Hollow Glass
General Catalogue

EN

Hollow Glass Technology

we • glass

we • glass

We know glass, we love glass

As a global leader in hollow glass and flat glass processing technology, we have been helping to shape one of the most beautiful and useful materials in the world for over 60 years. Its unique qualities, combined with the passion for technology and innovation, guide us in seeking for newer and more effective solutions to improve and expand its use.

BOTTERO

Process Addicted

TECHNOLOGY | AUTOMATION | SERVICE

Gob forming and delivery

Mechanical feeder

Servo shear mechanism

Servo feeder mechanism

Electronic gob distributor

Coaxial delivery system

Roller coaster system

Forming machine

E-IS Machine

IS Machine

Pneumatic mechanism

E-MOC technology

Pneumatic plunger mechanism

HSC twist mechanism

Neckring 300 series

Forced Convection Cooling Mechanism

Servo technology

Forming pack

Servo invert

Servo takeout 2.0

Universal backlash free takeout arm

Ware handling

700 Electronic pusher module - Twin axis

700 Electronic pusher module

Machine conveyor

Control system

700 Electronic forming control module

700 Flexible motor control module

HHT 700 Hand Held Terminal

Automation

Forming engineering

Customer service

Remote assistance

Training

Spare parts

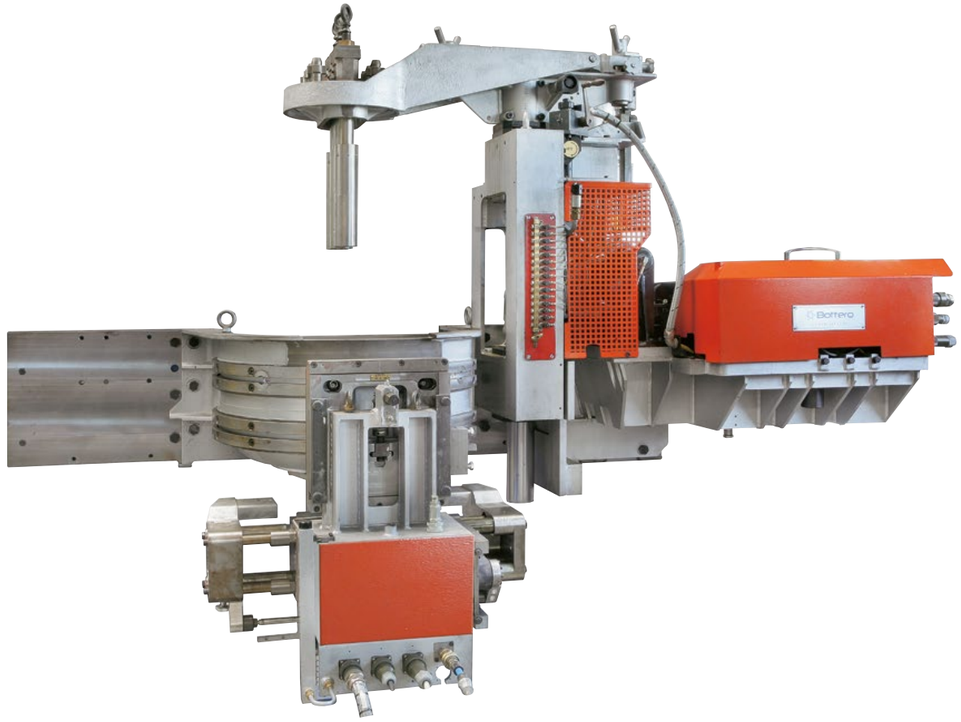
Gob forming and delivery

Mechanical feeder

- Spouts available: 281 Standard and Deep, 703, 715 in single double or triple gob
- Maximum flexibility of shearing angle: standard from 30° right to 90° left, symmetric from 30° left to 90° right
- Improved mechanical feeder: bearing type 7” stroke plunger linkage, oil bath shear mechanism, pneumatic spring
- Stand alone tube rotation inverter control (RTC) and electrical tube height adjustment (THD) are available.)

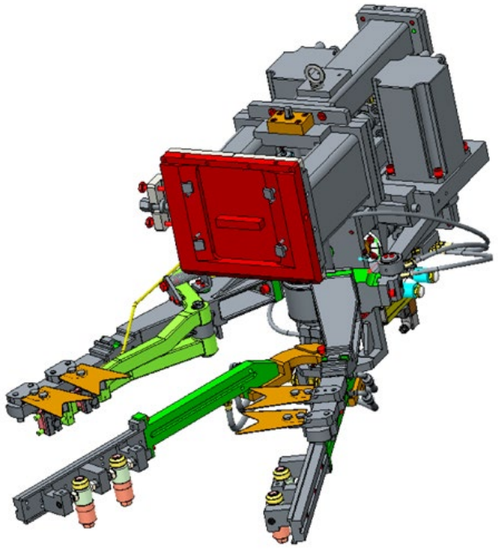
Servo feeder mechanism

- Easy replacement of existing mechanical feeders for 281, 703 and 715 spouts
- The servo motor ensures consistent and repeatable operation up to 240 cuts/minvute
- Oil bath gearbox granting longer life of mechanical components
- Multiple weight operation for sampling or for different gob weight production.



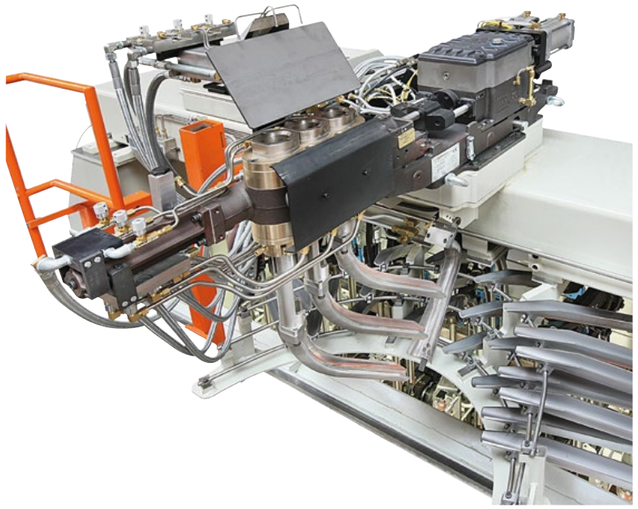
Servo shear mechanism

- Dual motor drive
- Arcuate cut
- Transmission with crank and connecting rod
- Independent movement for each arm
- Max frequency: 220 cuts/min
- Available center distances:
  - SG
  - DG.3"
  - DG.4-3/8"
  - DG.5"
  - TG.3"
  - TG.4-3/8"



Electronic gob distributor

- Retrofittable on any existing IS Machine
- Fully programmable firing order
- Dwell time and scoop positioning adjustable by Hand Held Terminal
- Automatic homing in case of power failure.



