NOx, SOx and all waste pollution related. Environmental regulations of reduction of taking in consideration the strictly management, for all types of production. Stability and flexibility in the Furnaces design tools are today able to guarantee recent years combined with cutting-edge technologies available on the market, and using engineer hollow glass melting furnaces Division of BDF Industries is able to gain over the years, the Furnaces wealth of experience. Thanks to our Customers.

Furnaces

Thanks to our wealth of experience gained over the years, the Furnaces Division of BDF Industries is able to engineer hollow glass melting furnaces using the most modern techniques and technologies available on the market, simultaneously combining efficiency in consumption, durability and quality of glass requested by our Customers. The studies and research developed over recent years combined with cutting-edge design tools are today able to guarantee stability and flexibility in the Furnaces management, for all types of production taking in consideration the strictly environmental regulations of reduction of NOx, SOx and all waste pollution related.

In order to work the glass gob better and create a perfect bottle, you need excellent glass conditioning. The Division of BDF Industries dedicated to the Working Ends and Forehearth is able to offer and install complete systems which are able to fully satisfy the requests of our customers. The Forehearths of the GTFS and GTHP series can be equipped with ad hoc systems guaranteeing a thermal homogeneity in the different configurations in the conditioning zone which is as close to 100% as possible, possibly installing Stirrer and/or Booster systems where required or recommended. BDF Industries is able to create a strategic connection between Furnaces-Forehearths-IS Machines: the Furnaces technology developed for the Forehearth in fact allows you to bring the glass to the correct temperature from the Furnaces to the IS Machines. Our advanced knowledge of the machines allows us to associate the most suitable Forehearth according to the IS Machine.

The historical core business of BDF Industries, in which regard we have over 60 years of experience in the hollow glass world. Through our elevated know-how gained in the engineering and manufacturing of machinery, the company’s IS Machines Division currently produces the most complete range of solutions, from machines with pneumatic handling to servo-assisted handling machines, with angular or parallel mould openings/closures, combined with all the variable equipment and accessories in order to better intercept the requests of the end customer. The internal R&D Department is focused every day on finding the best solutions to be applied in IS Machines which not only allow the production of perfect glass containers, but also a high-performance production, reducing costs: flexibility, reliability and production efficiency have always been the fundamental advantages which BDF Industries makes available to its customers all over the world.

A distinctive feature is the fully Made in Italy production: the machines are fully designed, manufactured and assembled in Italy, where there is an important knowledge of the production process.

Being able to integrate highly-sophisticated process systems such as hollow glass from the Batch house to the annealing lehr is not for everyone. BDF Industries, thanks to the vertical integration developed over the years, has managed to specialise in the engineering of all the automation of the hot end. The R&D Department, working in close contact with the Furnaces, Forehearths and IS Machines Divisions, is aimed at constant research into the most advanced control and supervision systems to best meet the demands of its customers.

Glass Plant is a highly energy-consuming and polluting industry, in which enormous amounts of energy are wasted and thrown away, especially in the form of heat and fine dust. Thanks to the synergy of highly-specialised teams between the Furnaces and Automation Divisions, BDF Industries is able to supply specific products for the protection of the environment and for energy recovery, using the most innovative solutions and products in compliance with the fundamental production and consumption requirements of glassworks, always paying attention to the fundamental parameters to be considered without affecting the daily tasks of the operators of the Furnaces.

From the Furnaces to the IS Machines passing through Working End and Forehearths, in a single strategic Partner for BDF Industries, the Customer satisfaction is always its goal from the phase of offer issuing up to after sales. This is why it makes use of a strong and cohesive Service structure with more than 80 people at the service of Customers all over the world, capable of helping the Customer in daily operations and able to find the most effective solutions to solve problems and increase performance. Not only after-sales service, among the activities that the Service Division performs all over the world every day, there are also those of supervision, auditing, installation, overhauling of machines and melting minor repair to guarantee complete coverage of the hot part of the glassware: from the Furnaces to the Forehearths to IS Machines with highly-qualified technicians specialised in the individual areas of competence.

Forehearths

IS Machines

Automation

Energy

Service
Innovation, technology and versatility make the BDF IS Machines the ideal solutions for high productivity, improved work surroundings and considerable energy savings.

