MICRO-EPSILON

More Precision

surfaceCONTROL Automotive

Fully automated surface inspection of bodies-in-white

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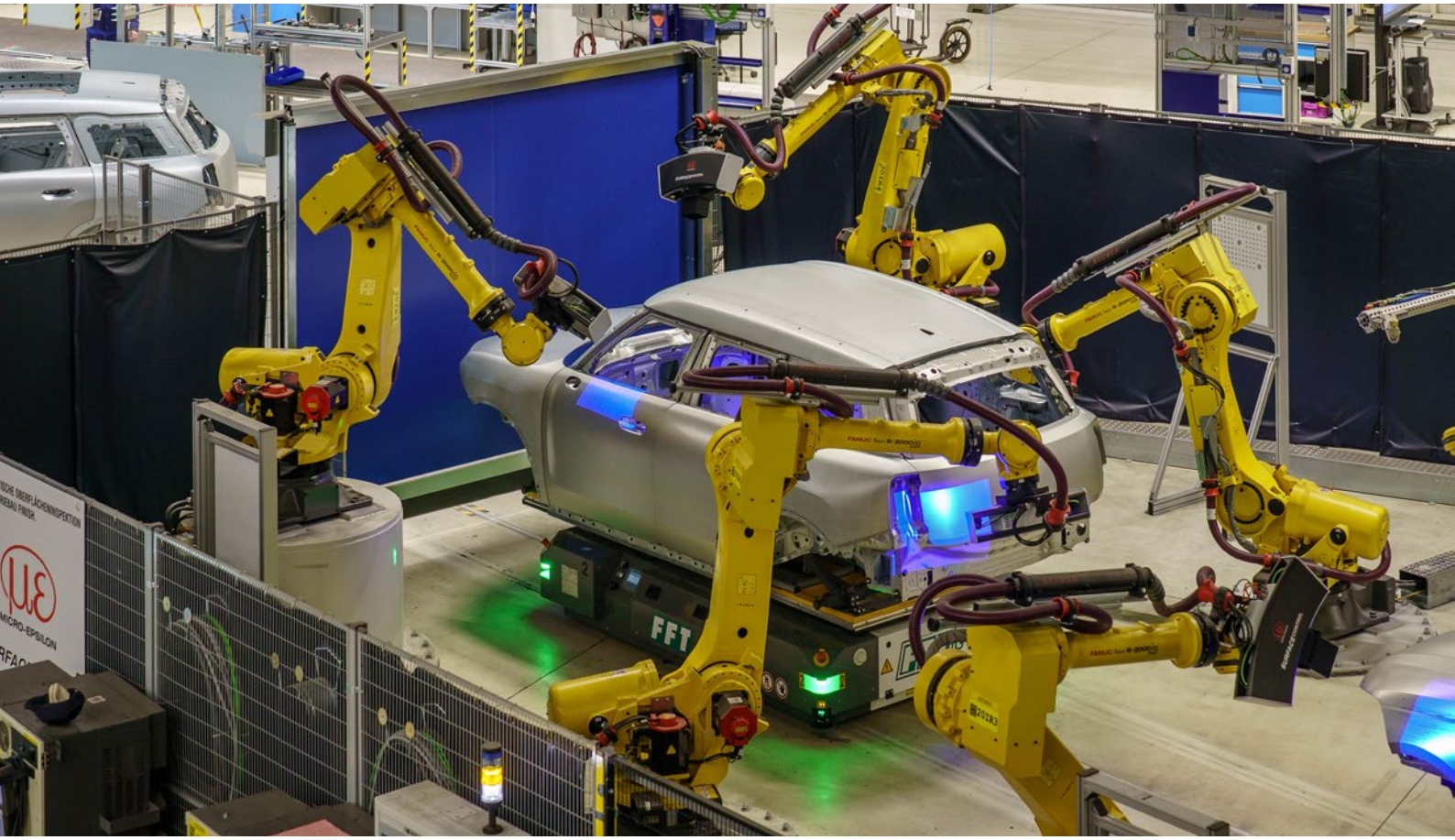
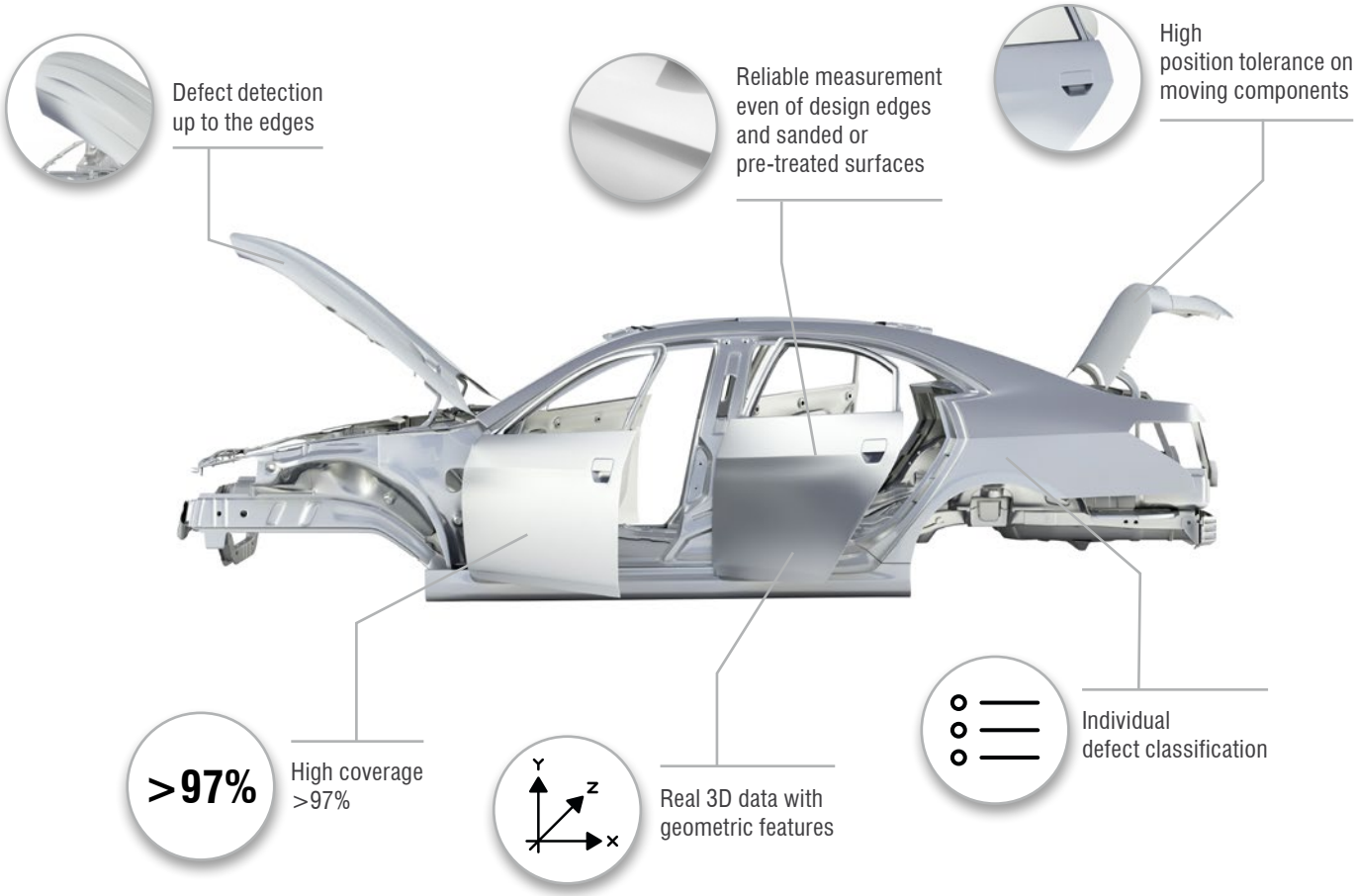