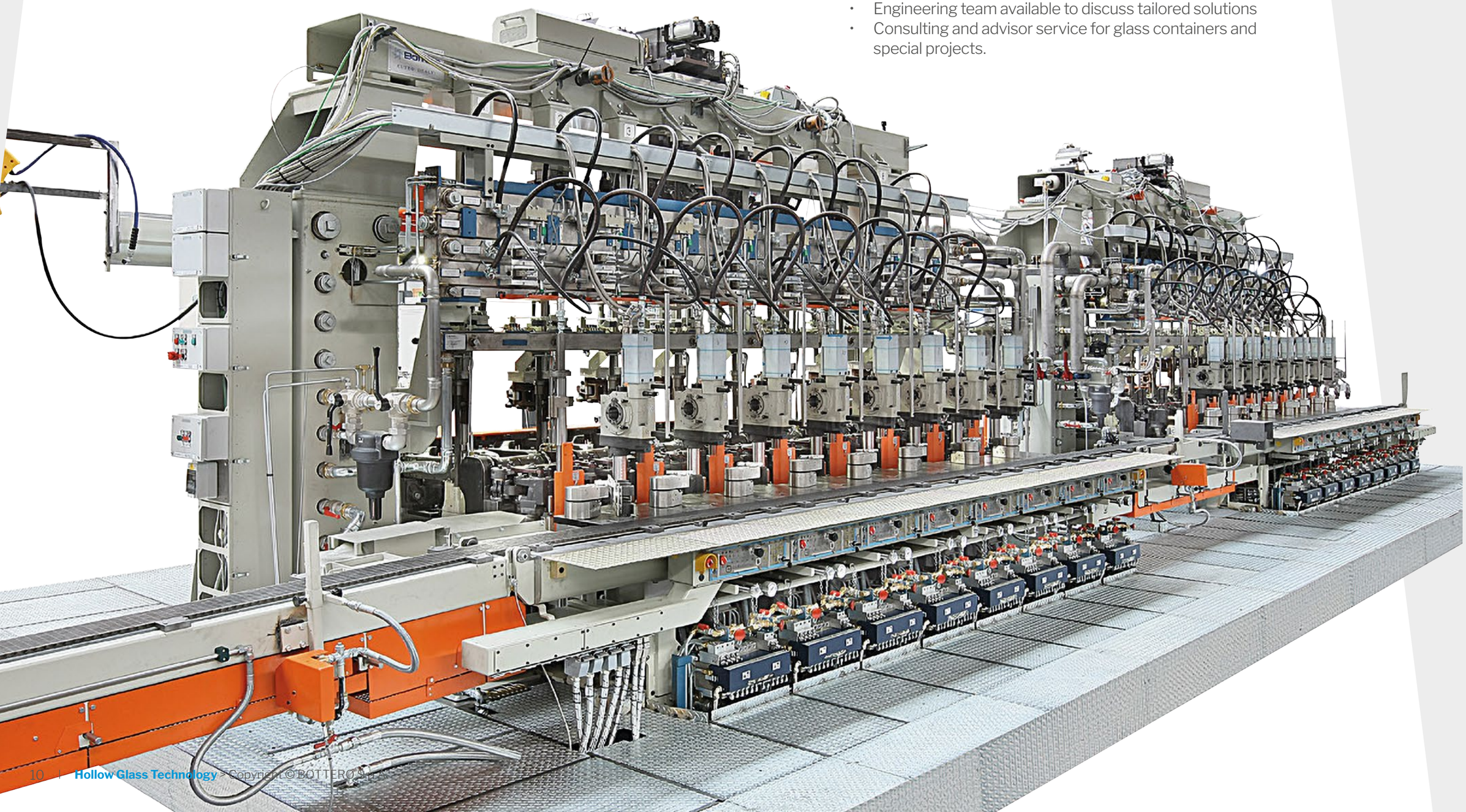
Coaxial delivery system

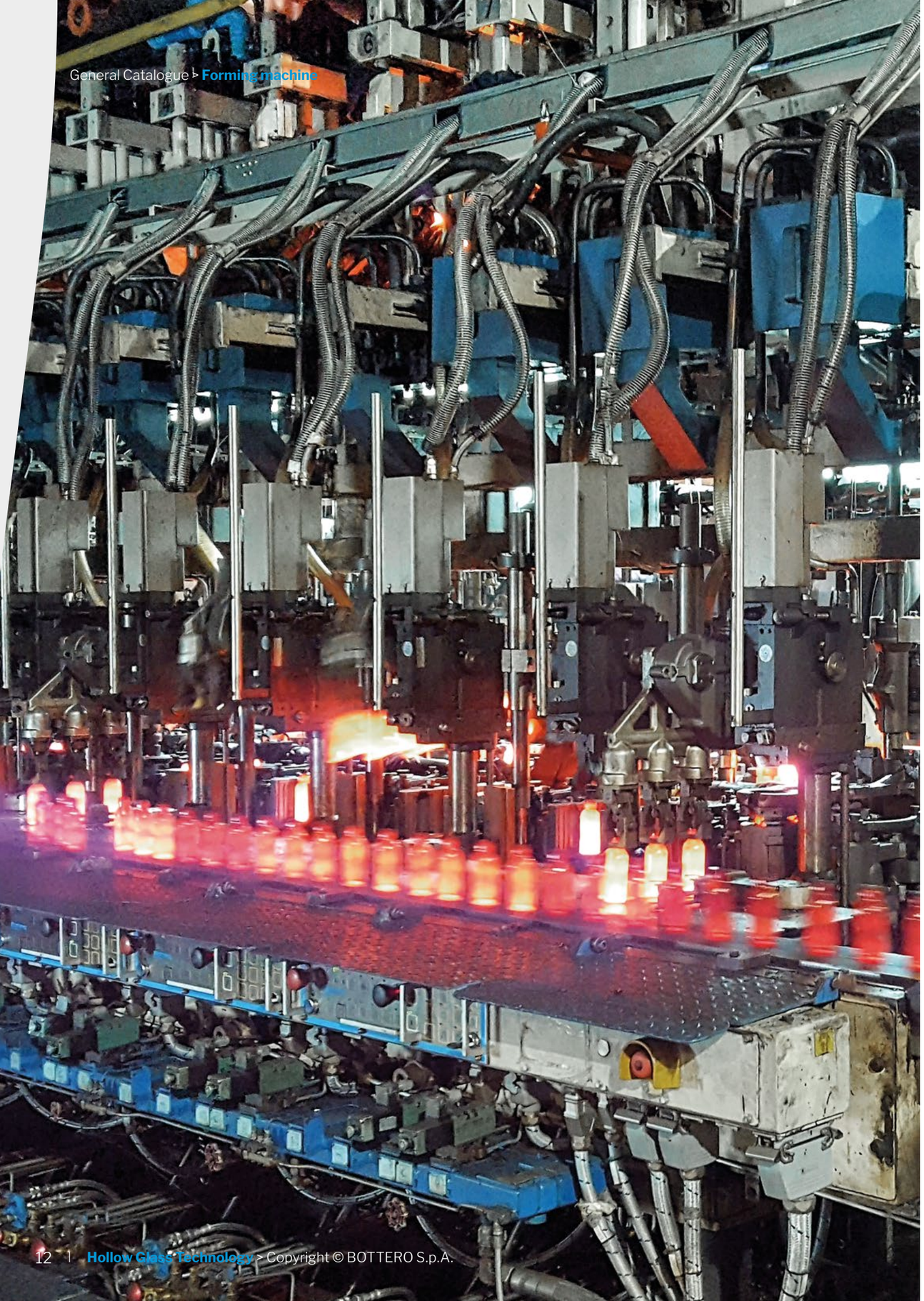
- Consistent trough deflector alignment ensures effective gob loading
- Complete range of trough and deflector sizes are available
- Available for single, double and triple gob
- Delivery aligned with laser fixture to ensure correct gob loading
- into the blanks.

Forming machine

E-IS / IS Machine

- Available from 2 to 20 sections configuration
- Blow & Blow, Press & Blow and NNPB process
- Variable equipment and accessories to cover any production range for single, double and triple gob
- Servo mechanisms available as option
- Advanced forming technology through proportional valves.
- Engineering team available to discuss tailored solutions
- Consulting and advisor service for glass containers and special projects.





E-IS Machine

- Available from 2 to 20 sections configuration.
- Blow & Blow, Press & Blow and NNPB processes.
- Variable equipment and accessories to cover any production range for single, double and triple gob.
- Servo mechanisms available as option.
- E-MOC mechanism is mounted on the top of the section frame.
- E-MOC is available in all traditional center distances as well as the newly developed TG 3-1/2".
- The cooling air with E-MOC improves the temperature balance between each half of the mould.
- The pantograph E-MOC movement is designed to grant smooth mould movement thus reduceing wear and damage to the equipment.
- Advanced forming technology through proportional valves.
- Engineering team available to discuss tailored solutions.
- Consulting and advisor service for glass containers and special projects.