The BDF machines are particularly designed for being functional in all their mechanical components (gob delivery, servo and pneumatic mechanism, molds cooling, easy mounting variable equipments, special process apparatus, wares handling) and also in electronic control systems (integrated and stand-alone).
IS ANGULAR ADV 8000 HS

8-10-12 SECTIONS AND TANDEM
IS 4 1/4": SG-DG TG3”-TG 3 1/8”- QQ 2 1/8”
IS 5”B: SG-DG-TG 96MM
IS 5 1/2”: SG-DG-TG 85MM
IS 5 3/4”: SG-DG
IS 6 1/4”: SG-DG-TG 4 1/4”

STANDARD MACHINE
CONFIGURATION

FEEDER
• Servo plunger
• Gear type revolving tube mechanism
• Servo Arcuate shear
• Shear spray system

DELIVERY SYSTEM
• Servo gob distributor SGD 330
• Easy Aligning Delivery System (EADS)

MACHINE
• Angular opening close mechanism
• 21 lines valve block
• Blank side DAC cooling
• Blow side vertical cooling
• Blow head anti-deflection
• Servo invert
• Servo take out

PROCESS
• Blow & Blow
• Press & Blow
• Narrow Neck Press and Blow (NNPB)

WARE HANDLING
• Step pusher
• HS Conveyor

TIMING SYSTEM
• ADV 8000

OPTIONAL

FEEDER
• Servo parallel Shear mechanism

DELIVERY SYSTEM
• Multi Direct Drive servo gob distributor X2/X3/X4

MACHINE
• 26 lines valve block
• Blow side DAC cooling
• Take Out anti deflection
• Proportional valves:
  - Plunger up
  - Counter blow
  - Final Blow
• IWS system

WARE HANDLING
• AP Pusher mechanism (dual motor)
• HS Conveyor
IS MACHINE

IS PARALLEL
ADV 8000 HS
8-10-12 SECTIONS AND TANDEM
IS-P: DG 6 ¼"-TG 4 ¼"

STANDARD MACHINE
CONFIGURATION

FEEDER
• Servo plunger
• Gear type revolving tube mechanism
• Servo parallel Shear mechanism
• Shear spray system

DELIVERY SYSTEM
• Multi Direct Drive servovac distributor X2/X3/X4
• Easy Aligning Delivery System (EADS)

MACHINE
• Parallel opening close mechanism
• 21 lines valve block
• Blow side DAC cooling + Vertical cooling
• Blow side vacuum system
• Blow head antideflection
• Servo Invert
• Servo Take Out
• Take Out anti deflection

PROCESS
• Blow & Blow
• Press & Blow
• Narrow Neck Press and Blow (NNPB)

WARE HANDLING
• AP Pusher mechanism (dual motor)
• HS Conveyor

TIMING SYSTEM
• ADV 8000

OPTIONAL MACHINE
• 26 lines valve block
• Proportional valves:
  - Plunger up
  - Counter blow
  - Final Blow
• IWS system
**IS MACHINE**

**IS PARALLEL ADV 8000 HSS**

8-10-12 SECTIONS AND TANDEM
IS-P: DG 6 ¼"-TG 4 ¼"

**STANDARD MACHINE CONFIGURATION**

**FEEDER**
- Servo plunger
- Gear type revolving tube mechanism
- Servo parallel Shear mechanism
- Shear spray system

**DELIVERY SYSTEM**
- Multi Direct Drive servo gob distributor X2/X3/X4
- Costant Angle 30° Delivery system

**MACHINE**
- Parallel opening close mechanism
- 26 lines valve block
- Blank side DAC cooling
- Blow side DAC cooling + Vertical cooling
- Blow side vacuum system
- Blow head antideflection
- Servo invert
- Servo Take Out
- Take Out anti defection
- Proportional valves:
  - Plunger up
  - Counter blow
  - Final Blow
- IWS system

