

ZEISS Car Body Solutions

Systematic Quality Assurance in Car Body Construction



We make it visible.



A black and white photograph. In the background, a man is seen from the chest up, looking out of a car window. He has a slight smile. The foreground is dominated by a large, dark, curved object, possibly a car's body part, which is out of focus. The lighting is soft, coming from the left.

The moment perfection, not a single
dimension makes all the difference.
This is the moment we work for.



In the line. In the measuring room. And in-between. ZEISS Car Body Solutions.

ZEISS is a one-stop partner for systematic quality assurance in car body construction: from measurement and inspection technology to the fixtures up to quality data management and service. All products and services from ZEISS are compatible with each other – for maximum quality and productivity.



ZEISS Car Body Solutions

IN LINE

Inspection

3D in-line inspection in the production cycle

AT LINE

Coordinate measuring technology

Fast measurements near production

OFF LINE

Coordinate measuring technology

Maximum precision in the measuring room

Service, software, fixtures, reporting, quality data management

IN LINE**AT LINE****OFF LINE**

Three pillars for complete inspection in car body construction.

ZEISS Car Body Solutions – benefits

- Complete, fully compatible product and service offering
- Customer-specific solutions based on the existing production structure
- Flexible and efficient solutions for smart factories
- Integrated software platform from the measuring room to production

IN LINE



In-line inspection

Quality inspection must keep up with the fast pace of highly automated car body production. Robot-guided optical sensors from ZEISS measure and inspect all parts without interrupting the production cycle. The quality of selected characteristics can thus be monitored with almost no loss of time. Networking with ZEISS PiWeb opens up entirely new potential to use the quality data in a smart factory.

AT LINE



Coordinate measuring technology next to the line

Increasing demands on flexibility and productivity also affect quality assurance. For this reason, ZEISS is using robot-guided optical measuring systems to move coordinate measuring technology closer to production. ZEISS at-line systems are known for their robustness and speed. As an extension of the measuring room near production, they enable more frequent random sampling.

OFF LINE



Coordinate measuring technology in the measuring room

If large parts, assemblies or mounted car bodies need to be inspected comprehensively and highly precisely, there is just no getting by the measuring room. The ZEISS portfolio ranges from fixtures to flexibly configurable measuring machines, optical and contact sensors, measurement and quality data software, up to a global service offering.

Every part



Typical application

End-line inspection of relevant characteristics in the production cycle, e.g. in 54 seconds.

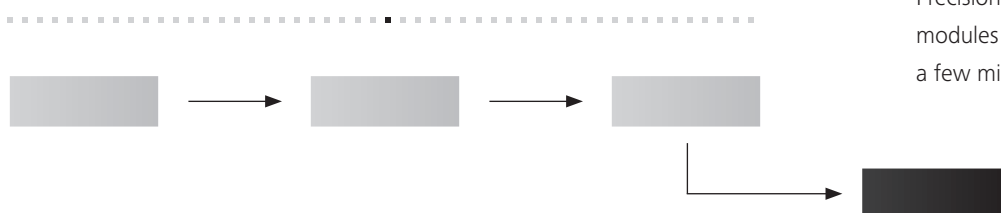
Every x^{th} part



Typical application

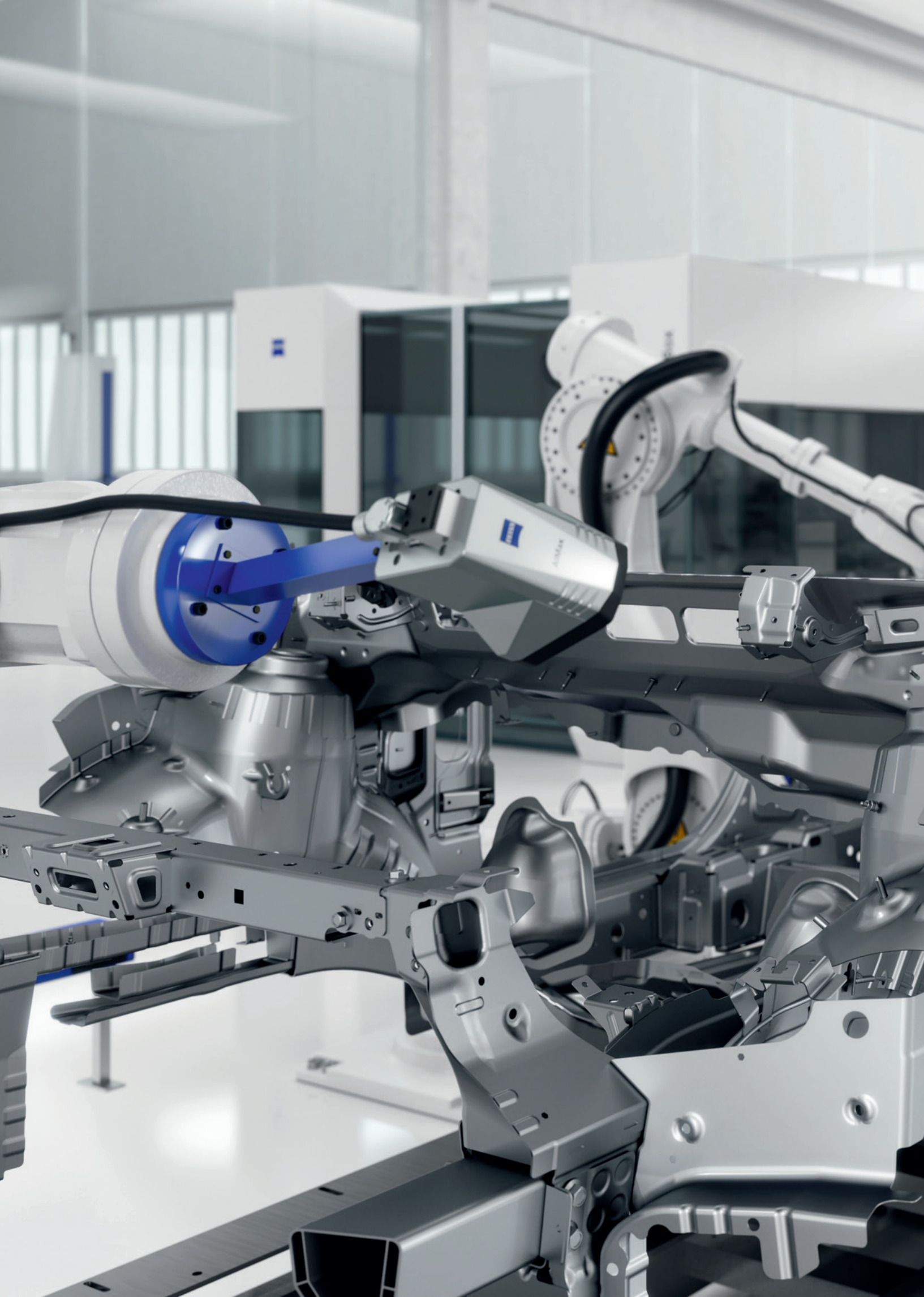
Complete optical scan of attachments in 5-15 minutes.

