

Forming Engineering



EN

Hollow Glass Technology

Copyright © 2019 BOTTERO S.p.A. All Rights Reserved

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.

We believe in glass

The Forming Engineering FE department prides over ten years on production support and facility supplier worldwide. The team is composed by engineers and production experts that cooperate each other to support customer in reaching the highest production efficiency.
The reading will introduce to FE main activities and capabilities available for our customers.



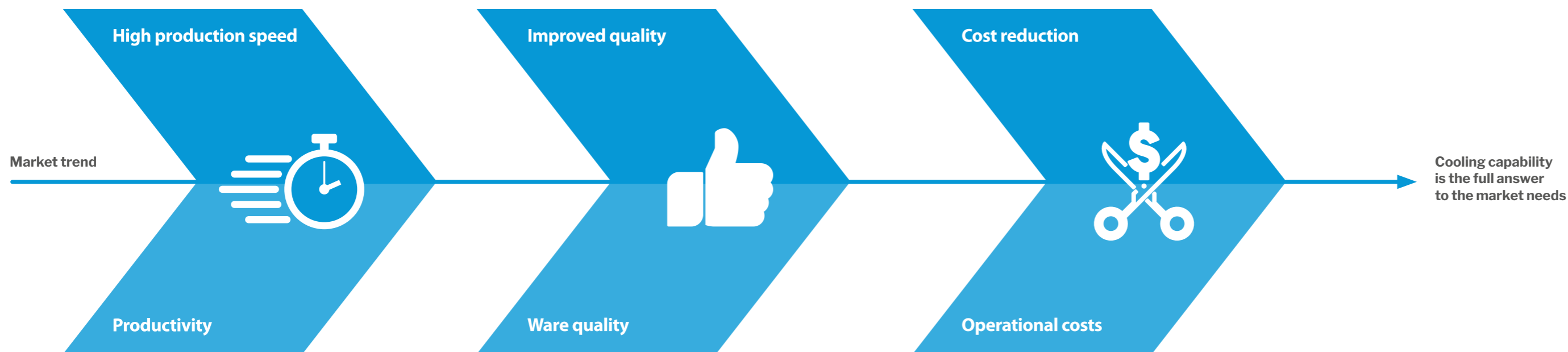
“The article is obtained by forming, The form is obtained by heat extraction...”

IS machine for forming engineers is an heat exchange device.
The cooling capability is the essence for forming and its performance and control are object of continuous improvement and studies.



We simulate the full forming process (BB, PB, NNPB) in order to give to our partners the best parison, article and equipment design.

What Market needs:

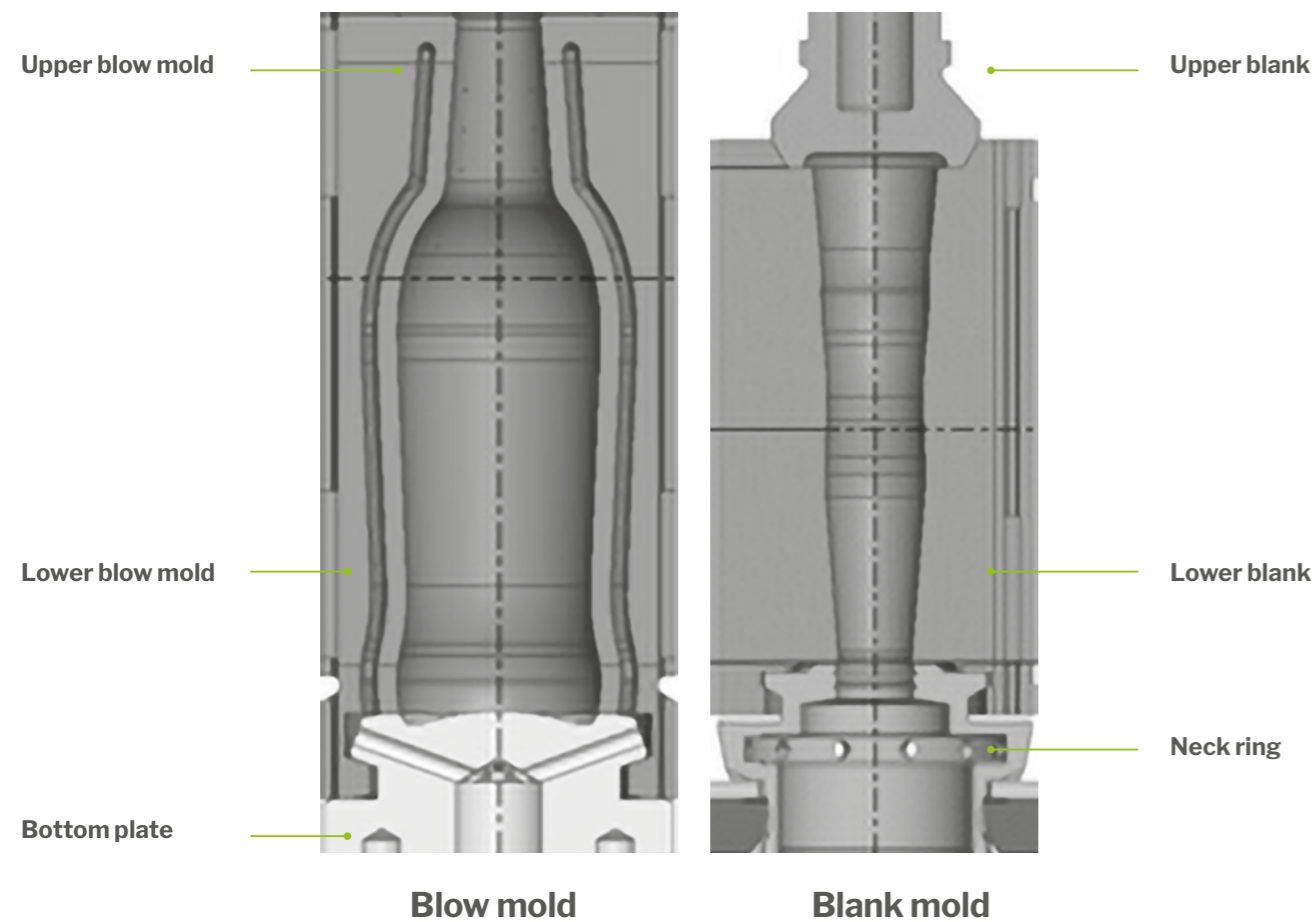


What Market needs:

“The E-MOC concept is the Bottero solution for cooling capability and market needs...”

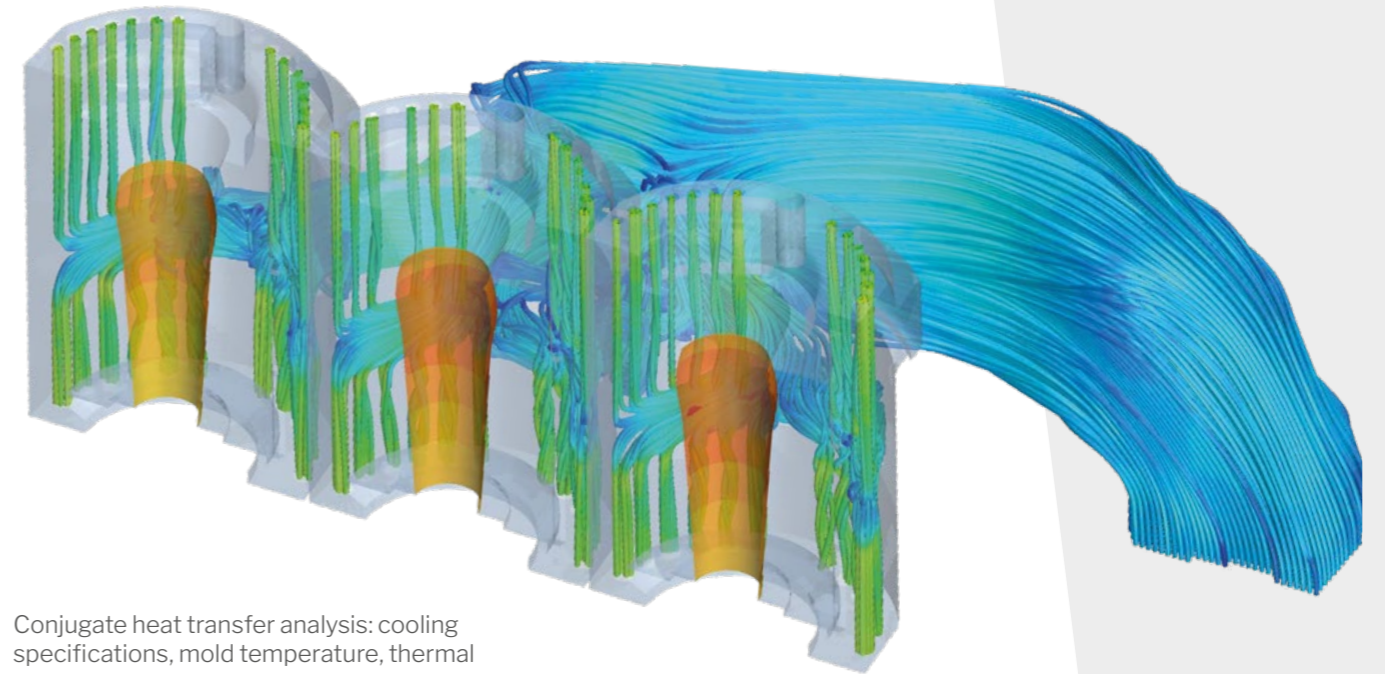
E-MOC is the most advanced heat exchange device. The airflow enters in the molds from the side and the cooling rate can be repartitioned in the following points:

E-MOC cooling system



The cooling adjusting is performed by differentiating:

- The number of rows between up and down;
- The number of holes for each row;
- The diameter of holes;
- The circumferential distribution.



