Welcome to Bucher Emhart Glass

Welcome to the new Bucher Emhart Glass brochure. As we look back on more than 100 years of growth and the success of our company, we recall many “firsts” – from the first glass gob forming and shearing device to the first high speed quad gob glassmaking machine – and many more breakthroughs along the way. As we have grown into a global company there has always been another “first” in our focus: Keeping our customers first in all we do.

We understand these are challenging times for glassmakers. So we asked our customers, “How can we help you succeed in the market today and prepare for the future?” Then we listened.

Our customers said they need to maximize production efficiencies and reduce dependency on skilled operators. Many plants suffer from skill gaps and find it difficult to attract qualified talent, in fact, knowledge drain is considered the single biggest challenge by many glassmakers today.

Our customers also want a true partnership with their suppliers, allowing them to be involved in the development process. With hot end and cold end under one roof, they feel that Bucher Emhart Glass is best positioned to take total process control to a next level. Finally, our customers expect Bucher Emhart Glass to continue delivering on its brand promise of best-in-class quality and cutting-edge innovation.

We’re responding to your challenges with solutions that will make glass production easier, safer and more efficient. Today we’re introducing “End to End,” a comprehensive product and service offering that will remove know-how gaps and unify the hot and cold end processes. We will also keep you involved in the development process by providing a deep insight into the major technological advances planned for the coming years.

As always, your needs will be our first priority. We look forward to working with you.

Martin Jetter
President
The End to End glass symbol represents the glassmaking process from raw elements through the finished product and the commitment of Bucher Emhart Glass to support its customers in every step of the process.
Introducing End to End

With the development of servo-electric machines, closed loop solutions, new inspection technologies and the continuous expansion of our service offerings during the last years, we can proudly offer solutions that support our customers in their continuous quest to increase production output and minimize losses. This brochure gives an updated overview of today’s product and service offering.

Yet, we cannot be satisfied. With an increasing number of servo axes, sensors and control knobs, the complexity of a modern glass production line has reached levels that are challenging for many plants. Data across hot end and cold end are not consolidated or processed in a holistic approach, leaving forming and inspection as isolated processes. In order to fully exploit the potential of today’s forming and inspection equipment, future development efforts must focus on relieving plant operators through more intelligent man-machine-interfaces and process control systems that integrate hot end and cold end. This will need to be complemented with even more effective support offerings.

Bucher Emhart Glass is proud to introduce its End to End vision. In the glass plant of the future, integrated equipment will read, analyze and react to data completely automatically. Backed with support, ranging from selecting the right machine to assistance in maintaining and running it, plants can achieve better performance, efficiency, safety, traceability, and reliability, ultimately leading to higher profits.

During the next ten years major R&D efforts will be undertaken to make this vision a reality. Important developments have already started and will be available in the next years. Read more on the following pages.

Our customers spoke and we listened:
“Total plant management is critical. Systems have gotten so complex and produce so much data that it’s difficult to keep an overview of the relevant plant processes. A system that consolidates the important production data would change the way we control our process for the better.”
Information Systems

The Plant Information System will aggregate production data from throughout the plant, providing an overview of key parameters, such as efficiency rates, machine speeds and furnace pulls.

The Control Center will be the central hub for the entire forming and inspection process. It will consolidate data from today’s numerous sensors and process monitoring systems, providing operators a much simpler overview of the relevant production information.

Further, an integrated Defect Expert System will display actual defects at the Hot End and propose possible corrective actions to the operator. Including measurement data such as blank temperatures or press durations, defect causes can be narrowed down to the most likely.

Process control and automation solutions

Future Closed Loop systems will use multi-variable controls, combining data from different areas of the forming process. Ultimately, defect data from the cold end will be included, automatically adjusting the forming process to prevent defects.

Sending data upstream, Automatic Sensitivity Adjustment will provide safeguards when the forming process deviates from its control limit. For example, temperature sensor data from the Hot End can be used to automatically alert inspection to potential hot-plunger defects. Robots will play an important role in automating certain tasks. Besides swabbing, an application will be the automatic adjustment of deflectors based on loading data.

Our customers spoke and we listened:

“Existing control systems are too complex and too difficult to use. Simple and intuitive user interfaces as well as higher degrees of automation are important, because it’s increasingly difficult to find skilled labor.”
Simpler man-machine interfaces

Application Oriented Programming will revolutionize the way machines are programmed. Rather than specifying timing drum start- and stop angles for mechanism motion and forming events, the users will focus on forming- and process durations. The control system will automatically manage the collision-free motion of mechanisms, moving as fast as necessary and as slow as possible.

Condition Monitoring and Preventative Maintenance tools will help plants schedule repairs proactively to minimize unplanned downtime. Cycle- and runtime counters, air consumption monitors as well as self-monitoring servo drives will provide key information on wear-time and replacement timings.

Inspection technology - SCOUT

SCOUT is the intelligent software behind Bucher Emhart Glass inspection technologies. It increases accuracy and control and supports fully modular expansion and upgrades in the future. SCOUT will communicate with the Hot end through the control center, thus becoming an integral part of the End to End solution.

We have set out on an exciting journey. Glassmaking in the future will be simpler, safer and more efficient than ever before. We are proud to be part of this journey together with you.

“Our new offer to customers is very simple: one plant, one partner,” says Martin Jetter, president of Bucher Emhart Glass. “We fully understand why, in the past, glass plants may have wanted to cherry-pick technologies from different suppliers. But with the skills gap and economic reality we all face, things have changed. To get the best return on assets, it makes sense to work with a single supplier who understands every area of the plant.”

“We see our job as helping a glass plant run as efficiently and profitably as possible. That’s why End to End is our future, and we hope it’s a future our customers will share.”
End to End technology

End to End is a unique set of solutions and automation technologies designed to make glass production easier, safer and more efficient. It takes a holistic view of the production process and unifies the hot and cold end.

The glass plant of the future will have production processes that would amaze the glassmakers of the past. Integrated equipment will document, analyze, and react to data automatically to ensure product quality and optimize operation. Products will be immediately traceable. Employees will be safer and more productive. And plant operations will run at peak efficiency to achieve optimum productivity and result in increased profitability.
Container forming

Bucher Emhart Glass has the world’s most comprehensive product portfolio for glass container manufacturing. Whatever our customers’ requirements, we have the perfect products to meet or exceed their needs.

Machines currently available include:

NIS machines
The most productive, flexible, and energy-efficient machines available today. Fully servo machines that are easily converted between double, triple and quadruple gob. NIS machines achieve the highest levels of productivity and flexibility.

BIS machines
The latest servo BIS machines focusing on small and midsize container production, providing highest flexibility and performance, enabling fast job changes, process and center distance changes thus combining the best of NIS and AIS.

AIS machines
The proven class leader in pneumatically driven machines, with the famous parallel mold open and close mechanism and ability to change easily from DG <-> TG.

IS machines
Highly customized conventional machines available in four different double gob center distances, three triple gob center distances, and single gob.
For producers of glass containers the competitive situation today means that the highest quality of machinery with the maximum productivity and minimum downtime is a prerequisite for success. As ecological awareness in consumers grows, the industry has to respond with lighter and stronger products.

With our large range of machine types, and our tradition of investment in automation and controls, Bucher Emhart Glass is the perfect partner for success. We continue to invest in cooling technologies, parison forming technologies, delivery systems and new forming processes, to make certain we lead the market in helping our customers to produce the highest quality container at the lowest cost.
## Machine overview

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- not available
- X available
- ● on request
- ■ planned
NIS machine

The servo electric-driven NIS machine introduced in 1999 is the high performance forming solution from Bucher Emhart Glass. The servo mechanism technology ensures that the NIS machine outperforms traditional IS machines through better and precise motion control, perfect repeatability and faster and more precise setup time.

The use of servo electric motors reduces not only the noise level of the machine, but also significantly lowers the energy consumption. The extended center distances of 6¼ DG, 5” TG, and 95mm QG together with the conversion features DG <=> TG <=> QG make the NIS a flexible, high performance machine.
Standard features
• FlexIS TS control system  
• Servo electric gob distributor  
• Constant Cone delivery system  
• Pneumatic Control Module PCM  
• Blank side with FPS valve technology  
• Quick change plunger mechanism  
• VertiFlow blank mold cooling RH/LH  
• VertiFlow blow mold cooling  
• Neck ring cooling RH/LH  
• High/low dead plate cooling  
• Pocket air fingers  
• Conveyor with silent chain  
• Automatic lubrication system with 4 zones  
• Vacuum assist blow side  
• Machine Control Unit MCU

Servo electric mechanisms for:
• Blank Mold Open and Close MOC  
• Baffle mechanism  
• Invert mechanism  
• Blow Mold Open and Close MOC  
• Blowhead  
• Takeout mechanism  
• FlexPusher

Optional features
• InVertiFlow blank mold cooling (DG, TG)  
• VertiFlow Assist  
• Vacuum assist blank side  
• Variable Center Distance tong head VCD (TG, QG)  
• Integrated dead plate guide air  
• Plunger Process Control PPC (enabling closed loop control)  
• Temperature Control System TCS (enabling closed loop control)

### NIS

<table>
<thead>
<tr>
<th></th>
<th>6 1/4” Double gob</th>
<th>5” Triple gob</th>
<th>95 mm Quad gob</th>
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</tr>
<tr>
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<td>95 mm B&amp;B</td>
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<td>365 mm P&amp;B</td>
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<tr>
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<td>65 mm NNPB</td>
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<td><strong>Finish diameter</strong></td>
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<tr>
<td>Maximum</td>
<td>48 mm NNPB</td>
<td>48 mm NNPB</td>
<td>35 mm NNPB</td>
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</table>
BIS machine

BIS will be the future industry standard, replacing the pneumatic IS machine types 4¼", 5" and 5½". One BIS machine has a ware range which covers almost the complete ware range of the respective pneumatic machines. Existing molds, using specific adaptations, can continue to be used which results in a low transition cost.

The first three BIS machines 140 mm (5½") <-> 95 mm TG are under glass and are running well. Commercialization is planned during 2017.
**Standard features**
- FlexIS TS control system
- Servo electric gob distributor
- Constant Cone suspended delivery
- Parallel blank and blow mold
- Flex pressure systems
- Quick change plunger mechanism
- Automatic lube-system with 4 zones
- Pneumatic control module
- Blank side with FPS valve technology
- VertiFlow blank mold cooling - 6 on/off
- Neck ring cooling - 2 on/off
- VertiFlow blow mold cooling
- VertiFlow Assist - 4 on/off
- High low dead plate cooling
- Pocket air finger
- Vacuum assist blow side

**Servo electric mechanisms for:**
- Blank Mold Open and Close MOC (single motor)
- Baffle mechanism
- Invert mechanism
- Blow Mold Open and Close MOC (single motor)
- Blowhead
- Takeout mechanism
- FlexPusher

**Optional features**
- Special adaptors to use up existing molds (Type 4¼" DG, 3" TG, 5" DG, 85 mm TG, 5½" DG)
- Funnel mechanism (servo)
- Blow side VertiFlow assist cooling
- Vacuum assist blank side
- Integrated dead plate guide air
- Plunger Process Control PPC (enabling closed loop control)
- Temperature Control System TCS (enabling closed loop control)
- Lifting device

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| BIS | 140 mm Double gob | 95 mm Triple gob | 70 mm Quad gob *
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<td>P&amp;B</td>
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<tr>
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<tr>
<td>Maximum</td>
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<td>90 mm</td>
<td>38 mm</td>
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* Planned availability
AIS machine

The AIS machine is recognized by the industry as the superior performer among pneumatically driven glass container forming machines.

