



smart plant

SMART BOOK

**h** heye  
international



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# YOUR PARTNER ON THE SMART ROAD

*Digitisation has been responsible for delivering many innovative and impressive changes to our lives, almost on a daily basis. Realistically, however, who can really claim to be totally 'smart' and completely in control in this new era? The extent of smart networking and Industry 4.0 solutions is developing so quickly that it can be difficult to keep up. But this is exactly the path we are committed to following!*

*Heye is embracing Industry 4.0's state-of-the-art developments for the world of glass in the same way we did when inventing the NNPB process. We will make every effort in the future to further exploit the great potential of glass as a packaging material by introducing relevant Industry 4.0 technologies.*

*The conditions are right: And the people at Heye are passionate about glass – they live and breathe glass production. Our answer is the Heye Smart Plant Concept, combining different innovative solutions in major areas. All of them have become possible through a set of enabling technologies, from sensors to communication networks and robots.*

*We offer customers a true partnership when it comes to selecting the correct solutions from the massive Industry 4.0 marketplace. We want to bring together our process expertise, expressed through our mission WE ARE GLASS PEOPLE, with thorough knowledge of advanced networking and data management technologies. This is our roadmap. And together with you, we can develop a roadmap for your smart plant.*

*The smart plant is our vision for container glass production, combining the best Industry 4.0 concepts to produce glass containers in an energy-efficient and profitable way. The smart plant is highly automated and safe, allowing customers to produce glass containers at high quality and low costs.*

*Very simply, a smart plant makes great glass.*

*We look forward to exploring the definition of your smart road!*



Dirk Pörtner  
Managing Director

# THE PEOPLE IN THE SMART PLANT

**A Smart Plant has to consider the operator's needs. And to be able to benefit from all the possibilities there are, the operator needs solid training – at Heye. Martin Bradt, our Customer Service Director, explains how it all works.**

**The 'Smart Plant' makes life easier for plant operators. Does that mean that the training courses you offer clients are any less demanding because of that?**

Smart Plant offers excellent tools that help identify and rectify errors more quickly. You nevertheless still have to be able to deal with the machine and observe the correct settings. The more glass containers the plant operator can package and sell from what used to be a glass gob, the larger his profits will be. Further training is absolutely essential so that the operator can fully exploit the plant's potential.

**What level of knowledge do participants have?**

It is very varied. There are those who have been using existing IS-machines for some time. They already have quite a lot of knowledge. But then there are, of course, those who have never seen a glassworks before.

**Three days surely isn't enough for this ...**

No, a course like that runs for several months. We start from scratch with theoretical knowledge addressing things like: What is glass? How does a glassworks like this function? Then the focal point is how to operate an IS-machine, how to shape a bottle from the cut gob and then take it to the lehr. For this, the participants



need lots of expertise: what is a pneumatic drive. What is a pneumatic drive, what manoeuvres are necessary? All of these are important practical skills, otherwise mistakes can occur that can have fatal consequences later on at the bottling process or even with the consumer.

**Even if Heye's machines are very reliable – machine failures can still sometimes occur. Can you also teach people how to repair them?**

We also offer training in the areas of mechanics and electronics. You need the electronics knowledge to find faults and to troubleshoot. Mechanical knowledge is necessary to be able to repair machines like Heye's. Generally, we offer a broad spectrum – we also impart the knowledge how to prepare the variables, which are the parts that need to be changed in a job change. We also provide training for how to optimise conversion times so that the machine runs as smoothly as possible. We offer training for mould design. We also train our clients in the Cold End area on inspection machines. We combine everything together in the technical assistance training.

**Where does the training take place? It can't all be in a seminar room.**

We have our own training centre for the theory lessons and it also has some training stations. And of course we have a complete IS-machine that we use for training participants on individual stations, until we finally get to go to the glassworks themselves where we can work under real-life conditions.

**Do those taking part also have a chance to experience a bit of the local area?**

Yes they do. We organise an enjoyable accompanying programme. We go bowling and spend a relaxing evening together. The participants usually stay at a hotel in the small town nearby, where you can take short walks in the evening or enjoy some sport.



# HEYE'S R&D AGENDA

'Product Development', that's the name of the department at Heye which turns visionary dreams into concrete plans. When asked what the industrial production of container glass will look like in ten years, Head of Research Dr Michael Kellner doesn't have to think for long: "Hollow glass production will be completely automated. The machines will work autonomously and will be able to identify and correct any faults or disruption quicker than before. They will be closed so that people will be kept completely away from this dangerous environment."

That sounds very self-confident, but the preconditions at Heye are simply very good – over 20 percent of its staff work in product development. They conduct basic research in cooperation with universities and develop specific solutions using new technology.

There are other signs to back up this optimistic view of the future. The milestones that have already been reached were by no means a foregone conclusion. Automated machines need intelligent sensors to observe process operations and actuators that can influence them – for example to compensate deviations during the shaping and cooling process of the glass. In hollow glass production, however, this sensitive technology has to work in close quarters with hot glass that reaches temperatures of up to 1000 °C. For this operation, Dr Kellner and his team have developed a completely new generation of production machines which can integrate Smart Plant modules.

Today the Heye PlantPilot registers information about every single glass container and prepares the data so that profound decisions can be made to increase efficiency. With around one million containers on the production line per day, that amounts to a data volume of 25 million bits of information. However, a lot more information still needs to be gathered – and this will soon be performed by sophisticated sensor technology, made possible by the research and development work.



## What does the future of glass container production look like? Heye's Head of Research Dr Michael Kellner explains it all in detail.

Closing the loop in hollow glass production, however, is not the only thing that the Product Development department has on its agenda. Other major tasks include developing servo drives, which can achieve ever more accurate motion sequences to optimise safety and deploy material and energy more efficiently. And of course, the area that has made Heye a real driver of innovation is that it has made glass containers lighter and lighter while maintaining their strength and meeting the increasing demands for individual design and appeal.

Dr Kellner notes that the excellent connection that Heye has to the people operating the machinery helps him tackle these projects with confidence: "Often, we find our partners for constructive research among our international clients," he says.

# SMART PLANT CONCEPT

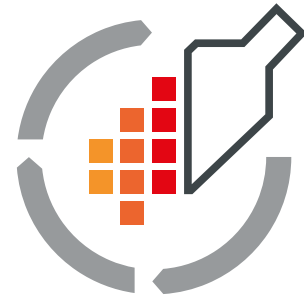
Adoption of the latest technologies is now crucial for the international glass container industry. Glass is constantly under pressure from other packaging materials, while attracting skilled people to work at the industry's factories is an increasing challenge. Heye offers customers a partnership on their individual path towards a smart plant, resulting in the creation of a highly automated and cost-effective glassworks.



## SELECTION IS KEY

Selection is key to defining the perfect path but some decision makers are still confused by the issues surrounding Industry 4.0 technologies. Combined with rising CAPEX challenges, this makes it absolutely necessary for plants to identify a partner when it comes to the selection of appropriate technology.

Not everything that is possible makes economic sense for a glass container plant. The Glass People at Heye combine long-term process expertise and a passion for the material, with advanced skills in the latest technology. Every possible solution is evaluated by the company's process experts, based on the decision criteria of financial ROI, workplace safety and influence on product quality.



# smart plant

## SMART USER INTERFACES

The availability of smart user interfaces for operators has become especially important, as production employees with comprehensive process knowledge are increasingly difficult to find. The Heye Cockpit will become the central user access to the Heye SpeedMaster Hot End control and process intelligence portfolio. The Heye SpeedMaster consists of three modules: E-timing; motion control (servo and pneumatic actuators); and the process intelligence solution set, combining all process control closed loops.

## EASY OPERATION

The approach employed is user-centric. The cockpit integrates all relevant sub-systems at the Hot End, plus the Heye PlantPilot. Features like the integrated article database make job changes as easy as possible.

Combined with precise mechanisms, the latest servo technology helps to achieve maximum production speed at high quality levels, especially for large beer lines etc. High production flexibility is another result of the technology.

Glass plants with small customers and many different jobs have two advantages. First, job changes can be performed in a very short time, as important parameters will be retrieved and the major parts of the machinery will be adjusted automatically in the future. Second, the operators can produce different bottles on one IS-machine, by using multi-weight assortment technology. This makes the production of samples or short job runs extremely efficient.

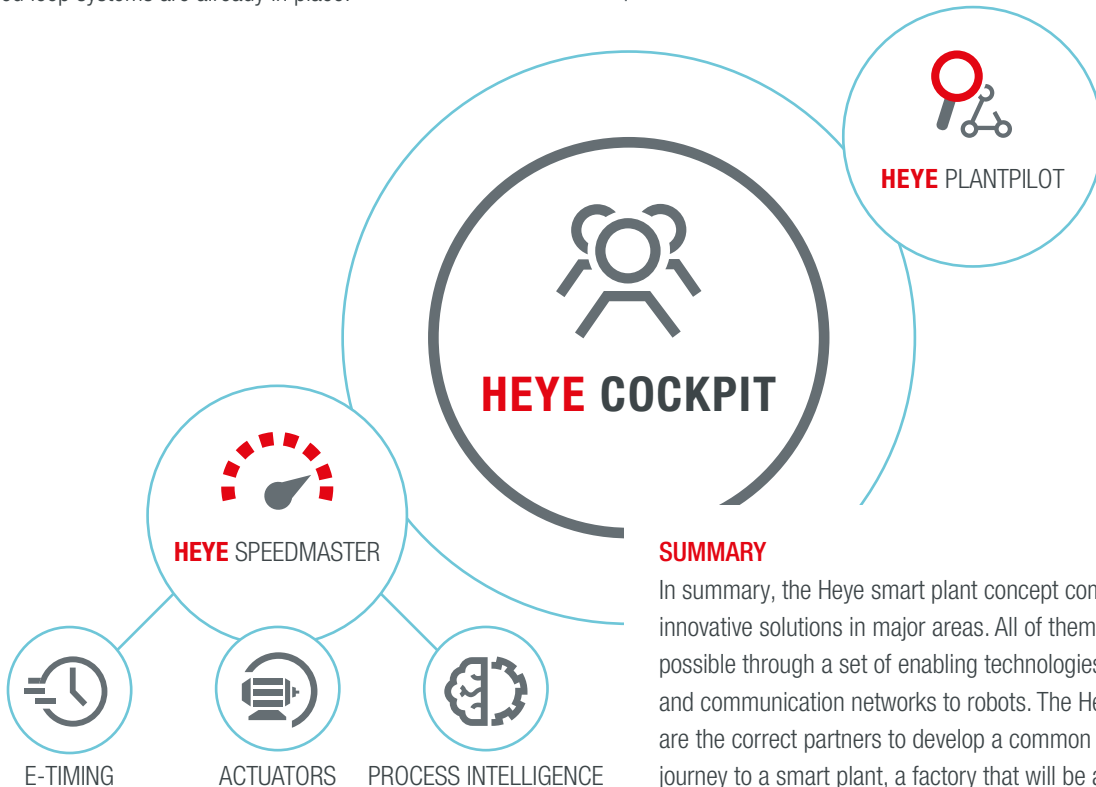
**PROCESS CONTROL AND CLOSED LOOP SOLUTION SET**

As well as being the inventor of the NNPB process, Heye has set the standard in closed loop production technology. A large set of closed loop solutions gives the customer a competitive edge. Heye offers operator assistance for gob loading and closed loops for gob form and weight.