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

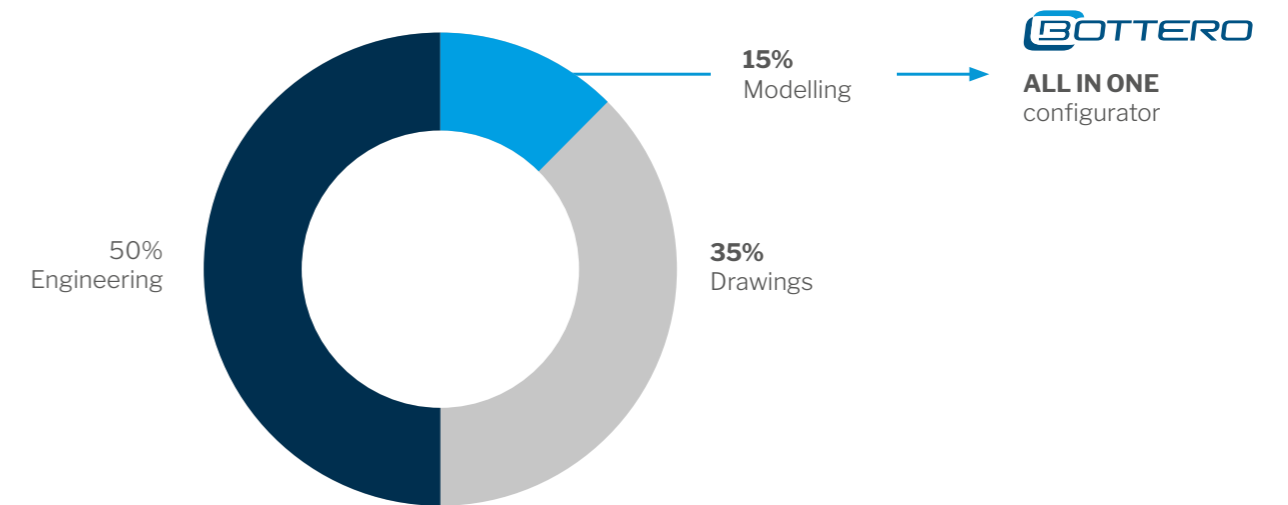
“Priority to efficiency and cost per Ton: Faster trial and sampling...”

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.

“We do not design molds, we design heat exchange cleverly...”

Project Time




Glass thickness correlation: glass bottle vs. simulations.



“We give possibility to glass to become an article...”


Strength and dimensional qualities are strictly related to glass distribution all over the article. Keywords for glass distribution are:



Parison design

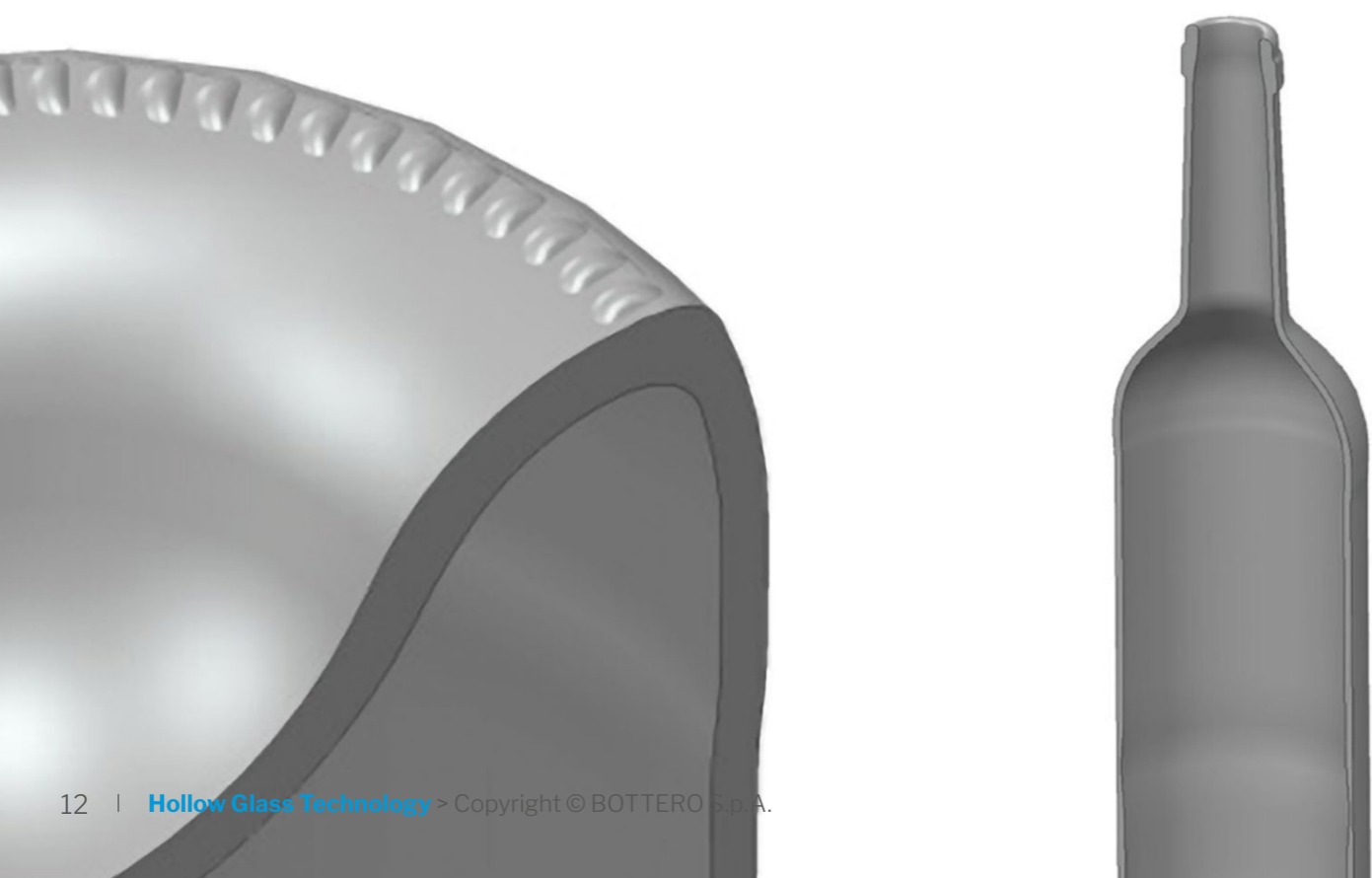
E-MOC 360° cooling;
Vertiflow;
Stack cooling;

Cooling technology



Machine timing

The mission of **Mold Engineering** service is to supply a “plug&play” mold equipment reducing machine timing settings to control the cooling effect.



