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 know glass, we love glass.
We believe in glass

The Forming Engineering FE department praises 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.

What Market needs:

- High production speed
- Improved quality
- Cost reduction
- Productivity
- Ware quality
- Operational costs

Cooling capability is the full answer to the 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:

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

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

“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

- Plant Audit;
- Training & Recommendation;
- Sampling & Defect Analysis;
- Production Assistance

- SOP: article design and quality specification
- Mold design services
“Time to market approach...”

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

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

| Production support days in glass factory from 2013 to 2016 |
|-------------------|-------------------|-------------------|-------------------|
|                   | 2013              | 2014              | 2015              | 2015              |
|                   | +15%              | +20%              | +25%              |

Adjustments

Production

Sampling

Bottle cut analysis after sampling.

Quality report

Quality control inspection graphs.

Machine timing set up.

Production optimization.
### Mold design

<table>
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<tr>
<th>1</th>
<th>Article Design</th>
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<td>Parison Design</td>
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<td>Equipment Design</td>
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</tbody>
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- 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

### Production services

- 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.

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“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:

- Article design;
- Machine limits;
- BB-PB-NNPB process;
- BB parison design;
- PB parison design;
- NNPB parison design;
- Blank cooling;
- Mold cooling;
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- Equipment design;
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- Tailored solutions
Hollow Glass Technology

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.
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