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UNOFFICIAL ENGLISH TRANSLATION

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

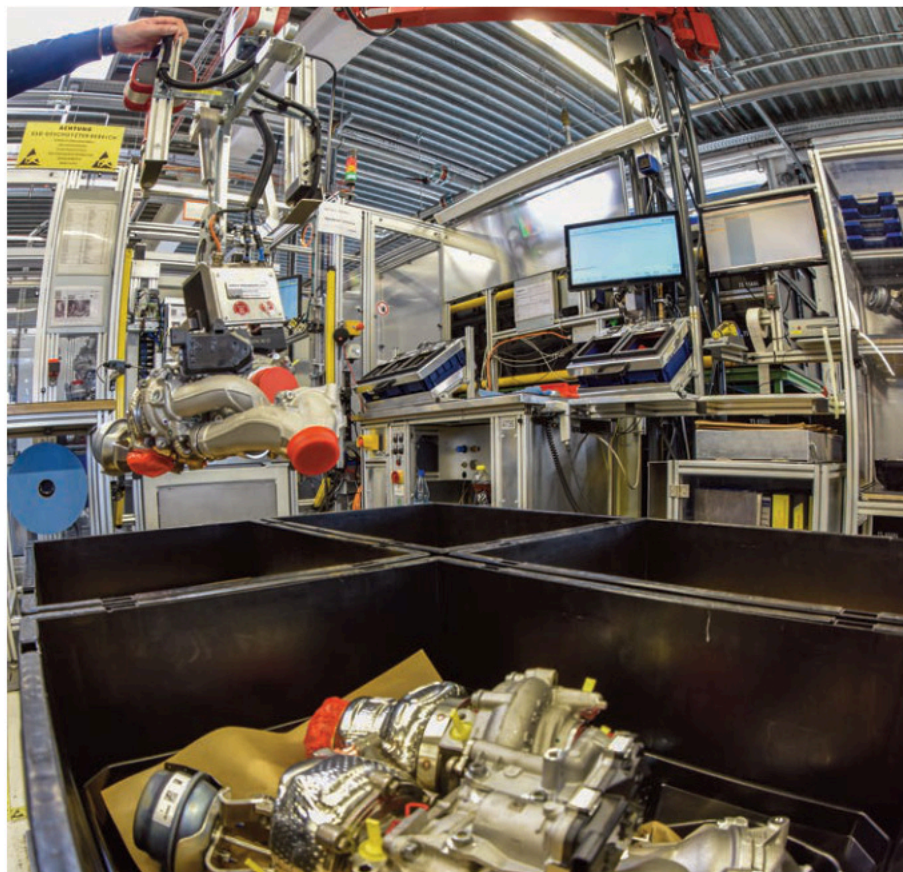


Complete traceability saves costs

Historical technical statements are translated as printed, including the original wording about aperture values and depth of field; this is not an independent validation of the claims. Screenshot labels remain part of the original artwork. Original publisher artwork, logos and advertisements are retained in their original language.

Complete traceability saves costs

When every value-adding step in high-mix production, assembly and logistics has to provide complete traceability, standardised vision-system structures with powerful hardware and software are essential.



Using a crane, the worker positions the turbochargers in the trays of the four boxes after the final assembly station. Three box layers are stacked on each pallet.

The successful experience in operational reliability and economy has led to Cretec solutions being adopted as the standard at 35 sites worldwide at this automotive supplier. All applications can be transferred directly to all locations through the customer's internal servers.

The finest detection from 3.5 m above

In the automotive industry, only the result matters: entirely defect-free goods delivered directly to the customer. Complete turbocharger units are placed in shipping boxes with individually shaped plastic trays and remain protected there until they reach the end customer. Four boxes form one layer, and three layers fit on a pallet. The turbochargers therefore have a height difference of about 1 m between the first and third layers. Handling the assemblies into their trays requires free access to this work area from all sides. Similar situations and requirements occur in many other logistics automation and handling applications.

