



Blowing System

APPLICATION

The blowing machine is designed to produce glass items with a wide range of simple and complex shapes: narrow-necked, bulbous, tapered, thin-walled, thick-walled (for cutting), high, slim and wide as well as stemware with no seams. It has been developed to achieve highest quality requirements and to provide highly flexible production conditions.

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GLASS ITEMS

Stemware

- goblet bowls (welding the separately pressed stem and foot onto the goblet bowl in the welding station of the blowing machine)
- goblet bowls with a vacuum-drawn (welding the pressed foot onto the stem in the welding station of the blowing machine)
- goblet bowls with a thick stem and foot (stemware made in one piece in the blowing machine); (stretching the stem in the stretching station of the blowing machine or on the stretching-roundtable)

tumblers, bowls, dishes, lampshades,
bulbous vases, narrow-necked vases, footed vases
bottles, decanters
blown glass items with décor



TYPES OF GLASS COMPOSITION

lead glass, soda-lime glass, recycling glass,
borosilicate glass

DIMENSIONS OF GLASS ITEM

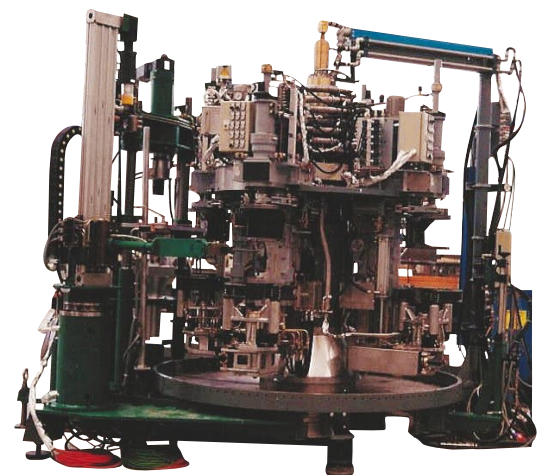
height: 50 mm to 500 mm
diameter: 20 mm to 350 mm

WEIGHT OF GLASS ITEM

100 g to 4,5 kg

PRODUCTION RATE

0,5 pieces/min. (i.e. 1 item in 2 min.)
up to 30 pieces/min.



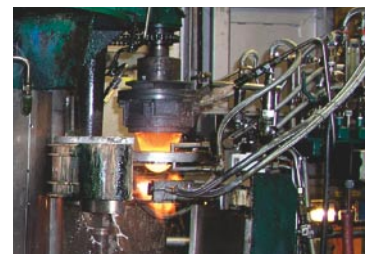
MODE OF OPERATION

The blowing machine is based on the roundtable carrying the blowing stations and on satellite or functional stations. The functional stations indicate the production steps which the individual glass item goes through. The number of blowing stations indicates the production rate. One main feature of the blowing machine designed by Füller is the fact, that the parison is pre-moulded in the first satellite or functional station, which is situated between the feeder and the blowing roundtable. To separate the pre-moulding process from the blowing process saves tool costs and allows to optimize each production step. The parison mould is mounted onto a telescope unit which performs a linear horizontal as well as a vertical movement. The parison mould may thus be moved right underneath the orifice of the feeder for gob-feeding or for a continuous casting feeding mode. A very careful feeding process may thus be achieved, since continuous casting allows to work with higher working temperatures and extremely homogenous glass.

After the parison mould is fed with a precisely defined quantity of glass in the feeding position, the parison is pre-moulded in the moulding position. The pre-shaped parison is then transferred to the roundtable for blowing by the neckring unit. There are several possibilities to pre-shape the parison. Depending on the production target, a deep parison or only a pastille can be pressed. It is also possible to pre-press the parison and to draw a seamless stem already in the parison mould with vacuum. A special mould-layout (of the parison mould as well as the blow mould) allows to use the vertical movement of the substation of the blowing station for squeezing a foot out of the vacuum-drawn stem – allowing to produce stemware in one piece (however implicating limits on design since the stem is short and thick). A modular swinging arm, which may be integrated into the external pre-moulding station, also allows to use the suck-and-blow production mode. The parison is also transferred to the roundtable for blowing by the neckring unit.

Before the blow moulds are closed and the blowing process is started, the shape and temperature distribution of the parison can be precisely influenced in a conditioning station using air-nozzles, burner systems, gravity, vacuum and blowing-air for pre-blowing. This allows to optimize the shape of the parison, to control the wall-thickness distribution very precisely and to further improve the glass quality.

After the parison has been conditioned, the blow-mould is closed and the blowing process is started. The welding station, which is equipped with a double-headed burner system, allows to weld a pressed stem or foot to the goblet bowl or the vacuum-drawn stem, while the blow-mould is still closed for blowing. After cooling, the blown glass item reaches the take-out station, where it is fully automatically taken out and is made available for further processing or annealing.