Fewer parts daily or weekly



Typical application

Precision analysis of parts or modules with a measuring time of a few minutes to several hours.



The background image shows a robotic arm with a blue sensor tip inspecting a car body part on a production line. The arm is white with blue accents and is positioned over a large, metallic car body component. The background is a blurred industrial setting with other machinery and bright lighting.

IN LINE

AT LINE

OFF LINE

100 percent without skipping a beat.

100 percent in cycle.

ZEISS In-line Solutions.

ZEISS Automated Inspection boasts decades of experience in optical 3D and 2D measuring technology, as well as in robot guidance. With several hundred robotic installations around the globe, our 3D in-line sensors are among the most widely used in car body construction. We plan and create entire in-line measuring systems in accordance with customer requirements. We achieve maximum flexibility through our broad technology and knowledge base.

3D in-line measuring technology from ZEISS Automated Inspection

Our services

- Preliminary inspections
- Project planning
- ZEISS sensor technology
- ZEISS software
- Robotics
- IT hardware
- Training
- Maintenance services
- Simulation
- Offline programming

Possible geometry characteristics in 3D in-line inspection



Gap-and-flush measurement



Elongated hole measurement



Bolt measurement

ZEISS 3D sensors combine 2D contour measurement with a 3D measurement using the multiple line triangulation principle. This enables the high-precision, high-speed inspection of complex geometric characteristics (features) in metalworking and in car body construction:

- Gap-and-flush measurement
- Sharp edges
- Delta Z
- Edge measurement
- Highest edge
- Borehole
- Large boreholes with multiple probing
- Probing point and vector of normal
- Bending radius of a theoretical edge
- Corner point with defined distance to theoretical edge
- Theoretical edge
- Bolt measurement with and without thread
- Elongated hole
- Square hole
- Overlapping metal and nut behind metal
- Collared hole



ZEISS AiMax sensor for robotic use



ZEISS AiMax – three measurement principles in one sensor

ZEISS AiMax unites three inspection methods in one sensor head: 3D multi-line triangulation, gray-scale imaging and shadow analysis. This unique combination makes it possible to very quickly and reliably check a wide range of characteristics in a single run. For example, the location of bolts can be inspected while types are detected or data matrix codes imported. The flexible illumination system on

ZEISS AiMax enables optimal illumination and ideal contrasting of difficult-to-measure features. Digital camera technology makes it possible to use signaling lines up to 100 meters.

ZEISS 3D BestFitSense – sensor for tight spaces

ZEISS 3D BestFitSense is a highly compact, 3D sensor for industrial use in stationary in-line measuring technology. Due to its small size, this sensor is particularly

well-suited for hard-to-reach areas. Furthermore, it can be deployed in stationary, fixed sensor cells when a large number of sensors have to be integrated into a small space.