**PROCESS**
- Blow & Blow
- Press & Blow
- Narrow Neck Press and Blow (NNPB)

**WARE HANDLING**
- AP Pusher mechanism (dual motor)
- HSS Conveyor

**TIMING SYSTEM**
- ADV 8000
### Production Limit Table

<table>
<thead>
<tr>
<th>I.S. Machine</th>
<th>4&quot; 1/4</th>
<th>5&quot;</th>
<th>5 1/2</th>
<th>6&quot; 1/4</th>
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<tbody>
<tr>
<td>Configuration</td>
<td>SG</td>
<td>DG</td>
<td>TG</td>
<td>TG 3&quot;</td>
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<tr>
<td>Max Height Under Finish (mm)</td>
<td>335</td>
<td>301</td>
<td>276</td>
<td>140</td>
</tr>
<tr>
<td>Min Height Under Finish (mm)</td>
<td>25</td>
<td>58</td>
<td>59</td>
<td>25</td>
</tr>
<tr>
<td>Max Body Diameter with Blow Axial Cooling (mm)</td>
<td>156</td>
<td>76</td>
<td>51</td>
<td>50</td>
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<tr>
<td>Max Body Diameter with Stack-Cooling (mm)</td>
<td>178</td>
<td>90</td>
<td>52</td>
<td>60</td>
</tr>
<tr>
<td>Max Body Diameter with Stack-Cooling/Vacuum (mm)</td>
<td>170</td>
<td>76</td>
<td>45</td>
<td>50</td>
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<tr>
<td>Max Finish Diameter (mm)</td>
<td>48</td>
<td>48</td>
<td>30</td>
<td>55</td>
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</table>

### Measurables

#### I.S. Machine Measures

<table>
<thead>
<tr>
<th>I.S. Machine</th>
<th>4&quot; 1/4</th>
<th>5&quot;</th>
<th>5 1/2</th>
<th>6&quot; 1/4</th>
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</thead>
<tbody>
<tr>
<td>Pressure</td>
<td>6 sect.</td>
<td>8 sect.</td>
<td>10 sect.</td>
<td>12 sect.</td>
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<tr>
<td>L.P. Compressed Air</td>
<td>30</td>
<td>2.1</td>
<td>283</td>
<td>8</td>
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<tr>
<td>H.P. Compressed Air</td>
<td>45</td>
<td>3.15</td>
<td>371</td>
<td>10.5</td>
</tr>
<tr>
<td>P&amp;B - Plunger Cooling</td>
<td>45</td>
<td>3.15</td>
<td>212</td>
<td>6</td>
</tr>
<tr>
<td>NNPB-Plunger Cooling</td>
<td>87</td>
<td>6</td>
<td>212</td>
<td>6</td>
</tr>
<tr>
<td>Vacuum Blow Mould</td>
<td>25&quot; Hg</td>
<td>635 mm Hg</td>
<td>170</td>
<td>4.8</td>
</tr>
<tr>
<td>Vacuum Blank Side</td>
<td>25&quot; Hg</td>
<td>635 mm Hg</td>
<td>85</td>
<td>2.4</td>
</tr>
<tr>
<td>Machine Cooling Air</td>
<td>42&quot; WC</td>
<td>1050 mm Hg</td>
<td>21190</td>
<td>600</td>
</tr>
<tr>
<td>Conveyer Cooling Air</td>
<td>26&quot; WC</td>
<td>650 mm H₂O</td>
<td>4238</td>
<td>120</td>
</tr>
<tr>
<td>Cooling Water</td>
<td>30</td>
<td>2.1</td>
<td>-</td>
<td>10 l/min</td>
</tr>
</tbody>
</table>

#### Standard Service Requirements for BDF I.S. Machines

<table>
<thead>
<tr>
<th>I.S. Machines Type</th>
<th>4&quot; 1/4 - 6&quot; 1/4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application</strong></td>
<td></td>
</tr>
<tr>
<td>Pressure (p.s.i.)</td>
<td>6 sect.</td>
</tr>
<tr>
<td>L.P. Compressed Air</td>
<td>30</td>
</tr>
<tr>
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<tr>
<td>Cooling Water</td>
<td>30</td>
</tr>
</tbody>
</table>

