

The Spyro System for Blank and Blow Mould Temperature Control

Peter Firth highlights a low-maintenance system with high-performance measurement and control.

The Konatic Spyro System represents a considerable advancement in the control of blank and blow mould temperatures in glass container manufacturing.

Developed initially with a basic thermocouple approach six years ago in Verallia, France, some of the installed systems have already evolved to incorporate infrared camera technology.

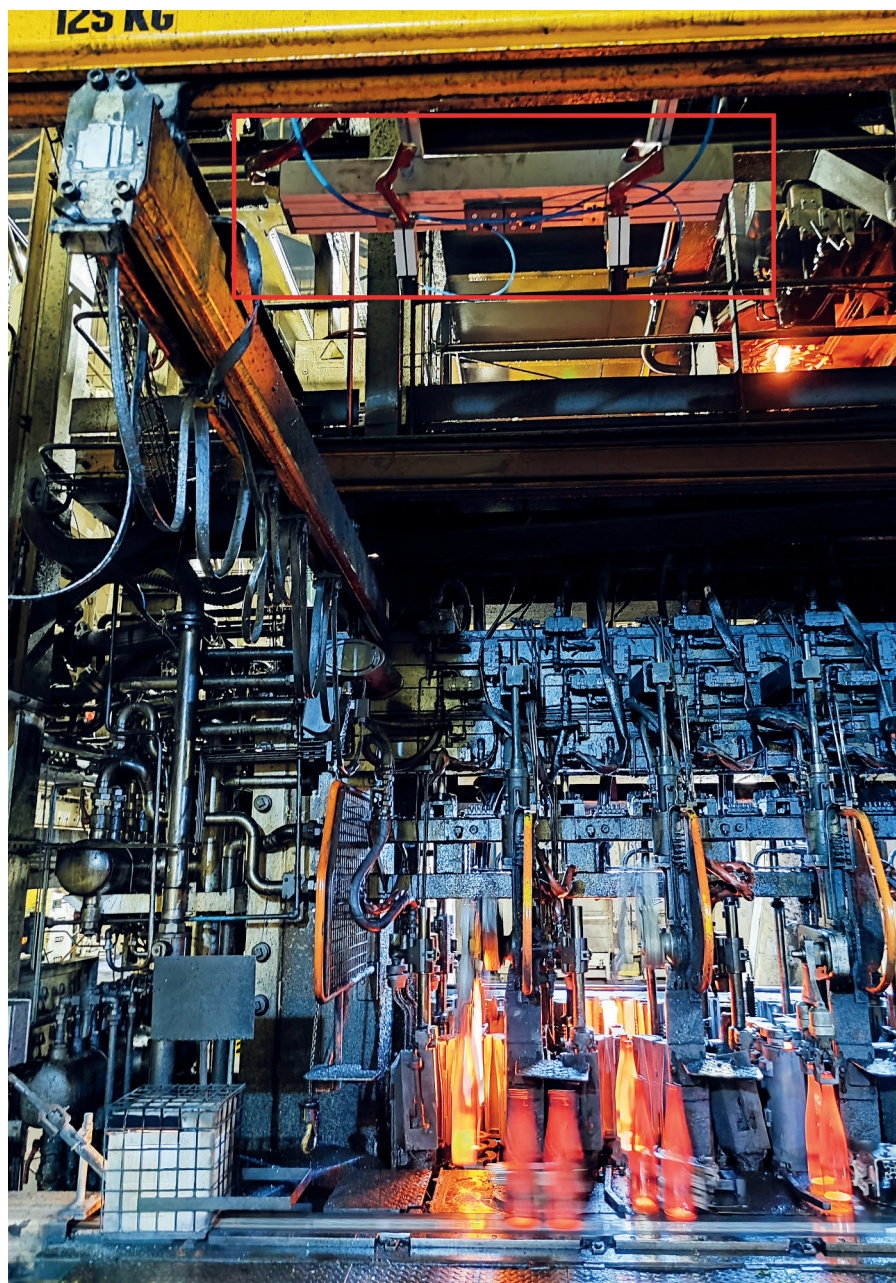
A move to the new infrared camera-based approach was only taken after three years of successful thermocouple use for reading the blank and blow-mould temperatures. This transition to infrared cameras has brought about several critical improvements in daily glass plant operations.

In Pursuit of Forming Process Stability

Talk to any respected glass bottle-making expert and they will tell you that stability is of paramount importance. 'Stability', in this case, means the stability of conditions under which the glass containers are made. Stability is an absolute necessity for high-quality and high-efficiency production output, something all glass plants want to achieve.