MACHINE WARE DIMENSION LIMITS [MM]			MACHINE CENTER DISTANCE						
SECTION BOX			4 1/4"		5"		5 1/2"	6 1/4"	
CENTER DISTANCE			DG 4-1/4"	TG 3"	DG 5"	TG 3-1/2"	DG 5-1/2"	DG 6-1/4"	TG 4-1/4"
BB PB NNPB	Max bottle diameter	Radial c. w/o Vacuum	75	56	105	58	112	129	75
		Axial c. w/o Vacuum	75	51	90	52	102	116	75
		With Vacuum	72	40	89	52	96	113	72
	Max bottom diameter		79	53	92	60	104	120	79
BB	Max H.U.F		312	294	360	281	357	370	320
	Min H.U.F		39	35	31	33	30	40	27
	Max Finish diameter		48	30	48	30	48	48	48
NNPB	38mm Finish	Max H.U.F	293	275	314	264	326	350	300
		Min H.U.F	23	22	23	23 (50mm)	30	30	20
PB	70mm Finish	Max H.U.F	293	-	314	-	326	350	300
		Min H.U.F	23	-	23	-	30	30	20
	83mm Finish	Max H.U.F	-	-	307	-	297	316	-
		Min H.U.F	-	-	23	-	30	29	-
	90mm Finish	Max H.U.F	-	-	-	-	297	316	-
		Min H.U.F	-	-	-	-	30	29	-

E-MOC BLANK AND BLOW MOLD								
Single fan [Nm3/min/sec]	PRESSURE [bar]	DG 4-1/4"	TG 3"	DG 5"	TG 3-1/2"	DG 5-1/2"	DG 6-1/4"	TG 4-1/4"
Section box + FCC TTS	0,10	32	28	36	32	44	48	44
Ranking		1	1	1	1	1	1	1
Suggestested number of fans		1	1	1	1	1	1	1

RADIAL BLANK - VERTIFLOW BLOW MOLD								
Single fan [Nm3/min/sec]	PRESSURE [bar]	DG 4-1/4"	TG 3"	DG 5"	TG 3-1/2"	DG 5-1/2"	DG 6-1/4"	TG 4-1/4"
Section box + FCC TTS	0,12	40	35	45	40	55	60	55
Ranking		1	1	1	1	2	2	2
Suggestested number of fans		1	1	1	1	2	2	2

RADIAL BLANK - VERTIFLOW BLOW MOLD								
Double fan [Nm3/min/sec]	PRESSURE [bar]	DG 4-1/4"	TG 3"	DG 5"	TG 3-1/2"	DG 5-1/2"	DG 6-1/4"	TG 4-1/4"
Section box	0,10	25	25	30	30	35	40	40
FCC ttb	0,15	18	18	20	20	25	25	25
Ranking		3	3	2	2	1	1	1
Suggestested number of fans		1	1	1	1	2	2	2

