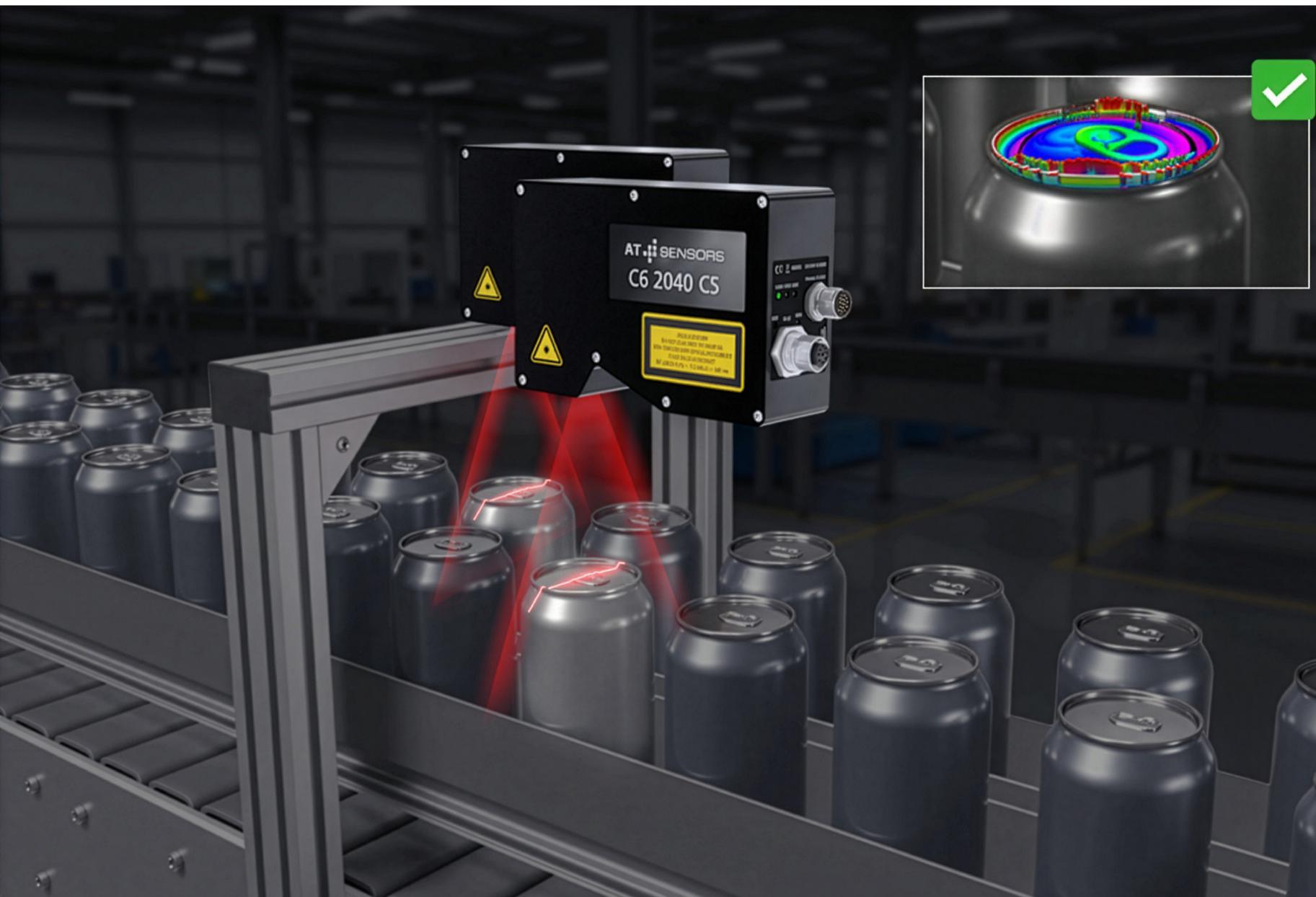# Filling Inspection in Turbo Mode

Inspection of 2,400 Cans per Minute

When a beverage can fizzes perfectly, high-tech is behind it. Two companies have developed a reliable 3D inspection solution to make this possible. Today, the beverage industry checks the quality of millions of cans per day worldwide.

