Green and efficient: 3D vision system checks car seats

Peter Stiefenhöfer

Dakota is the name of a vision system used for the inspection of polyurethane blocks such as those used for the manufacture of car seats. This application provides return on investment for the customer through a more efficient inspection process, a reduction in the use of raw materials, and has the added benefit of protecting the environment due to a lower material requirement.

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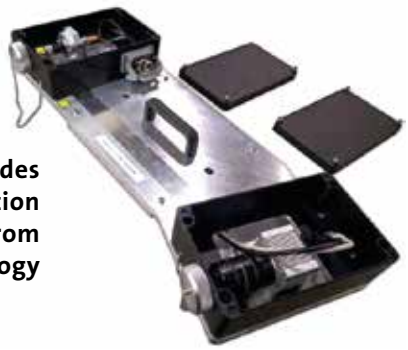
The development of the Dakota system began in 2012 and has since been developed in close cooperation between Gips Vision and Stemmer Imaging France to its current state. The system helps in the production of polyurethane foam parts that are used for car seats. In this case, the components are inserted manually into the mold. Frédéric Equoy, founder and CEO of Gips Vision, who played a key role in developing the Dakota system explains: "This delicate process cannot be automated. Given the high rate of the line, this manual process can lead to errors such as missing or misplaced components. These errors are unacceptable for the end product and hard to detect once the foam block has been produced."

Preventive inspection adds to customer satisfaction

The Dakota 3D inspection system is designed for detecting errors before they occur. It is applied immediately before mold injection and thus avoids the production of faulty foams and prevents a significant waste of material. Equoy describes the principle: "On the foam production line the Dakota system comes immediately after insertion and checks directly before injection whether every component in the mold is inserted and well positioned and depending on that validates or declines the next step of foam injection. This prevents the production of incomplete parts."

This method leads to a number of benefits: First of all, the system significantly saves material which would otherwise be completely wasted as a solidified faulty part which cannot be used again. Although the parts that are manually inserted have only little value, faulty ones can no longer be used either.

With the Dakota system visual controls of fabricated foam parts are no longer necessary, thus saving human resources on this process stage. Another advantage for users is the reduction of customer complaints due to poor quality and other returns of supplied products. In total, the customers' ROI and



01 The 3D module includes a Z-Laser laser illumination and a 3D camera from Automation Technology

production reliability increase significantly when using the Dakota system in their manufacture.

Function principle of the inspection

The 3D imaging system is based on laser triangulation. The injection mold is scanned by a laser illumination from the manufacturer Z-Laser. An Automation Technology high-performance camera captures up to 1,000 laser profiles per second with a width of 2,000 pixels. The known angle between camera and laser level allows extracting the height information from the laser profile based on exact calibration and adapted to the line and mold configuration.

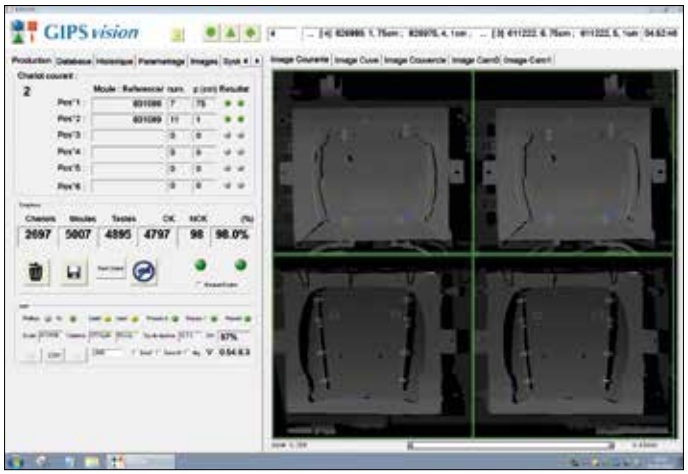
In this way, the system creates a 3D image of the mold and its inserts, which allows for their localization in three dimensions. The evaluation of the 3D image allows a reliable conclusion as to whether all parameters meet the requirements and the injection molding process can be initiated.

For every slide Dakota inspects the components or inserts which are placed into the empty mold immediately before injection and need to be in the completed foam block. These inserts can be composed of different materials, sizes, thicknesses, colors and forms: metallic wires, plastic clips, fabrics, foam blocks that are important for the subsequent correct functioning of the car seats.

Flexible and powerful

Dakota offers a dedicated, graphic and easy-to-use human-machine interface (HMI) which allows defining test points and configuring the applied tools. Up to 999 different mold specifications can be programmed to Dakota's database and up to 999 spot checks can be carried out on every mold.

Moreover, the system can be adjusted to molds and slides of different sizes and to variable speeds of the production line. Equoy cites an actual application example, where the Dakota system checks molds with a size of 1700 mm corresponding to the total size of a complete rear seat on a conveyor at a speed



02 The graphic HMI of the system shows images and evaluations of test objects

of 14 m/min. According to the CEO of Gips Vision the system's performance limits are far from being reached. "This concept is not only limited to the automotive sector, it is suitable for many other industries, too. We plan to extend the application fields of the Dakota systems in the near future."

Successful cooperation

The system was achieved thanks to the close cooperation between Gips Vision and Stemmer Imaging in France. Equoy sums up: "Our partner significantly helped us in defining the 3D imaging system and choosing the optimal components. The integration of the Dakota system was not easy at all due to the rough injection molding environment. But Gips Vision specialization in this field combined with Stemmer Imaging's expertise in machine vision combined to create this powerful vision system that saves the users' money and leads to a more environmentally friendly use of raw materials."

Photographs: *teaser fotolia , other images GIPS vision*

www.stemmer-imaging.com

About

Company name: Stemmer Imaging
Established: 1987
Headquarters: Puchheim, Germany
Turnover: € 70 m (2014)
Employees: more than 230
Products: machine vision systems, cameras, software, ...