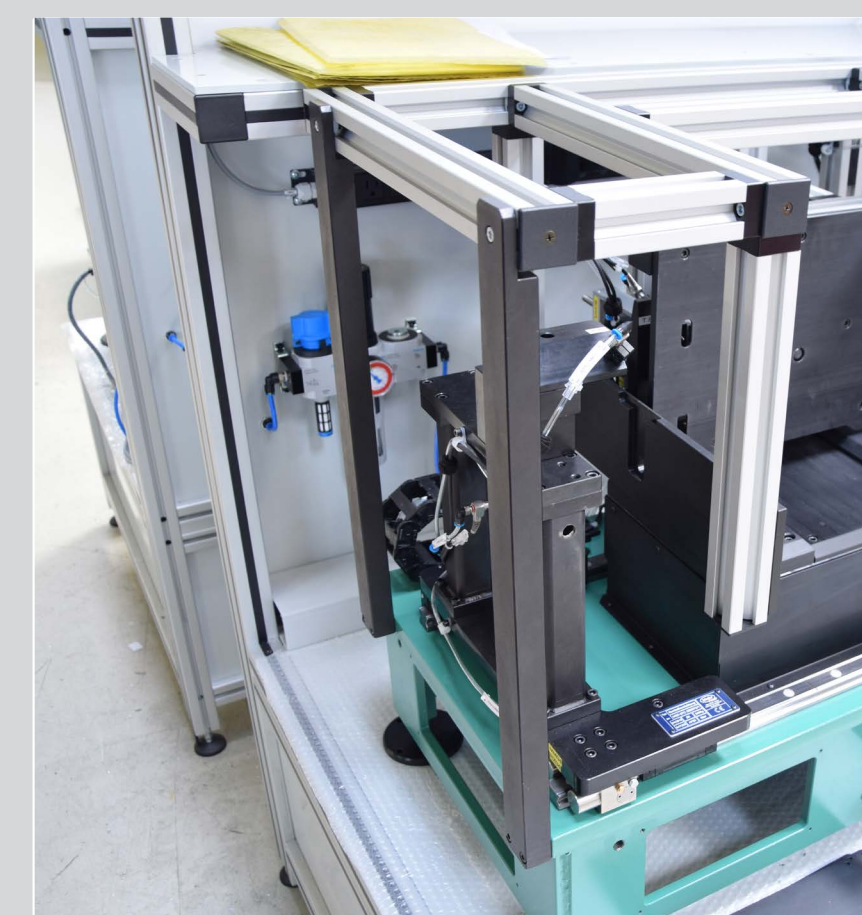
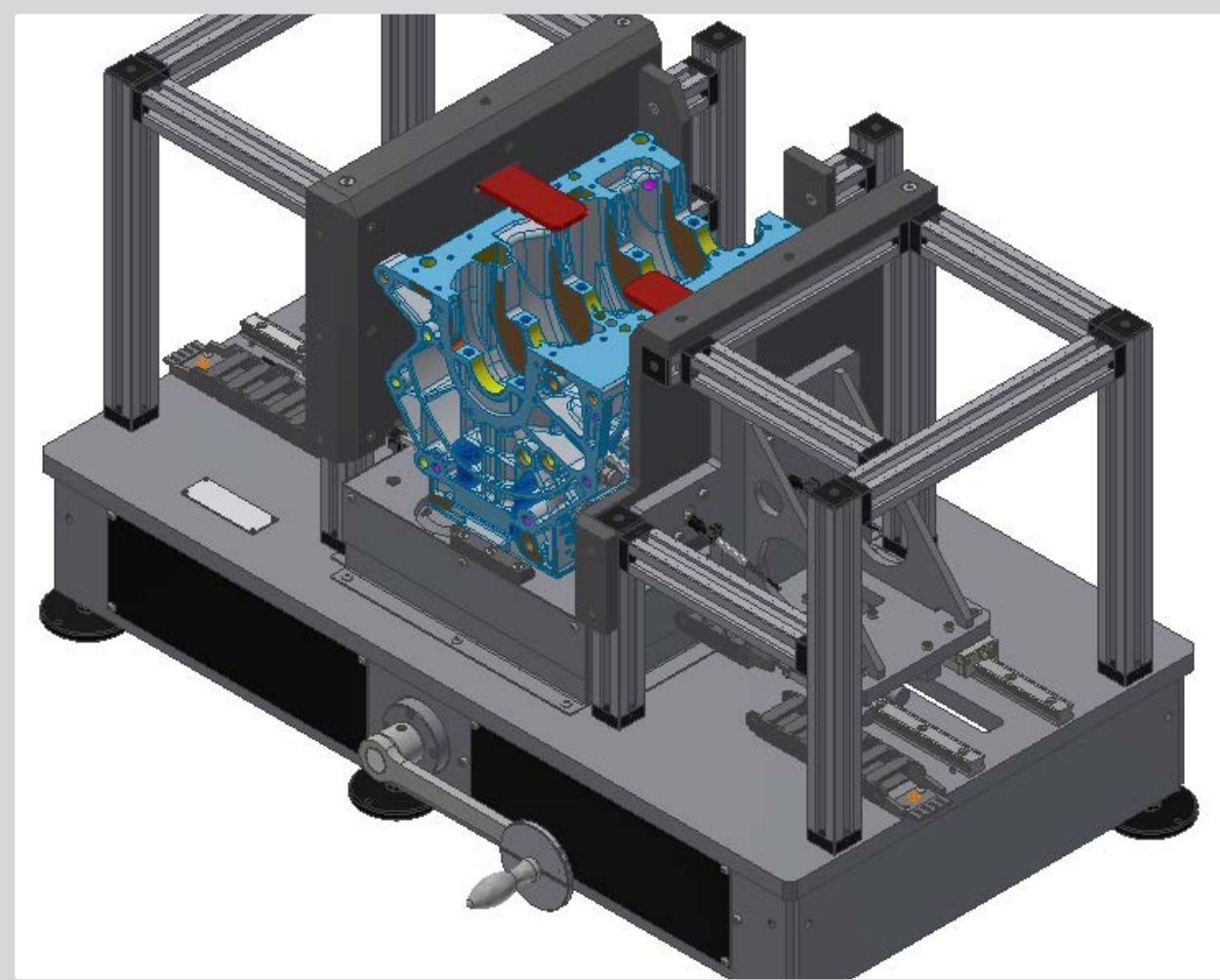
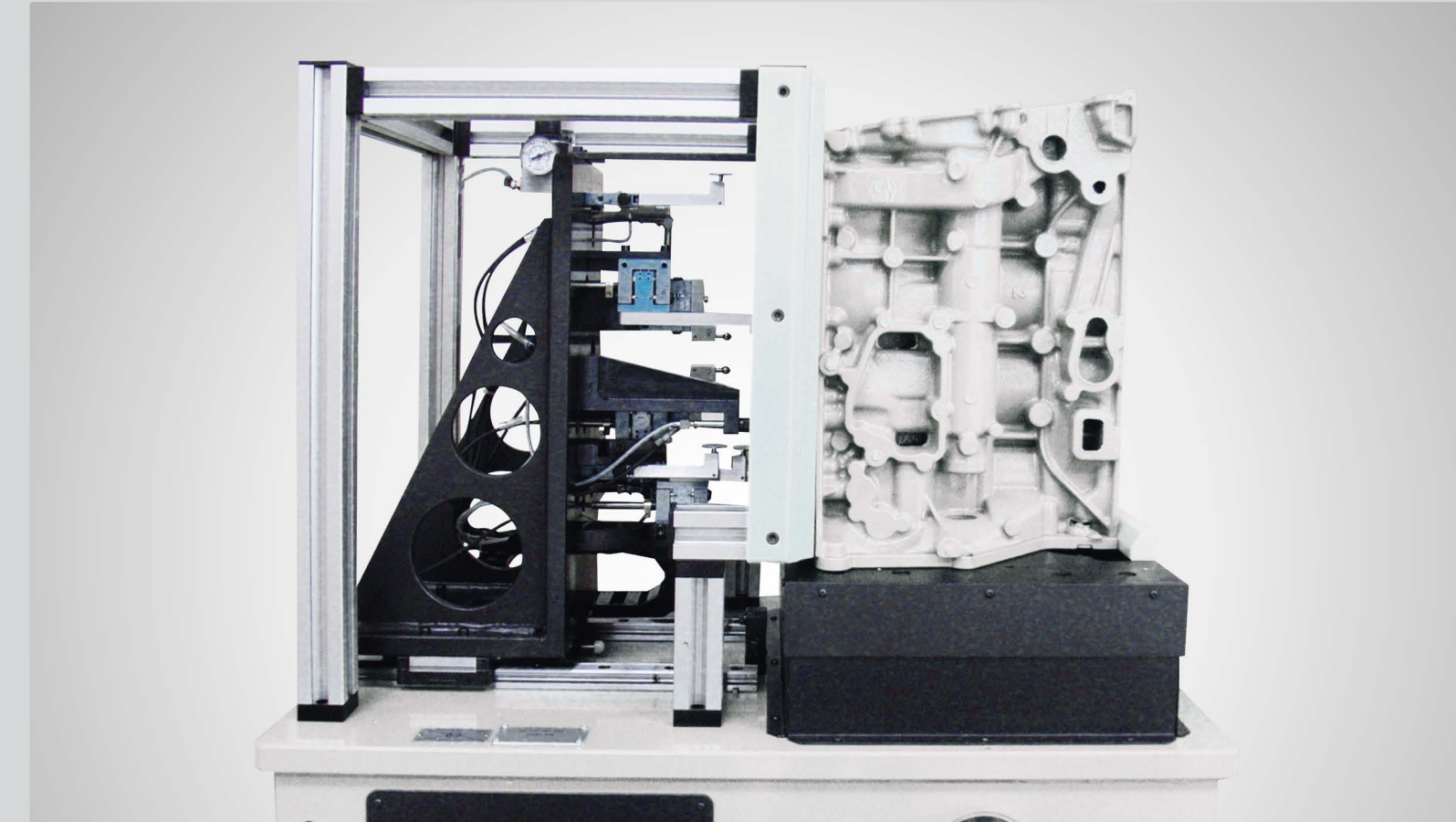
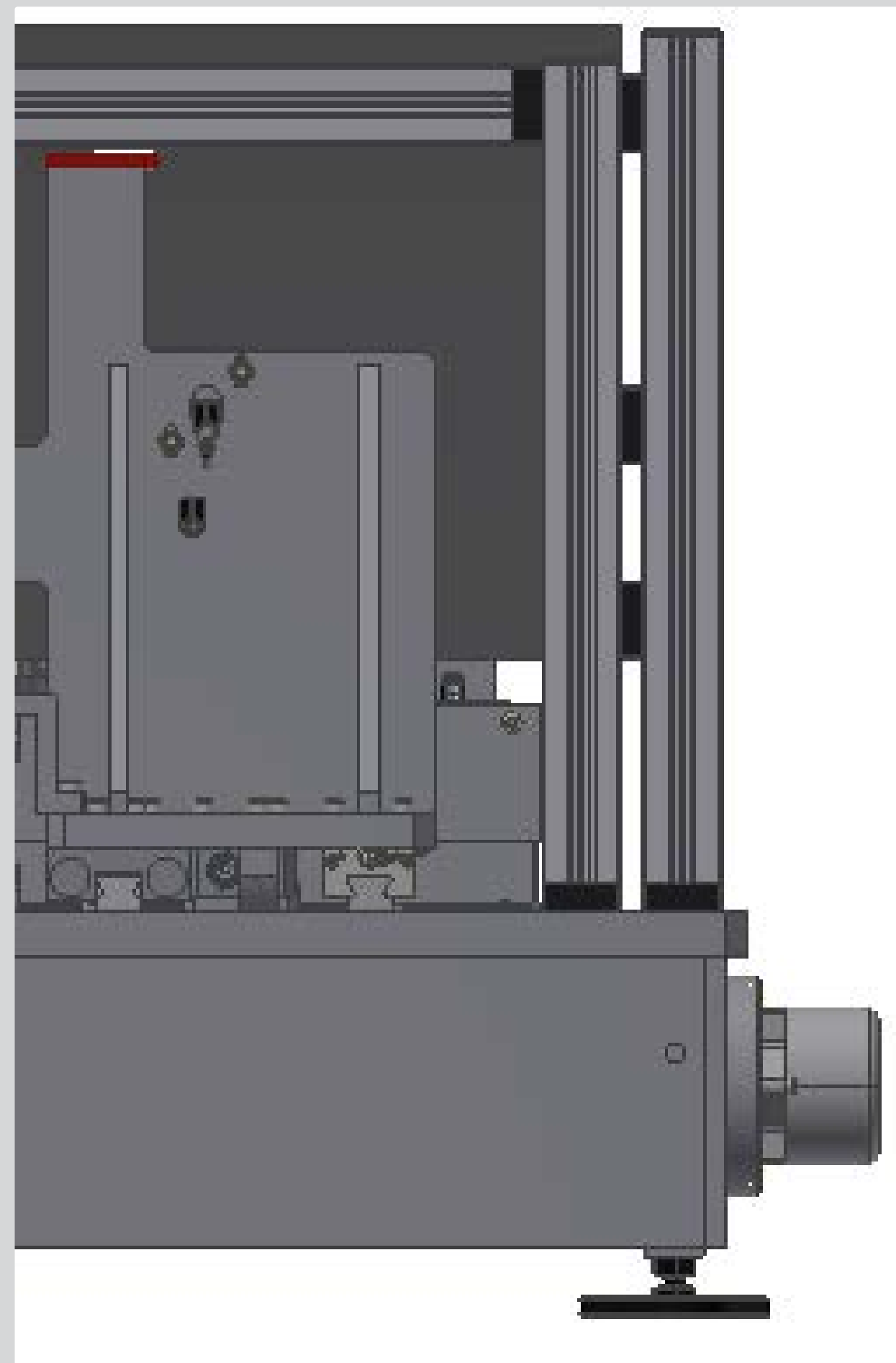
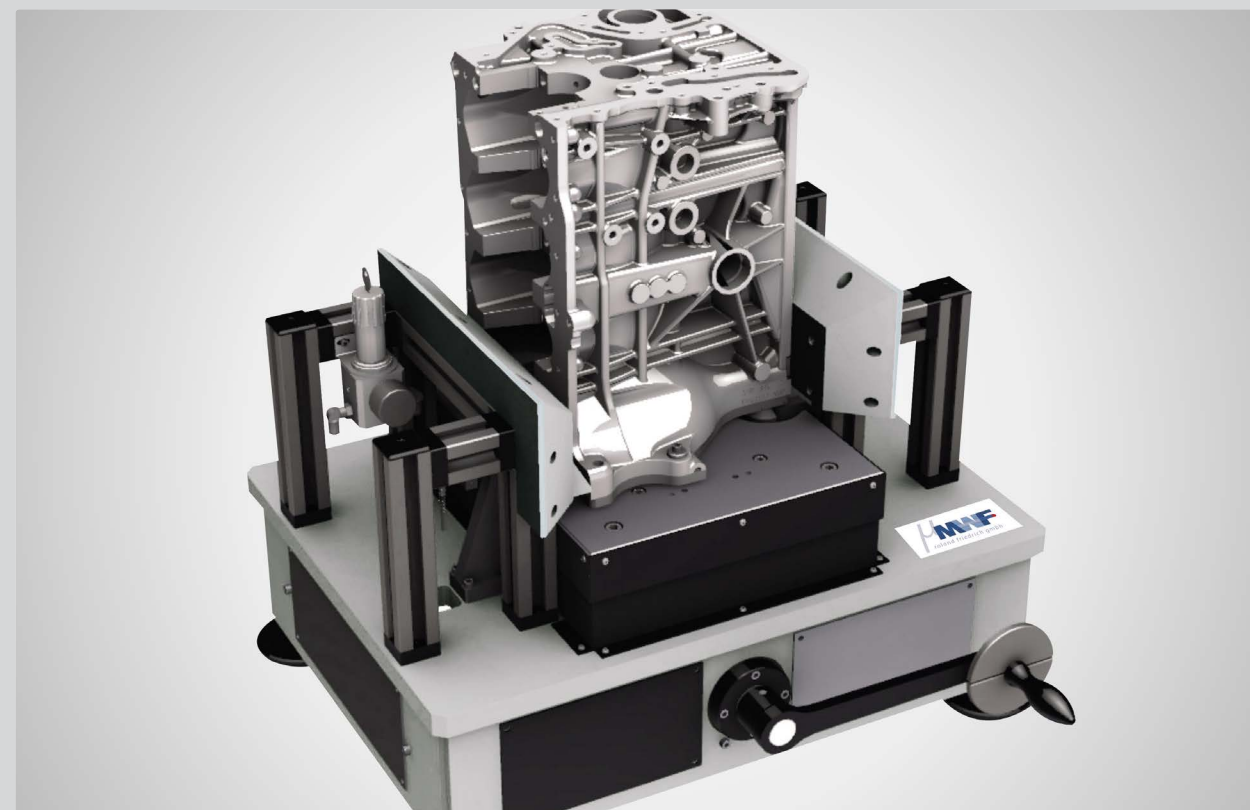
Measuring device for **cylinder crankcases**

This measuring device is used for measuring surfaces, distances and diameters.

- Superb flexibility for your measuring room
- The workpiece is clamped by means of a crank handle, which lowers the lifting platform complete with workpiece and advances the measuring slide mechanically



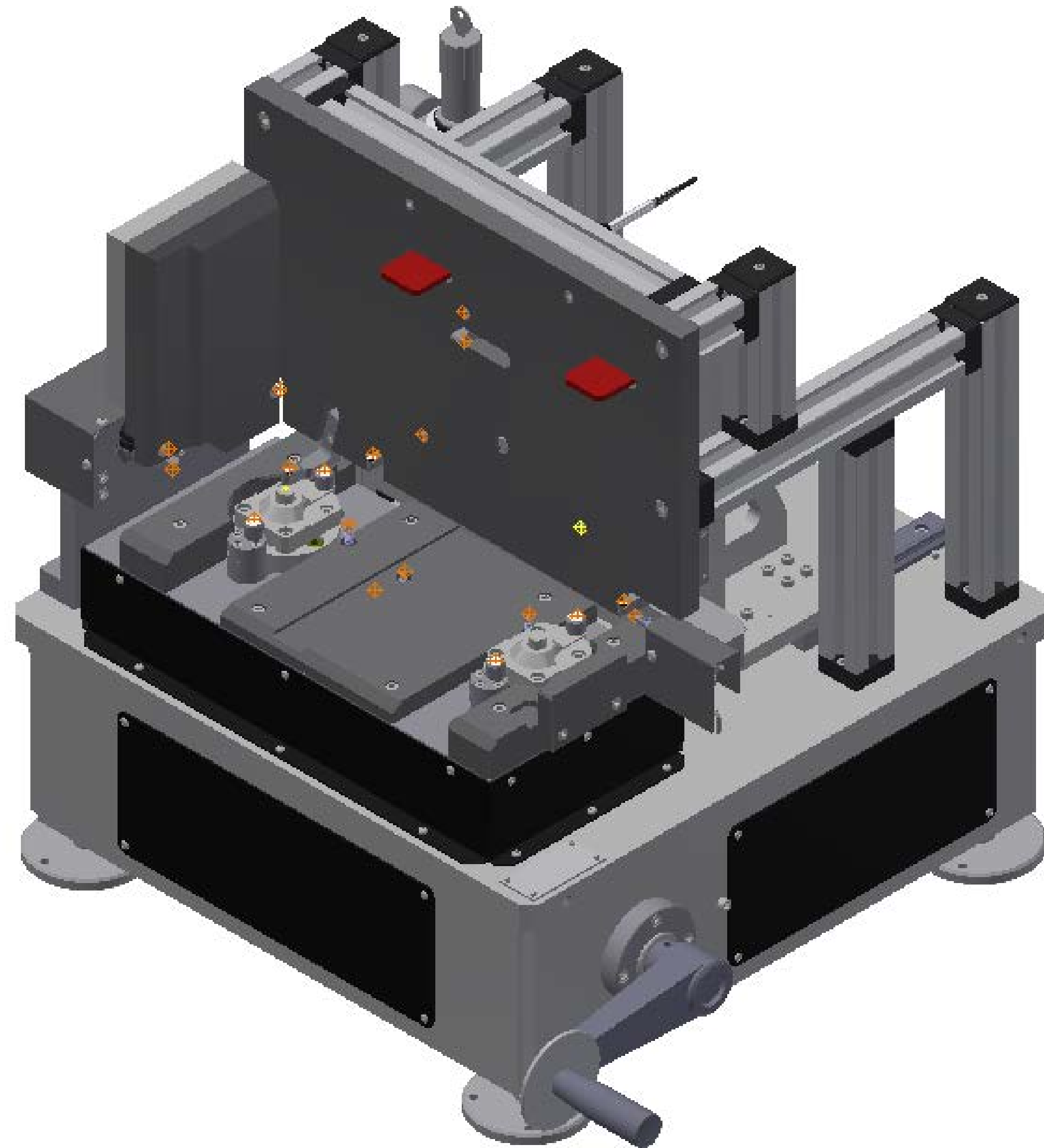
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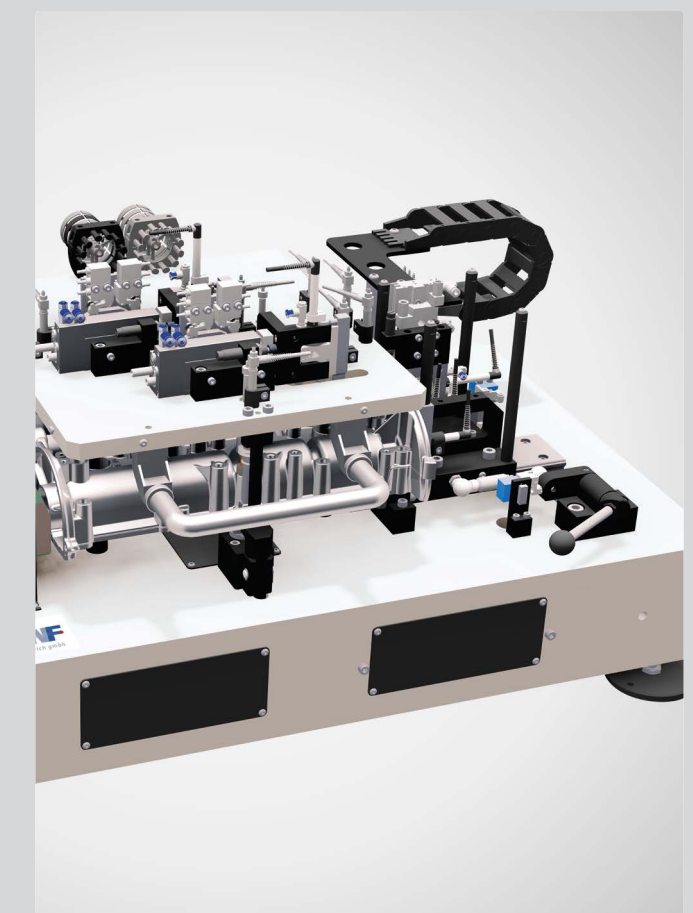
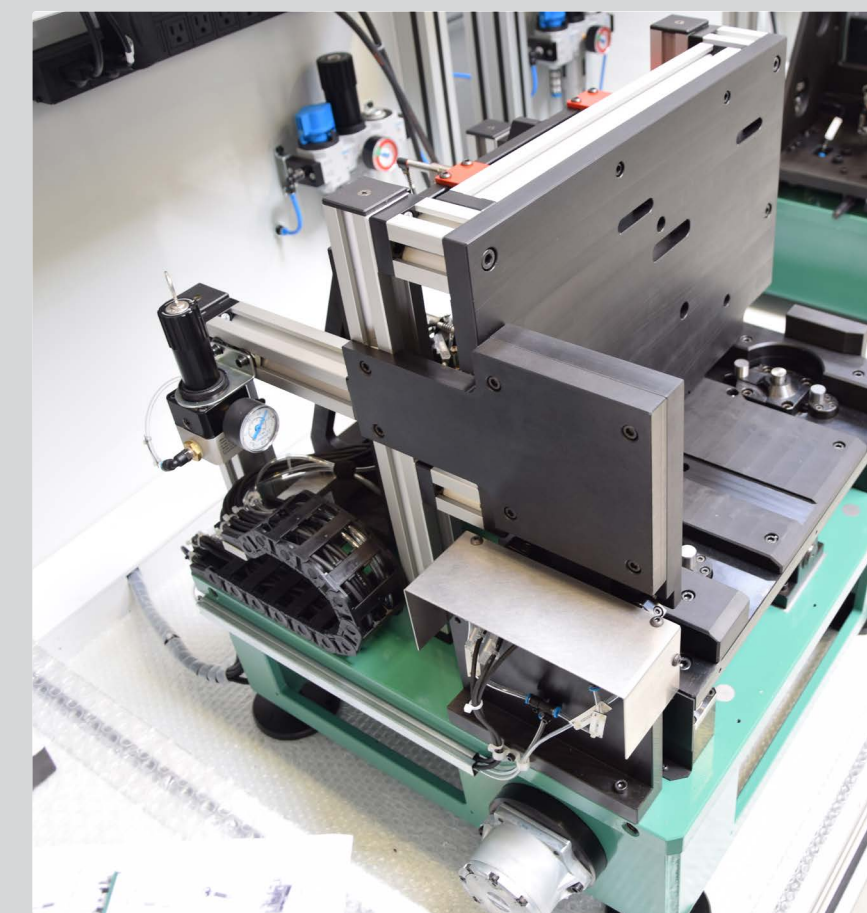
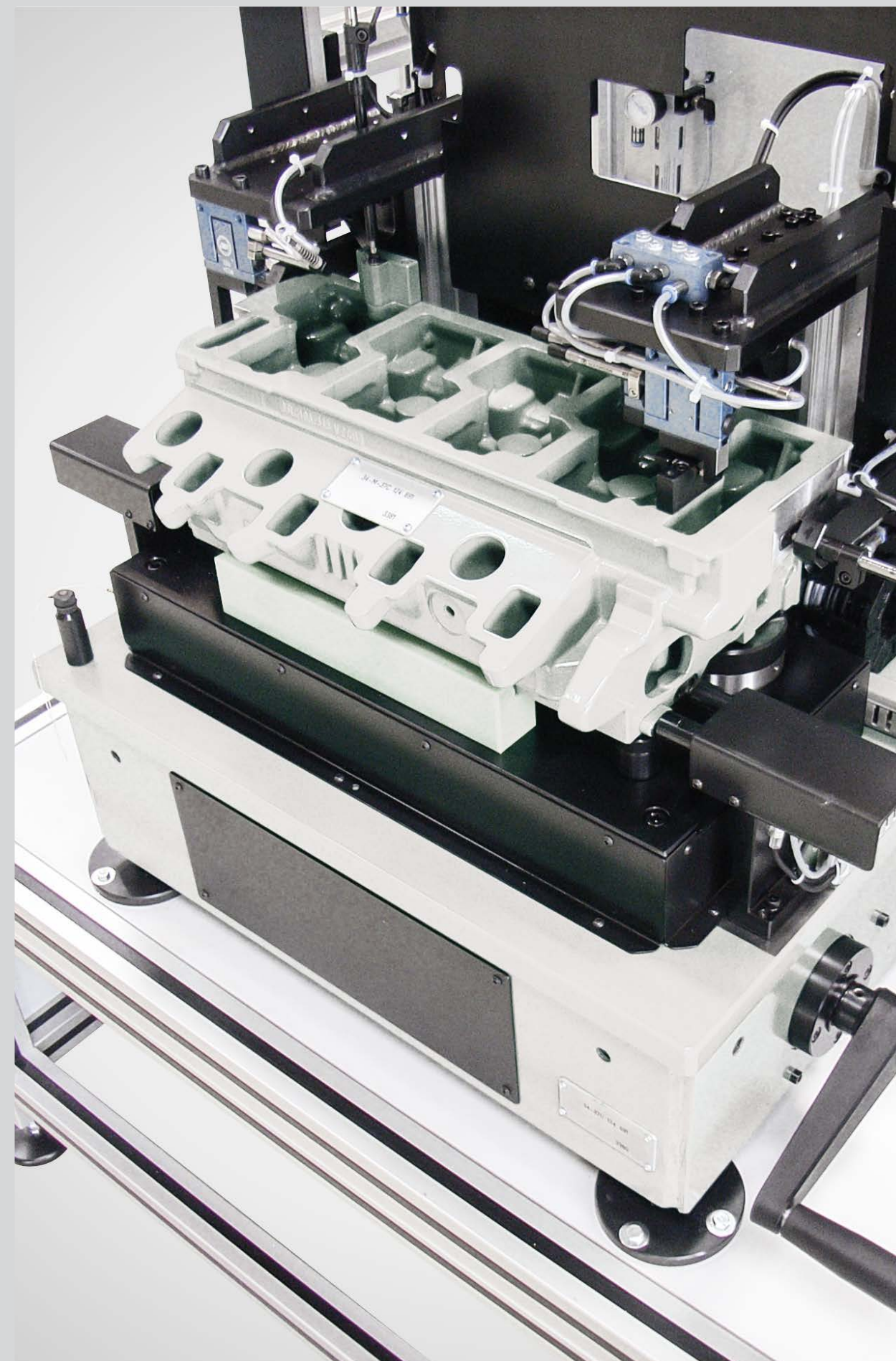
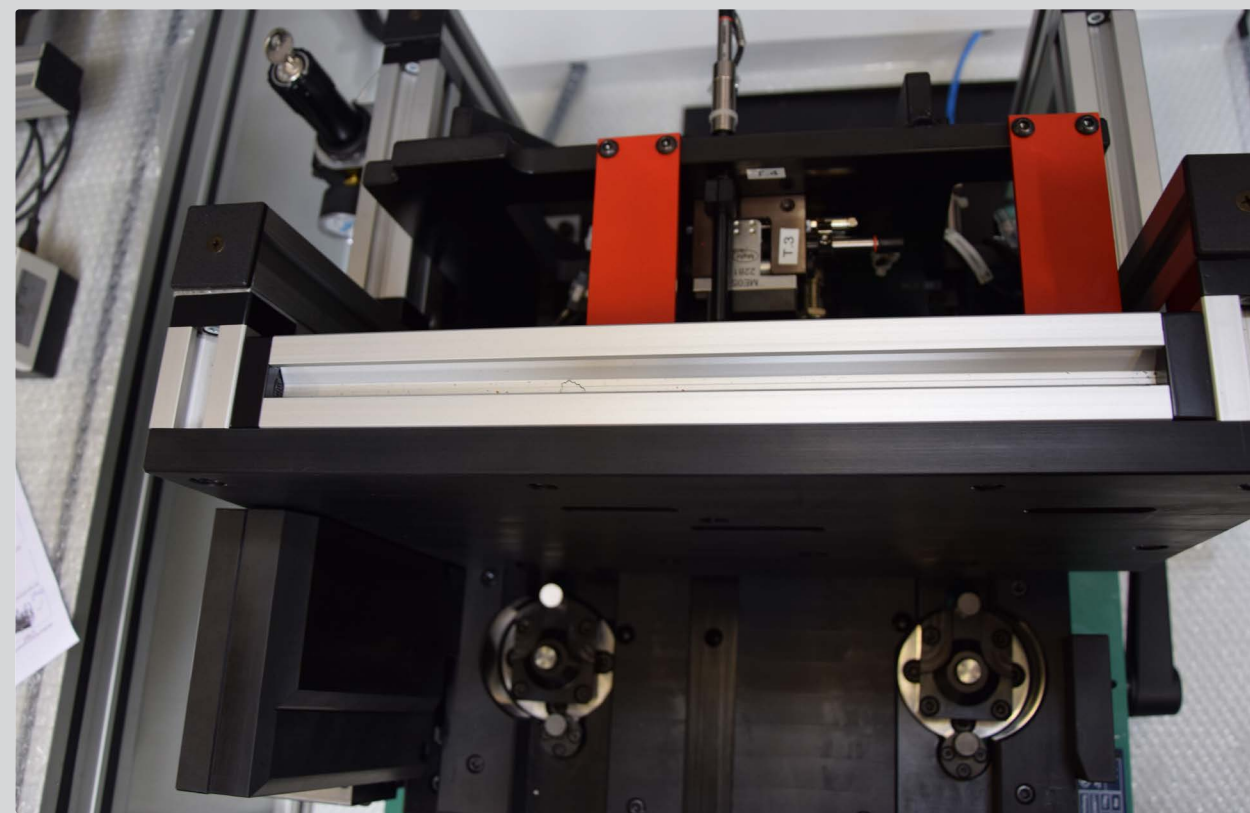
Measuring device for **cylinder heads**

This measuring device can be used to measure distances, heights and diameters on a cylinder head. The workpiece is placed on the support and lowered by means of a crank. At the same time, the measuring slide moves to the workpiece.

