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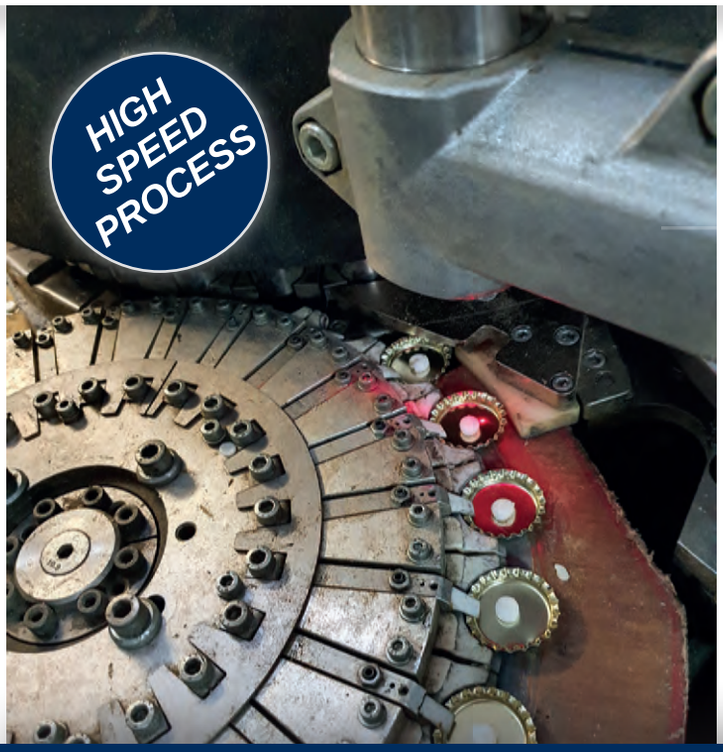
APPLICATION ARTICLE

FOOD-INDUSTRY



Highspeed-Processes

Packaging-Industry

High Quantities

Contactless temperature measurement: A thousand times faster than the blink of an eye

Highspeed pyrometer CTlaser 4M measures up to 5000 crown caps per minute

Measuring temperatures with pinpoint accuracy, contactlessly - and thousands of measurements per second? That is now possible, thanks to the expertise of Berlin-based technology company Optris. The new, fast sensor technology enables many new applications, for example in the quality control of packaging or on railways.

22 billion crown corks are produced in Germany every year - and they have to meet the highest quality standards. After all, the small punched metal plates keep sodas, beer and juices tight in their bottles.

This is ensured by the seal made of thermoplastic elastomer (TPE). It is molded into the inside of the crown cork in the form of a pellet together with glue varnish.

The sealing compound (1), which initially consists of a TPE pellet, is molded into shape after activation of the adhesive varnish (2). The result is a sealed bottle cap (3).

APPLICATION ARTICLE

The installed electronics box of the CTlaser 4M *(Image: Optris GmbH)*

Technical data optris CTlaser 4M

- Temperature range: 0 °C to 500 °C
- Spectral range: 2.2 µm - 6.0 µm
- Ambient temperature: 0°C ... 70°C
- Acquisition time: 90 µs (90 %)
- Response time: 300 µs (90 %)
- Optical resolution (90 % energy): 30:1
- System accuracy: ± (0,3 % TMess + 2 °C)
- Emissivity / Gain: 0,100 - 1,100
- Transmittance: 0,100 - 1,100
- Protection class: IP 65 (NEMA-4)

Find more information about the CTlaser 4M at: www.optris.global/ctlaser-4m

> ***„22 billion crown corks are produced in Germany every year - and they have to meet the highest quality standards.“***

The glue varnish is then activated at around 150°C and the TPE pellet is finally pressed into shape.
This process happens very quickly - at a rate of 83 times per second, or just under 5000 times per minute.

Precise measurement at high Process speed

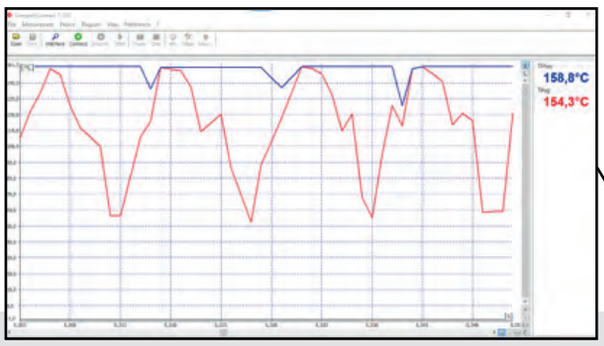
The temperature is crucial here, because it activates the adhesive coating for the thermoplastic elastomer seal. But at this rapid speed, how do you know whether it is sufficient? Measurement by touch is no longer possible. That‘s why the experts from Optris came into play: Since 2003, the Berlin-based company has specialized in measuring devices for non-contact temperature measurement - even in extreme situations.