IN LINE

AT LINE

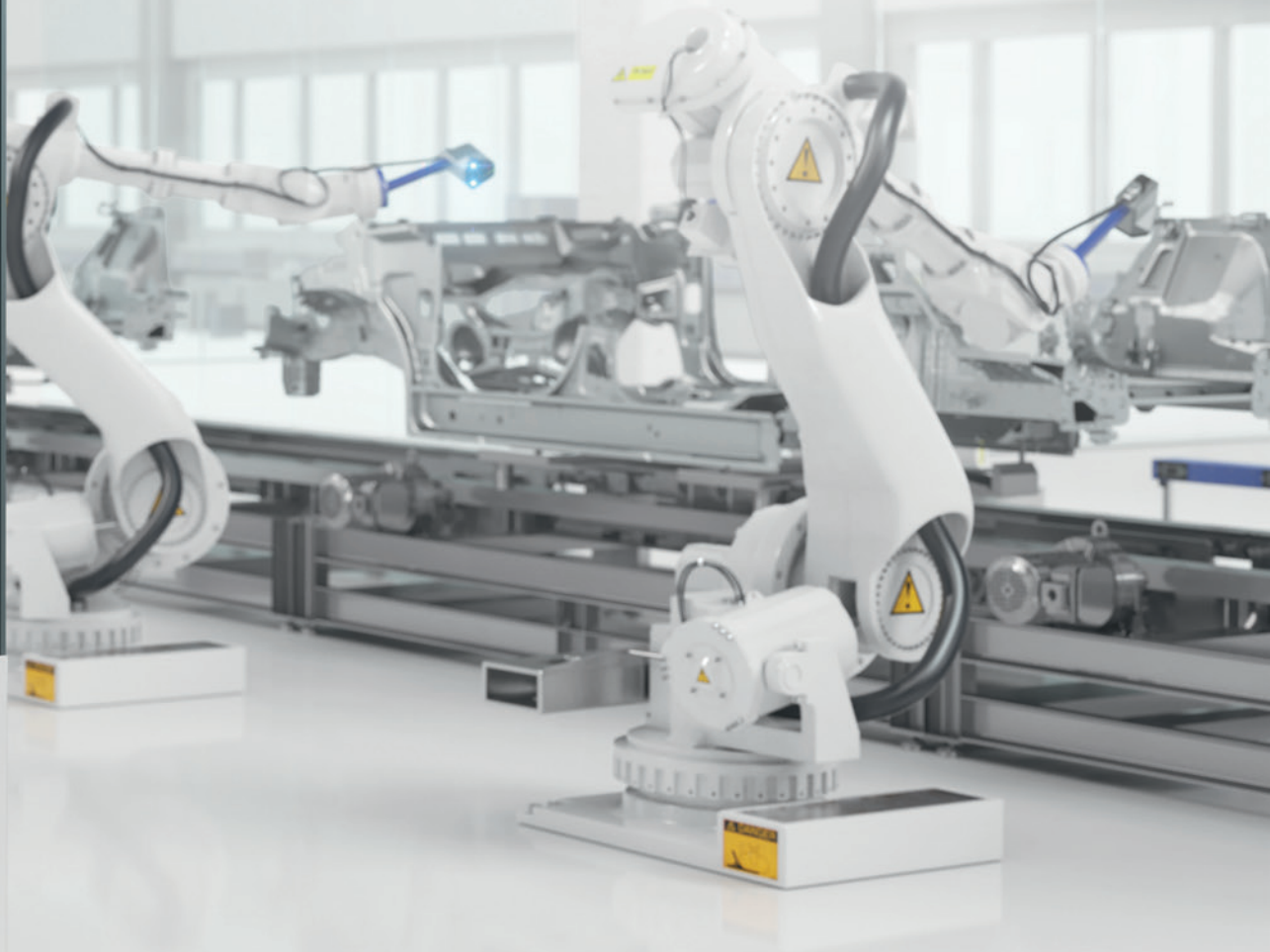
OFF LINE

Take the measuring room to the part.

ZEISS AIBox

The ZEISS AIBox makes traceable coordinate measuring technology available near production. It shortens the trip to the measuring station and reduces the time needed for a measurement through the use of a robot and optical sensors. With ZEISS CALIGO, the same measuring software as in the measuring room is available. This allows the flexible use of measurement plans and personnel.