Parison study

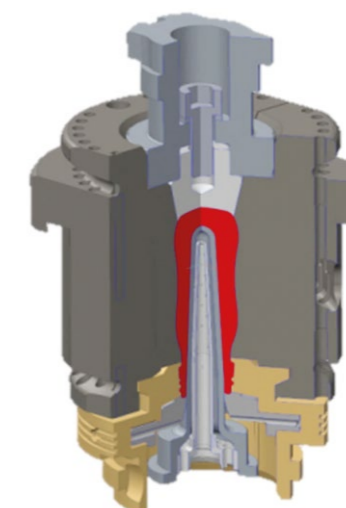
Model INPUT

Blank configurator

Final design

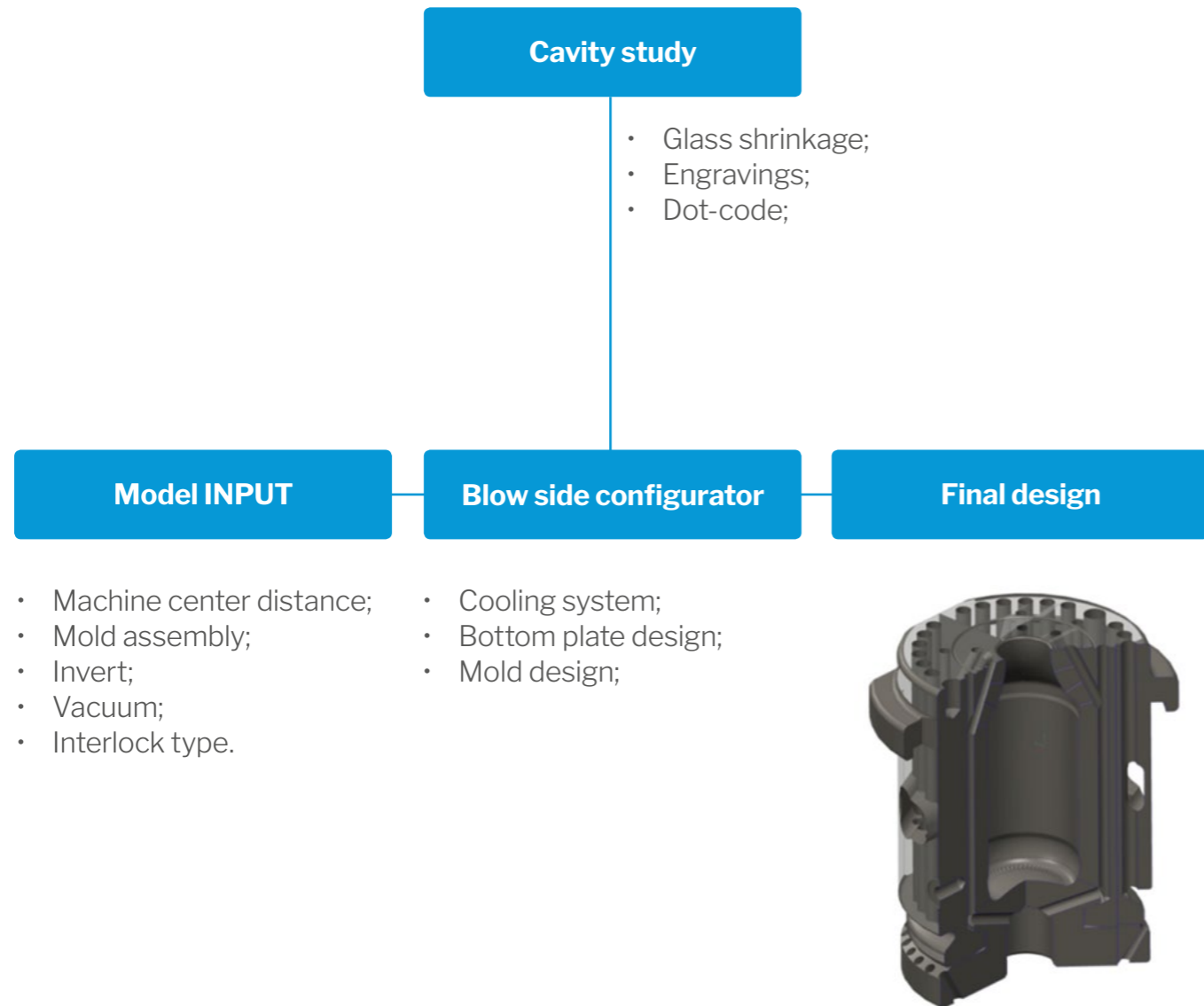
- Process BB,PB,NNPB;
- Machine center distance;
- Mold assembly;
- Invert;
- Neck ring size;
- Interlock type.

- Cooling system;
- Baffle type;
- Mold design;
- Neck ring, guide ring,
- plunger design;



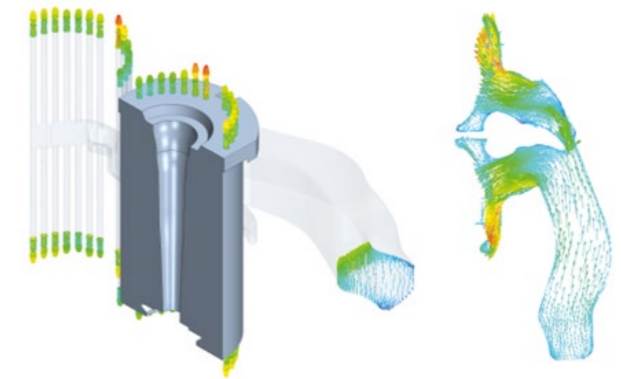
“We give possibility to glass to become an article...”

As well as the parison study, the Blow cavity is modelled according to glass shrinkage. Engravings and Dot-code are placed according to inspection machine reading. Given input specifications, the Blow configurator generates the mold in real time.

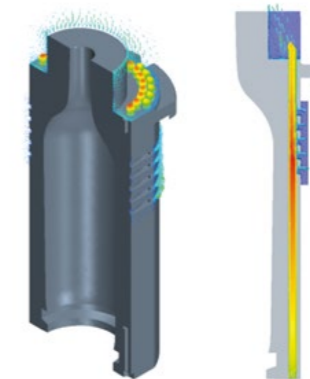


What ever is the cooling technology whatever available in your plant, the engineering service will supply the most efficient design.

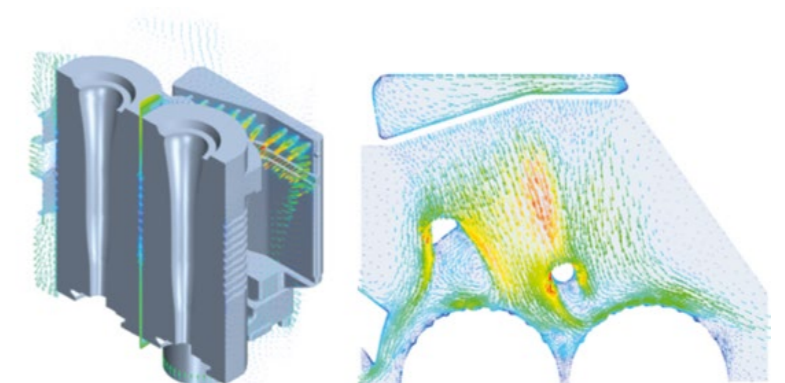
E-MOC 360° cooling
Airflow balancing through cooling duct optimization. Result: cooling capacity balancing between cavities.