Following the glass flow, on the blank side, closed loops for cooling and press duration/glass distribution are available. The swabbing robot eliminates one of the most important manual working steps, at the same time being the basis for precise, infrared-based temperature measurement on the blank side. Closed loops on the blow side allow accurate, high speed ware handling. Dead plate cooling is controlled, creating the basis for proper bottle movement through the high speed pushers, while the closed loop for ware spacing is a second speed-relevant factor. Furthermore, both loops eliminate defects generated by a wrong ware handling set-up. Many of these solutions are already available, while others are in the prototype phase. In some areas, operator assistance is a good first step and in other areas, full closed loop systems are already in place.

**CONNECTING THE HOT END AND COLD END**

The Heye PlantPilot is a cornerstone in the field of data integration in the glass plant. By using internet-based technology, different machines or modules can be connected to manage the plant. In addition, important analysis possibilities are offered to optimise the production process. Data integration between Hot End and Cold End helps especially to gain time. Via the Heye Cockpit, the Hot End operator has a perfect overview of the defect situation on the different cavities. By a future extension of the database to an expert system, recommendations for the correction of production defects can be given. As production companies have more and more challenges to find skilled people, these expert systems for glass forming will become an important success factor.



**SUMMARY**

In summary, the Heye smart plant concept combines different innovative solutions in major areas. All of them have become possible through a set of enabling technologies, from sensors and communication networks to robots. The Heye Glass People are the correct partners to develop a common roadmap for the journey to a smart plant, a factory that will be able to produce high productivity containers at low cost, resource-efficiently and with a consistently high quality.

# HEYE PLANTPILOT – INTEGRATED PLANT DATA

Today, boosting efficiency is a key challenge in the glass production industry. In order to optimise decisive cost and performance factors such as PTM (pack to melt) or mould lifetimes, an overview of all relevant production data is needed.

## USER CENTRIC APPROACH



### IMPROVING PLANT PERFORMANCE

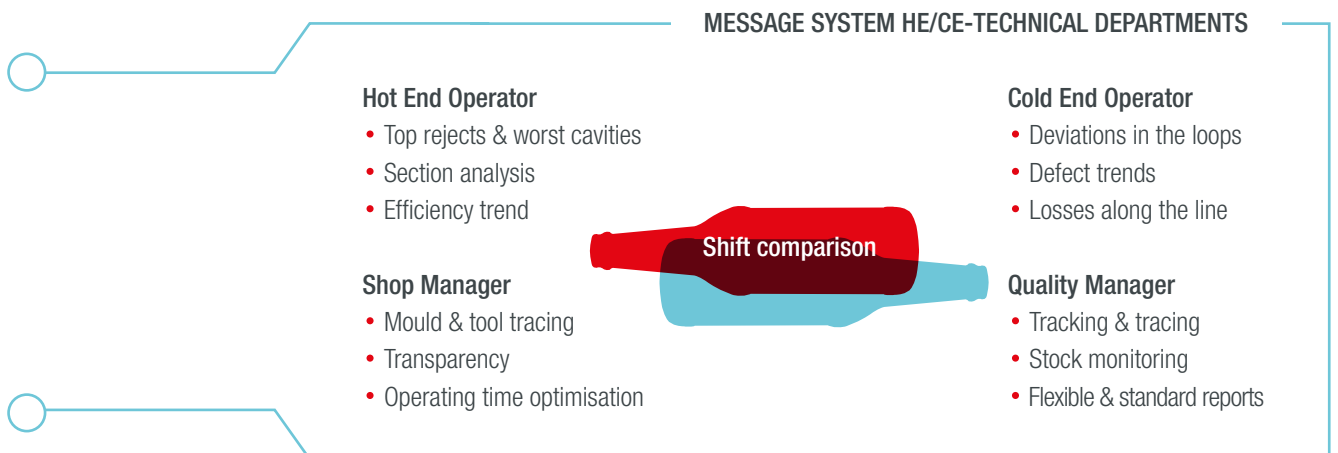
The Heye PlantPilot is the tool to help group directors, plant managers, department managers and operators keep their eyes on the maximum plant efficiency. The powerful information system collects data from both the Hot and Cold End.

This important information about the production and inspection process is evaluated and presented in a clearly laid out way. Thus, the Heye PlantPilot supports glassmakers to achieve high quality production, avoiding cost-increasing production disturbances.

### INFORMATION TRANSFER

The Heye PlantPilot matches together all relevant production information in real time. As a result, the system gives a complete overview of production performance. The data collected includes sources such as the laboratory, the article counter, the inspection machines, the IS-machines and input added by the operator.

## ROLE-BASED FUNCTIONALITIES



## DASHBOARD

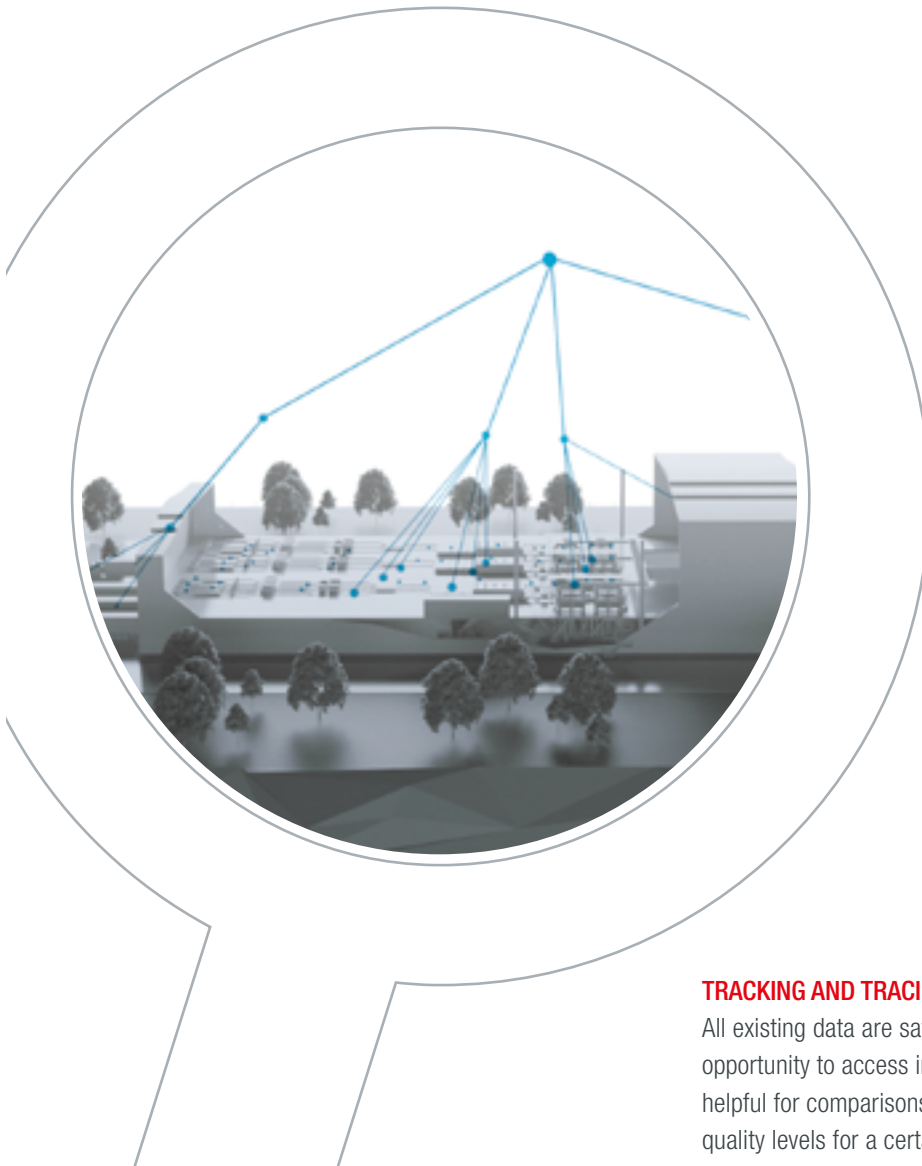
The dashboard is the central screen of the information system. It is designed to provide the user with all relevant data at a glance. Thumbnails give a brief overview. The different areas can be expanded for more details. The efficiency graph function shows production efficiency for the past 24 hours, split into Hot and Cold End efficiency. The current status as well as the expected future trend can be checked. Furthermore, the dashboard informs about defects which are either reported by operators or detected by inspection machines, providing a quick overview of the section status, the inspection machines and rejection rates.

## MAINTENANCE SHOP

Obtaining precise information about the ideal lifetime of mould, variables and wear part exchanges is a key factor for cost optimisation. The maintenance shop function helps to keep an overview of all part lifetimes in order to use them as long as possible, without missing the right moment for replacement.

## MAIN REJECTS

The main rejects function offers an overview of the most frequent rejects in the production process, sorted by value. It is a very useful tool to define the ideal order of defect corrections.



## TRACKING AND TRACING

All existing data are safely stored in a database, giving the opportunity to access information for a chosen period. This is helpful for comparisons, as well as providing proof of production quality levels for a certain moment.





SpeedLine



# HiPERFORM – EXCELLENCE IN FORMING

HiPERFORM is synonymous with excellent equipment and support in container forming. Every stage of the glass forming process demands meticulous attention to detail. Heye takes care of every detail, as even minor variations in manufacturing techniques and their application have a huge impact on production performance.