---

* For NNPB plunger cooling pressures above 3.15 Kg/cm² (if required by the customer)
* Quantities specified are free air (21°C-70°F and 1 Kg/cm²-14.7 p.s.i.)
* The operating air supply must be clean and dry (it is required the installation of drying and filter system before the piping connection to the machine with an efficiency of 98% and a nominal retention of 4 x 10^10 µ).
* Maximum temperature of compressed air supply to the machine = 80°C
* Minimum temperature of compressed air supply to the solenoid valve block = 10°C
* Pilot air (Valve Block) 0.5 m³/min of free air at 21°C (clean, oil and water free)
* Dew point of compressed air: -5°C to -2°C
* Water hardness 100 parts CaCO² per 1,000,000 parts of water (P.P.M.)
**VALVE BLOCK 21 LINES**

**GENERAL DATA**
- Poppet type valve with 265 mm² air passage section;
- Valve body in aluminium alloy with vulcanised polymer seal;
- Valves in vertical working position;
- Quick change valves system;
- Pilot air pressure down to 1.5 bar;
- Possibility of direct air feed for all 21 lines;
- Precise needle valves for all 21 lines;
- Light alloy main body construction;
- 21 manual controls with safety micro switches;
- Interchangeable with others type valves block;
- Frontal guard with 21 leds;
- Wire harness protected against moisture;

**BENEFITS**
- More air available for mechanism operation;
- Higher working speed and lower pressure drop;
- Improved valve operation with reduced wear;
- Improved mechanisms speed control;
- Visual control of electric pilot signals;
- Less down time for valve replacement;
- Reduced weight thanks to construction;

---

**VALVE BLOCK 26 LINES**

**MAIN DATA**
- 26 pneumatic valves (N.O. or N.C.) controlled by a pilot;
- Valves air flow = 4000 Nl/min;
- Air-air valves control (no spring return);
- Valve pilot made with a 5/2 solenoid micro-valve;

**BENEFITS**
- Each valve can operate with high, low or direct pressure just trough the positioning of a special plug on each air feed duct;
- Each pneumatic line can be controlled in feed or exhaust just changing the position of the pin-valve;
- No more use of check-valves;
- High flexibility on the valve-block configuration (air pressure or air control) with the machine in operation;
- Manual controls with 3 positions (run-stop-manual);

---

**ACCESSORIES**

18 | FORMING IS MACHINE | 19
**IWS 2.0 WEIGHT CONTROL SYSTEM**

**MAIN DATA**
- BDF automatic weight control system through the position control of the plunger mechanism
- Position control of the plunger mechanisms
- Capacitive linear transducer
- Complete plunger stroke control
- Available for SG-DG-TG-QG on all machines type
- Glass weight controlled by height regulation of revolving tube
- DG - TG - QG gobs balance through individual refractory plunger height control
- Process control fully integrated in ADV 8000 control system

**BENEFITS**
- Automatic regulation of the gob weight
- Reduction mechanical interventions of the operators
- Qualitative and quantitative improvement of the production
- Stability of the gob weight
- Defects reduction on the finish of the articles
- Best thermal stability of the forehearth, machine and production
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**TECHNICAL FEATURES**
- Fast change Plunger Mechanism thanks to the “wireless data transmission and inductive transformer” between plunger mechanism and foot plate
- Linear transducer made in heavy-duty and high stability materials (ceramic)
- New wireless technology on transmission serial data (RS485) with high frequency (27MHz) and high speed (1Mb/sec) transceiver
- New inductive technology on the power transmission between plunger foot and sensor on the plunger cylinder
- Possibility to up-grade existing machines with standard plunger mechanisms

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- Possibility to up-grade existing machines with standard plunger mechanisms
Improved cooling efficiency and thermal homogeneity maintaining standard moulds and equipment:
- Use of standard moulds designed for stack-cooling (radial)
- Use of standard mould holders, arms, plates or inserts
- Dual on-off valve for blank cooling and neck-ring cooling (blank side)
- Neck-ring cooling design with standard nozzles and spacers (blank side)
- Telescopic tube with quick self centering clamping system

DAC DUAL AXIAL COOLING
RADIAL COOLING 360°
- Radial cooling plenum chamber with easy change and customizable flat drilled plates
- Available for blank and blow side

DAC DUAL AXIAL COOLING
SIDE AXIAL
- Dedicated plenum chamber shaped according mould’s diameter and height
- Two separated cooling air flows (upwards and downwards) with independent air volume optimization
- Available for blank and blow side

