FROM BREWERY TO CUSTOMER: CRATE INSPECTION SYSTEM RECOGNISES THE CORRECT BEER BOTTLE

Glass beer bottles arrive in their thousands at breweries where they are checked, washed, refilled (often 40 to 50 times) and sent back to the customer. To ensure a smooth procedure of further machine processing – such as the removal of caps and labels – the crates need to be inspected at goods inwards and, while completeness of the bottle is crucial, it is also important that the correct bottle type is in the right crate.

Different bottle types are a challenge for bottlers and breweries, with the glass often trimmed with the brewery logo or the bottles specially shaped for a certain manufacturer. The inspection process is, however, often manual, with the crates moving along a conveyor belt – and it is estimated that more than one third of the bottles delivered to the breweries are in the wrong crate.

To overcome the problem, Slovak company Tipteh has developed an inspection system using laser line triangulation sensors for the fast, fully automatic, inspection of the received beer bottle crates. This inline system is equipped with five non-contact scanCONTROL 2900-50 laser scanners from Micro-Epsilon.

In the production line, the scanners measure from above onto the crates which are moving along a conveyor belt. Each scanner measures a row of bottles in the crates; and presence detection is carried out at conveyor speeds of up to 850mm/s. Laser scanners not only monitor the presence of a bottle but also the height of the bottle, so the sensor uses the respective bottle height to determine whether the correct type is in the crate.

The bottle height must not deviate by more than 3mm from the target height of the respective bottle type.

The PLC then receives the result of the evaluation as an 'OK' or 'not OK' value, whereby any faulty crates can be removed from the production line. The user can also output the measured results via an integrated display on the control unit.

The challenges of the measurement task primarily lie in the different reflective properties of the bottles which vary due to different glass colours. In addition, bottles can arrive with and without caps at goods inwards and these are recognised by the scanner using pre-stored algorithms. The bottles are also constantly vibrating and shaking while being transported on the conveyor belt. As the sensor captures all points across the line simultaneously, Micro-Epsilon laser scanners overcome these challenges. They can be positioned at a large distance from the measurement object and detect 1,280 measuring points per profile.

The scanCONTROL laser scanner is based on the laser triangulation principle for two-dimensional profile detection. It emits a laser beam which is widened to a laser line that hits the measurement object. The laser light is reflected by the object surface and projected onto a highly-sensitive receiving matrix in the sensor. In addition to distance information (z-axis), the controller also uses this camera image to calculate the position along the laser line (x-axis). These measured values are then output in a two-dimensional coordinate system that is fixed with respect to the sensor. In the case of moving objects or a traversing sensor, it is therefore possible to obtain 3D measurement values.

Micro-Epsilon **www.micro-epsilon.co.uk**

A ROBUST SOLUTION FOR MEASURING PRODUCT VISCOSITY TO ENSURE THE RIGHT MIX

For the manufacture of many products, mixing is a fundamental process. And while in some cases this doesn't need to be precise, in other applications it can be more of an exact science, with under-mixing leaving various component materials unevenly distributed and over-mixing changing the state of the end product. Examples range from the mixing of concrete; to ketchup, sauces, mayonnaise and other sauces where the slightest variation in texture could have customers up in arms. Similarly, drugs and medicines must have the active ingredients precision mixed with the carrier material – the consequence of poor mixing could be life threatening; and cosmetics, toiletries and even paint need to be the right colour and consistency.

As a result, rotational viscometers are often used to measure viscosity by monitoring the torque required to rotate a spindle at a constant speed within the fluid. The torque, generally measured by determining the reaction torque on the motor, is proportional to the viscous drag on the spindle, and thus to the viscosity of the fluid.

The rotational viscometer can run throughout the mixing process, logging data constantly to provide a log of the change in viscosity over time. This profile can be compared with historic data from earlier mixes to give detailed information that would not be available from final target viscosity readings alone.

Torque can, however, be difficult to measure. Because the spindle is rotating, wires attached to a torque sensor on the shaft would wind up and quickly snap. To help, Sensor Technology has developed a wireless technique using TorqSense rotary torque transducers. These do not need a physical connection to the rotating shaft, but instead use a radio frequency (RF) link to both send power to the sensing element on the spindle and to receive torque reading signals back from it.

In the rotational viscometer, the TorqSense transducer is mounted between the motor and the paddle. A double bearing eliminates any side loads, while a torque limiting coupling provides protection in the event of the paddle mechanism seizing. With the motor operating at constant speed, the transducer provides an output of torque that changes proportionally to the viscosity during mixing, thus enabling the operator to accurately measure the relative viscosity of the mix.

Where it is important to determine absolute viscosity rather than relative viscosity, the system can be pre-calibrated using specific paddles immersed in fluids with a known viscosity. Water, for example, has a viscosity of 0.001 Pascal seconds at room temperature. By calibrating the viscometer to a known sample, the absolute torque figure can then be derived in the application from the relative torque figure, and the required viscosity then accurately measured.

The rotary torque transducers have simplified the design of these new rotational viscometers while also increasing accuracy, providing a robust and reliable solution in challenging applications where the absolute viscosity of the mix is crucial.

Sensor Technology **www.sensors.co.uk**