

Smart plant (concepts) for smart glassworks engineers

An established supplier of manufacturing technology to the international glass container industry, Heye International recognises the importance of closed loop control to the attainment of long-term productivity gains. Mark Ziegler spoke to *Glass Worldwide* about the company's latest advances and how they can be integrated with existing technologies to create an effective platform for glassmakers to operate successfully within the framework of Industry 4.0, the fourth industrial revolution.

Information integration is among the many exciting challenges posed by Industrie 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 companies like Heye International are working to adapt the best concepts to the glass container manufacturing process.

Reinforcing the company's guiding principle 'We are glass people', the Heye automation strategy and the development of closed loop production concepts, combined with the benefits associated with Heye engineering, training and technical assistance, are helping glassmakers to realise valuable productivity improvements. As well as developing NNPB process technology, for example, 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" explains Mark Ziegler, Marketing Manager. "Heye has looked specifically at the working steps in which the potential for error is highest or where the greatest savings can be achieved."

Following the flow of glass, a series of innovative and proven solutions are offered, examples of which are described here. Heye's long-term vision, the Smart Glass Plant incorporates dedicated process control technology (including press duration control), sensor networks,

safety concepts, dead plate air control, dead plate monitoring and the ability to accommodate assortment production, featuring different weights. The technology available also includes the availability of a swabbing robot, a blank side protection grid, the development of Heye Simotion servo concepts, Heye PlantPilot tracking and tracing and the employment of integrated user interfaces.

Employing clear engineering design layouts, the company aims to create working environments that are safe, ergonomic and clean. Product quality is addressed by reducing the risk of dirt and particles entering the container. In addition, clearly structured production design makes it easy for employees to operate the different functions correctly and make unnecessary disruptions a thing of the past.

Alongside this highly structured engineering approach, Heye asserts that well-trained employees guarantee seamless workflows and provide managers with essential information on existing and potential problems. "Moreover, a properly trained workforce contributes significantly to the attainment of productivity and safety" Mark Ziegler comments. "Experienced Heye International production specialists provide a series of job-specific training courses, either at the company's training centre in Oberkirchen or at the client's facilities."

PROCESS CONTROL

Among the company's closed loop glassmaking process innovations is 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.



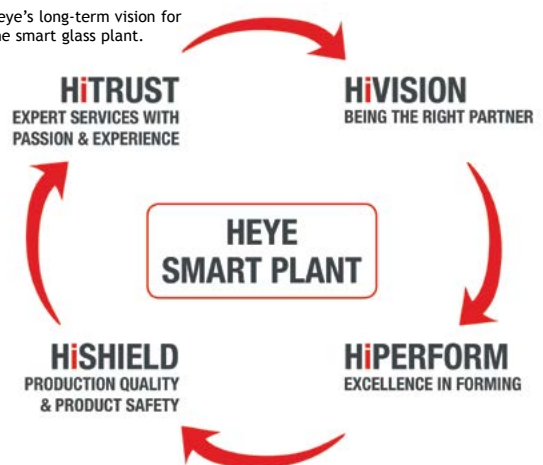
Closed loop ware handling.

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.

The Heye servo feeder and dual motor shears allow full production flexibility, where different weights can be made on the same IS machine, even when using the NNPB process.

An optional component of the process control system is Heye Press Duration Control, which keeps the press duration of all cavities constant, provides for equal heat dissipation and ensures reproducible wall thicknesses. Using this system, it is possible to control the individual phases of the pressing process.>

Heye's long-term vision for the smart glass plant.





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PRECISE DELIVERY

The Heye Loadmaster delivery system guarantees constant and precise gob loading. A stable and solid design of the troughs has the advantages of high heat capacity (no delay/shift as simple gutters). Uniform temperature distribution, as well as uniform gob speeds due to the high masses is the result.

The gob is guided precisely by the delivery system and always leaves the deflector coaxially to the blank mould axis. In addition, long periods between cleaning and recoating of the troughs and deflector are achieved.

THERMAL HOMOGENEITY

Precise gob loading starts at the feeder. Delivering superior thermal homogeneity and top weight consistency, the Heye rotor mechanism is another key element of the company's closed loop knowhow, having been widely adopted by the international hollow glass community, even by customers not operating the company's IS machines. The rotating movement of the rotor segments provides good thermal homogeneity of the glass melt, the equipment's proven design guaranteeing reliable functionality and a long lifetime.

Via a rotary movement of the toothed ring, three paddles provide a stirring movement in the glass melt and thereby, keep it homogenous. The servo motor motion is controlled by Heye Simotion Servodrives, based on the future-proof multi axis Simotion drive system from Siemens.

SWABBING ROBOT

The automatic Heye swabbing robot improves productivity by up to two percentage points, 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 production stop is unnecessary. Short spraying cycles with a small amount of lubricant avoids bottles having to be rejected after swabbing. A special programme allows spraying of the neck ring, within the same time an operator swabs the blow moulds by hand.

CLOSED LOOP 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.

An optional visualisation tool shows cushioning performance with the help of a speed and time graph. By setting the ideal graph as a standard, it is possible to detect deviations and ensure the smooth and reliable performance of the control system.

VALVE MONITORING

Sensors are employed to monitor 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.

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.

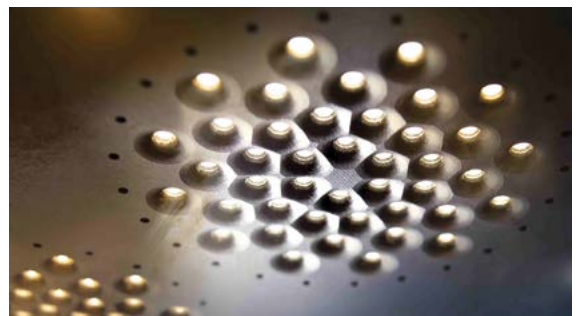
ADVANCED CONCEPTS

Collectively, the innovations described above deliver an advanced smart plant concept and together with Heye PlantPilot, which integrates plant-wide data, they illustrate the value of closed loop systems and information feedback in 21st Century glassmaking. According to Mark Ziegler, Heye's development priorities will continue to focus on process innovations that help directly to improve productivity, as opposed to monitoring for process irregularities, without necessarily providing the means for the attainment of discernible productivity benefits.

"It's not exclusively about delivering equipment innovations and greater volumes of production information to factory managers... Heye personnel continue to work closely with customers to identify those processes that need to be measured more closely, how often and by what means, as well as agreeing what the information generated is to be used for. In addition, providing relevant training and support to operate this equipment is equally important" Mr Ziegler concludes. ■



The Heye multilevel safety concept includes many patented solutions.



Dead plate monitoring.

FURTHER INFORMATION:

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