

## Application Report

### Smart camera saves time and money

Label inspection at Apollinaris with camera technology from Leuze electronic



Labels in automated beverage filling systems are generally inspected using light scanners. With an increasing variety of products which are moved through a system, however, the necessary retrofitting effort and expense rises with the number of product changes. In addition, scanners are often pushed to their limits during retrofitting due to the many label design and construction varieties. At Apollinaris, the light scanners used in one filling system were exchanged for LSIS 412*i* smart cameras from Leuze electronic. Thanks to these cameras, retrofitting is not necessary and reliable detection of all label varieties is ensured at Apollinaris.

Apollinaris is now a Coca-Cola Company brand and is one of the most well-known mineral water brands in Germany. The products range from the carbonated Apollinaris Classic variety to Apollinaris Big Apple, Lemon and Active+. The halls in Ahrtal, in which the Apollinaris deep spring water was first filled into clay jugs in 1860, are today characterized by fully-automated processes with extraordinarily high speeds and strict quality controls.

Here "THE QUEEN OF TABLE WATERS" is accompanied by many different monitoring procedures on its journey from the 200 meter deep springs of the Vulkaneifel into the bottles. One of these is label monitoring, which occurs after filling is completed; not one label praising the bubbly drinking enjoyment can be absent.

In the diverse systems at Apollinaris, these monitoring steps were implemented with light scanners, as is common practice. "However, with increasing product diversity, the limits of this method became apparent", says Wolfgang Speck of the Maintenance Department at Apollinaris. The optimization of production systems is part of his job, which also includes the implementation of ways to cut set-up times - an issue which is becoming more and more important in the area of label monitoring due to rising product diversity.

Wolfgang Speck clarifies the situation using thick sample folders with so-called stomach, back and neck labels: "Label design varieties multiply exponentially due to drink varieties and packaging types, that is glass and PET bottles, then due to the different bottle sizes and finally due to country and language diversity." If, for example, a filling system fills 30,000 bottles an hour, the product change which takes place several times a day turns into a huge cost factor, owing to production downtimes – alone because of the time expenditure for adjusting the light scanners. "Furthermore", adds Workshop Supervisor Bernd Schneider, "adjusting light scanners was very difficult for particular types of labels and detection was sometimes impossible."

The solution for efficient and reliable label control was realized by Apollinaris with the innovative and high-performance camera technology from Leuze electronic; or, more precisely, with the LSIS 412*i* smart camera. The cameras were delivered by Seli Automatisierungstechnik, Neuenkirchen, the system supplier for the Coca Cola Erfrischungsgetränke AG for the Automation Technology Division.

LSIS stands for Leuze Smart Image Sensors, which are available in different designs. The LSIS 412*i* model used at Apollinaris provides intelligent, pixel-perfect image evaluation and, due to its functions, is destined for presence inspection for label monitoring in beverage filling systems (figure 1).

### **Compact and easily integratable**

Remarkable in the Apollinaris filling system is the compact design of the LSIS 412*i* sensors. They are easy to integrate, even when space is tight, like it is here (figure 2). Illumination, image processing, image and program memory, display, result display

and interfaces – everything is contained in industrial-grade metal housing (figure 3). With the airtight glass window and design in accordance with protection rating IP65/67, the devices are made for damp environments and the corresponding cleaning processes.

The fastening concept and M12 connection system of the smart cameras ensure quick mounting. "Compared to the previously used light scanners, only the synchronization, that is the triggering of the camera on the course of the bottles, has to be adjusted in the PLC of the filling system", explains Wolfgang Speck. "Furthermore, the programs for the detection of the labels had to be created", he added, thereby broaching the issue of the significant advantage of the smart cameras: the flexible detection of different labels through features defined by program-technical factors and automatically adjustable focusing.

### **No alignment needed**

In contrast to the light scanners, the LSIS 412*i* smart cameras do not have to be realigned when the products are changed – this saves the entire set-up effort and expense. This is possible primarily due to the motor-driven focus adjustment and the integrated blob analysis. The focus adjustment corresponding to the specific camera distance is loaded with each check program and the respective focus position is automatically approached. Manual focusing is therefore unnecessary.

The so-called BLOB (Binary Large Object) analysis enables pixel-perfect image processing over contiguous areas of pixels in an image. Individual pixel groups are thereby designated as blobs. By limiting blob features such as surface and circumference, individual objects or object groups can be specifically detected. An area is the sum of pixels enclosed in a blob, even including free spaces within the blob if required. The circumference is the length in pixels of the outer contour of a BLOB. In addition, from the ratio between surface and circumference, a shape factor for a blob can be determined, for example, which classifies its geometric shape.

Via various evaluation criteria and the intelligent selection of particular areas on the labels, at Apollinaris all monitoring processes are covered with a total of 16 different programs.



