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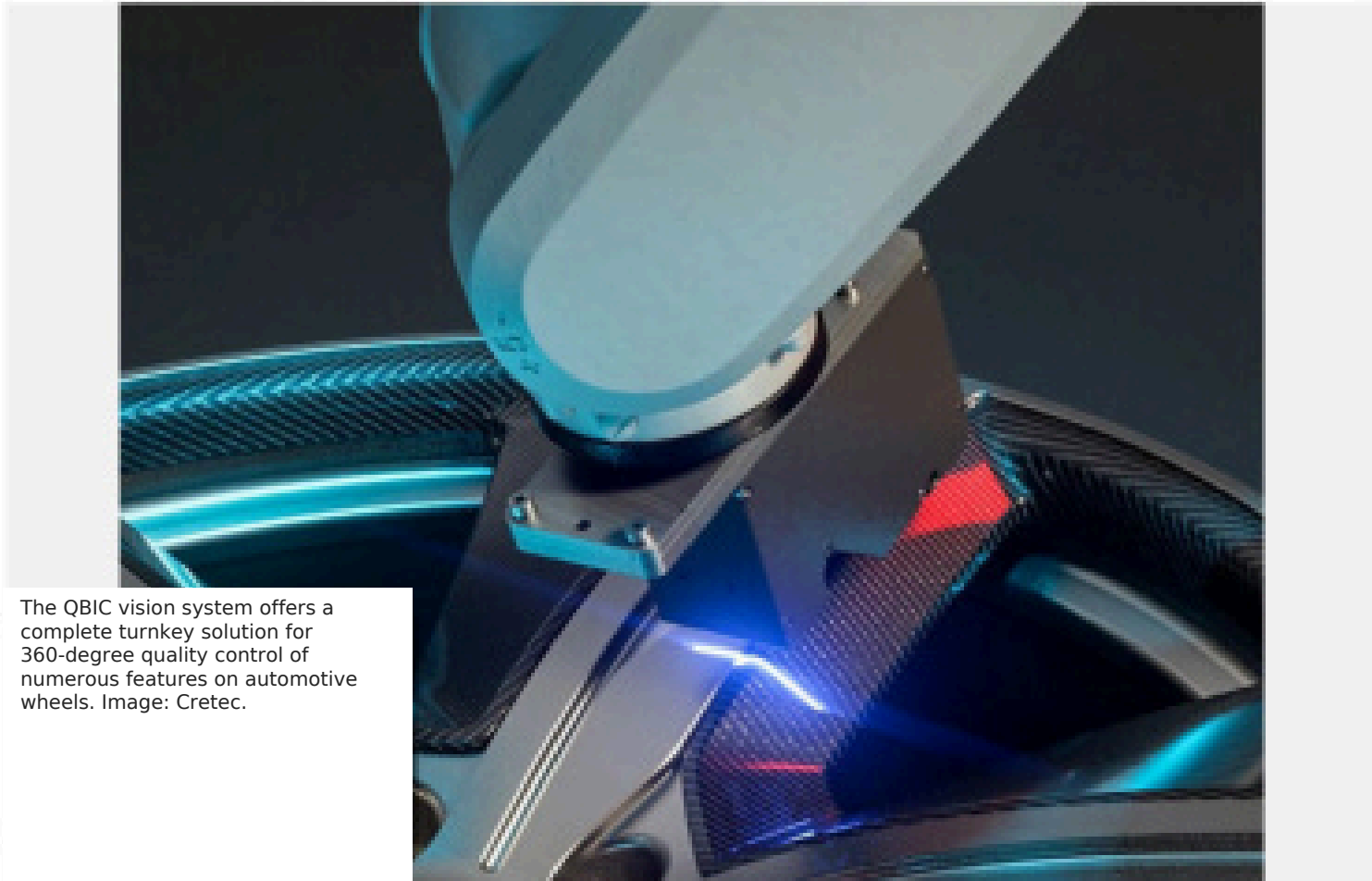
The original article was published in German in Quality Engineering online, a trade publication published in Germany. Prepared for CRETEC. The German original remains the reference.