Stability does not happen by accident. It has to be created and maintained. Thankfully, new technologies are bringing more stability to the conditions under which glass production is made. Hence, giving Glass Plants the opportunity for a higher output of quality glass container production.

Konatic is a company that is at the forefront of taking advantage of such new technologies and delivering benefits to Glass Container plants. Konatic is a prime example of the kind of company the glass container industry needs to thrive. I wrote



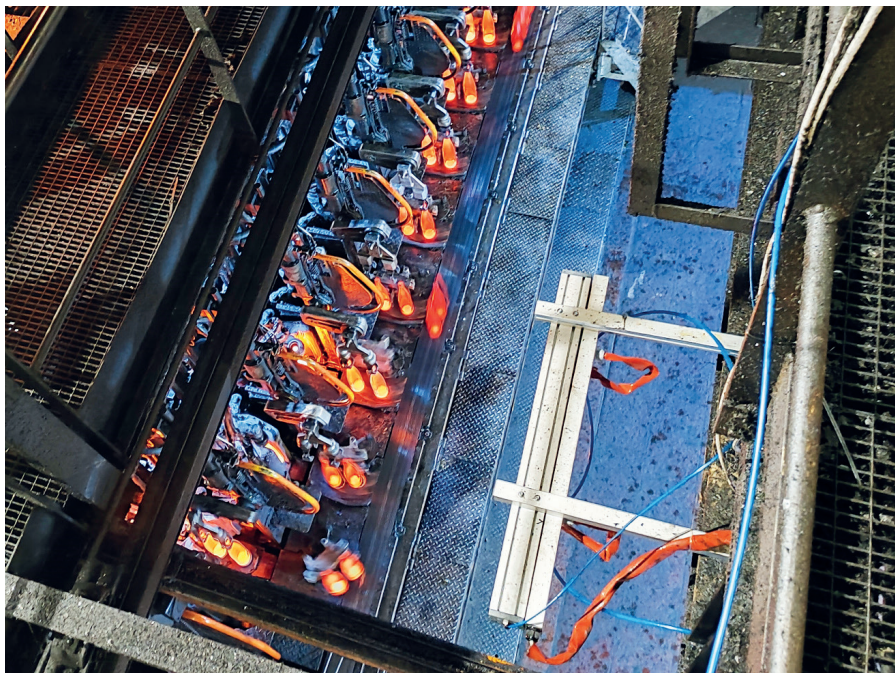
my views on this topic in an article in Glass International, November 2022, The GUYS and GIANTS of the Glass Industry¹.

Several years ago, with its Smart Gob system, Konatic initially focused on creating better gob stability with camera monitoring of gob shape, as well as automatic control of gob weight for any IS Machine forming process (BB, PB, & NNPB). This system was also previously

reviewed in Glass International, November 2022, Assessing the Konatic Smart Gob System².

Having created stable gob conditions, the next logical area of focus is to create stable blank temperatures. This area of control is not new to the glass industry but the way Konatic is now doing this

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is very new. We will describe in what way the system is new, later in this article. However, despite being new, it is already proven by multiple IS Machine installations.

With NNPB production in particular, correct and stable blank temperatures have a significant impact on production efficiencies due to the impact on glass wall thicknesses. This includes side-to-side blank-half temperature control and the average blank temperature. The other forming processes of PB and BB are also sensitive to having correct blank temperatures held constant for optimal performance.

Innovation summary

The Spyro system leverages advanced infrared camera technology to monitor and control the temperature of blank and blow moulds. Traditional methods involved manual measurement with hand-held infrared thermometers, leading to inconsistent readings due to human error. Automatic control using thermocouples was developed decades ago but required high levels of maintenance due to sensor and wire damage when placed in the blanks and blow-moulds.

The Konatic Spyro system innovates by placing static infrared cameras at the mould side of the IS machine, a departure from the conventional camera placement at the blank side. Implementations with travelling cameras moving across the blank-side have been used in some existing systems but this can lead to more

maintenance and less accuracy due to the moving parts (**Pic 1**).

In the new Konatic infrared camera system, each statically mounted camera is located at high level and looks down into the machine sections. The cameras monitor the temperatures of both the blank and blow moulds in real-time, giving good measurement repeatability and easy adjustment capability (**Pic 2**).

Benefits

1. Enhanced Stability: By maintaining stable temperatures in the blank and blow moulds, the Spyro system ensures consistent production quality. This stability is crucial for achieving high production efficiency and minimising defects.

2. Reduced Maintenance: Unlike thermocouple and ‘travelling camera’ systems that require frequent maintenance, the Spyro system needs minimal upkeep. The primary maintenance task is cleaning the camera lenses once a month, making it a low-maintenance solution.