### **Sophisticated illumination**

In image processing, the illumination of objects creates the basis for reproducible analysis. In the Leuze electronic smart cameras, the quick and reliable evaluation of the images recorded is supported by illumination with special optics.

They consist of eight rectangular lens segments equipped with extensively calculated free-form surfaces (figure 4). This achieves a rectangular, intensive and uniformly illuminated field of view. Compared with conventional LED illumination, the images are significantly more detailed and homogenous. In this way, they can be evaluated more reliably.

### **Overall evaluation and summary**

In the overall evaluation, Wolfgang Speck in particular praises the simple operability which helps with start-up and also extends to the creation of programs with the clearly-arranged software. In this context, he especially appreciates the quick and easy access to the smart camera via an Ethernet interface as well as the "webConfig" configuration interface for configuration directly through any arbitrary web browser.

Extensive light scanner alignments which used to be necessary several times a day during product changes no longer have to be done for presence inspection with the LSIS 412*i* smart camera. In addition, labels which were very difficult or even impossible to detect with light scanners can now be reliably detected. All requirements for the application can be fulfilled flexibly and efficiently with Leuze electronic smart camera technology, especially due to the motor-driven focus adjustment, intense and homogenous illumination and blob analysis.

Figures and captions

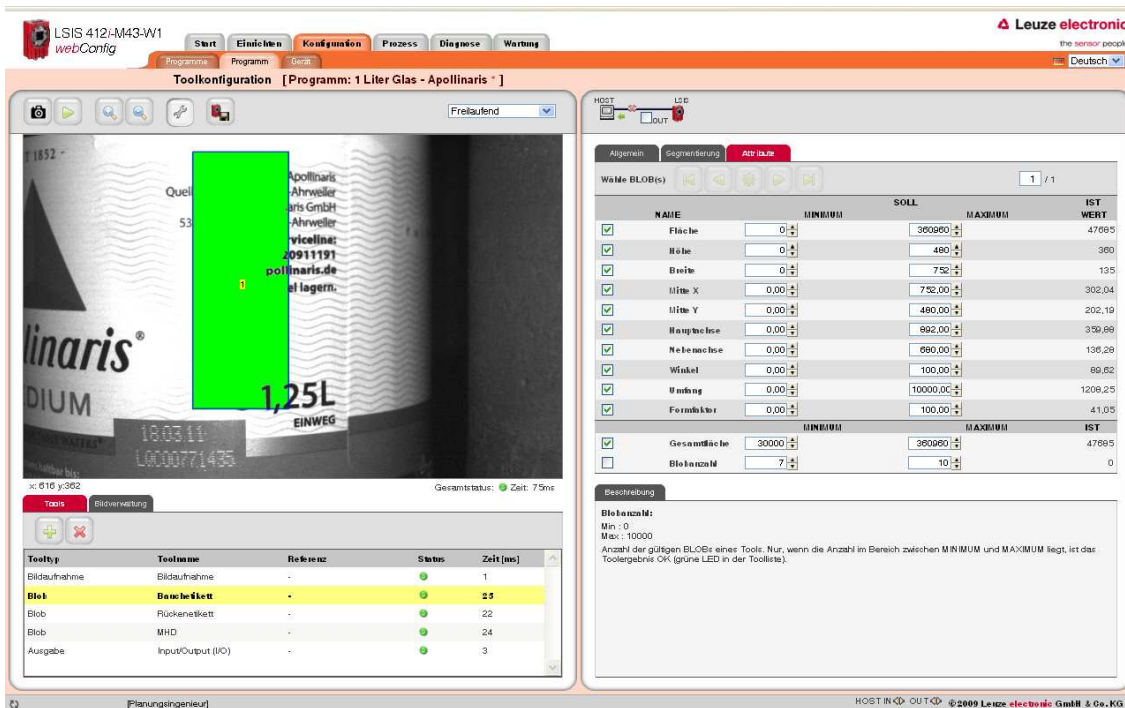


Figure 1. Label monitoring OK 1 stomach label present: the LSI 412i smart cameras can be easily configured via webConfig.



Figure 2. Compact and robust – the LSI 412i smart cameras can be integrated easily into beverage filling systems.



Figure 3. Illumination, image processing, image and program memory, display, result display and interfaces – everything is contained in compact industrial-grade metal housing, which can be very easily mounted due to the fastening concept.



Figure 4. The LSIS device family from Leuze electronic with special illumination optics uses blob analysis to monitor for presence and completeness as well as detect the model, position and orientation of objects.

**Press inquiries**

Leuze electronic GmbH + Co. KG  
Matthias May, Tel. +49 8141 5350-123  
matthias.may@leuze.de, www.leuze.com