Defect detection on bodies-in-white

The surfaceCONTROL Automotive measuring system is used for fully automated defect detection on bodies-in-white. 3D sensors detect the diffusely reflective surfaces based on the principle of fringe projection. Using a learning process, local shape defects such as dents, bumps, notches, and scratches are detected with high precision and repeatability and evaluated objectively.

Configured to customer specifications, the system comprises sensors, robotics, computers, software and interfaces. The number of sensors and robots can be scaled flexibly – ideal for different cycle times and throughput requirements.



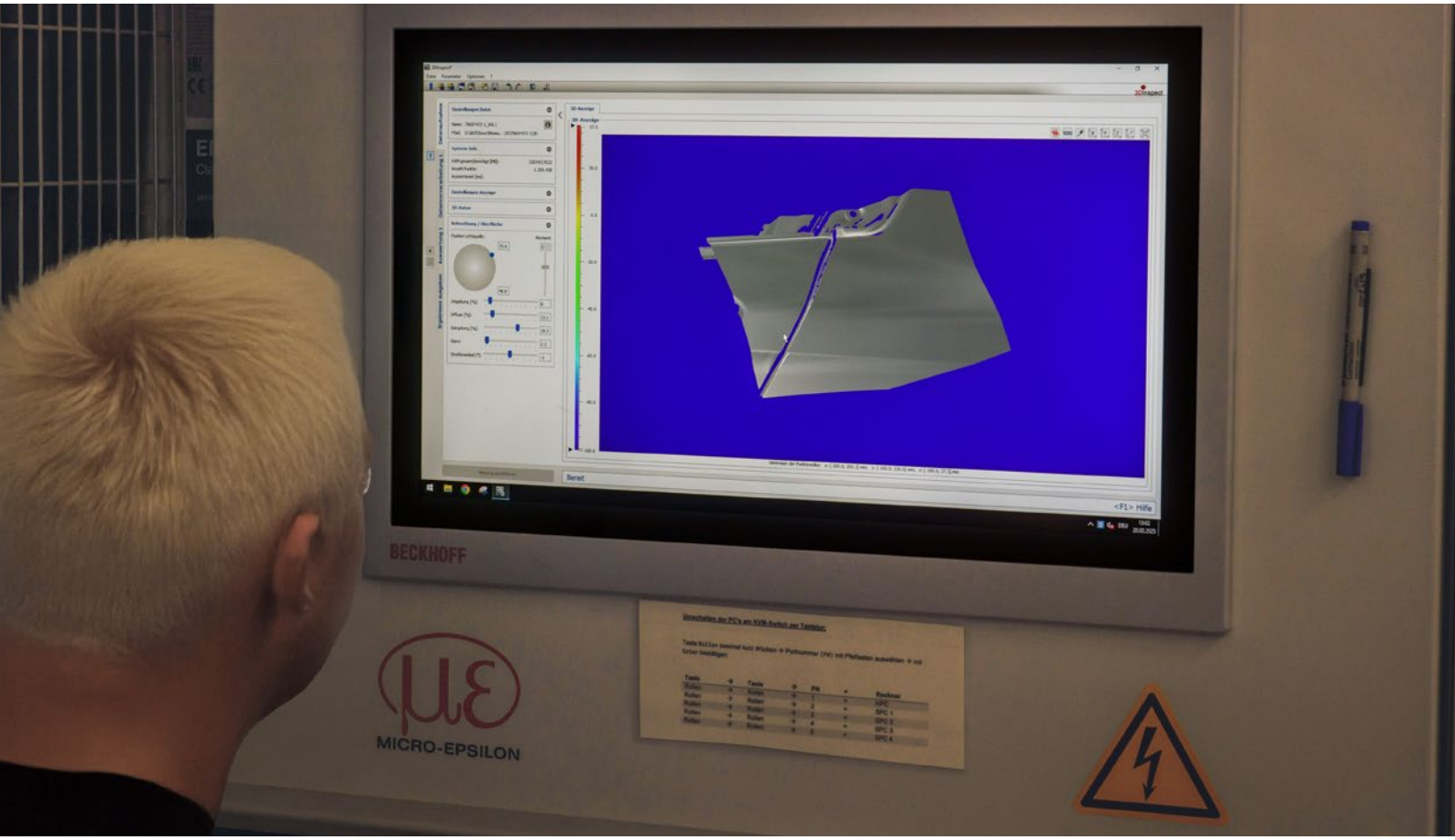
Fully automatic inspection with highest detection rate

surfaceCONTROL Automotive impresses with a very high defect detection rate in the inspection of bodies-in-white. The inspection system detects shape deviations right up to the edges, as well as on design edges and in strongly curved areas, such as door handle recesses. surfaceCONTROL systems also detect defects on pre-treated surfaces of bodies-in-white with high reliability. With outstanding area coverage of more than 97%, the systems enable fully automatic operation allowing bodyshells to pass directly.

