APPLICATION REPORT | TESTING

Testing via 3-D-Scanner
Fast, cost effective and space-saving

No setup times: Instead of working with individual workpiece carriers, “SCoT" from Berghof Testing is designed for the tested assemblies to lie freely on a linear conveyor belt. A 3-D scanner then uses triangulation to determine the respective model and the exact coordinates.

Independent of light, contrast, reflection and position: Novel system to flexibly check assemblies for completeness

With the “Smart Component Tester (SCoT)" from Berghof Testing, it is now possible for the first time to test modules at the end of the production line for the correct assembly and position of the components, regardless of light, contrast, reflection or position. SCoT also no longer requires any complex conveyor technology based on workpiece carriers – and can therefore be used very flexibly.

Many suppliers currently use industrial image processing systems with cameras for their test systems in order to be able to inspect components quickly and reliably in all relevant quality parameters after production and assembly.

This process has its pitfalls: “The industrial image processing systems used so far are no longer the first choice, especially for different, painted surfaces and very diverse components," explains Dipl.-Ing. Klaus Maichle, project manager at Berghof Testing.

The reason: These systems are dependent on a corresponding contrast of the components and an adapted light. In order to achieve convincing results, a large number of aligned cameras are therefore required for different surface coatings and large component variance. An implementation of such systems is very time-consuming and therefore expensive as well as inflexible for future variants.

In addition, in practice, stray light or changing ambient light often falsify the results.

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Klaus Maichle and a team of specialists in various areas at Berghof Testing have therefore developed a completely new test system for a renowned automotive supplier, with which these difficulties are history once and for all. No cameras are used, but special 3-D scanners. The optical inspection is carried out using 3-D images and is completely independent of light, contrast, reflection and position.

But these devices also have another advantage: They are able to determine the exact position of the supplied module by triangulation. For the first time, we are able to dispense with the specific workpiece carriers usually used and thus with expensive conveyor technology.

A short, linear conveyor belt transports the test specimen – without fixed orientation and without variant definition – to the first station, where a 3-D scanner records the respective 3-D model. The robot gripper uses this 3-D model for the exact calculation of the removal coordinates.

That enables the robot to pick up the respective test specimen quickly and safely – regardless of where and at what angle it lies on the conveyor belt. With this completely new approach to checking assemblies, the system saves enormous amounts of time and money, because the previous system with numerous individual workpiece carriers and corresponding setup times is no longer required.

The robot then picks up the test specimen and places it in the actual inspection position. The second 3-D scanner displays the 3-D data for our specially developed virtual camera, which performs the optical test analogously to conventional vision inspections – but unlike completely unimpressed by the current light situation, the contrast between the component and its surroundings or disturbing reflections.

Sounds simple, but it is quite complex – especially when it comes to the software, as project engineer Benjamin Ulrich explains: “We have developed a special software solution based on “LabVIEW” for this innovative test system, which we also use to control the robot. On this basis, we have furthermore programmed the virtual camera and our unique solution for correcting the positional tolerances resulting from this type of localization. Besides, the system is designed to allow us to add new samples quickly and easily via the user interface. In order to optimize the cycle time, the software also controls the three stations feeding, testing and discharging in parallel. As a result, three assemblies can be in the system at the same time.

Further important advantages of SCoT: “The system concept not only saves a lot of production space, it is also much more cost-effective: Roughly estimated, our new system is around 50 percent cheaper than conventional systems with industrial image processing systems and specific workpiece carriers," Maichle sums up.

Customer benefits

- → Variant independent and flexible
- → Perfectly reproducible results, even with changes in contrast and / or lighting conditions
- → No set-up times
- → New test specimens can be added easily and quickly.

Absolutely flexible: The scanner transmits this information to a robot in a fraction of a second. This robot is thus able to pick up the respective assembly quickly and safely..

The robot then picks up the assembly and places it in the actual testing position. The second 3-D scanner displays the 3-D data for our specially developed virtual camera.

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PE_Prüfen mit 3D Scanner_FB_en_2D2702000FB00.docx.Subject to change. Printed in Germany