The Heye SpeedLine Hot End portfolio covers the production process from feeder to lehr loader:

● HEYE SERVO FEEDER FOR  
PRECISE GOB FORMING AND  
MULTI-WEIGHT OPTION

● SPEEDLINE IS-MACHINES WITH  
INTELLIGENT INDUSTRY 4.0  
OPTIONS

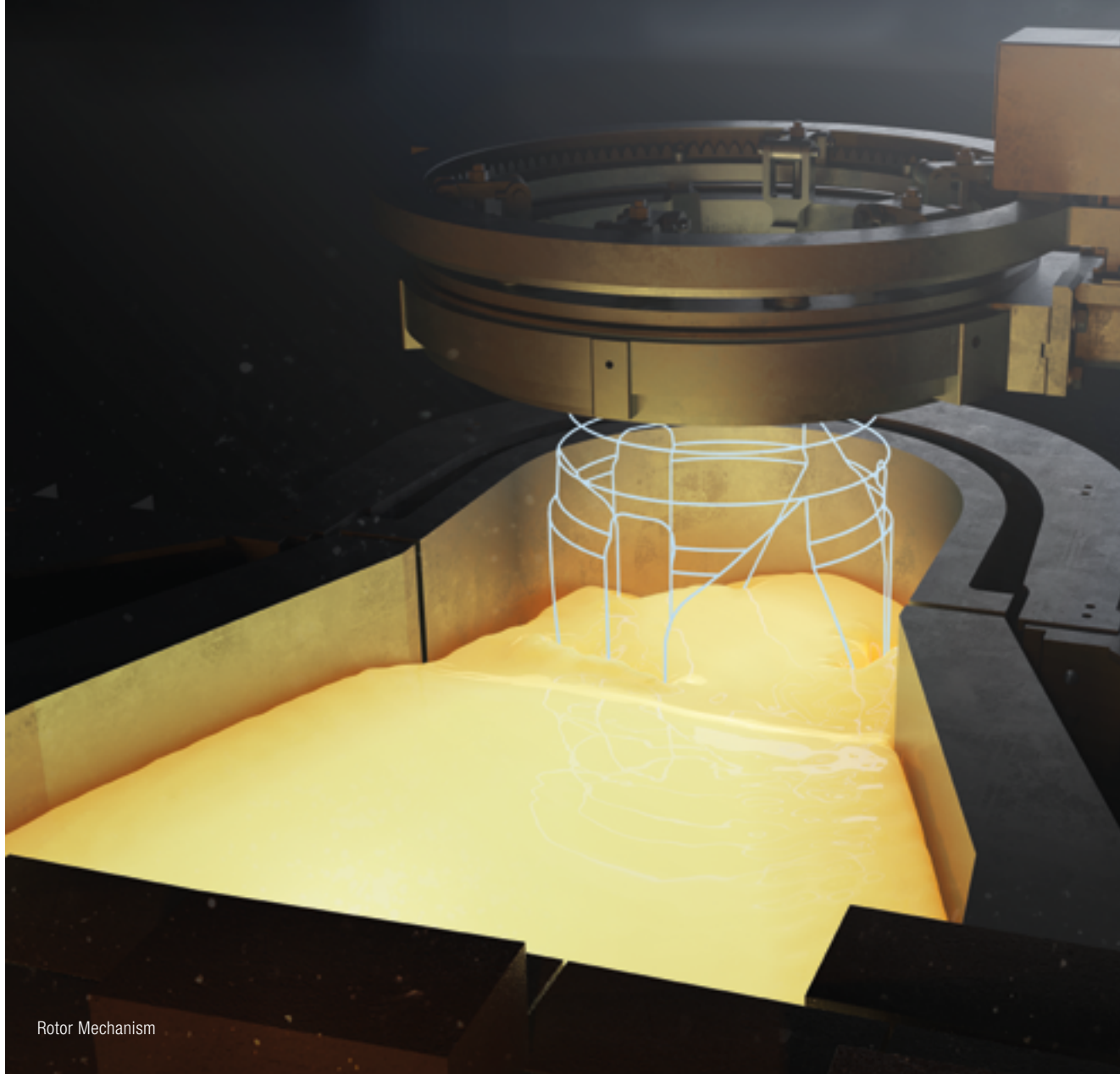
● DUAL MOTOR SHEARS AS  
MARKET STANDARD IN  
LIFETIME AND LONG SERVICE  
INTERVALS

● PRECISE WARE HANDLING FOR  
HIGH SPEED PRODUCTIONS



# GOB FORMING

Heye International sets the benchmark in gob forming. Latest Siemens servo technology is combined with process intelligence and precise assembly of the equipment. Multi gob weight/assortment production can be integrated to increase flexibility in production. Precision, ease of use and low maintenance costs are standard. Heye offers feeders for small, medium and large productions up to 200 tpd. Depending on the size and configuration, productions from single to quad gob are possible.

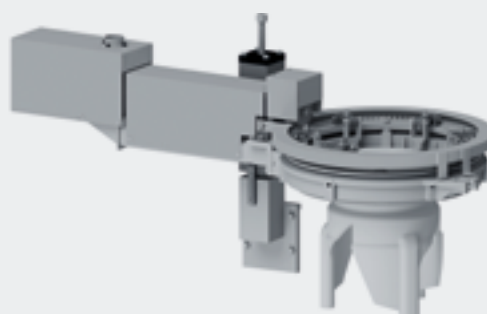
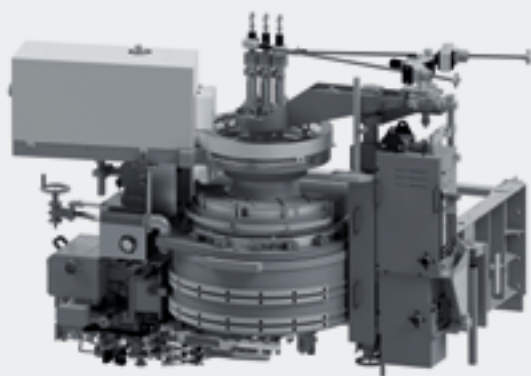


Rotor Mechanism

## SUPERIOR THERMAL HOMOGENEITY AND WEIGHT CONSTANCY

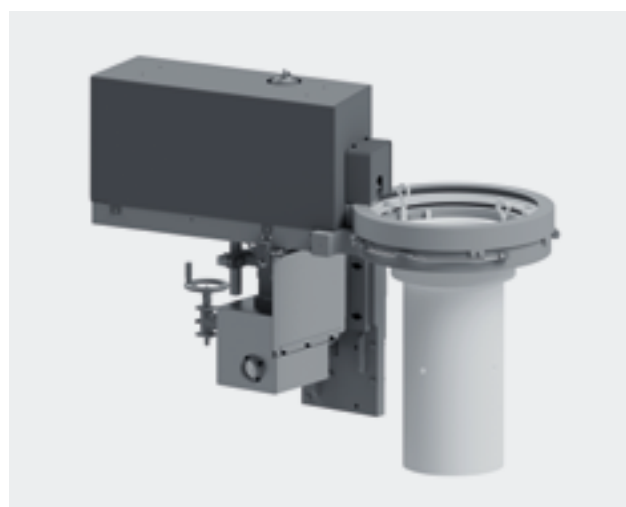
### HEYE ROTOR MECHANISM – THE ULTIMATE STANDARD FOR NNPB

The Heye Rotor Mechanism for superior thermal homogeneity and weight constancy has become the standard equipment in many large container glass groups. Especially for NNPB productions the precise weight constancy is a unique advantage. The design is robust. By a rotating movement of the toothed ring, three paddles provide for a stirring movement in the glass mass and thus keep it extremely homogeneous.



### ROTATING TUBE MECHANISM

The mechanical design of the tube mechanism provides for high running smoothness and exact alignment of the tube above the center of the gob. The height adjustment benefits from the well-proven technology of the Heye Servo Plunger. The combination of a stable guiding with low-backlash threaded spindle drive provides for an exact and reproducible movement of the tube. For NNPB applications, the height adjustment is controlled by the Heye Process Control during run. Manual adjustment is possible by means of an adjusting rod.

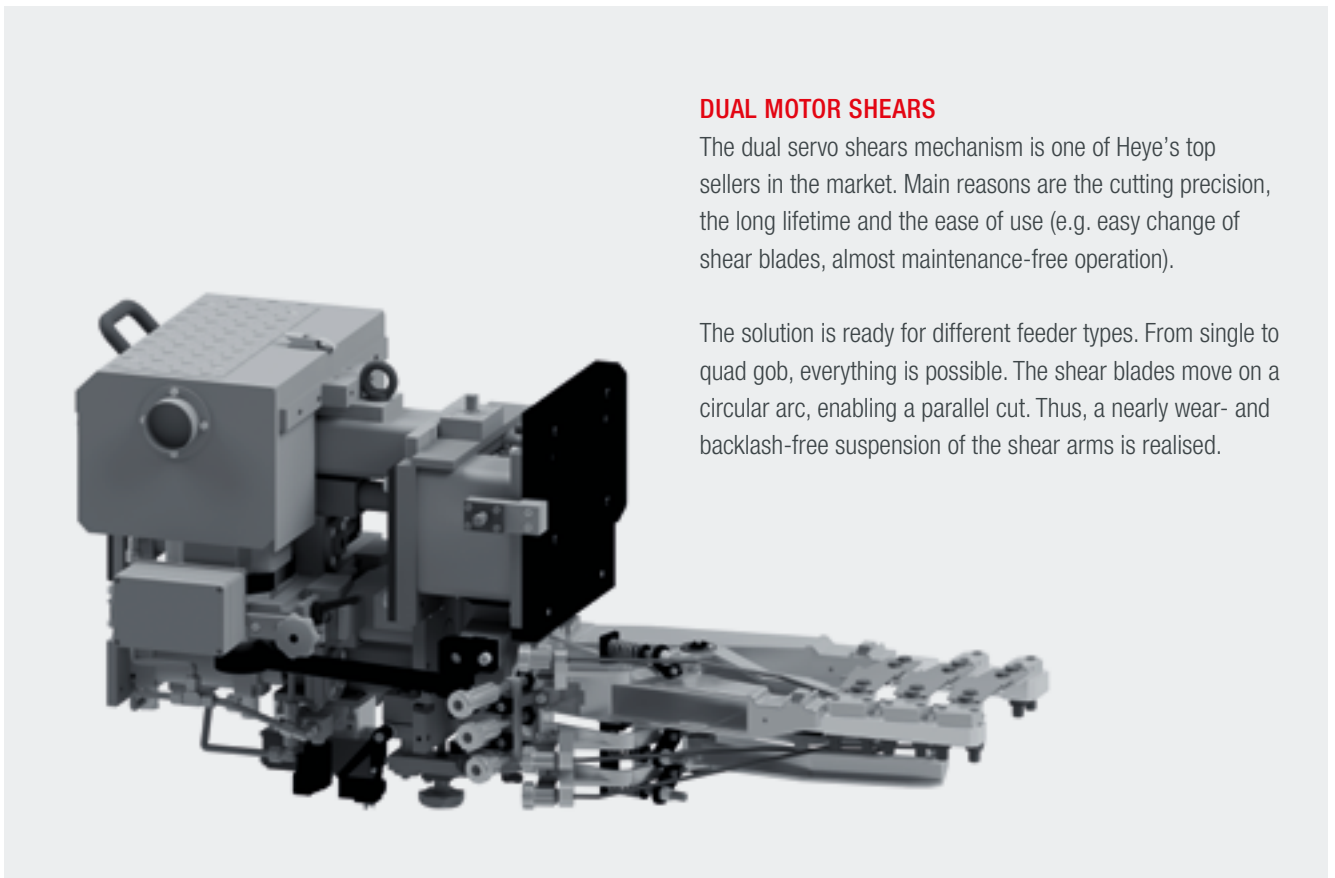
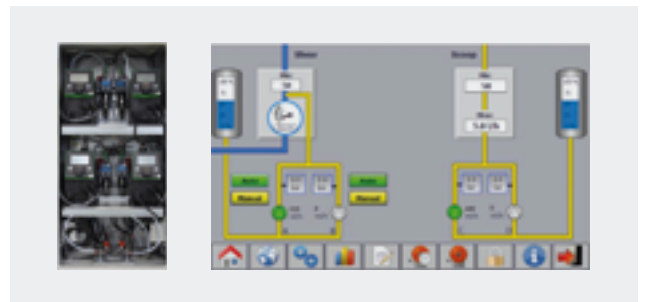


### SERVO PLUNGER

The reliable and precise Heye Servo Plunger is characterised by a servo motor driven spindle. The carriage transfers the stroke movement without any bending- and transverse force onto the plunger tube. To compensate the gravity forces, a pneumatic cylinder takes effect to the carriage. Stroke alterations through the whole stroke range of 170mm do not require any changes at mechanisms.