- Workpiece measurement with pneumatic probes
- Easy to operate



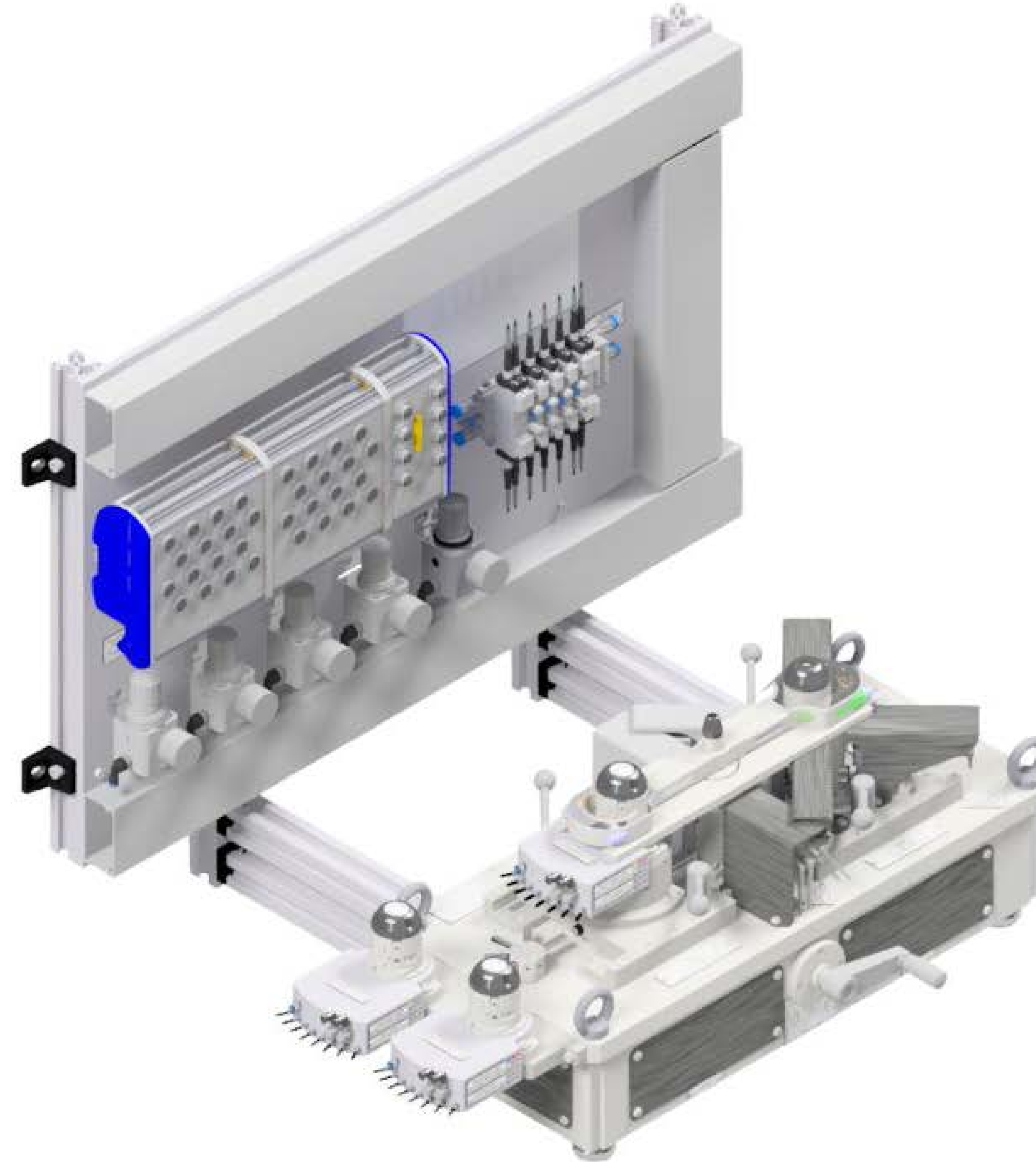
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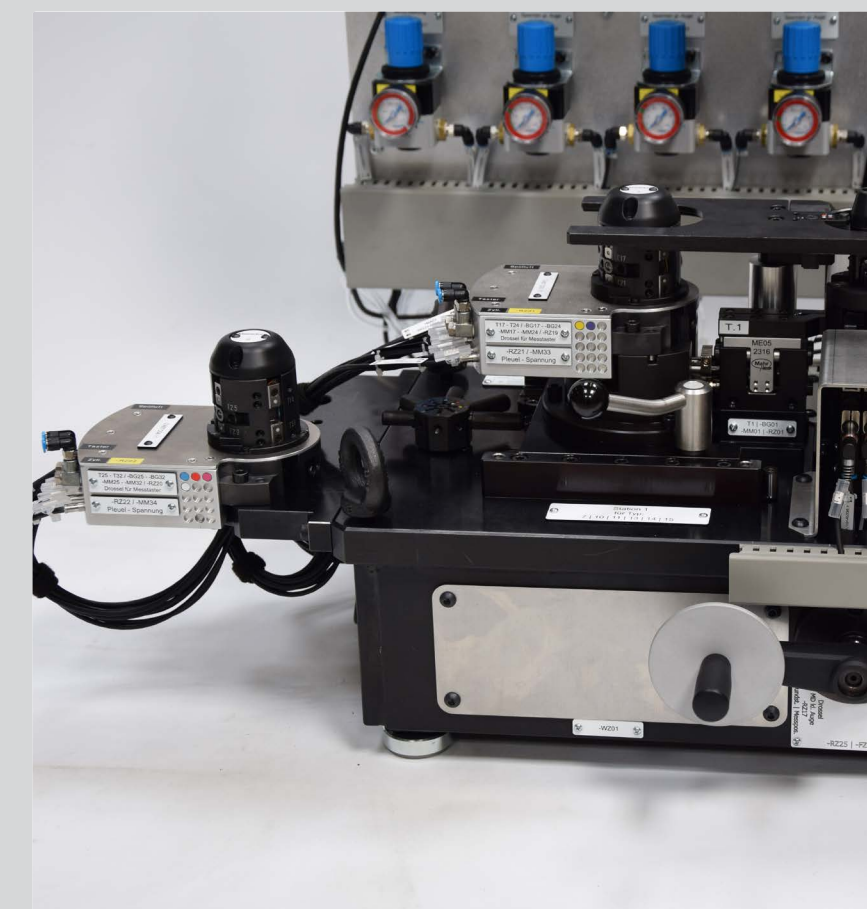
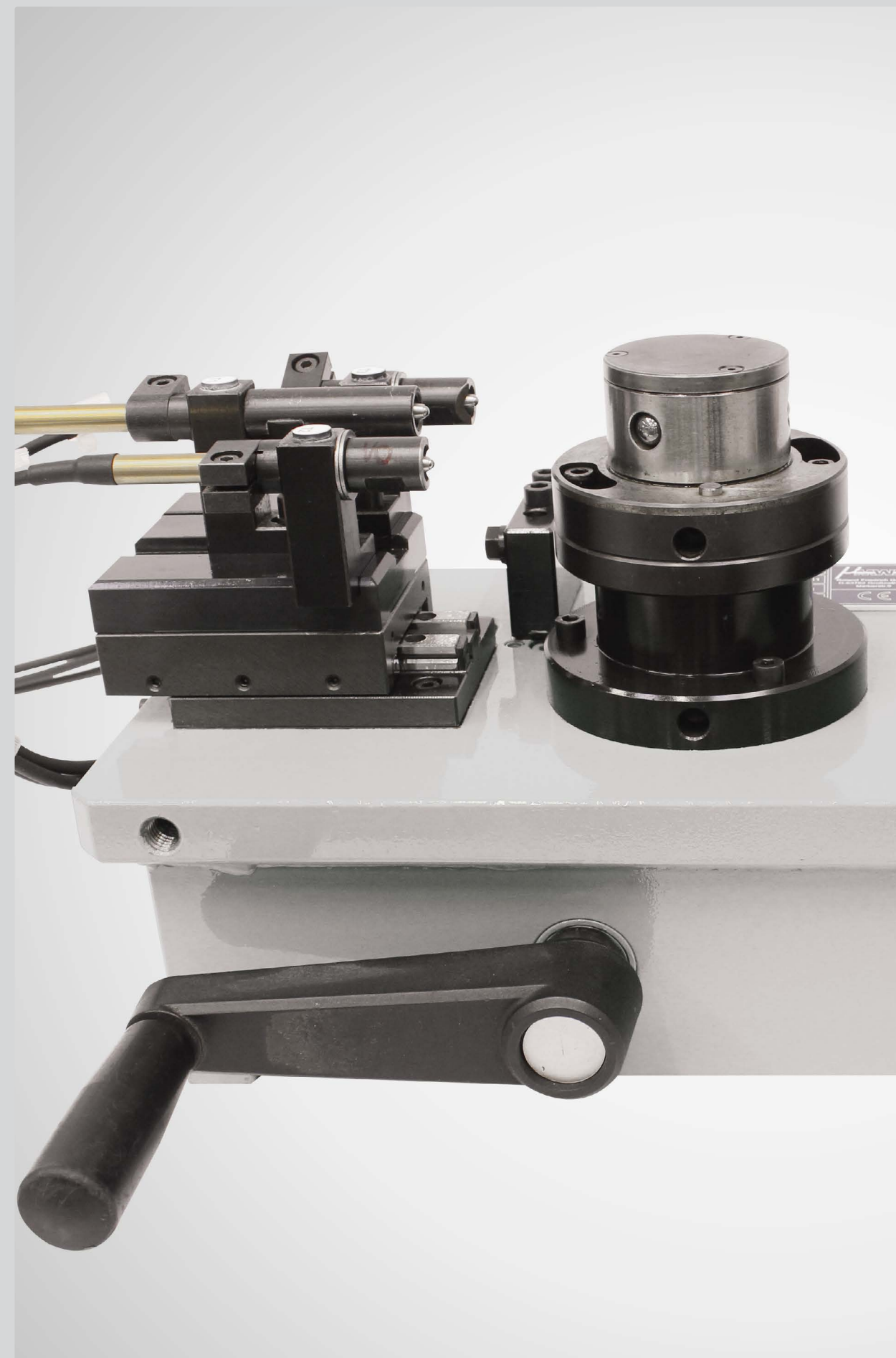
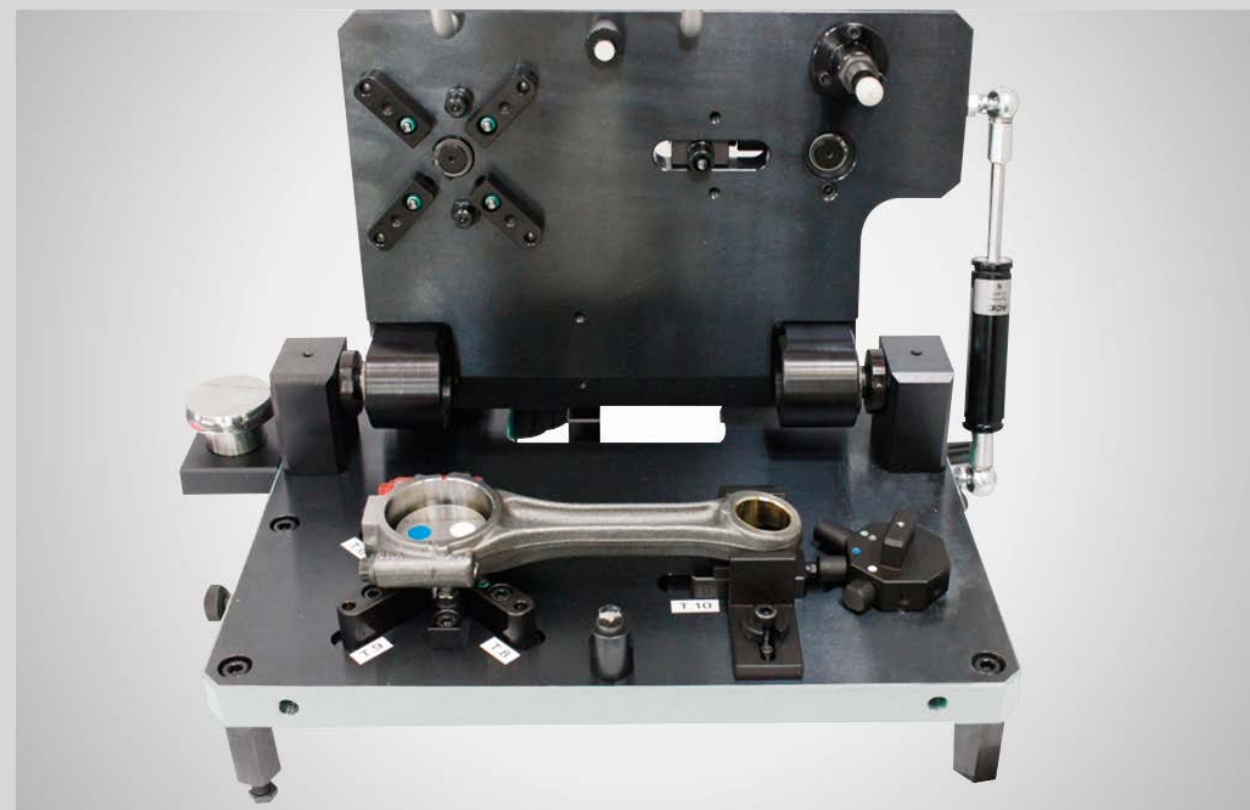
Measuring device for **connecting rods**

This measuring device is used for measuring diameters, distances and rotations on connecting rods. Workpieces are placed on centering pins for measurement. The bore diameters are measured in multiple measuring planes. The measuring elements are pneumatically controlled.

- Centering pins include the measuring probe
- Workpieces clamped by turning the crank



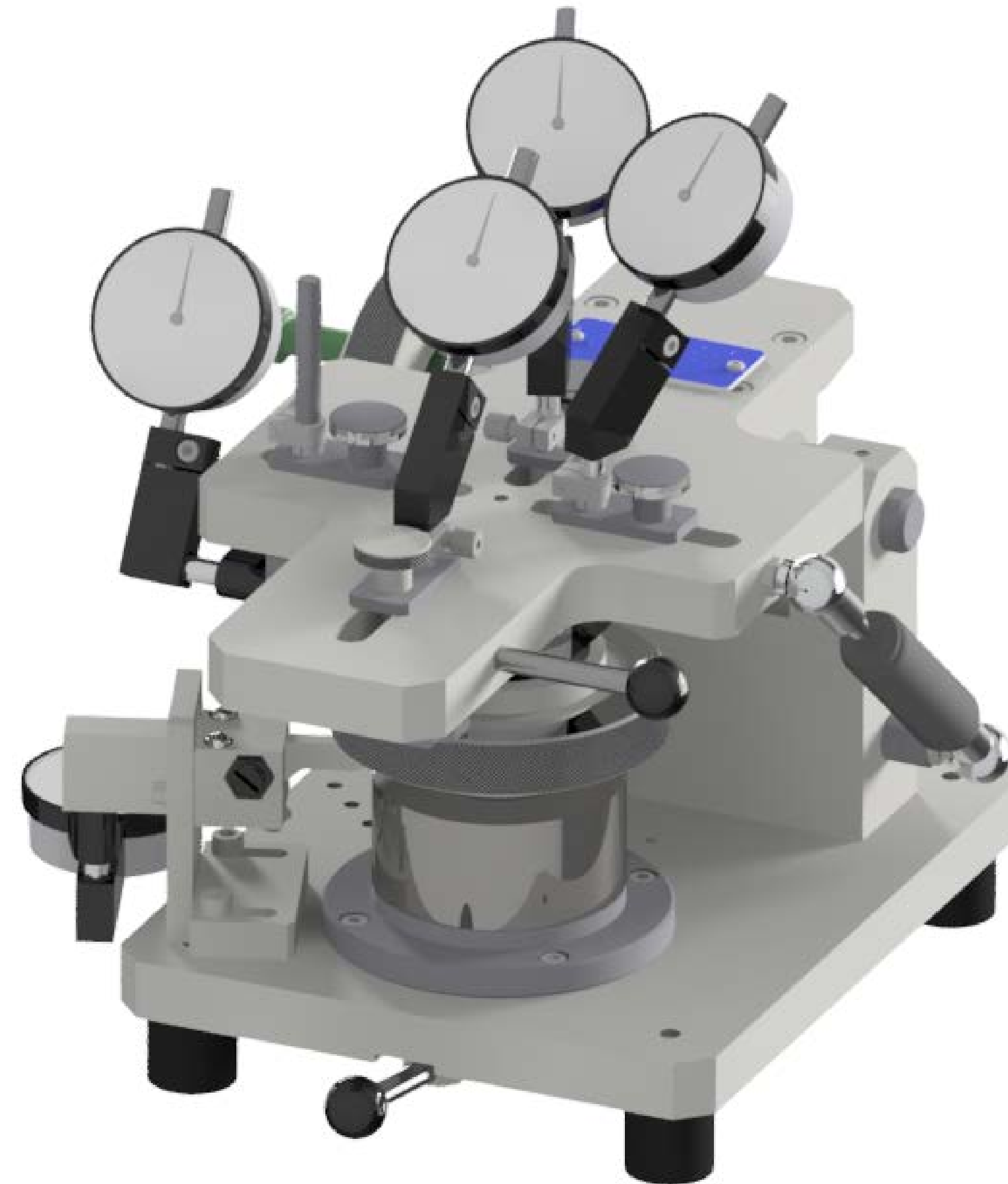
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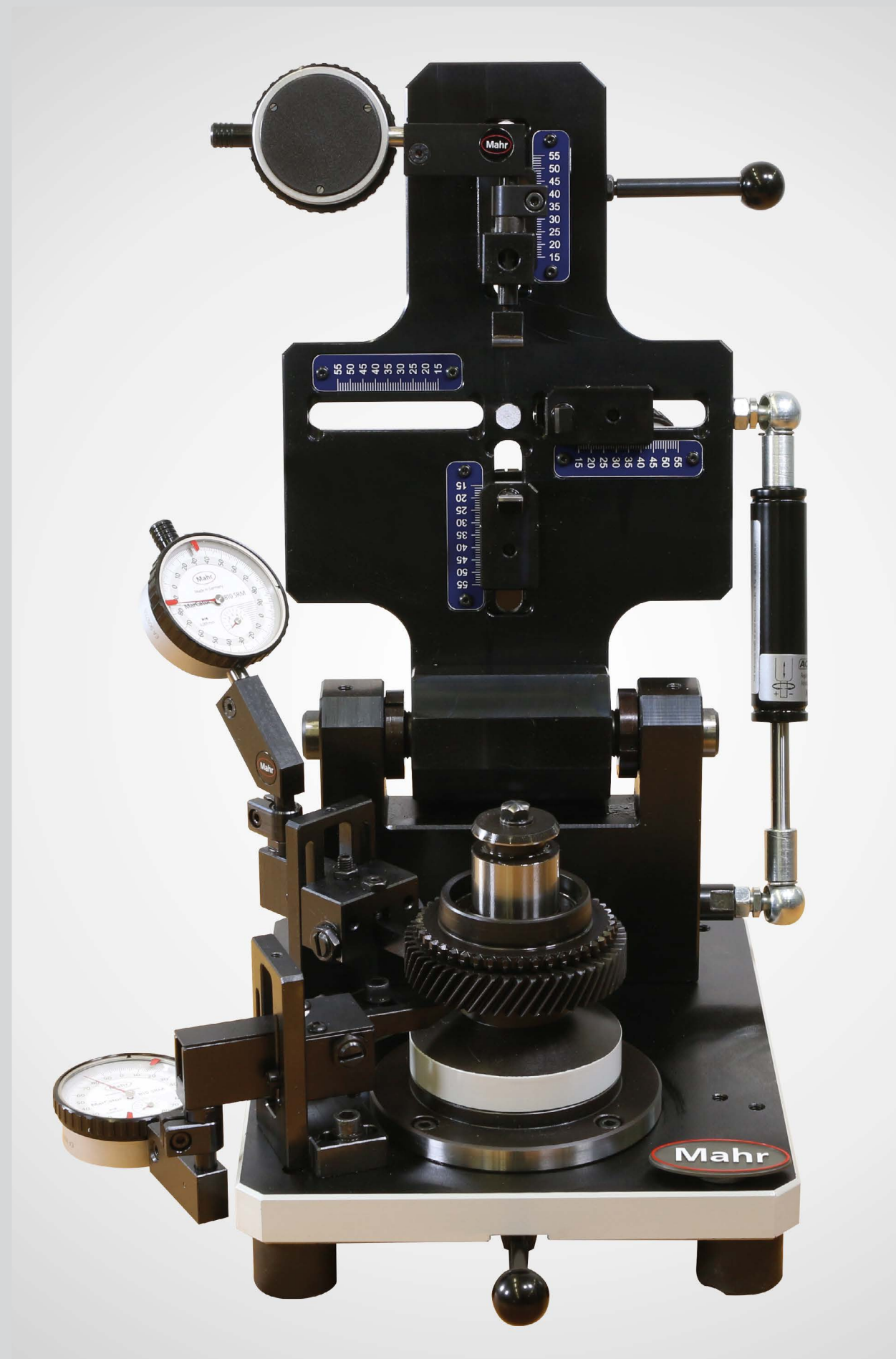
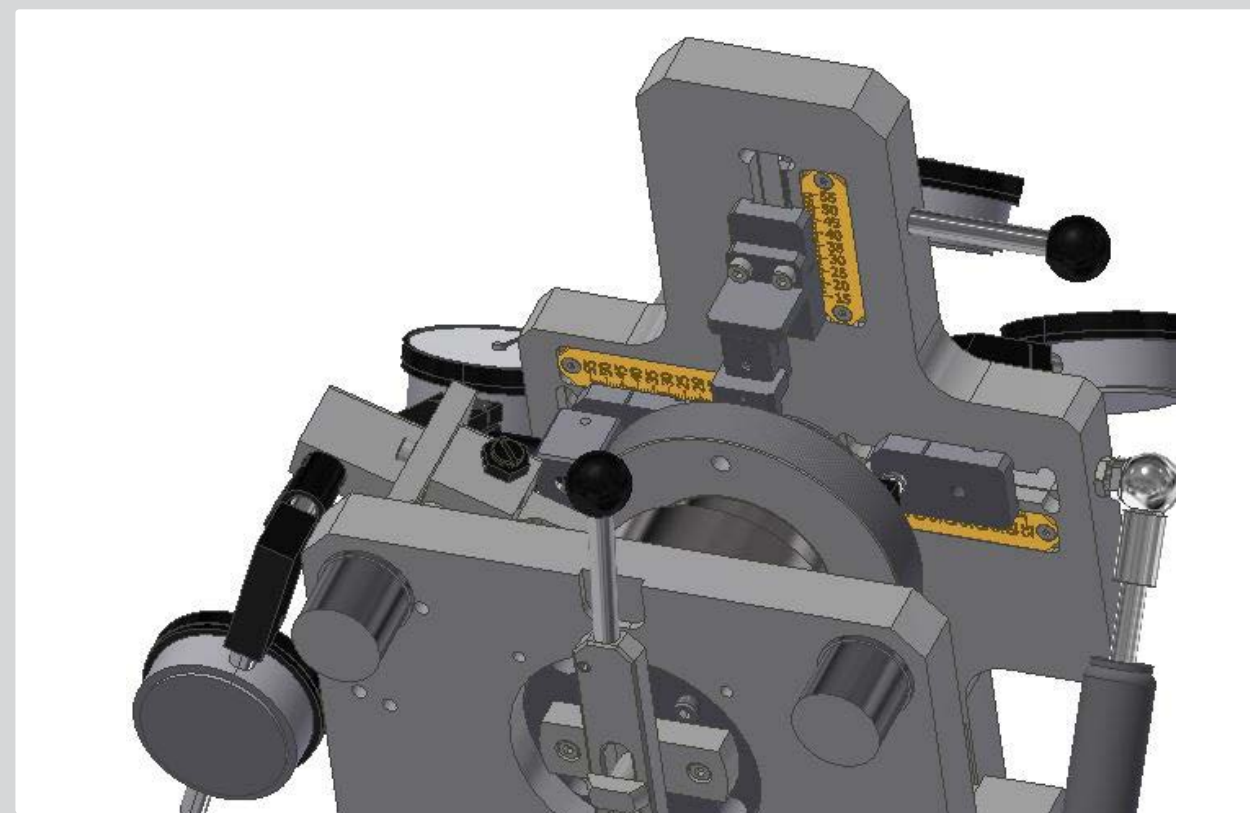
Folding gage for **gears**

Can be used to measure axial and radial run-outs and height dimensions. The ball mandrels can be permanently mounted or designed as an exchangeable part with a bayonet disk.

- Folding device is used mainly for measurements on gears
- Maximum number of measuring points: seven features



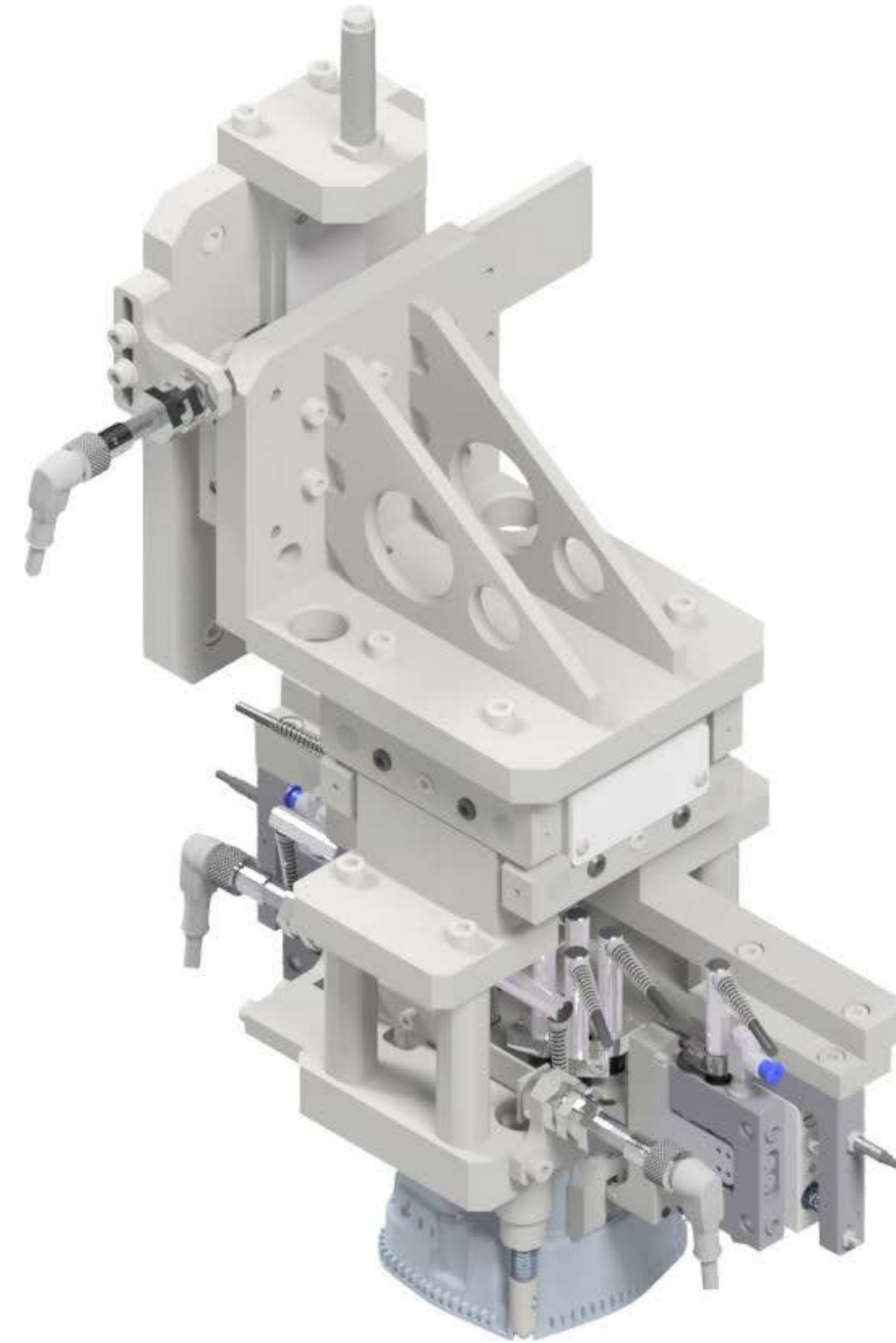
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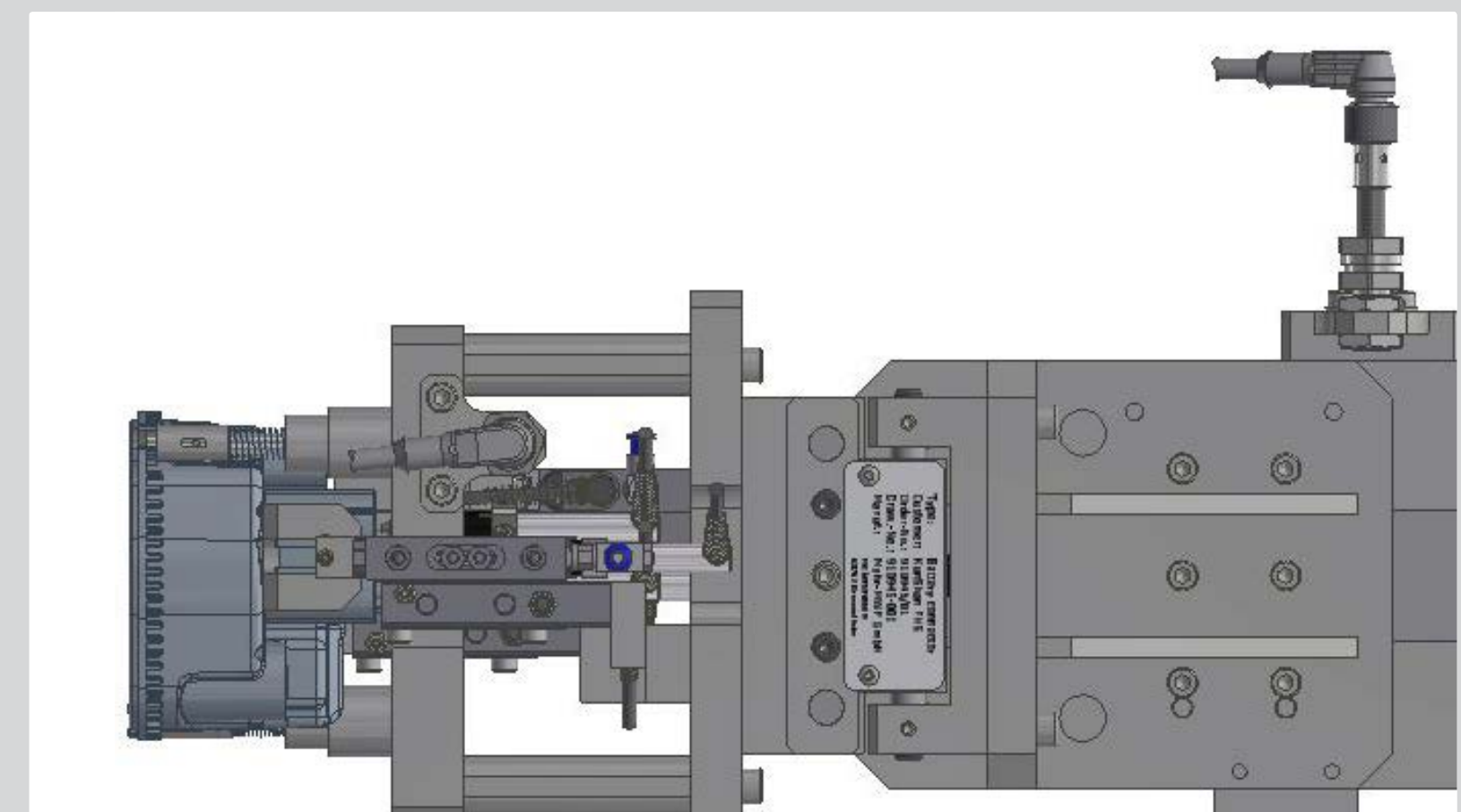
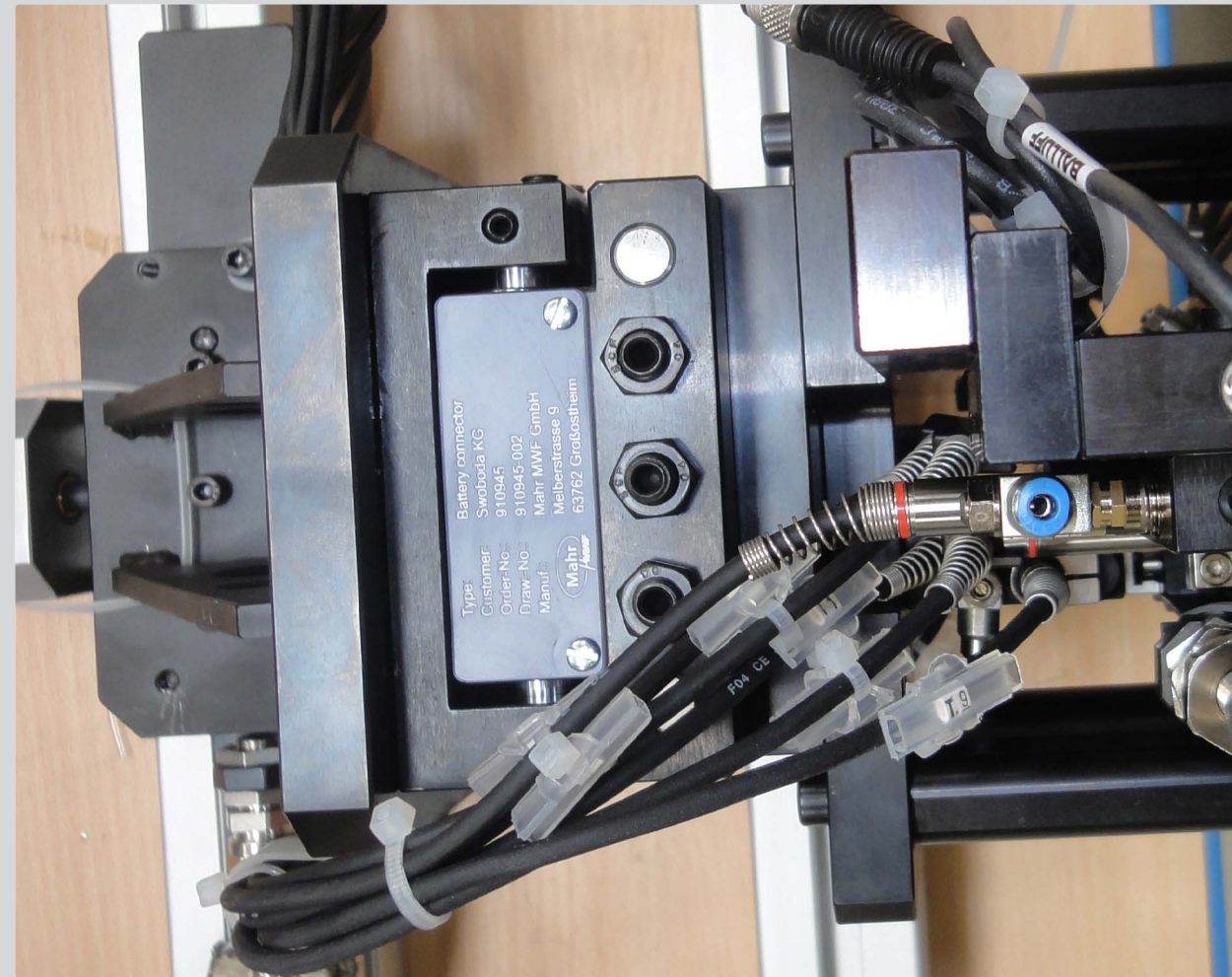
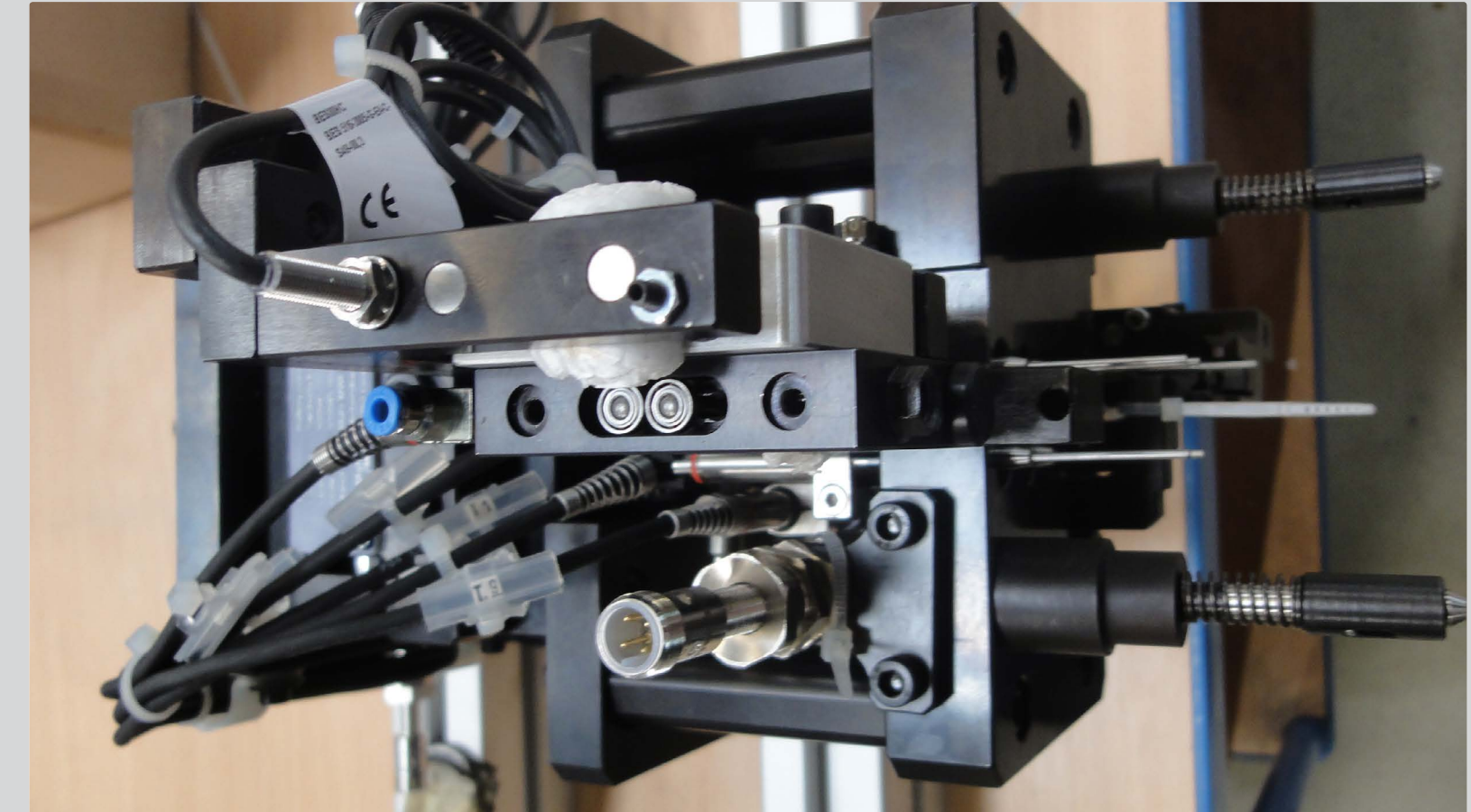
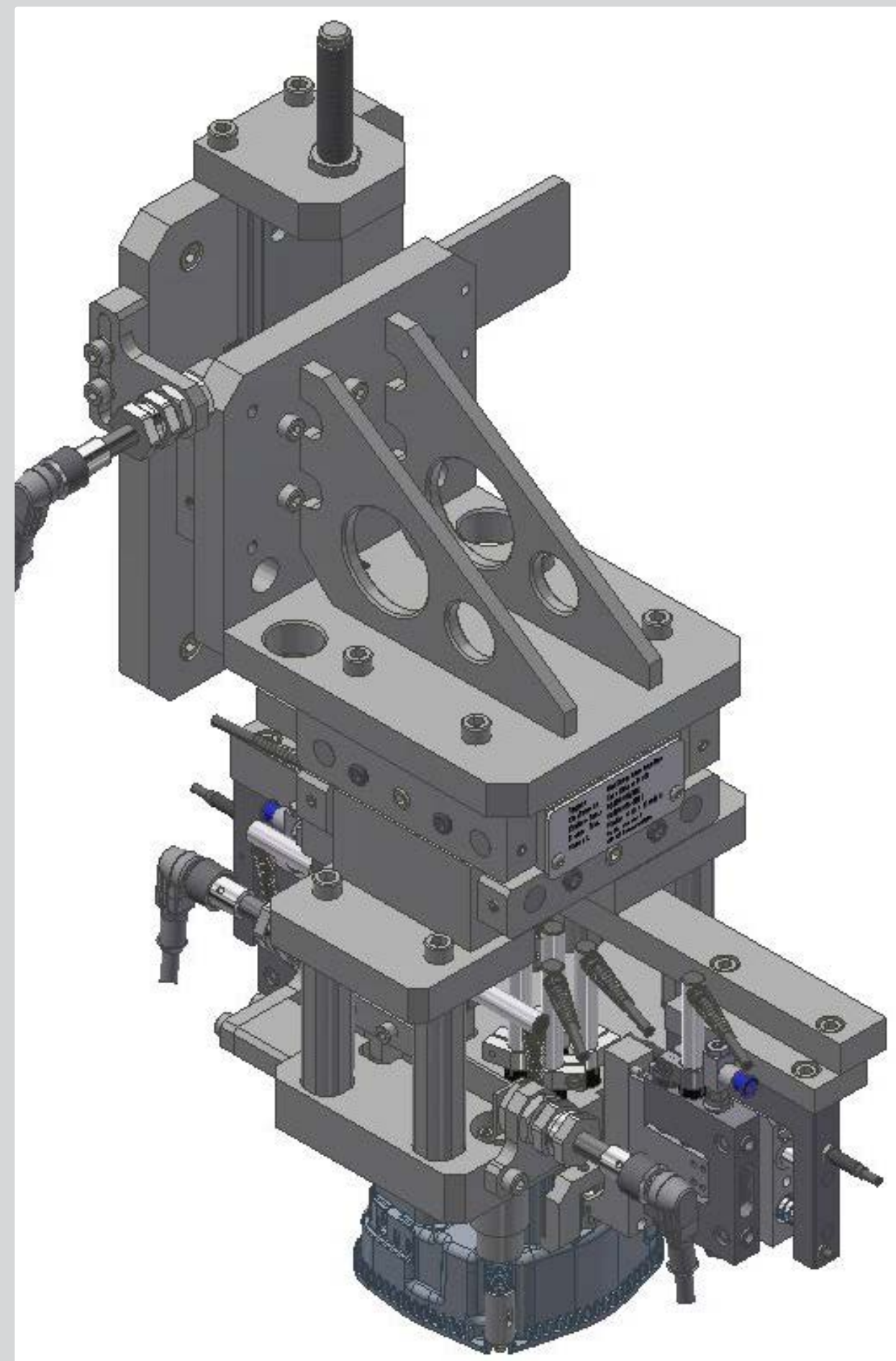
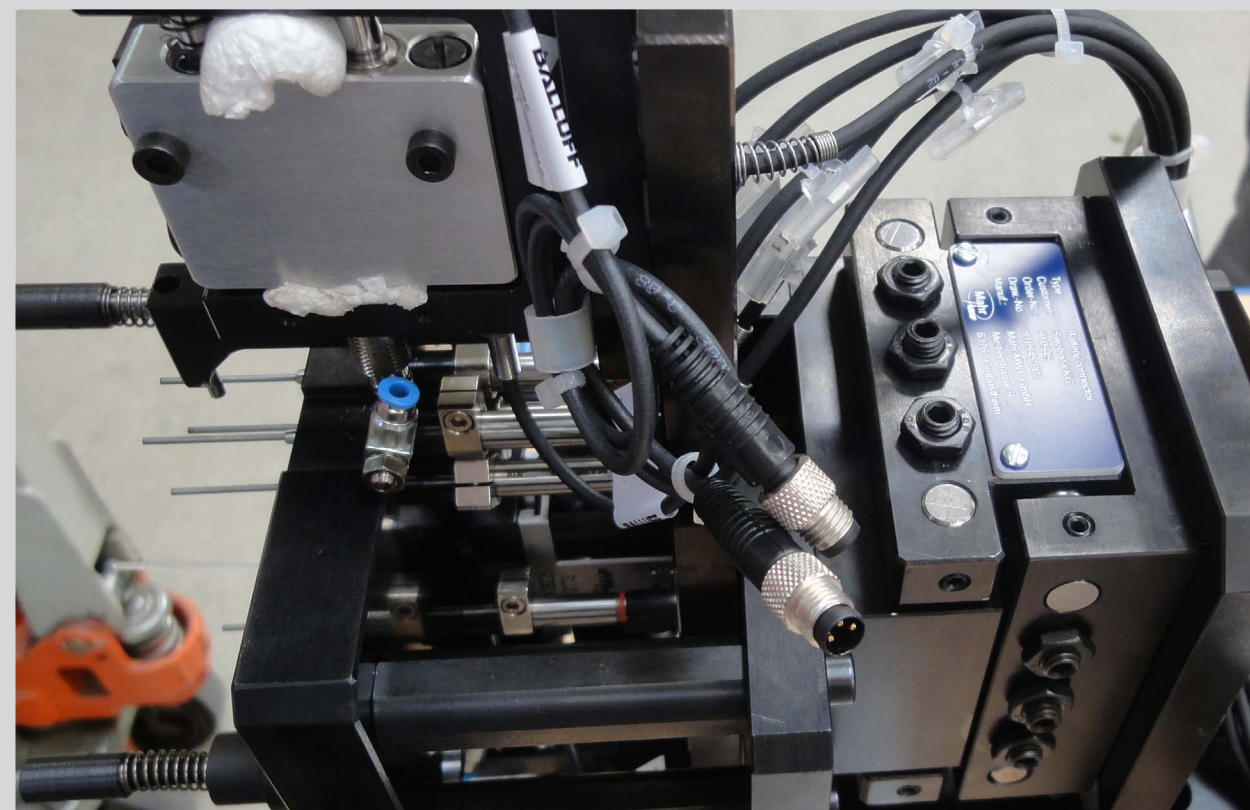
Measuring device for **battery connectors**