**Container quality**  The unique parallel Mold Open and Close mechanism MOC enables more balanced cooling, improves mold equipment alignment and permits equal parison reheating. User experience shows mold wear can be reduced by up to 30%, resulting in better containers at lower cost.

**Productivity**  The combination of an improved pneumatic system, highly efficient VertiFlow cooling, and parallel MOC motion ensures stable operation at higher cavity rates.

**Flexibility**  Market demand for containers is often unpredictable. To cope with changing requirements, the AIS machine can be converted between 6¼” DG and 4¼” TG within less than a shift, providing the most cost-effective way to benefit from familiar technology with the option of Servo Electric Take Out SETO and Invert mechanisms.
Standard features
- Control system FlexIS
- Servo gob distributor
- VertiFlow blank cooling, InVertiFlow blank cooling
- Quick change plunger mechanism
- Quick change accessories
- VertiFlow blowside cooling
- Constant Cushion Baffle & Blowhead (top mounted)
- Constant Cushion invert & take out mechanism
- Constant Cone delivery
- Conveyor with silent chain
- FlexPusher
- High/low dead plate cooling
- Automatic lubrication system
- Blow & Blow BB, Press & Blow PB, Narrow Neck Press & Blow NNPB
- Center distance change DG <=> TG
- FPS valve technology

Optional features
- Servo Electric Invert SEI
- Servo Electric Take Out SETO
- FlexPressure System FPS
- Plunger Process Control PPC (enabling closed loop control)
- Temperature Control System TCS (enabling closed loop control)
- VertiFlow Assist

### AIS

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### AIS

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<td>Maximum</td>
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IS machine

The most traditional machine on the market today. The IS machine is based on the original invention from the 1920’s, and has undergone continuous development and improvement over the last 90 years.

Available in the “small” section (4¼” and 5”) and “large” section (5½” and 6¼”), IS machines are offered in single, double, and some in triple gob configurations.
Standard features
- Control system FlexIS
- Integrated drive system
- Servo gob distributor
- Delivery Suspension System DSS
- Quick change plunger mechanism
- Quick change accessories
- VertiFlow blowside cooling
- Constant Cushion invert
- Constant take-out mechanism
- Conveyor with silent chain
- FlexPusher
- High/low dead plate cooling
- Automatic lubrication system
- Blow & Blow BB, Press & Blow PB, Narrow Neck Press & Blow NNPB
- Process change SG <=> DG or SG <=> DG <=> TG
- FPS valve technology

Optional features
- VertiFlow blank cooling
- InVertiFlow blank cooling
- Servo Electric Invert SEI
- Servo Electric Take Out SETO
- FlexPressure System FPS
- Constant Cushion blowhead
- Plunger Process Control PPC (enabling closed loop control)
- Temperature Control System TCS (enabling closed loop control)

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<td>* with stack cooling</td>
<td>N.A.</td>
<td>90</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>* with VertiFlow cooling</td>
<td>N.A.</td>
<td>76</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Max. finish diameter</td>
<td>N.A.</td>
<td>38</td>
<td>38</td>
</tr>
</tbody>
</table>

The specified ware ranges are valid when using standard mold equipment, Q.C. plunger mechanisms, through bed/through frame VertiFlow bottom plate mechanisms and blank mold stack cooling (excluding AIS and NIS which have standard InVertiFlow blank side cooling)

a) with blow mold stack cooling using non VertiFlow adaptor  
b) with blow mold stack cooling, with or without non VertiFlow adaptor  
c) 70mm max. finish with VertiFlow blow mold cooling

* IS 4 1/4" - TG 3" is mostly superceded by IS 5" TG 85mm  
** IS 5 1/2" and IS 6 1/4" are mostly superceded in the market by the AIS machine
Health and safety

Health and safety is a key issue for Bucher Emhart Glass as a supplier to the glass industry. It is important for us to develop equipment which makes work safe and provides good working conditions for our customers.

We continually strive to improve the safety of Bucher Emhart Glass machines, and today all container forming machines are equipped with features that allow operators to make section interventions, job changes, and repairs more safely, quickly, and easily. In addition, safety features have been implemented that deliver safer blow side operation and maintenance. New safety features can be retrofitted on existing machines.

Bucher Emhart Glass' safety innovations confirm our ongoing commitment to making our machines safer, as well as more effective. Instead of relying on operators' own vigilance and skill, we aim to “design out” the possibility for accidents to occur. That way, operators can put more effort into optimising production speed and quality while enjoying a safer workplace.

The most important thing to avoid accidents and negative health impacts is to know how to operate our machinery. Bucher Emhart Glass has training facilities in Europe, Asia, and North America where customers are trained to operate the machinery in the most optimal way.

Gob distributor guard

**Hazard** Activating feeder, shear or gob distributor maintenance stop will retract the gob distributor. If an operator is working in the area where the gob distributor retracts, there is a risk of being hit by the gob distributor or getting pinched between the gob distributor and the beam structure.

**Avoid hazard with gob distributor guard** The guard is designed to inform and hinder access to the dangerous zone. It is light and can be easily removed. The fasteners are attached to the guard.

Override switch protection

**Hazard** When an operator performs maintenance on a pneumatically operated IS section there is a risk that the override pneumatic switches on the valve block could be activated unintentionally when the operator stands close to the valve block.

**Avoid hazard with protection guard for of override switches** The U-shaped channel minimizes the risk of unintended activation of the override switches. The U-shaped channels are standard on the Bucher Emhart Glass pneumatic valveblock. They can be retrofitted on the 26 l EPVB.
Safety flaps

**Hazard**  When work is performed on both blank and blow sides of the IS section, there is a risk that the operator on the blank side could activate an override switch controlling a mechanism on the blow side. The operator on the blow side could be hit by the moving parts or get limbs crushed.

**Avoid hazard with safety flaps**  The EVPB valve block safety flaps alert the operator on the blank side about the risk of overriding mechanisms and risking the safety of an operator on the blow side. The safety flaps are available in different lengths for retrofit. On the standard Bucher Emhart Glass EPVB invert/revert, blowhead and blow molds are covered by the safety flaps.

Blowhead and blow mold interlock

**Hazard**  The operator on the blank side of the machine may mistakenly activate the movement of the mechanism on the blow side of the machine by activating blowhead or blow mold override switches when the section is in the maintenance stop. The operator on the blow side could get pinched or have limbs crushed.

**Avoid hazard with blowhead & blow mold Interlock**  The blowhead & blow mold interlock gives the operator on the blow side of the machine control of the blowhead and blow molds. The switches lock the mechanisms in the up and open position and indicate the status of these mechanisms very clearly.

Conveyor ladder

**Hazard**  Performing exchange of accessories on the blow side of the section requires that the operator leans over or has to climb over the flow of hot containers on the conveyor belt. There is a risk the operator will get burns performing this operation. The working position is ergonomically cumbersome.

**Avoid hazard with conveyor ladder**  The conveyor ladder is designed to enable easy and safe service on the blow side (mold halves, blowhead, blowhead arm, bottom plate, TO tong, and TO head change) by providing a robust ladder with a thermal insulated “tunnel” and integrated footstep to assist the maintenance work. FlexConveyor with steel girder has an integrated conveyor ladder.
Lifting device on the blank side

The pneumatically powered lifting device is designed to give the operator support by avoiding heavy lifting when changing mold equipment. The lifting device rail is mounted to the blank side overhead panel. The equipment is CE certified for a maximum lifting weight of 125 kg. The crane has 2 speeds for up and down movement. If pneumatic power is lost the load is locked at the actual position.

- Lifting range 125 Kg
- Pneumatic driven

Lamps for section illumination on the blank side

**LED lights** Good illumination is important to monitor the process and to make accessory exchange, job change etc. easy and safe. The LED lamp panel on the rear side of the blank side overhead panel improves the illumination of the section. The lamps are located between the sections to have overlapping light and to prevent the section from being shadowed by the operator when leaning into the section for a job change. The separate LED lamp module is powered by a 24 V integrated power supply.

- LED lights are mounted on a separate module
- Lights are situated between sections to overlap and avoid shadowing

Manual Mode - Simple and safe

Using state-of-the-art safety technology, Bucher Emhart Glass introduces a simple and safe mode of operation. We call it Manual Mode. This technology allows users to supervise the speed of servo mechanisms. It ensures that the Servo Electric Invert SEI and the Servo Electric Takeout SETO move with limited speed when operators are in the section. We have also developed a unique method to safely separate the operation of the blank and blow sides. This allows an operator to enter the blank side with their hands while the operator on the blow side moves mechanisms.

It’s no longer necessary for operators to activate Maintenance Stop MS when going into the section with their hands. Operators just activate Manual Mode on their side of the machine. There are separate Manual Modes for the blank and blow sides.
Blank Side Barrier

The Blank Side Barrier BsB is an addition to Bucher Emhart Glass container forming machines that helps to provide additional safety during the forming operation.

• During normal operation the barrier is in the up position. The visibility of operating mode of the section increases and the risk of reaching into the operating section is reduced.
• The up position of the BsB during normal operation will eliminate the risk of “swabbing on the fly” on the blank side of the machine, where the operator reaches into the running section to swab the blanks.
• The BsB, in conjunction with a swabbing cycle on the timing system (manually operated), helps to reduce risk while swabbing the blanks on the blank side of the IS machine. BsB will clearly indicate to the operator if a section is in swab cycle or not. The risk of swabbing a section which is not in swab cycle is eliminated.
• The up position of the BsB during normal stop will decrease the risk of an operator interacting with the section without activating the maintenance stop which is the only stop that allows the operator to interact with the machine.
• When the maintenance stop is activated (blank or blow side), the BsB is down and it will clearly indicate that it is safe to interact with the section.

Integrated Swab Robot

The Novaxion swab robot can be installed on new or existing IS/AIS machines with FlexIS controls to swab the blank molds and neck rings. By implementing the auto swab cycle in the FlexIS controls, the robot provides “swab on the fly” to the blank molds. This frees operators to manage the process sensor systems to achieve higher output from the machine.

From a safety perspective the swab robot decreases the risk of accidents by reducing the number of operator interactions with the machine. In an 8 hour shift, an operator performs approximately 700 swab movements, lifting the arm to activate the manual swab cycle more than 200 times. The swab robot, which is designed for repetitive work, is an ideal replacement and an ergonomic improvement to avoid repetitive strain injuries.

