

# 3D Laser Scanning for 100 Percent Inspection

## Robot-assisted Inline Measurement System with 3D Compact Sensors

Modern production requires inspection processes that are precise, fast, and fully automated—moving away from traditional measurement methods. Such a solution is the robot-assisted inline measurement system Flexscan. It operates with two different 3D compact sensors and ensures reproducible measurement results.

Whether in the automotive industry, aerospace, or defense technology, modern production processes demand reproducible measurement results in real time that are independent of the

operator, shift, or environmental influences. This is precisely where the trend toward robot-assisted, fully automated inline measurement systems comes in.

In response to this market situation, Lass Technology developed the Flexscan system. Originally designed with a focus on dimensional measurement, it was then refined technically into a fully integrated solution for geometry inspection, weld seam analysis, and optical component inspection directly on the production line. A feature is not only the bundling of several inspection tasks in a single inspection process, but also fully automated continuous operation without operator intervention.

„Our goal was to create a measurement system that works independently of humans and still delivers the highest accuracy even under harsh production conditions,“ explains Hüseyin Bozan, CTO of Lass Technology. „FlexScan is our answer to the need for true 100 % inspection in production lines.“

### Three Partners Take on the Challenge

The result is a customizable, robot-assisted 3D laser scanning system that inspects both individual parts and complete car bodies quickly, reliably, and in a validatable manner.

The robot-assisted inline measurement system Flexscan enables high-resolution profile captures for geometry inspection, weld seam analysis, and optical inspection.



To implement this application, Lass Technology relied on a strong technology trio: AT Sensors, EVT Eye Vision Technology, and its own system expertise. As a component manufacturer for machine vision, AT Sensors supplied the high-precision 3D sensor technology, EVT wrote the powerful machine vision software, and Lass Technology finally took over the robot-assisted system integration.



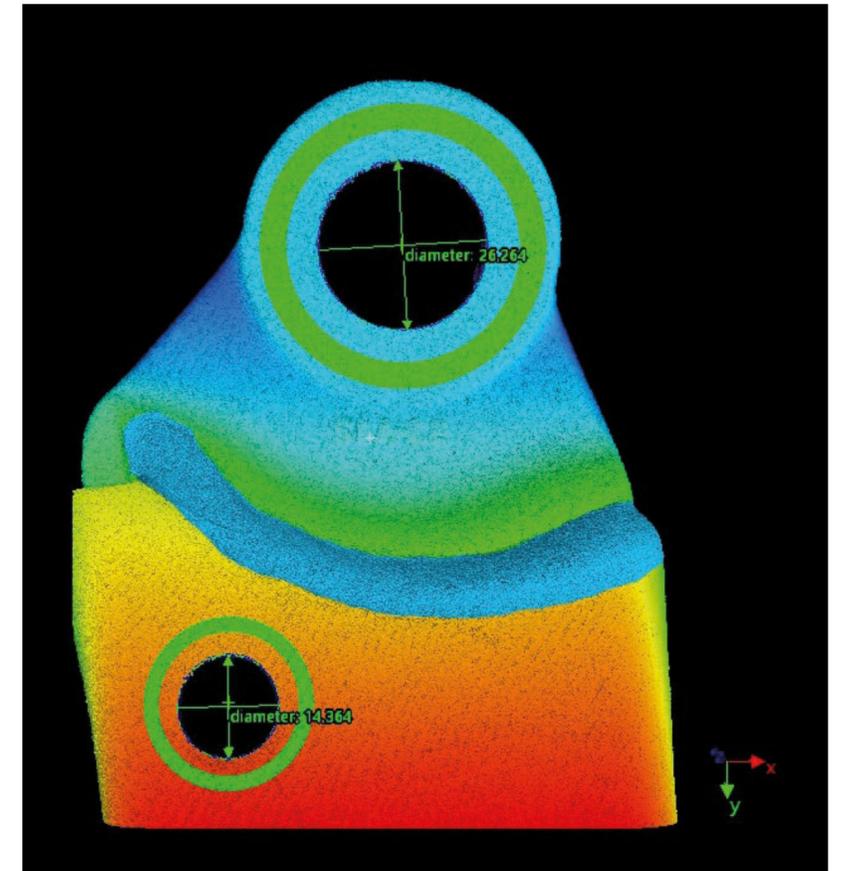
However, several hurdles had to be overcome. One of the challenges in developing Flexscan was the enormous variety of variants. Different component geometries, changing inspection tasks, and individual customer requirements called for a system that is flexibly configurable yet stable in long-term operation.