This measuring device can measure multiple features of a battery connector simultaneously. Its compact design provides versatile and flexible connection options. The measuring elements are pneumatically controlled.

- Flexible connection options
- Measuring head can be started and stopped pneumatically



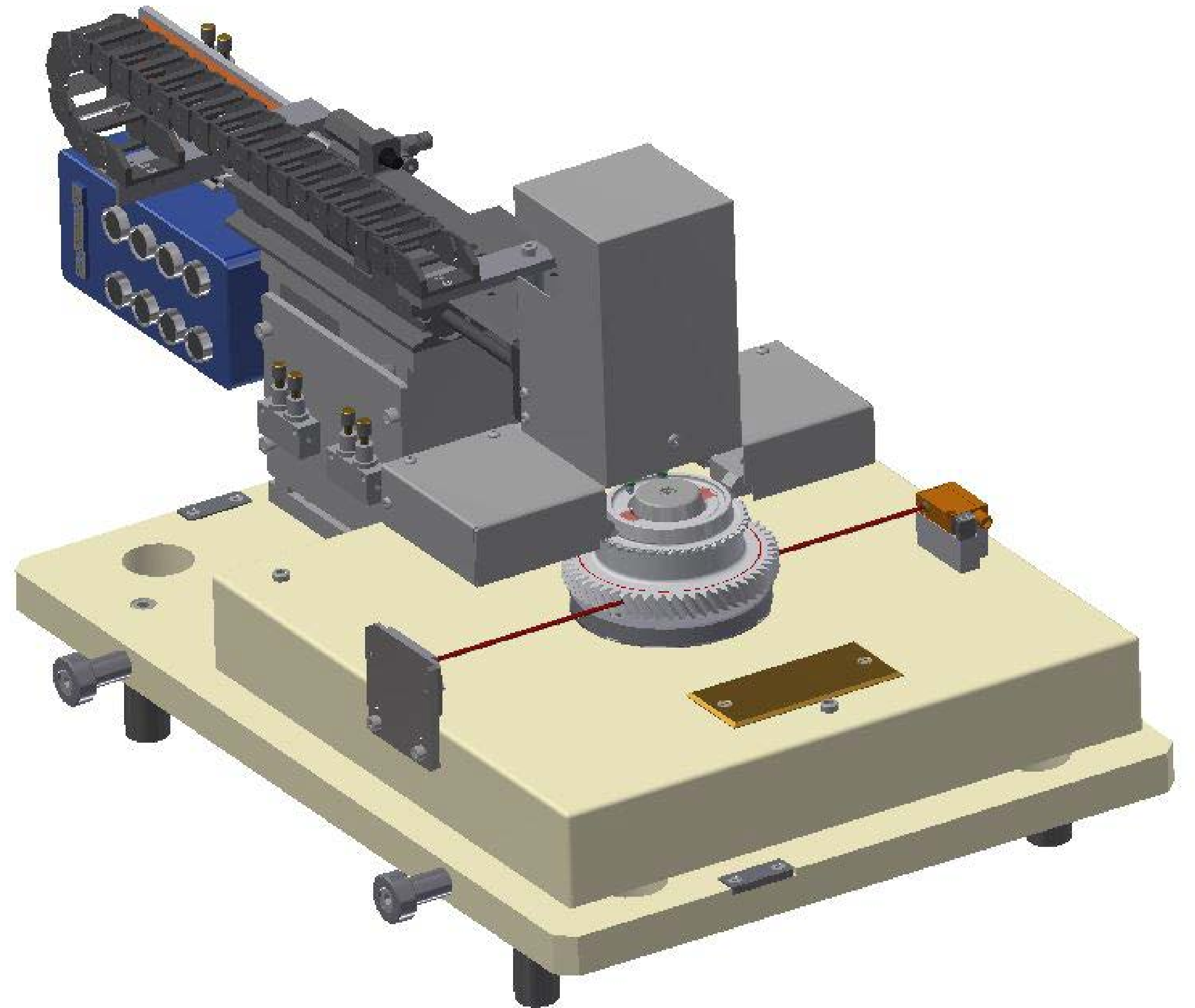
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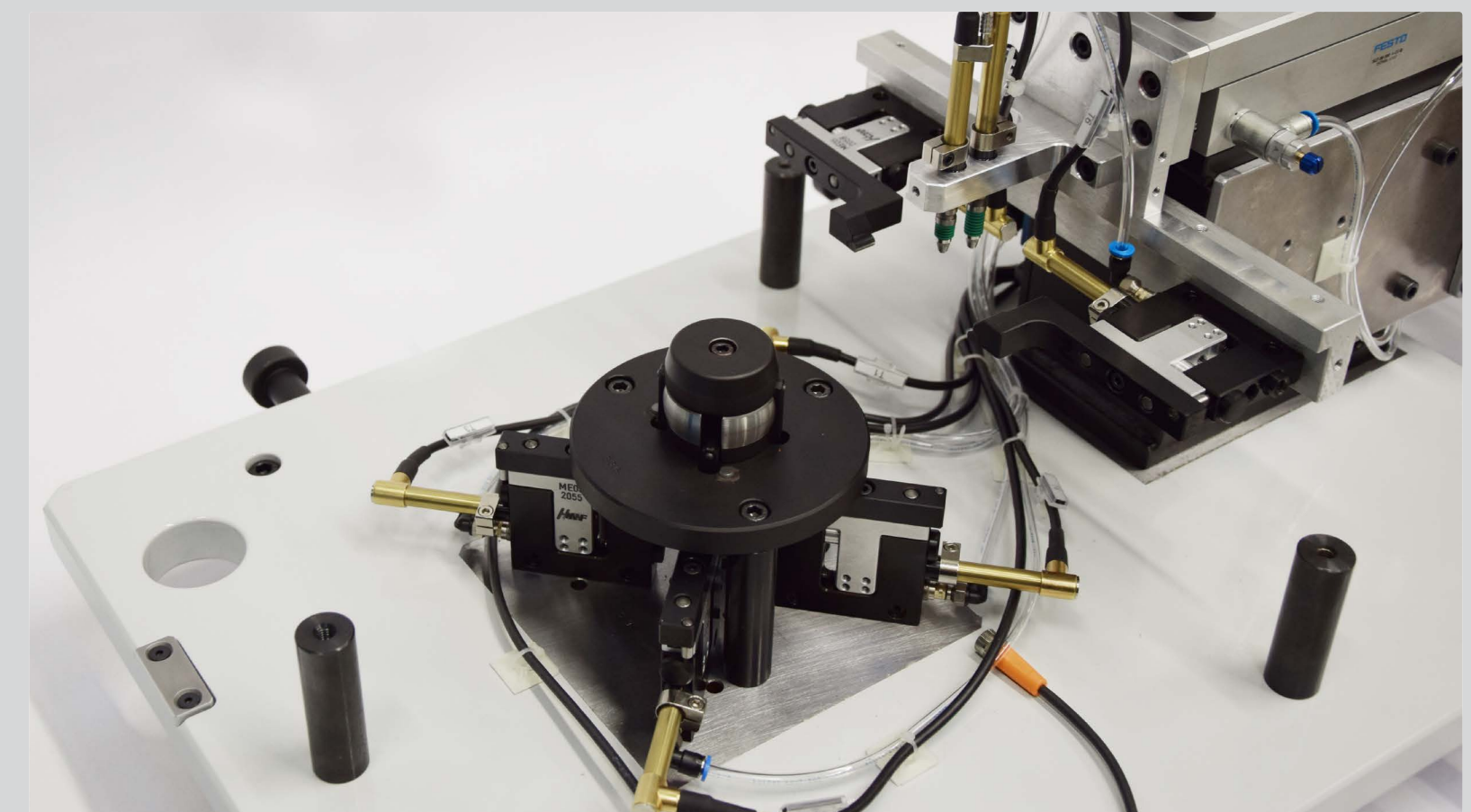
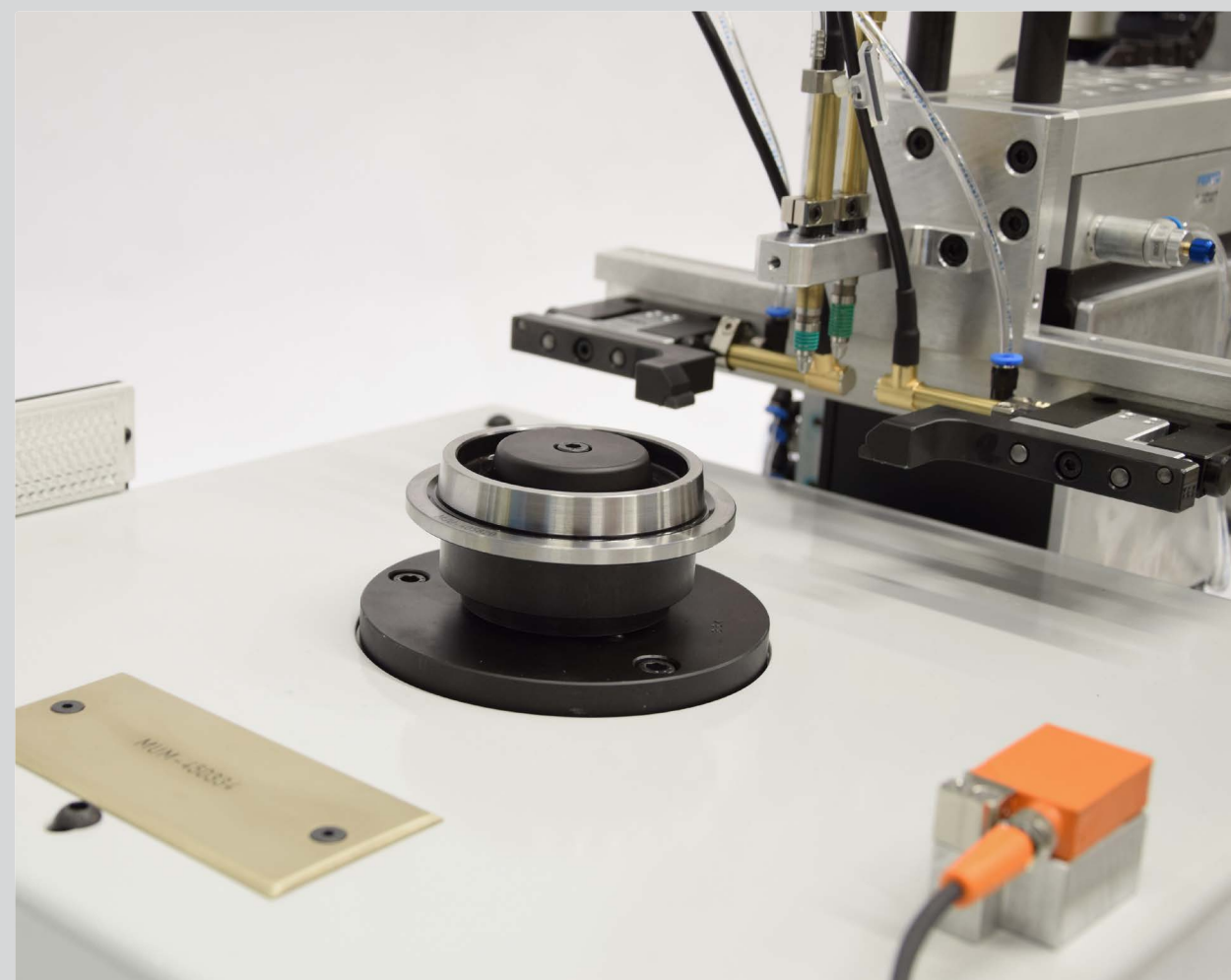
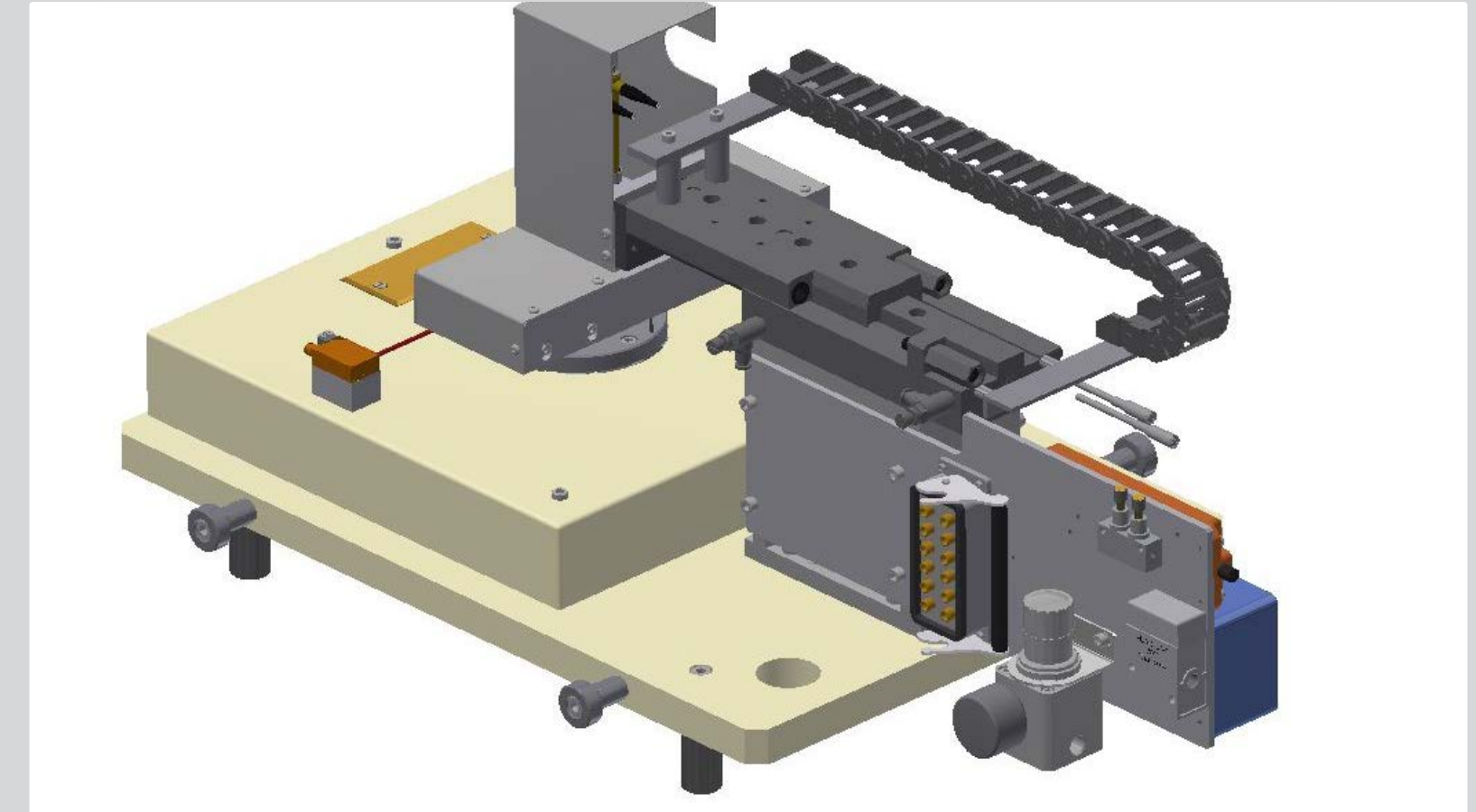
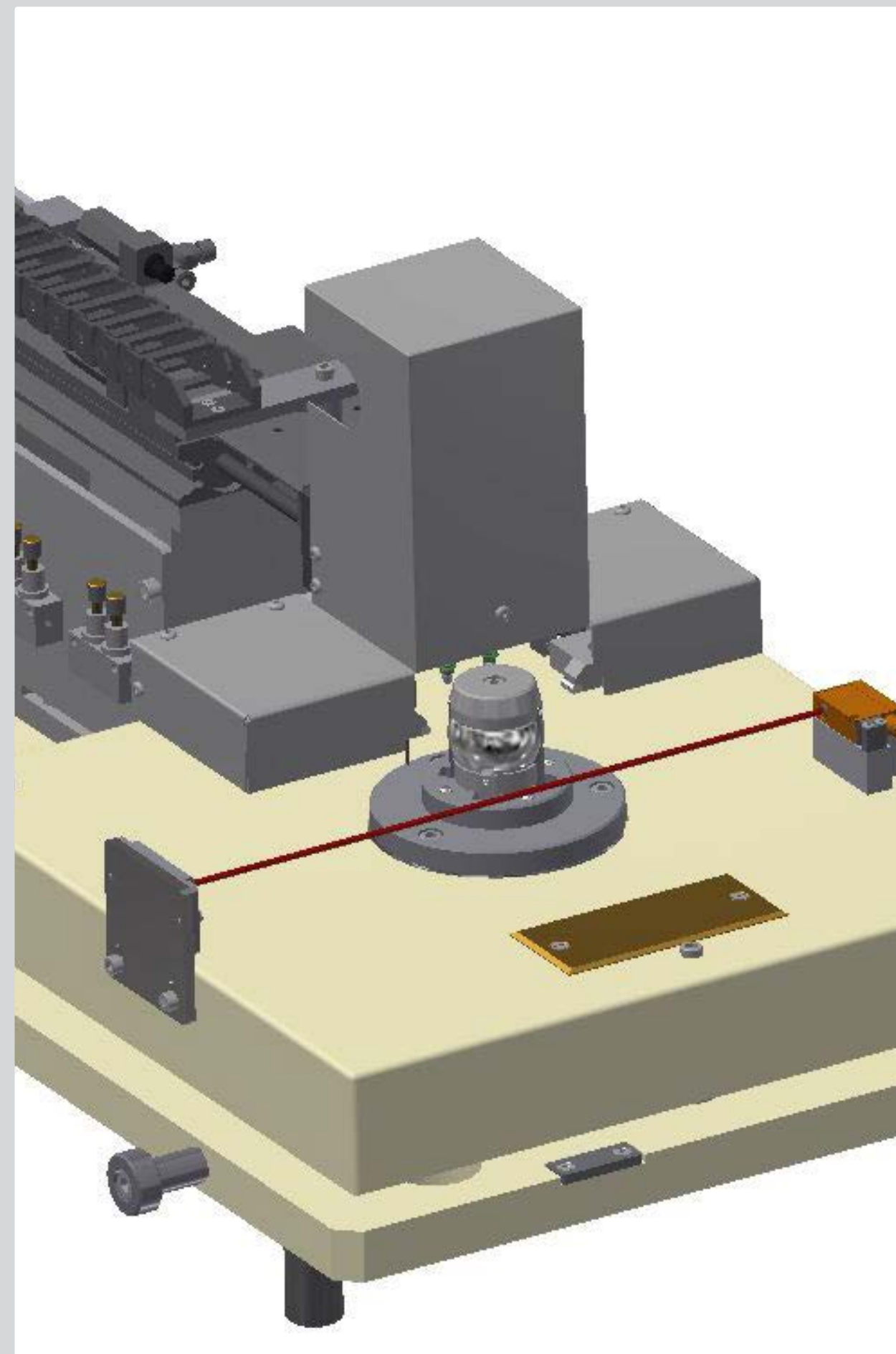
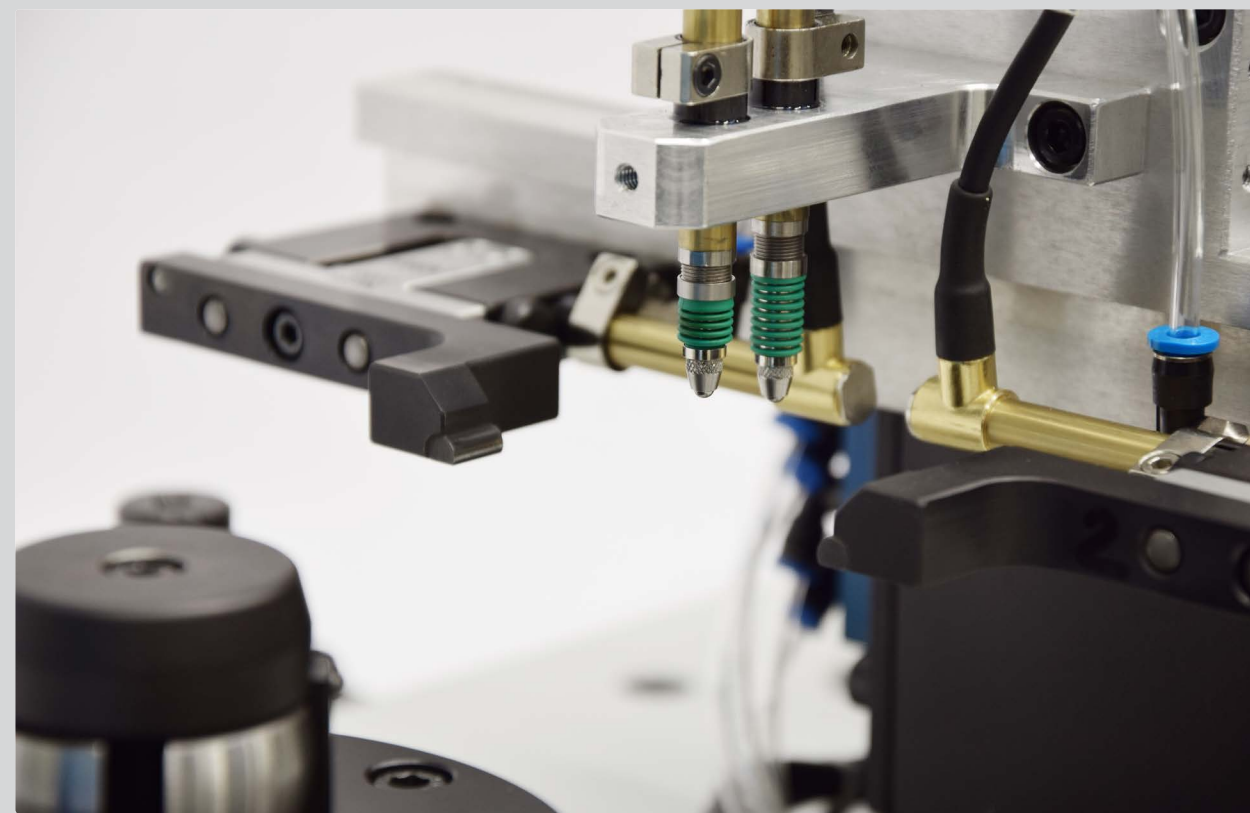
Measuring device for **gears**

This measuring device is used for measuring inside and outside diameters as well as heights and radial run-outs. The workpiece is placed in the device, centered, and then measured.