AIBox



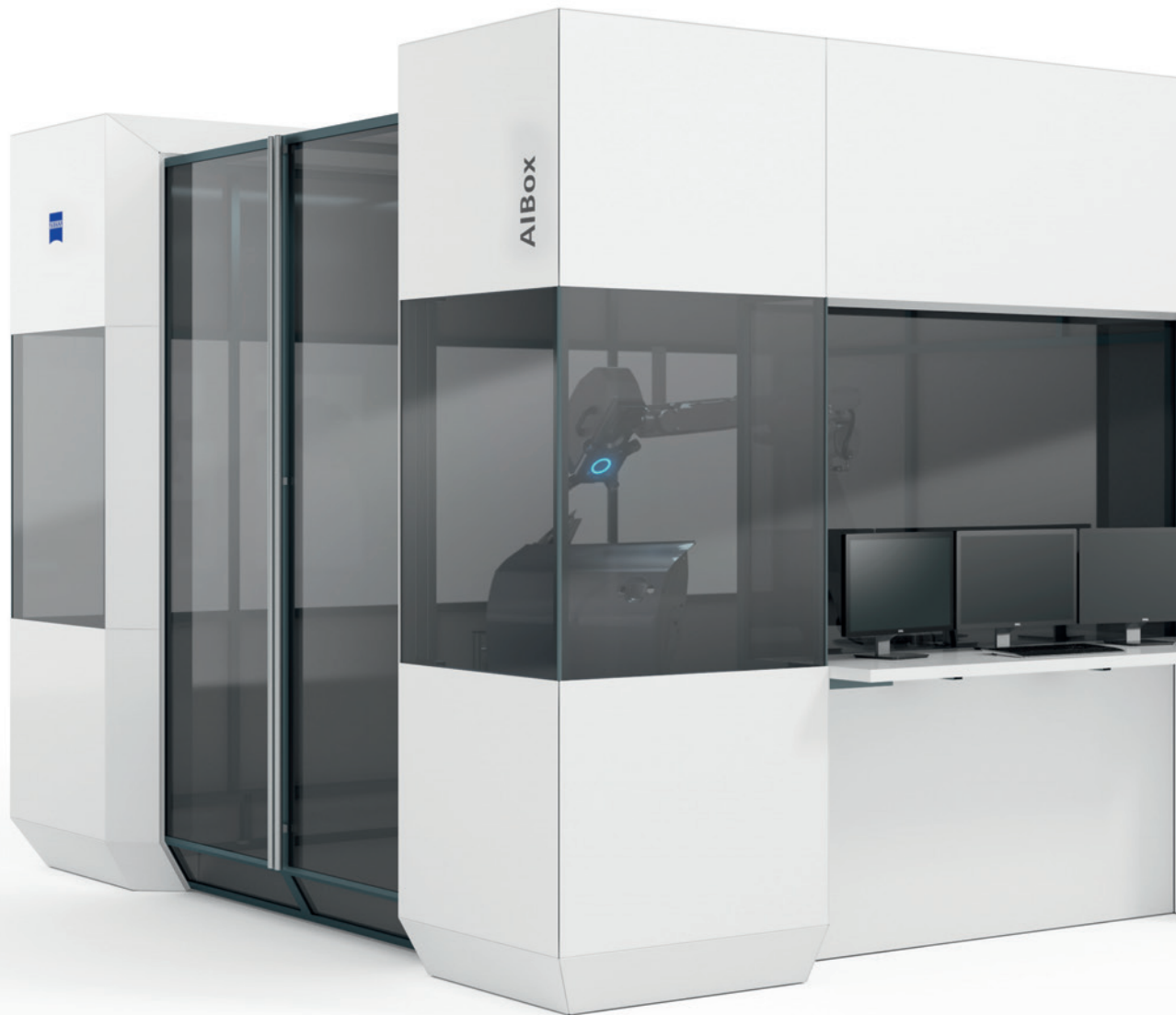
IN LINE

AT LINE

OFF LINE

Quick pit stop. Reliably accurate.

ZEISS AIBox



Advanced total system – ZEISS AIBox

Our services

- Complete enclosure, including robots, sensors, computer workstation and software
- ZEISS sensors
- ZEISS software
- ZEISS CARFIT fixtures
- ZEISS lifecycle services

Fully enclosed, fully protected

ZEISS AIBox features a fully enclosed compartment. It is primarily intended for occupational safety, but also protects the high-resolution measuring technology against external