The new vision application had to cope automatically with the changing height distance when checking numerous quality features and reading codes and plain text. Technological experience was required to make all the complex requirements work smoothly together. New handling of the finished assemblies was intended to improve the efficiency of automation and traceability. At this

A software platform for global corporate communication at an automotive supplier brings far-reaching benefits in efficiency, operational reliability, economy and sustainability. Controlled and documented by powerful machine vision and 1D/2D code-reading systems, this complete solution handles a wide range of challenges. On an automation platform based on a high-end industrial PC, Cretec integrated the powerful HALCON vision software package into the customer's TurboPCS system in a joint effort.

An efficient global strategy

The aim is a decisive improvement in flexibility and quality in assembly

production at higher cycle rates, through to shipping. Development, installation, parameterisation, maintenance, 100% traceability, scalable deployment of vision-automation solutions and a global audit trail on a uniform platform enable much more efficient solutions across the entire spectrum of automation. Applications and parameter changes can be checked and modified centrally at any time, independently of current settings. If, for example, an application requires higher quality through a higher-resolution colour camera, the update can be implemented globally very quickly. The automotive supplier can scale this independently, without an integrator.

production step, plugs could theoretically be missing from the assembly or the connector housing damaged. Absolutely complete data and image documentation is

therefore required.

The system has been running smoothly since January 2021. Within only six months, it saved several

“Even the small DataMatrix code and the nameplate carrying customer data are read reliably - guaranteeing 100% traceability that can be implemented quickly.”

times its investment cost.

The vision-system solution is outside the handling and crane area, requiring cameras at least 3.5 m above the boxes. Four LED ring-lighting modules with integrated cameras were installed below the factory ceiling, each centrally above one box position. High-performance LED strobe lighting is controlled directly by the camera, synchronised with image capture. Compared with continuous lighting at larger aperture values and potentially associated image noise, strobe lighting with substantially more light permits smaller aperture values with a considerably greater depth of field. A very short flash duration readily permits LED operation at a nominal current 300% higher, greatly increasing the available illuminance. External interference from ambient light, factory lighting, daylight and reflections can thus be eliminated.

The four cameras, each with an autofocus lens and 20 MP resolution, reliably detect whether a plastic web only 3 mm thick is intact and complete, even from 3.5 m away. The small DataMatrix code (5 mm x 5 mm) and the nameplate carrying customer data are also read with absolute reliability. This guarantees 100% traceability that can be implemented quickly.

The vision system can easily be extended for versatile colour evaluation. With the 20 MP monochrome camera and sequential

switching of the red, green and blue channels of the LED strobe lighting, the images can be combined into an RGB colour image without a Bayer filter and with substantially more image information, comparable to a 60 MP colour camera.

Complaints ruled out

If a feature of the complete turbocharger in its packed tray is faulty, it is immediately displayed on the monitor with a red circle in the captured image. At the same time, the boxes are brightly illuminated in green or red, controlled directly by the camera. The worker therefore sees a fault indication immediately, without having to look at the monitor, and the cause can be rectified at once. Data and images from every box are stored centrally and are immediately available throughout the company. The automotive supplier can thus guarantee that every turbocharger assembly, accurately packed in its tray, is defect-free when sent to the customer. In the event of a complaint, a six-step plan makes it possible to send the customer all values and images collected at the respective assembly and quality stations across the production chain within 24 hours.

Since commissioning, the system has operated continuously without problems, handling 15 pallets per shift, three shifts per day and seven days per week, including additional shifts.

Despite a distance of 3.5 m, the vision application detects the finest details of the turbocharger assemblies in the shipping-box trays. In addition to the monitor display, the worker receives a clear indication from the brightly red-lit box. Up to twelve features are detected from 3.5 m at the final inspection in the packaged state. A small missing plug is marked red as a reject. All data and images are documented.

The important question of the payback period for this quality-assurance inspection station - checking individual assemblies for completeness, absence of defects and correct packaging - produced an impressive result after only a short time. A customer complaint concerning a delivery of 24 supposedly defective assemblies could be rejected because 100% traceability proved that the components were defect-free, with images documenting correct packaging. It is easy to see that this alone quickly amortised the cost of the final-inspection and packaging system. In addition, the automotive supplier's image among its customers is enhanced by the 100% quality of its products.

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