



360° FROM PELLET TO PALLET EXPERTISE

SFR

Rotary Blowing Systems

SIPA



Plastic containers

Materials: PET, OPP, PLA, Multilayer

Types

- Standard and custom
- Lightweight
- Heat Set for Hot fill and pasteurization
- Ultra-Clean

- Light barrier
- Gas barrier
- Humidity barrier
- Aroma barrier
- Active packaging

Products

- Mineral Water
- Carbonated Soft Drinks
- Fruit Juices, isotonic and functional drinks
- Tea, coffee
- Milk and milk based products
- Edible oil
- Beer and liquors



SFR range: high speeds for optimum container quality



SIPA rotary blow molding SFR machines guarantee industrial production of optimum quality containers at the highest production rates available on the market.

Packaging solutions

A Wide Range of Experience. In 30 years of activity, SIPA has built up a wide range of experience in developing preforms and bottles, designing and developing thousands of containers for various applications including beverage, food, detergents, cosmetics, pharmaceuticals, etc.

SIPA is structured to fully support customers providing preform and bottle solutions optimized to meet specific customer requirements and needs, from design to pilot sample supply, to final bottle quality certification. SIPA's R&D team is equipped with unit-cavity machines for both Single-stage and Two-stage process development as well as a complete series of lab testing equipment. Preforms and bottles can be fully tested to qualify dimensions, mechanical and physical characteristics

(AA, permeability, humidity) and to simulate filling and packaging processes.

Complete Solutions. SIPA has developed industrial production technologies for both Single-stage and Two-stage platforms for a variety of applications, as well as turn-key production lines, thus building up deep knowledge of industrial processes. Packaging optimization is fully guaranteed: preform, bottle, closure, label, packaging, storage and transportation.

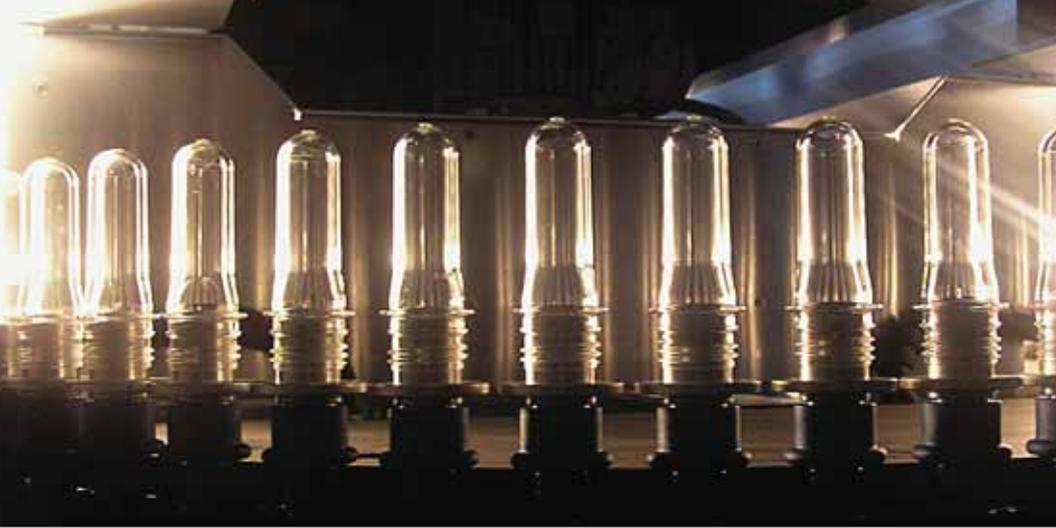
High production rates. SIPA rotary blow molding machines are designed to assure the best blowing process flexibility at the highest production rates available on the market today. With SIPA rotary machines, users can produce

standard or multilayer containers such as carbonated soft drinks at rates of 2,200 bottle/hour/cavity, complex custom containers such as Heat Set containers for Hot filling at rates up to 1,800 b/hour/cavity, or handling and blowing of very light containers with extremely high preform stretch ratios (above 15).

Thanks to the SIPA rotary SFR's unique and optimum oven ventilation system and simple and slow preform handling kinetics, the handling of light and delicate neck finishes remains easy even at such high production rates.

The possible applications are numerous: mineral water, carbonated soft drinks, milk and milk based products, edible oil, fruit juices, detergents, isotonic and functional drinks, beer and liquors.