Bucher Emhart Glass supplies machines with swab robots that are fully integrated with FlexIS control from our factories in Sweden and Malaysia. For retrofit installation an interface connection box is mounted in the cabinets for each section. Integrating swab robots with forming machines is part of our strategy to provide automation solutions to our customers for increased profitability.
Gob forming systems generate out of the continuous glass flow from the forehearth a constant gob in weight and shape which is required for processing in the IS machine. The feeder plunger, tube height and rotation and the shear mechanism form a gob which is tailor-made for the container to be produced in the forming machine. Errors made in this process step cannot be corrected afterwards in the forming of the container. This is the reason why the gob forming is a key factor of the quality of the finished product.
Superior gob forming technology

Bucher Emhart Glass has perfected the process of gob forming to turn streams of molten glass into the shapes that will be molded into the finished container. Our complete product line includes feeders that offer wide operating ranges for simplified operation. Feeder deflectors are designed to ensure uniform, consistent, and repeatable gob guidance and delivery. Delivery and support systems provide precise alignment for smooth and centered gob transition into the mold which is essential for high ware quality. The spout system consists of an entire set of spout refractory components specially designed to promote optimum gob forming conditions.
Servo Feeder System

The Servo Feeder System offers the ability to improve production quality and customize the gob forming. The 555 system includes the feeder plunger, tube height and rotation and the shear mechanism as well as the optional metering spout system. The metering spout features reduced servo tube sensitivity and improved thermal and weight variations. This degree of control with the servo-driven gob forming equipment reduces glass loss and optimizes feeder and shear performance. The Servo Feeder System is available fully integrated into the FlexIS process control system and also as a standalone version which interfaces with existing non-FlexIS timing systems.

Features and benefits
• Improves gob forming and loading at rates from 1 to 240 cuts/minute
• Speeds job changes and allows quick save & recall of all critical job information
• Provides high torque needed to make custom feeder plunger motions
• Improved gob weight control

Specification
• Covers tonnage ranges from 5-200 m TPD
• Fits 81, 503, 515 and 585 spout assemblies
• Advanced servo technology
• Cut rates from 1 to 220 cuts/minute
• Software cam profiles can be adjusted while feeder is running
• Includes metering spout system for: reduced tube sensitivity, improved thermal and weight variations, improved loading
• High dynamic servo motors for precise plunger motion
• Bucher Emhart Glass standard FlexIS technology
• Installs into new or existing applications
• Available with standalone or integrated controls

570 Feeder Plunger
With the general increase in machines operating in triple gob and quad gob format, the need for a feeder plunger which can control the shape and the weight of the individual gobs has been realized. With improved controls and monitoring of gob shape, the new 570 plunger mechanism has the added benefits of:
• Direct motor drive
• Mechanical spring plunger assist system

565 Shear
• Parallel shear motion
• Synchronized cutting forms consistent gob shapes and weights with reduced shear marks
• Improves gob loading
• Minimal contact time lengthens blade life and reduces shear spray consumption
• Universal mounting design, simplifies installation and reduces mechanism spare parts
Gob distributor and delivery

The gob distributor and delivery system on an IS machine receives the gobs after the shear cut for delivery to the individual sections of the machine. The gob distributor moves the scoops with high speed and accuracy to the entrance of the troughs in accordance with the firing order. The motion and the resulting dwell time of the scoops are important for smooth transition of the gobs into the troughs. The Bucher Emhart Glass gob distributor has proven to be a very reliable and low maintenance mechanism. The reject system with both gob interceptor and center reject chute increases the safe operation of the machine.

The Bucher Emhart Glass delivery equipment covers a wide range of scoop, trough and deflector sizes to permit gob weights from a few grams to over 1 kilogram to be delivered correctly to the section. With the introduction of the delivery suspension system, a truly individual optimization adjustment of the delivery can be achieved. Together with the 18000 Series deflectors, the suspended delivery system provides an accurate vertical gob drop into the blank mold.

535 Gob Distributor

- Available in all configurations
- Universal drive module with exchangeable distributor heads
- Fast scoop motion up to 140 ms permitting in excess of 200 cuts/minute
- Carbon plate gob interceptor
- Center reject shoot
- Redundant gob reject for increased safety
- Constant cone delivery

Options

- Multi gob weight system

Constant Cone Delivery Features and benefits

- Constant Cone trough angle for improved consistency in gob loading
- Equal gob transition scoop-trough-deflector for less variation and improved gob loading
- Delivery prepared for different center distances enables fast conversions from SG <=> DG <=> TG <=> QG
- Universal trough support covers all center distances for maximum flexibility in configuration
- Fewer parts for faster back to pack
- Robust deflector adjuster with less vibration for even gob loading
It is clearly understood that one of the key factors in improving pack-to-melt and container quality is the kinematics of the IS machine, which must be reliable, mechanically precise and fully controlled. However, the stability of the forming process itself is becoming ever more recognized as vital for excellent quality and superior performance which result in reduced container costs. The high variations and fluctuations can now be managed with the Bucher Emhart Glass Process Product line.
Process products

Container forming is the heart of the glass container process, where the gob is manipulated and pressed or blown into its final form. Different techniques are used to make different types of containers. Both processes comprise a blank side, where the gob is formed into a partially completed form known as a parison, and the blow side where the final shape is achieved.

Bucher Emhart Glass machines have features for optimum handling and forming to ensure consistent quality and uniformity from a single gob machine running slow volumes to quad gob high speed production.
Forming

Parison formation is the most critical step in the production of glass containers. In Narrow Neck Press & Blow NNPB and Press & Blow PB, weight control and the motion of the plunger are critical in producing high quality containers. The Plunger Process Control PPC system visualizes and displays the actual plunger stroke providing vital information to optimize the container quality.

FPS technology provides programmable pressure control for the plunger movement and plunger cooling/counterblow. This technology increases accuracy and reduces variation in the parison formation. Combining the PPC with FPS technology offers the ultimate in control for optimizing parison forming. Recent development of the PPC technology has enabled the plunger operation in Blow & Blow BB to be monitored and displayed. This has shown to be a useful aid in monitoring wear, alignment and lubrication in the production of Blow & Blow BB containers.
Plunger Process Control PPC

The Bucher Emhart Glass Plunger Process Control PPC system is a product which monitors individual plunger motions during the parison forming process. The system uses full stroke sensors and a unique method to eliminate cabling in the plunger mechanism.

As well as measuring plunger stroke in the NNPB and PB process, gob weight is automatically controlled, with closed loop technology to adjust tube height and individual plunger needles in the feeder.

The display shows by cavity the full plunger stroke profile allowing optimization of the press time and plunger up profile. All profiles are stored electronically and all data is easily displayed.

Most recent developments included plunger position profiles for BB process, allowing a visualization of the plunger operation for the first time. All the features enable the production specialists to optimize the forming process, reduce variability and improve quality.

PPC features

- Full stroke motion tracking
- Gob weight control
- Wireless sensor connection
- Hot End Ware Reject HEWR
- Process data collection and storage
- Advanced diagnostic tools
- Support of all processes NNPB, BP and BB
- Status visibility with large LED display

Configuration

PPC is available for the following quick change plunger mechanisms

- 4¼” DG
- 5” DG
- 85 mm TG - 5” DG quick conversion
- 5½” DG
- 6¼” DG (IS/AIS/NIS)
- 4¼” TG (IS/AIS)
- 4¼” TG - 6¼” DG quick conversion
- 5” TG (NIS)
- 95 mm QG (NIS)
- BIS 140 mm DG, 95 mm TG (70 mm QG)
FlexPressure System FPS

The Bucher Emhart Glass FlexPressure System FPS is technology to optimize and program the pneumatic process function on the forming machine. On the parison formation, FPS is a well-accepted technology for plunger up control and plunger cooling/counterblow optimization. Always standard on the NIS machine, the FPS technology is a standard option on IS/AIS machines. Latest application of this technology is on final blow and finish cooling.

New valve designs are now available to allow programmable FPS technology to be applied to the final blow. This allows for increases in productivity and quality. With the FlexIS forming control the optimization of pressure profiles are job dependent and stored as part of the job setup data.

Features and benefits

- Automatic pressure control
- Quick response to pressure changes
- High air flow
- Maximized cooling time and efficiency
- 4 different pressures in one cycle
- Tailored pressure for each process step
- Job related setting
- Testing and repair features

Valve type application

ED 02  Pilot for regulators
ED 07  Plunger up
ED 12  Counter blow
       Plunger cooling
ED 19  Final blow
       Finish cooling
       Settle blow
Temperature Control System TCS

The Bucher Emhart Glass Temperature Control System TCS is a pyrometer-based system which monitors mold equipment on the blank side of the forming machine.

Mounted on a rail in the region of the blank side panel, the pyrometer is capable of being programmed to measure and display individual blank temperatures, blank temperature vertical profiles, plunger temperatures, and neck ring temperatures.

These temperature readings give the process transparency needed to reduce blank mold, plunger and neck ring temperature variations, resulting in improved process stability. The collected data is plotted on various graphs and a warning is activated if any of the temperatures falls outside the predetermined set limits. On new IS machines the TCS system is fully integrated and is hidden behind the blank panel without interfering with the machine operator. Upgrades to existing IS machines in the field can be done and may require a prior installation review on-site.

Features and benefits
- Simple setup using integrated laser
- Warnings and alarms for out-of-range
- Storage of data
- Automatic swab detection
FlexIS Multi Gob Weight System

The Multi Gob Weight System provides long desired capabilities like sampling a different glass container on one section without affecting the commercial production on the other sections.

Offers today's required flexibility Unprecedented production flexibility can be achieved by operating the 555 Feeder and 565 Shear with the new Bucher Emhart Glass FlexIS Multi Cam/Multi Shear software. This permits each section of a forming machine (IS, AIS, NIS or BIS) to produce items with different gob weights and shapes. The advantages of such a system are many:

• Production can be very closely coordinated with demand, both in time as well as in quantities. This optimizes machine utilization and minimizes stock.
• To accommodate a short-notice job, it is no longer necessary to halt an existing run. Some of the sections can continue, while the remainder can be changed to one or more new jobs.
• For low-quantity production runs, it is not required to equip the entire machine with molds, or to leave some sections standing idle.
• This application can be used to test a new set of mold equipment or to make sampling runs on a single section without interrupting the normal production.
• Production can be adjusted precisely to the supply of glass, thus optimizing the furnace output.
FlexRadar

Over the last few years, Bucher Emhart Glass has invested in research using infrared imaging technology. This area of research focuses on the forming process and glass distribution throughout the container. Data collected from this research has led to the development of the FlexRadar system.

This glass forming process analyzer quickly identifies deviations in the glass forming process by monitoring each container’s glass distribution and geometry as well as its position on the conveyor.