FCC
FCC with double row cooling channels with fins intercepting the flux. Result: higher heat extraction and better mold temperature homogeneity.



Stack cooling
Blank stack cooling optimization to balance air delivery between cavities. Result: lower air consumption, higher heat extraction and better mold temperature homogeneity.



“The invariability of variable equipment...”

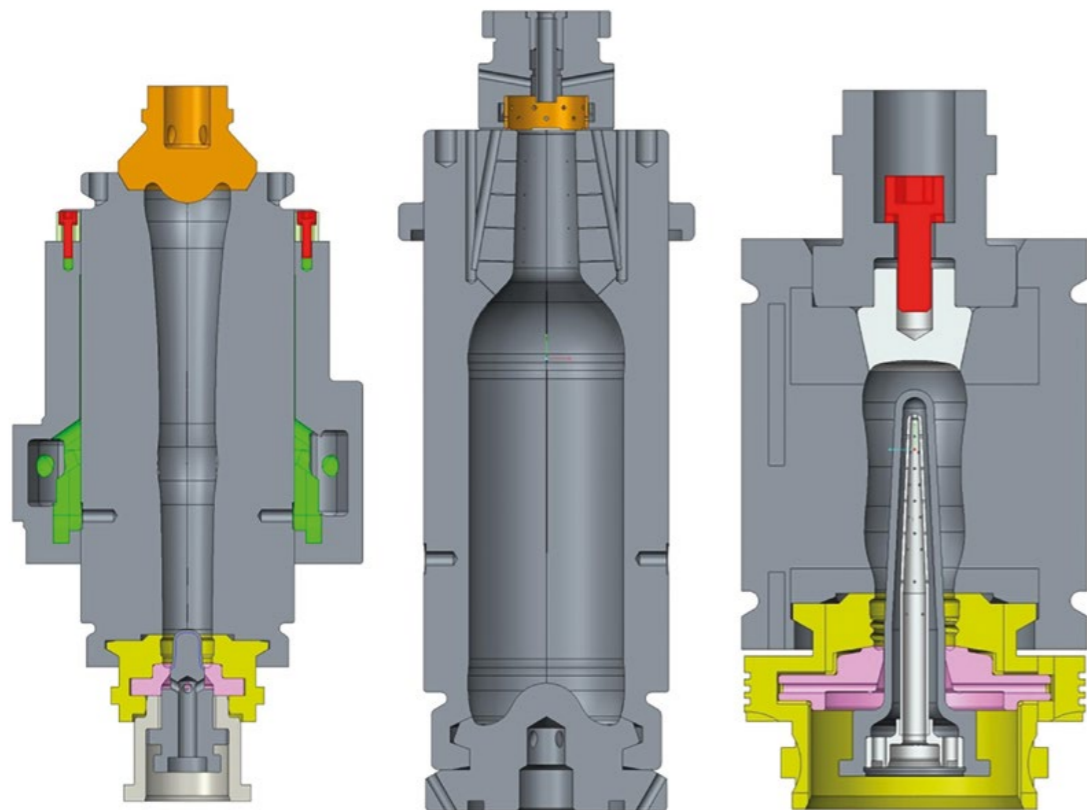
Engineers support customer in the definition of the variable equipment reducing the number of components, costs and job change time. Starting from refractories up to machine mountings, customer will be sure to get the best performances given a set of articles.

Increasing

FE team will guide customers to maximize the profit through conversion from double to triple gob.

Reducing

FE team will guide customers to minimize costs and energy consumption through conversion from double to triple gob.