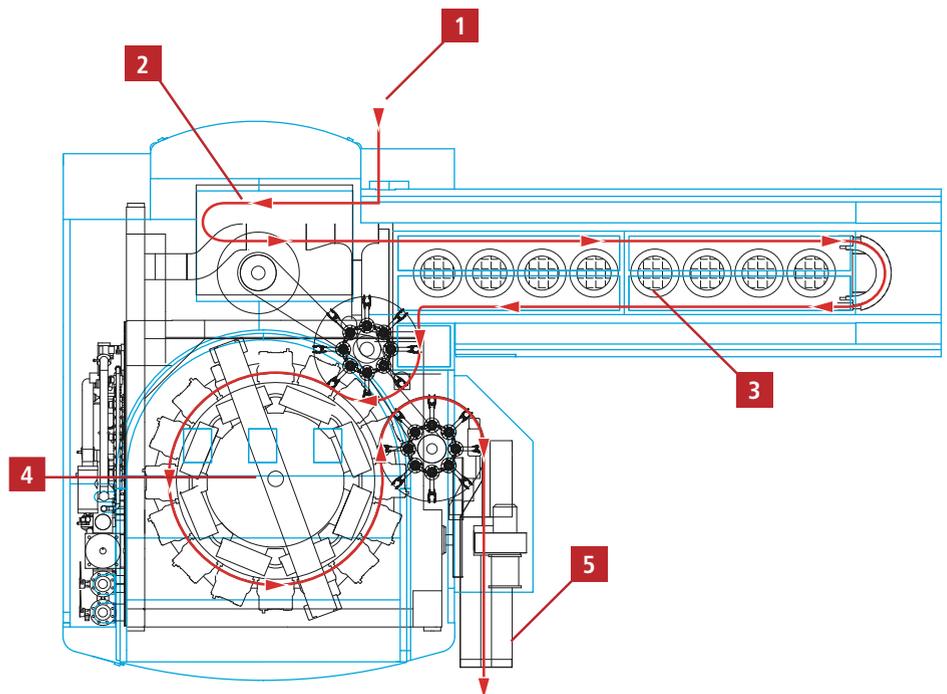




Models	Blowing cavities	Max bottle size (l)	Maximum production rate* (b/hour)
SFR 9/27 Triple	27	0.6	up to 40,500
SFR 9/27 Single	9	3	up to 16,200
SFR 24 EVO	24	3	up to 48,000
SFR 20 EVO	20	3	up to 40,000
SFR 16 EVO	16	3	up to 32,000
SFR 12 EVO	12	3	up to 26,400
SFR 8 EVO	8	3	up to 17,600
SFR 6 EVO	6	3	up to 13,200

* The above figures are indicative and they must be confirmed by the Technical Department for specific applications.

From a complete 360° experience base with all the current technologies for the production of PET containers, SIPA developed its range of rotary blow molding machines for high production rates, flexible blowing process and simple utilization.



1 Preform loading. The preforms are unloaded in bulk into the preform hopper and are then transported by an elevator belt, the speed of which is controlled by the electronics of the machine. Preform loading on oven chain is assured by conventional in-feed screw. Conventional hoppers, elevators, linear unscramblers and chutes can be configured as needed to meet the most demanding space requirements, including remoted locations.

2 Preform transfer. The preforms are loaded into the transportation chain to be sent to the conditioning ovens by means of a mechanical star wheel. Two major preform quality checks are made before the preforms enter the ovens. Each single chain element is made of injected technopolimer, being very simple and light.

Innovative solutions, fast and flexible



The SFR range

Seven models are today available: SFR 6 EVO, SFR 8 EVO, SFR 12 EVO, SFR 16 EVO, SFR 20 EVO, SFR 24 EVO and SFR 9/27.

The number after the acronym indicates the number of blowing cavities. The model SFR 9/27

is equipped with 9 stations able to carry either 9 standard shell molds or 9 triple-cavity molds for a total of 27 blowing cavities. The table on previous page illustrates the max container size and production rates associated to each SFR machine