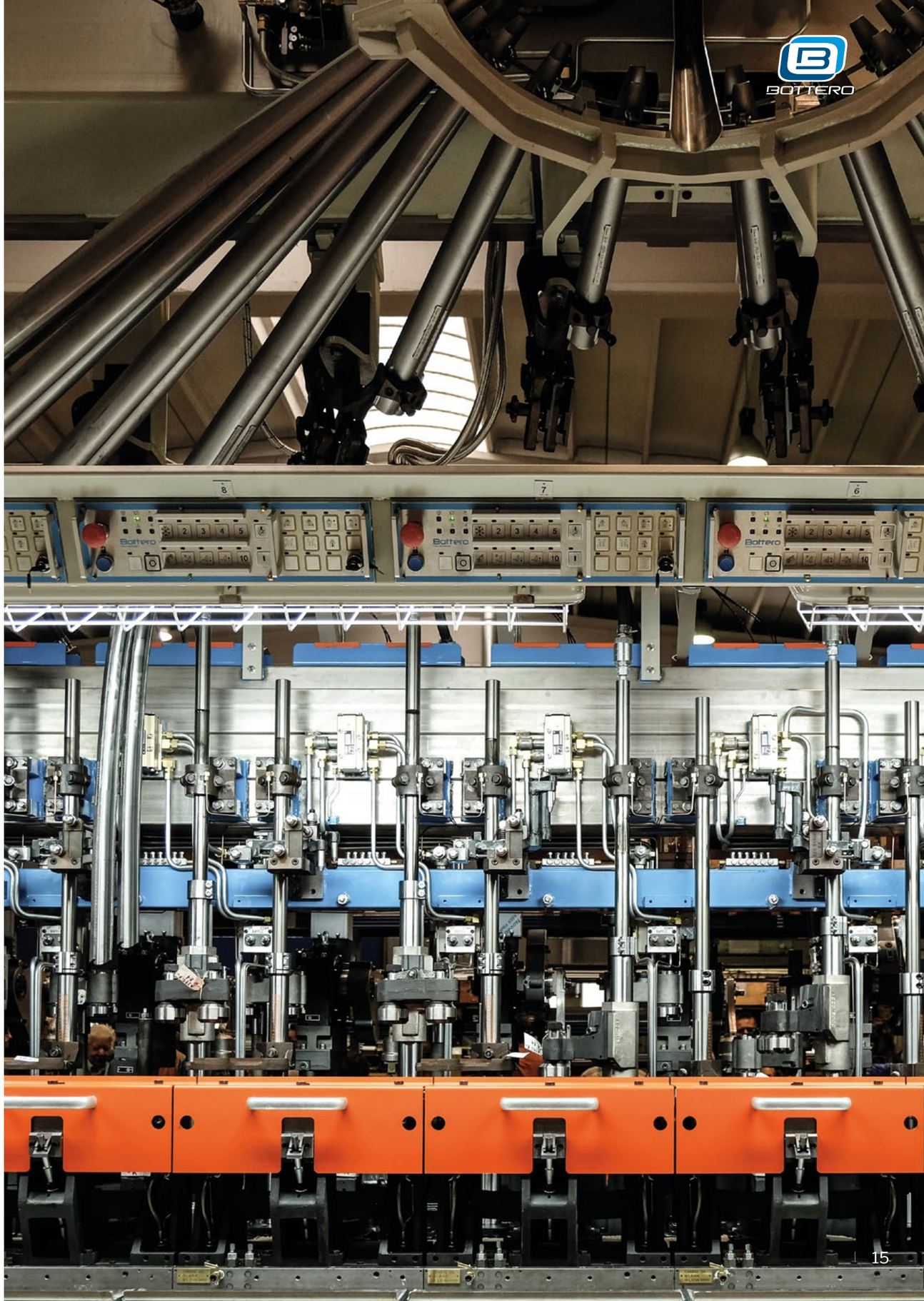
IS Machine

MACHINE WARE DIMENSION LIMITS [MM]			MACHINE CENTER DISTANCE										
SECTION BOX			4-1/4"			5"			5-1/2"		6-1/4"		
CENTER DISTANCE			SG 4-1/4"	DG 4-1/4"	TG 3"	SG 5"	DG 5"	TG 3-5/16"	SG 5-1/2"	DG 5-1/2"	SG 6-1/4"	DG 6-1/4"	TG 4-1/4"
"BB NNPB PB"	Max bottle diameter	Radial c. w/o Vacuum	178	75	56	178	102	58	178	112	178	129	75
		Axial c. w/o Vacuum	174	75	51	174	97	53	174	112	174	122	75
		With Vacuum	172	72	40	172	89	48	172	96	172	113	72
	Max bottom diameter		178	85	53	178	102	58	178	112	178	129	85
BB	Max H.U.F		328	304	291	314	324	287	344	338	314	341	309
	Min H.U.F		69	59	58	54	87	55	80	79	83	77	106
	Max Finish diameter		48	48	30	48	48	30	48	48	48	48	48
NNPB	38mm Finish	Max H.U.F	272	285	271	252	290	253	299	293	263	302	290
		Min H.U.F	78	40	45	53	68	37	80	62	78	57	87
PB	70mm Finish	Max H.U.F	272	285	-	252	290	-	299	293	267	302	282
		Min H.U.F	78	40	-	53	68	-	80	62	78	57	87
	83mm Finish	Max H.U.F	260	247	-	252	274	-	290	285	257	285	-
		Min H.U.F	78	40	-	-	62	-	80	62	-	57	-
	90mm Finish	Max H.U.F	260	-	-	252	-	-	290	275	257	277	-
		Min H.U.F	78	-	-	-	-	-	86	62	-	57	-
	120mm Finish	Max H.U.F	260	-	-	252	-	-	290	-	257	-	-
		Min H.U.F	78	-	-	-	-	-	86	-	-	-	-

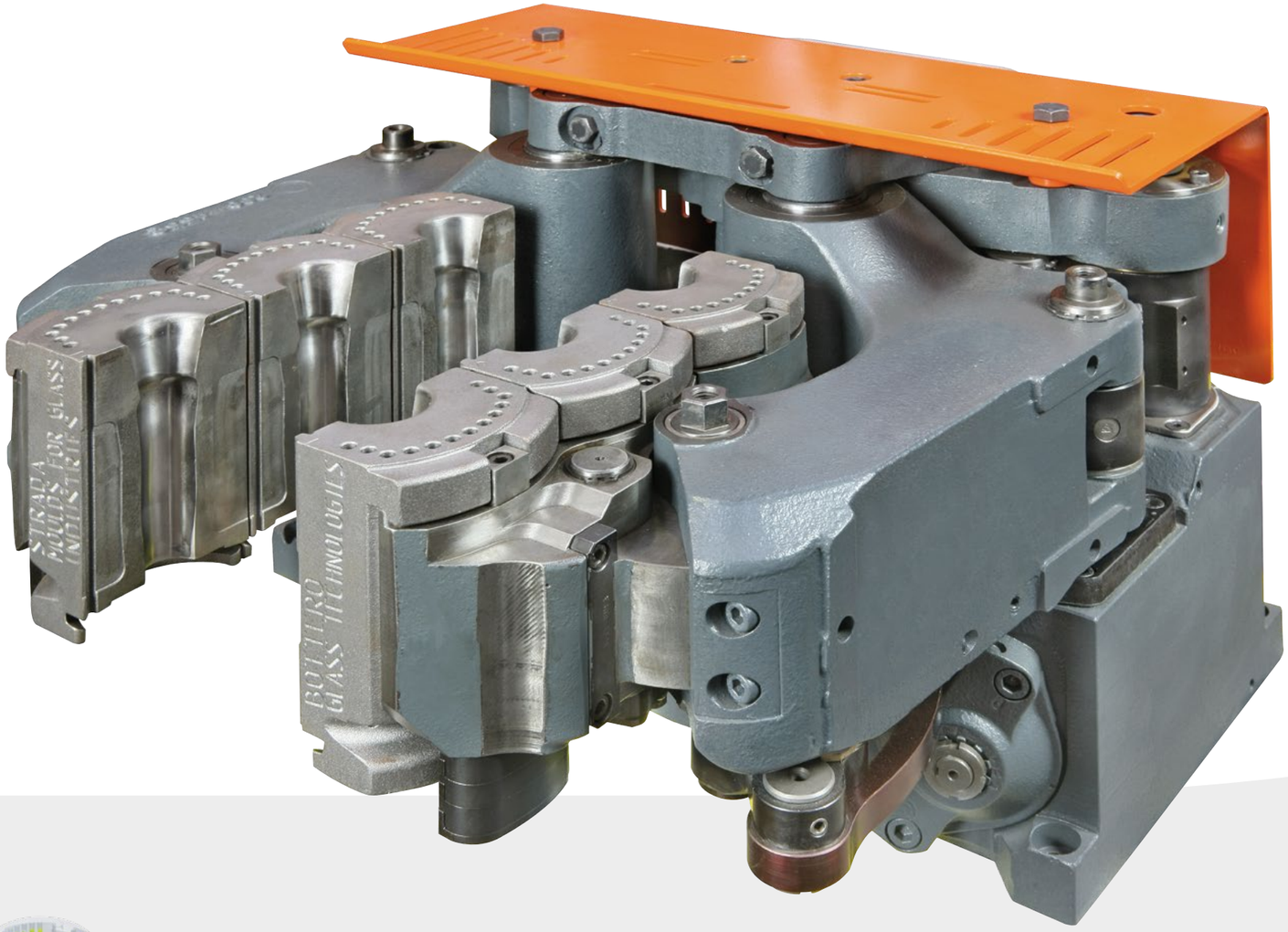
The above minimum/maximum limits are valid if the followings are observed:
1) A57 plunger mechanism.
2) Standard section frame (without upper plate).
3) Standard mold equipment illustrated in the Mold Design Books.
4) 47.6mm BB neck ring height; 66.7mm NNPB/PB neck ring height.
5) 20mm bottom plate flange height

BLANK STACK COOLING - BLOW VERTIFLOW									
	PRESSURE [bar]	DG 4-1/4"	TG 3"	DG 5"	TG 3-5/16"		DG 5-1/2"	DG 6-1/4"	TG 4-1/4"
		1	2	3	4	5	6	7	8
Single fan [Nm3/min/sec]									
Section box + FCC TTS	0,12	55	45	60	50		70	75	70
Ranking		1	1	2	2		3	3	3
Suggestested number of fans		1	1	2	2		2	2	2

BLANK STACK COOLING - BLOW VERTIFLOW								
Double fan [Nm3/min/sec]	PRESSURE [bar]	DG 4-1/4"	TG 3"	DG 5"	TG 3-5/16"	DG 5-1/2"	DG 6-1/4"	TG 4-1/4"
Section box	0,10	40	35	45	40	55	60	55
FCC ttb	0,15	18	18	20	20	25	25	25
Ranking		3	3	1	1	1	1	1
Suggestested number of fans		1	1	2	2	2	2	2

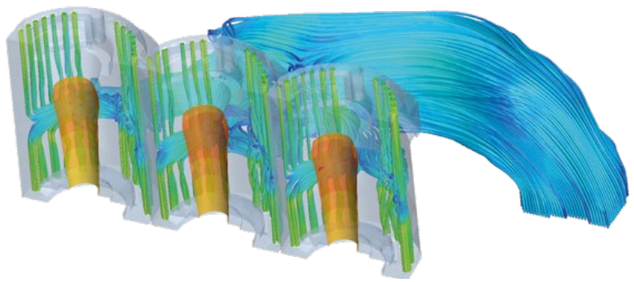


Pneumatic mechanism



E-MOC technology

- Top mounted design improves the access to the mechanism.
- 360° integrated cooling at blank and blow side allows high airflows.
- E-MOC is designed to be retrofitted on existing machines.
- The pantograph E-MOC movement is designed to grant smooth mould movement, thus reducing wear and damage to the equipment.

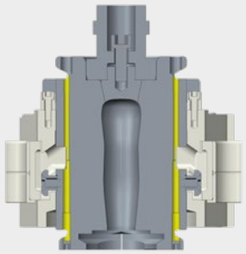


Conjugate heat transfer analysis: cooling specifications, mold temperature, thermal transfer and glass behaviour are all inside the simulation.