3. Improved Temperature Control: The infrared cameras provide accurate and repeatable temperature measurements, which are essential for maintaining optimal glass wall thicknesses and preventing hot- or cold-related defects.

4. Versatility: The system can be installed on various IS machine types, including Emhart, Bottero, BDF, and Heye, and is adaptable to different cooling configurations. It can also accommodate multiple cavity sections, making it

suitable for double, triple, or quad gob production.

5. Quick Temperature Recovery: The system can rapidly restore blank mould temperatures to setpoints after interruptions, such as swab cycles or machine stoppages. This quick recovery reduces production downtime and increases overall efficiency.

6. Future-Proof and Upgradable: Konatic sees the Spyro as a work in progress, with further improvement potential coming from future software upgrades to enhance the capability of the installed systems. Envisaged upgrade potentials are discussed later.

7. Cost-Effectiveness: Despite its advanced capabilities, the Spyro system is competitively priced, offering a reasonable payback period considering the efficiency gains and defect reduction.

How It Works:

1. Infrared Cameras: The system employs high-speed infrared cameras positioned on the mould side of the IS (Individual Section) Machine. Each section has a dedicated camera that captures the temperature profiles of both the blank and blow moulds (**Pic 3**).

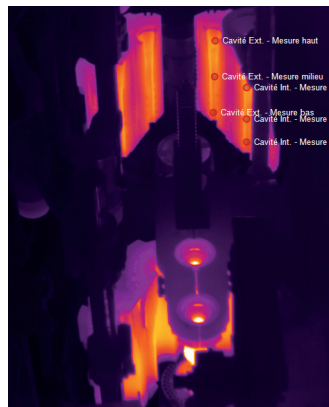
2. Temperature Measurement: The cameras measure temperatures at specific selected points in the blank and blow-mould cavities. Typically, two or three spot points per mould half are monitored. The average temperature of these temperatures on each cavity-half is then used to control the cooling air to maintain the setpoint temperature (**Pic 4**).

3. Control System: The measured temperatures are fed into a PID (Proportional-Integral-Derivative) controller, which adjusts the cooling air timing to maintain consistent mould temperatures.

4. Real-Time Adjustment: The system automatically compensates for temperature deviations caused by production interruptions to quickly restore optimal operating temperatures (as determined by the setpoints entered by the operator).

5. Data Integration: The Spyro system can connect to Big Data platforms via OPC-UA (Open Platform Communications Unified Architecture), allowing for comprehensive data analysis

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and integration with production output metrics.

Quick System Setup

Setting up the Spyro system is straightforward. Measurement points are selected by positioning 'spots' on the desired locations, and the system can copy these settings across all sections, minimising setup time. The system also supports saving settings for repeat job runs and can integrate with existing 'Best Day History' data to optimise future setups.

Future Development Potentials

Just a little further development work will see the detection of IS Machine sections that jam-up with glass stopped automatically and then an alarm raised for the operator to attend. In this case, the 'normal stop' can be used to bring the section to a controlled stop and prevent an unnoticed jam-up presenting the threat of an IS Machine fire.

The detection of the jam-up and any other situation where there is a high-temperature reading that should not be present is a natural part of having the camera look through each IS Machine section from the mould-side to the blank-side. The cameras see everything in infrared so such unwanted presence of high temperature in certain parts of the IS Machine are easy to detect.

Measurement of the neck-ring temperatures can already be carried out with the blow mould side camera. However, this is not under automatic control just yet. For that, it is thought a dedicated camera on the blank side may be required.

Neck-ring temperature control does not however fall into the same category

as the requirement for blank temperature control. Monitoring the neck-ring temperatures and alarming upon detected deviations could simply be all that is required in practice.

Summary

In summary, the Konatic Spyro System delivers significant new operational benefits to glass container manufacturing by enhancing stability, reducing maintenance, improving temperature control, and offering a versatile and future-proof solution. This advanced technology enables high-quality production and increased operational efficiency, making it a potentially valuable investment for glass plants. ■

Further Information

Konatic has ample experience in helping to evaluate potential paybacks based on the results of the current applications. They can advise you on factors to consider when calculating the potential payback.

Nevertheless, there is no replacement for implementing such a system in your glass plant, as each plant will be unique in terms of exactly how quickly the investment payback is delivered.

Take advantage of their free one-to-one detailed explanation sessions for more detailed information. Or visit the link given here for further insight into how the system works and the benefits it offers <https://bit.ly/spyro-info>

References:

1. The GUYS & GIANTS of the Glass Industry, Glass International November 2022, P J Firth. See short link bit.ly/GUYS-AND-GIANTS

2. Assessing the Konatic Smart Gob System, Glass International November 2022 P J Firth. See short link bit.ly/smartgob-gi2022-article

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