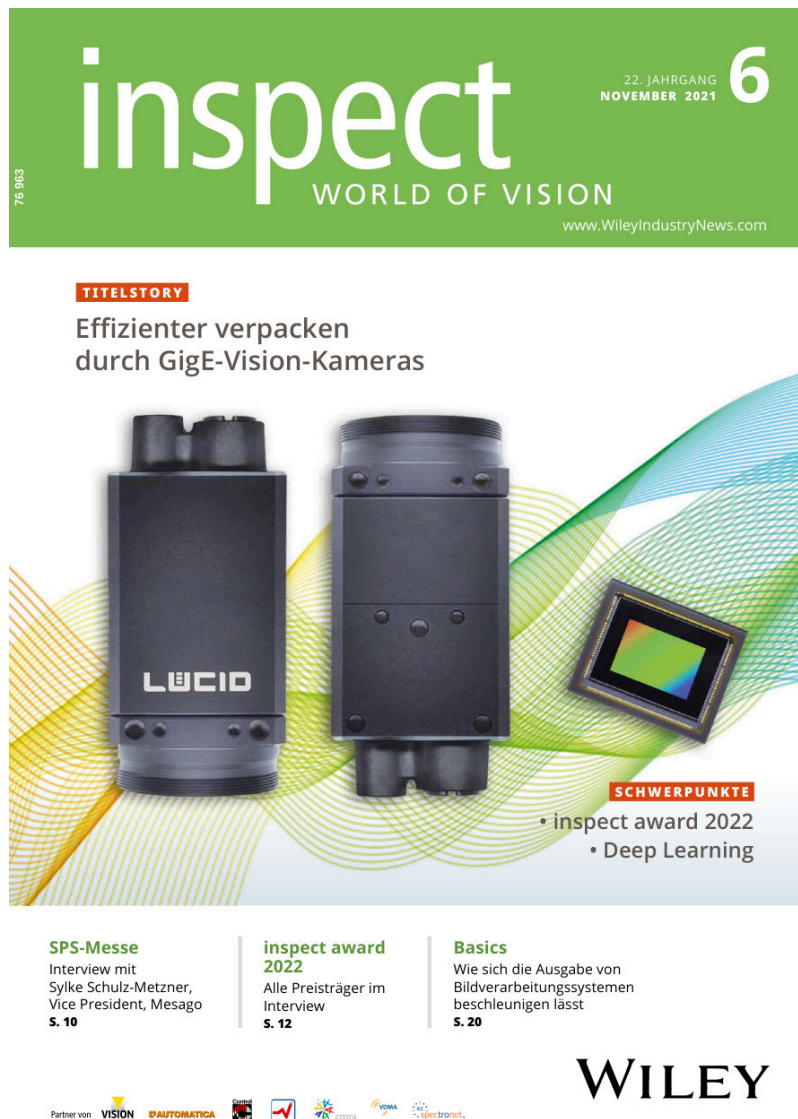


inspect

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UNOFFICIAL ENGLISH TRANSLATION

The original article was published in German in inspect, a trade magazine published in Germany. Prepared for CRETEC. The German original remains the reference.



Modular, fully automated 100% inspection

The adjacent BitFlow advertisement remains unchanged. Original publisher artwork, logos and advertisements are retained in their original language.

Modular, fully automated 100% inspection

360° inspection of automotive components

A machine builder has developed a modular inspection system with a wide range of capabilities, complete with control, data analysis and communication. A major automotive supplier uses the system for quality assurance of die-cast parts, where it operates as part of an autonomous complete system.

A major automotive supplier approached Cretec to find a complete solution for 100% quality assurance of die-cast components measuring 10 to 60 mm. Fed in bulk, the parts must be inspected precisely from all sides for dimensional accuracy, completeness, damage, contamination, surface defects and other deviations. The complete automated vision-system solution was to operate entirely independently with a high degree of functional flexibility and also be mobile.