influences. Extraneous light is eliminated by the enclosure, contamination reduced and temperature stability increased.



Robot-guided optical sensors for high measuring speeds

Traceable accuracy

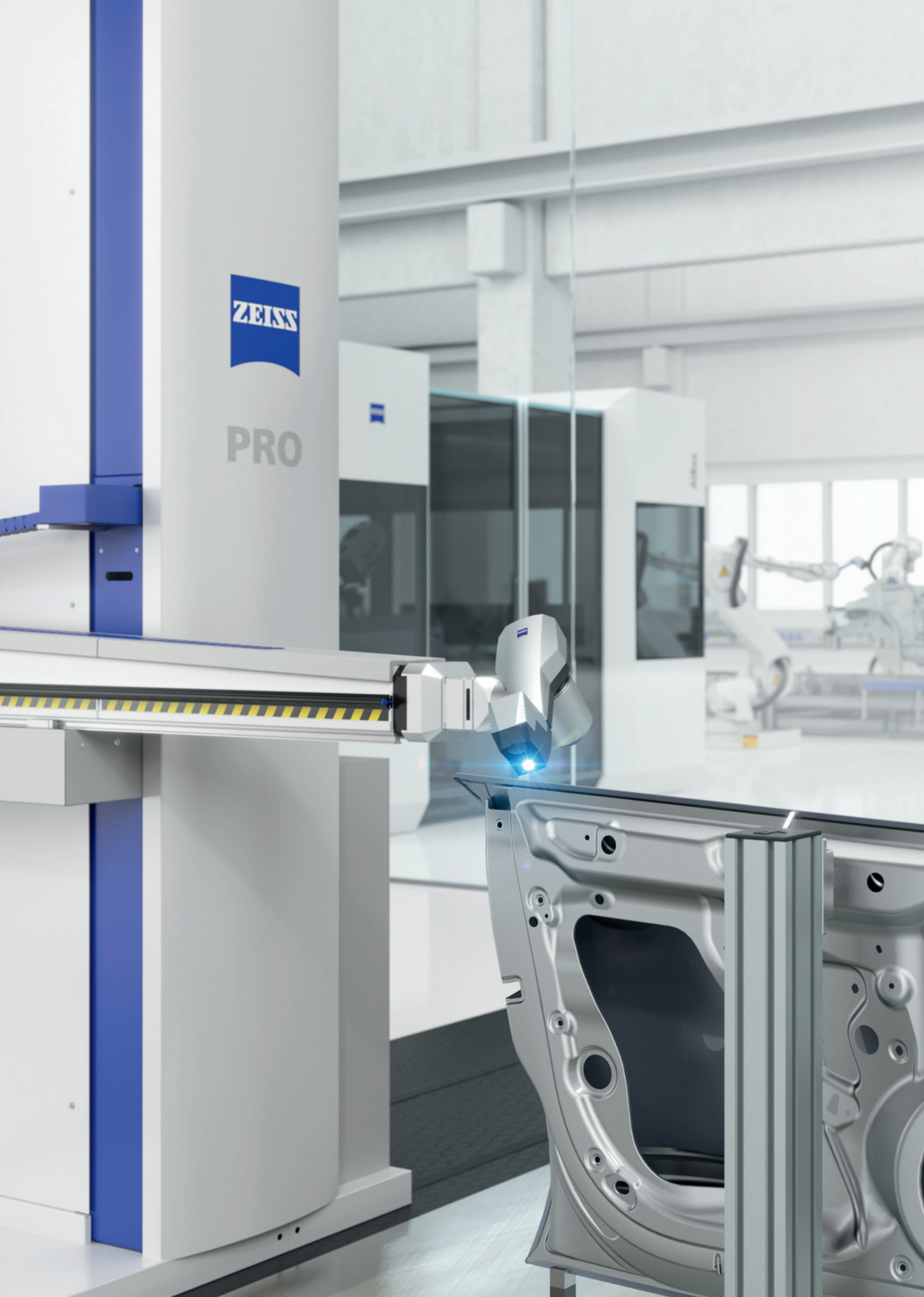
The ZEISS AIBox robot-guided optical measuring system is designed above all for speed. At the same time, it is powered by the measuring expertise of ZEISS. The specified accuracy can be traced to the calibration standard at the German National Metrology Institute (PTB) – and therefore to information that you can rely on at any time.