DAC DUAL AXIAL COOLING
BOTTOM-UP
- Dedicated plenum chamber shaped according mould’s diameter and height
- One cooling air flow direction: from bottom to top
- Available for blank and blow side
TIMING SYSTEMS

IS MACHINE TIMING SYSTEMS

ADV SERIES - MUTUAL FEATURES

- Complete integrated control system for control of the entire machine operation from stirrer to ware handling
- Real time telediagnostic
- Possible Servo Feeder Control
- Tandem Capability
- Energy Saving With AFE Technology
- From 4 up to 12 sect.
- Single gob, Double Gob, Triple Gob
- Servo Plunger, Servo Tube Height Positioning, Servo Tube Rotation, Servo Parallel Shear, Servo Gob Distributor, BDF-CWD Conveyor, BDF Dual Axes servo stacker.

INTEGREX

- Simple but effective integrated electronic control system to move from mechanical IS machine
- Compact electric cabinet
- Integrated control system
- Unique control board as with PLC and Operator’s interface functions
- From 4 up to 10 sect.
- Single gob, Double Gob, Drive Controller: max 4 motors for brushless motors.
- Electro-mechanical pusher control Servo gob distributor control.
The Section Controller has max 48 (32 on valves block, 8 blank side, 8 blow side).

ADV 1000 PLUS

- User friendly
- Low cost basic functions
- Possible Servo Feeder Control
- Full integration of BDF stand-alone systems in third part timer

ADV 1000

- Energy Saving With AFE Technology
- Single gob, Double Gob, Triple Gob
- Modular machine and industrial standard for Hw and Sw, with centralised, decentralised and with distributed intelligence
- Full integration of BDF stand-alone systems in third part timer

ADV 8000

- Servo Mechanisms Control
- Stand Alone Mechanisms Control
- Servo Plunger, Servo Tube Height Positioning, Servo Tube Rotation, Servo Parallel Shear, Servo Gob Distributor, BDF-CWD Conveyor, BDF Dual Axes servo stacker.
- Tandem Capability
- Servo Plunger, Servo Tube Height Positioning, Servo Tube Rotation, Servo Parallel Shear, Servo Gob Distributor, BDF-CWD Conveyor, BDF Dual Axes servo stacker.
- Tandem Capability
- Integrated Drive Controller for Mechanical Feeder (when the Servo Feeder is not present), Conveyor, Transfer and Cross Conveyor.
- The Section Controller has 48 outputs, Free assignable events to outputs with attributes for blank or blow side, Integrated electric pusher with step motor, Individual Ware Rejection with manual or automatic stop, Special cycles.
AFE - ACTIVE FRONT END
OUR ENERGY SAVING PHILOSOPHY

We consider a complete BDF system equipped with servo plunger, servo shears, servo gob, servo pusher, servo invert and servo take-out mechanisms.

Considering the system from a mechanical point of view, there is a continuous energetic inertial changing due to the continuously mechanisms acceleration and deceleration.

We may say that for every movement the energy needs for the acceleration is balanced with the energy needs for the deceleration, more the energy to compensate the mechanical and electronic losses. These losses are functions of the machine speed.

As the servomechanisms movements are not in the same time, the excised energy is recovered on the CC BUS. The system takes from the main line only the energy to compensate all the losses (passive energy) that are not compensate from the recovered energy.

The system transfer from the main line to the BUS full power (without cutting) with cos φ = 1.

The sinusoidal current is without low harmonic (is remaking signal), and the only harmonic signal present is very low and with high frequency, because depend from the modulation frequency (PWM signal).

The converter system on the BDF control cabinet is reversible and recover the energy on the BUS line.

- Sinusoidal line current with reduction of the harmonic current distortion THD_i
- Compensation of line voltage variations
- Energy saving
- DC BUS Control also with power line voltage fluctuations
- Regenerative capability thus to make power flow in both directions

---

<table>
<thead>
<tr>
<th>AFE Inverter</th>
<th>Power (kW)</th>
<th>Regenerated Power (kW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains</td>
<td></td>
<td>Wind Power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hydro Power</td>
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</tbody>
</table>

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TIMING SYSTEMS