One partner for the entire project

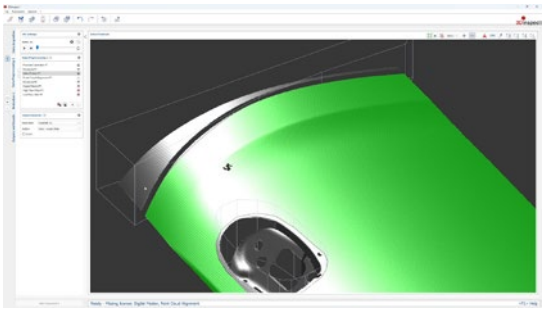
As the main contractor, Micro-Epsilon handles the entire project planning. This includes measurement technology, robot design and planning, integration into existing control systems and data, and the implementation of data and software interfaces. Micro-Epsilon also provides service and maintenance packages for the systems.

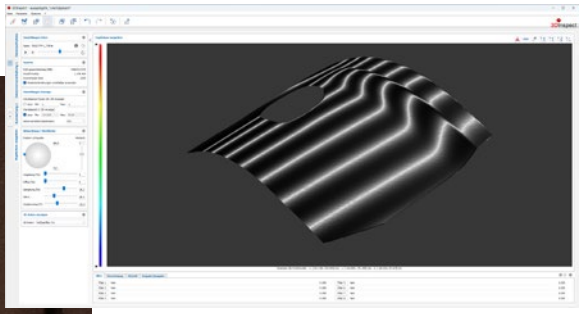
Software package
surfaceCONTROL Automotive

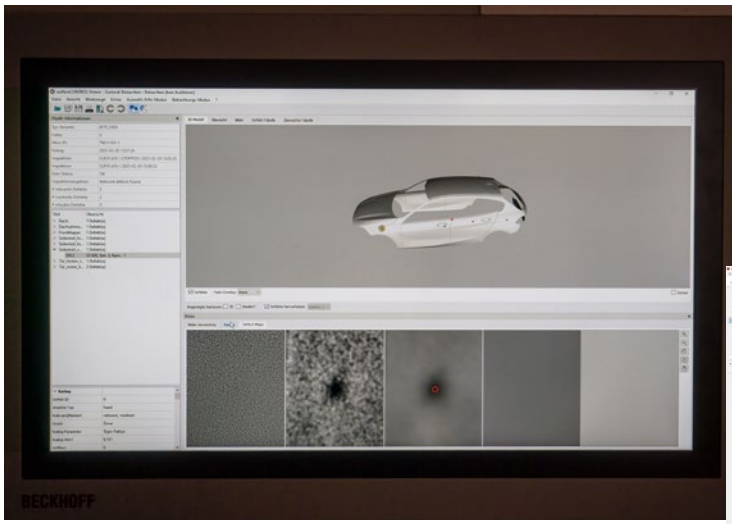


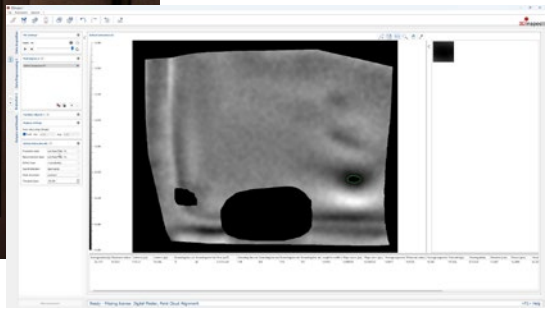
Powerful software

In addition to the measurement hardware, the surfaceCONTROL systems include a powerful software platform with various tools for data analysis. In addition to generating a Digital Master from the data sets of defect-free reference parts, the components can also be analyzed using a Digital Stone and a Digital Light Tunnel.