ZEISS CALIGO measuring software – one solution instead of two

The ZEISS AIBox runs with ZEISS CALIGO measuring software which has proven its value in car body construction. You can continue working with the ease you are accustomed to with ZEISS horizontal-arm measuring machines. Measuring room staff can easily operate the ZEISS AIBox without additional training. Measurement programs can be used regardless of the machine.

Innovative sensors

3D sensors specialized for robot applications allow you to capture part data particularly at extreme speed and precision thanks to the innovative technical features such as blue LED technology. The integrated edge illumination module ensures the high-quality measurement of trimming edges and boreholes. An integrated photogrammetry system provides the foundation for the excellent system accuracy of ZEISS AIBox.



IN LINE

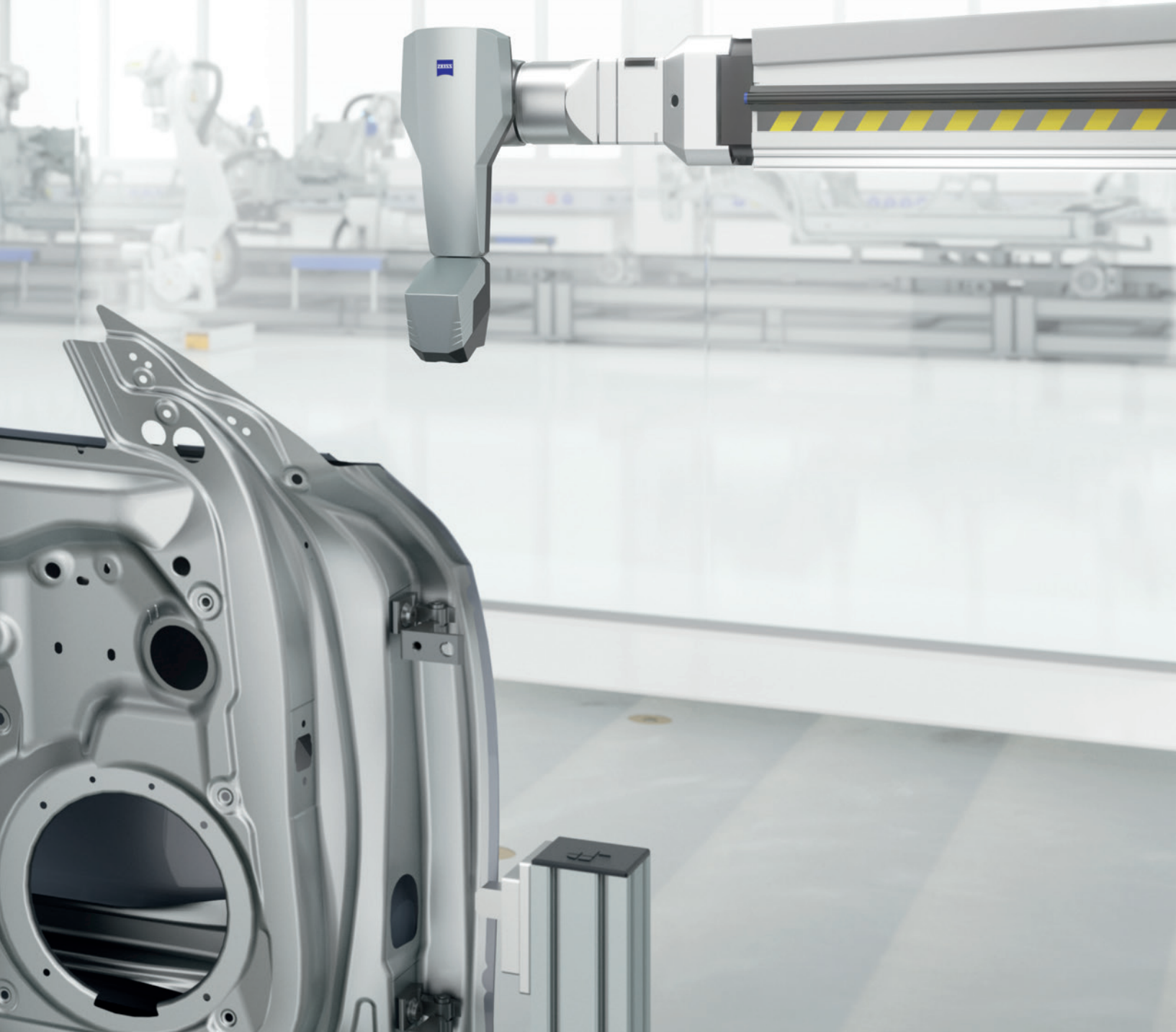
AT LINE

OFF LINE

Measuring certainty.

ZEISS horizontal-arm measuring machines

ZEISS CARMET and ZEISS PRO horizontal-arm measuring machines measure car body parts with reliable accuracy and efficiency – by contact and optically. Is a stable foundation available? How stable are the temperature conditions? How long can the inspection take? ZEISS offers an appropriate and comprehensive solution, including fixtures, software, sensors and service from ZEISS depending on the requirements and environmental conditions at the customer's site.



Systematic leading-edge performance. ZEISS horizontal-arm measuring machines



Our services

- Consultation
- Turn-key measuring room configuration
- ZEISS measuring machines
- ZEISS sensors
- ZEISS styli
- ZEISS CARFIT fixtures
- ZEISS software
- ZEISS lifecycle services

ZEISS CARMET

The standard for a wide range of tasks

MPE E from $35 + L/50 \leq 80$ [μm]

For measuring volumes up to
7000 x 3000 x 2500 (mm)

ZEISS CARMET is an economical total package that leaves almost no wish unanswered while offering ZEISS quality through and through. The trapezoidal Z column, the user and service-friendly design, the high operating safety, good accessibility and quickly calibratable RDS-CAA articulating probe holder are just some of the highlights that come standard on ZEISS CARMET.

ZEISS PRO/PRO T advance

Freely configurable for your benefit

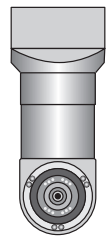
MPE E from $18 + L/125 \leq 50$ [μm]

For measuring volumes up to
10000 x 3000 x 3000 (mm)

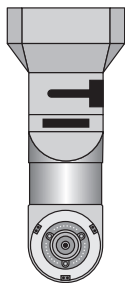
The ZEISS PRO/PRO T advance can be very flexibly configured. For example, ZEISS PRO/PRO T advance can be tuned for economic efficiency or performance depending on your needs – and thus enables maximum performance no matter what the task. Regarding measuring volume, design and sensors, ZEISS PRO/PRO T advance provides maximum flexibility.