- Superb flexibility
- Once a suitable workpiece has been inserted, the measuring head moves into position for data acquisition



Gallery



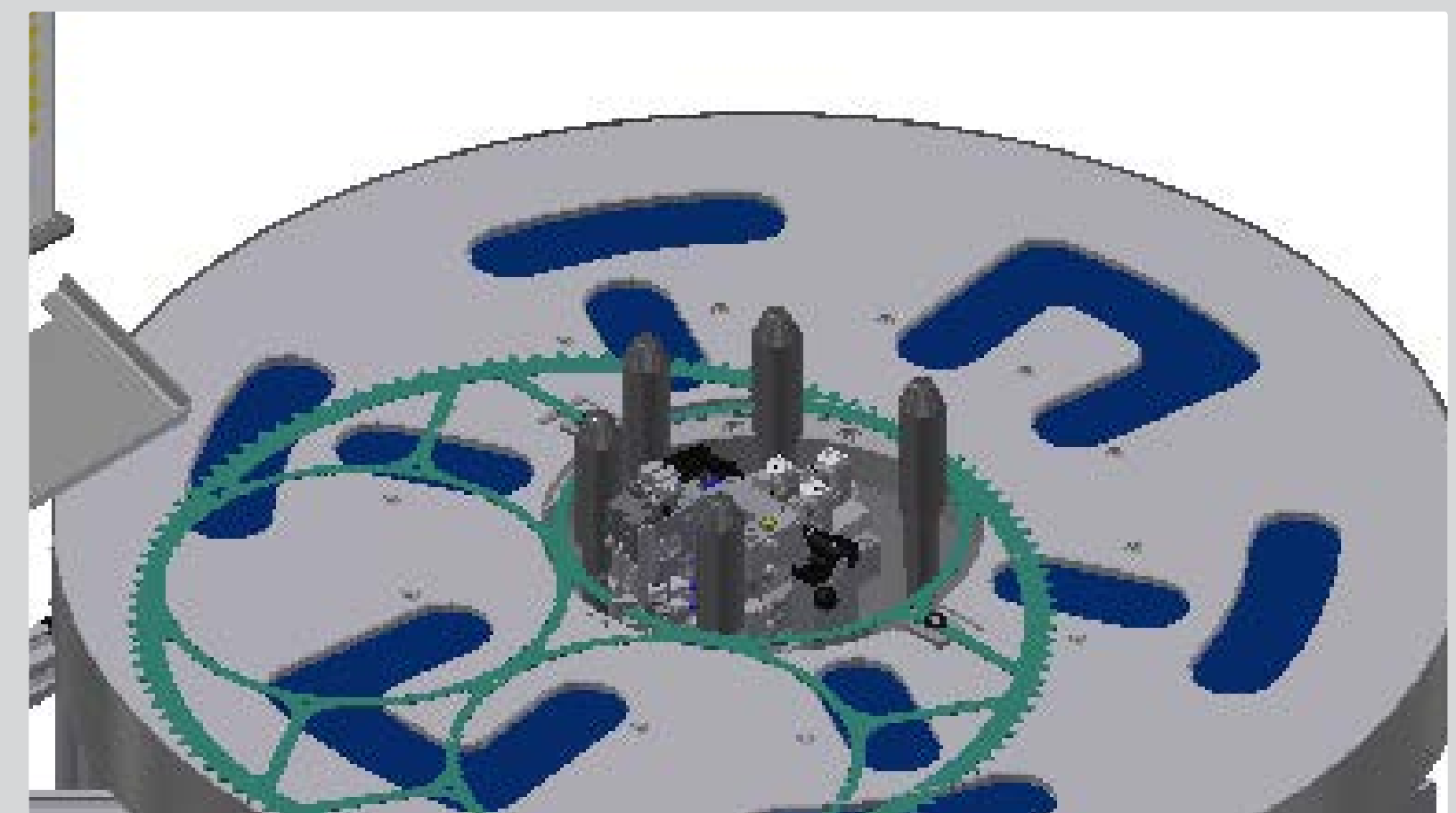
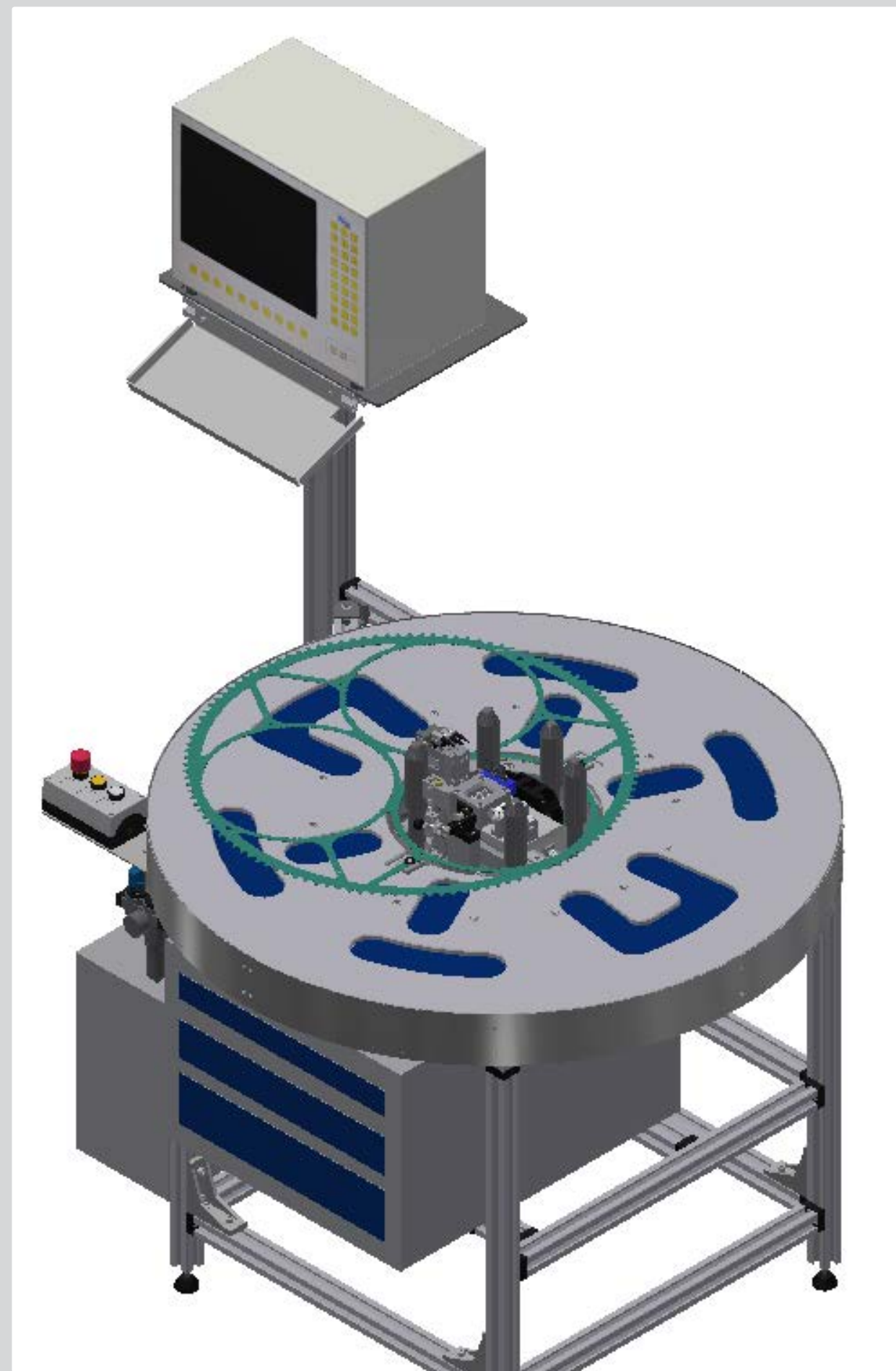
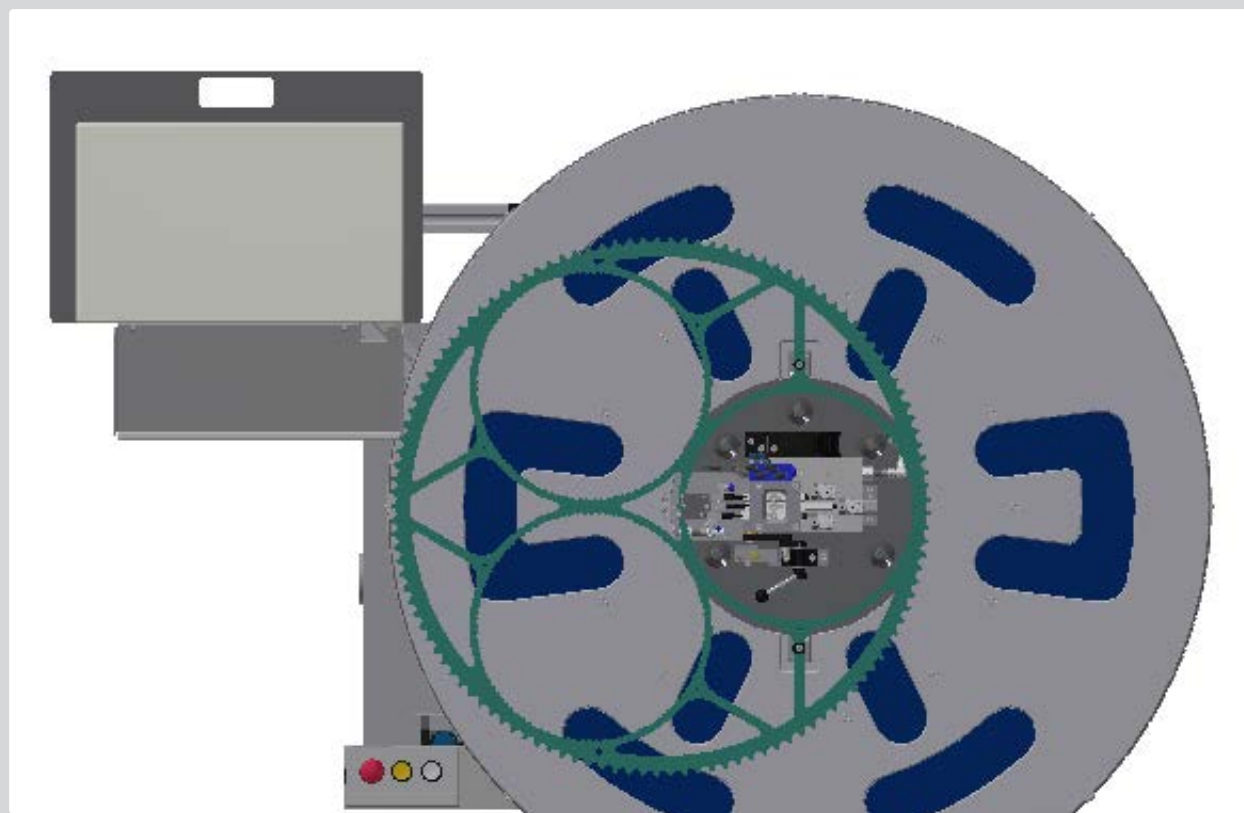
Semi-automatic measuring device for **rotor disks**

This measuring device is used for measuring inside and outside diameters as well as heights and radial run-outs on a range of different workpieces. The workpiece is placed on the device for measurement.

- Measurement takes place semi-automatically, with pneumatic measuring elements
- For dynamic measurements, the workpiece is rotated about the axis of the bore



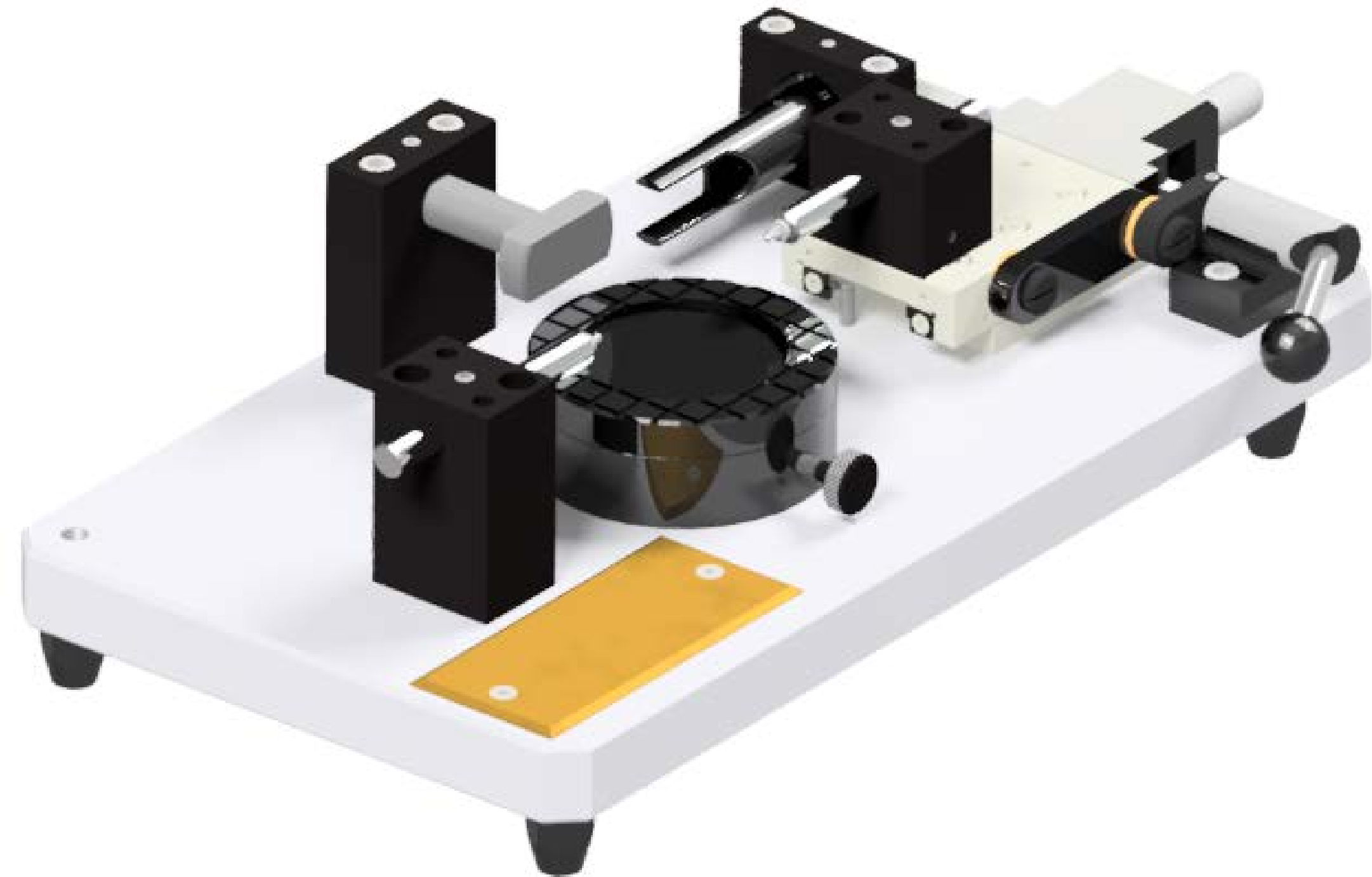
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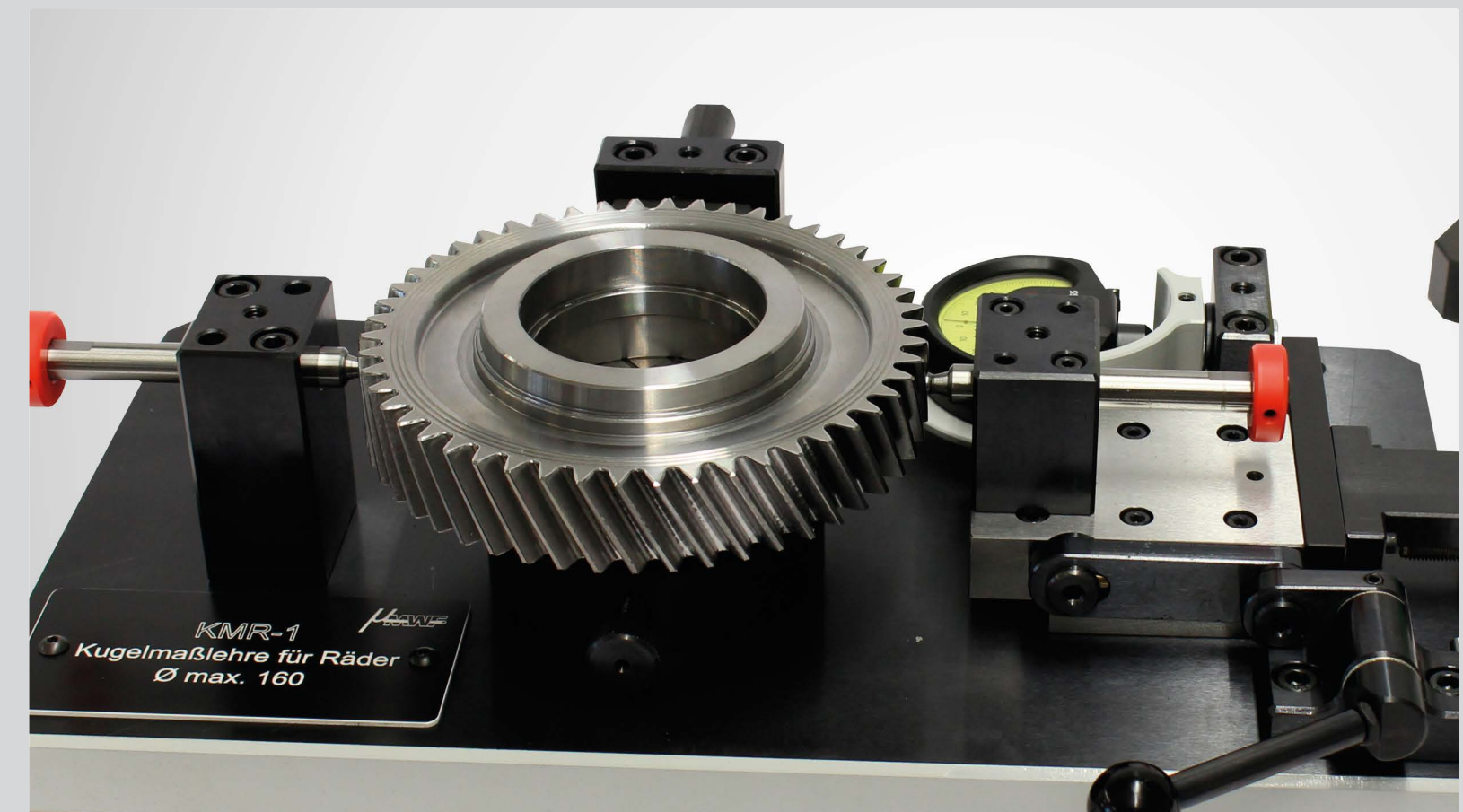
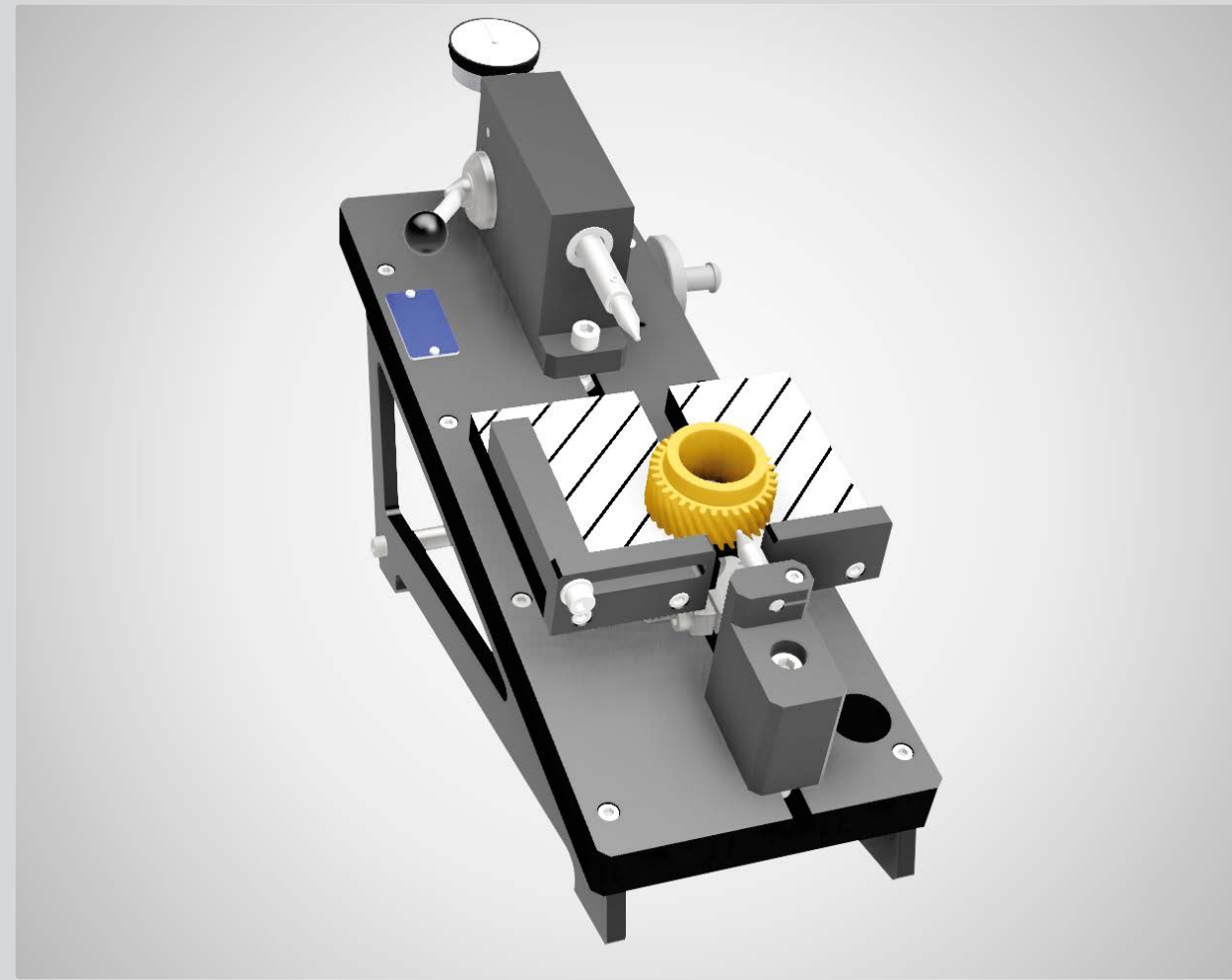
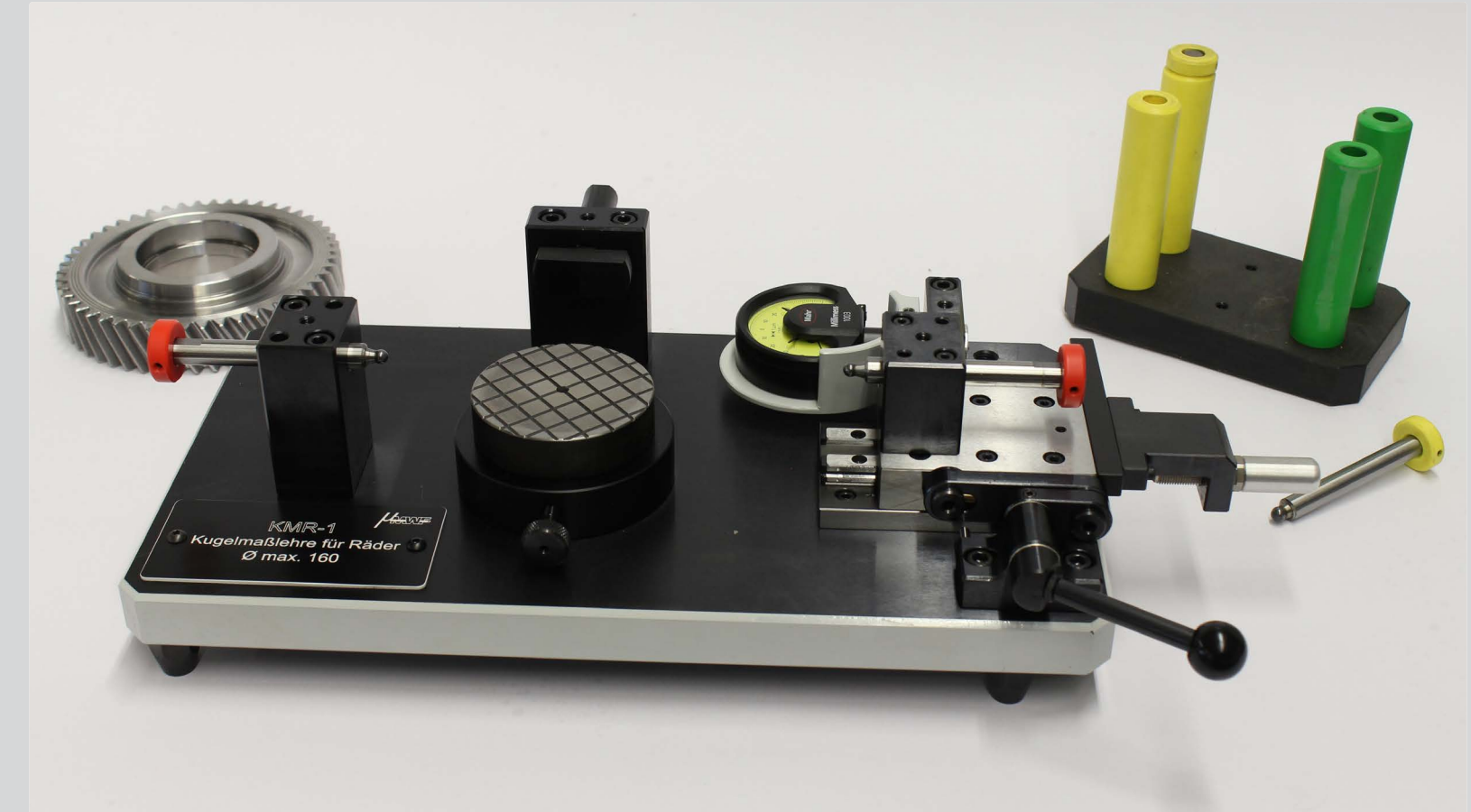
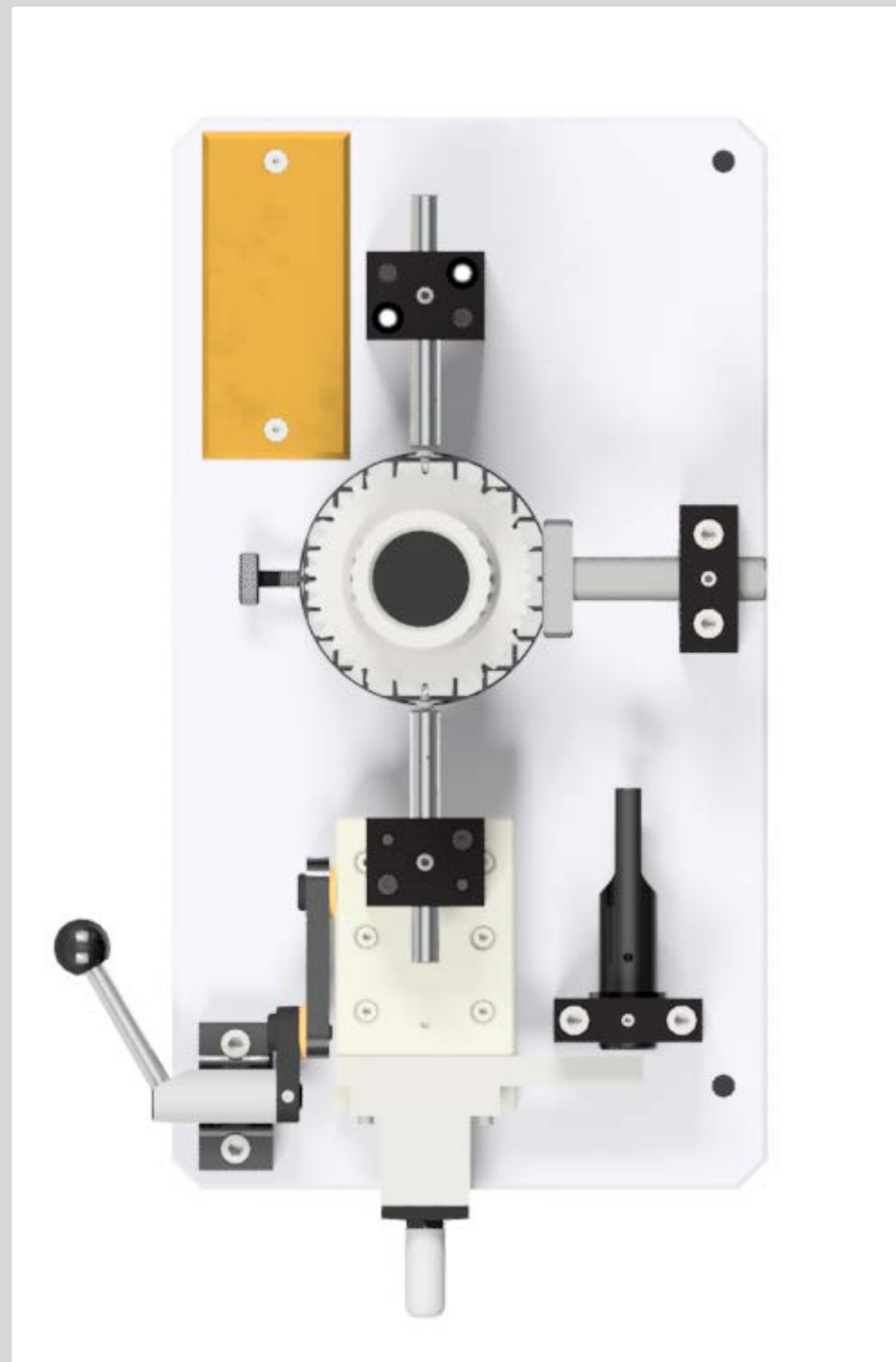
Gage for dimension over balls (gears) for **gears**

A gage for dimension over balls measures the diametrical dimension over balls of a gear. This dimension can be measured with an odd or even number of teeth, and even workpieces with helical teeth can be measured.

- The gage comes in many different variants, but customized solutions are also possible
- Fitted with a dial indicator or measuring probe as required



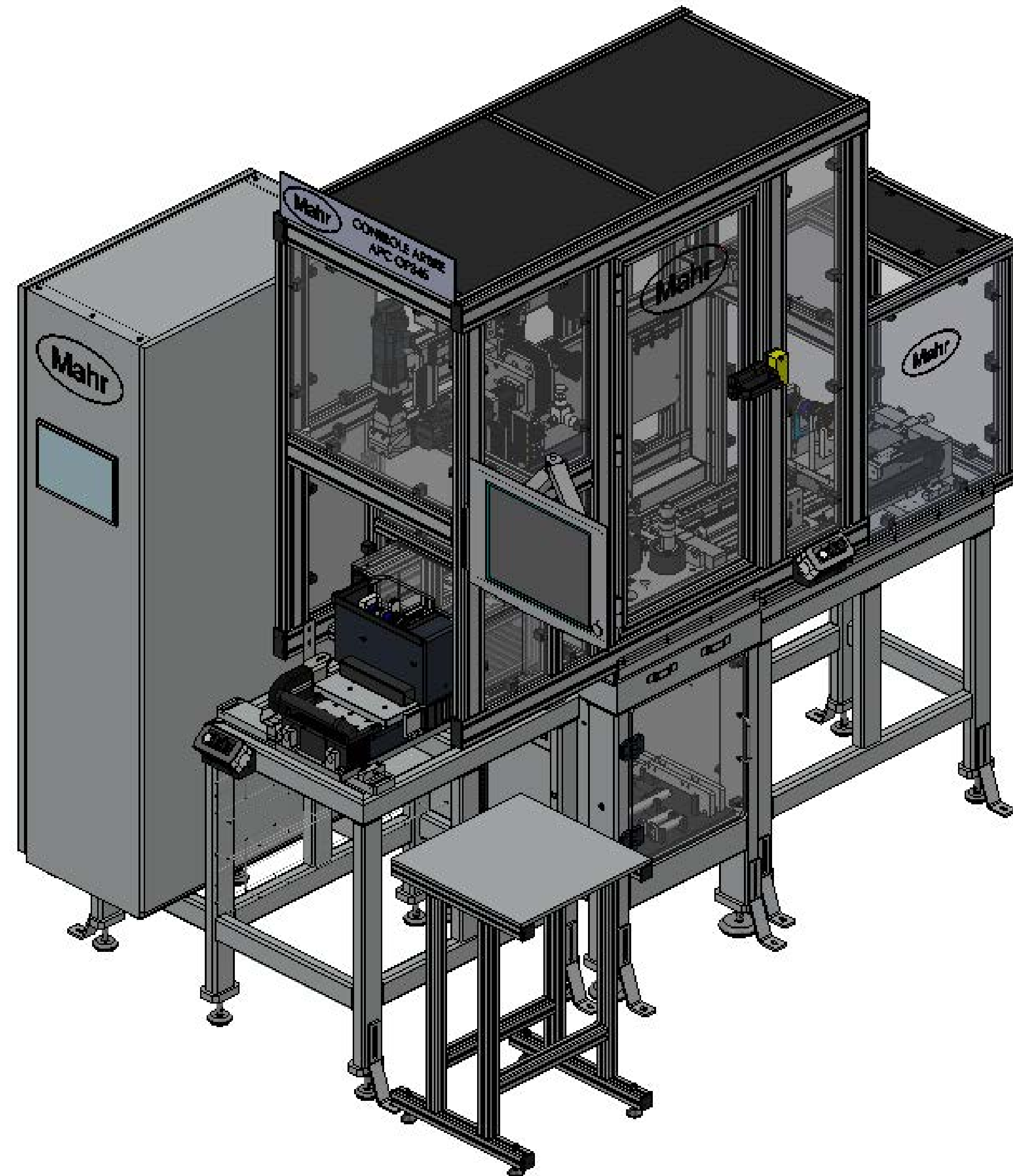
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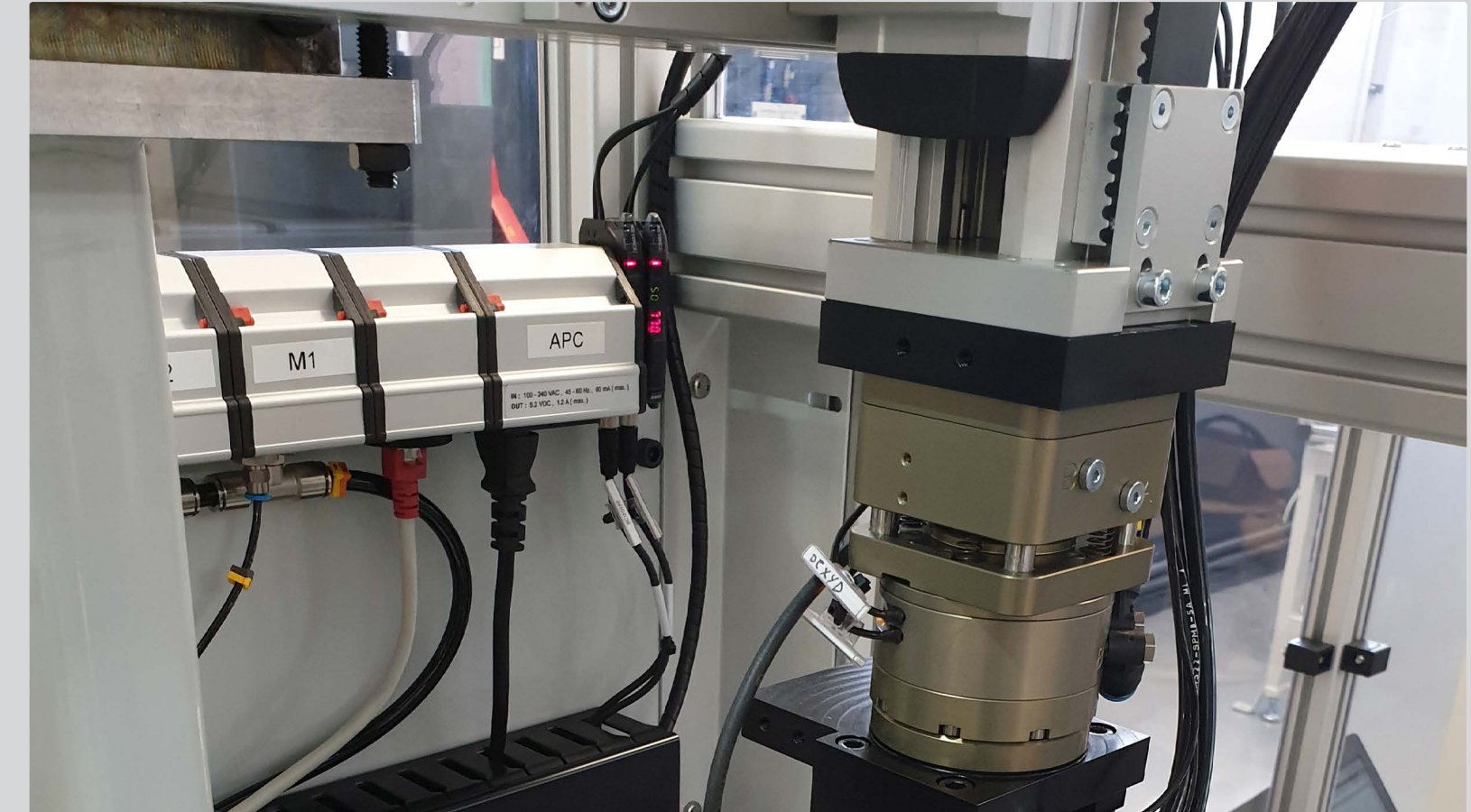
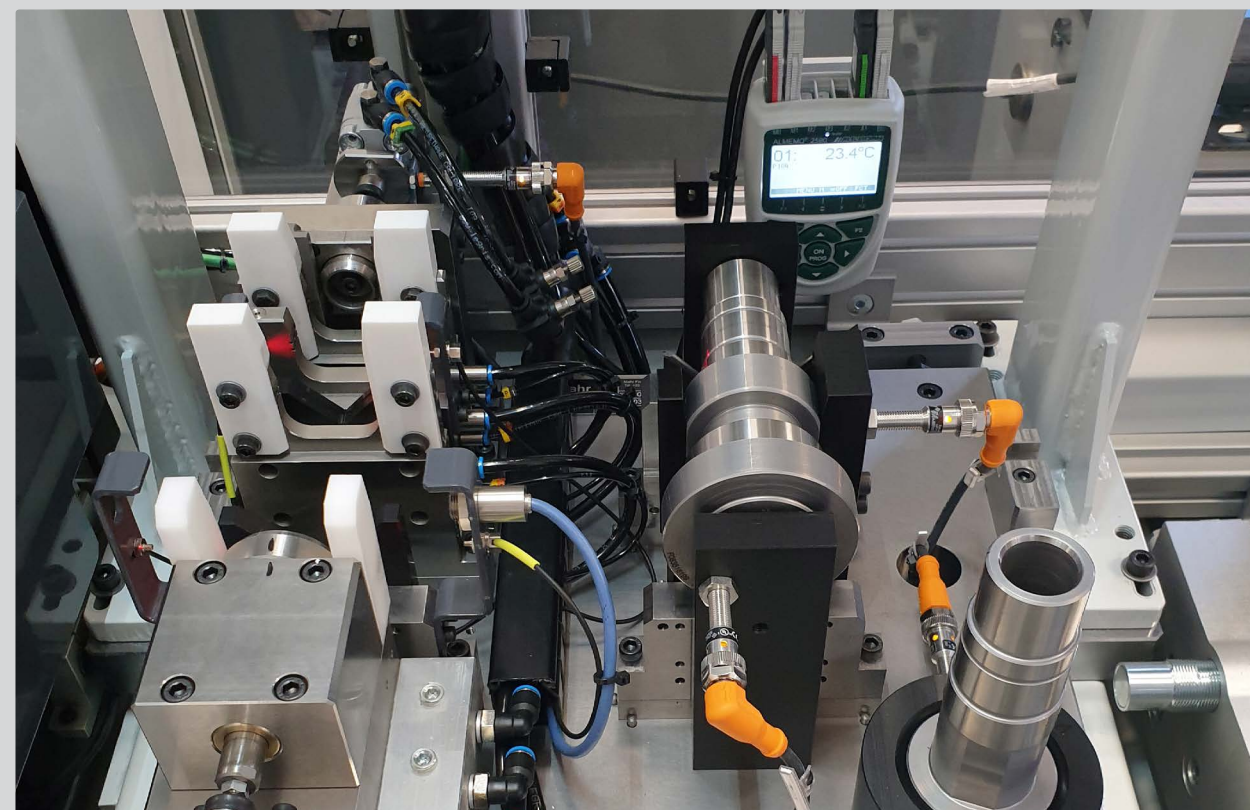
Transmission gage for **secondary shaft transmissions**

The measuring station is used to measure diameters on transmission shafts. Measured values are captured with the IBR measuring modules using Millimar D 1200x measuring software.