### HEYE SPRAY SYSTEM

It is possible to integrate the spray system into the SpeedLine. By the use of dosing pumps, it sprays finest spray mist on the shear blades and scoops. This ensures a reproducible gob loading, strong cooling effects and wear reduction. The shear blades and the gob distributor funnel are continuously sprayed via appropriate spraying bars with a mixture consisting of treated water, compressed air and additives.



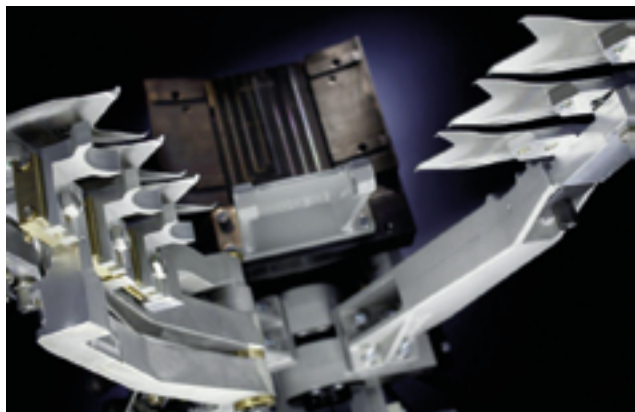
### DUAL MOTOR SHEARS

The dual servo shears mechanism is one of Heye's top sellers in the market. Main reasons are the cutting precision, the long lifetime and the ease of use (e.g. easy change of shear blades, almost maintenance-free operation).

The solution is ready for different feeder types. From single to quad gob, everything is possible. The shear blades move on a circular arc, enabling a parallel cut. Thus, a nearly wear- and backlash-free suspension of the shear arms is realised.



## HIGH FLEXIBILITY: MULTI-WEIGHT FEEDER / ASSORTMENT PRODUCTION



Using the smart servo concept for plunger and the dual motor shears, gobs of different weights can be produced on a single IS-machine – also in NNPB. What sets the Heye International solution apart from others is that every gob is used and no energy is wasted. Handling and operation are very easy due to the smart servo solution.

- Samplings easy to manage
- Less downtime to reconfigure the IS-machine
- Different jobs per machine
- Fewer machine-wide job changes
- Fewer moulds for each low-volume article



# MULTILEVEL SAFETY CONCEPT – SAFETY SERVES PRODUCTIVITY

As a global manufacturer of glass plant technology, we have recognized an international trend of growing investment into safety conditions. This trend responds to our conviction that safety is a key factor of maximum productivity. For this reason, we have developed the Heye Multilevel Safety Concept with many patented solutions. This includes improvements and achievements in the fields of engineering, training and especially forming equipment like the IS-machine. All in all, we have considered several fields to be the most important:

- A clear and clean design of the equipment to maximize operator safety
- Innovative automation solutions and closed loops to reduce manual operator interference
- Simple but effective solutions like red/green LED lights for the blank side
- Useful tools and working instruments like hoists or access ladders
- Additional protection devices, coupled with sophisticated control workflows

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*The swabbing robot is a great innovation and we are very proud to have installed the first one in Thailand. We are satisfied with its performance on the Heye IS-machine.*

Pongdej Chamsawat,  
Assistant Vice President – Group Technical Service at TGI



Robot with Safety Cage



## HEYE SWABBING ROBOT

The swabbing robot has become a market success in short time, aiming at replacing one of the most important manual working steps on the IS-machine. What makes the Heye solution a unique is the combination of process know-how with automation technology. The robot can be used for BB, PB and NNPB productions, for smaller beer bottles or larger wine bottles.

### OPERATING PRINCIPLE

The robot runs on a rail in the overhead beam. This means that the floor is free from obstructions and mould changes can be performed as before. All new Heye SpeedLines are prepared for the installation of the robot. The robot sprays into the open moulds on the blank side. ‚Swabbing on the fly‘ even at high cavity rates is the key advantage, which means that a section stop is unnecessary. Short spraying cycles with a small amount of lubricant avoids bottles having to be rejected after swabbing. A special program allows spraying of the neck ring and baffle.

### UNIQUE BENEFITS

- On-the-fly blank swabbing for high cavity rates
- 1-2% higher productivity
  - » Zero rejects from swabbing
  - » Avoidance of section stops
  - » Constant thickness and location of swabbing
- Up to 75% saving on lubrication
- Cage with additional sensors for improved operator safety

”

*The data and experience we have gathered to date is very promising. Using the automated Heye swabbing technology allows us to improve safety and optimise process stability on an ongoing basis. Our operator's time is redirected from manual swabbing to focus on process quality.*

*Andrew Barreau,*

*Technology and Business Development Manager at Orora Glass*

### EASY SET-UP

Another unique advantage is the robot set-up procedure. This can be performed by a zero station in front of the IS-machine. While one job is running, the settings for the next article can already be adjusted. The user sets the trajectory points and movement speeds. Once stored in the control system's article database, the settings can be reused if the article is produced again. Running the robot is easy. The advanced control with an easy-to-use touch screen helps the operator to do his job.



Spraying Head

# SPEEDLINE CONCEPT

Experts recognize Industry 4.0 as one of the major trends in every industrial sector. With Heye SpeedLine, we show our approach to adapt the best concepts to container glass manufacturing. In particular, the combination of advanced sensor integration, innovative servo technology, closed loops in the forming process and user-friendly interfaces guarantees production environments for maximum performance, highest efficiency and strict safety.

A lot of improvements were necessary to increase production speed, while keeping the highest quality standards. For instance, a separate exhaust air outlet optimises plunger cooling and guarantees smooth performance at higher production speeds. The new arrangement of the injectors and air manifolds allowed a redesign from the piping to the section. This path optimisation has a positive influence on the reaction time. The newly developed Loadmaster delivery system presents a redesigned deflector adjustment, offering the IS-machine operator the opportunity to convert easily from DG to TG, in addition to optimal gob loading.

The Heye SpeedLine series is available in many configurations, from single to triple gob operation:

#### CENTER DISTANCES:

4 ¼" TG, 6 ¼" DG, 5 ½" DG, 5" SG/DG

#### ADVANTAGES

- Available for up to 24 sections
- Applicable for BB, PB and NNPB
- Servo modules e.g. for invert, takeout or pushers
- Pneumatic closing mechanisms with high clamping forces and long operating lifetime







SpeedLine with Protection Grid and Robot

## SPEEDLINE BENEFITS

### REDUCED DOWNTIMES

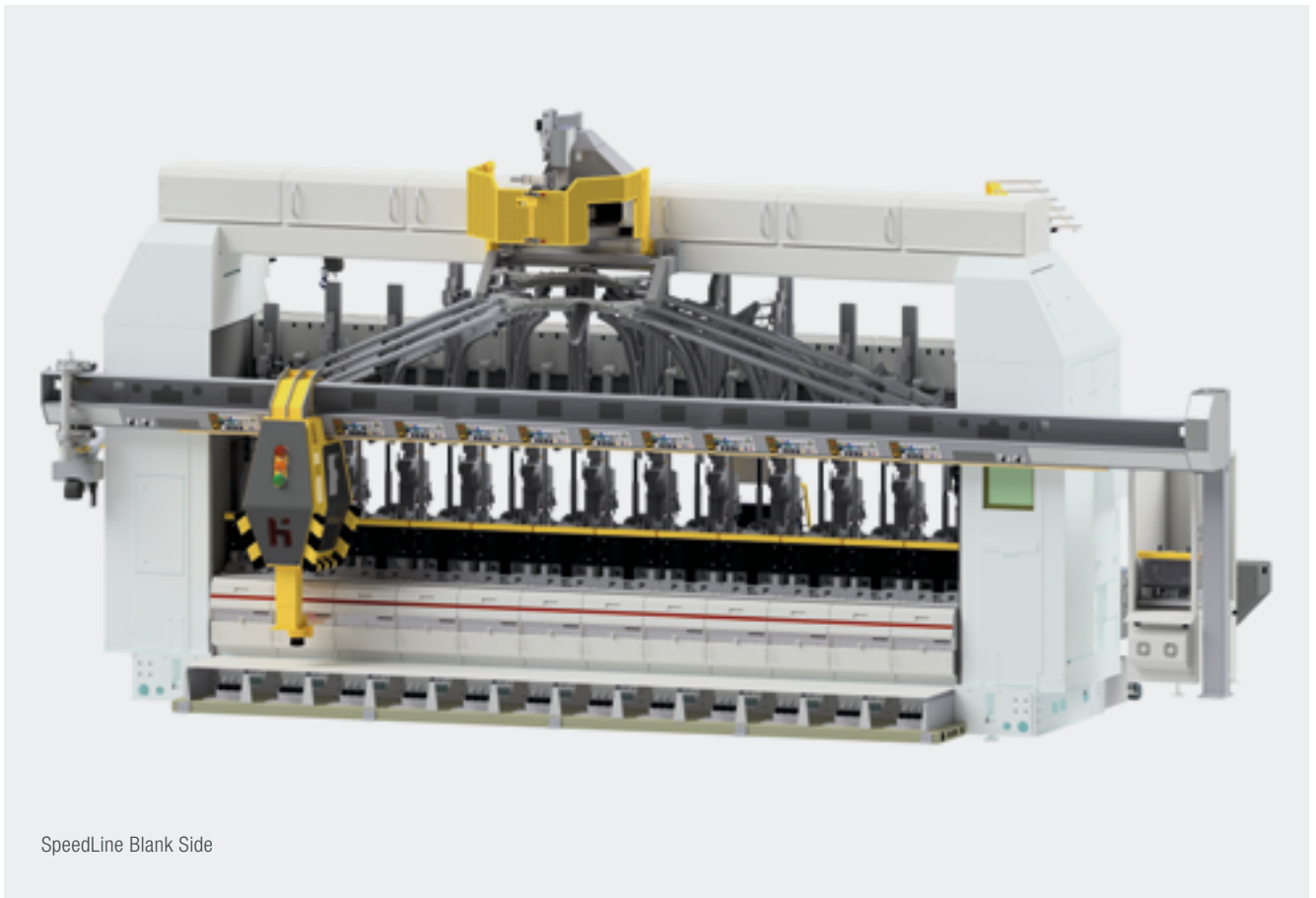
#### ADVANTAGES

- Easy planning of maintenance cycles due to advanced monitoring systems
- Heye Process Control and Press Duration Control
- recognize impending problems at an early stage
- 6-cycle machine lubrication with pressure and temperature monitoring allows to determine defective mechanisms before complete failure (unplanned repair)
- Optional supervision of final blow valves enables planned exchange
- Error reporting server with different warning messages