E-MOC Cooling advantages:
Blank cooling

E-MOC axial cooling

- **Efficient** Cooling from mold center.
- **Better** horizontal temperature homogeneity.
- **Easy** vertical temperature profile adjustment with PLUGS.
- **Full 360°** cooling time.
- **Low** fan pressure and mass flow requirement.
- **Indipendent** blank and neck ring cooling.

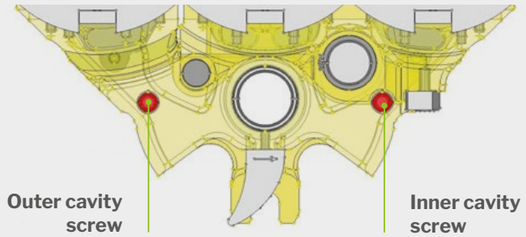


CFD airflow velocity controls mold temperature profile

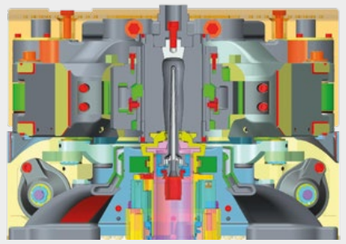
The cooling **Adjustment:**

- Top & Bottom **number** of holes.
- The **diameter** of holes.
- The circumferential **distribution.**

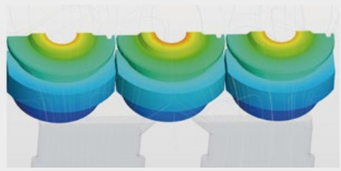
Indipendent cavity regulation



E-MOC neck ring cooling

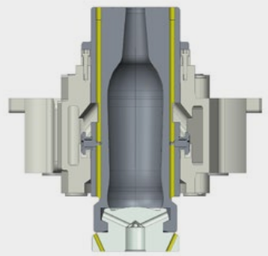


ADJUSTABLE for all invert position



ADJUSTABLE for all invert position

E-MOC neck ring cooling



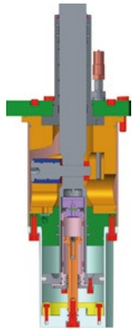
- **EFFICIENT** Cooling from mold center
- **BETTER** horizontal temperature homogeneity
- **EASY** vertical temperature profile adjustment with PLUGS
- **FULL 360°** cooling time
- **LOW** fan pressure requirement
- **INDIPENDENT** mold and bottom plate cooling
- **NO** air **LEAKAGE** inside mold cavity

Pneumatic plunger mechanism

- Floating plunger concept
- Low Friction Design
- High Cooling Capacity
- Lightweight Design
- Sensor for Dynamic Forming System

HSC twist mechanism

- Speed control with hydraulic cartridge (hydraulic cartridge inside piston rod)
- Cam – Cylinder positions are inverted achieving vibration reduction and possibility of oil level check with rod
- Absence of hydraulic circuit and pump
- Absence of remote controls



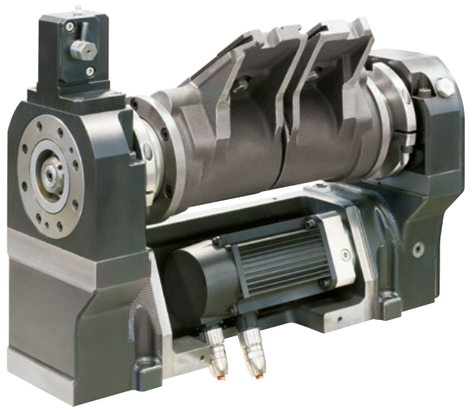
Neckring 300 series

- Air ducts inside the mechanism have been optimized to achieve balanced motion of the arms
- The mechanism has been redesigned to reduce the weight masses and improve the performance
- The mechanism can be overhauled and re-used for more machine campaigns
- The backlash free neckring assembly is also available as option with needle bearings at shaft ends.

Forced Convection Cooling Mechanism

- Operations not affected by Cooling Pressure Level
- The internal vacuum piping can be removed for faster maintenance and easy conversion
- Cooling air flow increased by 20%
- Retrofittable to any existing machine. No modification to section frame required.

Servo technology



Servo invert

- The movement profiles can be programmed to fit each job requirement and can be extended from one section across all the machine.
- Can be retrofitted to existing machines without any alteration to the section boxes.
- The invert and revert movement can be adjusted through the HHT or PC during production.
- High speed and accurate parison transfer granted by precise and repeatable motion.

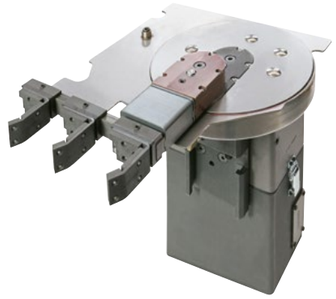
Servo-takeout 2.0

- The servo-takeout ramp UP and DOWN speed is fully adjustable to ensure optimum production results
- Stable transfer of ware onto the dead plate garanted by precise and repeatable motion
- Takeout arm is easy to exchange
- The speed profile can be programmed to suit each job.

Gob forming and delivery

700 Electronic pusher module - Twin axis

- The two axes concept grants smooth and precise handling of unstable container at high speed.
- Using a special adapter plate the mechanism can be installed on most existing conveyor retrofittable to most existing conveyors.
- Graphic simulation of ramps profile helps the fine tuning of the perfect handling.



High speed Twin axis servo pusher

- High Speed operation for IS 12 sections TG and Tandem Machines.
- Two axis operation.
- Machine conveyor speed up to 80 m/min.
- Maximum article diameter 75 mm in TG 4-1/4".

Machine conveyor

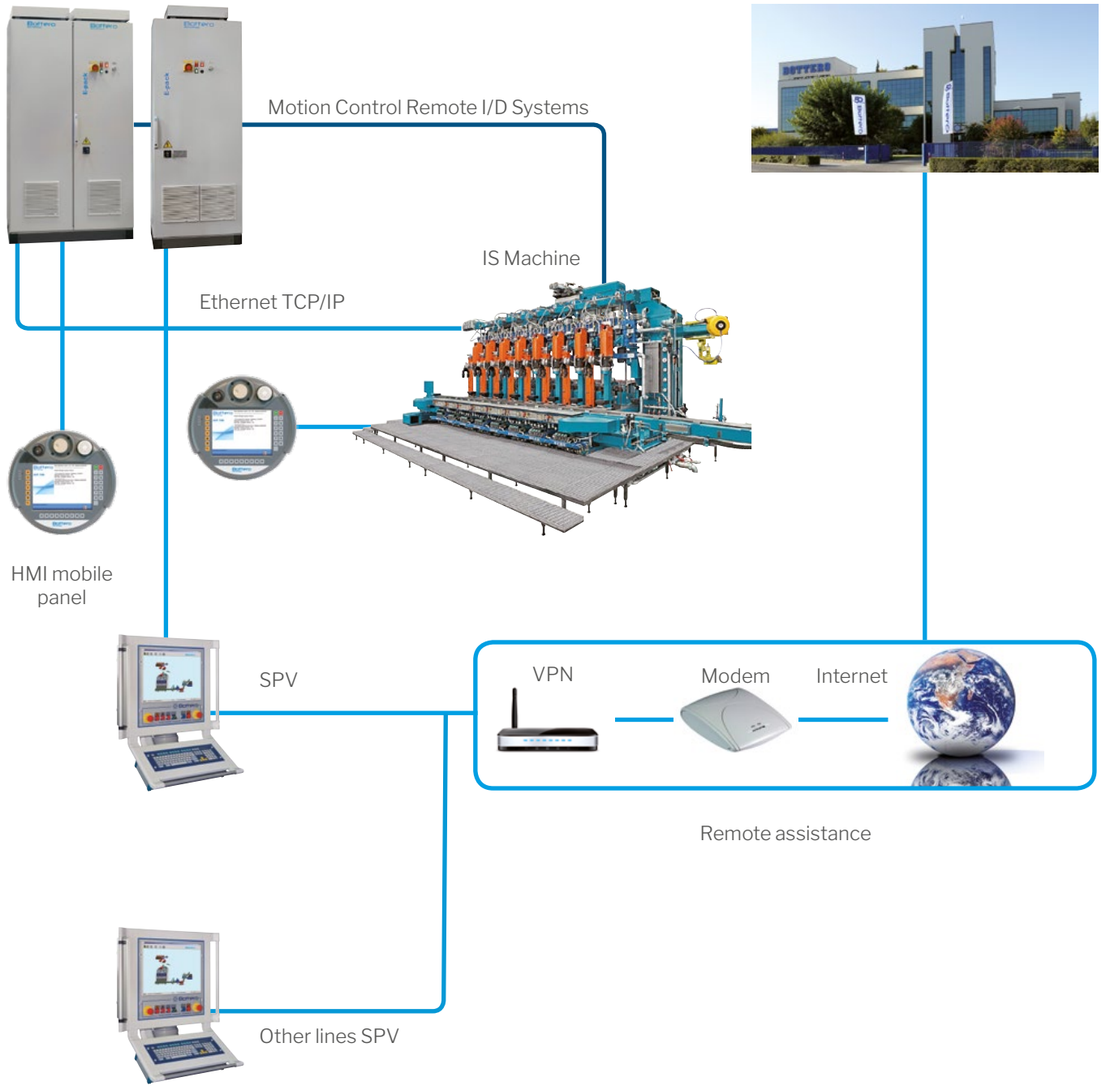
- The basic UBC conveyor is available for up to 12 sections single bed machine or up to 24 sections tandem machine.
- The air cooling inlets can be from front or back of the conveyor body.
- Separate Belt Cooling version available as option, featuring two different air pressure levels on beam and dead plate separately, granting higher cooling flexibility .
- Independent Cavity Cooling version features additional individual cooling control of inner and outer cavity on dead plate for better cooling equalization.