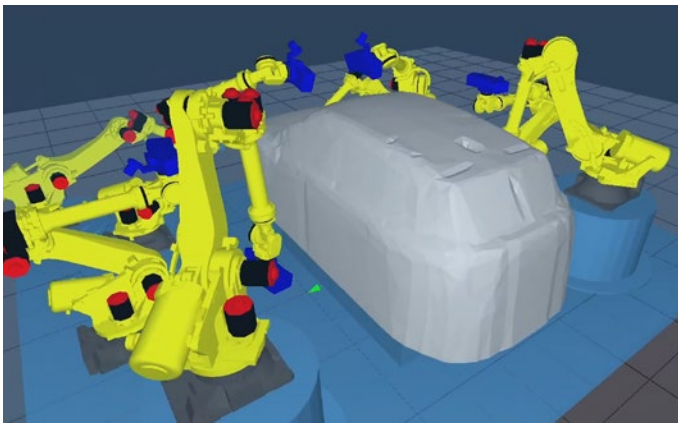


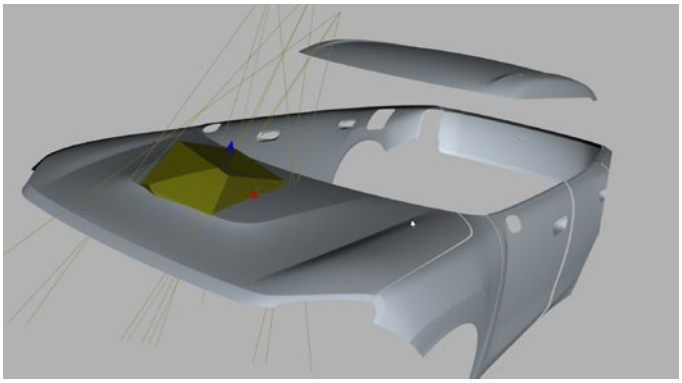


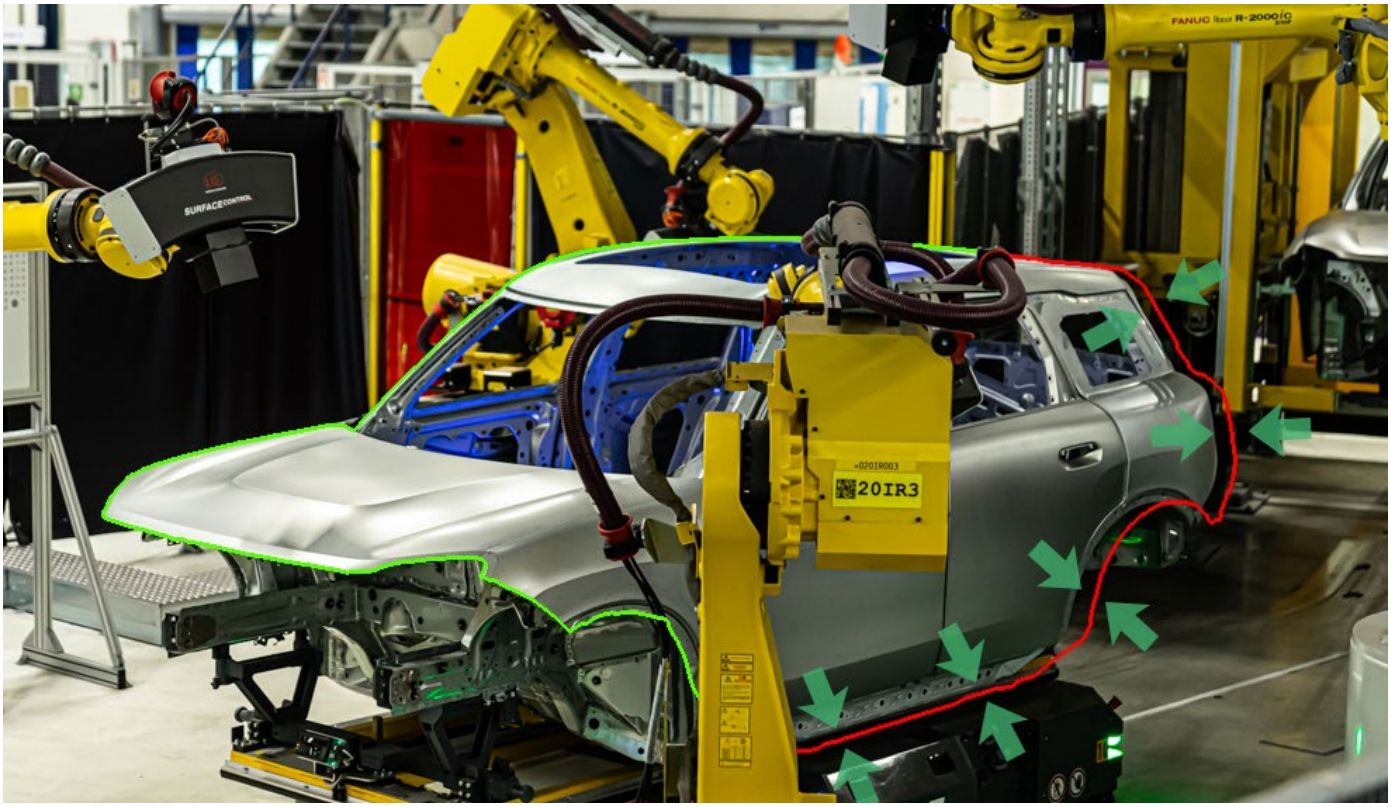
Simulation with CAD model

The robot-based inspection solution uses state-of-the-art simulation methods based on the CAD model of the body-in-white. Even in the planning phase, the virtual sensor model enables precise analysis of fields of view, measurement distances and potential shadowing. This makes it possible to define optimal sensor positions and motion sequences without having to use physical prototypes.

The simulation offers a high level of planning reliability: critical surface areas are identified at an early stage, inspection strategies can be tested realistically and integration into existing production lines is significantly