Reduces real time process variations The FlexRadar system incorporates short wave infrared imagers SWIRs positioned directly after the IS machine on opposing sides of the conveyor. These SWIRs provide images of the sidewall of each container for maximum coverage and improved dimensional profiling of each container.

The images produced by the SWIRs are processed using proprietary algorithms to identify cavities that stand out from the overall population of all cavities. The deviations used to identify the outliers are based on the containers’ vertical and horizontal glass distribution, dimensional outline including lean, and the position on the conveyor. Cavities or sections producing outlying containers are quickly identified and visually displayed to the machine operator.

Development of additional features for the FlexRadar system continues at the Bucher Emhart Glass research center. The focus is on closed loop controls by exchanging container information with the FlexIS machine control. These developments are aimed at automatically reducing process variations during container forming.
Closed Loop Products

**FlexIS Plunger Up Control**

FlexIS Plunger Up Control adjusts the Plunger Up motion in Press & Blow PB productions. The system ensures that the cavity is filled entirely with glass at the desired time.

**FlexIS Plunger Up Control** uses information from the Plunger Process Control PPC in Press & Blow PB and Narrow Neck Press & Blow NNPB production. It determines the time needed to move the plunger up to its end pressing position. It adjusts FPS pressures and sets FPS timing values so that the desired time to raise the plunger is maintained. Controlling the plunger rise time means also having a defined full contact time (dwell time) which is – in common understanding – an important process parameter.

The result of this continuous adjustment is a well-maintained full contact time throughout the production run and across all cavities of the machine. Customers report that also the start up after a job change is greatly supported by the system – Plunger Up adjustment is automatically done within a few cycles.

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**Screen showing rise in dwell time**
**PPC Off – Screen shows variation in contact time and fill before switching on**
**PPC On – Screen shows well-maintained full contact time across all cavities of the machine**

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FlexIS Blank Cooling Control

FlexIS Blank Cooling Control automatically adjusts the cooling of the blank mold halves so that the desired temperatures are maintained.

**FlexIS Blank Cooling Control** uses information from the Temperature Control System TCS. It gets the measured temperature values of the mold surfaces and automatically adjusts the duration of the mold cooling.

Depending on the machine type and configuration, up to 72 mold halves are permanently monitored and adjusted to slow changes of surrounding parameters. This leads to more stable production runs and also prevents quality problems like leaners, for example.

With continuous adjustment, the mold temperatures can be kept within tight limits over day and night. The system is also very helpful when starting up a machine after a job change.
Plunger Cooling Control

FlexIS Plunger Cooling Control automatically adjusts the cooling of the plungers so that the desired temperatures are maintained.

FlexIS Plunger Cooling Control uses information from the Temperature Control System TCS. It gets the measured temperature values of the plunger surfaces and automatically adjusts the duration of the plunger cooling.

Depending on the machine type and configuration, up to 48 plungers are permanently monitored and adjusted to changes of surrounding parameters. This leads to more stable production runs and also prevents quality problems inside the container and finish.
**Bottle Spacing Control**

FlexIS Bottle Spacing Control automatically adjusts the placement of the containers on the conveyor so that an equally distributed ware sequence is maintained.

**FlexIS Bottle Spacing Control** uses information from the FlexRadar forming process monitor system. For each bottle, a deviation value to the ideal position on the conveyor axis is transmitted and used to adjust the pushout timings.

The closed loop averages the position deviations for each section and calculates a correction for the pushout and related events, so that the bottles maintain equally distributed along the conveyor axis.

By the automatic adjustment, an equally distributed ware sequence is achieved and maintained, also when pusher parameters are slightly changed.
Cooling

Mold cooling is a key process to cope with current market demands including production speed, flexibility, quality and lightweighting. A predictable and efficient cooling system is a must to accomplish a good container quality and an elevated production speed. Such a high efficiency (energy waste) cooling offers also more production flexibility, especially as far as special shapes are concerned. The available service tool TekPak calculates the 3D mold glass contact temperatures and ensures predictability based on mold and process parameters. In addition, a successful cooling system has to serve different needs on the blank and blow sides.
Blank side
The final container glass distribution is primarily set by the blank mold temperature profile and the resulting parison quality. Therefore a predictable, adjustable and stable blank mold temperature grid is vital to achieve a high container quality. The blank cooling is in fact a parison conditioning system.

Blow side
On the blow side, cooling leads to the stability of the container. This stability defines the production speed. The cooling capacity has to be predictable and high. It is also important to use cooling wind as efficiently as possible and not to waste energy.

Parison conditioning = glass distribution

VertiFlow
- Efficient cooling air utilization = energy savings
- More constant potential predictable mold temperature
- Production speed increase
- Less job-change and production downtime
- Noise reduction

VertiFlow through the bed
- High cooling capacity
- Individual cooling air pressure for blank and blow mold cooling is possible
- Simple, maintenance friendly design
- Less mold surface temperature variation
- Upper support brackets interchangeable with Series 9700 mechanisms

InVertiFlow
- Higher cooling efficiency → speed increase potential
- Individual cooling of molds → optimized cooling conditions
- Fumes and heat carried away → improved operator environment
- Easier mold change → reduced downtime

VertiFlow assist on AIS
- Addition to the efficient VertiFlow cooling
- Higher cooling efficiency 360° resulting in higher speed
- Extra cooling on specific critical areas
- Independent control through left and right on/off control
- Up to 20% higher cooling capacity
- Upgrade on existing AIS machines possible
Ware handling

Hot end ware handling has to ensure the stable transport of the still hot and fragile containers from the IS machine into the lehr. This is the part of the production process where good ware can not only be lost or damaged but the speed as well as the efficiency of the entire production line can be limited.
**Ware handling**

Good ware handling significantly improves the stability of operation on any production line. During the start up of a machine the hot end transport should work without any intervention of the operating personnel. This improves start up time and allows the production specialists to focus on the important forming issues.

The advanced ware handling system supports the flexibility of IS production lines with smart variable parts like pusher fingers and low maintenance requirements on the equipment such as the pusher mechanism or the conveyor belt. The ware handling system must operate consistently and without the need for operator adjustments.
Servo Electric Take Out SETO

The Servo Electric Take Out SETO picks up the containers from the blow mold, moves them over the dead plate for cooling and afterwards releases the containers on the dead plate. A backlash-free pickup and a smooth transfer is essential to avoid damaging the sensitive hot containers. Increasing production speeds require tight control of the take out motion with dynamic servo motors.

The belt-driven take out arm connects the gear box with the Tong Head. The belt provides a play-free motion and very low maintenance cost. Tong head is available in every center distance of the Bucher Emhart Glass machine portfolio and in addition as Variable Center Distance VCD Tong Head.

The SETO can be retrofitted to existing machines to reduce defects and improve the performance of the ware handling.

Features
- Servo control
- Compact design
- Front mounted safety lock, tong close speed adjustment and take out height adjustment
- VCD Tong Head to reduce ware spacing and belt speed
- Fully integrated into the FlexIS
- Upgrades with FlexIS standalone on existing lines
- Gearbox running in oil bath

Benefits
- Precise motion control and adjustment with the FlexIS process control system
- Good access into section
- Easy handling
- HS Ware handling ware handling TG/QG
- One control system
- Available for all machine configurations on the market
- Low maintenance

Ware Handling Supervision WHS

The Ware Handling Supervision WHS, fully integrated in the FlexIS timing, rejects incorrectly positioned containers at the hot end. The unit uses a light barrier to detect cullet and “stuck” or “down” ware on the conveyor belt. An air reject system removes such ware from the conveyor before it can become the source of handling problems on the rest of the production line.

Features
- The WHS helps to eliminate line jams at the hot end coating tunnel and transfer wheel by sensing and removing faulty ware before it reaches these areas
- The WHS is fully integrated in the FlexIS Timing hardware

Benefits
- The WHS will improve packed ware quality
- The number of rejected bottles are reported on the FlexIS Production Counters PC
FlexPusher

The FlexPusher mechanism transfers the containers from the dead plate onto the running conveyor. It combines the motion of two independent servo motors to generate the sweep out motion. The motion can be modified by changing parameters on the pusher page of the FlexIS control.

The unique motion of the FlexPusher uses all available space on the dead plate for a smooth sweep out motion and opens the door for conveyor speeds which were not possible before. The motion of the pusher determines the placement of the containers on the belt which is the main factor in the performance of the downstream ware handling. Precise placement of the containers by the pusher also reduces losses at the ware transfer, the stacker, and the hot end coating tunnel. The pusher fingers of the FlexPusher are designed to be equipped with carbon finger liners. This makes these fingers very flexible and contributes to the high performance of the entire system.

FlexPusher Special Performance SP  The FlexPusher Special Performance SP is a FlexPusher extension, addressing specific high speed triple gob, non-round and unstable productions, which could otherwise restrict the standard FlexPusher ware range. Where the ware range limitation is not an issue, standard FlexPusher installations are upgradable to FlexPusher SP (and vice versa), by changing the upper housing (conversion kit 904-12/16). The FlexPusher SP is so far not available on NIS machines due to the larger 22.5” section width.

Features
- 2 axis fully servo-controlled
- No pneumatics & no lubrication
- Available for IS, AIS, BIS and NIS machines
- Fully integrated into the FlexIS
- Simple interface for motion profile adjustments - optimization made by plant personnel
- Upgrades with FlexIS standalone on existing lines
- Various finger spacings available for SG, DG TG and QG
- Flexible finger liner concept
- 2 different finger heights
- Flexible finger liner inserts
- Vertical pocket air at the back plate

Benefits
- High repeatability
- Reliable
- Standard
- One control system
- Easy setup and handling
- Fits all machine types on the market
- Standardized
- Easy to customize for special products
- Built in feature for high speed production

Additional Features
- Full parallel container positioning before going onto conveyor belt
- Same centrifugal forces for all cavities

Benefits
- Improved high speed ware handling in TG and QG
- Better handling of unstable ware (non-round)
- Reduces ware handling losses
End to End technology

Container forming

Ware handling

Dual Row

Pharma Type II sodium calcium glass containers need a surface treatment to achieve the specified hydrolytic stability. Larger and faster machines have pushed existing dosing equipment on the machine conveyor to its operating limits. The new Bucher Emhart Glass Dual Row system uses the FlexPusher and allows changes between single and dual row within minutes.

Features
- Easy and quick to convert from: single row <=> dual row
- Built into FlexS
- Fits all Bucher Emhart Glass conveyors

Benefits
- Flexible
- Standard choice
- Universal

Cross Conveyor

The Cross Conveyor has a unique cast iron girder, reducing vibrations and minimizing distortion due to the hot environment. It reduces installation service requirements (fluid cooling) and guarantees a long equipment life. The Cross Conveyor fits nearly all lehr widths and heights.