First, an optris CT 3M with a response time of 1 ms was used on a trial basis. The temperature measurement with this system delivers approx. 12 measured values per crown cork. After evaluating the temperature-time diagram, the desire arose for an even more detailed recording of the temperature distribution as the crown cork passed by. For this reason, a change was made to the optris CT 4M.

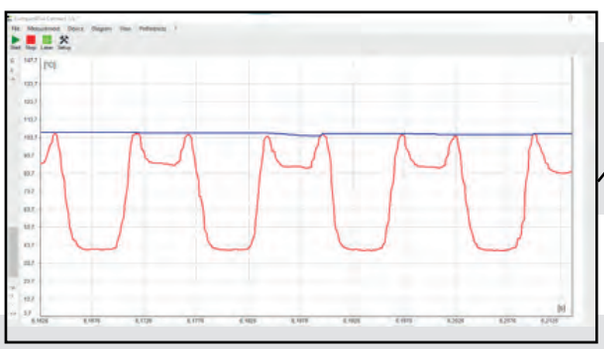
Higher temporal detail resolution due to faster sensor

Compared to the CT 3M, the CT 4M offers a measurement speed that is more than 10 times faster. Instead of the previous 1 millisecond response time, the CT 4M sensor operates with a response time of 90 microseconds. By

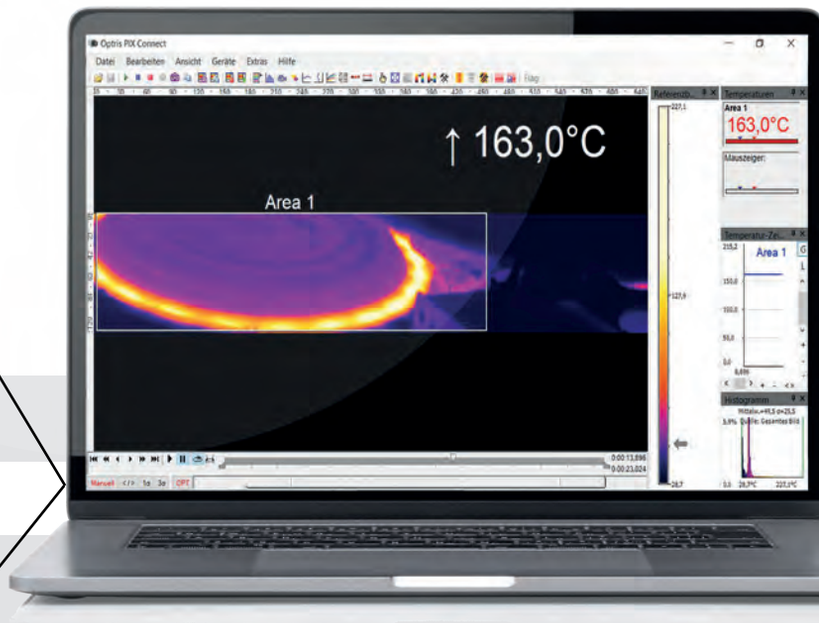
Evaluation of the measurement data



Measurement results from CTL 3M - 12 measurements in 12 milliseconds



Measurement results from CTL 4M - 130 measurements in 12 milliseconds



Installation optimization for the high-speed sensor and detection of interfering, reflecting heat sources by the optris PI 640i thermal imaging camera

comparison, a blink of an eye takes about 150 milliseconds.

During this time, the 4M sensor takes more than 1600 measurements.

The result: with the Optris sensor, the temperature of each crown cork can be individually and precisely recorded as it passes through the production line.

This ensures constant heating of the crown corks at full process speed, thus guaranteeing the quality of the sealing insert bonding.

To optimize the installation position of the

CT 4M sensor, the Optris team used an in-house thermal imaging camera - also to avoid the possible influence of reflective heat sources.

When the application is in use, up to 5000 crown corks per minute are measured - The double laser sight of the CTlaser 4M enables an exact measurement field marking.
(Image: Optris GmbH)

New possibilities in quality control

At the heart of the Optris sensor is a new indium antimony arsenide detector. This development enables the combination of a low-temperature measuring range, which already starts at at 0 °C with a measuring speed of 90 µs. This opens up many new areas of application:

High volume production processes

For example, in the quality control of PET bottle production - here, too, large quantities are involved in a short time, around 80,000 units per hour, which is why extremely fast measurements are required.

Marking by laser coding

High-speed temperature measurement can also help with quality control when marking product packaging using lasers, for example - thermal energy dissipates very quickly in this process.

Packaging processes

The sealing of packaging using glue can also be optimized with the 4ML sensor.

Traffic safety for trains

High-speed trains are a completely different area of application: Here, critical parts such as brakes and wheel bearings, which are exposed to heavy loads and high temperatures, can be reliably inspected and monitored.

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