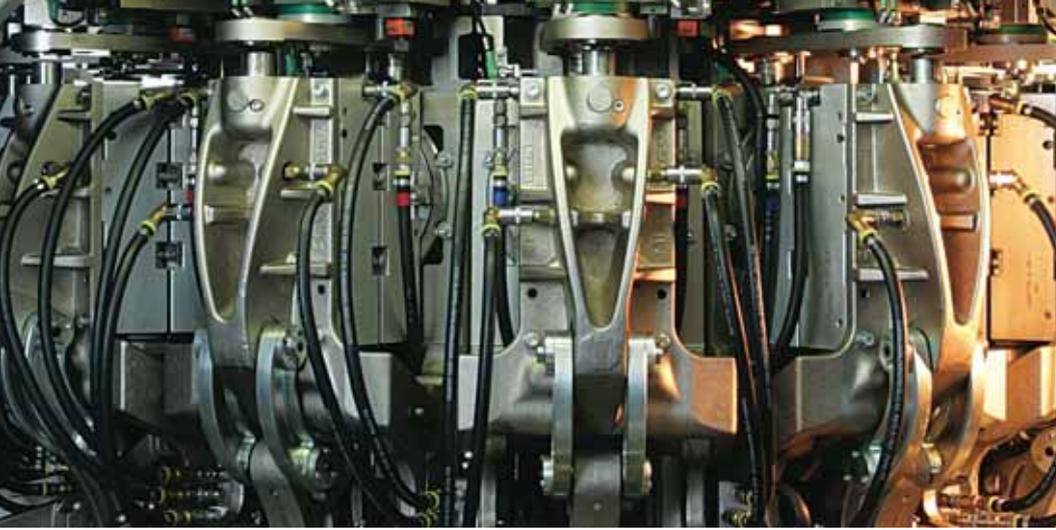
model. SIPA technical and sales departments are available to supply data related to specific applications.



3 Thermal conditioning. Preforms are carried through the oven with neck down while being heated with standard infrared lamps. Each oven module and each lamp can be adjusted with regards to position and power, thus assuring the maximum process setting flexibility. The innovative and patented transversal oven ventilation system contributes heavily in assuring the largest process window in PET blow-molding.

4 Stretch-blowing. Upon leaving the thermal conditioning, preforms are transferred by mechanically synchronized grippers from the transportation chain to the blowing wheel. Conventional cam stretching profile is used. Stretching rods follow a cam profile thanks to Festo pneumatic cylinders action. Monobloc Eugen-Seitz blowing valves for pre-blow, blow, and discharge contribute to achieve the fastest and most consistent blowing process possible.

5 Bottle ejection. The blown bottles are removed from the molds and sent to the ejection guides by means of a wheel and a series of mechanically synchronized pincers. From the discharge guides the bottles can be evacuated either in bulk on a conveyor belt that feeds a silo, or on air transporters that directly feed the filling lines.



SIPA rotary SFR Blow Molding Machines incorporate a series of unique innovative solutions and allow the fastest production rates while guaranteeing optimum container quality, simple and flexible operation, high utilization rates, and low running costs.

The fastest production rates

Conceived and designed back in 1998, SIPA rotary Blow Molding Machines have benefitted in these years from a series of detailed optimizations in materials and components, as well as from SIPA's extensive experience in preform-bottle design and blowing process settings. Equipment reliability has been optimized, and guaranteed speeds increased to the maximum available on the market. SIPA has worked on components optimisation for preform feeding, preform handling, and machine kinetics and today production rates of 2,200 bph per cavity. Blowing circuit configuration, blowing monobloc valves, and up-to-date electronic controls allow the consistent and reliable blowing process control even at such high production rates. The standard SIPA ovens have not required any modification to achieve such very high production rates, thus confirming the unique and great advantages of this SIPA patented oven.

Optimum quality containers

Today's need to reduce production costs poses a great challenge: to guarantee optimum quality containers at the lightest possible weight when produced at the fastest rates. SFR machines have proven to be outstanding performers. The patented oven configuration with the most effective ventilation and with the feature of inversion-stabilization time regulation allows the heating of any preform design, from multilayer to hot fill high IV resin preforms, to very high stretch ratios (up to 15, 16 total stretch ratio), or special containers with no axial stretch ratio whatsoever. There is never the need of going up to high oven temperatures as it is for conventional blow molders. This is a great advantage for a wider process window and for lighter and thinner neck finishes. Thanks to the patented "crocodile" mold opening, the diameters of machine and transfer wheels are much smaller than conventional blow molders with up to 45% slower peripheral speeds. This is a great advantage in preform-bottle handling at high speed, especially in case of thin neck finishes.



THE BEST FIT TO YOUR

Competitive performances and running costs



Reduced consumptions

All process steps were conceived to reduce energy consumption and running costs.