700 Electronic pusher module

- Advanced diagnostic (alarms, event modification log, system and motors status, real time production data availability).
- Reversibility of the mechanical group; left or right delivery may be achieved without the use of additional parts .
- Quick change single motor pusher mechanism.

Control system

With E-pack 700 series Bottero strengthens its position as leading supplier of electronic control systems, setting new standards in hot-end production lines.
'Intelligent' diagnostic and modularity are the key features of the 700 E-Pack.



700 Electronic forming control module

- “Selective job change” with fully independent section structure: possibility to run different processes. Fully flexible event setting and special cycle configuration.
- Section control units can be customized according to specific requirements.
- All events can be manually operated.
- The firing order can be adjusted to suit the operating conditions.

700 Flexible motor control module

- The phasing on all drive motors is automatically configured, even after motors re-start.
- The design of the motors ensures maximum flexibility for the changes in parameters during production.
- Digital motor speed control with wide adjustment range and no need of replacement of mechanical parts.

FMC700 is including:

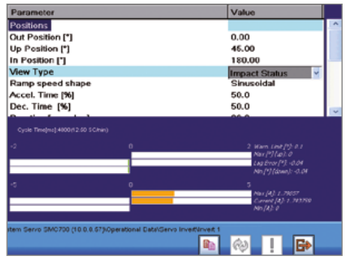
- Revolving Tube Control
- Tube Height Driven
- Servo plunger
- Servo parallel shear
- Servo Gob Distributor
- Main Conveyor
- Up and down conveyor
- Ware Transfer
- Cross conveyor
- Stacker

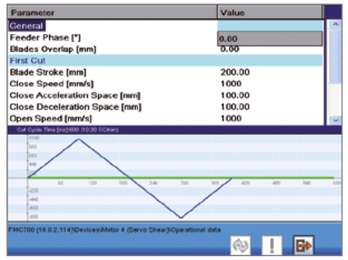
OR:

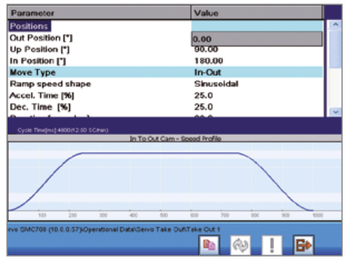
- Mechanical Stacker
- Mechanical Feeder
- Mechanical Gob distributor
- Others

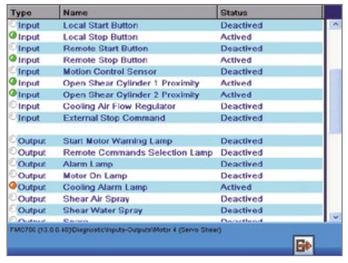
Mobile interface panel 700

- All machines parameters are visible and editable from any plug-in point.
- User friendly menu grants easy surfing through the parameters (all SPV data are available).
- Multilingual functions are available: (Chinese, Japanese, Farsi, Thai, Turkish, Russian).
- Full screen and easy diagnostic is available on mobile panel.









Automation

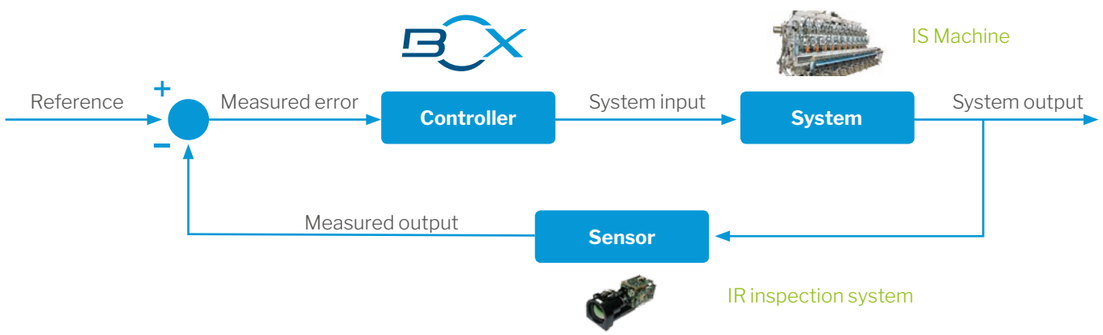
Bottero Integrated Automation Platform

- Full standardization of HW components, SW modules and communication interfaces.
- Unique, integrated development platform putting together:
  - Supervisory platform with open interface toward external Plant Automation Systems.
  - Wide configuration capability of special cycles.
- **Tier 1 closed-loop** controls (DFS, GWC for BB, Servo Plunger, Prop. Valves 2.0, MWM).
- **Process view closed-loop** controls (BoX).