- Non-contact temperature probes allow for temperature compensation
- Measuring results are displayed via a touchscreen monitor directly on the machine



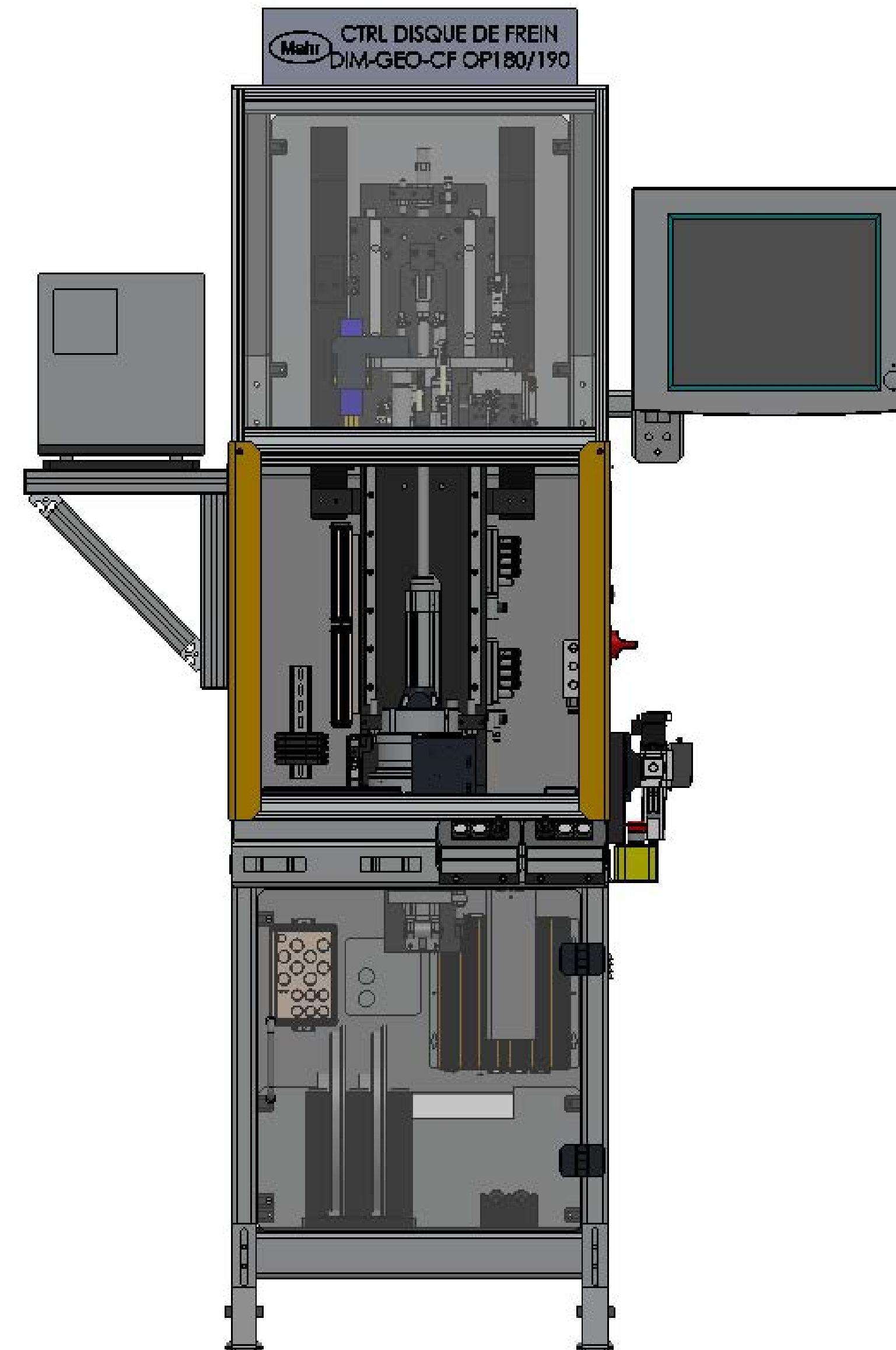
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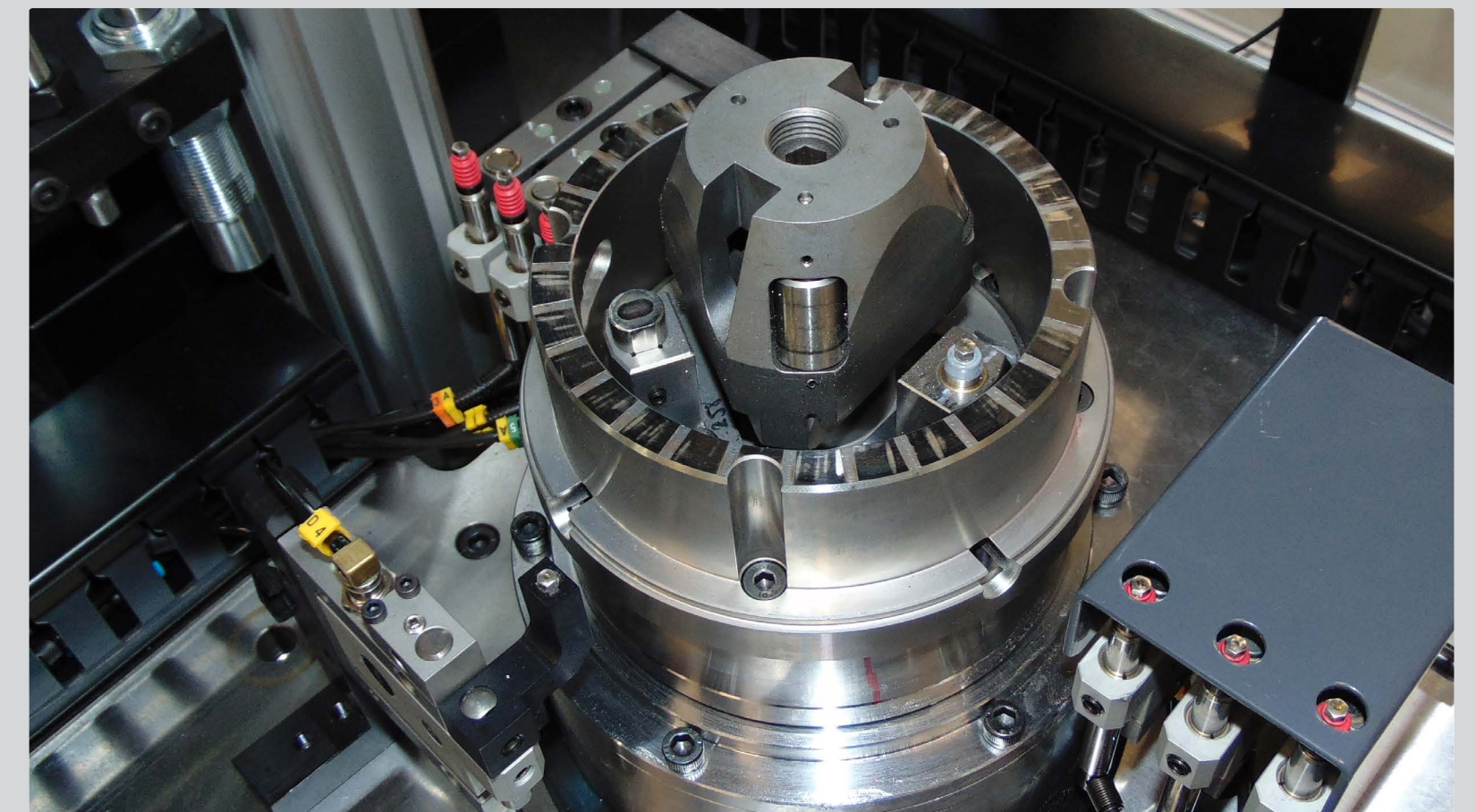
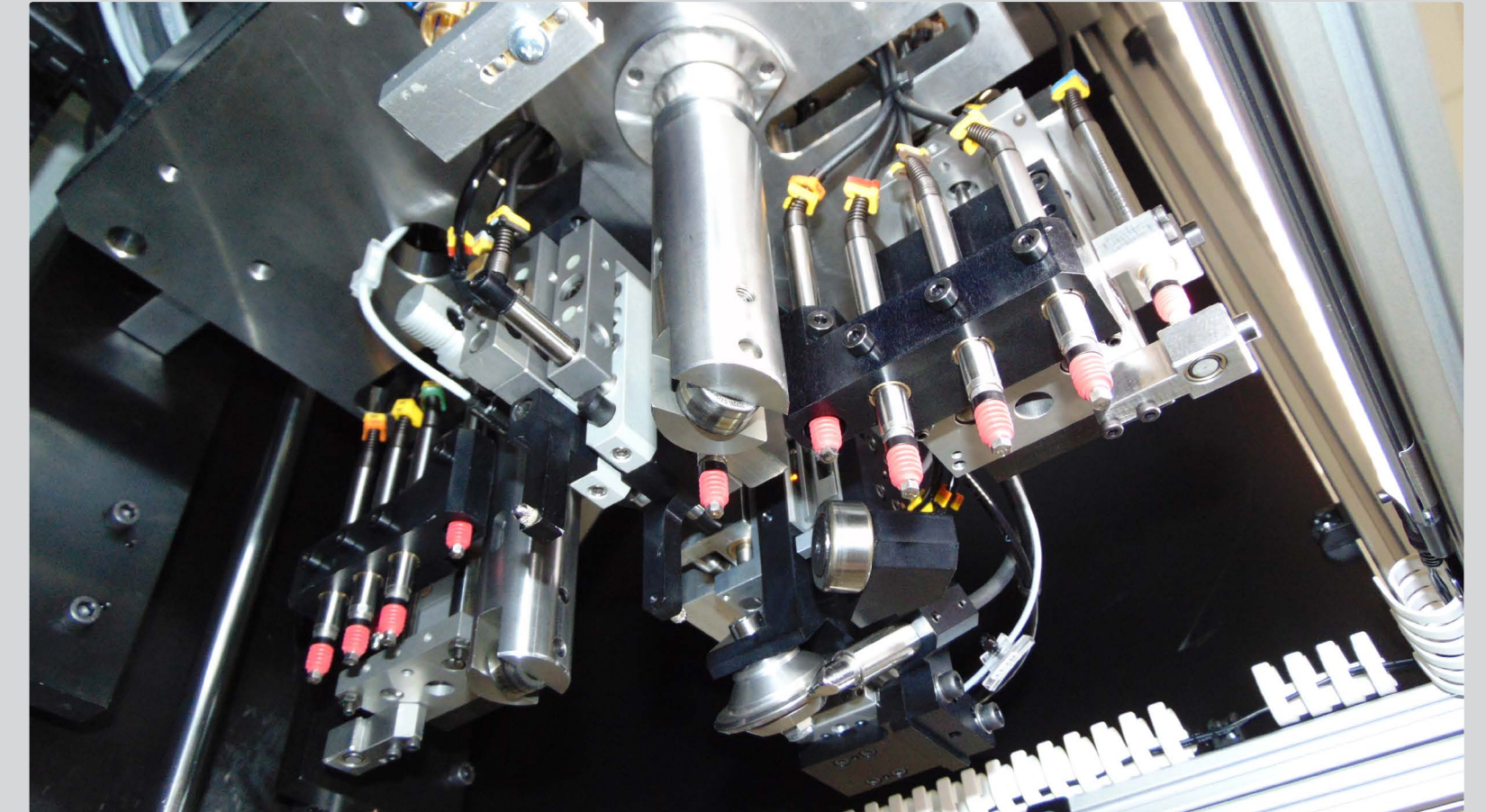
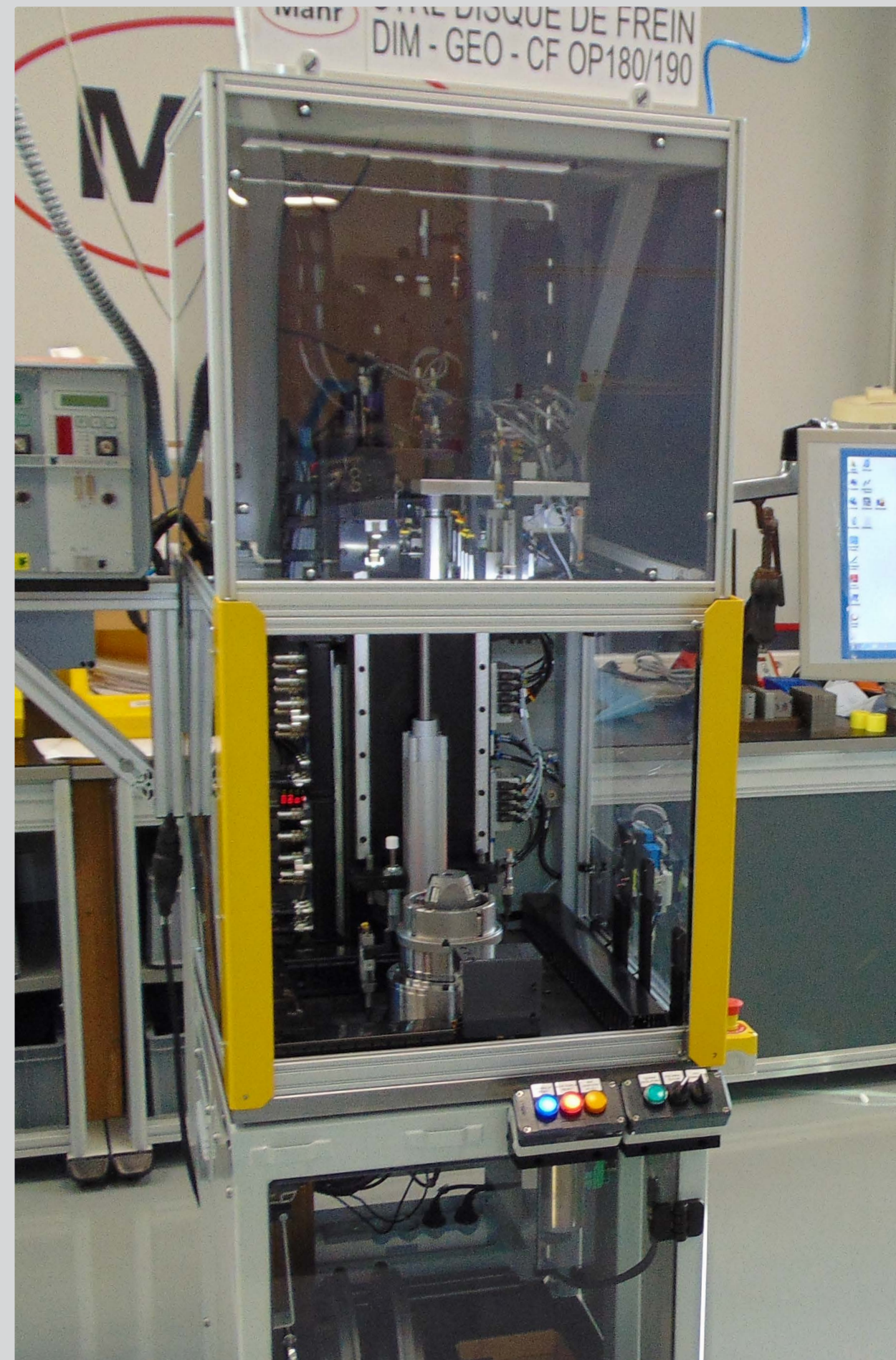
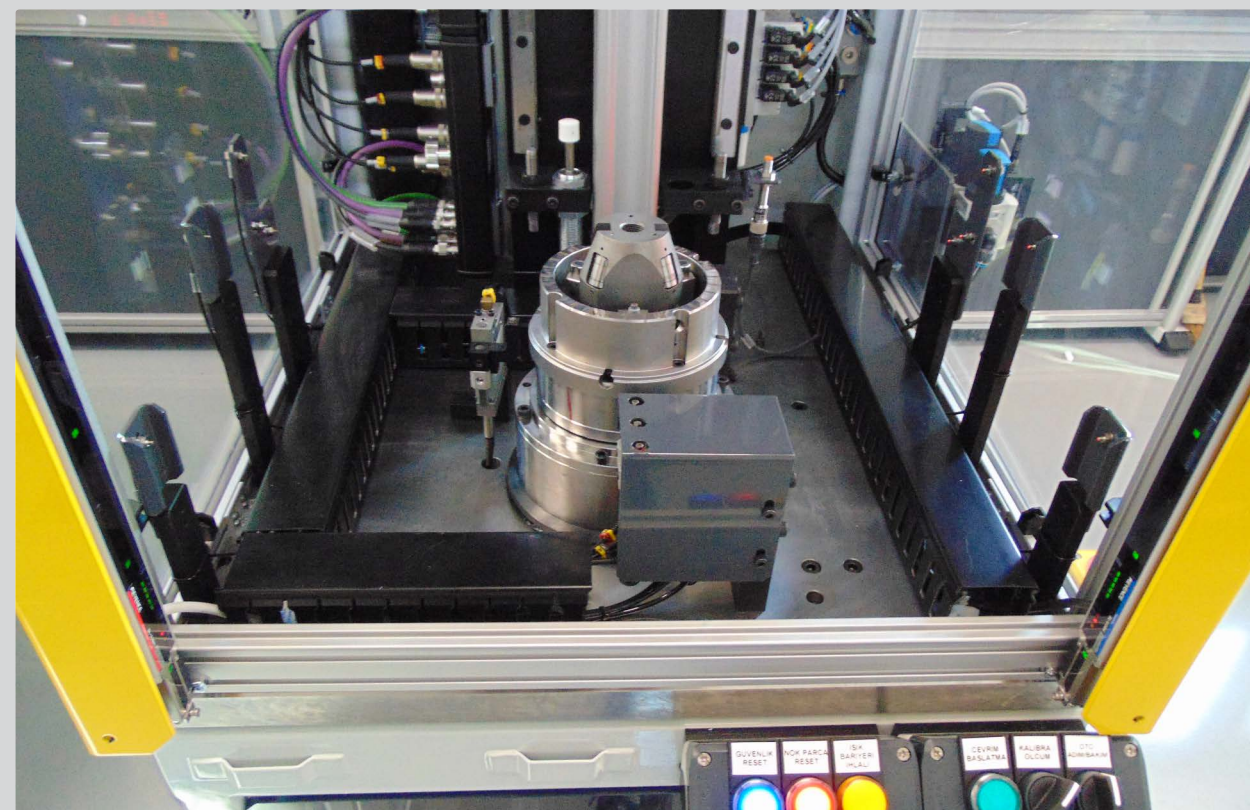
Automatic inspection of brake disks

This measuring station is used for automatic dynamic measurement of brake disks.

- Inside and outside diameter, height, flatness, radial run-out and susceptibility to cracking are measured
- Measured values are captured with P 2004 inductive measuring probes and Millimar D 1200x measuring software
- With a cycle time of approx. 30 seconds, information about the quality of the workpieces can be obtained very quickly
- Manual and automatic loading options



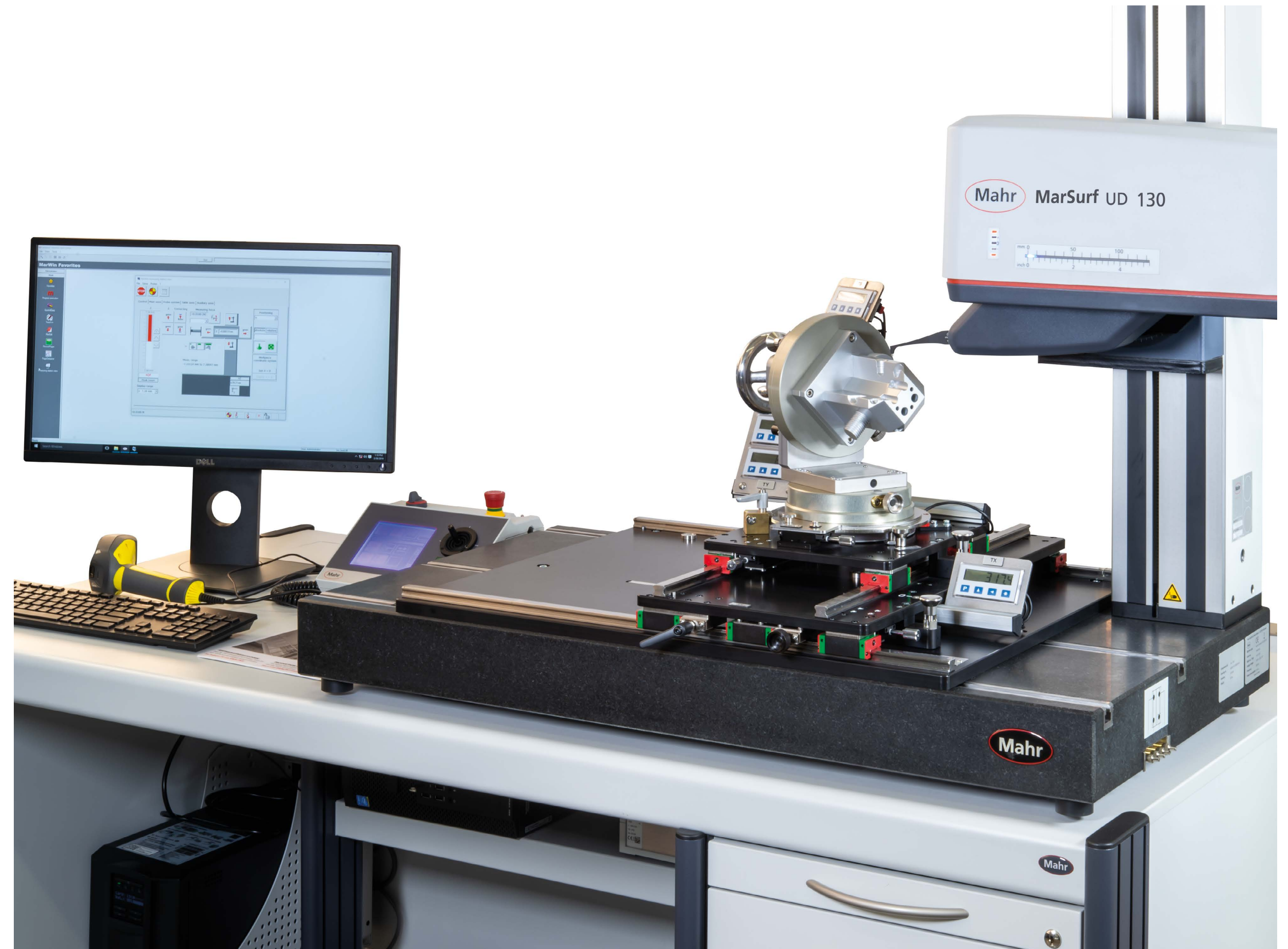
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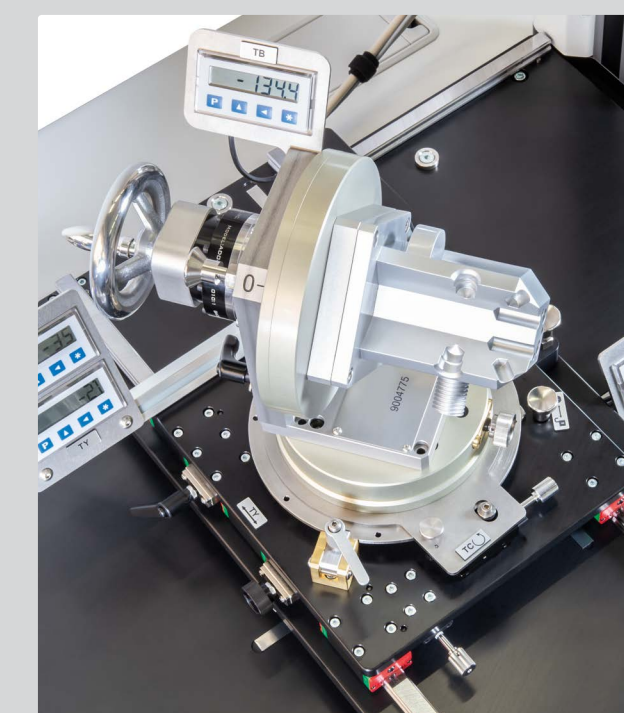
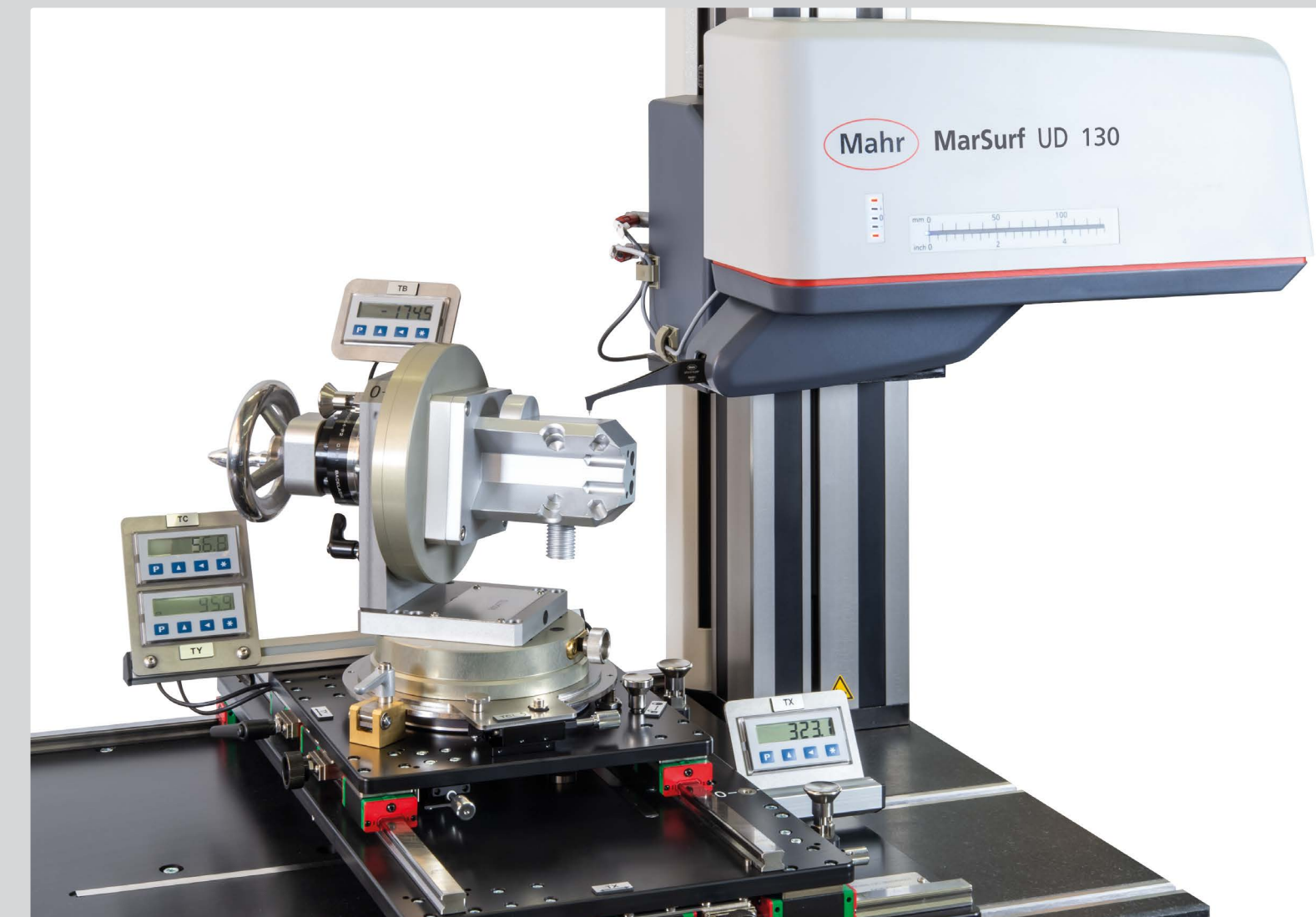
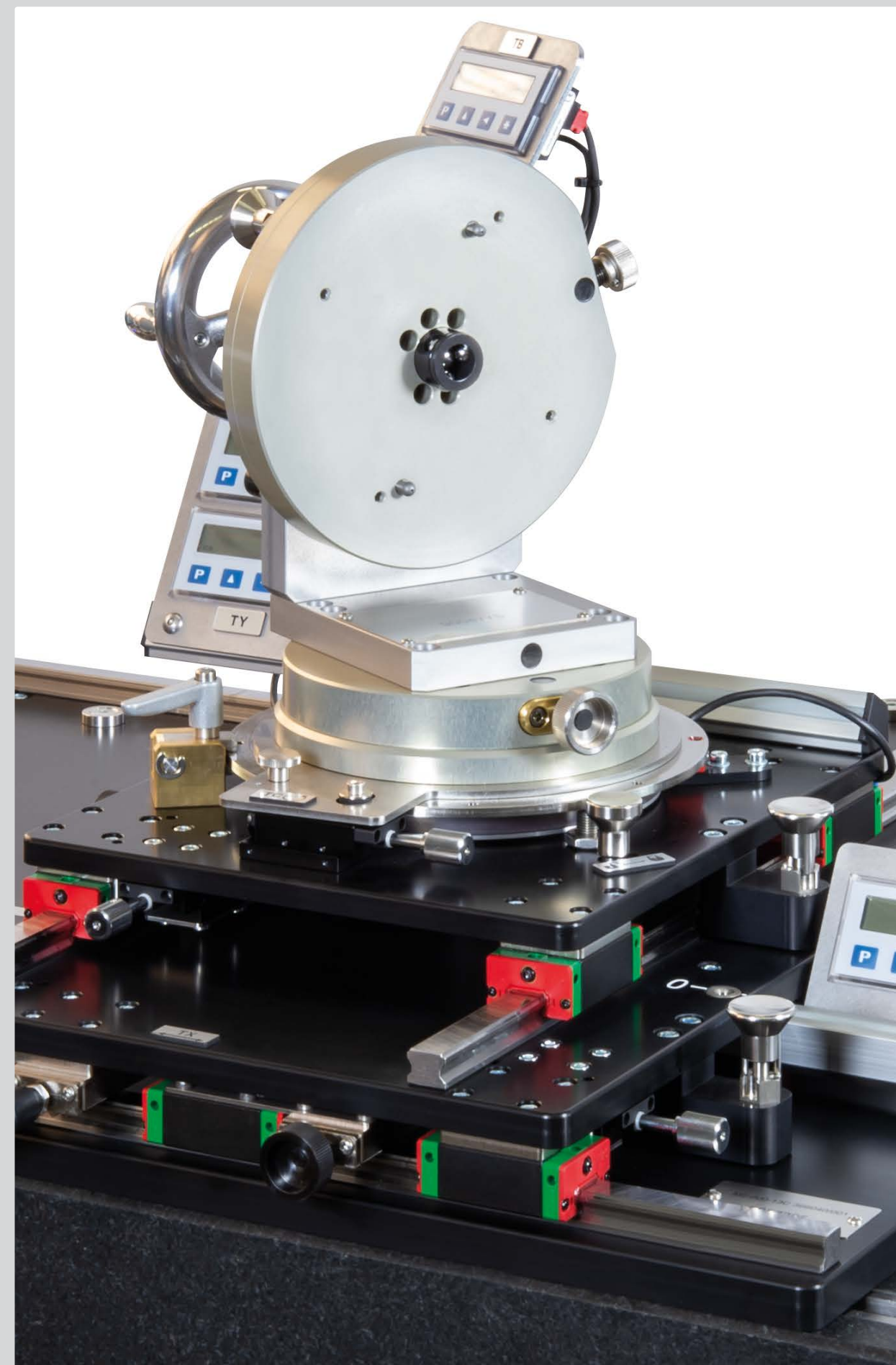
Manual **universal** **measuring station**

With its positioning axes, the **MarSurf Engineered Series 001** manual universal measuring station offers efficient and flexible measurement of a wide variety of workpieces. Even workpieces that are too big for the CT 300 XY table can be measured with this measuring station.