Cretec Cybernetics presented the QBIC system. It documents all quality-inspection data and images, which are available at any time for further analyses and statistics, including deep learning. High-performance industrial PCs based on Windows 10 allow requirements to be adapted at any time, regardless of their complexity. Achieving high cycle rates was an important aspect for the automotive supplier. The system had to guarantee complex quality assurance of numerous features on more than ten parts per minute, or around five million parts per year.

Flexible complete vision solution, including AI

High-mix component production that is fully inspected and documented by machine vision presents many additional challenges to the flexibility of the whole process. A rapidly prepared feasibility study documented the range of achievable flexibility.

QBIC is the consistent strategy of a platform with synergy and scalability

through logical relationships in networked quality assurance. It enables flexible complete vision solutions, including AI algorithms, for complex automation, quality assurance and traceability. Standardised vision hardware and software components in complete station modules make it possible to establish the feasibility of a vision-system solution quickly, already covering most of the required tasks in all their complexity.

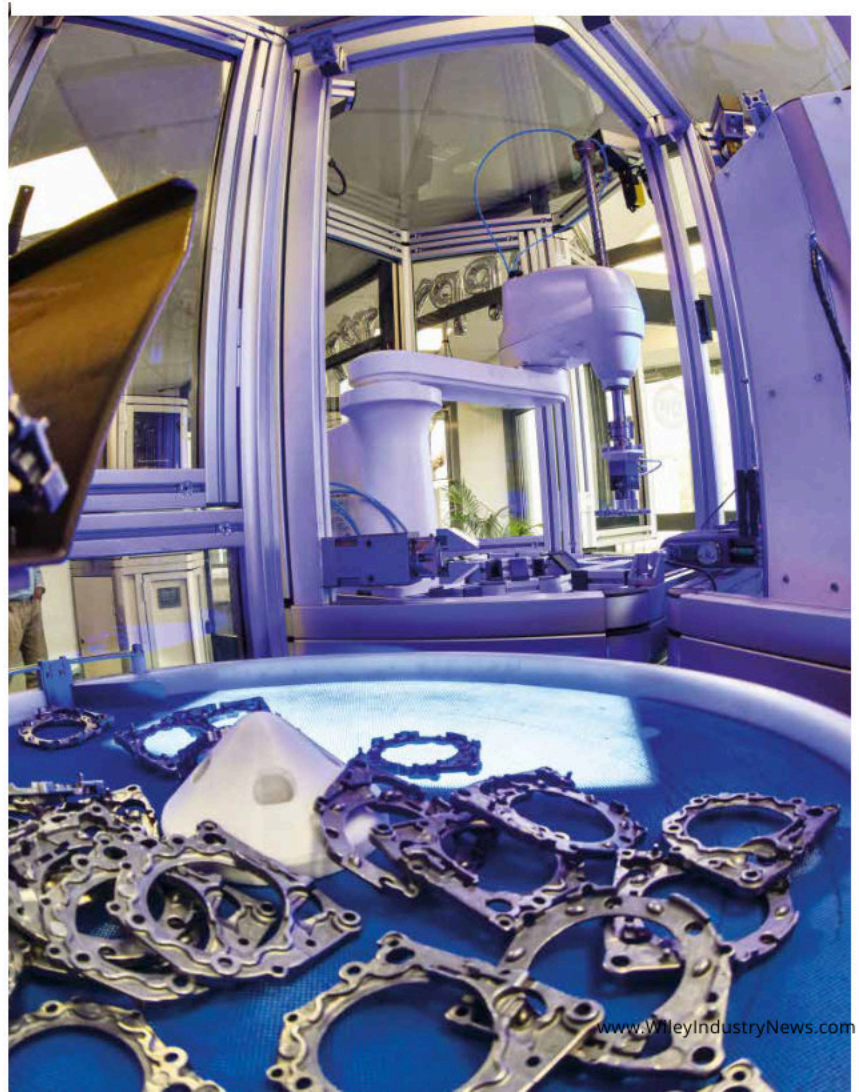
The patented hexagonal design of the QBIC modules provides good access from all sides and a high degree of flexibility in designing compact, mobile solutions. A module needs a footprint

of 0.8 m × 0.8 m and has a maximum height of 2 m. Its retractable wheels allow it to pass quickly through any office doorway and simplify transport by van. At the destination, the individual modules can be reconnected quickly using Plug & Work.