Features
- Cast iron main structure
- Adjustable dead plates
- Spring steel belt wear plates
- Reduced vibration
- All lehr heights supported

Benefits
- Increased robustness & reduced high temperature distortion; Fluid cooling not needed; no running cost for cooling
- Tilt/rocker smoother container transition
- Long girder life time
- Better container handling
- Universal

FlexConveyor

The FlexConveyor fulfills all the different customer needs. This new standard steel conveyor improves the stiffness, reduces the reach distance, optimizes the wind box for equal flow with an option for two on/off controls, integrates the pusher cables and provides a height-adjustable dead plate. To improve the ease and safety of blow side accessibility the FlexConveyor has an integrated ladder.

Features
- New steel girder
- Integrated safety ladder
- Dual controlled wind box
- Height adjustable wind box
- Closer access to blowside
- Fits all Bucher Emhart Glass machines

Benefits
- Increased robustness
- Safe and easy access to blowside
- Balanced flow & adjustable pressure profile
- Standard
- Easier blow side swabbing
- Universal

FlexConveyor

The FlexConveyor fulfills all the different customer needs. This new standard steel conveyor improves the stiffness, reduces the reach distance, optimizes the wind box for equal flow with an option for two on/off controls, integrates the pusher cables and provides a height-adjustable dead plate. To improve the ease and safety of blow side accessibility the FlexConveyor has an integrated ladder.

Features
- New steel girder
- Integrated safety ladder
- Dual controlled wind box
- Height adjustable wind box
- Closer access to blowside
- Fits all Bucher Emhart Glass machines

Benefits
- Increased robustness
- Safe and easy access to blowside
- Balanced flow & adjustable pressure profile
- Standard
- Easier blow side swabbing
- Universal
Ware Transfer

The Ware Transfer moves the containers from the machine conveyor to the cross conveyor. The transfer wheel has to cope with spacing variations and transfer the containers with consistent spacing. A smooth motion is essential to avoid damage or loss of any containers during the transfer. Both 178 and 478 ware transfers can be driven either with a reluctance motor controlled by the FlexVector drive or by a servo motor controlled from the integrated FlexIS Ware Handling Controller WHC.

Features
178
• Reliable and simple design
• Easy to change fingers
• Up to 250 containers/minute
478
• Precise and stable
• Pocket inserts which match the container shape

Benefits
178
• Low operation costs
• High flexibility
478
• Reliable, high speed transport
• Reduces ware losses
• Simplifies job change, setup & maintenance

FlexStacker

The new three-axis FlexStacker is a result of a joint development project. It uses the FlexIS control hardware from the IS machine. This enabled the introduction of a pioneering human interface with built-in expert knowledge, allowing easy setup of the new stacker without the need of “specialists.” Performance is proven to handle high speed loading into the lehr.

Features
• 3 axis fully servo
• FlexIS control
• Newly developed user interface
• Optimized motion profiles

Benefits
• High repeatability
• Bucher Emhart Glass standard
• Easy setup and handling
• High speed lehr loading
Controls
**FlexIS Process Control System**

Bucher Emhart Glass has reliable and innovative control systems for driving the different types of IS machines in its portfolio. There has been a quantum leap with the introduction of the FlexIS Control, a control system born from the collaboration between Bucher Emhart Glass and Jetter AG, merged now in the Bucher Group.

Knowledge in motion control solutions and technology, combined with expertise in technology and application of the Bucher Emhart Glass IS machines, make the FlexIS a powerful process control system that can manage the entire glass container forming process.

The FlexIS Control System is at the heart of a strategy that brings well-coordinated and integrated process control to glass container production and the capability to interface with other current and future components – from the feeder to inspection.

A completely new User Interface UC2 is being introduced, offering the latest capabilities for interactive screens which in return give endless possibilities for user-friendly machine operation.

On top of all of this, FlexIS introduces a new safety level for the machine operation. The new Manual Mode gives the operator a simple and safe method for changing mold equipment.
FlexIS Process Control System

The FlexIS Process Control System is the core component that makes automation of the container forming process possible. In addition to controlling a forming machine, FlexIS is capable of fully driving all mechanisms from feeder to stacker. Latest developments include closed loop control technology, giving real automation solutions to the glass forming process.

Much more than a forming control system, FlexIS was conceived as a full process control system capable of directing all of the various events and actions required to produce high quality glass containers. The FlexIS system is designed to be the neurological control center for the glass container production process.

Reliable, flexible and expandable  The FlexIS system takes into account the closed loop control strategies that lead to considerable reductions in operator intervention and higher levels of automation. Closed loop control is now available for several applications and many more to come in the future. The system includes a simple, operator-friendly user interface with a unified look and feel that enables easy access to setup, configuration and adjustment parameters. FlexIS adds a new level to glass container process control. It is the platform for current and future innovations in process control from Bucher Emhart Glass.

The FlexIS TS-E is a scalable and expandable control system for IS and AIS machines. The FlexIS for NIS and BIS have the same design concept, running the same software but controlling more servo axes. FlexIS unifies the section, machine and ware handling controllers into a single system. The simple, three-module configuration keeps spare parts costs to a minimum. The system is capable of controlling both pneumatic and servo-electric devices.

FlexIS is housed in two different cabinet layouts: one for the machine controller and ware handling controller, and one for the section controller. Communication and synchronization are via ethernet, which allows remote access and supervision via internet, if required.
Machine controller/ware handling controller cabinet
The machine controller drives five gob-forming servo motors, ensuring precise and controlled motions for:
- Tube Rotation and Tube Height
- Feeder Plunger
- Shear
- Gob Distributor

The ware handling controller manages the various servo motors involved in smooth container handling:
- Conveyor
- Ware Transfer
- Cross Conveyor
- Stacker

In addition the ware handling controller can control:
- Conveyor Height
- Ware Handling Supervision WHS operates as stuck- and down-ware reject
- Machine Control Unit MCU, which is standard for BIS and NIS and optional for IS and AIS. It manages up to 12 compressed air lines of an IS machine forming process in a closed loop.

Section controller cabinet
TS-E for IS and AIS machines:
- One section controller cabinet manages the section timing for four sections. Up to four servo drives can be added in order to support FlexPusher, SEI, SETO
- FPS control for a maximum of 12 channels with feedback as option is integrated in the section control

FlexIS NIS/BIS designed for NIS and BIS machines
- One cabinet holds 2 sections of controls with a maximum of eleven drives per section and the FPS with feedback.

We can help clients old and new to make a truly future-proof investment in state-of-the-art glass manufacturing controls. The current Bucher Emhart Glass controls portfolio fulfills all customer needs for a reliable, flexible, scalable, best fit control system that allows seamless and straightforward future expansion.
New User Interface UC2

The face of a control system is the Human Machine Interface HMI. The machine operator needs to enter many parameters to successfully make a glass container. We are proud to present a new user interface which offers endless possibilities to make it even easier and faster for the operator to enter data.

The User Console UC2 runs on a standard Windows PC with a touch screen, housed in an air-conditioned cabinet. The interface features ergonomic and rapid navigation, allowing operators to quickly set the desired parameters. It provides alarms in the event of problems plus reports on status, production and downtime. Servo axis parameters are now fully integrated in the bar chart with intuitive graphics, showing theoretical and real curves. UC2’s multi-language database allows operators around the world to use it in their primary language.

The UC2 comes with new features:
• Full Multi Article data handling. Every section can run with its own type of container.
• Fully integrated and interactive bar chart. Make all section adjustments on one screen.
• Enter data on multiple clients (user interfaces) simultaneously.

As a replacement for the Hand Held Terminal HHT, we are introducing a portable terminal (Tablet) which gives the full functionality of UC2 near the machine.

For the direct interaction with the machine, the blank side panel is located overhead on the blank side of the section, while the blow side panel is located on the conveyor in front of each section. These two panels feature switches and buttons with functionality clearly indicated with pictograms. Operators can override or disable each mechanism individually, to allow manual operation, initiate an automatic calibration cycle for all the section’s servo mechanisms or activate special cycles including cold blank/blow cycle, manual swab, delivery request, normal stop and blow side special cycle.
Manual Mode - Simple and safe

Using state-of-the-art safety technology, Bucher Emhart Glass introduces a simple and safe mode of operation. We call it Manual Mode.

This technology allows users to supervise the speed of servo mechanisms. It ensures that the Servo Electric Invert SEI and the Servo Electric Takeout SETO move with limited speed when operators are in the section. We have also developed a unique method to safely separate the operation of the blank and blow sides. This allows an operator to enter the blank side with their hands while the operator on the blow side moves mechanisms.

It’s no longer necessary for operators to activate Maintenance Stop MS when going into the section with their hands. Operators simply activate Manual Mode on their side of the machine. There are separate Manual Modes for the blank and blow sides.
Bucher Emhart Glass refractories are formulated from high purity, special oxide raw materials and manufactured with the properties necessary for the success of each specific glass making operation. In our laboratory, manufacturing, and quality operations, we bring together people, processes, and products to meet your needs. Our refractory craftsmen – most with at least a decade of experience – are the heart of our operation. They are supported by engineering and R&D professionals who emphasize innovative product development and individual customer solutions.
Forehearth and feeder products  High quality refractories are crucial to proper conditioning of molten glass. Bucher Emhart Glass forehearth refractory components are designed for long life with predictable heat loss characteristics and resistance to thermal shock, erosion, and corrosion. Our range of forehearth components includes both substructure and superstructure. We manufacture distributor shapes, alcoves, doglegs, and colorant sections and a full range of feeder refractories, including spouts, tubes, plungers, and orifice rings. Feeder refractories are available in many materials to address each customer’s needs.

Exclusive refractory products for the handglass industry  The ability to match our proprietary mixes to our customers’ melt and firing needs has enabled us to serve a wide spectrum of glass industries. Today, we are a leading manufacturer and supplier of glass house crucibles used exclusively in hand glass shops throughout the world. These highly specialized products demand meticulous craftsmanship. We manufacture a wide variety of shapes and sizes, ranging from one pound glass capacity open crucibles to closed pots with 500 pound glass capacity. We also offer a complete line of refractory accessories designed specifically for the handglass industry.

Quality engineered feeder and refractory expendables  Bucher Emhart Glass has earned a reputation for unsurpassed quality in refractories. As a flexible, well-staffed fabricator of premium refractory compositions, our goal is to serve the individual requirements of each customer no matter what type of glass they manufacture. We deliver a level of customized service normally unavailable from other refractories manufacturers. As a division of the global Bucher Emhart Glass enterprise, we leverage the continuing evolution in glass making technology from the industry leader. We offer a full range of standard refractory shapes and manufacture unusual, complex, and small quantity shapes to the same exacting tolerances. We also serve the optical, tableware, and float glass industries.

The industry’s widest range of glass refractory expendable compositions  We continue to advance the state of the art in gob forming technology. One way we do this is by providing the industry’s widest range of glass refractory expendable compositions. Our bonded compositions include alumina silicates, AZS, zircon, and fused silica. We offer a full range of shapes in industry standard compositions: 301, 315, 333, 311, 338, 345, and 357. For applications demanding customized compositions, our unrivaled R&D capabilities enable us to devise formulations to achieve specific customer objectives.