- Positioning system can be mounted on standard measuring stations (with large granite plate)
- Existing systems can be upgraded
- Positioning is supported by digital displays on all axes
- Optional: one or two swivel axes (TA or TA/TB) with standard quick-change interface



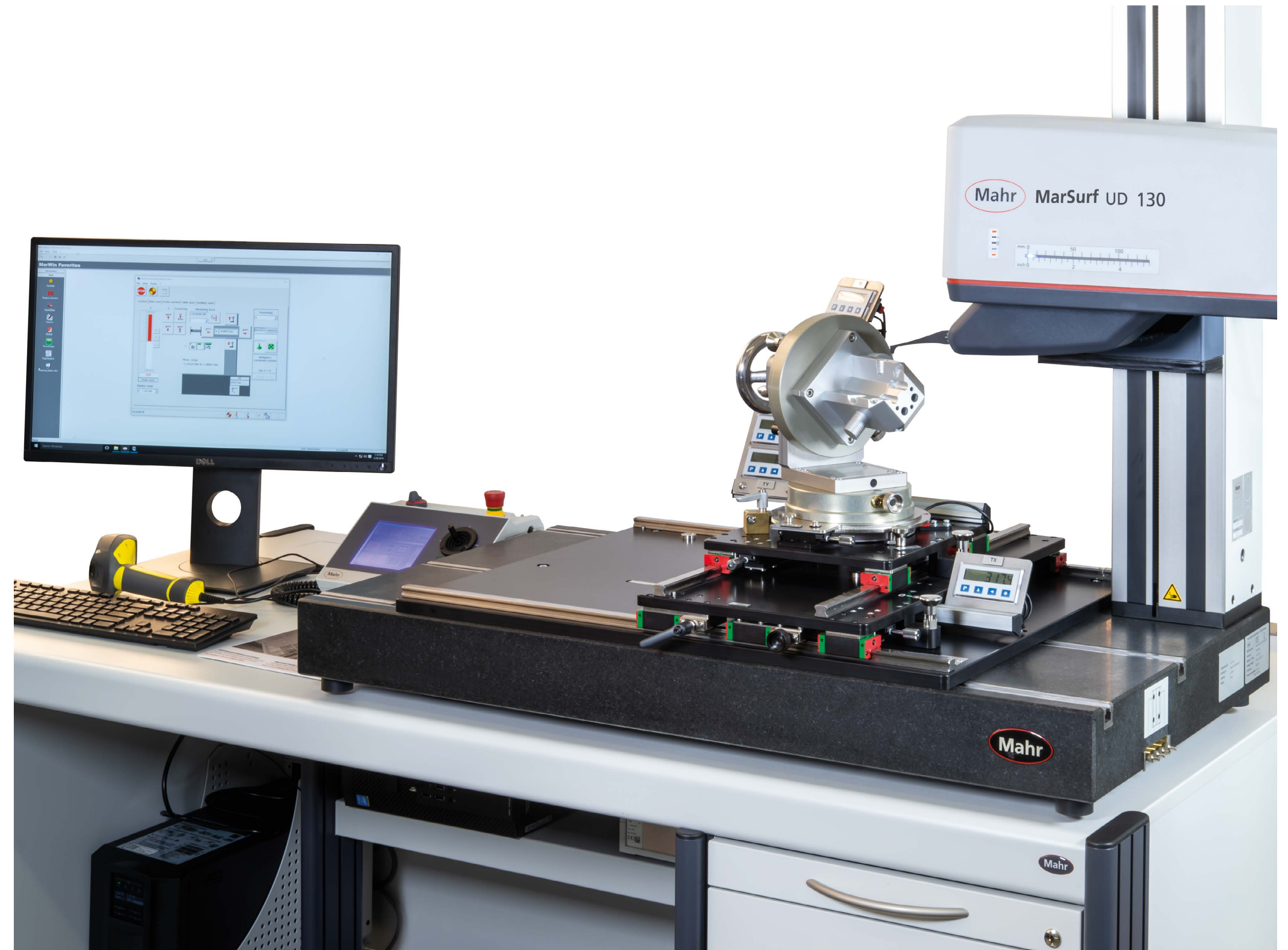
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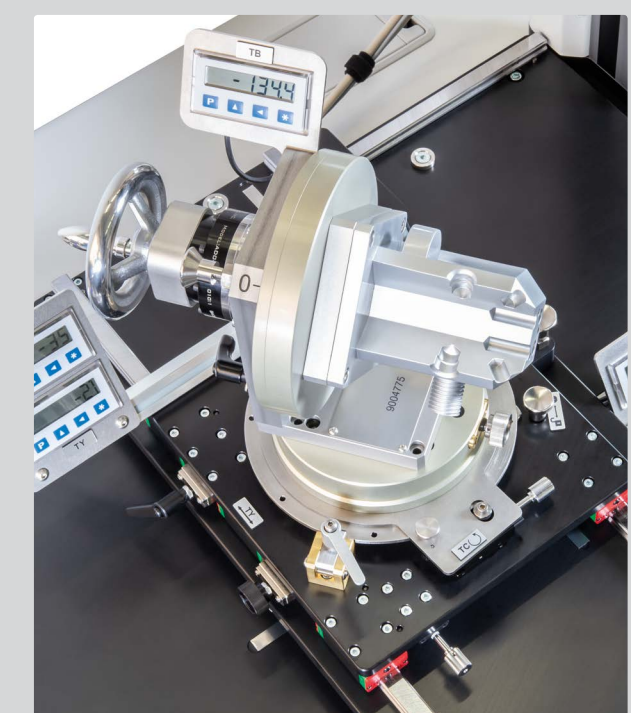
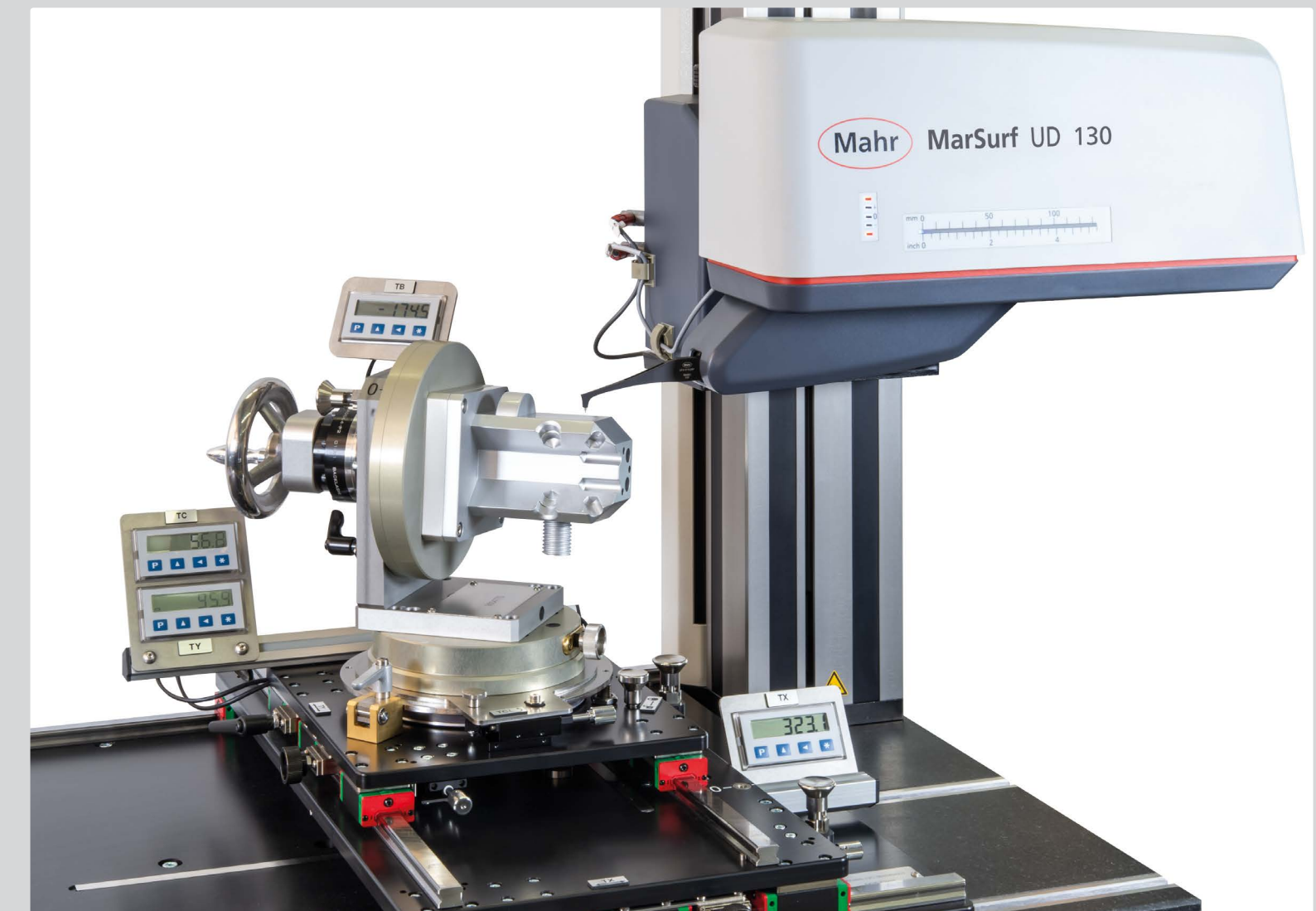
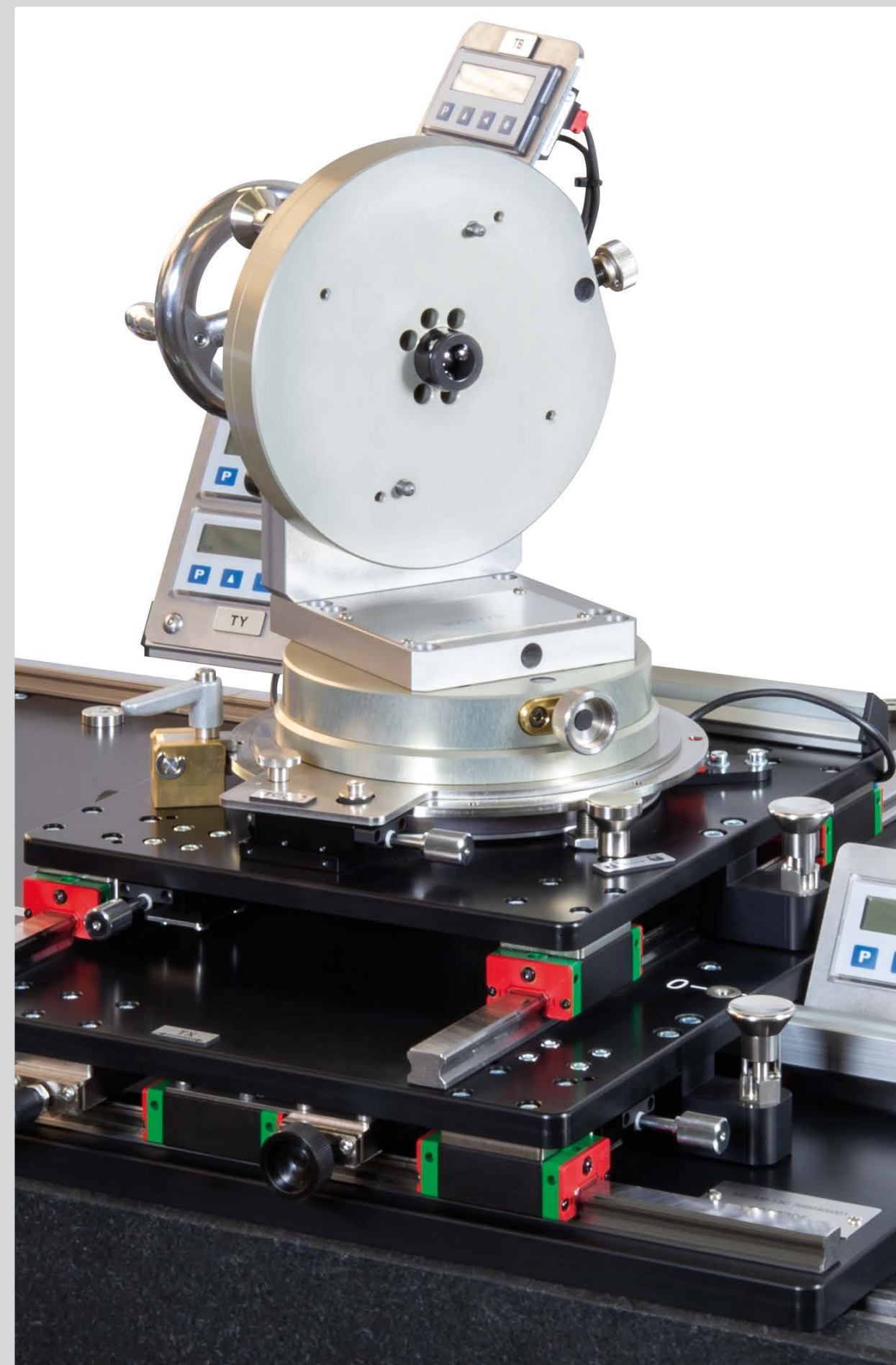
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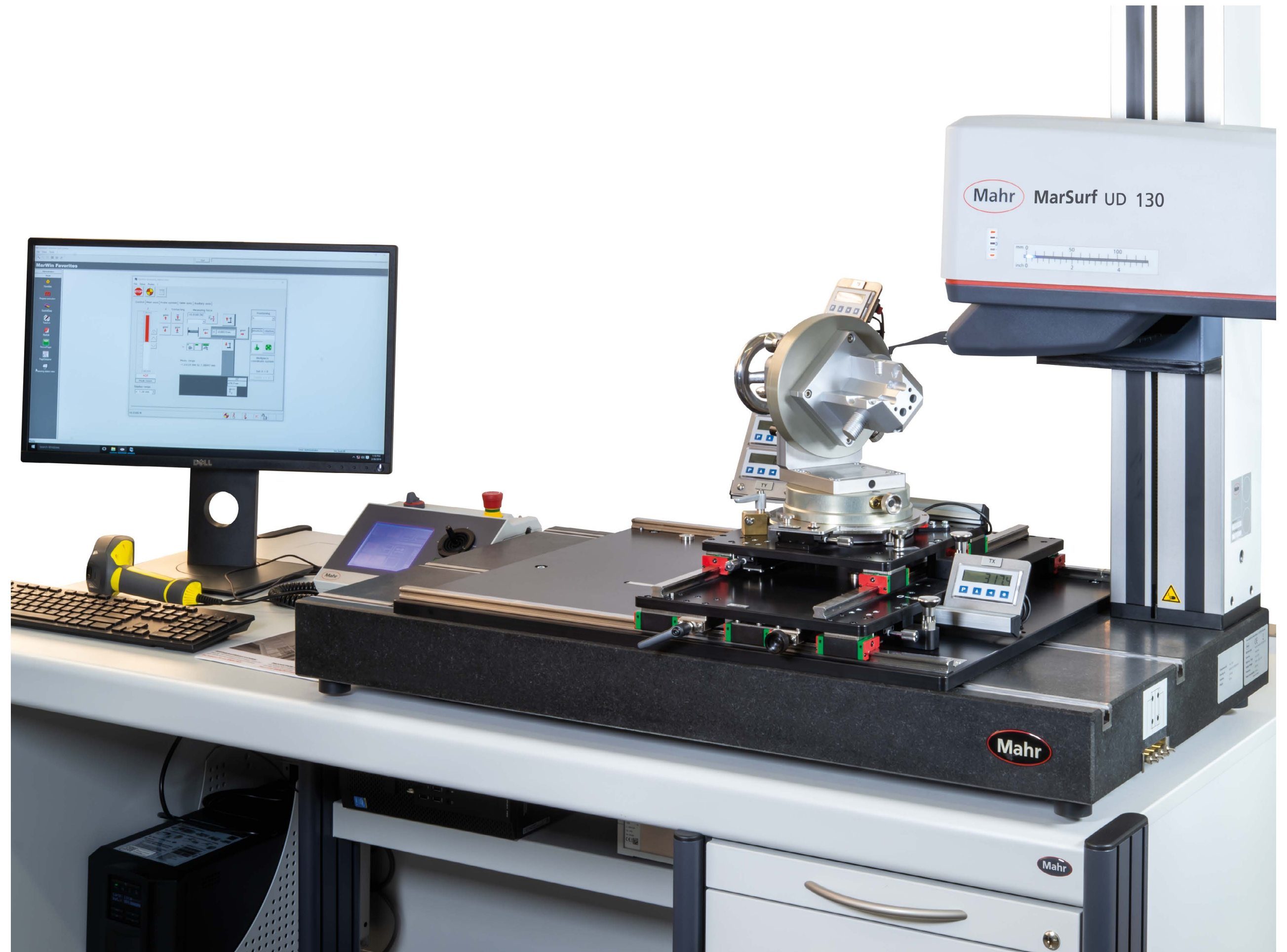
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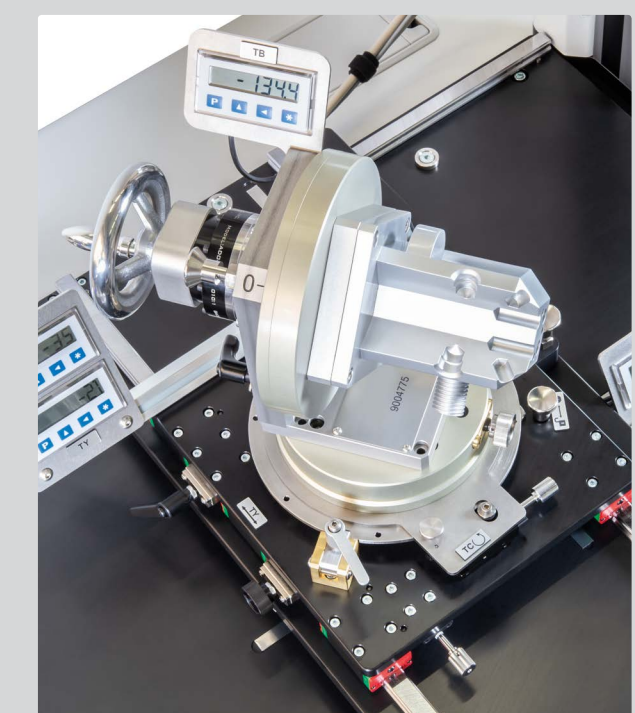
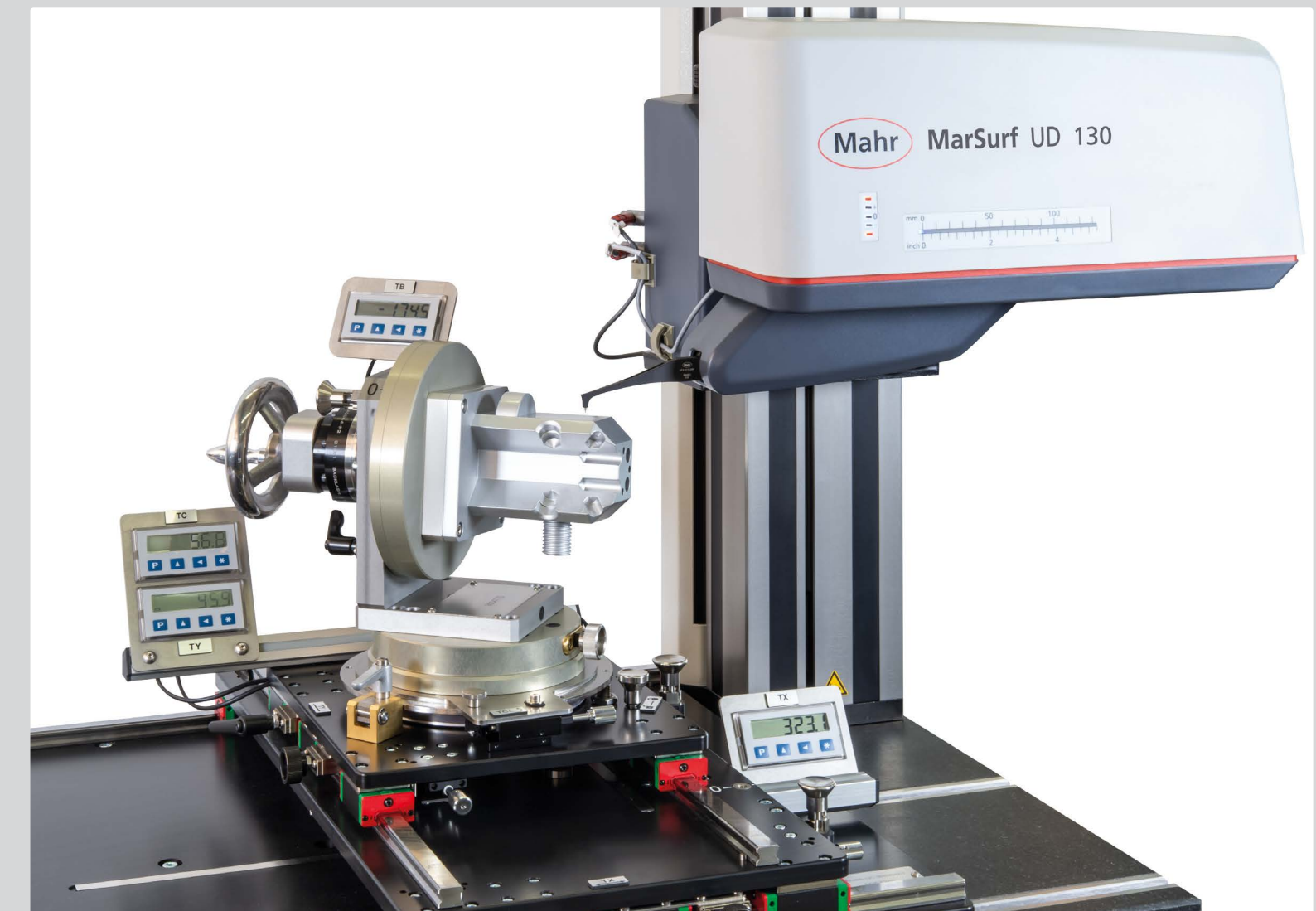
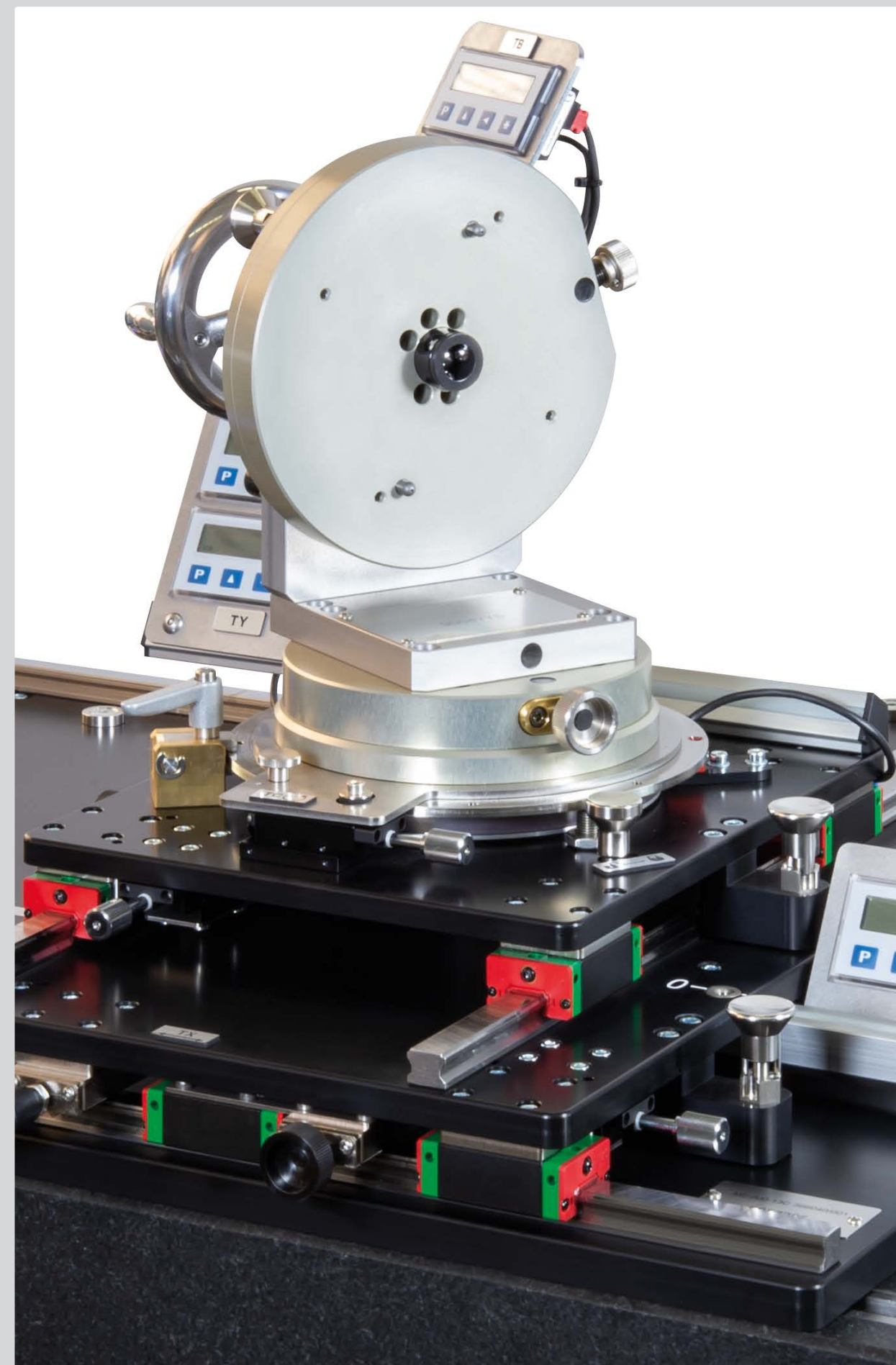
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Gallery



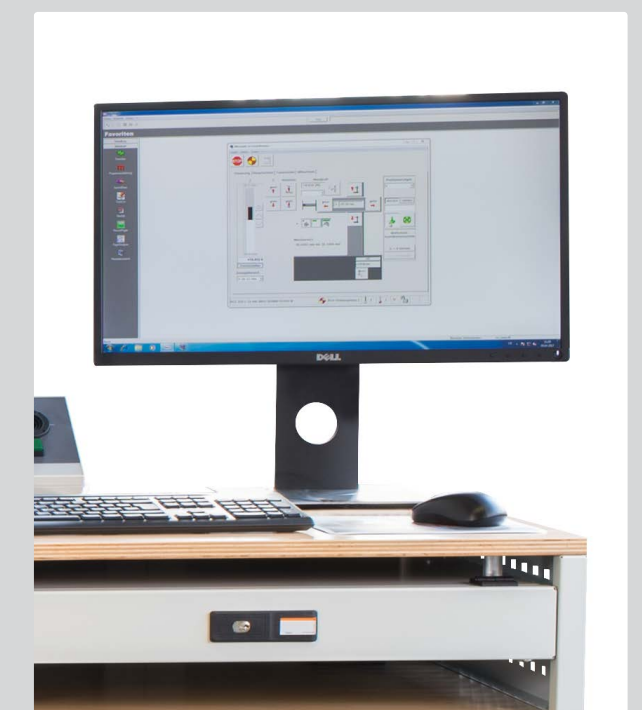
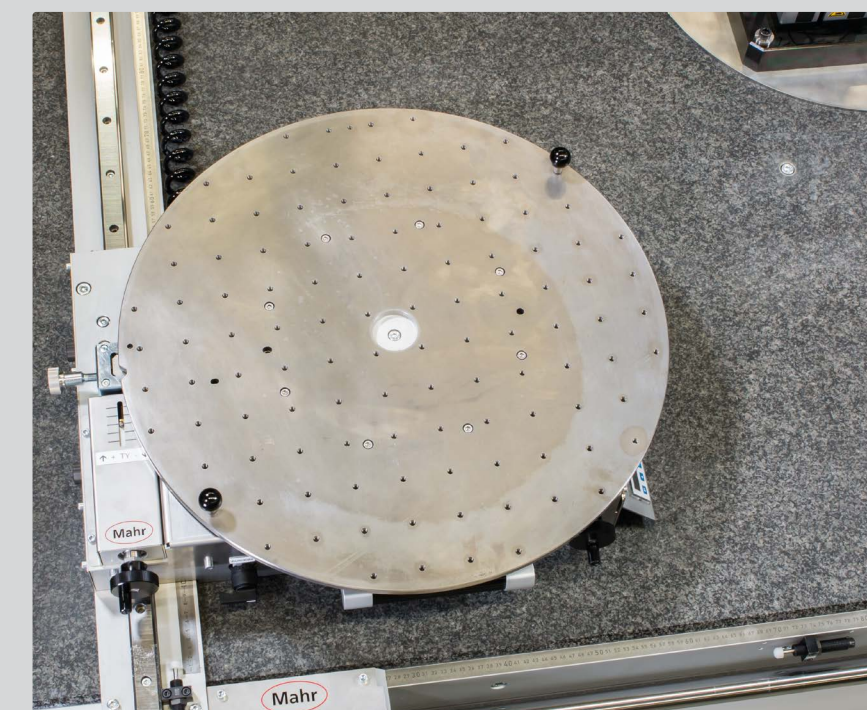
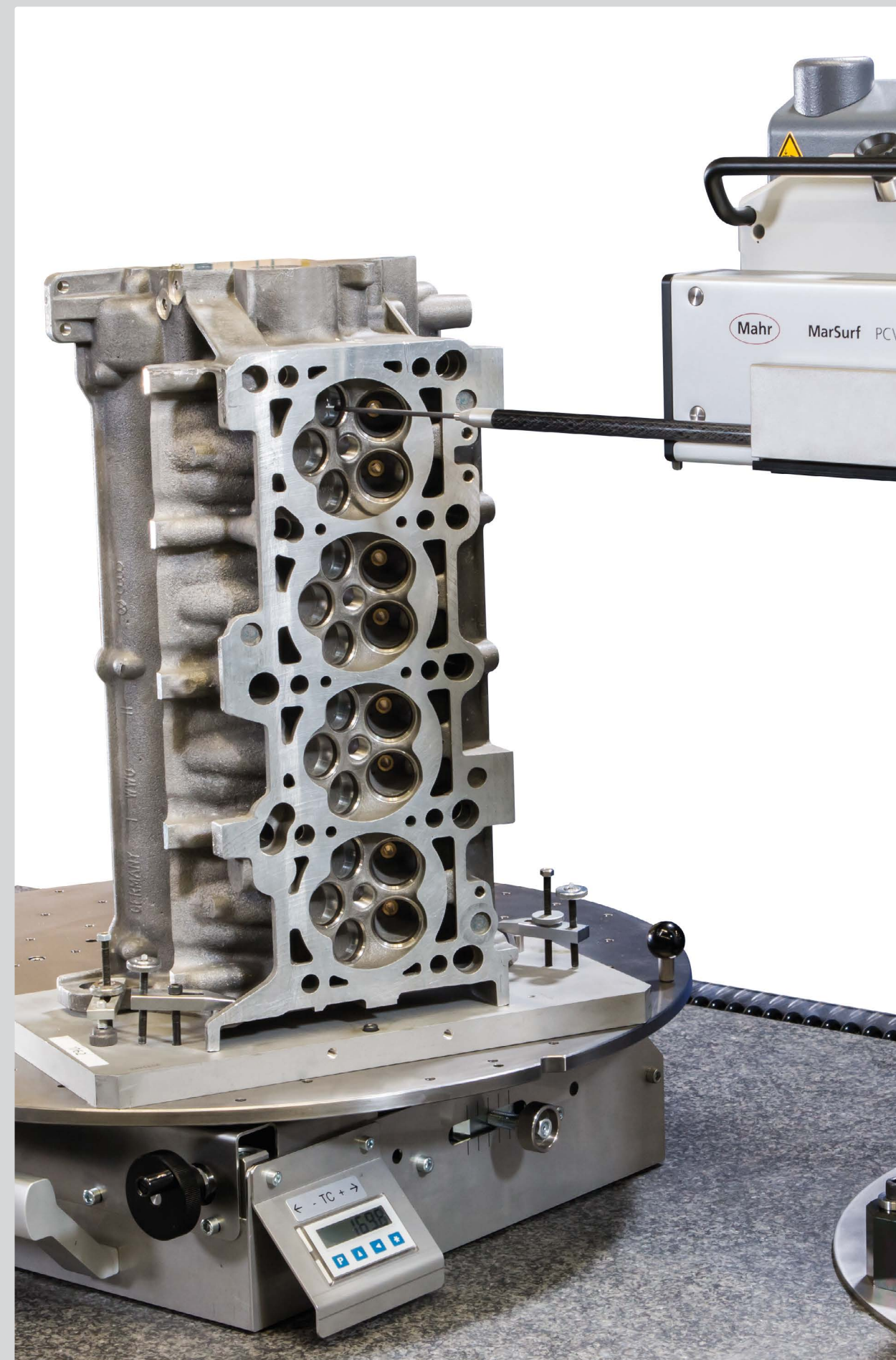
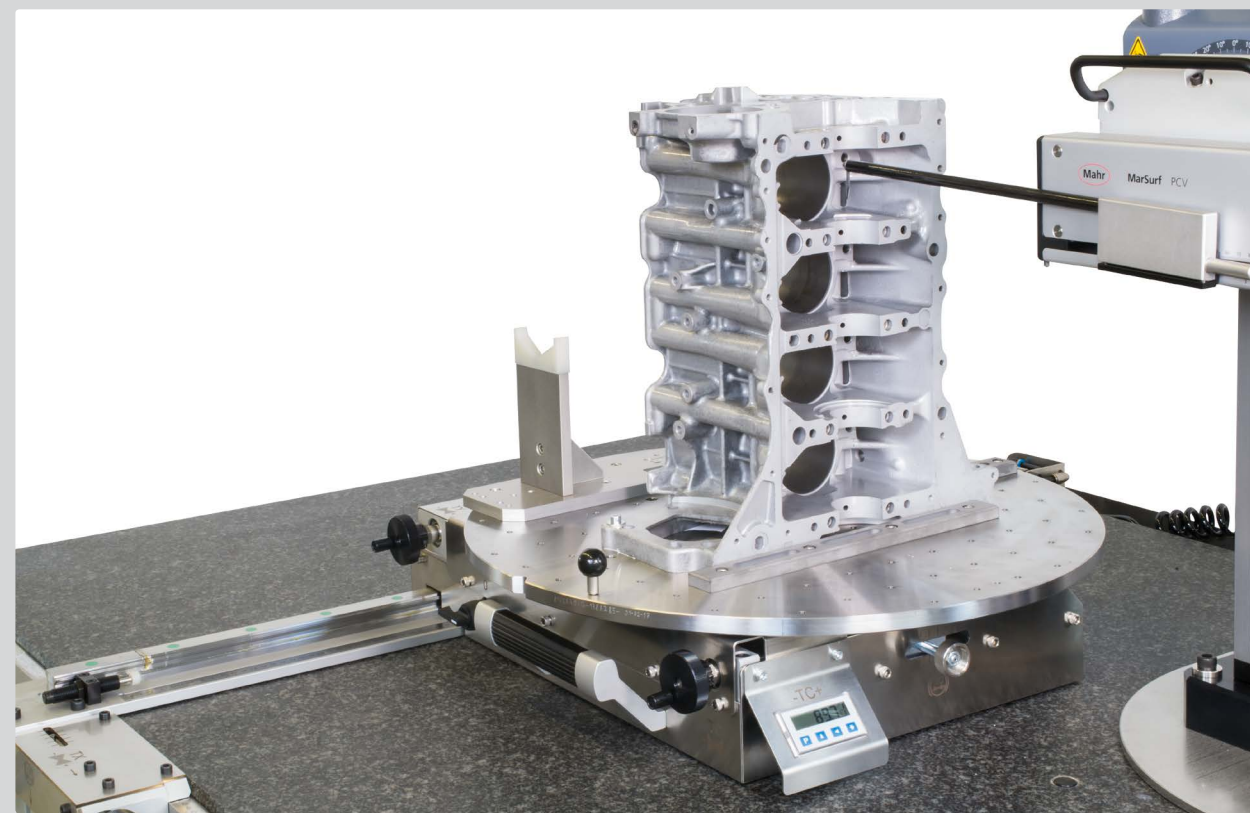
Individual and accurate positioning with air bearings

With its positioning table mounted on air bearings, the **MarSurf Engineered Series 002** measuring station offers simple yet accurate manual positioning of heavy workpieces.