### LOW OPERATIONAL COSTS AND LONG LIFETIME

#### ADVANTAGES

- Low downtime costs due to high system availability
  - » General overhaul only necessary after 10 – 15 years
  - » First class materials and components
  - » Extended supervision and sensors
- Intelligent temperature controlled central lubrication
  - » Reduced oil consumption achieves higher cleanliness
- Optional Heye Robot for swabbing the blank moulds avoids loss of containers and increases productivity



SpeedLine Blank Side

## INNOVATIVE DESIGN OF HEYE SPEEDLINE

### SUPERIOR SPEED COMBINED WITH LONG OPERATING LIFETIME

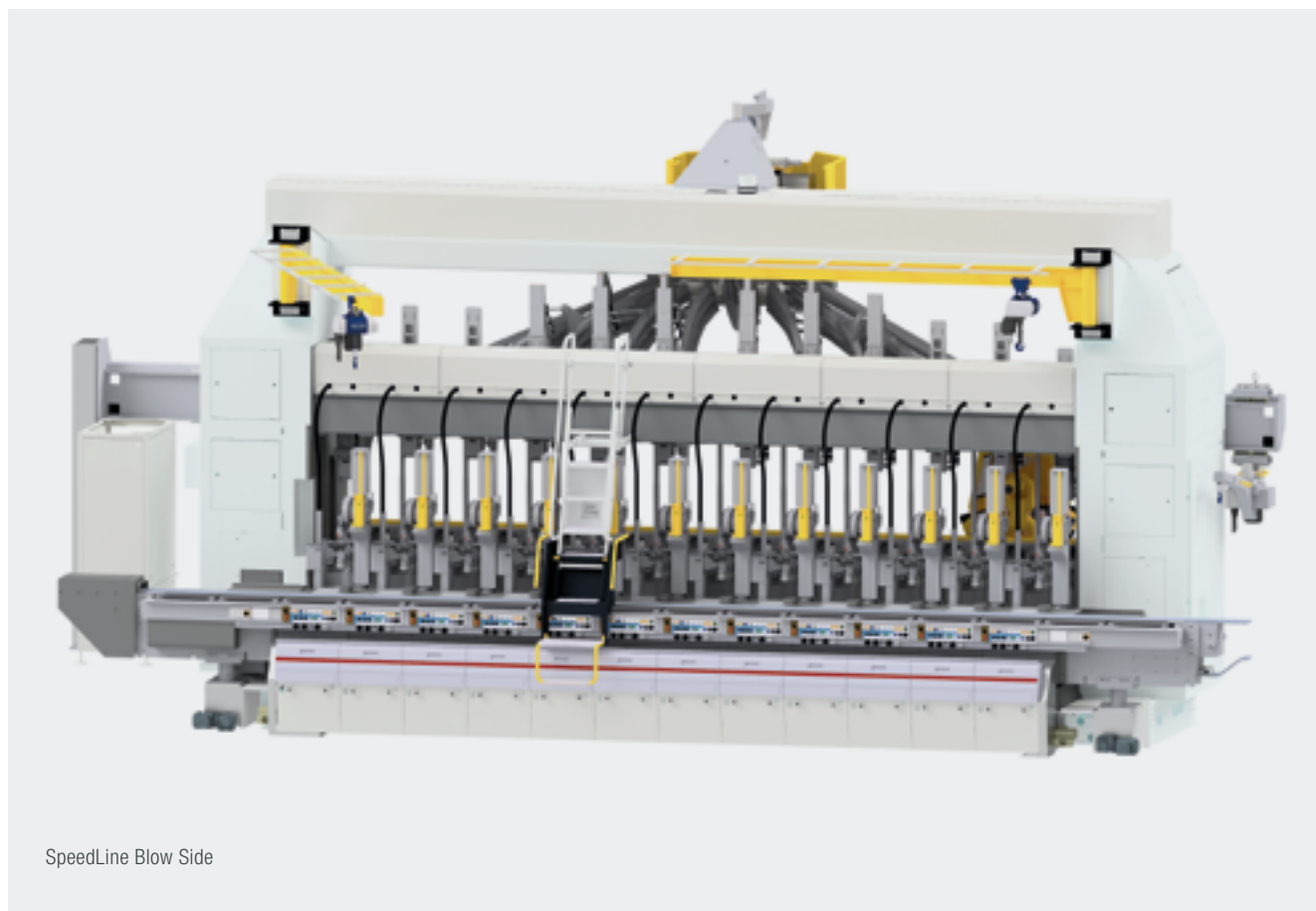
#### ADVANTAGES

- Highest quality materials and precise manufacturing processes ensure a very long operating lifetime even in high-speed productions
- To achieve high speeds, powerful coolings are available
- Powerful and precise servo-systems work as team with pneumatic cylinders (SpeedLine machines achieve very high clamping forces – ideal for fast NNPB productions)

### HIGH PRODUCTION FLEXIBILITY

#### ADVANTAGES

- Conversion time from DG to TG and back has been shorted (flexible Loadmaster delivery system, conversion base plunger cylinder, easy to change gob distributor heads)
- Fast conversion between the production processes (BB, PB and NNPB) by quick-change inserts for BB as well as plunger positioner for NNPB
- Assortment production (different container weights) on one machine without losing a gob (maximum weight difference 20% depending on gob weight and shape)



SpeedLine Blow Side



### HEYE SERVO GOB DISTRIBUTOR TYPE 2171

The Heye Servo Gob Distributor Type 2171 combines long lifetime and precise running. The model is applicable for IS-machines with up to 12 sections. An operation with single-, double-, triple- and even quad gob for up to 12 sections is possible by simply exchanging the gob distributor head. The maximum swivel range of the scoops is 140°. At a motion time of 130 ms, a pivoting angle of 70° is possible. The scoops are water-cooled and the oil circulation lubrication for the distributor head contains integrated cooling in the recirculation. The servo motor drives a nearly backlash-free set of worm wheels.



### THE HEYE LOADMASTER DELIVERY SYSTEM

In IS-machines, the glass gobs are transported to the individual blank moulds by a delivery system. As they pass through the system, the gobs are influenced both in their absolute speed and in their shape. In diversified systems such as the 12-section-delivery, there are undesirable secondary effects. These have been minimised by Heye International, with the result of a very high constancy in gob loading.



### ADVANTAGES

- The machined surfaces ensure a smooth run of gob
- Long coating intervals are achieved
- The gob always leaves the deflector vertically and can easily be adjusted to the blank mould
- The need for readjustment is reduced to a minimum
- Quick change from SG - DG - TG

### HIGH PERFORMANCE VALVE BLOCKS

Time is a top priority in modern production processes. In hollow glass production, the performance of the entire system is determined by the speed of the individual mechanisms and cooling within the IS-machine. Any acceleration in working speed increases the yield accordingly. Through the high performance of the Heye Modular Valve Block, the speed of the system can be increased, downtime reduced and production optimised.



”

*Our major furnace repair is an important step towards the future and secures production success for the next two decades. The sustainable and efficient SpeedLine technology of Heye International supports this success exceptionally.*

Hartmut Treichel,  
Plant Manager at Ardagh Group in Neuenhagen



### HEYE SERVO INVERT

The Heye Servo Invert transports the parisons from the blank side to the blow side. Apart from the integration in new Heye IS-machines, the system can also be used for retrofit projects. The servo motor is located inside the bracket. The motor drives the neck ring holder via a nearly backlash-free planetary gearing, with spur gear connected in series. The synchronisation of all functions is performed by the E-Timing. The motion profiles are freely selectable.

### HEYE SERVO TAKEOUT

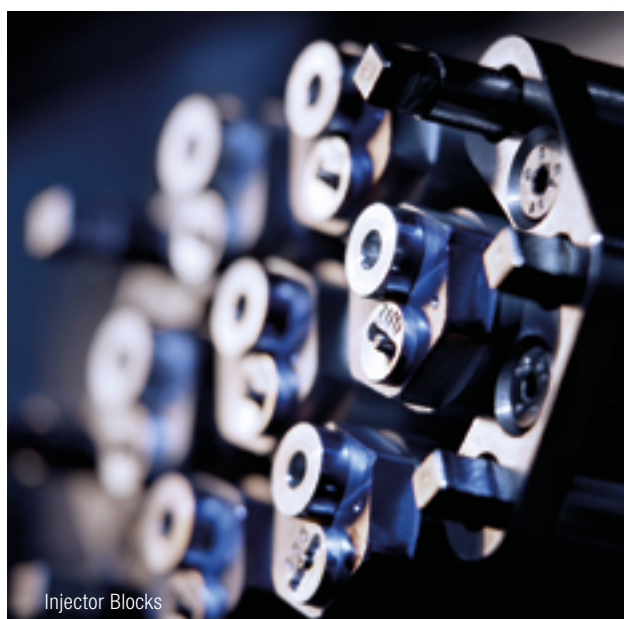
The Heye Servo Takeout serves to transport finally blown glass articles in a careful way from the blow mould onto the dead plate. The servo motor drives the takeout arm via a lowbacklash and highly stressable worm gear. All motion profiles are reproducible and profiles plus the gripper position can be adapted during run.

The Heye Servo Takeout is either part of a new IS-machine or can be supplied as a conversion kit for existing machines.