simplified. The system can also be quickly adapted to new models and variants. The result is efficient, reproducible inspection processes with minimal setup effort and high measurement quality.



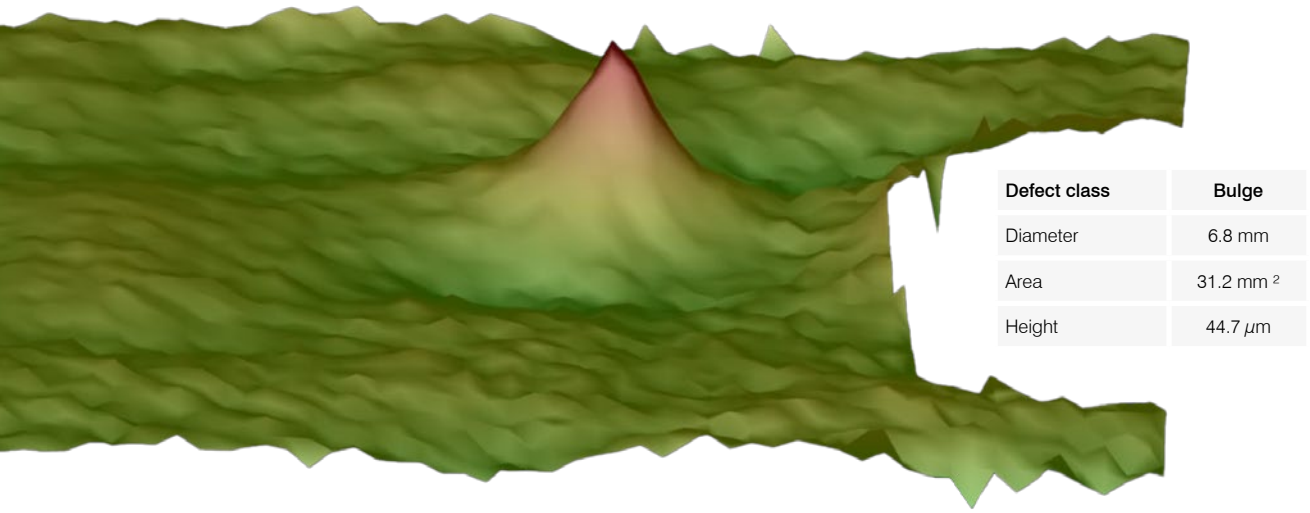




Integrated 6D offset correction

The surfaceCONTROL inspection systems are equipped with an integrated offset compensation that automatically corrects positional or orientation deviations of the car body. After the car body has arrived in the inspection cell, the surfaceCONTROL systems detect geometric characteristics and, based on these, calculate the body's position in the room. Consequently, the travel paths of the sensors are adapted accordingly which enables a fast, precise and highly repeatable measurement.