ZEISS sensor carriers



ZEISS RDS-CAA articulating probe holder
For ZEISS CARMET/PRO

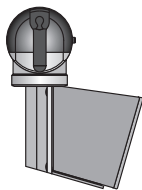


ZEISS CSC continuous articulating probe holder
For ZEISS PRO

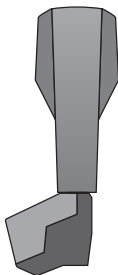
ZEISS sensors



ZEISS RST-P single-point sensor
For ZEISS CARMET/PRO



ZEISS FalconEye optical sensor
For ZEISS CARMET



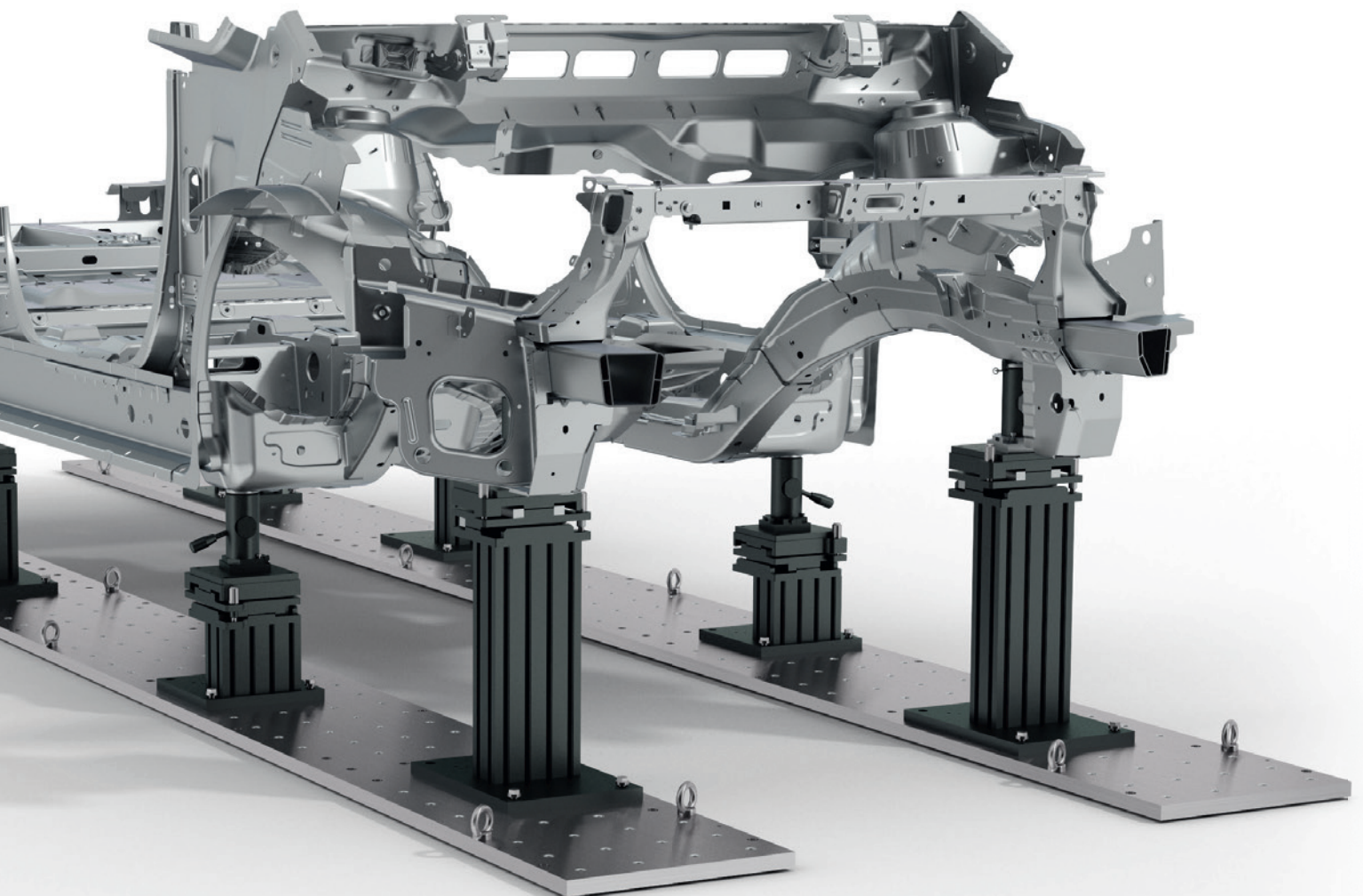
ZEISS EagleEye optical sensor
For ZEISS PRO

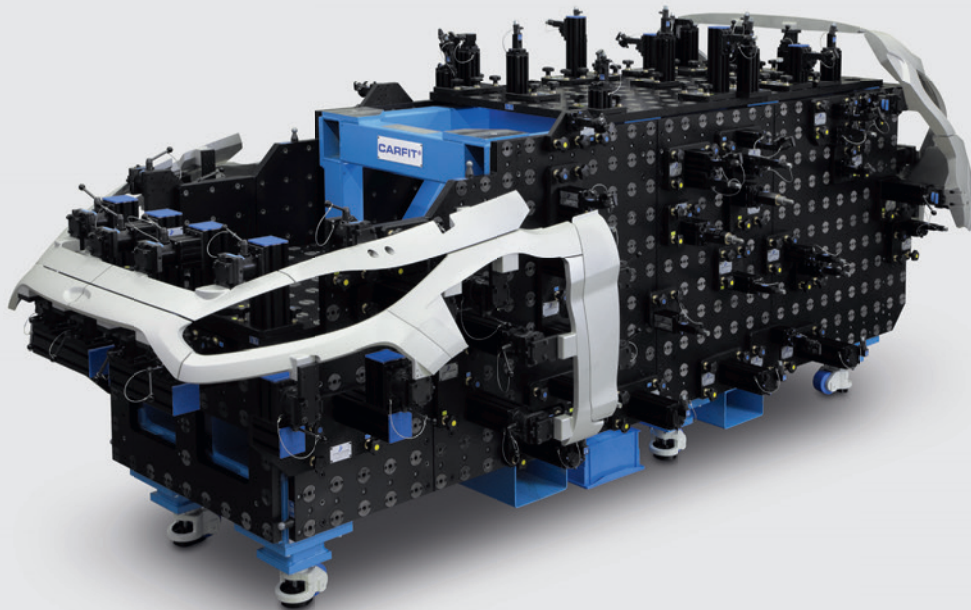
IN LINE**AT LINE****OFF LINE**

Standardized quality. Infinite flexibility.

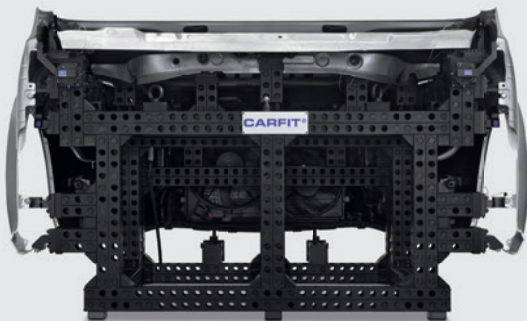
ZEISS CARFIT fixtures

The ZEISS CARFIT modular system has become the international standard for the manufacture of fixtures and inspection equipment. The wide range of available components and their combination possibilities covers an extremely large number of applications. All standard ZEISS CARFIT components are modular, compatible with each other and can be delivered on short notice.