The Box Platform

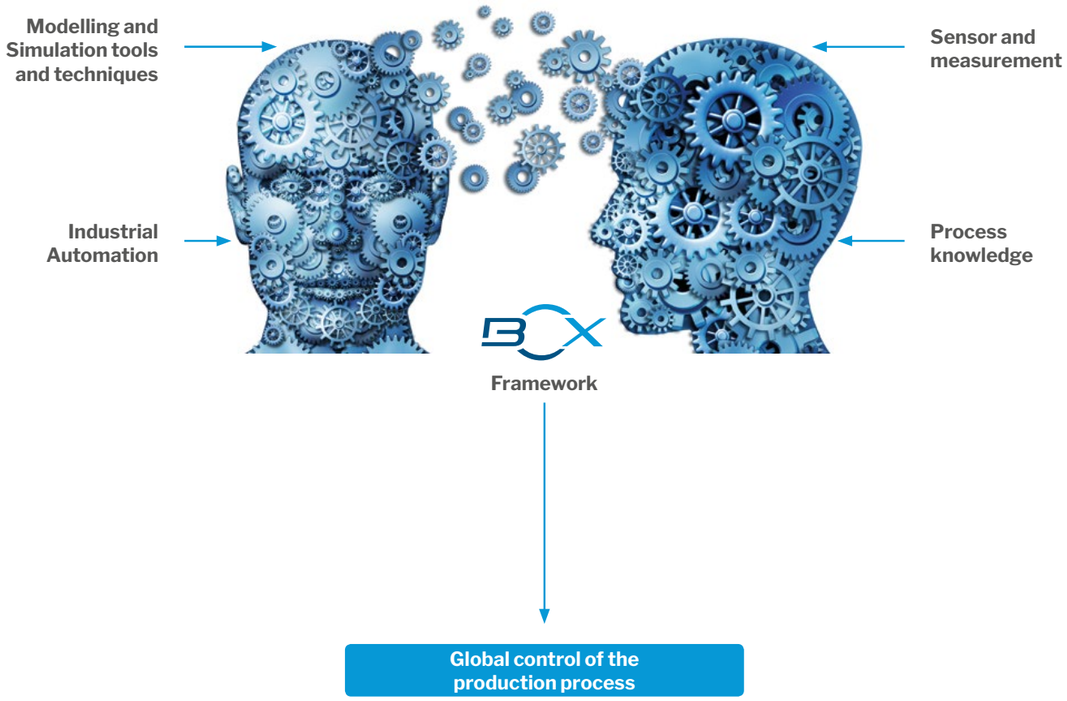
Automation platform implementing process monitoring and automation functions related to:

- Automatic control and optimization of ware spacing.
- Automatic control and optimization of vertical glass distribution (VGD).



Evolution of the BoX concept

The BoX platform is evolving to embrace a wider set of automatic controls and applications, putting together Process knowledge, sensors and measures on the most critical process areas, taking advantage from modelling and simulation techniques to create new models for automatic controls, using industrial automation to implement them as part of the Bottero automation platform and create a global system to control and optimize the production process.



Forming Engineering

Forming engineering service

The Forming engineering **services provided** are:

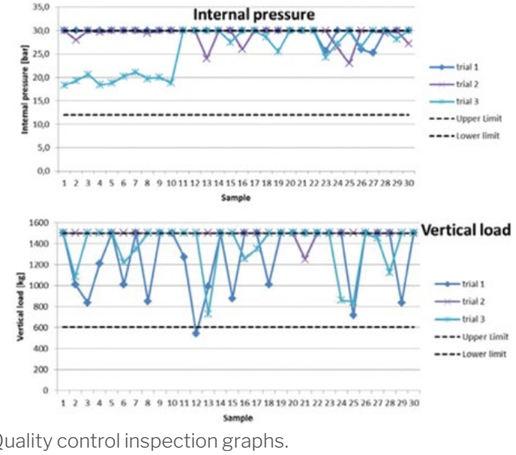
- Cooling design;
- Parison and Mold Design;
- Consultation and conversion from DG to TG;
- Consultation and conversion from B&B to NNPB;
- New container design;
- Production and Mold Design training;
- Production support.

For an important investment the right guarantee. **FE** team evaluates with our customers the performance of conversion directly in glass factory.

Sampling

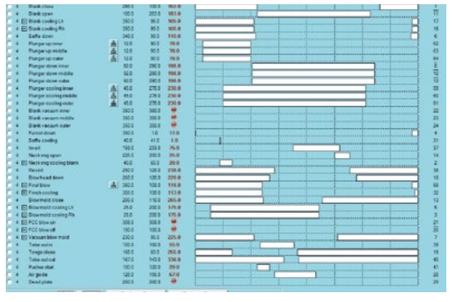
Bottle cut analysis after sampling.

Quality report



Quality control inspection graphs.

Adjustments



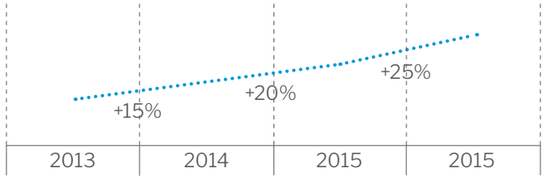
Machine timing set up.

Production

Production optimization.

Production support service

Production support days in glass factory from 2013 to 2016



Technicians with experience more than 25 years on glass work will support customers for any production problem related.

Just one mission, increase production efficiency.

Service

Customer Service

Customer Service: a dedicated team of expert mechanical and electronic engineers, providing a full range of services, from assistance provided from our HQ, to on-site services and training packages. Our team is available during office hours to support specific Customer requests or troubleshooting activities.
For assistance or enquiries please refer to: **hollowglass.services@bottero.com**

Remote assistance

Remote Assistance is our on-line service that enables Bottero qualified engineers, if access is allowed, to take control of the production line from Bottero offices through the SPV supervisor via Internet. Remote control improves and speeds up troubleshooting and problem solution.

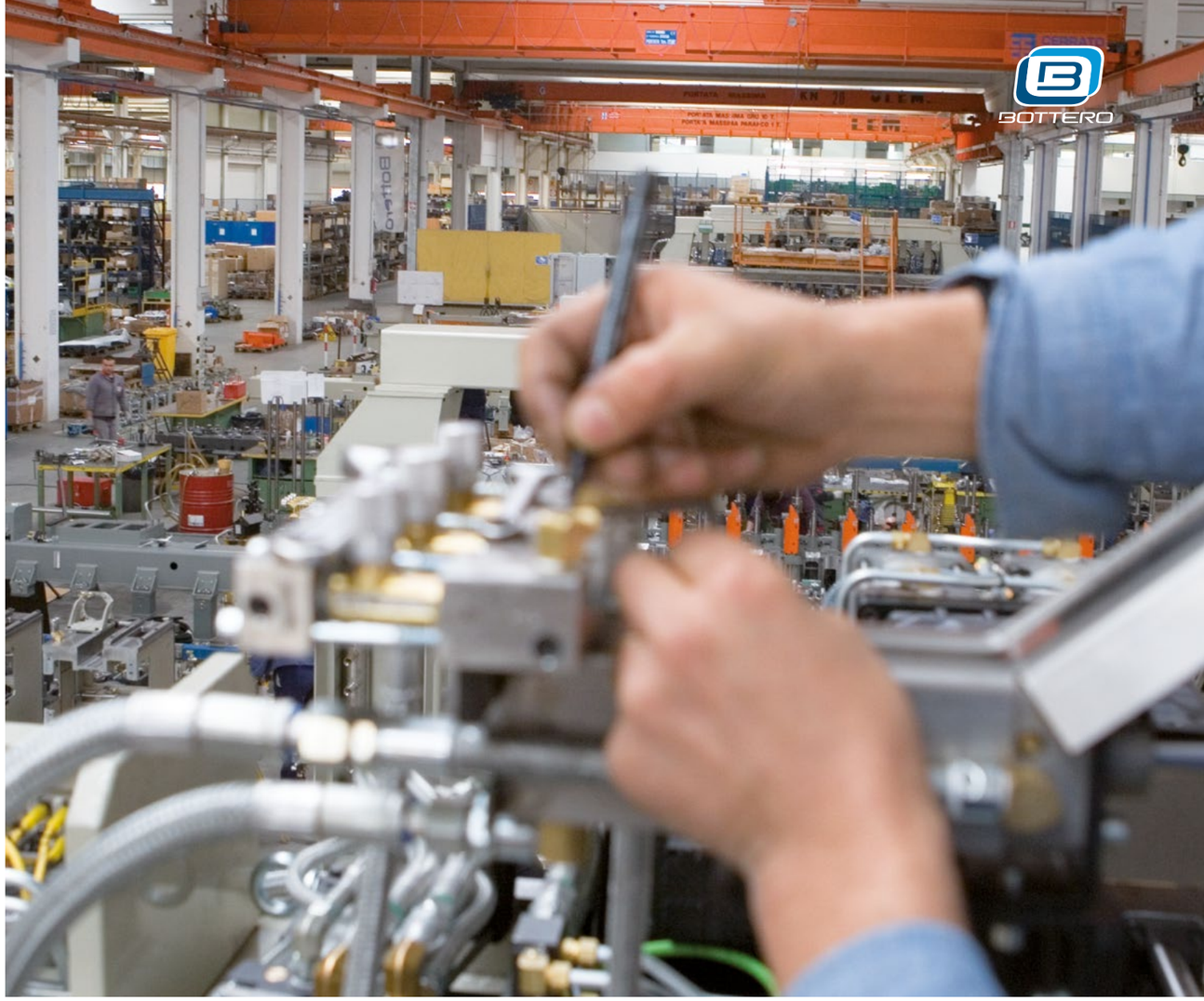
Training

training sessions can be held either in Bottero fully equipped training facility or on-site, depending on training equipment availability