Leader in defect classification
surfaceCONTROL Automotive



Defect class	Bulge
Diameter	6.8 mm
Area	31.2 mm ²
Height	44.7 µm

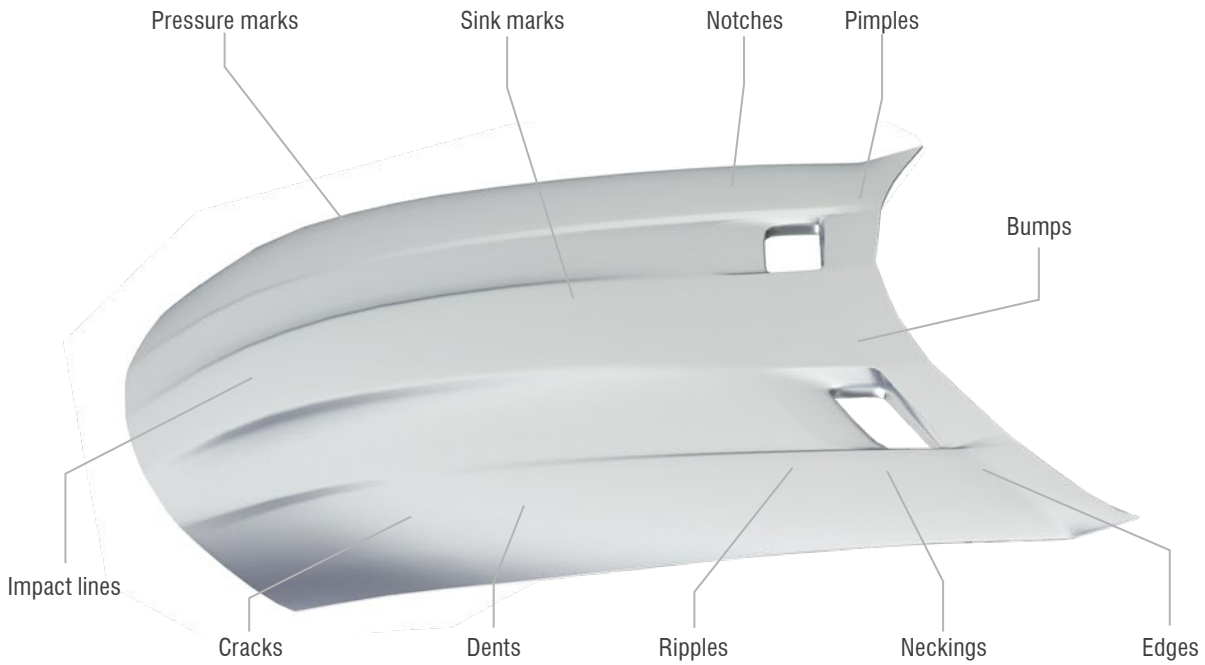
Individual defect classification with adjustable tolerances

By generating real 3D data, detailed 3D features such as diameter, area and height are assigned to each defect. These defects are classified taking into account permissible deviations according to the user's individual specifications. The data are provided in an XML file, enabling seamless integration of the results into existing quality assurance systems.