Quality driven  Since 1927, Bucher Emhart Glass has developed and manufactured high quality refractories for the glass container industry. The Owensville plant that now manufactures refractories was purchased in 1980 from the Laclede Christy Refractory Company, a renown refractory maker since 1844. Before becoming a refractory plant, the Owensville plant specialised in the production of glass pot refractories. Upon purchasing the plant, the company closed its other refractory operations and concentrated all production in Owensville – a setup that has been maintained to this day. Bucher Emhart Glass understands that the basis of superior glass conditioning for all areas of the glass making industry is high quality refractories. Their use in forehearth and feeder mechanisms play crucial roles in the formation and conditioning of the glass prior to forming into finished products. All Bucher Emhart Glass refractories are formulated from the highest quality raw materials and designed to achieve predictable density and resistance to erosion and corrosion. Precise PC monitoring of batching and kiln firing ensure the highest quality, performance and service life.

Customer focused  Our service team responds rapidly with knowledgeable assistance to help our customers eliminate downtime and maximize production efficiency. Bucher Emhart Glass continues to grow by serving the industry with time-honored craftsmanship, world-class innovation, and service to customers.

General  
- Spouts  
- Tubes  
- Plungers  
- Stirners  
- Rotor segments  
- Orifice rings  

Nonstandard, Individual shapes  

Metering spout system  
- Spout  
- Tube  
- Orifice rings  
- Heat baffle  
- Refractory plunger  

Forehearth shapes  
- Superstructure refractory  
- Superstructure insulation  
- Substructure insulation  

Distributor shapes  
- Alcoves  
- Doglegs  

Colorant sections  
- Pre-heat section  
- Melt section  
- Stirrer section
Container inspection

Glass is truly a perfect package representing quality and value in the eyes of the consumer. To uphold its premium image, the glass container must achieve the highest standards of excellence. A company’s reputation, therefore relies on the effectiveness of the container inspection system. Bucher Emhart Glass inspection solutions verify container quality and integrity at the highest levels, combining vision inspection, software, lighting, and reject systems for optimum system performance at production line speeds.

We deliver the industry’s most comprehensive selection of empty glass inspection solutions. From base, sidewall, finish and stress inspection to mold correlation and check detection for glass containers in all sizes, shapes, colors, and configurations, Bucher Emhart Glass inspection systems perform all these critical inspection tasks at production line speeds.

Our systems offer exceptional flexibility with quick product changeover, ease of operation and maintenance, and concise, real-time data generation for production analysis and trending. Our systems are intelligently designed for ease of operation with minimal operator intervention.
FleXinspect is the tool that increases efficiency and reduces costs by allowing glassmakers to configure only those functions they need on a modular platform. To reduce capital expenditures while maintaining flexibility, the manufacturer can add additional inspections on the existing platform as the need arises. With a large 21.5” touchscreen, the user interface has been enhanced to utilize icon-based command sequences for simplified setup and operation. Container inspection parameters can be pre-programmed for easy recall, thereby reducing downtime for job changes. Additional highlights include built-in production trending screens, change logs recording all settings being modified, and system logs monitoring the machine uptime.
## Machine overview

<table>
<thead>
<tr>
<th>Inline inspection</th>
<th>Total</th>
<th>Mechanical</th>
<th>Vision Flexinspect BC</th>
<th>Vision Flexinspect B</th>
<th>Vision Flexinspect C</th>
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<tbody>
<tr>
<td>Model</td>
<td>FlexInspect T</td>
<td>FlexInspect M</td>
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<td>X</td>
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<td>Inspections:</td>
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<td>Mold number reading</td>
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<tr>
<td>- Heel dot codes</td>
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<tr>
<td>- Bottom codes</td>
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<td>●</td>
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<td>●</td>
<td></td>
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<tr>
<td>Vision plug</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Vision dip/saddle</td>
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<td></td>
<td></td>
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<tr>
<td>Vision ring</td>
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<tr>
<td>Wire edge</td>
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<td>Check detection</td>
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<td>Wall thickness 1-4 head</td>
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<tr>
<td>Mechanical plug, dip, saddle, ring</td>
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<td>Out of round detection 2 pts</td>
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<td>Sidewall inspection (opaque)</td>
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<tr>
<td>- Dedicated transparent</td>
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<td>●</td>
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<td>- Dedicated shoulder</td>
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<tr>
<td>Sidewall stress</td>
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<td></td>
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<td>●</td>
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</tr>
<tr>
<td>- Dedicated shoulder stress</td>
<td>●**</td>
<td></td>
<td></td>
<td>●</td>
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<tr>
<td>Dimensional inspection (lean, height, diameter)</td>
<td>●</td>
<td>●</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

X standard inspection  
● additional inspection

* The sidewall inspection on the FleXinspect T is performed in two stations and is optimized to detect all types of glass defects in all areas of the container from the heel to the top of the neck

** The sidewall stress inspection on the FleXinspect T is performed in two stations and is optimized to detect stress types in all areas of the container from the heel to the top of the neck
FleXinspect T

A reliable and uniquely configurable platform that easily allows additional inspection functionality and redundancy as needed. The FleXinspect T provides unmatched modular versatility, value, and flexibility for glassmakers’ current and future requirements.

As a component of the FleXinspect family, the FleXinspect T can be used in concert with the FleXinspect BC to create the most comprehensive inspection solution in today’s market.
A total inspection solution  The FleXinspect T gives glass manufacturers a total inspection solution, as the fully equipped system is capable of providing all the necessary cold end inspections. The unique design of the servo-driven handling devices allows inspections that in the past were not possible with rotary inspection machines.
- Reduced line space and maintenance
- Higher speeds and larger ware
- Precise container rotation
- Non-contact vision gauging (plug, ring, dip)

Reduced line space and maintenance
- Multifunction configurations reduce the total number of machines per inspection leg
- High speed machinery reduces the number of inspection legs per forming line
- Significant maintenance and labor savings due to fewer inspection machines in the production area

Higher speeds and larger ware
- New starwheel design allows higher speeds on large diameter containers
- Flexible starwheel pocket configurations to maximize throughput (BPM)
- Synchronized servo technologies to optimize overall machine efficiency

840mm servo driven starwheel
Configured with 9/12/18/24/30/36 inspection pockets
- Up to 79mm dia. in 24 pocket with 12 stations
- Up to 107mm dia. in 18 pocket with 10 stations
- Up to 152mm dia. in 12 pocket with 7 stations
- Up to 160mm dia. in 9 pocket with 5 stations

Non-contact vision gauging (plug, ring, dip)
- Elimination of possible contamination or damage to the finish
- High speed operation with improved accuracy
- Simple and quick setup

Standard inspections
- Vision plug
- Vision ring
- Vision dip/saddle
- Check inspection with modulated lights and sensors
- Heel dot code mold number for defect correlation

Additional inspections
- Mechanical plug/ring
- Mechanical dip/saddle
- Base/Base stress
- Sidewall opaque/Sidewall stress
- Sealing surface/Wire edge
- Bottom mold code reader (alpha dots)
- Wall thickness measurement (chromatic light)
- Non-contact 2 point out of round (ovality)
- Dimensional (lean, height, diameters)
- Vision check
FleXinspect M

Designed to be a drop-in replacement for many of the older mechanical inspection machines currently installed throughout the world. The FleXinspect M provides configurable inspection functionality, modular versatility, value, and flexibility for glassmakers’ current and future requirements.

Part of the FleXinspect machine family, the FleXinspect M can be used with the other FleXinspect products to create the most comprehensive inspection solution in today’s market.
**Combined inspection** The FleXinspect M gives glass manufacturers the potential to reduce the cold end footprint by combining multiple inspections within a single machine frame. The unique design of the servo-driven handling devices allows accurate and reliable inspections not historically associated with rotary inspection machines.

- Inspection flexibility
- Modular and configurable to meet all of your current and future inspection needs
- Round and non-round inspection

**New infeed design**

- Precise container control and smoother starwheel loading with 30° entry angle
- Unique design allows users to reposition the screw if needed to have a built-in bypass conveyor
- “Reach over” design allows the machine to be installed on any straight section of conveyor with minimal effort

**Modulated LED check inspection**

- Reduces good ware loss caused by ambient or reflected light
- Long life LED emitters with “auto checking” for damaged or unplugged hardware
- Allows greater area of inspection coverage with fewer emitters

**680mm servo driven starwheel**

Configured with 12/24 inspection pockets
- Up to 66mm dia. in 24 pocket with 7 stations
- Up to 120mm dia. in 12 pocket with 7 stations

OR

Configured with 9/18 inspection pockets (Veritas tooling)
- Up to 83mm dia. in 24 pocket with 5 stations
- Up to 120mm dia. in 9 pocket with 5 stations

**Standard inspections**

- Mechanical plug
- Mechanical ring
- Mechanical dip/saddle/height
- Check inspection with modulated lights and sensors
- Heel dot code mold reader for defect correlation

**Additional inspections**

- Base/Base stress
- High resolution Sealing surface/Wire edge
- Bottom code vision mold reader for defect correlation
- Wall thickness measurement (4 elevations)
- Vision check
FleXinspect BC, B, C

FleXinspect machines can be supplied as independent standalone units FleXinspect B and FleXinspect C, or joined together as a combined machine, FleXinspect BC.

FleXinspect is a reliable and uniquely configurable platform that easily allows additional inspection functionality and redundancy as required. The FleXinspect family provides unmatched modular versatility, value, and flexibility for glassmakers' current and future requirements.
Unmatched inspection accuracy
• High resolution camera technology for improved defect detection
• Programmable long life LED illumination providing repeated, accurate results
• Stable, precise and efficient ware handling

Optimized container stability at high speed
• Improved container stability for round, non-round and tapered ware due to individually adjustable servo belt handlers
• Integrated container separator releases container at conveyor speed
• Precision conveyors for smooth transfer through the inspection areas of the machine

Comprehensive vision inspection
The proprietary design of the FleXinspect BC includes 360-degree wraparound lighting and patterned lighting for 100% sidewall inspection of containers to precisely pinpoint both opaque and transparent defects. Polarized lighting is utilized for stress inspection to ensure detection of defects that may be missed by conventional methods. When equipped with a mold reading option, the FleXinspect BC mold-correlates results from all installed inspections.

FleXinspect BC inspections - B side
• Sealing surface
• Base
• Base stress
• Vision plug gauging
• Wire edge
• Vision dip/saddle
• Mold reading
  - Bottom up mold reading
  OR
  - Top down alpha code/bottom dot reading

FleXinspect BC inspections - C side
• 6 views of “opaque” sidewall
• 6 views of “transparent/cosmetic” sidewall
• 6 views of “sidewall stress”
• 6 views of “dimensional”
• Height
• Diameters
• Verticalities
• Opaque shoulder
OR
• Stress shoulder
Bucher Emhart Glass Corporation Brochure 2016 ➤ End to End technology ➤ Container Inspection ➤ Statistical sampling

Statistical sampling machines

Bucher Emhart Glass machines for statistical sampling are designed to provide frequent measurement of a variety of critical glass container dimensions through sampling, giving the glassmaker valuable feedback about the quality of the production and advance warning of any drift in the forming process.
Statistical sampling for quality assurance

Bucher Emhart Glass statistical sampling machines are designed to provide frequent measurement of a variety of critical glass container dimensions through sampling, giving the glassmaker valuable feedback about the quality of the production and advance warning of any drift in the forming process.