ZEISS CARFIT CMX matching equipment system (Meisterbock)



ZEISS CARFIT CML hole grid profile



ZEISS CARFIT CMO for optical measurements

ZEISS CARFIT technology combines the preferences of customized fixtures with a modular, standardized system design. The extremely wide variety of components enables a very wide range of uses. Part-specific requirements can be easily incorporated. The ZEISS CARFIT system also supports the design of very complex and combined inspection equipment.

ZEISS CARFIT benefits

The ZEISS CARFIT system is known for its unique clamping and joining technology. This guarantees a high degree of precision and repeatability, and also permits fast part change-out.

The system impresses with its ease of use, minimal configuration and modification work, excellent stability and robustness, and good accessibility to the measurement points.

Standardization of the individual system parts creates cost advantages and allows the use of proven technology around the globe – without sacrificing quality and precision.

ZEISS CARFIT line

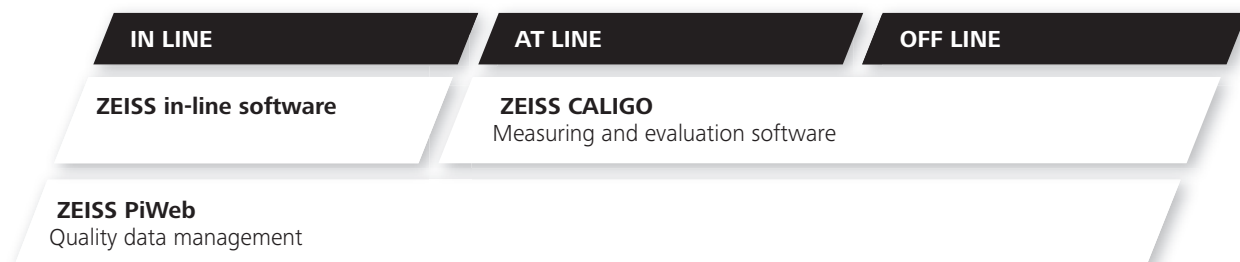
CMB	Kit with hole grid plate
CMP	Kit with profile design
CMK	Kit for small parts
CME	Universal clamping device unit
CMF	For fixturing devices and testing equipment with a framework design
CMS	Support and clamping system – flexible and space saving
CMG	Versatile hole grid plate system
CMX	The line for matching equipment
CML	Hole grid profile system
CMO	System for optical measurements

IN LINE**AT LINE****OFF LINE**

Big data. Big opportunities.

ZEISS Software for car body construction

The intelligent use and networking of all types of process data is a driving, future-oriented subject that offers great potential for quality improvements and increased efficiency. In this regard, the demands on IT structures and software are also growing. ZEISS supports car body manufacturers with a holistic, networked service offering – that is being enhanced on an ongoing basis.



ZEISS in-line software

For in-line inspection, ZEISS uses its own software modules that are ideally compatible with ZEISS sensors. ZEISS in-line software features modules for

- Measurement planning
- Measurement process control
- 3D image processing
- Visualization
- Calibration/error correction

ZEISS CALIGO

Measuring and evaluation software

ZEISS CALIGO provides extensive tools for analysis measurements, serial measurements, simulations and reporting. ZEISS CALIGO works in the measuring room with ZEISS horizontal-arm measuring machines as well as on the line with ZEISS AiBox.

ZEISS CALIGO highlights

- User-friendly interface
- Extensive simulations
- Simple change management
- Measuring program templates
- Automatically generated travel path around a safety sheath
- Colored display of freeform surface errors
- Finished report templates and individual reports

ZEISS iDA

Offline programming system for car body construction

ZEISS iDA software supports measurement planning and offline programming for car body construction. Measurement plans can be converted to measurement programs with a high degree of automation. The measuring programs created off-line are transferred in the standardized DMIS format to the coordinate measuring machines of various manufacturers. ZEISS iDA accommodates the measuring plan formats of all leading carmakers.



ZEISS PiWeb Quality data management

With ZEISS PiWeb, measuring technology, production and quality management always have access to the latest measurement reports and process data – on-line from anywhere in the world. Informative diagrams, statistical analyses and CAD displays visualize your measurement data and allow you to optimally monitor all your production processes.

PiWeb highlights

- With ZEISS PiWeb, the measurement data of various parts and measuring machines can be quickly merged into a single measurement report.
- Non-ZEISS and manual measuring machines can be easily integrated via open interfaces.
- Templates for diagrams, plots and tables facilitate familiarization and provide the foundation for customized reports.
- The integrated option for the 3D visualization CAD models allows you to view point cloud data on standard laptops.

ZEISS PiWeb consists of three modules:

- **PiWeb Monitor:** on-line quality data and process control with interactive 3D visualization and statistical analyses
- **PiWeb Designer:** easily and professionally design inspection reports; easily integrate form plots and statistical analyses
- **PiWeb Planner:** characteristic and measurement data management, measurement data import, change management, user management

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