



Mark Ziegler* describes Heye International's vision for a Smart Plant of the future, and the technology it has available today that will help glass plants to implement the principles of Industry 4.0.

Information integration is among the many exciting challenges posed by Industry 4.0, employing concepts that make extensive use of sensors, the processing of collected data and its intelligent analysis.

Experts believe that the fourth industrial revolution could be widely adopted throughout industry within 20 years and Heye International is already working to adapt the best concepts to the glass container manufacturing process today.

Correct priorities

Heye has been one of the industry's pioneers in closed loop control, with many years' experience as a glassmaker, equipment supplier and an important long-term partner.

Glassmaking is a demanding process and one that has become increasingly automated. Automation does not come for free, however, making it important to set the correct priorities. Heye has looked specifically at the working steps in which

the potential for error is highest or where the greatest savings can be achieved.

Heye's long-term vision, the Smart Glass Plant, incorporates dedicated process control technology or the ability to accommodate assortment production, featuring different weights.

The technology available also includes the availability of swabbing robot sensor networks, safety concepts (e.g. blow side monitoring) or new servo concepts.

The information platform will be the Heye PlantPilot information management system, connecting data from the hot end and the cold end.

Process control benchmark

Among the company's closed loop glassmaking process benchmarks is the Heye Process Control, which automatically regulates the horizontal and vertical plunger position, as well as the tube height. The result is a constant gob weight, with critical defects avoided.

An optional component of the process control system is the Heye Press Duration

Control, which keeps the press duration of all cavities constant, provides for equal heat dissipation and ensures repeatable wall thicknesses. Using this system, it is possible to control the individual phases of the pressing process.

In conjunction with dual motor shears, the Heye Servo Feeder mechanism allows stable and precise gob forming.

This provides easy parameter settings and preselectable profiles to support the operator, resulting in a consistent gob form.

Superior thermal homogeneity

Precise gob loading starts at the feeder, and Heye has developed its Heye Servo Feeder. Delivering thermal homogeneity and top weight consistency, the Heye rotor mechanism is another key element of the company's process knowhow, having been widely adopted by the international hollow glass community, even by customers not operating the

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company's IS-Machines. The rotating movement of the rotor segments provides good thermal homogeneity of the glass melt, and the equipment's proven design guarantees a reliable functionality and a long lifetime.

Replacing manual steps

Heye's automatic Swabbing Robot replaces the most critical manual working step and, depending on local conditions, improves productivity by up to 2%, through avoiding section stops and minimising container rejects. Up to 75% lubricant savings are standard.

The robot sprays into the opened moulds on the blank side. 'Swabbing on the fly' is the key advantage, which means that a section stop is unnecessary.

Short spraying cycles with a small amount of lubricant avoid bottles having to be rejected after swabbing.

Ecomotion cushioning

Production efficiency can be increased by implementing a cushioning system of the invert that reduces the number of critical defects. Heye Ecomotion provides reliable self-regulating end position cushioning.

The system is designed to upgrade

existing IS-Machines, replacing their safety-critical oil cushioning. Ecomotion achieves the optimal deceleration point of the device by a control system and 'distance-time monitoring' of the entire pneumatic cylinder hub.

Safety and maintenance

It is important that manual interference at difficult to access or hot locations of the machines is avoided. Heye has employed optional sensors to monitor the final blow valves and to conduct automatic pressure measurement of the entire process stage.

The trend monitoring of valve function is a good example of preventative maintenance, providing configurable alarm thresholds and avoiding the need for operators to climb into machines to check the valves' functions.

Another option is to use sensors in the dead plate to measure the heat of the containers.

In the event of abnormal heat radiation, the following gobs for this section will be rejected to avoid a jam-up of hot glass.

Closed loop ware handling

To ensure efficient ware spacing and pusher operation at the end of the IS-

Machine conveyor, Heye has developed a pusher optimisation solution, where data from a light barrier at the end of the machine belt is delivered to a control unit. The pusher cycle start point is set according to the space between bottles on the belt.

Using a Heye Ware Transfer, automatic synchronisation is employed when initiating production, where the fingers of the guide belt go right into the gaps between bottles. The result is smooth article transfer, with no loss of production.

Concepts and solutions for a Smart Plant

Collectively, these innovations deliver an advanced smart plant concept. Together with Heye PlantPilot, which integrates plant-wide data, they illustrate the value of closed loop systems and information feedback in 21st Century glassmaking. ■

* Marketing Manager, Heye International, Obenkirchen, Germany
marketing@heye-international.com
www.heye-international.com