How a vision system inspects automotive wheels automatically

Online publication. Designed archive cover. Navigation and unrelated website material remain in German. Two lines obscured by the captured navigation bar were recovered from the matching German print article in Quality Engineering 05/2024. Original publisher artwork, logos and advertisements are retained in their original language.

How a vision system inspects automotive wheels automatically



The QBIC vision system offers a complete turnkey solution for 360-degree quality control of numerous features on automotive wheels. Image: Cretec.

A car manufacturer used Cretec's Q-Bic vision system to check whether plastic blades were positioned precisely within aluminium wheels.

In the premium automotive segment, a perfect appearance is a very important part of brand image and marketing. Buyers can be extremely exacting. Components must therefore be highly precise, while no visible surface defects may spoil their flawless appearance. The human eye can easily overlook something when lighting conditions vary slightly. Here, perfection in quality control is guaranteed only by high-performance 3D machine vision.

For this reason, a car manufacturer assigned the task to Cretec's QBIC vision system in a feasibility study. Specifically, the vision platform had to detect defects unequivocally at numerous measuring points relating to the precise positioning of plastic blades fitted into aluminium wheels. The 3D vision system had to provide measured evidence that every blade met the specified permissible gap and height difference relative to the aluminium surface. Compared with a more elaborate inline solution, the compact QBIC platform offered convincing technological and economic advantages for industrial series production.

Each wheel is placed manually or automatically in the vision system's drawer and moved into the measuring position. From above, a 20 MP camera records the wheel's exact centring, rotational position and type with an inspection accuracy of 0.3 to 0.15 mm. This also documents its flawless condition. A six-axis robot moves the 3D camera measuring head to the respective inspection positions.

Cretec's measuring concept, patented for both inline and offline use, guarantees an accuracy per measuring point of less than 10 µm in all three dimensions during wheel inspection. Measurement accuracy is better than 100 µm. This ensures very high accuracy and flexibility, because each inspection feature can be adjusted individually at any time. The cycle time for a complete wheel inspection in QBIC is less than one minute.

Using the vision system, a wheel could already be inspected with around 50% less time during the feasibility study. Further time savings came from faster final project implementation and quicker, simpler installation and integration into production. Accelerated project delivery also proved to be an important economic factor. In the event of a complaint, the documentation provides the measuring-point data, all measured values and every wheel type. This supplies evidence that the wheel was in flawless condition when delivered.

The hexagonal design of the Cretec vision system provides excellent access from all sides and great flexibility in designing particularly compact, mobile solutions. Depending on the version, the complete QBIC module requires a footprint of only 0.8 m × 0.8 m or 1.2 m × 1.2 m, with a maximum height of 2 m. Integrated retractable wheels allow it to be moved quickly for delivery or relocation and connected to other QBIC units.

The complete solution economically automates numerous vision tasks simultaneously in a minimal space. Integration options include electrical equipment, controls, a high-performance PC, cameras, the VisionTube code verifier, a cobot or robot, different vision modules, intelligent lighting, a large touchscreen monitor, Industry 4.0 communication modules, OPC UA, IOTA and neural networks. A mains-independent power supply maintains operation during a power failure and prevents data loss. It even allows the system to be relocated while operating. Integrated high-performance PCs also make these solutions suitable for demanding tasks using artificial-intelligence algorithms.

The mobile platform with its minimal footprint and modular hardware and software ensures exceptional flexibility for complete vision-system solutions. This shortens project development, installation and adaptation to new product variants. Versatile QBIC modules, each with a broad range of capabilities, are linked directly into an autonomous system through control, data analysis and communication.

Kamillo Weiß

Journalist commissioned by Cretec

www.cretec.gmbh



Video

Cretec demonstrates how carbon wheels are measured in the automation cell in this video.

Company mentioned: CRETEC GmbH