„A fully automated system must function reliably in every situation, without downtime, without readjustment, without room for interpretation,“ says Bozan. The development timeline reflects this requirement: three years of prototyping, one year of application optimization, and over eight years of continuous system and software development with a growing installed base.

### High-Precision 3D Sensor Technology

To implement the different inspection tasks in the Flexscan system, AT proposed the simultaneous use of two different compact 3D sensors from the 2040 line.

“For us, the image quality of the 3D sensors is the decisive factor,“ emphasizes Athinodoros Klipfel, Head of Sales at AT Sensors. “Only a low-noise, stable signal makes it possible to systematically reduce measurement uncertainties in complex robot-assisted applications.”



Detailed data from the 3D sensors ensures the precise analysis of components.

The 2040CS is considered the all-rounder within AT’s portfolio: With a field of view of 63 mm, a resolution of 31  $\mu\text{m}$  in the X-axis and 0.9  $\mu\text{m}$  in Z, it combines high resolution with a profile speed of 43 kHz. The blue laser ensures a clear signal, making it ideal for fast inline measurements of geometry and weld seams. The 2040CS with a 63 mm field of view is complemented by the 2040CS with a 100 mm field of view, which is used for larger profile measurements and multi-sensor calibrations. With a resolution of 49  $\mu\text{m}$  in X and 3  $\mu\text{m}$  in Z, it provides the necessary flexibility for large-volume components.



The team at Lass Technology has invested substantial time in development, integration, and testing phases of Flexscan.

„For us, the image quality of the sensors is the decisive factor,” emphasizes Athinodoros Klipfel, Head of Sales at AT Sensors. „Only a low-noise, stable signal makes it possible to systematically reduce measurement uncertainties in complex robot-assisted applications and achieve reproducible results.” Lass Technology’s decision in favor of AT Sensors components was no coincidence. In addition to resolution and speed, the robustness, signal stability, and extremely low noise characteristics of the sensors were convincing. „The quality of the recorded profiles significantly reduces our development effort,”

explains Bozan. „The better the raw signal, the more stable and efficient the evaluation software can work.”

### User-Friendly Software

All data evaluation is handled by the Eyevision software from EVT Eye Vision Technology. EVT deliberately relies on standard software that can be individually customized using graphically combinable command modules. An additional special command was developed for weld seam inspection, while surface and geometry inspection is implemented entirely with standard functions.

„Our goal is to make powerful machine vision as easy to use as possible,” says Michael Beising, CEO of EVT, who has been working with Lass Technology for more than nine years. He adds: „Once a setup has been properly configured, it can be reproduced worldwide and operated reliably in the long term.” Depending on the configuration, the system achieves an accuracy of 0.05 to 0.15 mm and a repeatability of 0.04 to 0.12 mm, depending on the robotics and sensor resolution.

### Conclusion

Flexscan demonstrates how modern 3D sensor technology, powerful image processing, and sophisticated system integration can work together. The customer-specific system design allows precise adaptation to different component geometries, cycle times, and production environments. The combination of AT Sensors, EVT Eye Vision Technology, and LASS Technology is therefore exemplary of the change in industrial quality inspection: away from humans and toward stable, automated processes and thus to measurably better quality. Or, as Athinodoros Klipfel from AT Sensors sums it up: „Automated inspection is no longer a trend; it is a prerequisite for sustainable production quality.”

**AUTHOR**

**Nina Claaßen**

Head of Marketing at AT Sensors

**CONTACTS**

[AT Sensors, Bad Oldesloe, Germany](#)

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