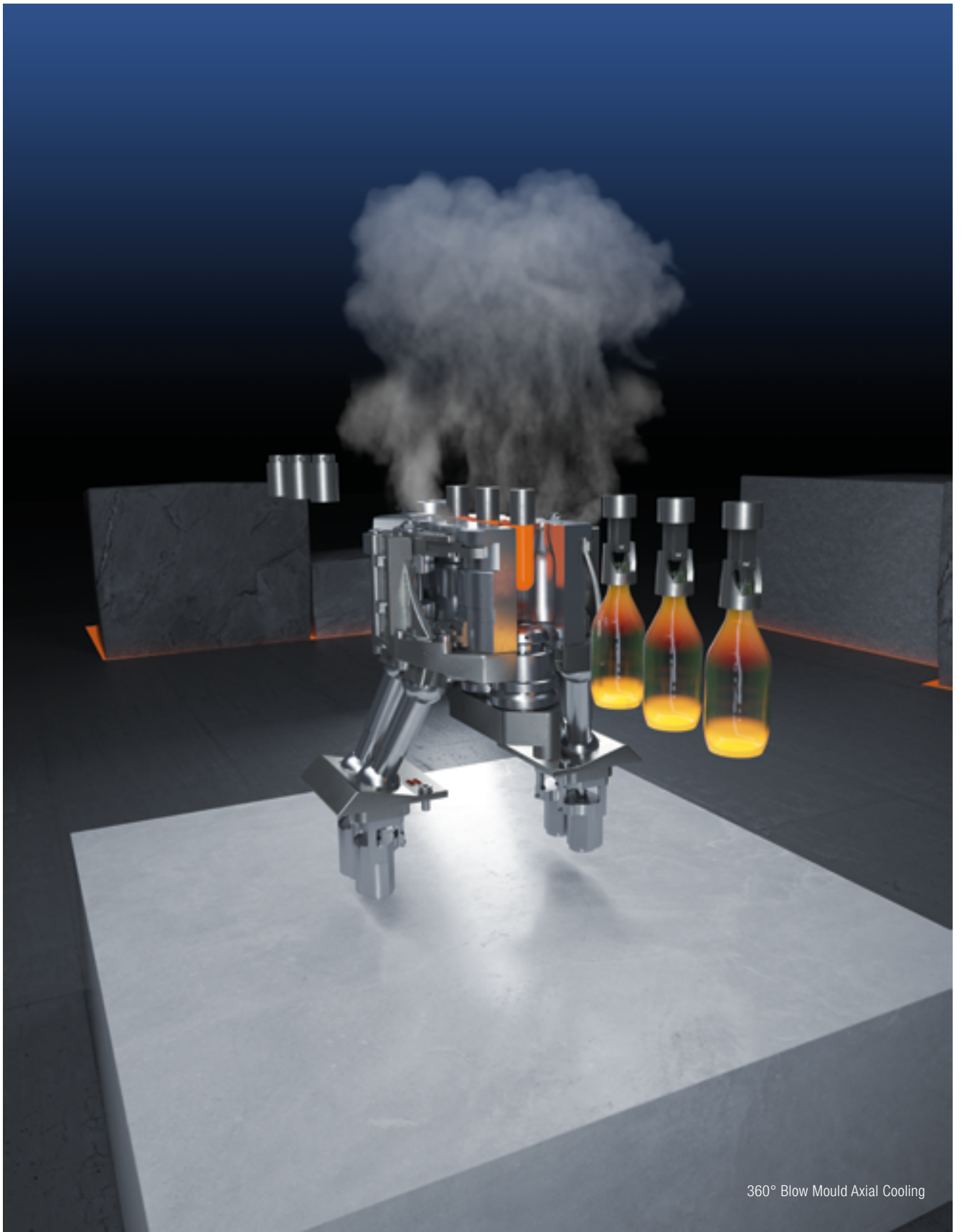
### CLOSED LOOP

#### TEMPERATURE-GUIDED CENTRAL LUBRICATION

With its patented temperature-guided multi-zone system, Heye is setting new standards in efficiency and cleanliness. The multi-zone system allocates injectors that operate under similar thermal conditions to temperature circuits. For the first time ever, the temperature-guided lubrication interval control allows temperature deviations at the lubrication point and the quality of the lubricant to be taken into account. Sensors in the temperature circuits, each positioned at the hottest lubrication point, regularly transmit signals that are used as input parameters to control the lubrication intervals. Lubricants used in IS-machines are characterised by a very low loss of volume from evaporation. Using the evaporation characteristics of the lubricant, as determined in laboratory tests, the times between lubrication cycles can be calculated for each temperature circuit.



Injector Blocks



360° Blow Mould Axial Cooling

## SPEEDLINE COOLING POWER

### MASTERING BLANK SIDE COOLING

Cooling power is a key prerequisite to reach high production speeds. Heye offers two options. The AXIAL COOLING TYPE 2242 is designed to cool the blank moulds axially and to cool the neck rings radially with fan air. During a job change, the axial cooling can be converted to radial cooling by changing the upper assemblies only. Conversions are possible for 5" DG, 6 1/4" DG and 4 1/4" TG. The adaption of the different mould lengths is compensated by the height adjustment of the cooling piece, where the neck ring cooling is automatically adjusted too.

The BLANK MOULD AND NECK RING COOLING HiFLOW 2221 for standard applications permits an ideal heat removal from the blank mould and neck ring. Due to the variable configuration and easy adjustment, nearly every application can be covered.

### 360° HIGH SPEED BLOW SIDE COOLINGS

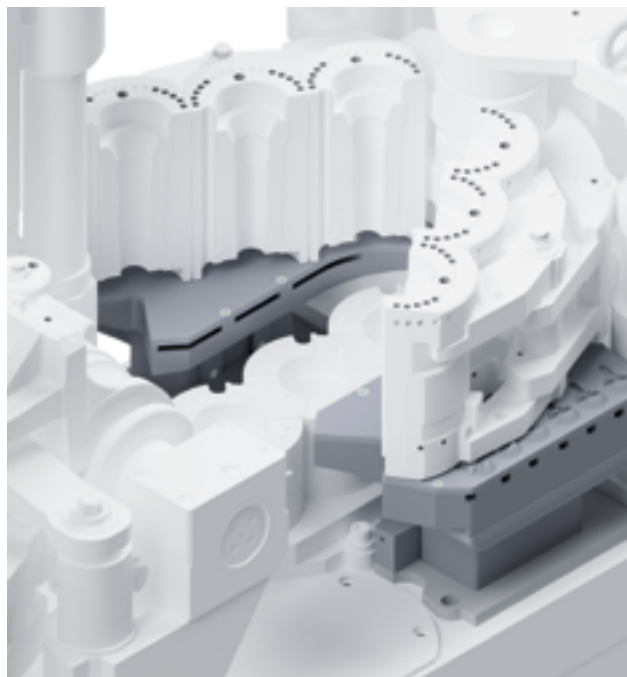
The new full-cycle (360°) blow mould axial cooling runs over the entire process cycle.

Thus, compared to other cooling systems, a much better cooling performance of the moulds can be achieved and the production speed can be increased. The cooling power is carried out more constantly whereby the stability and quality of the glass containers being produced is influenced positively.

”

*The new Heye 360° blow mould axial cooling helped us to significantly increase our production speed. Beside this, the impressive reliability and performance stability are the key benefits of this innovation.*

Khun Potjanat,  
Production Manager at Bangkok Glass



# HEYE WARE HANDLING: SMOOTH AND FAST FOR HIGHER YIELD

Often underestimated, fast and smooth ware handling is a decisive factor to reach high Pack-to-Melt (PTM) ratios. The ware handling equipment from Heye International has been setting market standards for years. Continuous improvement, combined with the latest technology means high value for our customers. Heye offers a portfolio for every need. Starting with the pushers, three different systems are available:

## TYPE 2154

This pusher is a reliable and robust system for article transport at IS-machines, with conveyor speeds of up to 60 m/min. This system uses standard components such as stepper motor and a pneumatic cylinder. The high torque of the stepper motor allows good push-out speeds and heavy finger plates.



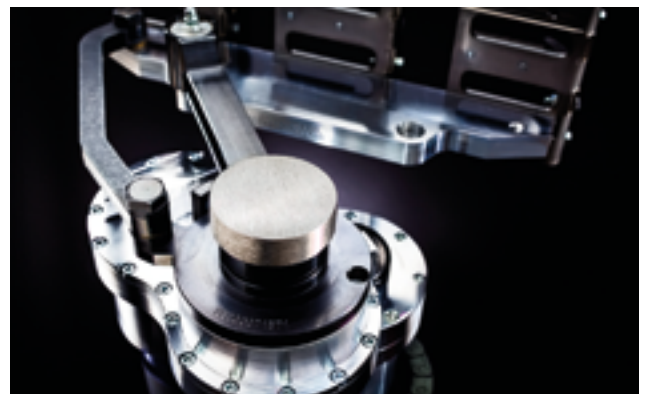
## TYPE 2157

This 2-axis servo pusher is integrated in the Heye SpeedMaster servo concept. It is used on IS-machines with up to 24 sections and a conveyor speed up to 70 m/min. Long service intervals and minimum wear are standard. The system is ideal for double gob operation but can also be adapted to triple-gob machines.



## TYPE 2158

The high-end 3-axis pusher offers sophisticated motion profiles. Motion and speed profiles can be adapted to the article geometry and transport speed even during operation. A conveyor speed up to 80 m/min is possible and the system can also be used for quad-gob operations. Most of the movable parts are located below the machine conveyor level inside the pusher housing, protecting them from environmental influences such as heat and dirt, resulting in long service intervals, minimum wear and long overall lifetime.





### WARE TRANSFER FOR TOP SPEED

Heye is offering two different ware transfers. Type 4220 offers two additional short conveyors running parallel to the machine conveyor. A maximum throughput of up to 800 BPM can be achieved, depending on the article. Type 4222 is a smaller version with one additional short conveyor and offers an adequate speed range for many standard productions.

**Unique automatic synchronisation:** Both systems feature the automatic synchronisation of the finger chain to the belt, allowing fast restarts after production stops. The optimal speed settings are calculated automatically. This replaces the manual adjustment, which is especially challenging in high-speed productions. Together with the mechanical design advantages, a unique reputation of the Heye ware transfer equipment is the result.

### CROSS CONVEYOR

Depending on the size of the lehr, Heye offers two different types of cross conveyors. Type 4216 is ideal for lehrs up to 3500mm belt width, type 4217 is perfect for smaller lehrs. Both types are controlled by the Heye SpeedMaster servo concept.

### LEHR LOADER

Just like the pushers, Heye is offering three types of lehr loaders. Type 4201 is ideal for simple applications with a speed up to 400 articles/minute. Type 4205 has two servo motors for a maximum speed of 600 articles/minute. Type 4206 is designed with three servo motors for maximum speed of about 800 articles/minute. Again, all types are controlled by the Heye SpeedMaster servo concept.



# HEYE PROCESS INTELLIGENCE

**WE ARE GLASS PEOPLE** – with a long industry experience and a large portion of passion, Heye is in the position to develop solutions for the smart glass plant of the future. Our mission stands for customer satisfaction, the people at Heye and for a partnership in innovation.