- Three positioning axes, each with coarse and fine adjustment
- Rotary table (ø 600 mm) with M6 fastening thread, clearance 50 mm, for holding the workpieces
- Multiple measuring tasks can be performed on one measuring station
- Wide variety of drive unit options



Gallery



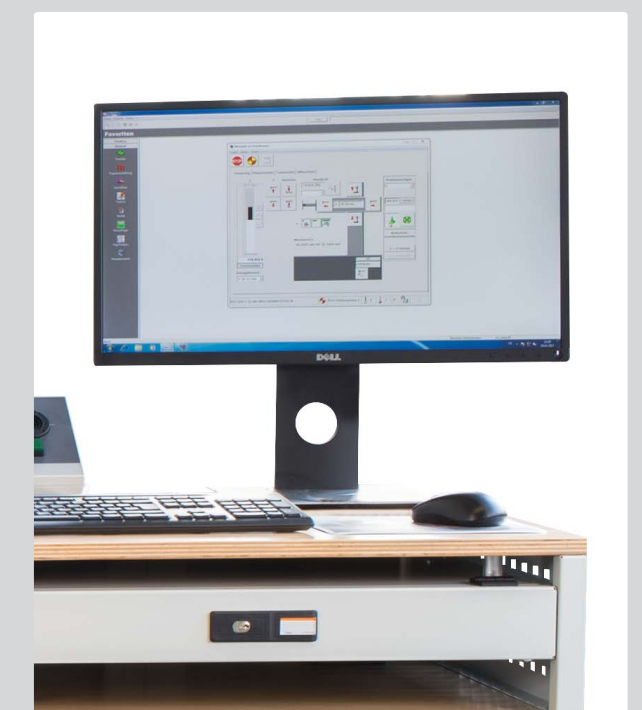
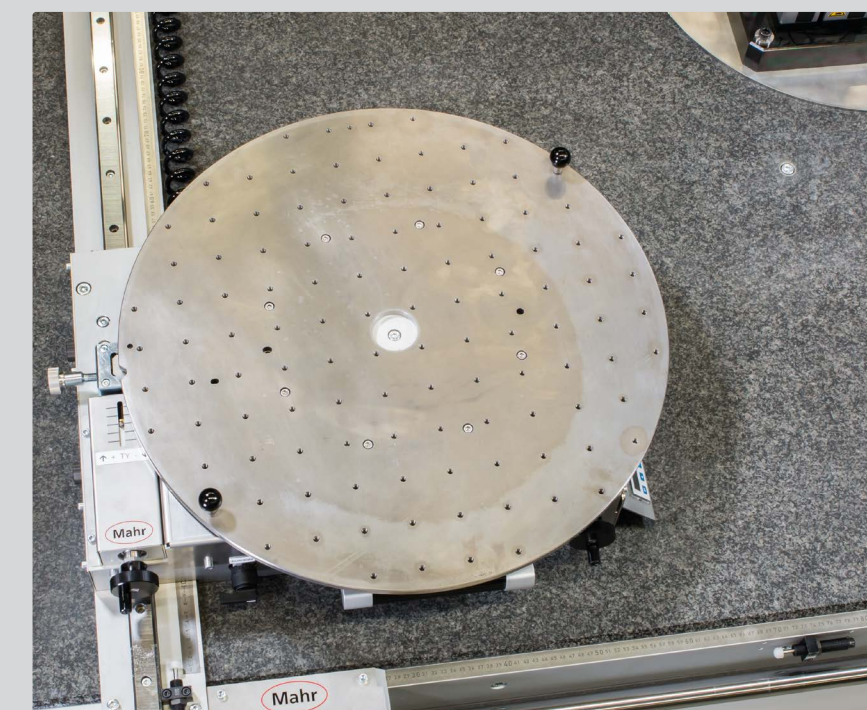
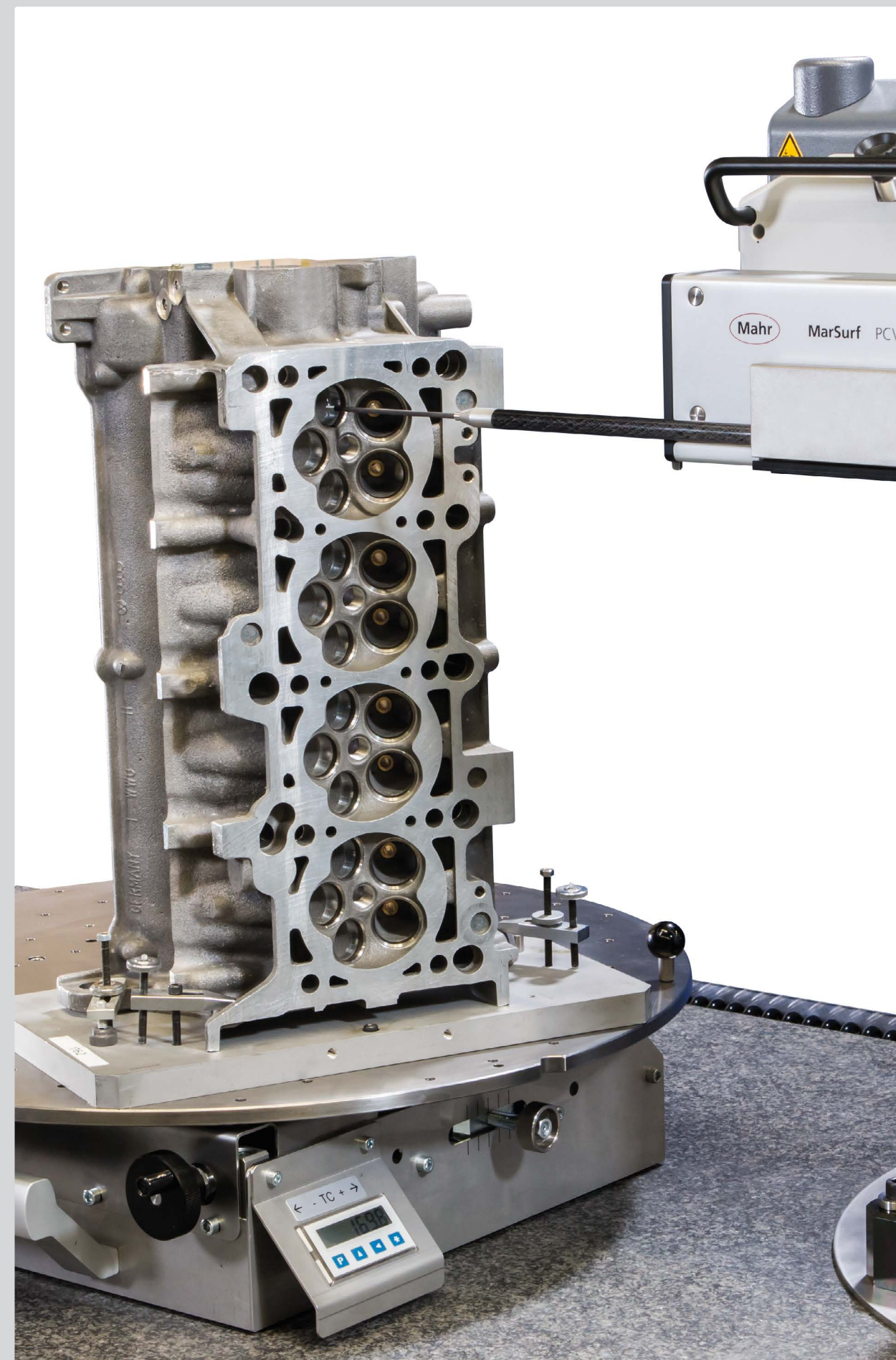
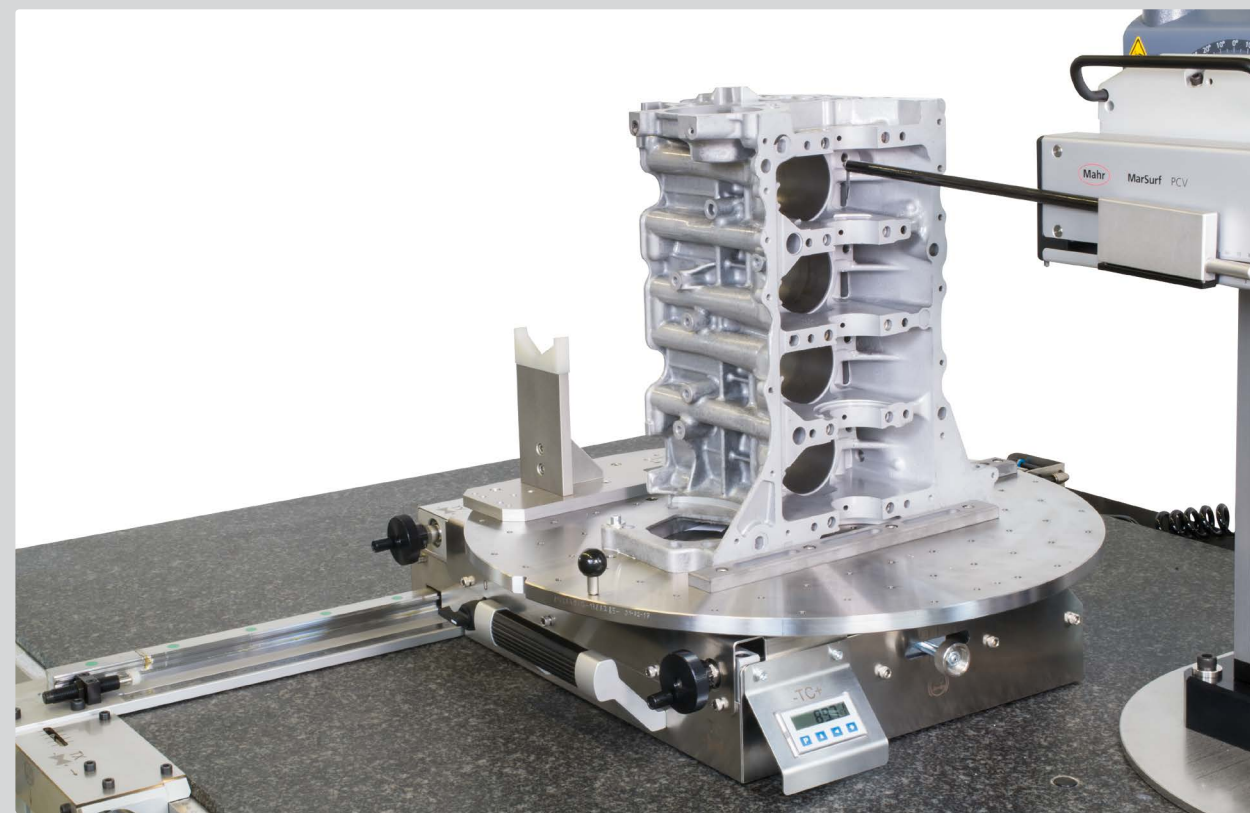
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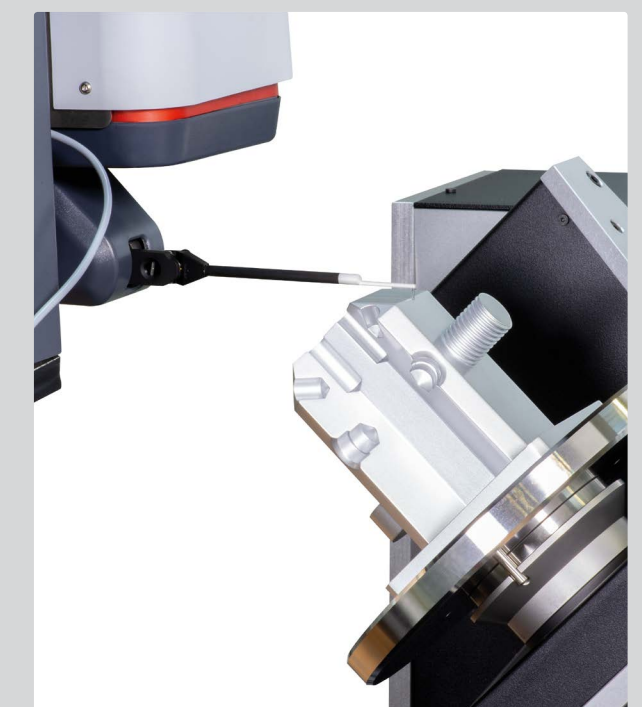
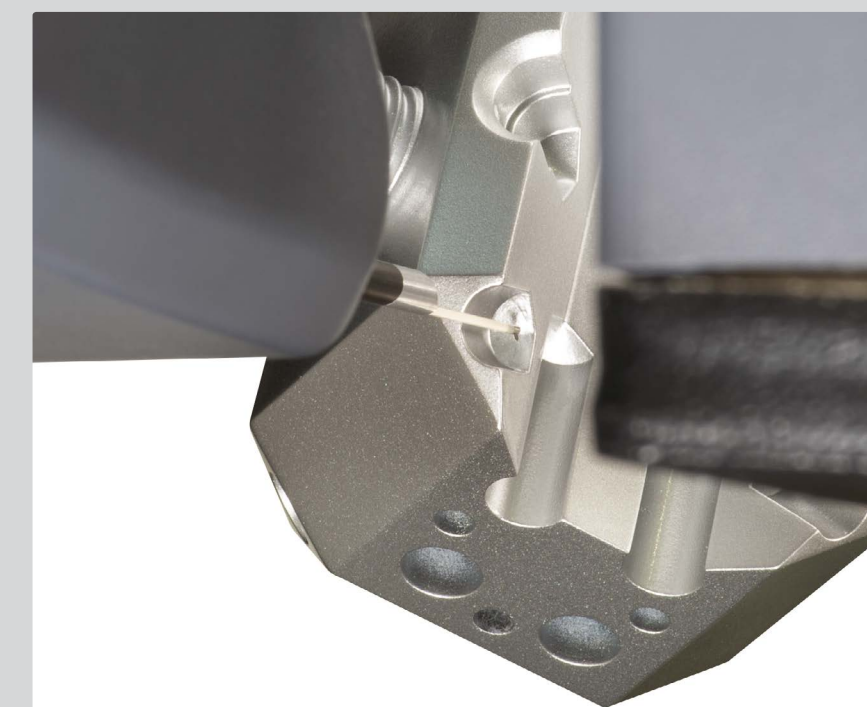
Fully automatic measuring station for **complex parts**

The **MarSurf Engineered Series 1000** measuring station has three linear and two rotation axes for workpiece positioning. It is ideal for small workpieces weighing up to around 10 kg and with a volume of up to 1 liter, e.g. nozzle bodies or axle components.

- Reproducible measurement and a fully automated measuring routine allow for fast and accurate positioning
- All sorts of workpieces can be reproducibly fixed using the pneumatic zero-point clamping system
- Even measurements that are difficult to set manually are achieved fully automatically
- Automatic probe arm change minimizes operator influence on the measuring results



Gallery



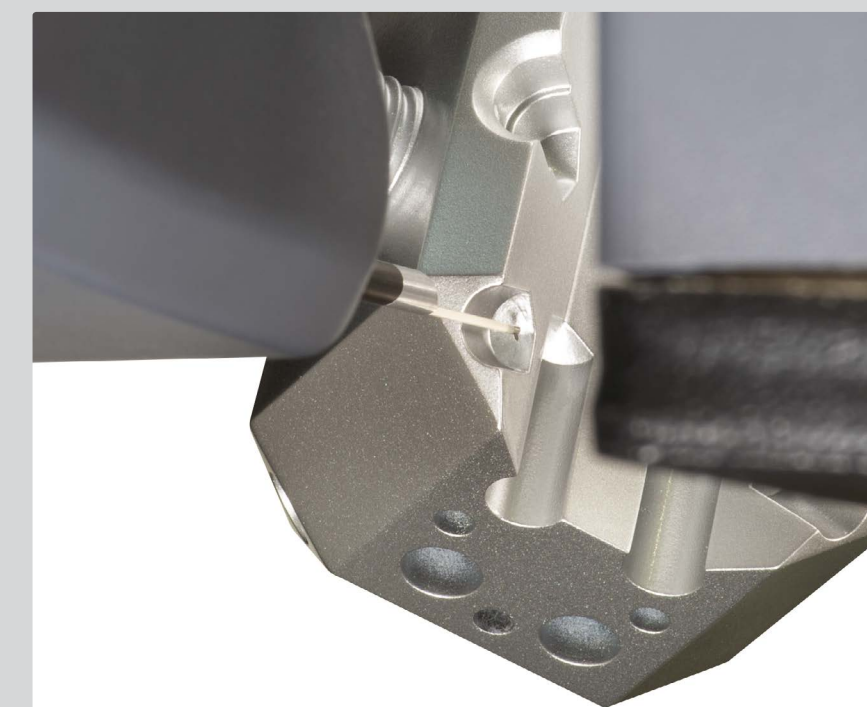
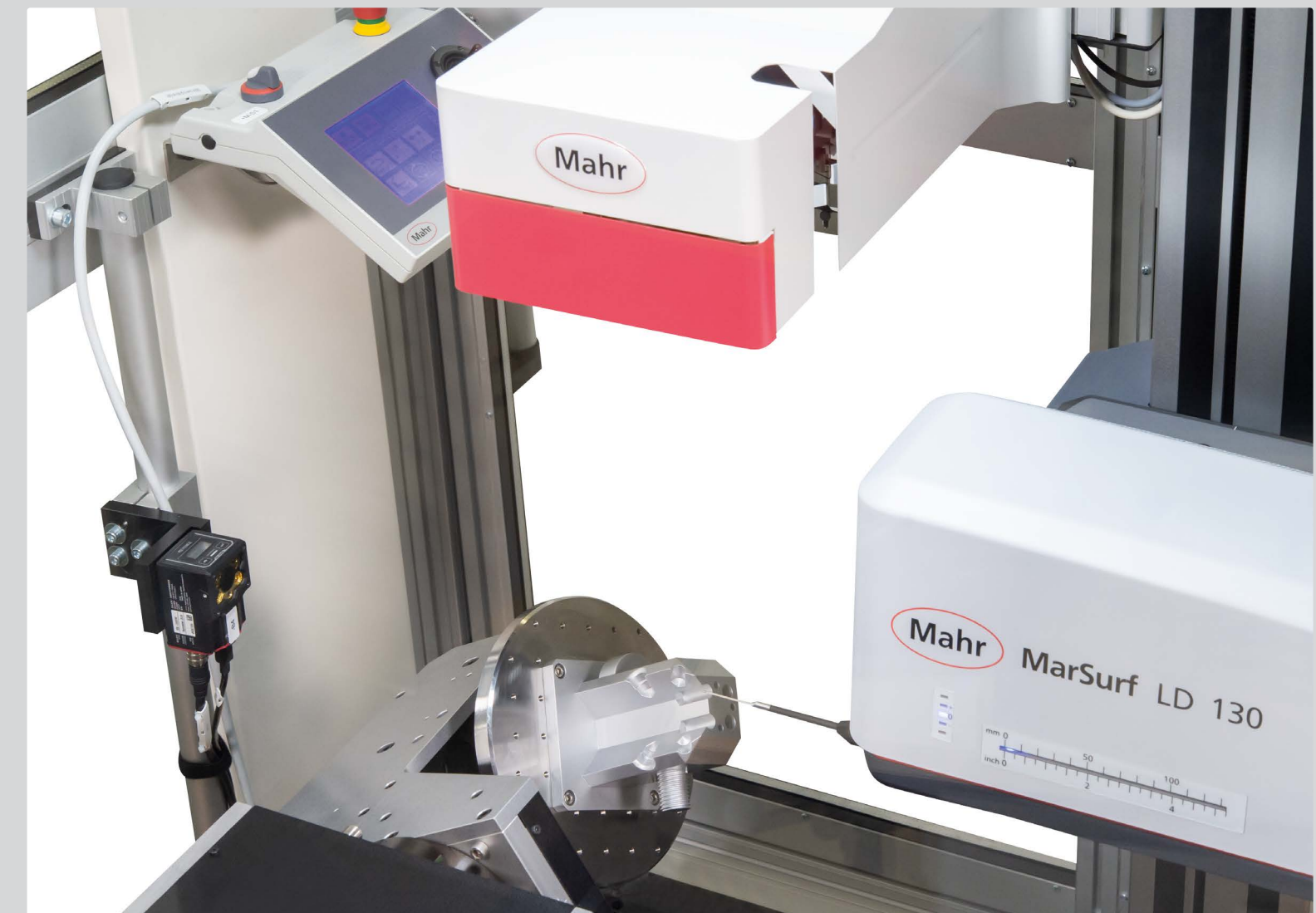
Fully automatic measuring station for **complex parts**

The **MarSurf Engineered Series 1000** measuring station has three linear and two rotation axes for workpiece positioning. It is ideal for small workpieces weighing up to around 10 kg and with a volume of up to 1 liter, e.g. nozzle bodies or axle components.

- Reproducible measurement and a fully automated measuring routine allow for fast and accurate positioning
- All sorts of workpieces can be reproducibly fixed using the pneumatic zero-point clamping system
- Even measurements that are difficult to set manually are achieved fully automatically
- Automatic probe arm change minimizes operator influence on the measuring results



Gallery



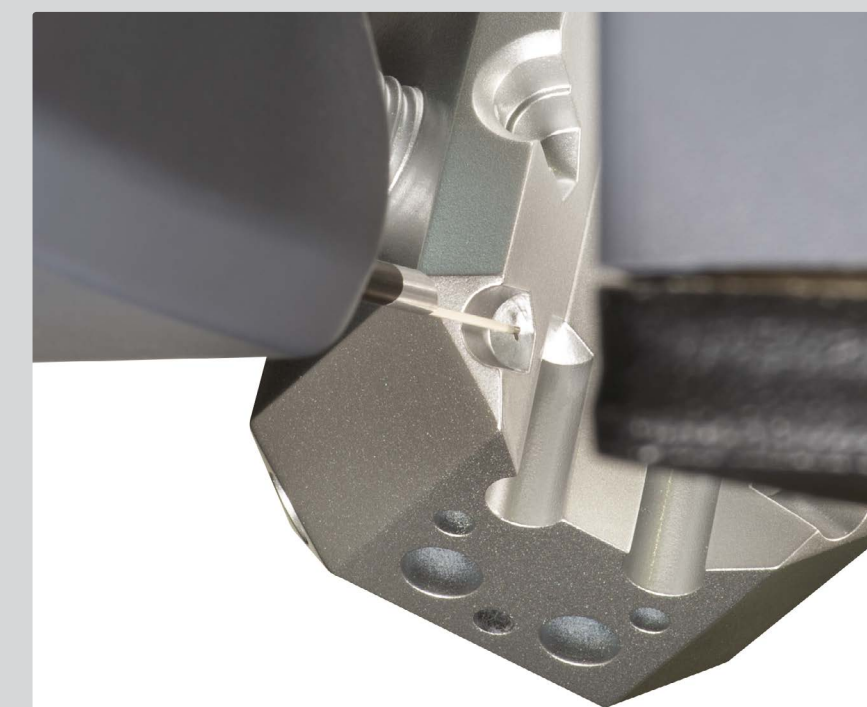
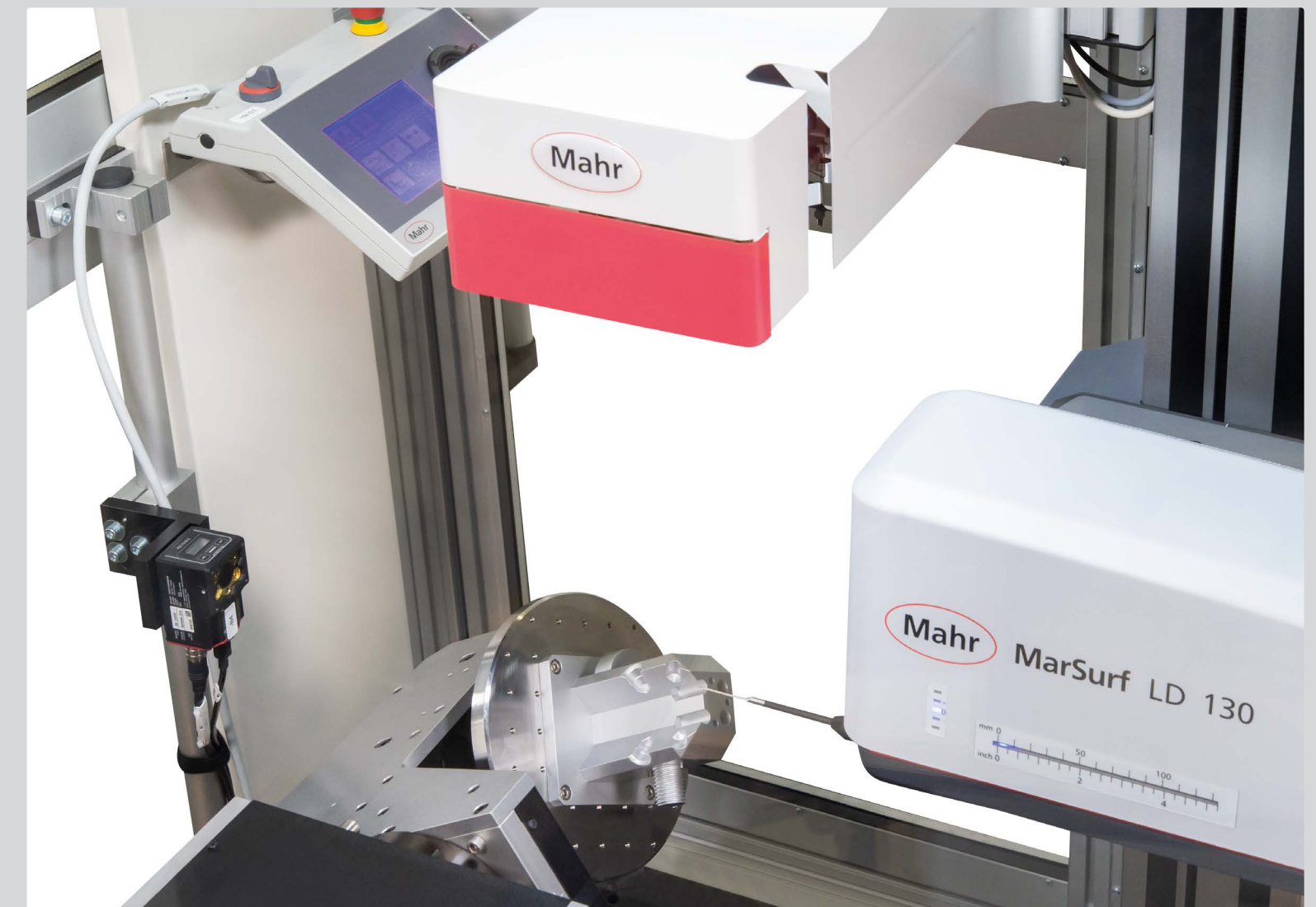
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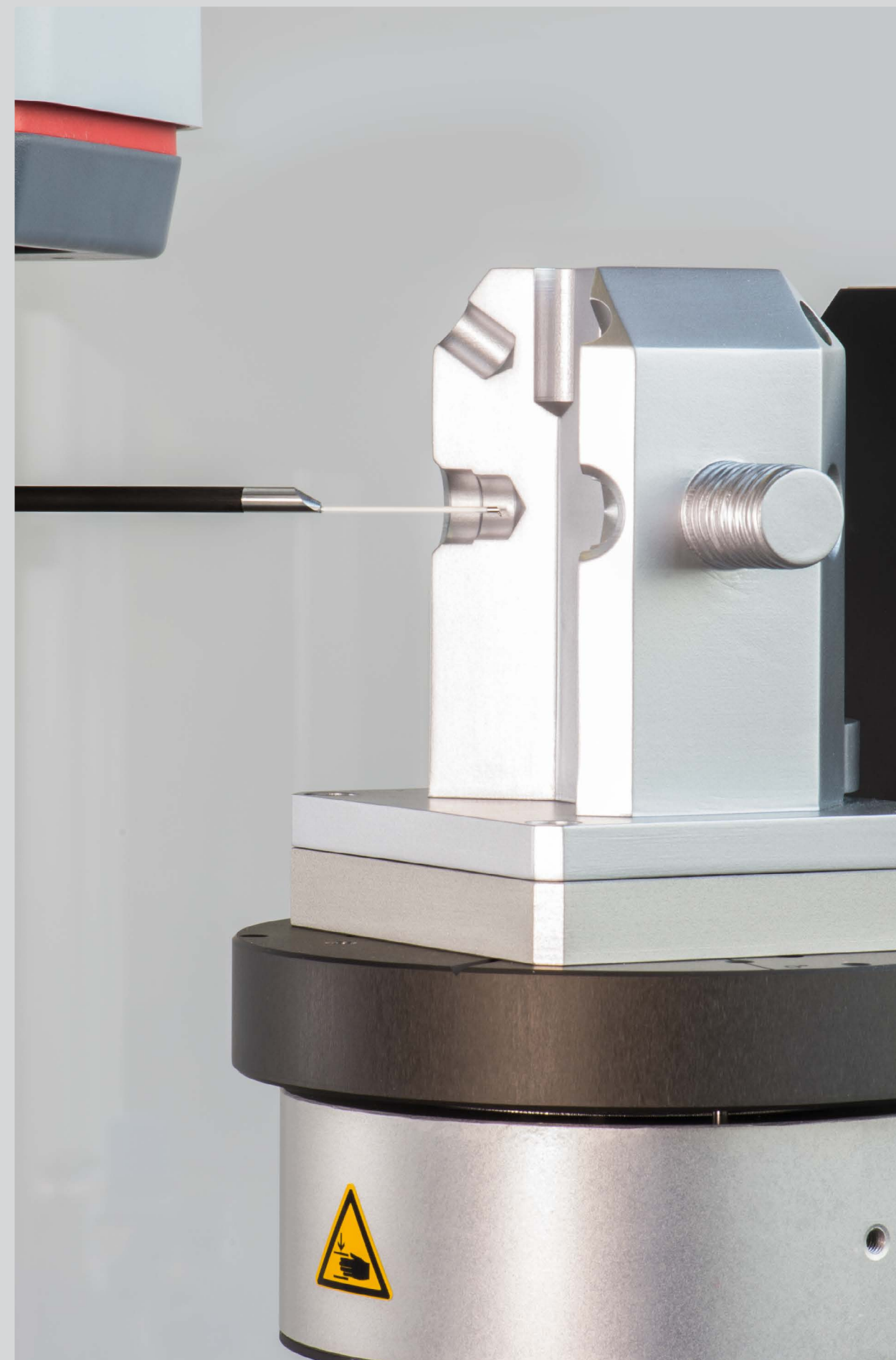
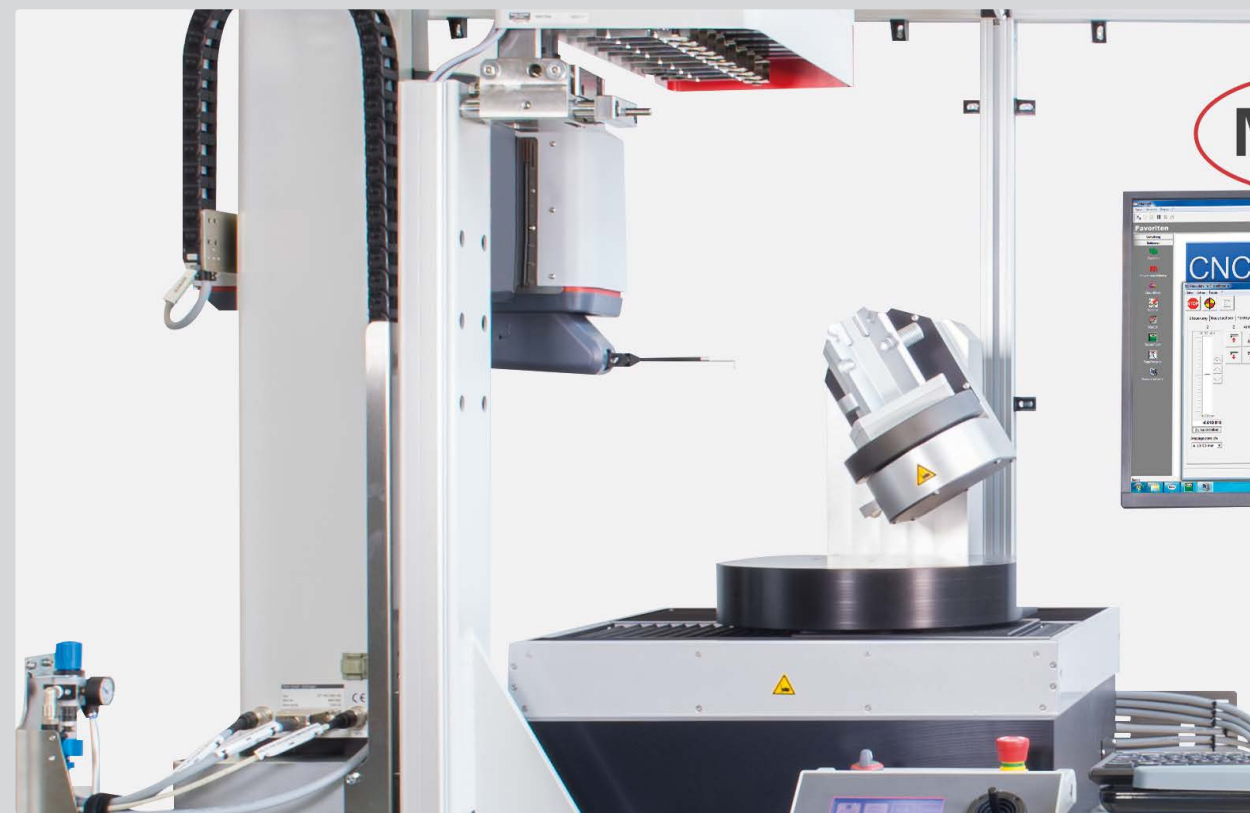
Fully automatic measuring station for **small workpieces**

With its fully automatic procedure, the **MarSurf Engineered Series 1200** measuring station offers maximum economic efficiency and flexibility for the measuring room or alternatively for the production environment.