These machines provide important product quality information where the bottlemaker can take immediate action, thus significantly reducing the response time to possible anomalies. Furthermore, by reducing the feedback time to the hot end operator they are very effective tools in bringing the forming process to target pack-to-melt and shortening the actual job change time.

These statistical sampling solutions ensure adherence to critical quality criteria and reduce plant labor via automation while improving measurement accuracy and repeatability.
MiniLab

MiniLab is a complete turnkey solution for statistical sampling of glass containers that not only ensures adherence to critical quality criteria but also reduces plant labor via automation while improving measurements’ accuracy and repeatability.

MiniLab is designed to provide frequent measurement of a variety of critical glass container dimensions through sampling, giving the glassmaker valuable feedback about the quality of the production and advance warning of any drift in the forming process. Its flexible and scalable design lets glass manufacturers integrate multiple devices to serve specific quality control requirements.
Benefits

• Fast and accurate measurement of a variety of critical glass container dimensions
• Measures wall thickness, capacity and burst pressure
• Increases the frequency and efficiency of the time-consuming quality control tests
• Designed to withstand operation on the production floor
• Connects to a factory information system, closing the loop to a plant-wide process improvement system

A typical MiniLab integrates conveyors, gates, and control system with:

• MiniLab D Dimensional Gauging and Weight Measurement System

And/or

• MiniLab P Pressure Tester and Capacity Measurement System

MiniLab is available in several configurations that are easily installed in the lab or on the production floor:

• Off-line sampling with sets of containers loaded manually by the operator
• Automatic sampling with containers automatically diverted from the production line(s)

MiniLab conveniently interfaces with the factory information system for data gathering, archive, and further analysis with SPC tools to review historical data and production trends.

MiniLab components

MiniLab D - Dimensional Gauging and Weight Measurement System

MiniLab D brings state-of-the-art vision technology and accurate servo-controlled handling to precision measurement of glass containers. Using high-resolution cameras and application-specific optics, MiniLab D is designed to measure the dimensional characteristics of glass containers.

MiniLab D can measure containers of different sizes without requiring a job change.

MiniLab D is built to withstand tough production environments and provide years of reliable service.

MiniLab D Wall Thickness Gauge

The Wall Thickness Gauge uses a single non-contact chromatic sensor to measure the wall thickness of glass containers. A servo-controlled linear slide automatically keeps the chromatic sensor at optimal distance from the surface of round and non-round containers during the entire measurement sequence.

Once installed and calibrated, the Wall Thickness Gauge does not require any mechanical adjustment. When creating a job, the operator simply specifies the distance from the top or base of the container the different wall thickness measurements should be performed. Up to nine locations can be specified, each with different diameter and min/max limit values.

MiniLab P - Pressure Tester and Capacity Measurement System

MiniLab P measures the maximum amount of internal pressure a container can withstand (meets the ASTM C-147 standard for internal pressure testing of glass containers). In addition, MiniLab P can be equipped with the Capacity Gauge. When equipped with this option MiniLab P can accurately measure the capacity of a container at several fill heights. The system automatically compensates for variation in water temperature and flow rate.

MiniLab P can test two containers of different sizes (with same finish size) without requiring a job change. Job change parts are minimal and a complete changeover does not require any mechanical adjustment.

Constructed with a stainless steel frame, MiniLab P is built to withstand tough production environments and provide years of reliable service.
SCOUT technology

SCOUT is the new hardware and software technology that now powers the inspection equipment produced by Bucher Emhart Glass.

Developed to take the FleXinspect products to new levels of automation, performance and simplicity, the SCOUT technology platform has proven itself to be the foundation that will support all of the new features and advancements in the hollow glass inspection processes.
Revolutionary, Innovative and Practical

SCOUT provides users with a new method of navigation and operation by harnessing the power of multi touch technologies. The gesture-based interface coupled with advanced automation and intelligent learning algorithms completes the system and creates the most usable, reliable and efficient inspection technology in the market.

SCOUT saves you money

- Advanced defect classification allows factories to pack more commercially acceptable ware
- Advanced defect classification informs factories what defects are being produced for better feedback and correction
- Advanced defect classification allows all machines to operate with the same sensitivities and limits

SCOUT saves you time

- Intelligent automation in the inspection setups reduce the time required for job changes and fine tuning
- Predefined defect classes and size limits reduce the time required for job changes and fine tuning
- Simplified multi touch user interface and logical layout reduce the time required for job changes and fine tuning

SCOUT provides you security

- With critical defect alarms, factories can now react faster and reduce the potential for held and returned ware
- Using the automated setups and predefined defect classifications means all machines are set the same, reducing the potential for held and returned ware
- Providing the correct information to the forming department ensures that the process is maintained reducing the potential for held and returned ware

FleXinspect machine upgrades

- All FleXinspect products can be equipped with the SCOUT technology
- Upgrades are performed in place and are completed within a few hours
- All features and benefits including new developments for the End to End will be available as they are released

Veritas machine upgrades

- Veritas iB and Veritas iC machines can be upgraded to SCOUT technology
- All inspection features and benefits from the FleXinspect machine family are included in the upgrade
- All features and benefits including new developments for the End to End will be available as they are released
End to End support

The glass plant of the future is arriving today as we develop integrated equipment that reads, analyzes, and responds to data automatically. With this technology comes a need for expert technical support and this is a key element of End to End. Bucher Emhart Glass teams are here to help and advise at every stage, from project planning, through specification, installation, and optimization of our customers’ glassmaking machines.

Our End to End offer is very simple: one plant, one partner. Working with a single supplier who understands every area of the plant gives glassmakers the best return on their investments in machinery and personnel.
Equipment maintenance

Good maintenance practices are a wise investment in productivity as they ensure high levels of performance and minimize unplanned downtime.

Bucher Emhart Glass offers a range of services to keep our customers’ machines in top operating condition:

• Customer Contact Parts local support
• Complete selection of spare parts for refractories, hot end and inspection machines
• Web Shop online shop for parts orders, status and tracking
• Field service and repair
• Service agreements
• Equipment audits
• Maintenance and repair kits
Spare parts and S-Class supply

Bucher Emhart Glass maintains a portfolio of around 150,000 parts for hot end equipment, inspection machines, and refractories. Glass plants can rely on this central stock for most requirements and achieve significant savings compared to the cost of maintaining a supply at the plant level. Distribution centers are located in Luxembourg and the US (Elmira, NY and Owensville, MO).

Quality parts are readily available:

- Our S-Class program stocks 5,000 of the most frequently requested hot end and inspection machine parts for shipment within hours of order
- Refractory S-Class parts are tailor-made to specifications and shipped within eight working days
- Parts are manufactured to precision standards at Bucher Emhart Glass in Örebro, Sweden
- Top quality parts ensure optimum operating life

In addition, Bucher Emhart Glass offers inventory management and optimization and consumption analysis, to help customers manage their maintenance budgets.

Expert assistance for service and repairs

Our global base of over 50 professional service engineers offer the specialized skills in hot end and inspection to assist our customers and resolve problems. They can also perform equipment audits and make recommendations on maintenance, parts and repair.
Web Shop/Customer Contact Parts CCP

The cooperation between Bucher Emhart Glass and our customers depends greatly on efficient communications. In each sales location, the Customer Contact Parts department is the first contact for the daily parts-related business. Offering contact in the local time zone and in the local languages is an important service to support our customers in their 24 h, 7 day operations.

The Web Shop is a second channel for ordering parts, as well as for tracking the order status. It provides various search functions in our comprehensive parts portfolio, for example, search by item number, product category and specific products such as “555 feeder.” A powerful new feature is the ability to search by attributes describing the parts in detail, for example, “funnel arm – 5” DG – quick change – offset alignment – 3½ funnel diameter.”

24/7 Emergency service

For production critical emergencies, 24/7 Emergency assistance offers phone assistance by experienced service engineers around the clock. If necessary, we can dispatch a service engineer for urgent on-site service.

FlexIS Remote Service

Remote Service gives our customers ready access via secure internet to experienced experts in equipment operation, troubleshooting, and maintenance. This service can reduce operating costs, downtime and lost production by supplying immediate assistance and problem resolution.

Maintenance and repair kits

For customers wanting to refurbish their equipment in-house, we offer a range of maintenance and repair kits tailored to virtually all our current and legacy machines. Each kit contains all the parts needed to restore the machine to full working order, based on two levels of refurbishment:

- Maintenance kits are for checking and cleaning a mechanism after a moderate period of use
- Repair kits are for a complete refurbishment after several years of service

Maintenance and repair kits are ideal for everyone involved: workshop personnel, inventory and purchasing. They reduce the cost of maintenance and ensure that every required part is available and easy to find in a single box. As each kit has a single item number, our customers also save time as there is no need to work through drawings and identify individual items one by one.
Production performance

The success of a glassmaking operation is dependent on many factors including the plant’s design, the efficiency and reliability of the production machines, the skill of the operators, and the maintenance of the line. Another key factor in the productivity of a glass plant is the plant’s relationship with the glass machinery supplier who can provide valuable support and expertise.

This is where the people of Bucher Emhart Glass shine. Experienced project managers offer valuable insight for the development of a new glass plant location or buildout of an existing factory, including project specifications, plant layouts, and production plans. Dedicated, highly skilled engineers offer support from installation and commissioning through 24 hour emergency assistance and remote service. Our production specialists draw on their broad experience to help customers identify and solve issues with performance or quality. Bucher Emhart Glass experts carry out on-site machine and performance audits leading to tailored improvement programs that are focused on equipment updates and/or training.

Bucher Emhart Glass’ integrated program of service and support is tailored to each customer’s needs to ensure their glassmaking success...end to end.
Greenfield Projects

Bucher Emhart Glass has developed the internal capabilities to manage the development of a new glass container manufacturing facility from concept to final commissioning and transfer to the customer. Our project management encompasses understanding the project specifications, developing plant layouts, and formulating production plans to meet your vision for the new facility. We develop solutions that optimise available technology to meet the requirements of each customer.

The development of the project budget includes all sub-sections of the full project scope and you are presented with a detailed breakdown of costs.

The full scope of the Greenfield Project includes:
- Civil, structural and building requirements
- Design, installation and commissioning of the key services for the new facility i.e., compressed air, electrical reticulation, cooling water etc.
- Full design, installation and commissioning of the production layout from incoming raw materials, glass melting, bottle forming, annealing, inspection, packaging and final delivery to the warehouse or filling hall
- Bucher Emhart Glass is the overall project manager for the Greenfield Project and your direct contact. Bucher Emhart Glass will partner with the leaders in the glass container industry who will provide their expertise and technology to complete the full production facility.
- Full commissioning of the new glass container plant which will include all services for the new facility plus the full production line commissioning.