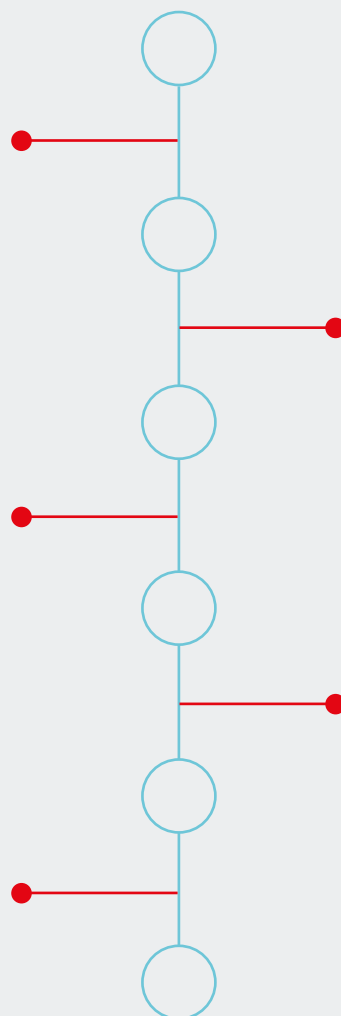
# PROCESS CONTROL AND CLOSED LOOP SOLUTION SET

Heye has set the standard in closed loop process control solutions. From feeder to gob loading, from blank side to blow side and from ware handling to lehr, Heye is focusing on the technologies with the largest impact on production results:

**HEYE PROCESS CONTROL** with new optional camera for gob weight control in blow-blow productions

**GOB LOADING MONITOR** to avoid critical defects and downtimes

**CLOSED LOOPS FOR HOT END WARE HANDLING** to ensure high production speed and Hot End efficiency



**HEYE PRESS DURATION CONTROL** for optimal glass distribution and wall thickness

**BLANK SIDE TEMPERATURE CONTROL** to maintain a constant parison temperature

# HEYE

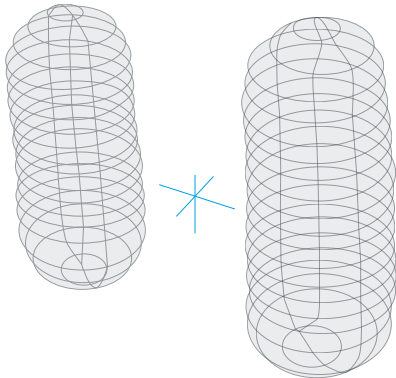
## PROCESS CONTROL 4.0

The Heye Process Control sets the market standard concerning weight control and control of the pressing process. Leading global fillers insist on the application of the Heye Process Control because of its ability to eliminate important critical defects. The Heye Process Control is Industry 4.0 ready due to its flexible connectivity. Usability is another key advantage, as the real time display and supervision of all pressing processes is very comfortable. An article database containing all article depending parameters eases job changes.



### CAMERA-BASED GOB WEIGHT CONTROL AS NEW OPTION FOR BLOW-BLOW PRODUCTIONS

The camera system for gob weight control offers the possibility to determine and control the gob weight in blow-blow productions. Two cameras placed underneath the shears act as sensor, while the software logic calculates the weight and automatically adapts the feeder settings. At the same time, the cameras show the gob shape.



3D Gob Image



# HEYE PRESS DURATION CONTROL

The Heye Press Duration Control is an additional feature to the Heye Process Control, focusing on the optimisation of the glass distribution, respectively the wall thickness. The closed loop algorithm guarantees a constant press duration by modifying the pressure for the plunger-up movement. Job changes become easier by the automatic adjustments and start-up times are reduced. The system is also important for preventive maintenance, e.g. if the pressure values exceed the limits and mechanical problems can be corrected at an early stage.

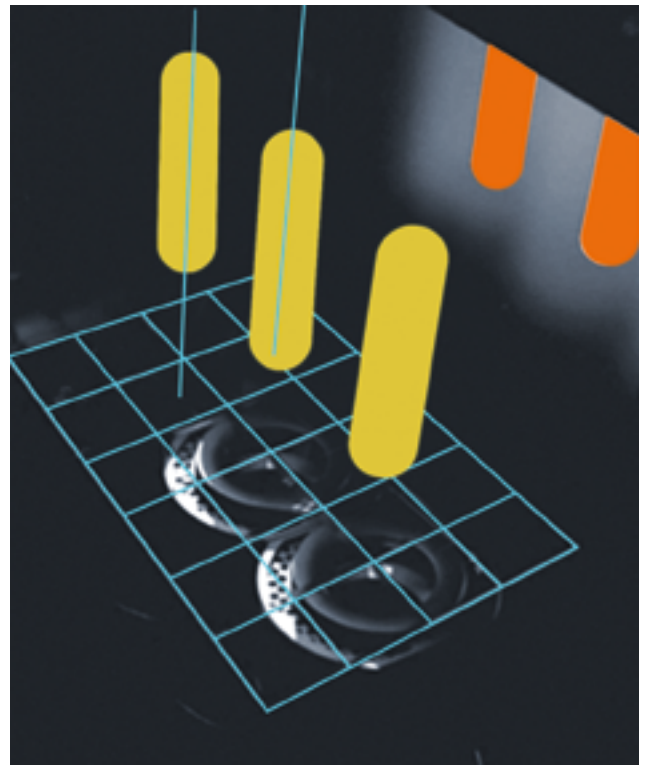
Equal Wall Thickness



# GOB LOADING MONITOR

The gob loading monitor assists the operator in optimising the loading of the gob into the blank mould. Important defects like loading marks are avoided and the glass distribution becomes stable. The system provides data about gob slope angle, gob length and speed. The gob loading monitor combines two high-speed cameras to record images of the gob when falling into the blank mould. The software calculates different values and presents them together with the images on a screen. The user has the possibility to use an additional hand-held unit, making it easier to arrange the settings directly in front of an IS-section. A data history allows users to draw-back conclusions from defects and to set-up better operation procedures.

Loading Monitoring





# BLANK SIDE TEMPERATURE CONTROL – OPTIMAL TEMPERATURE MANAGEMENT ON THE BLANK SIDE

The blank side temperature control is a closed loop solution to improve the wall thickness, while achieving better process stability and short job changes. An infrared camera measures the temperature of the mould halves, the neckring and the plunger.

Most important is the parison temperature, which is the basis for the closed loop control logic, developed by the Heye glass experts. The system modifies the cooling intervals for the blank mould halves, the neckring and the plunger. The result is a stable parison temperature, leading to better glass distribution and process stability.

Blank Side Temperature



# HIGH SPEED WARE HANDLING CONTROL

Optimal Hot End ware handling is important to reach high speeds. Often underestimated, fast and smooth ware handling is a decisive factor to achieve high Pack-to-Melt (PTM) ratios. Ware handling itself begins with the pusher system, which moves containers from the dead plate to conveyor belt. Another important part is the ware transfer, where Heye sets the market standard in production speed.

## WARE SPACING

The Heye ware spacing closed loop optimises the distance between the bottle-packs that the pushers are moving onto the machine belt. A light barrier in front of the coating hood acts as a sensor to measure the distance between bottles. The software algorithm adjusts the starting points of the pushers in case of deviations. This feature allows to go to the maximum production and handling speeds.

## AUTOMATIC WARE TRANSFER SYNCHRONISATION

The core of this feature is an automatic synchronisation of the finger chain to the belt, allowing fast restarts after production stops. The optimal speed settings are calculated automatically. This replaces the manual adjustment, which is especially challenging in high-speed productions. Together with the mechanical design advantages, a unique reputation of the Heye ware transfer equipment is the result.





#### DEAD PLATE COOLING CONTROL

A prerequisite for high pusher speeds is that the containers are standing properly and equally tempered on the dead plate. This is guaranteed by the unique dead plate cooling control, which keeps the amount of cooling air and the time interval on a constant and optimal level. The data are set in the Heye Cockpit and are kept stable for each cavity in the different sections. Thus, job change times become shorter and the container handling process becomes more stable.

Dead Plate Cooling



SmartLine 2





# HiSHIELD – PRODUCTION QUALITY AND PRODUCT SAFETY

The quality and consistency of global brands is increasingly important to producers of consumer goods. Product safety and purity are major issues and Heye offers the solutions to ensure glass container production quality. At the beginning of a partnership, everybody needs to get to know one another. This is why Heye often starts with line audits and a proposal for an optimisation of the inspection layout. The result is a cost-efficient concept for the Cold End, respecting both the brand owner's requirements and the budget requirements of the customer. Apart from delivering an extensive range of advanced inspection equipment, Heye's PlantPilot information management system brings together all relevant data, crossing the borders between Hot End and Cold End.

# SMARTLINE 2 –

## NEXT LEVEL IN SPEED AND FLEXIBILITY

The Heye SmartLine 2 is the new generation of Heye's starwheel inspection machine series. The SmartLine sets the standard in reliability and robustness. The user interface has been improved and makes job changes as easy as possible. Both the mechanical design but also the control unit are extremely reliable and easy to operate. The large hood gives maximum access to the working space, reducing the job change times to the absolute minimum. Latest non-contact inspection features are integrated, as well as a self-learning system for camera-based check detection.

### INSPECTION SPEED AND JOB CHANGE TIME

The application of servo technology results in a high degree of flexibility. Fast and easy changes of the item indexing positions and optimal use of the servo torque for up to four rotation stations are possible. Optimised motion sequences allow faster reactions to changing process parameters. The new design and the large and easy-to-open cover provide more working space between the inspection stations.

- The standard article height is 400mm (up to 500mm on request); angular, oval and round containers can be processed
- Thanks to the servo driven star wheel, indexing positions from 6 to 48 are usable
- The enlarged working radius allows a high compatibility with existing tooling sets



### QUALITY AND RELIABILITY

Innovations have to stand the test of time. This is achieved by the use of robust industrial electronics and a climate-controlled electrics and electronics compartment, together with high quality components. Operational usability is enhanced by a touchscreen monitor, easy access to all electronic components and an extricable mounting plate for frequency inverters and servo controllers. Hazard-free working condition for the operator is provided by a microprocessor-controlled safety module.

### FLEXIBLE INSPECTION OPTIONS

The SmartLine can be configured in different ways. Up to six inspection stations are available. Depending on the customer's requirements, various container attributes can be checked:

- Tightness
- Finish diameters
- Container height
- Finish and shoulder checks
- Bottom and heel checks
- Body checks
- Wall thickness inspection (non-contact)
- Defects of the finish surface (LOF - line over finish)
- Out of round, body diameter
- Mould number reading (dot code and alphanumeric)
- Dark check inspection



# RANGER 2

## CAMERA CHECK DETECTION

Check detection is one of the most important quality inspections in container glass production. The HSHIELD Ranger 2 has been developed to fulfill the customer's quality expectations.

### FULLY MODULAR AND SCALABLE SYSTEM

A Ranger 2 system consists of one camera, collecting five images simultaneously via five lenses and fiber optic light guides, the illumination unit and the control unit with the software for image processing, including the decision "container okay or not okay". Based on your budget and needs, you can start with one system and add any number of parallel systems whenever you want. A typical and recommended configuration would be four parallel systems, each dedicated to and optimized for one of the following types of checks:

horizontal    shoulder    vertical    bottom

Each system runs independently and does not need to be synchronised with the others. So there is no influence or need to compromise between the systems. This allows an individual optimisation of all settings (illumination etc.) for the respective type of check. If one system is not available or not adjusted optimally, the others are still fully operational.

### INTELLIGENT CLOUD MASKING – SELF LEARNING SYSTEMS

Every container produced must be regarded as a unique object and any check detection concept has to respect this. For this reason each Ranger 2 system is using Heye's Intelligent Cloud Masking. Bearing in mind that each article is distinctive, the Ranger 2 system is designed to investigate each one independently. Accordingly, each container serves as a reference for itself. But moreover, the inspection zones are dynamic in nature. The Ranger 2 system is therefore able to detect different variations of checks, as well as to recognize new variations of them during production. No sample bottles are needed, as the system is absolutely flexible.





# WALL THICKNESS – MULTI-POINT AND SINGLE-POINT

In container glass production, wall thickness measurement is one of the most important aspects. Heye offers a flexible package for every need. The MTE electronic module can handle single-point as well as multi-point sensors. A major advantage: Heye is using the superior chromatic confocal method, which is much more precise, robust and reliable than other solutions.