Optimised lighting for reliable feature detection

Each application has its own optimised lighting solution with intelligent lighting control. The in-house LED lighting modules are the result of extensive experience in vision applications and the associated hardware and software technology. Basic modules in all lighting colours,

In the QBIC FlexiBowl station, components fall from the feeder onto the vibrating disc. They are separated and precisely located by machine vision. The robot grips them and presents them to the 2D and 3D vision systems.





Five high-resolution cameras inspect numerous features of the parts on the conveyor using reflected and transmitted light. The shorter wavelength of large-area blue LED lighting increases detection precision.



Each part is inspected automatically and precisely from all sides (360°) for 21 features. Data and images are documented and the parts are sorted into pass/fail categories.

for continuous or strobed illumination, can be assembled in any geometric format. Circuit boards carry white, red, green, blue, IR, UV, RGB or RGBW LEDs. Users have a whole range of individual hardware adaptations available for each application, including fast colour changes for each image capture. The shorter wavelength of blue LED lighting increases detection precision through higher pixel resolution. Homogeneous, large-area light is important in minimising the negative effects of reflective surfaces.

Blue light is used to inspect metal-part surfaces for scratches and impact marks from 0.2 mm × 0.2 mm, burrs at casting joints, foreign bodies and raised features (ejector marks). Light-related environmental interference is excluded at the same time.

The particularly versatile intelligent control of the LED modules stands out. Together with other design features, it ensures optimum lighting for each requirement. A simple touchscreen interface on the monitor provides flexibility in quality assurance for different product variants.

Three modules form a complete QA system

Three QBIC modules were already connected during

the feasibility study: FlexiBowl part feeding, a robot with 3D part inspection, and five-sided final inspection with pass/fail sorting.

The FlexiBowl feeder family enables reliable handling even of sensitive components. A motorised vibrating feeder supplies parts to the rotating, vibrating disc, where delicate components are separated reliably and presented individually for the next process. The disc has different textures and an integrated vision system with backlighting or reflected lighting. Lighting can be controlled individually for continuous or strobed operation and offers the full RGB spectrum. Machine vision provides precise part and position data relating to geometry, surface properties, material characteristics and weight, enabling safe robot gripping.

In the second station, the robot takes the parts and positions them above the 2D camera for underside inspection and above the 3D camera, also acting as the part-turning station. It then places the component on a conveyor, which carries it to the third QBIC station. Five high-resolution 5 MP cameras, using transmitted and reflected light, perform the final all-round inspection. The system then sorts the parts

into pass/fail categories.

In total, 21 features are inspected. This complete vision solution in a small space can automate many vision tasks simultaneously. Integrated equipment includes electrical systems, controls, a high-performance PC, cameras, robots, different vision modules, individual lighting, a large IP65-protected 24-inch touchscreen monitor for data display and operation, and communication modules, including OPC UA.

Fully automated complete vision solutions based on connected QBIC modules cover a broad range of applications in many industries: pick-and-place, registration and classification, ID codes, inspections in 2D and 3D, measurement, surface inspection, decision-making, sorting and assembly.

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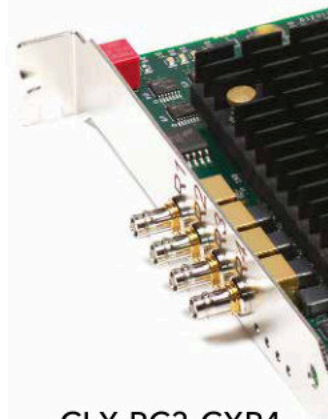
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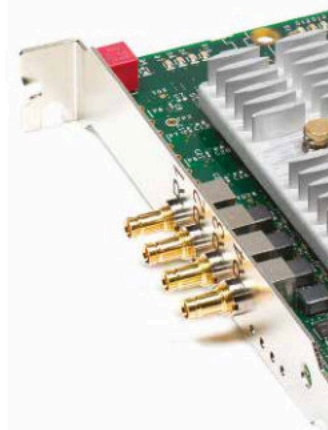
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