<p>very high quality</p>	<ul style="list-style-type: none"> • due to optimized feeding, since the parison mould may be moved underneath the orifice of the feeder for gob-feeding or continuous casting, which allows to work with higher temperatures and more homogenous glass • because a separate pre-shaping process provides optimized conditions with regard to temperature control of tools, tooling layout and cycle time • due to a perfectly conditioned parison (heating and cooling in combination with gravity, pre-blowing and vacuum) providing optimal wall thickness distribution and very high surface quality
<p>highly flexible production</p>	<ul style="list-style-type: none"> • because the modular components of the external pre-moulding station allow to use all available operation modes while reducing job-change times to a minimum: press-and-blow, suck-and-blow, rotation blowing and static blowing • since many additional functions may be intergrated for special applications, such as the press-and-blow process with the additional option to use the neckring-unit for moulding the rim (advantage: no processing, no waste glass and extended product range i.e. jars with a handle) • due to satellite or functional stations, which help to extend the product range: i.e. necked vases (conditioning), stemware (welding), extremely thin or twisted stems (stretching) etc. • due to a highly flexible tooling layout, which is suited for large moulds as well as small-size moulds • due to easy job-changes since the MMC-software provides an efficient product management tool which stores the adjustments of all production parameters under the specific name of the glass item and provides optimal production parameters for later resumption of production
<p>optimized production cycles</p>	<ul style="list-style-type: none"> • because transferring the pre-shaped parison onto the roundtable extends the time available for the blowing process – which means to have more time available for conditioning or to increase the indexing speed, because the blowing process can be started immediately • since the modular satellite or functional stations allow to adjust the production cycle perfectly to the requirements imposed by glass characteristics (i.e. cooling characteristics) and the design of the glass item • since the modular satellite or functional stations allow to achieve the maximum speed in each station and to avoid any “bottle-neck” in the production system
<p>large cost-savings</p>	<ul style="list-style-type: none"> • since the external pre-moulding station reduces tool costs significantly, because only one plunger and one parison mould (blank mould) is required • since the external pre-moulding station ensures short job-change times, since only one plunger and one parison mould (blank mould) has to be changed
<p>optimal production conditions</p>	<ul style="list-style-type: none"> • because the static pre-moulding station makes water-cooling for the plunger easier (no rotating water supply for plunger cooling on the roundtable) and allows a more efficient temperature regulation of the plunger using a thermocouple for temperature measuring • because the relevant parameters may be altered while the machine is in operation and optimal results may thus be immediately achieved • because the MMC-software facilitates noting, connecting and keeping record of all adjustments and events and helps to efficiently control and monitor the production process
<p>extremely user-friendly</p>	<ul style="list-style-type: none"> • due to the uncomplicated user menu of the MMC-software • due to the MMC-software’s graphic programming tool which includes all movement cycles, the blowing pressure and the air volume through a proportional valve and pulse width modulation

THE PACKAGE INCLUDES

EXTERNAL PRE-MOULDING STATION

- telescope unit (servo-motor based horizontal and vertical movement for the parison mould)
- servo-motor pressing unit mounted onto the crossbeam
- transfer device for the parison (neckring unit)

ROUNDTABLE WITH BLOWING STATIONS

- servo-driven rotating table
- each blowing station is equipped with split working tables, blowing heads, blow-mould holders and a motor-based substation

CONDITIONING STATION

- air-nozzles, burner systems, vacuum

WELDING STATION

- double-flame burner

TAKE-OUT STATION

- servo-motor based handling unit (vertical and turning movement)

ELECTRONIC CONTROL PANEL

- PC-based real time system with MMC-software and Windows-2000 operating system, incl. cooling system



OPTIONS

NUMBER OF BLOWING STATIONS (INDICATING THE PRODUCTION RATE)

- 1, 2, 4, 6, 8 (up to 20) blowing stations

BASIC LAYOUT

- external pre-moulding station (one or more pre-pressing stations)
- pre-moulding station integrated into the roundtable (on one station)
- pre-moulding equipment integrated into each blowing station
- static satellite or functional equipment (for indexing roundtable movement)
- oscillating satellite or functional equipment (for continuous rotating movement of the roundtable)

MANUFACTURING MODES

- press-and-blow system
- suck-and-blow system
- rotation blowing
- static blowing (three-parted moulds on substation)

DESIGN SPAN

- press-and-blow process with the additional option to pre-mould a parison with a vacuum-drawn stem
- press-and-blow process with the additional option to use the neckring unit for moulding the rim (advantage: no processing, no waste glass and extended product range: i.e. jars with a handle)
- suck-and-blow process (for bottle-necked items)

SATELLITE OR FUNCTIONAL STATIONS

- external pre-moulding station (one or more pre-pressing stations)
- conditioning station
- welding station
- stretching station
- take-out station

COMPLEMENTARY EQUIPMENT (I.E. FOR STEMWARE PRODUCTION)

- feeder system and shear unit
- foot press (the foot press may be fed with a separate feeder system; or the feeder of the blowing machine feeds the blowing machine and the foot press alternately with different gob weights)
- stem and foot press (with split moulds)
- welding roundtable
- stretching roundtable (in order to stretch short and thick stems of one-piece stemware produced on the blowing machine or in order to achieve even thinner stem design requirements than can be achieved with vacuum-drawn or pressed stems)
- flame-processing combi-system (allowing welding, stretching, twisting and/or fire-polishing of vacuum-drawn or pressed feet and stems)
- burning-off roundtable for removing the cap or top of blown glass items
- disc-grinding system which allows sawing-off, grinding and bevelling the rim of (heavy) blown glass items before they are acid-polished or processed on the rim-glazing roundtable
- rim-glazing roundtable for processing the rim after the cap or top of blown glass items have been removed by a cold-cut process (crack-off)
- all necessary handling units

COMPLEMENTARY EQUIPMENT

- external control panel, when there is insufficient space to install the control panel close to the blowing system
- comprehensive control panel for the whole (stemware) production line