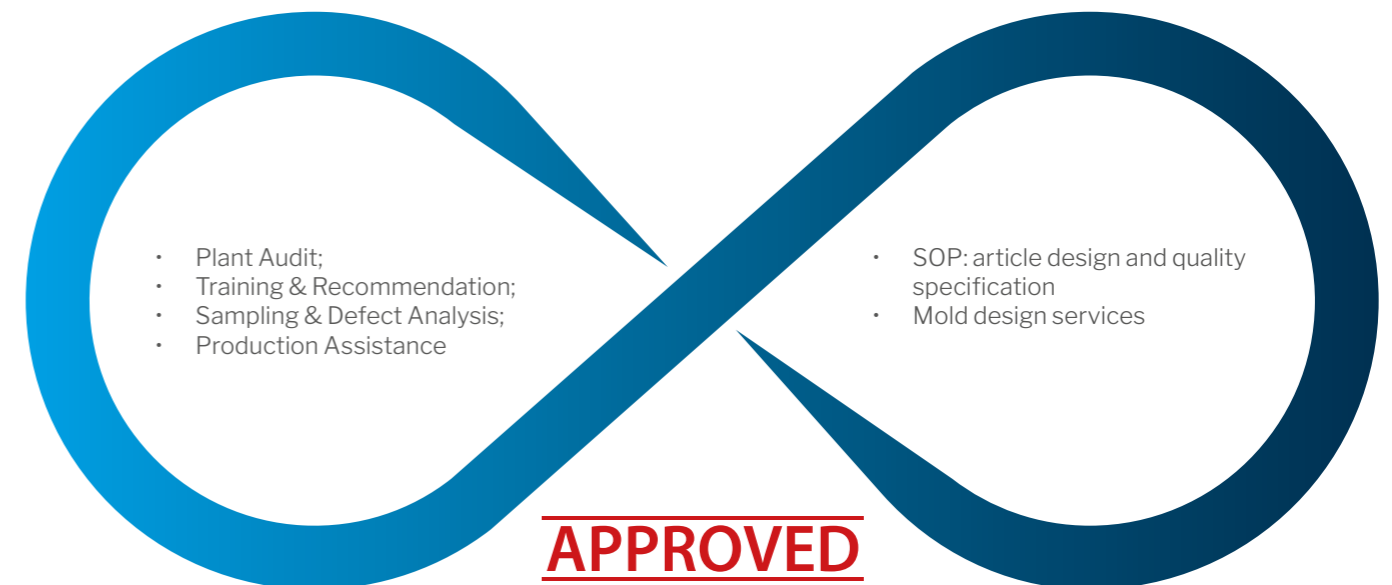


Enhanced mold design software to optimize the mold equipment design.

“From B&B to NNPB...”

The FE team will guide customers to increase article quality, production speed and reduce glass weight through the conversion from Blow&Blow process to Narrow Neck Press&Blow.

PSA Production Service Assistance

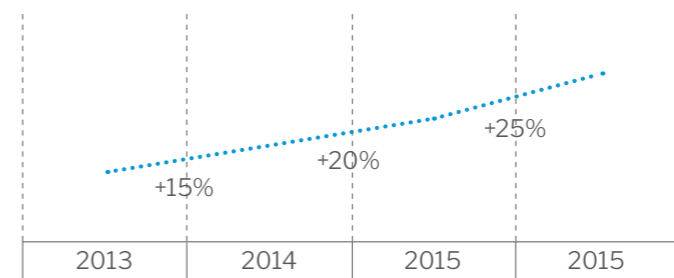


“Time to market approach...”

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

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.

Sampling



Bottle cut analysis after sampling.

Adjustments

Machine	Start	End	Operator
1	08:00	12:00	A
2	08:00	12:00	B
3	08:00	12:00	C
4	08:00	12:00	D
5	08:00	12:00	E
6	08:00	12:00	F
7	08:00	12:00	G
8	08:00	12:00	H
9	08:00	12:00	I
10	08:00	12:00	J
11	08:00	12:00	K
12	08:00	12:00	L
13	08:00	12:00	M
14	08:00	12:00	N
15	08:00	12:00	O
16	08:00	12:00	P
17	08:00	12:00	Q
18	08:00	12:00	R
19	08:00	12:00	S
20	08:00	12:00	T
21	08:00	12:00	U
22	08:00	12:00	V
23	08:00	12:00	W
24	08:00	12:00	X
25	08:00	12:00	Y
26	08:00	12:00	Z
27	08:00	12:00	AA
28	08:00	12:00	AB
29	08:00	12:00	AC
30	08:00	12:00	AD

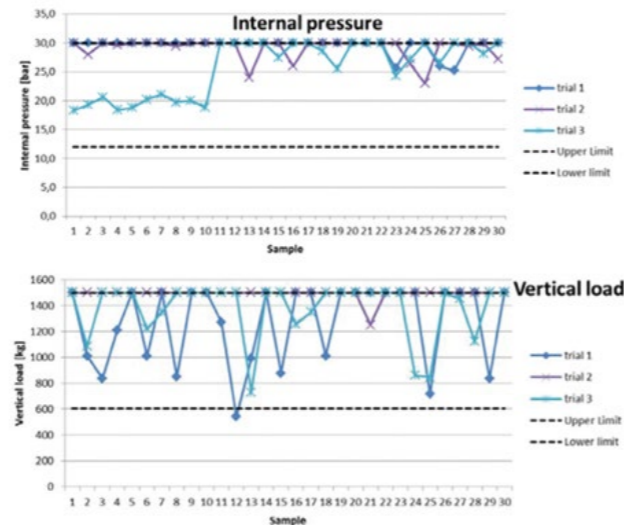
Machine timing set up.

Production



Production optimization.

Quality report



Quality control inspection graphs.

“Customer training...”