Oven process temperatures are by far the lowest in the category (up to 40% lower than conventional machines) with two important advantages: a) less process sensitivity to ambient temperature variations (wider process window) and b) fastest re-start times from either cold oven or stand-by with very low oven stand-by temperature (normally in the range of 50°C).

Low stand-by and running oven temperatures mean fast start time (higher machine and line utilization) and reduced energy consumption.

The closed loop pneumatic circuit for stretching rods brings the service air consumption for stretching close to zero.

The patented ARS Blowing Air Recovery System incorporates a large air reservoir and allows the unique ability to recover over 50% of precious blowing air.

Reduced maintenance costs

The simplified machine structure and kinematics, along with the patented innovations (oven ventilation, oven chain, mold opening) are the keys for low maintenance costs over the years. In particular:

- the low oven temperatures and the innovative ventilation system reduce the frequency of lamps, mirrors and spindles change;
- the lightweight chain made of simple injected technopolymer does not encounter the typical issues of chain elongation and heavy wear and tear;
- the reduced wheels diameters and peripheral speeds, eliminates the need of classic transfer wheel alignment and shimming (no shimming on SIPA blow molders);
- the "crocodile" mold opening and patented compensation system eliminates the need of shock absorbers.

Compact and clean

Patented Oven ventilation allows for the following:

- simple installation of an optional oven air filtration hood with great advantage to prevent dust contamination inside the machine and the oven. This air filtration hood in association with the grease free oven chain, makes the SIPA oven the only clean oven in the category with the best guarantees against preform contamination;
- electric cabinets are placed underneath the ovens (optimum space utilization);
- ovens are placed at 2 m height and allow for an operator passage underneath with easy access to all machine sides;
- thanks to the mold opening the SFR machines, wheels diameters are up to 45% smaller, thus making the machines the most compact in the market.



PRODUCTION REQUIREMENTS



The numerous SIPA patents show the important innovations and technological solutions available in the SFR Blow Molding Machine range and confirm the ability to achieve outstanding performances.

Preform feeding and handling

- Conventional hoppers, elevators, linear unscramblers and chutes can be configured as needed to meet the most demanding space requirements, including remoted locations. Optional anti-dusting covers with or without pressurization are also available.
- Preform treatment is also available at different degrees, based on the clean or ultraclean system required. Innovative preform de-dusting wheel with ionized air nozzles entering the preforms is available at machine in-feed along with preform UV treatment. Preform loading on oven chain is assured by conventional in-feed screw.
- Thanks to the SIPA innovative oven configuration, the preform chain has been simplified eliminating the need of spindle axial movement for preform pick-up and chain rotation for neck up-down reverse. Preforms are carried in the oven with neck down and the reverse is achieved by the patented oven chain. As a result, each single chain element is made of injected technopolimer, being very simple and light. There is no need for lubrication thus assuring very clean preform handling, and no issue whatsoever with chain wear and tear or elongation. Thanks to the simple chain elements, SIPA has incorporated the unique "Spindle snap-on quick changeover".
 - Chain pitch is 45 mm thus allowing the use of neck finishes up to 40 mm, while optimizing energy transfer in the oven.