The sustainability of the new facility will come through well-trained employees and for this reason a strong focus is placed on training and preparing the new employees for the task of running the new glass container facility. During the project development a major emphasis will be placed on training to ensure that going forward the human resources have the capabilities to efficiently run the new facility.
Brownfield Projects

The Brownfield Project will take place within the existing factory boundary and the full scope of the project is dependent on your individual requirements for the specific production footprint.

Bucher Emhart Glass has the capability to manage the full project scope as per the customer’s requirements. The Brownfield Project reviews the existing footprint against the future market demands and this may require a review of installed melting capacity or technology, increased throughput or flexibility from the bottle forming footprint, plus increased quality focus or new demands from the final customer.

The Brownfield Project may include a major review of buildings and structures due to expansion opportunities plus an upgrade or new services supporting the production layout.

Bucher Emhart Glass’ team will work with you to develop the full project scope, develop the project budgets and be accountable for the project construction, installation, commissioning and full glass production.
Upgrades and repair services

The highly aggressive conditions of a glass plant inevitably lead to wear on even the best-designed mechanical and electronic components. In some cases this damage can optimally be fixed by replacing the item with the latest version from the original supplier. In other cases, it makes economic and operating sense to overhaul the assembly, and restore it to as-new condition.

Bucher Emhart Glass offers repair services for a wide selection of equipment, ranging from entire gob distributors to components of the control system, to cold end inspection systems.

There are two distinctive approaches for repairs:

- On-site repairs, where an experienced crew performs the agreed repair in your plant. As the equipment does not have to leave its position, the de-installing and re-installing of the equipment is not required and the shortest possible downtime is achieved.

- Off-site repairs, in cases where the equipment must change its position and/or in cases the repair is combined with a major upgrade. Repair/upgrade services are furnished in the workshop of one of our repair partners, preferably at Ergon Meccanica in Dego, Italy.
Bucher Emhart Glass is able to document and optimise line operation throughout the production process with the technology supplied in both the glass container manufacturing and the inspection equipment. Our technical experts can work with you to enhance the production of a specific line or an entire factory. The line optimisation program requires Bucher Emhart Glass IS machines and preferably Bucher Emhart Glass inspection technology where the complete production line can be reviewed.

Once you explain the problems or the gaps in performance, we use this key information, along with an audit of the specific production line or facility from standard documents, to pinpoint the issues and/or problems that are affecting performance.

From this information an action plan will be developed and confirmed. The resolution activities will be audited on a regular basis with a formal review.
Bucher Emhart Glass’ fully qualified training team helps customers worldwide get the best out of Bucher Emhart Glass forming and inspection equipment. To be closer to our customers, training centers are located in various regions in the Americas, Europe and Asia.
Container forming equipment training

Training centers for forming equipment and controls are located next to Bucher Emhart Glass Manufacturing Sites in Sundsvall (Sweden) and Johor Bahru (Malaysia) to give our customers additional insight in our main IS Machine Manufacturing Centers. The proximity to manufacturing sites allows the training centers to be fully equipped with the latest equipment innovations.

Students will gain a complete understanding of the mechanical aspects of forming machines, control systems and production processes of Bucher Emhart Glass hot end products. Courses are carried out in classrooms and with various hands-on exercises to approach a real production setup.

Current modules:
• Machine types IS, AIS, NIS and BIS and FlexIS control systems
• Forming processes NNPB, BB, PB and Closed Loop
• Mold Design & Mechanical Interface

Depending on customer requirements, training modules are flexible in accommodating entry-, intermediate- or advanced-level students. Moreover, customers can register for application-specific or open courses at the training centers. On-site training is also available upon request.

Inspection competence centers

Bucher Emhart Glass Inspection Competence Centers are located in St. Petersburg FL (USA), Johor Bahru (Malaysia) and a new center will be available in Leipzig (Germany) by the end of 2016. The training centers are equipped with the latest container inspection and laboratory equipment. Courses offer a balanced mix of theory and practice, including container testing. The modules are tailored to your specific inspection needs for the following product range:
• FleXinspect T, BC and M
• Veritas iB, iC and iM
• Statistical Sampling - MiniLab D and P

Your Bucher Emhart Glass sales account representative would be very pleased to further advise you.
About us

Bucher Emhart Glass is a company with a rich heritage and a tradition of excellence that we are proud to continue today. Our founders laid the foundations for automation in glass manufacturing, setting us on a course of market-leading innovations that has lasted for almost a century. We created the industry-standard IS machine and have repeatedly delivered game-changing innovations in gob forming, container forming, automation, control and inspection.

Growing strategically through new branches, alliances and acquisitions, we have developed into a true global enterprise with the power to serve customers around the world with speed, responsiveness and understanding. Our global footprint provides the very best in established expertise, economical manufacturing and hands-on client support.

Our work is underpinned by a profound and unshakeable belief in glass as a packaging material. And we back up that belief with investment in R&D. Driven by our clients’ priorities, we continue to work towards new milestones in production speed, product quality, testing precision and glass container strength. The ideas we have today will deliver the improvements of tomorrow.
Our progress

Bucher Emhart Glass began 100 years ago with the quest to improve gob forming technology. A century later, we have become a multinational industry leader serving the glass industry around the world. This is our story.


1912 Four more businessmen join to form the Hartford-Fairmont Company, which develops the first glass gob shearing and feeding device, the forerunner of modern glass container machines.

1913 Hartford-Fairmont introduces the first plunger feeder, laying the foundations for the automation of the glass container industry.

1922 Hartford-Fairmont joins with the Empire Machine Company to form Hartford-Empire.

1924 Glass-making pioneer Henry W. Ingle creates the first Individual Section - IS machine, a new automation standard that still forms the core of our product range.

1925 The first four IS machines go into operation, heralding the dawn of automatic container manufacturing.

1932 Hartford-Empire introduces a continuously rotating pastemold machine, allowing glassmakers to manufacture seamless tableware.

1940 The first double-gob equipment is introduced.

1945 The HE-74 check inspector is introduced, and inspection research is made a priority.

1951 A new name, Emhart Manufacturing Company, reflects an ambition to explore new directions.


1954 The first six-section IS machine is introduced, along with the HE-127 automatic finish check inspector.

1968 The first triple-gob machine is introduced.

1970 The first eight-section double-gob machine hits the market, delivering a 30% improvement in productivity.

1972 A ten-section double-gob machine with modular sections is introduced.

1974 Emhart Glass ships its 1000th IS machine and launches its innovative 516 electronic control system.

1977 The first Advanced IS machine - AIS is installed.

1980 Emhart Glass' first total machine AlIDA (Automatic Inspection Defect Analysis).
1982  Emhart Glass acquires Powers Manufacturing Inc. based in Elmira, NY. Powers had established an international reputation for quality cold end inspection equipment, and its facility was ideally suited for producing Emhart Glass’ Total Inspection Machines TIM.

1985  The VertiFlow mold cooling system is introduced, almost doubling production speed and enhancing product quality and strength.

1986  Emhart Glass introduces its FlexLine system, allowing glass producers to make rapid changes to the number of IS sections being used.

1989  Emhart Glass is acquired by the Black & Decker Corporation.

1990  Emhart Glass launches innovations including servo-electric parallel shears, an improved 555 servoelectric feeder system, the T600 LAN forming control system, the 560 servoelectric pusher and pocket air fingers for pusher mechanisms.

1998  Emhart Glass is acquired by Bucher Industries of Niederweningen, Switzerland.

2000  The next generation IS machine NIS is introduced, delivering up to 4.2% higher cycle rates, reducing workout times by half and increasing mold life by up to 20%.

2005  NIS becomes available in a quad-gob configuration.

2007  Emhart Glass completes the acquisition of ICS Inex Inspection Systems. Established in 1855, Inex created Optitron, the first inspection machine for refillable bottles in 1955, and subsequently built a strong position in inspection devices for the pharmaceutical, food and general packaging industries.

2008  Emhart Glass opens a completely new, state-of-the-art production centre at Johor Bahru, Malaysia. The factory is devoted to the assembly of new IS machines, cross conveyors, and the fabrication of welded parts, with facilities for warehousing, training, and demonstrations.

2010  FlexInspect, a comprehensive and modular inspection technology, is launched.

2011  Emhart Glass finalizes a joint venture with Shandong Sanjin Glass Machinery Co. of China. Together, the companies have a comprehensive product portfolio and are ideally placed to serve the fast-developing glass industry in China.

2012  BIS, a highly flexible new configuration of the industry-standard IS technology, is introduced.

2012  First hard glass line is installed. ProLab, a hot end measurement system and FlexRadar are announced.

2013  Emhart Glass becomes Bucher Emhart Glass to emphasize our connection with the Bucher Group, an industrial leader with a clear vision for the future.

2016  End to End launch.
Research and development

From our beginnings more than 100 years ago as the inventors of IS glass forming technology, our success has been based on innovation. Today, we continue to search out new ideas that will shape both our future and that of the entire glass industry.

We aim for innovations that will help our customers thrive in today’s commercial and economic environment. That means helping them improve operator safety, automation, process control, productivity, and flexibility. As partners to an industry where environmental concerns are paramount, we also focus on areas such as energy economy, lower cost of ownership and reducing container weight to save material, transport and energy.
Container forming  Our forming R&D team spans six locations across three continents, from Sweden, Italy, and Switzerland to the USA and Malaysia. Our engineers focus on three key areas: automation, productivity, and flexibility.

In automation, our aim is to make the glass-forming process more stable and repeatable, and less dependent on the skills of expert operators. Results of our efforts include closed loop controls for plunger up motion and blank cooling, which use machine readings to optimize production automatically in real time, and the FlexRadar hot end inspection system.

Productivity is about making the manufacturing process faster and more efficient, to unlock improvements and savings for glass plants. Finally, innovations in flexibility help producers switch between different containers more quickly, or produce different types of containers at the same time.

Inspection  No other firm offers the same depth of inspection experience combined with a proven commitment to product development. Our inspection research facility in St. Petersburg, FL (USA) houses a dedicated team of engineers specializing in mechanical design, software development, optics, and application engineering for glass container inspection. The next generation SCOUT hardware and software technology developed by Bucher Emhart Glass delivers unmatched precision and reliability in container inspection.

Research center  The team at our research center in Windsor, CT (USA) is comprised of over 50 professionals from all over the world. Together they work to improve our existing products and develop new ones.

The state-of-the-art facility includes a complete production line for forming and inspecting glass containers, allowing engineers to test new ideas in real-world conditions, gather incredibly detailed production data, and develop valuable time-saving solutions such as our software for automatic multi-gob weight setup.

Customers can also visit the research center for help with specific issues around quality, efficiency, speed, flexibility, safety, or energy savings.
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