FE team and customers are partner.
They organizes in-Bottero or in-glass factory trainings in order to improve technical skills related on:

Mold design

1 Article Design

- Article design;
- Machine limits;
- BB-PB-NNPB process;
- BB parison design;
- PB parison design;
- NNPB parison design;
- Blank cooling;
- Mold cooling;
- Neck ring cooling;
- Equipment design;
- Mold design book;
- Tailored solutions

2 Parison Design

3 Cooling Design

4 Equipment Design

Production services

- IS machine operator activities;
- Machine equipment setting;
- IS machine start up;
- Job change assistance;
- Production improvement;
- Cross conveyor
- Proportional valves set up;
- Defects analysis;
- Specific customer requests.



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 position put 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.

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



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

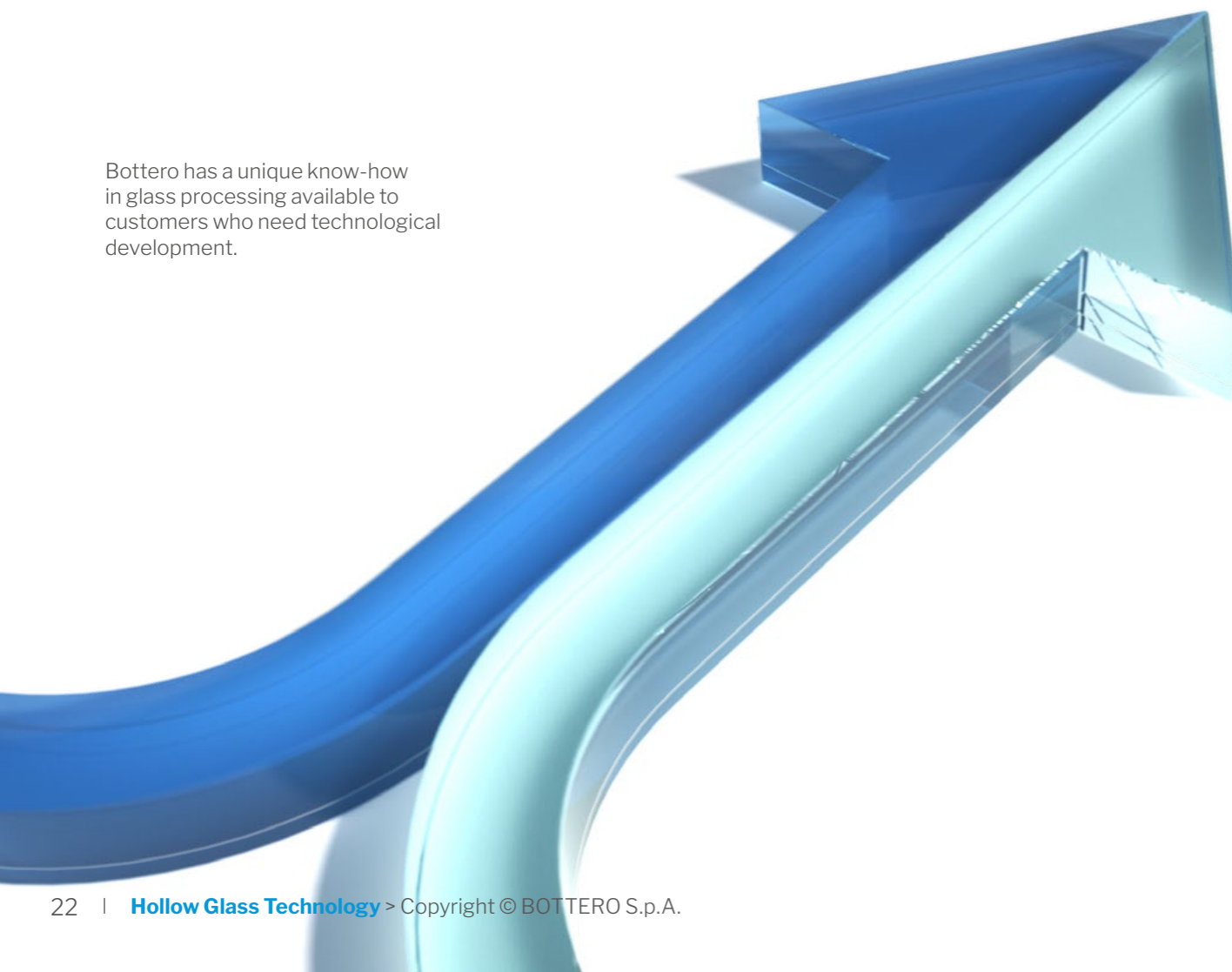
Bottero UK Limited
Rochdale - Great Britain

Bottero France SA
Nice - France

Bottero do Brasil
S.Paolo - Brasil

Bottero Flat Glass Inc.
Kernersville - North Carolina - USA

Bottero Glass Industry Co. Ltd
Shanghai - China





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