The inline quality lab

Intravis' new CapFeeder with a capacity of up to 288,000 cph

"We bring the quality lab to the production line!" Gerd Fuhrmann, CEO of Intravis GmbH, announces as he introduces his company's future strategy for Industry 4.0 in the field of cap inspection. The reason for this was the product presentation of the new CapWatcher Q-Line, where visitors also were introduced to the CapFeeder, the first in-house at Intravis manufactured cap sorter system.

Industry 4.0 is and will remain the dominant topic in the industry. According to a survey conducted in 2018 among more than 300 companies in the industry, the goals pursued by Industry 4.0 applications are above all the improvement of processes, higher capacity utilisation and faster implementation of individual customer requirements. If Industry 4.0 should mainly achieve the optimisation of processes in manufacturing companies, vision quality inspection is currently the main focus of the process. By constantly inspecting and measuring the produced objects, the quality of the processes can be determined in the end. Only good processes lead to good quality. And if you succeed in deriving recommendations for actions from the measurement results, then we are on a quick path to the "Smart Factory".

In quality labs, the various characteristics of an object are often measured partly-mechanically or by hand in extensive but laborious work. After a certain time, relevant data is collected and can be back tracked to a single object which then enables conclusions about the entire process to be drawn. Wouldn't it be better to gain large amounts of data from innumerable produced objects within a very short time and then be able to directly draw conclusions about the process? This thought triggered the development of the inline quality control, which is playing an increasingly important role today. The aim was to collect meaningful measured values quickly, comprehensively and across all produced objects in order to be able to draw well-founded conclusions about the quality of the process.

Intravis GmbH, supplier of inspection solutions for the plastic packaging industry has always gone beyond solely sorting faulty products with its systems. Rather, it has always gathered extensive measurement data, which, provided at the right time, helps to increase the Overall Equipment Effectiveness (OEE) of the production plant. Gerd Fuhrmann says: "We don't want to just collect data with our systems. We also want to detect even minimal trends directly."

Based on these data and trends, an experienced machine operator or even a self-regulating injection moulding machine can adjust the processes so that defective parts are virtually eliminated. "Intravis has already shown how a self-regulating process, also known as closed loop, can look like at Drinktec 2017 in a showcase together with Netstal Maschinen-AG (see also PET-planet Insider 4/18). Thanks to different interfaces such as OPC-UA, Profibus, Shotscope or even MQTT, the inspection system measurement data can be made available to all parties involved in the process, from machine control center to any other systems on the production line. Furthermore, thanks to the data connection, it is also possible to transmit test orders from the Manufacturing Execution System (MES) to the inspection system. This saves time, optimises processes and minimises potential sources of error. The Intravis systems therefore represent an interface in their own right, namely between planning and process data.

The CapWatcher Q-Line

The new CapWatcher Q-Line is an important piece to the puzzle in Intravis' future Industry 4.0 strategy. The newest system in this line was launched on November 2018 at a major premiere for around 60 invited guests from the plastics industry, politics and press. Thanks to many new developments, it is claimed to meet the demand for high-precision measurements. "For good, high-precision measurement, a stable positioning of the closure is helpful. Belt transport is currently the best choice, which is why we have been using our double track belt technology for a long time," explains Klaus Schönhoff, CTO of Intravis when describing the importance of positioning. But Intravis offers even more. "For the first time in the new generation of the CapWatcher Q-Line, we have installed our new, positive-locking singularisation system. This way, we can guarantee positioning that is accurate to the millimeter and even more precise measurements later on," says Schönhoff.

A positive side effect here: due to the form-fitting handling of the closure from the side, an even more gentle treatment of closures of all tamper evident band variants is possible. In addition to improving positioning, the CapWatcher Q-Line offers even more innovations. The focus has been on the testing of functional elements, to always enable faultless and fully functional closures reach the consumer. For example, to prevent closures from being processed with incompletely ejected or damaged threads, the system checks the complete thread area with a special in-house developed imaging. The testing of the sealing elements has also been improved. Smallest notches or missing material – regardless of one or two-piece closures – can lead to uncontrolled degassing or the ingress of foreign substances. To prevent this, two independent inspection stations check the sealing elements for their functionality.

An essential element of the functionality of closures is a perfect tamper evident band. On one hand, it has to make sure that a closure hasn't been opened already; on the other hand, the end user should be able to open the closure

easily. For the first time the CapWatcher Q-Line also checks the quality of the tamper evident band. For folded bands, additional attention is paid to the quality of the slit. This makes it possible to detect worn knives or problems with the temperature of the blade at an early stage. In the case of injection-moulded tamper evident bands, inspections are in place for long and short shots between the bars, which would question the functionality of the closure.

Another technical highlight is the measurement with a temperature sensor. This sensor makes it possible to give each closure a timestamp. Closures, which obviously have been on the road for a longer time than the average of the last tested closures, are indeed inspected and their results included in the summary. However, the measurement results do not have any influence on possible changes to the process because they are not further processed for this case. This ensures that closures from the past have no influence on current line optimisations.

Another value of the temperature sensor is that one is able to make a prediction about the shrinkage behaviour of the closures. This means that a closure manufacturer can ensure that the closure at the planned time of the application has exactly the dimension that he assures to its customers. With eight high-resolution cameras, accuracies in the hundredth of a millimeter range and more than 40 inspection criteria per cap, the CapWatcher Q-Line collects, visualises and reports on quantitative statistical data at a rate of 60 closures/s in just 1 min evaluation. Due to the efficiency, the system already offers the security of high quality closures on the production line - not after being checked by a quality lab.

High line output

Increasing the capacity utilisation of a production line is another of the goals when using Industry 4.0 applications. An essential component of this is that you get as many elements of a production line as possible from a single source. Dr Fuhrmann states “Although we do not produce injection moulding systems, in the future all customers will be able to source from Intravis production. From now on, aside from our cooling and cross conveyors as well as our CapWatcher product family we also offer our own cap sorter, the Intravis CapFeeder.” With a capacity of up to 288,000 cph, the sorter is also a powerful infeed system and, in combination with the CapWatcher S-Line, the fastest closure inspection system line in the plastics industry, states Intravis.

Extended product family

In the area of standard beverage closures, Intravis brings the quality lab into the production line with the CapWatcher Q-Line described above. In contrast, the enhanced CapWatcher S-Line focuses entirely on the reliable high-speed inspection of beverage closures. At test speeds of up to 80, six cameras provide all the information needed to sort the closures with the highest precision.

With the CapWatcher Slitter, Intravis offers a compact system for closure inspection after the slitting process. In addition to reliable cavity readings, this system is equipped with a comprehensive range of spindle statistics, so that seals and error types can be clearly assigned and traced. Furthermore, the system offers the improved high-voltage test for non-contact control of the microhole closures around the injection point and inspection of the slit quality. The fourth member of the product family is the CapWatcher SC. It serves the entire range of closures outside the standard beverage closures such as sports caps, flip-top caps or large oil closures. The product portfolio is rounded off by integrated systems for the inspection of single or multi-part closures in assembly handling systems or in feeding systems of large filling lines.

Industry 4.0 applications are and will remain a current topic. Intravis GmbH has used its experience of recent years to be able to offer its customers the best possible solutions in the future. Not only that the new CapWatcher Q-Line now offers an even more powerful system for cap testing, which supports industry 4.0 applications such as self-regulating injection moulding machines with its high-precision testing. By expanding the product range with its own sorter, they now have another important element of the downstream equipment of a closure production in their portfolio.

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