- Electrical and Mechanical machine configuration, use and set-up
- Mechanical and Electrical maintenance, machine on-board troubleshooting and problem solving
- Planned maintenance programs and procedures
- SOP – Standard Operating Procedures related to both Job Change activities and Technological Process stable and constant operation

On-site services:

- Supervision to installation, cold test and start-up
- Turnkey machine installations, in new or existing production lines
- Section box exchange
- Machine upgrades
- Mechanisms repair
- Machine center distance conversion, including alignment
- Audit for line upgrades
- Periodical checks and inspections
- Troubleshooting support on mechanical and electronic issues
- Software upgrades



Spare Parts

IS machines run 24/7 under tough operating conditions: proper maintenance operations are essential to grant production stability and Bottero recommends the use of original parts.

Bottero currently maintains of parts portfolio of over 200.000 parts, tracked on the complete installed base of machinery currently in operation. For each of them all the components and groups are tracked and coded (including tailor-made customization of the single machine). This allows to support our Customer in identifying the needed spare part.

Original spare parts are available to support machine operations during its entire life span. In the case of obsolescence of components, Bottero compensates with stocks, repairs (even on an exchange basis) or interchangeable components. Bottero Customer Support is organized with audit services, aiming to inspect the machine conditions, the spare part stock availability, resulting is recommendations on maintenance activities to be performed.

For further information and enquiries please contact us: **hollowglass.sales@bottero.com**

We support customers' development

Bottero, a global technological partner for customers growth

Thanks to the experience earned in the field through thousands of installations and thanks to the continuous and significant investments in research and development, Bottero has deserved the trust of many among the most important manufacturers of glass containers in the world. The **international** dimension of the company, the ability to be highly **innovative** and the **independent** market positionput Bottero in the ideal condition to supply every customer with solutions for the optimization of production processes and indications on new opportunities for technological investments.

Thanks to the presence in the hollow glass and flat glass sectors, Bottero can boast a widespread presence and top-class technical and commercial assistance.

Bottero S.p.A. - Headquarters
via Genova 82 - 12100 Cuneo - Italy

Bottero S.p.A. - Trana
Trana - Italy

Bottero S.p.A. - Pesaro
Pesaro - Italy

Revimac S.r.l.
Vicenza - Italy

Bottero GmbH
Grevenbroich - Germany

Bottero UK Limited
Rochdale - Great Britain

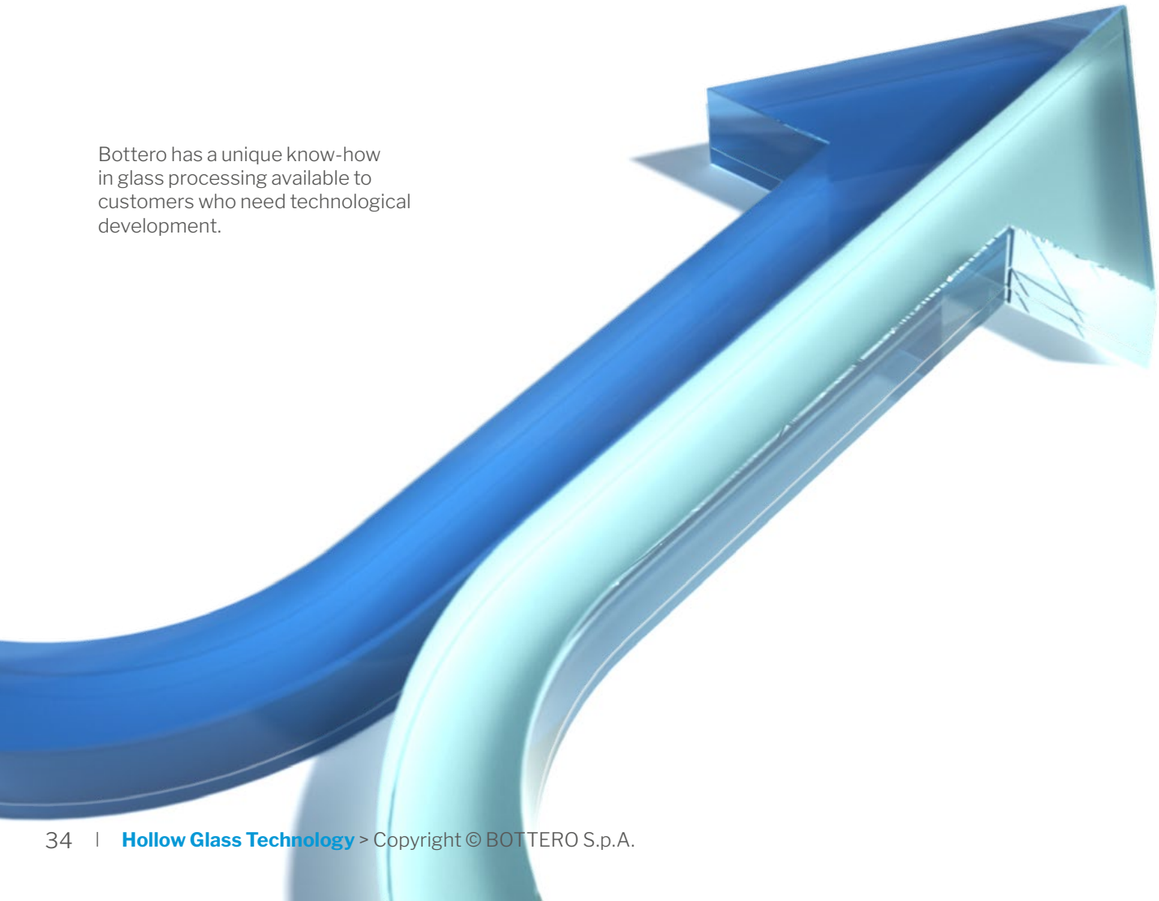
Bottero France SA
Nice – France

Bottero do Brasil
S.Paolo – Brasil

Bottero Flat Glass Inc.
Kernersville - North Carolina - USA

Bottero Glass Industry Co. Ltd
Shangai – China

Bottero has a unique know-how in glass processing available to customers who need technological development.



The images and data in this Catalog are only indicative and never override the contract engagement of Bottero S.p.A.
For photographic reasons the products are often shown complete with accessories that are not part of the standard equipment of the machine.

Discover the Bottero technology for Hollow Glass

Technology
Forming Machine
E-MOC Technology
Gob Forming
Servo Technology
Ware Handling
Pneumatic Mechanism

Automation
Architecture
Control System

Service
Forming Engineering
Customer Service

BOTTERO S.p.A.
via Genova 82
12100 Cuneo Italy
Tel. : +39 0171 310611
Fax : +39 0171 401611

www.bottero.com