Beverage cans are inspected and evaluated for filling volume and pressure at high speed using 3D scans.

What is the decisive sound when opening a beverage can? The hiss! This not only stands for freshness, but above all for a guarantee of quality. However, the fact that the can hisses correctly is no coincidence—it depends on the exact filling quantity and the correct filling pressure. To ensure these parameters meet the required standards, AT Sensors and EVT Eye Vision Technology (EVT) jointly developed an application for Filtec, a manufacturer of filling machines. This solution inspects and evaluates beverage containers using 3D scanning. And it does so at an impressive speed in 24/7 operation: 40 cans per second, 2,400 cans per minute, 3.5 million cans per day. In the USA, these filling machines are used by well-known beverage manufacturers.

The Challenge

However, it is not only the high frequency that makes this application, developed specifically for the beverage industry, so special. It has been running so successfully for years that Filtec recently reordered 3D sensors to equip several hundred more filling machines, which are now being ordered not only by beverage manufacturers in the USA, but globally. In order to develop this application in the first place, a number of challenges had to be overcome. EVT and AT Sensors had to come up with a solution for checking 40 cans per second at maximum speed on a conveyor belt just two meters long using innovative image processing.

And it wasn't just a matter of evaluating the can, but also of ejecting the beverage container if it did not meet the specified standards in terms of filling pressure and fill quantity.