- The automatic probe arm changer (optional) allows for maximum automation and fully automatic processing of a wide variety of measuring tasks
- The high measuring and positioning speeds of the MarSurf LD 130 as a contour and roughness measuring instrument offer time savings of up to 50%
- Automatic alignment and positioning of workpieces by means of two linear axes and three rotation axes
- No manual setup of workpiece holders required



Gallery



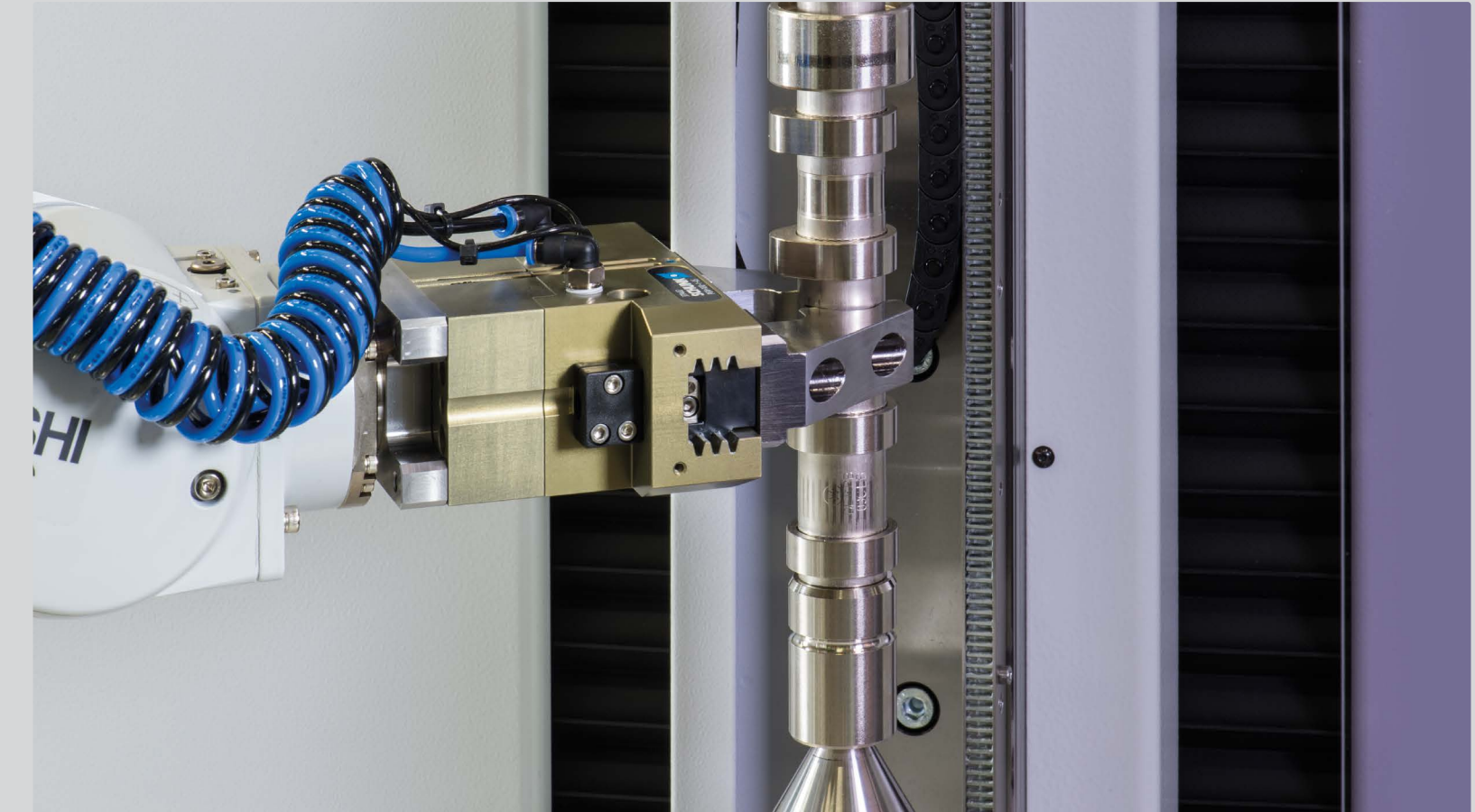
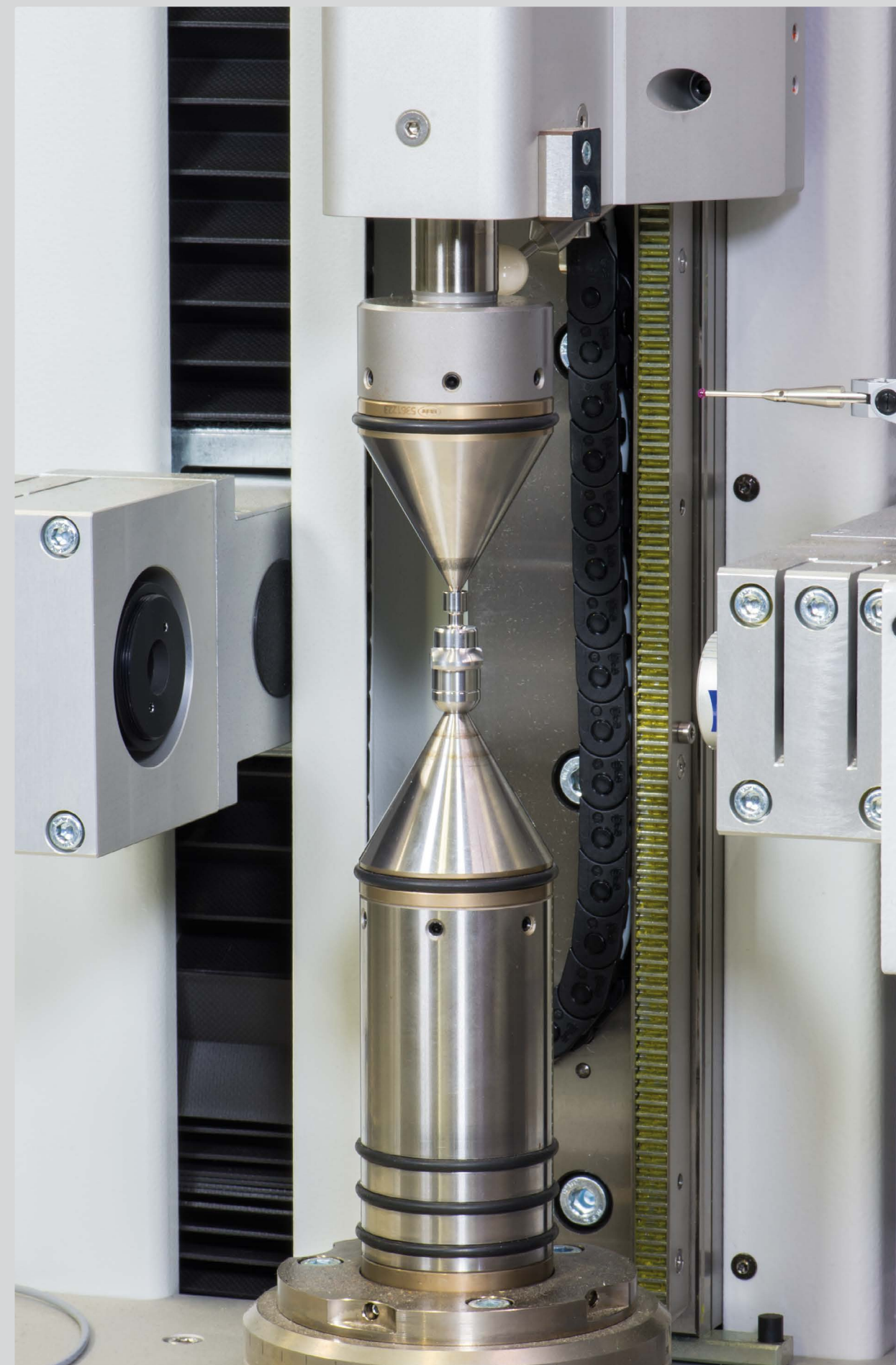
MarShaft Scope 750 plus with robot loading

The **MarShaft Scope 750 plus** measuring instrument from Mahr offers robot loading and automated measurement.

- Fully automated quality assurance, without operator influence, round the clock
- Measuring process integrated into the existing production environment, through fully automatic robot loading and the proven performance features of the MarShaft Scope family
- If an additional measuring machine is needed, the robot can transfer the workpiece to different stations
- With the fieldbus interface in the MarWin platform software, measuring stations from all product groups can be easily integrated into the production process



Gallery



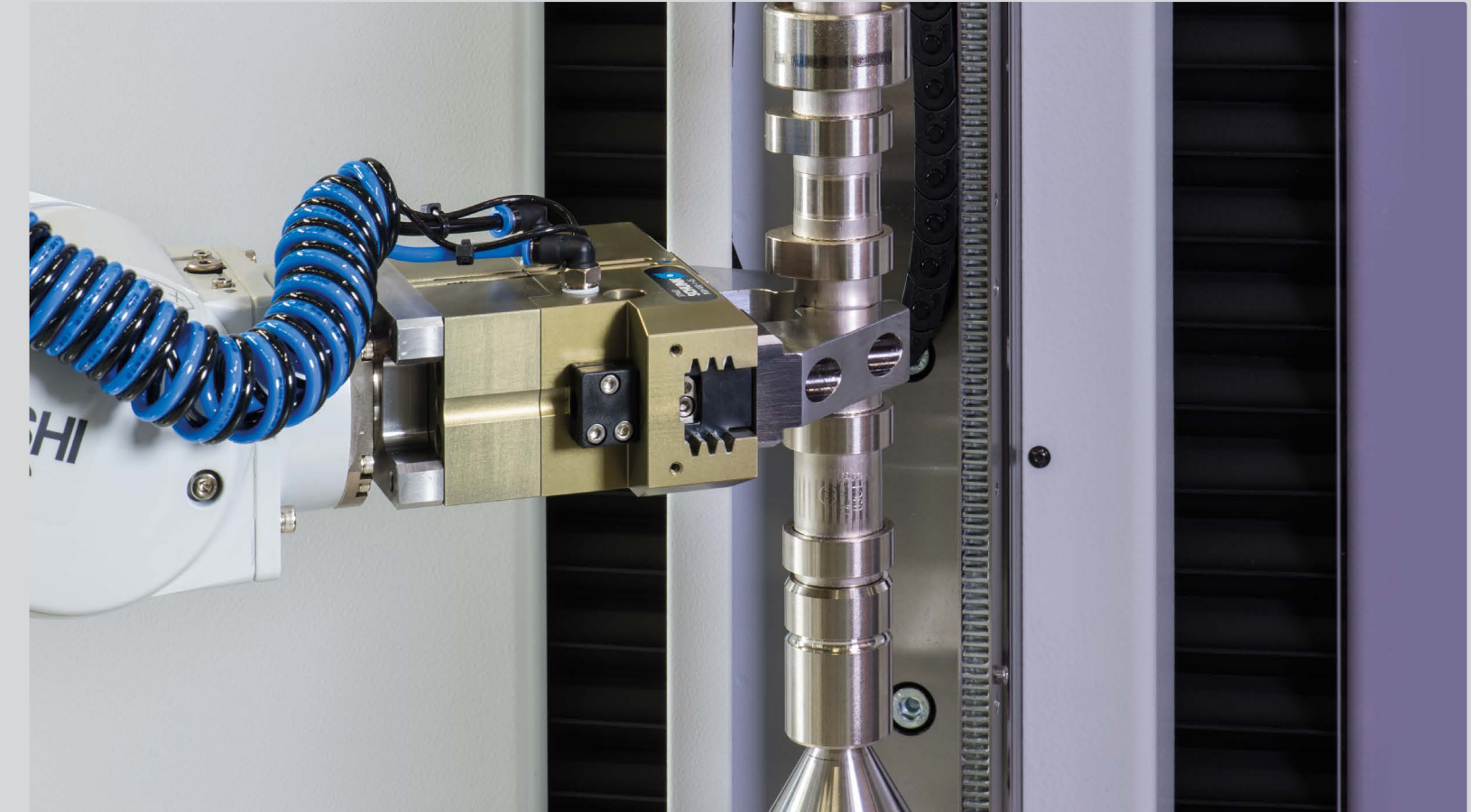
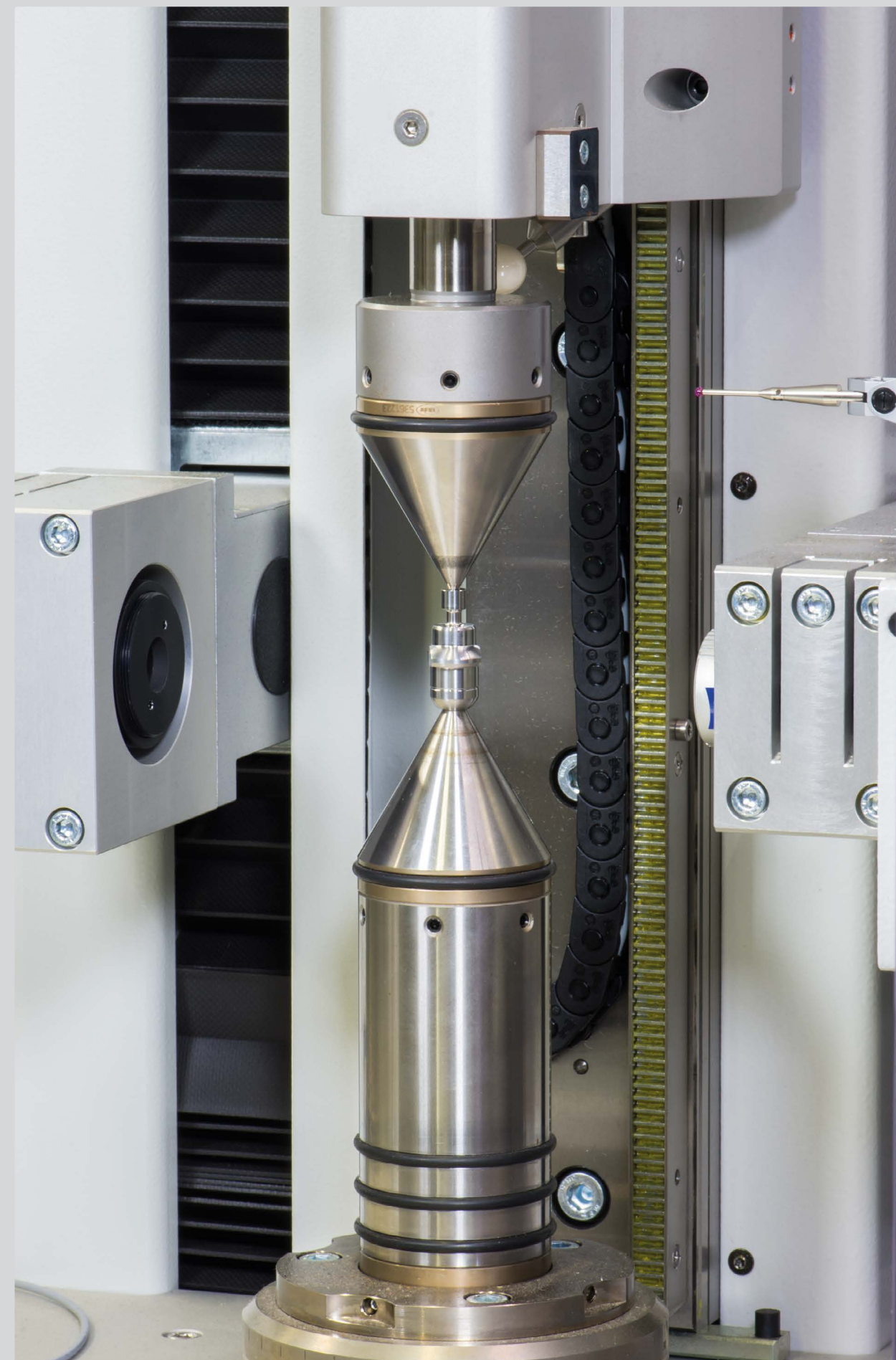
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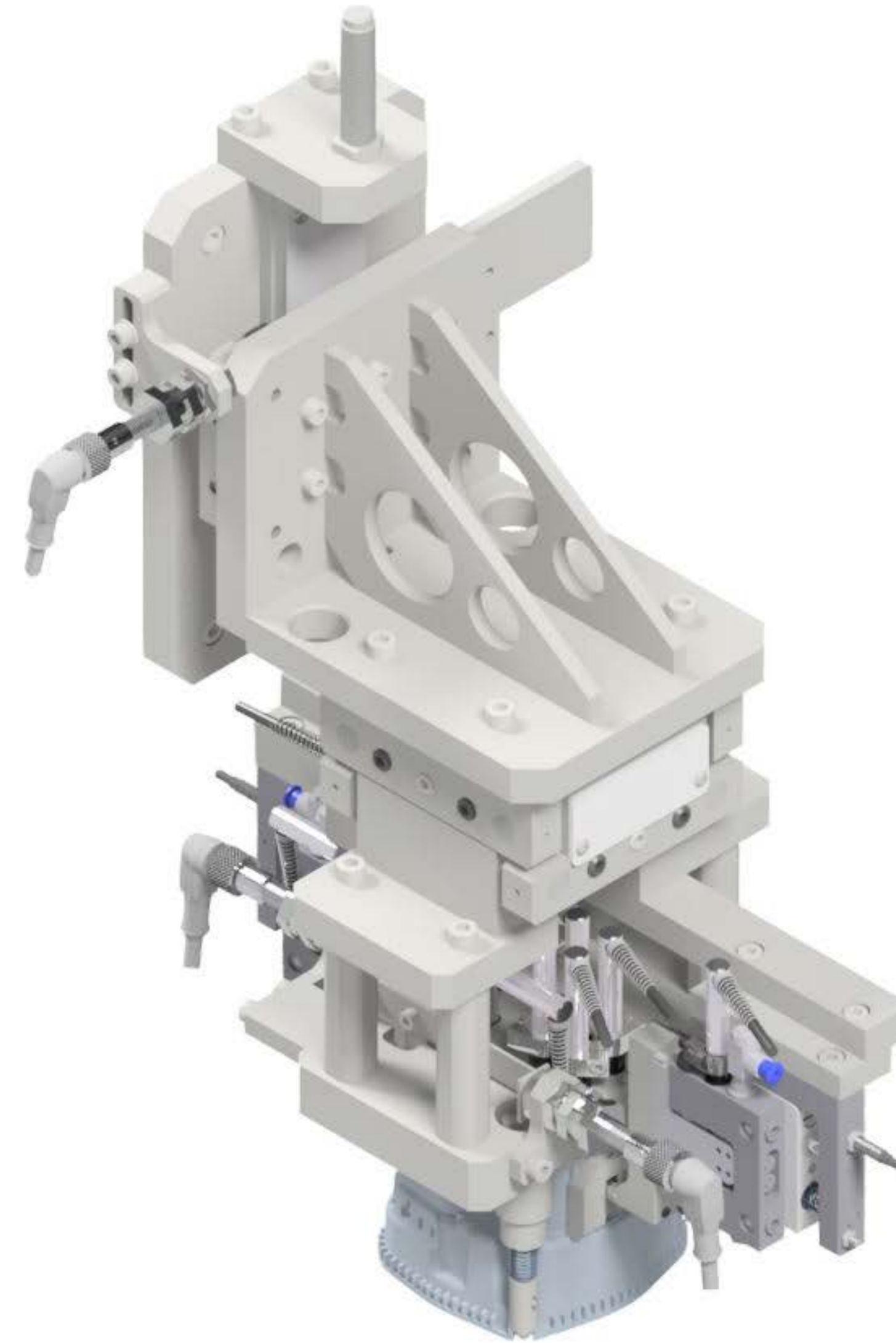
Gallery



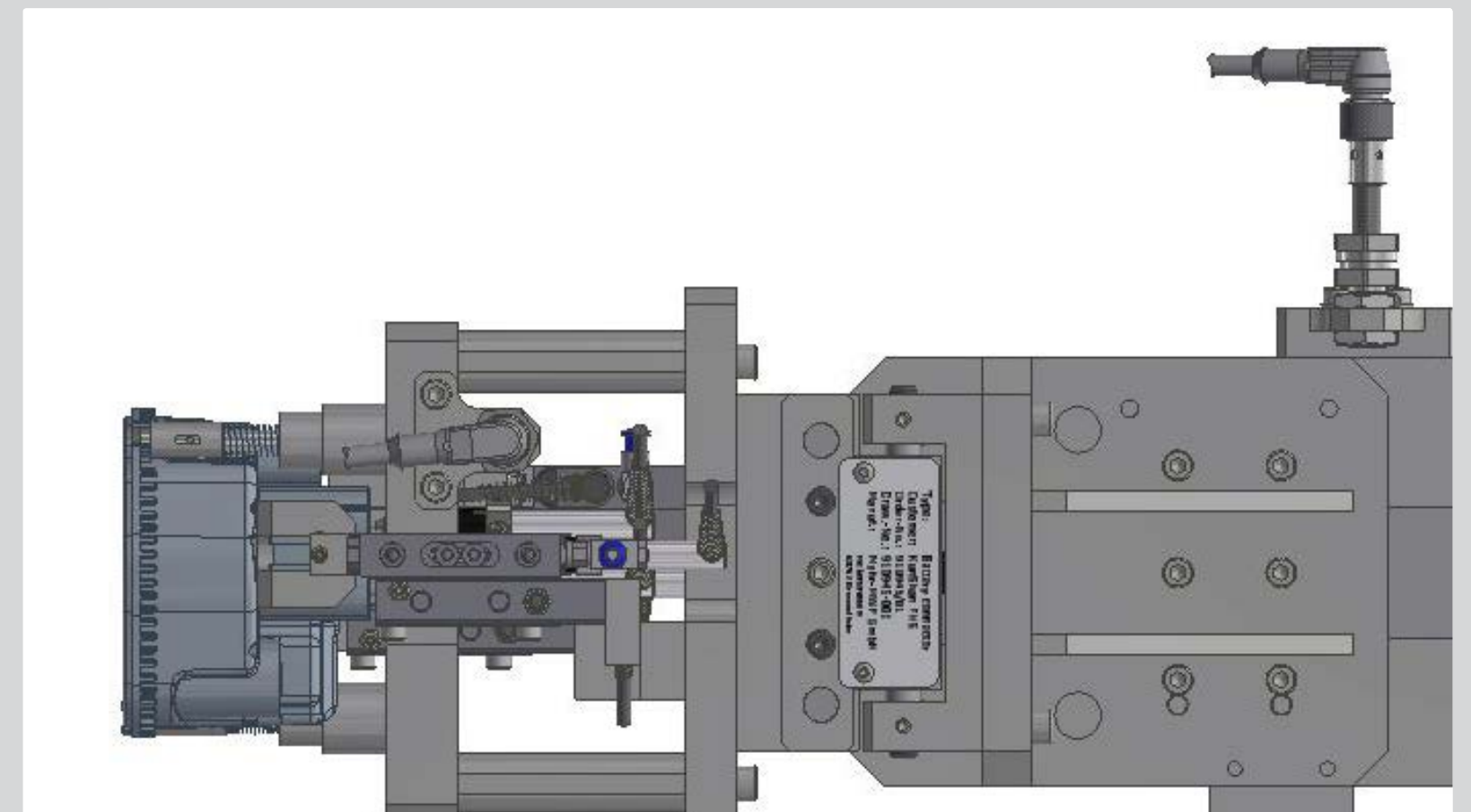
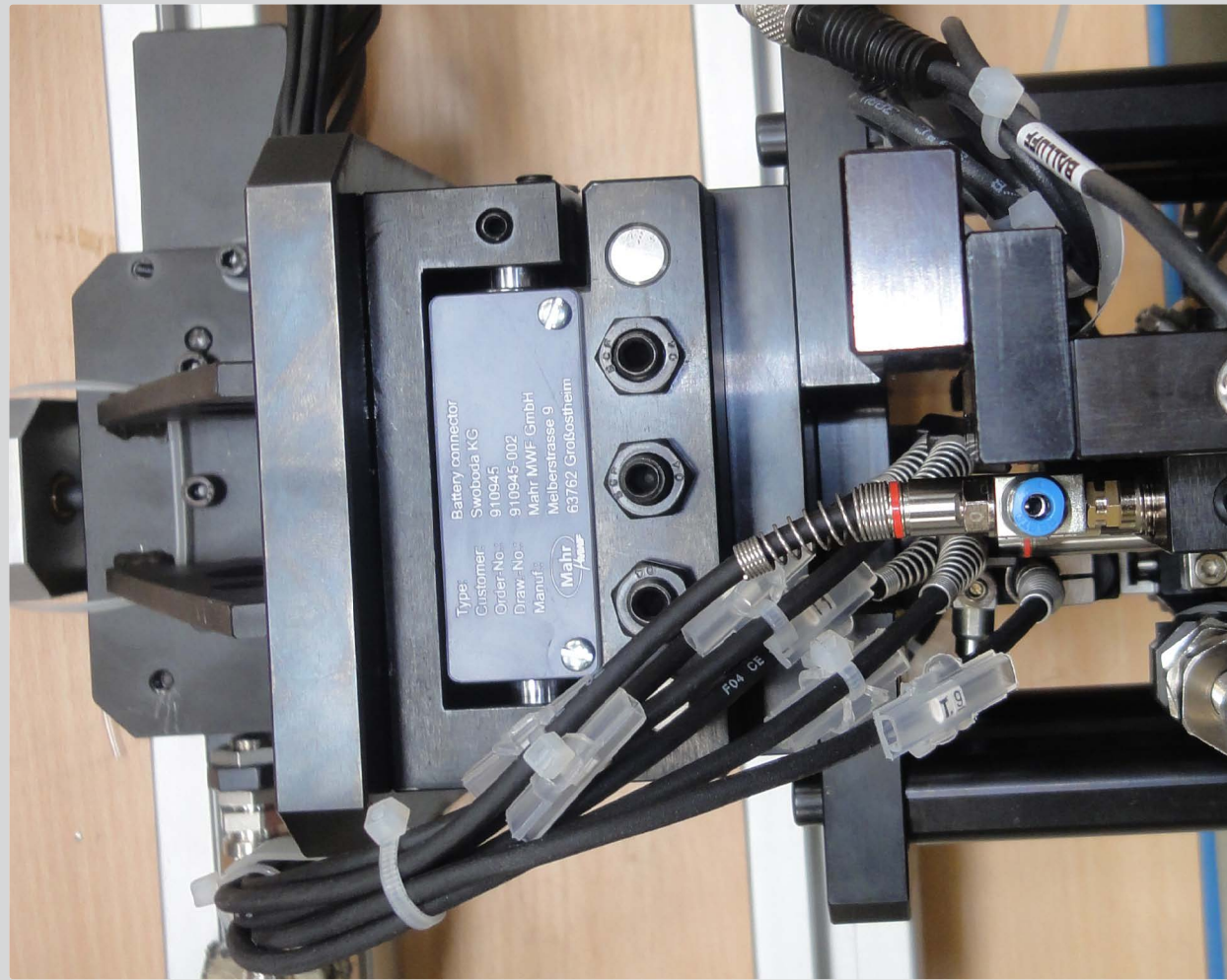
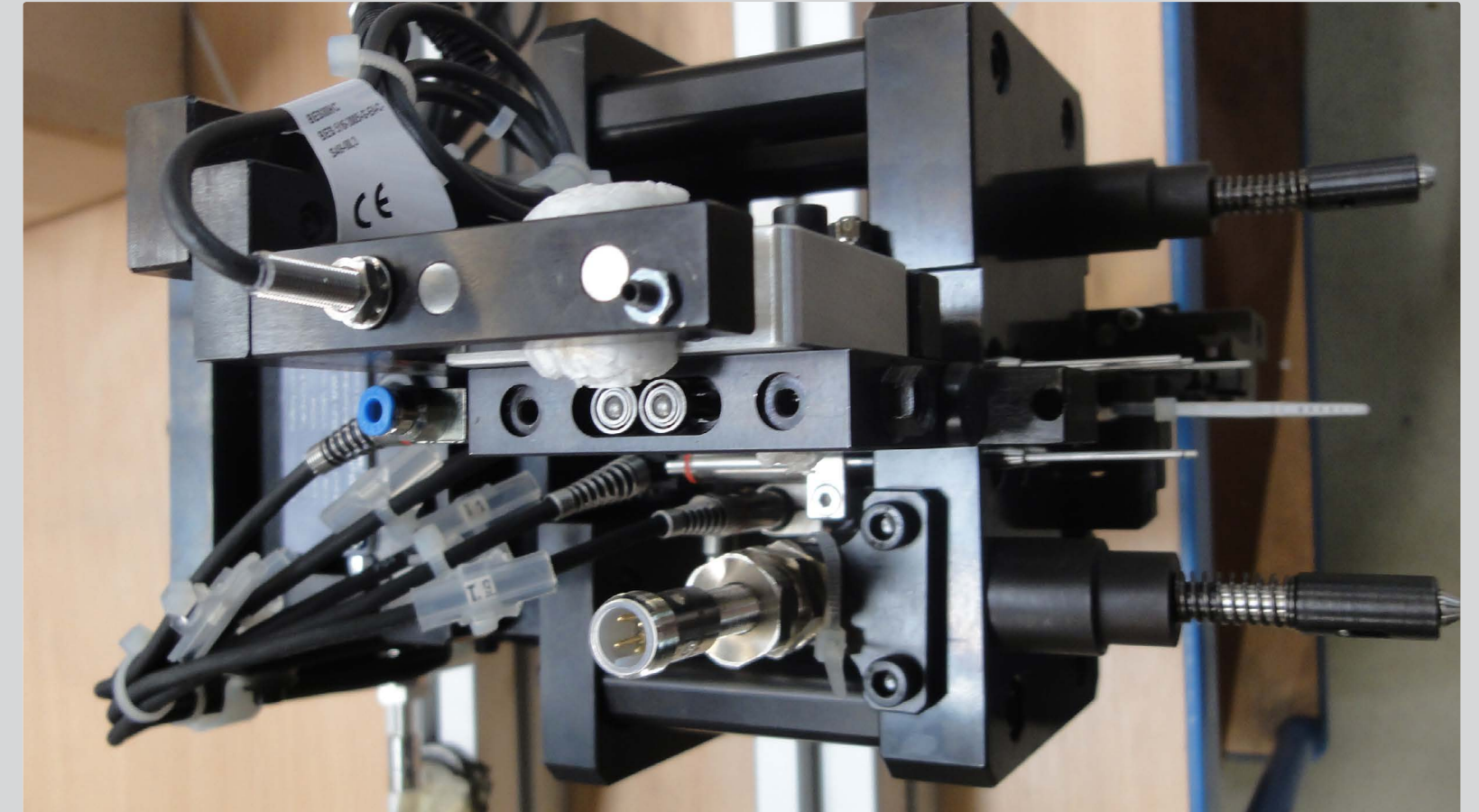
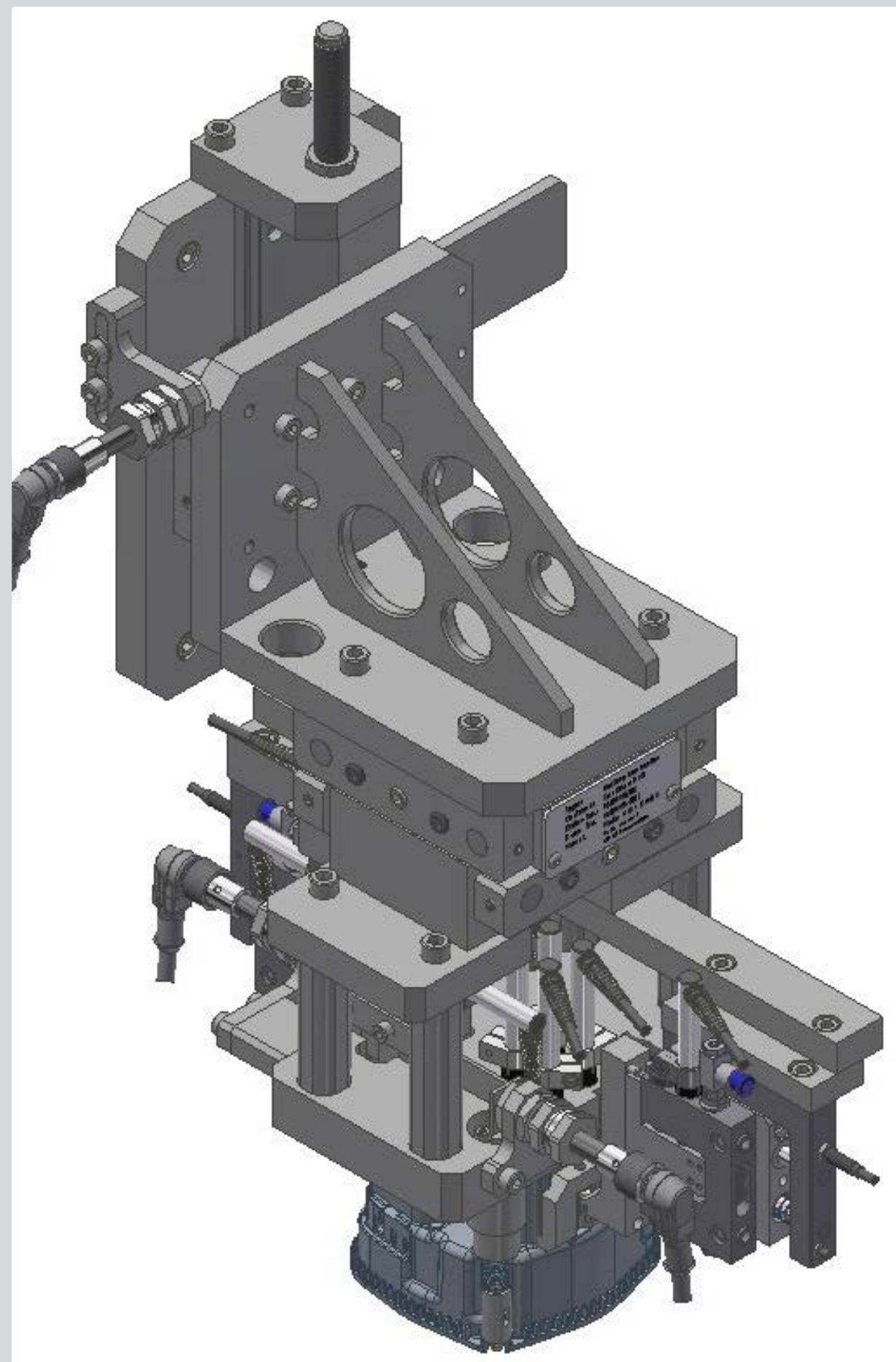
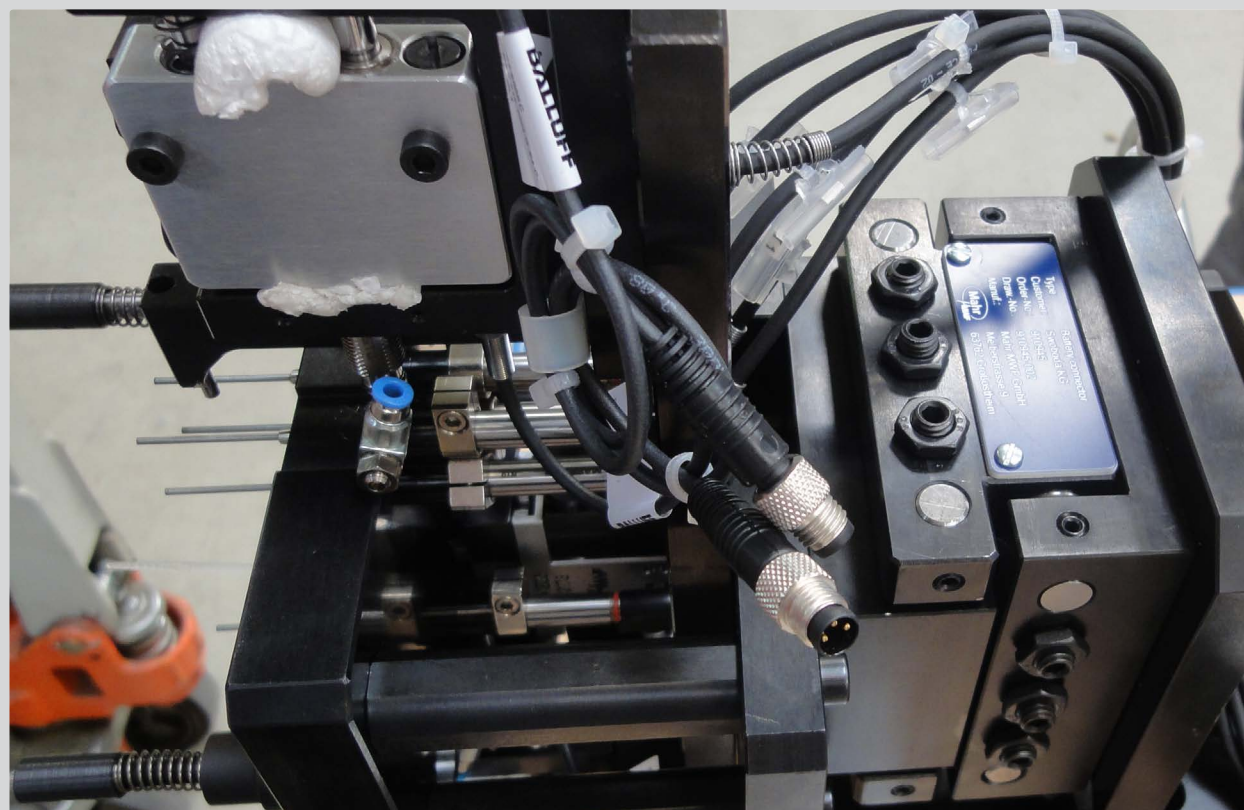
Measuring device for **battery connectors**

This measuring device can measure multiple features of a battery connector simultaneously. Its compact design provides versatile and flexible connection options. The measuring elements are pneumatically controlled.

- Flexible connection options
- Measuring head can be started and stopped pneumatically



Gallery





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