## MTE 12 ELECTRONICS

The MTE 12 supports the latest multi-point sensor MTS 10/05, as well as the well-proven single-point sensors. It can handle up to 4 sensors and 12 measuring points simultaneously. This allows the fast and precise inspection of all critical container areas at the same time. The MTE 12 is available as a stand alone unit, adaptable to numerous inspection machines, or as an integrated component in the Heye SmartLine and other machines with Heye control.

## MULTI-POINT THICKNESS SENSOR (MTS 10/05)

The Heye MTS 10/05 is equipped with 5 measuring points, spaced 2.5mm apart. All 5 points simultaneously measure the wall thickness using the chromatic confocal method. This allows a wide range of possible settings for measurement distance and measurement angle to the surface. With this multi-point thickness sensor, it is possible to inspect the wall thickness along a line of 10mm length. An inspection area 10 times larger than a single-point sensor improves the quality and reliability of inspection. This makes it very easy to find the right points of inspection to cover all possible thin areas of a container.

## SINGLE-POINT THICKNESS SENSOR

The well-proven single-point wall thickness sensors are available in different versions. One can choose between sensors with long or short working distance and normal or very compact sizes, depending on the dimensions and shape of your containers and the available space in your inspection machine.





Retrofitted Machine

# SAFETY & HACCP CONFORMITY

## RETROFIT SOLUTIONS FOR EVERY BUDGET

Retrofitting of existing machines is often a good alternative to buying a new one. Heye offers a special kit to lift your existing starwheel machine to the next certification level. This may involve the installation of specially fabricated hoods and other safety-related features to ensure full HACCP compliance. In addition, the old control units can be replaced with the latest Heye control system, combining unparalleled reliability with ease-of-use. Heye Cold End experts in Nienburg, Germany have comprehensive experience with many variants of starwheel machines.



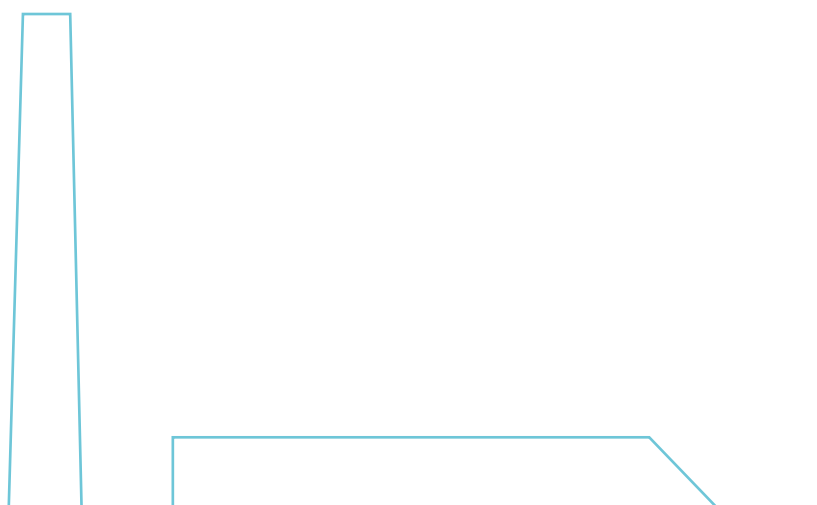








# HiTRUST – WE ARE GLASS PEOPLE

With experience and passion, we develop solutions for the smart glass plant of the future. This mission stands for our production expertise and for the people at Heye. Our ambition and our passion is to provide complete customer satisfaction from consultancy, delivery of equipment and production process expertise to long term assistance in production.





-  ENGINEERING
-  PROJECT MANAGEMENT
-  TAA – TECHNICAL ASSISTANCE
-  TRAINING





# ENGINEERING COMPETENCE FOR HIGH SAFETY

Our engineering team has the competence to professionally handle all areas of a glass plant. The basic design offers all necessary information for a more detailed budget information of the project. Doing so, they are not only focused on the scope of Heye equipment but are also taking care for all the surroundings in the specific area. Our Hot End detail engineering ensures effective technical solutions. The operators can focus on the manufacture of bottles, with safe and easy access to the equipment at the Hot End area and ergonomic arrangement of control element equipment and tools.

Also for the Cold End part of a glass plant, Heye offers detailed expertise for an optimal design of the inspection loops and the packaging area. Depending on the article range and the customer portfolio, our experts help to find a cost-efficient set-up for the Cold End. This also includes a concept for the data management of all relevant quality information, including connection to a plant management system like the Heye PlantPilot.

”

*We have combined the best engineering and manufacturing features to meet our customers' highest quality needs. Focusing on harmonising with international standards and continuous improvement in all of our activities, the glassworks project aims to capture the success achieved by the Bastürkler Sirketler Group elsewhere around the world.*

Bastürk Cam



Usability and Safety



# PROJECT MANAGEMENT IN CONTAINER GLASS PRODUCTION

Heye International has experience from many and varied projects of every type all over the world. This knowledge is gathered together in the HiTRUST process chain, a complete tool package for the container glass industry, managing every aspect of your project. Our know-how covers all project stages with our international pool of experts in each field of knowledge.

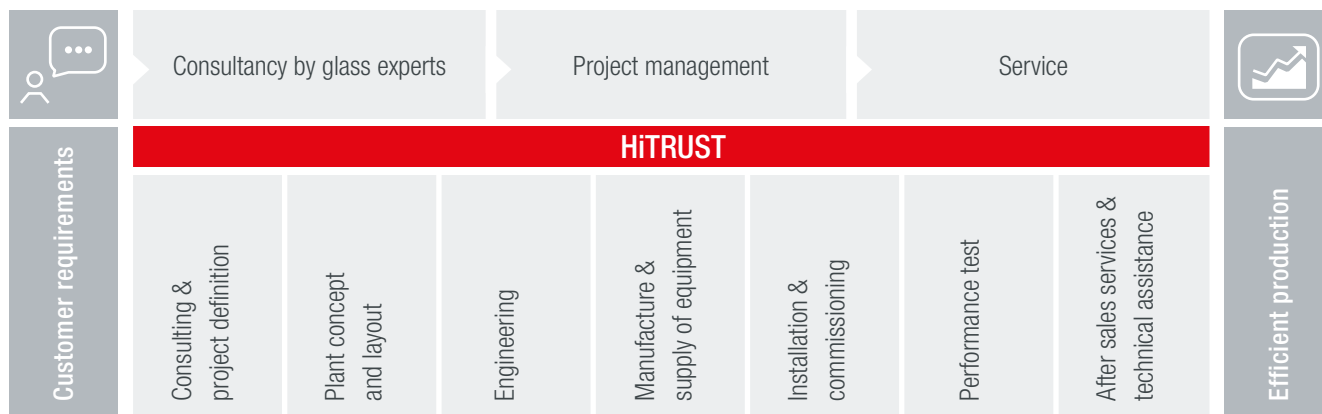
Each project has its own professional, experienced project manager, who leads every step and is the consultant for the customer. Therefore Heye International developed its own Project Management Handbook, called PM@Heye, which is based on the international PMI rules. With PM@Heye all project partners have a structured project program with:

- Milestones
- Work packages
- Responsibilities
- Project organigram with contact person



IS-machine Transport

The Heye International project managers give continuous progress reports and are responsible for making sure the project is finalized up to quality standard, on budget and on time.





# TRAINING EXPERTISE: BECAUSE KNOWLEDGE IS POWER

At Heye, we know that the greatest asset a business has is its people. Specialist knowledge and expertise is necessary to help implement new technology or processes and to improve production efficiency. We provide you a training portfolio covering every production step, like glass chemistry, batch and furnace management, Hot End machine operating, mechanics and electronics specialist, mould repair or quality management.



Training in Glass Plant

**WE CAN TRAIN YOUR STAFF AT  
OUR OWN DEDICATED TRAINING  
CENTRE, ON-THE-JOB IN GLASS  
PLANTS OR ON-SITE, IN THE  
ENVIRONMENT IN WHICH THEY  
ACTUALLY WORK.**



*These training programmes were positively received by local glassworks personnel in Brazil.*

Lorenzo Barquin,  
Global Director Glass Operations at Ambev



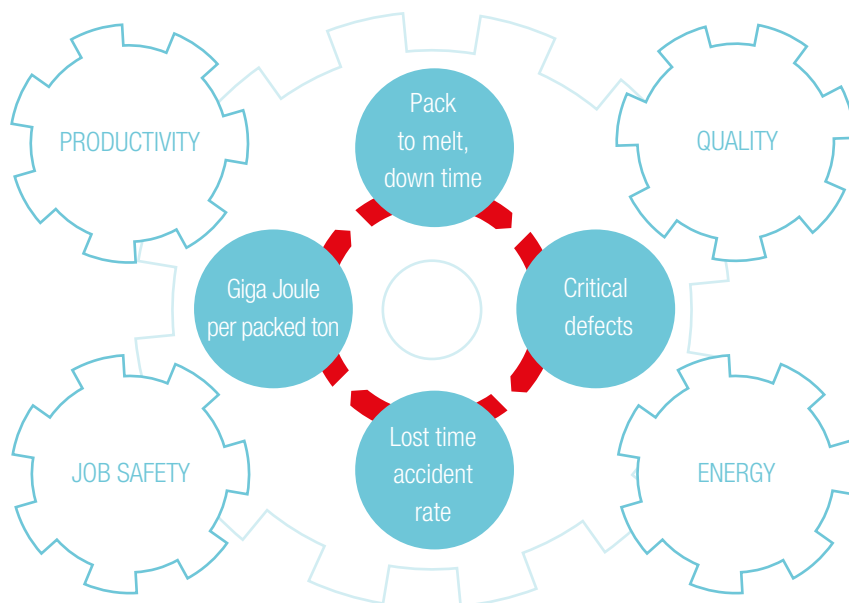


# TECHNICAL ASSISTANCE BY HEYE: BOOSTING YOUR EFFICIENCY

When new technologies are implemented or plant performance is being pushed to the next level, the technical assistance from Heye is the answer. In more than 60 years, Heye has built a unique expertise in container glass production.

Heye International is offering a true long term partnership for the improvement of productivity and quality of the customer's production. This is the only way for a sustainable improvement of the core Key-Performance-Indicators (KPIs) of a glass plant.

## KPI MODEL FOR HEYE TAA



Starting with a plant audit, every customer gets a dedicated expert team. The Heye TAA manager has at least 25 years of experience in container glass production. Also the other team members have experience, whether in melting and glass chemistry, mould design and mould repair, forming, NNPB, inspection or quality improvement. However, each Heye expert knows exactly that efficient production is not the result of a single person; it is always the result of a good team, knowing how to make use of the equipment.

# HEYE IN THE WORLD

**15** Heye offices  
as your local contact

over **200** plants  
with Heye equipment

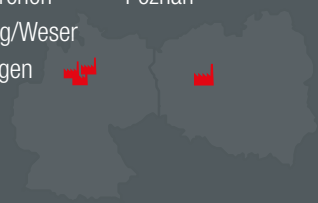


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