"The can inspection system is characterized by its enormous speed and high precision. During development, we had to ensure above all that the data was accurate and that the correct cans were ejected. After all, the machine runs 24/7 in continuous operation, so reliability played a decisive role," explains Michael Beising, CEO of EVT. In this context, EVT and Filtec then suggested AT Sensors as the sensor supplier. "We have known AT since its founding, and even back then, AT developed impressive 3D sensors. Therefore, we quickly realized that this was exactly the right solution for can inspection," Beising continues.

The Sensor Decision

AT opted to use C6-2040CS-23-100 compact 3D sensors for this application. With a resolution of 2,048 points per profile, these sensors are not only highly accurate, they also impress with an enormous speed of 25,000 profiles per second. The viewing range of 100 millimeters of this model is also worth mentioning. This allows the sensor to react flexibly to the position of the can on the conveyor belt. "In addition to using only high-quality technology, the customer benefit is always a priority for us, as we always focus on long-term cooperation in our customer relationships. The 2040 compact sensor is equipped with standard interfaces such as GigE Vision and Genicam 3D. This means that the application can be easily and simply implemented in any new filling machine at any time using the plug & play principle," says Dr. Athinodoros Klipfel, Head of Sales at AT.
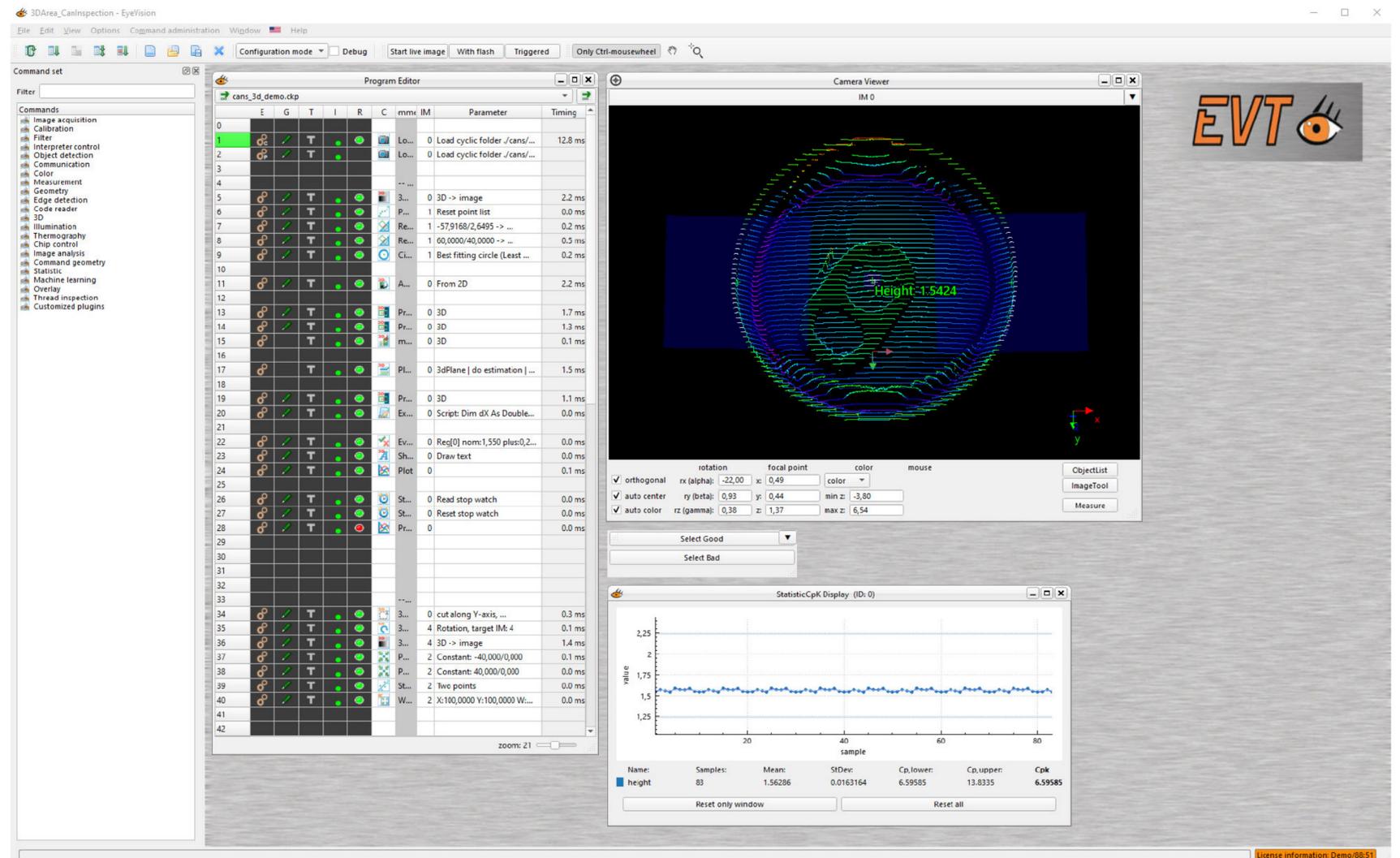