Transferable across the company group

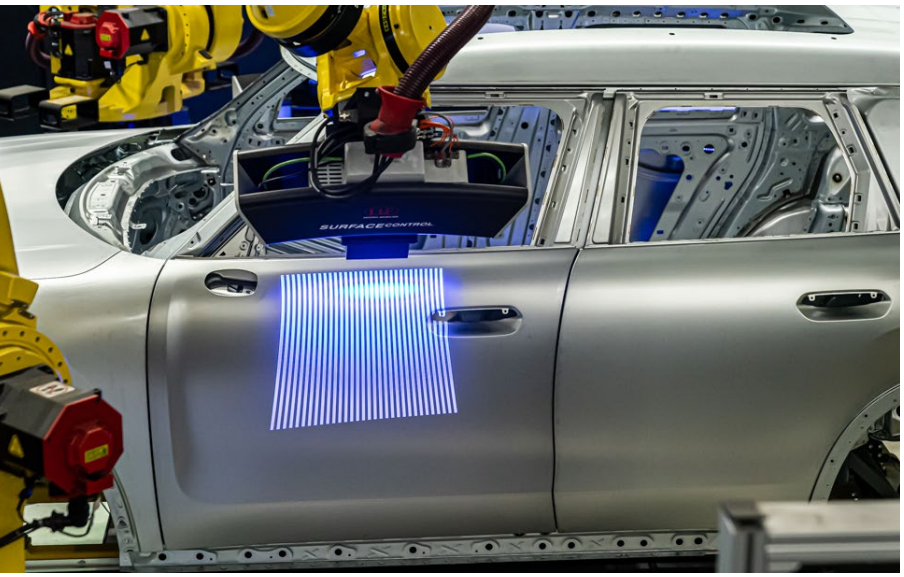
For individual defect classification, the latter can be parameterized quickly. This makes transfer to other plants and models quick and easy. In addition, AI-based algorithms can be used to optimize the defect classification in a targeted manner. New and existing production sites benefit from established testing procedures and validated quality standards.

Typical defect types



Optimized car body flow & targeted reworking

The precise detection and localization enable optimized reworking processes. The extremely high coverage also allows bodyshells to pass directly, eliminating the need for manual inspection. Defect-free bodyshells can be passed on directly to the paint shop. As a result, surfaceCONTROL measuring systems contribute to a significant increase in efficiency in automotive production.

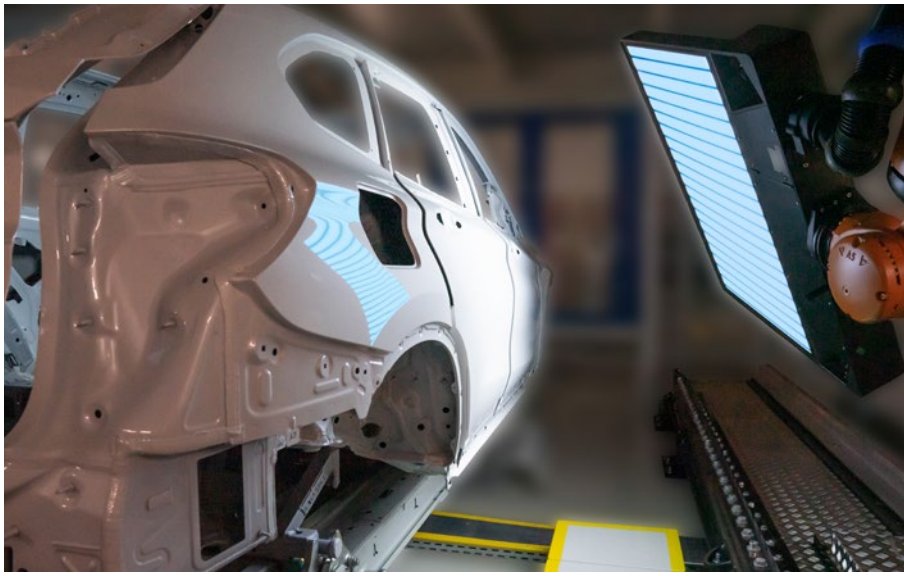


Continuous inspection from body shop...

Micro-Epsilon offers the automotive industry highly precise inspection systems for the entire car body production process – from body shop to paint shop. The surfaceCONTROL systems detect even the smallest dents, unevenness, or other surface defects in the bodyshell directly in the production line. This allows quality problems to be identified early on and production processes to be optimized efficiently.

... to paint shop

Moreover, with the reflectCONTROL Automotive, Micro-Epsilon offers an inspection system for defect detection of painted bodyshells. The system uses the same software basis as the surfaceCONTROL systems and can be seamlessly integrated into the production process. Modern sensors based on deflectometry reliably detect defects such as dust inclusions or craters and evaluate them in a reproducible manner.



By combining surfaceCONTROL in the body shop and reflectCONTROL in the paint shop, Micro-Epsilon provides a comprehensive inspection concept that covers the entire car body manufacturing process. The results from both systems can be superimposed to ensure consistent quality assessment throughout the entire manufacturing process. Therefore, car manufacturers benefit from high measurement accuracy, reliable processes, and a significant improvement in the overall quality of the car body.

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