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QBIC cells automate turbocharger end-of-line inspection at BorgWarner

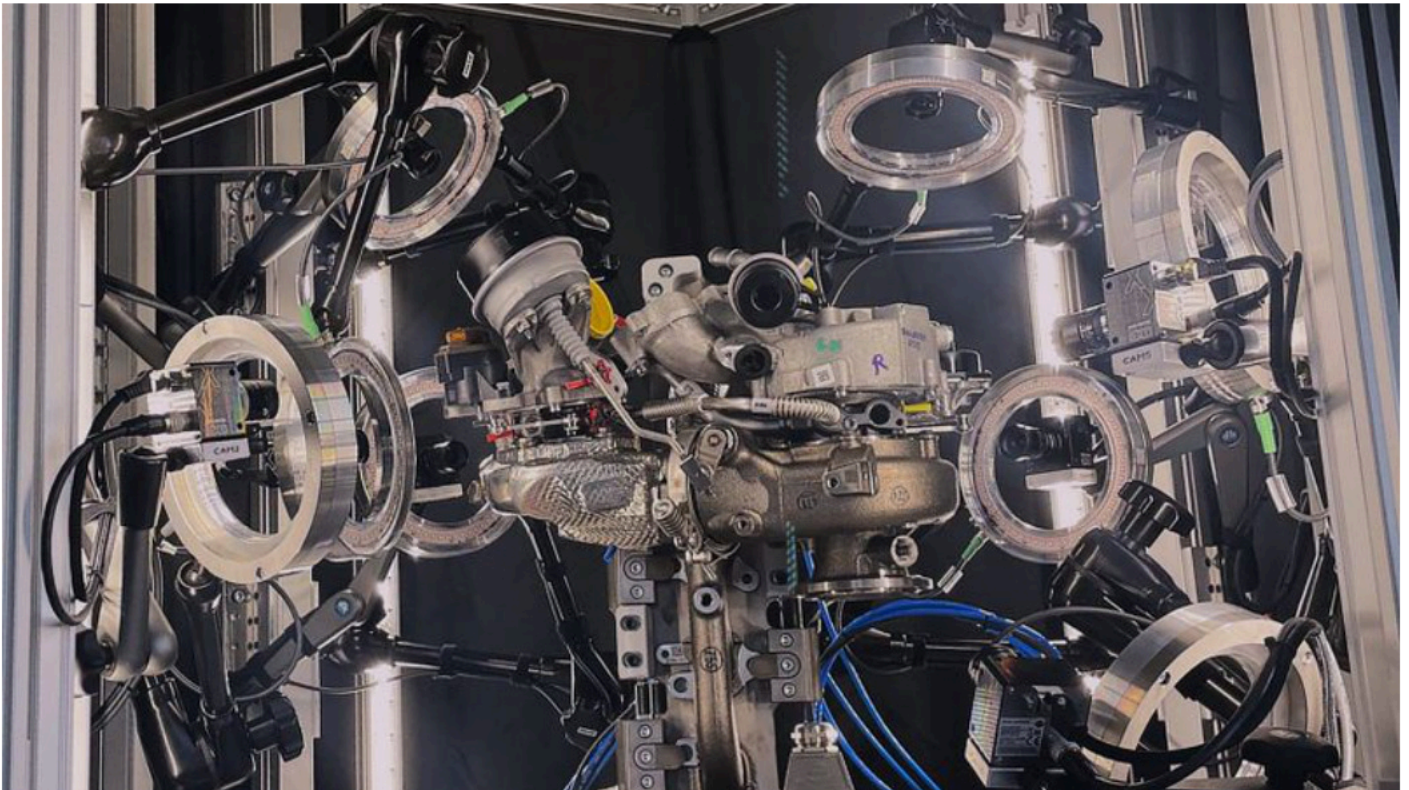
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Synergy chains in a machine-vision application

QBIC cells automate turbocharger end-of-line inspection at BorgWarner

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With QBIC, Cretec shortens feasibility studies and development times, automates end-of-line inspection of turbocharger assemblies, achieves cycle times below 100 seconds and integrates the solution into corporate communication.



The modular design of QBIC production cells enables a reliably functioning final solution to a demanding vision-automation task as early as the feasibility study. (Image: Cretec)

The existing end-of-line station - the final complete quality-assurance stage for automotive turbocharger assemblies - needed further automation and greater efficiency. Previously, two employees per shift in three-shift operation applied labels, inserted plugs, scanned IDs and carried out visual quality checks. Finally, the turbocharger assemblies were placed in trays in

shipping boxes, with an image recorded for each one.

QBIC inspection cell: 8 × 5 MP cameras, robotics, cycle time <100 s

The existing process, which included several manual tasks, had to become more efficient, automated and sustainable. This applied both to the concept with an active robot and to the contingency concept for a robot fault. A cycle time of less than 100 seconds was specified for the entire process. The QBIC system philosophy (Query By Image Content) provided decisive advantages in the final machine-vision application.

At the end of the production line, an employee applies a label to the turbocharger and scans its ID. This starts the robot, which picks up the turbocharger, presents it to the employee for plug insertion and positions it in the QBIC inspection cell. Four 5 MP cameras above and four below capture the complete unit spatially and use machine vision to inspect a wide range of features. The robot then places the turbocharger in the box. An existing vision system captures the unit there for the final photographic documentation. Every box reaching the end customer thus contains inspected, defect-free goods.

Cretec has maintained an intensive, continuous exchange of experience with the global automotive supplier for years, through a series of delivered vision systems. Joint development also produced the TurboPCS communication system, in which the machine-vision applications on the production lines are fully integrated.

Modular, space-saving cell concept - high flexibility

The consistently modular system architecture of the QBIC cell concept enabled a particularly space-saving stand-alone or integrated solution to this complex machine-vision task, with a high degree of flexibility and automation. The many practical benefits in smooth industrial operation significantly shorten the payback period.

The QBIC system already proves highly advantageous during the feasibility study, because many demanding machine-vision requirements and solution approaches can be implemented more simply. This allows the final solution to be adopted on a one-to-one basis.

The mobile QBIC platform, with its small footprint and modular hardware and software, ensures exceptional flexibility for complete vision-system solutions. Modules with a broad range of capabilities are integrated directly into an autonomous system encompassing robotics, control, data analysis and communication.



The eight 5 MP cameras and their individual high-resolution fields of view provide complete all-round 3D inspection of the turbocharger assemblies. (Image: Cretec)

Good access for greater flexibility

The patented hexagonal design of the QBIC platform provides excellent access from all sides and great flexibility in designing particularly space-saving, mobile system solutions. Integrated retractable wheels allow it to be transported quickly for delivery or relocation and connected compactly to other QBIC units.

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 even during a power failure, preventing data loss. Integrated high-performance PCs also make these system solutions suitable for complex AI tasks using deep learning.

BROAD RANGE OF APPLICATIONS

Complete QBIC solutions cover a broad range of applications: pick-and-place, registration and classification tasks, ID codes, inspection, 2D and 3D measurement, surface inspection, decision-making and sorting processes.