EVT developed the software for can inspection. The company considered it essential that customers do not need any image processing expertise to use it.

EVT CEO Michael Beising adds: "AT worked as an integrator for many years before becoming a sensor manufacturer. As a result, the colleagues at AT have a wealth of expertise and knew exactly which 3D sensors would be best suited for this application. This meant that all the prerequisites were in place for the reliable output of precise point clouds."

Incidentally, poor quality management was the decisive factor in the development of can pressure control in 2013. The beverage manufacturer was repeatedly faced with the problem of downtimes during the filling process due to, for example, faulty bulges on the can surface. In order to eliminate these downtimes once and for all, optimize the inspection process, and significantly increase can production, the beverage manufacturer hoped to achieve profitable success by developing a system for inspecting can printing. Before delivery to the end customer, Filtec tested the AT sensors for three months in 24/7 operation to ensure that the technology met all the required specifications.
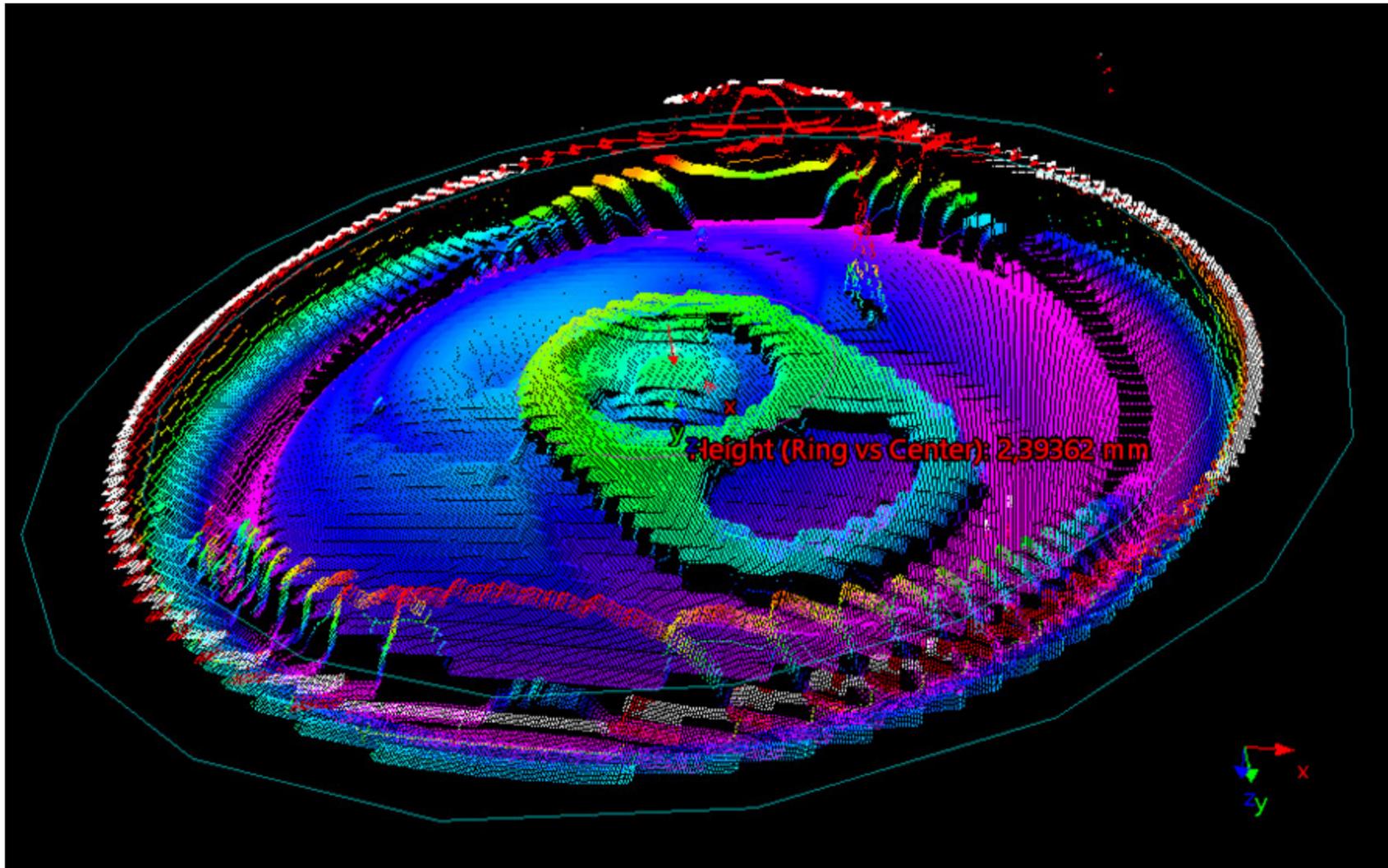
The 3D sensors transmit precise point clouds, which form the basis for effective image processing.

for pressure control, which in turn is connected to the 3D sensor. If this transmits a 3D point cloud that deviates from the norm, the can disappears from the conveyor belt within milliseconds via compressed air.

Conclusion

The can inspection system for Filtec demonstrates how modern image processing takes quality assurance to a new level in 24/7 continuous operation. The application combines maximum speed, absolute reliability, and seamless plug-and-play integration. This not only ensures consistent product quality and minimizes downtime, but also creates a scalable solution for the beverage industry.

Analysis of Point Clouds

EVT then developed the software for the application, which enabled pixel-precise analysis. It was important to the Karlsruhe-based company that the customer did not need any image processing knowledge to be able to use it. On the contrary: the goal was to simply start a program, select a few tools, and the machine could start right away. „We typically have to continuously develop our software in order to keep up with ever faster processors and production processes.

With the can inspection application, however, it's exactly the opposite. The 3D sensors have been running flawlessly in conjunction with the software for years, so we don't want to change anything about the application, as the entire system would possibly have to be re-qualified," says Michael Beising.

In fact, the application works so well that, in normal operation, at most one can per day has to be rejected due to a pressure issue. The conveyor belt has been specially equipped with a tracker

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