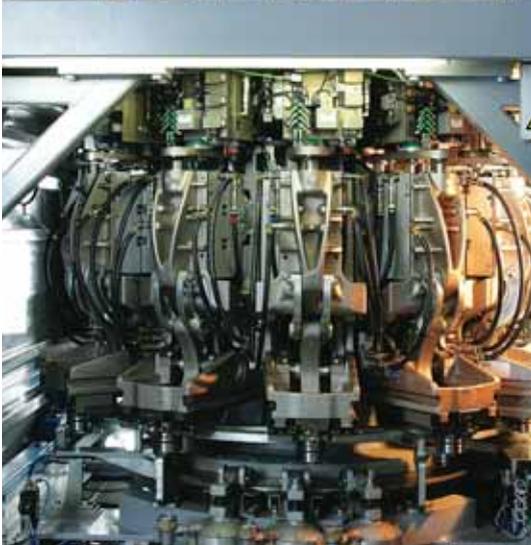
Preform heating and oven ventilation

- The oven ventilation system blows fresh air across the preforms as the highly efficient infrared lamps power ratings can be used to heat the preforms through almost pure radiation while still allowing perfect cooling of the preform surface, the neck finish, and the lamps. Less risk of preform surface crystallization or neck overheating and long lamps life are therefore guaranteed.
- Oven process temperatures are by far the lowest in the category (up to 40% lower than conventional machines) with two important advantages: a) less process sensitivity to ambient temperature variations (wider process window) and b) fastest re-start times from either cold oven or stand-by with very low oven stand-by temperature (normally in the range of 50°C).
- Low stand-by and running oven temperatures mean fast start time (higher machine and line utilization) and reduced energy consumption.
- Each oven module and each lamp can be set in position and power thus assuring the maximum process setting flexibility.
- At the end of the ovens, the chain length is longer than conventional machines, which can be adjusted manually. Perfect stabilization time can therefore be set according to preform weight and thickness in order to let preform temperature stabilize across the preform thickness (hotter inside, colder outside). This becomes an important feature for typically difficult applications such as thick preforms (4.5 mm) at high speeds (2,000 bph per cavity) or heavier Multilayer preforms.
- Before transfer wheel, a classic pirometer checks preform temperature with continuous feedback to oven regulation.

THE ADVANTAGES OF INNOVATION



Unique technology solutions



Preforms and bottles transfer wheels

- Thanks to the innovative mold opening of SIPA rotary blow molding machines, the preform and bottle transfer has been simplified with NO need for the classic telescopic gripper movement. Transferring arms are fixed, thus grippers do not move radially and do not turn. In addition, transfer wheels diameters are reduced by up to 40% comparing to traditional blow molders, thus dramatically reducing the peripheral speeds while guaranteeing level alignment in transferring.

Molds and molds carriers

- Mold opening is accomplished by one mold half making the complete opening action while one "fixed" mold half makes only the compensation movement (pneumatic cylinder moving by 3-4 mm).
- Quick change-over conventional shell type molds are mounted on fixed carriers.
- When molds close, the two mold halves do not make contact (no shock, therefore no need for shock absorbers). At blowing, the compensation cylinder pushes one mold half towards the other.
- Molds carriers are available to allow the use of all shell type molds from conventional blow molders.
- Molds can be thermoregulated with separate conditioning circuits for shoulder, body and base.
- Molds conditioning for Heat Set bottles is guaranteed by the patented SIPA electric heating system (no diathermic oil running through the machine).

Stretch-Blowing

- Conventional cam stretching profile is used. Stretch rods follow a cam profile thanks to Festo pneumatic cylinders action. All pneumatic stretch cylinders are double-action type and are connected to each other in a closed-loop service air circuit. The cylinders going up give pressure and flow to the ones going down, thus eliminating service air consumption for stretching.
- Monobloc Eugen-Seitz blowing valves for pre-blow, blow, and discharge contribute to achieve the fastest and more consistent blowing process.
- Blowing curves are given on real time for each cavity on the operator interface module.
- Stretch rods are available at different diameters or hollowed with recirculation system for Heat Set Bottle production.
- Patented ARS Blowing air recovery system is available as option for all models and applications including Heat Set bottle production. Thanks to the ARS system configuration, air recovery is guaranteed without affecting the blowing process and thus maintaining the same process window.



SIPA SFR Rotary Blowing Machines were conceived and designed to be outstandingly reliable, guaranteeing the widest process window and flexibility, while being simple to use and to maintain.

Process flexibility

The best machine characteristic often appreciated by operators is process flexibility and the wide process window of the SIPA SFR rotary blow molders. Thanks to the oven configuration, for the same container it becomes very simple to adapt the process to a large variety of preforms with different dimensions, and even different resins, while easily managing variations of ambient temperature and humidity.

Automation and operator interface

All SIPA machines are equipped with an Industrial Soft PC Beckhof control with software developed by SIPA's electronics department. Standard Siemens electric and electronic components are used in standard electrical cabinets with Profibus or optic fibers communication; the touch screen operator interface module allows the access and recording of all process and control parameters, alarms and diagnostics, and production statistics as well as maintenance procedures and spare parts lists. Modem connection is available for SIPA Teleservice.

Mold changeover

Quick change-over shell molds are similar and interchangeable with all conventional shell type molds, therefore the blow mold changeover operation is well known in the industry. However, the SIPA Mold opening system allows the simultaneous access to more than one station (on a 20-cavity SFR 20 machine 3 molds can be changed at the same time) and therefore in case of more operators available, changeover time is reduced significantly.

Process regulation and bottle quality control at each changeover is very quick thanks to the SIPA oven characteristics, well described in the other sections of this brochure.

Maintenance

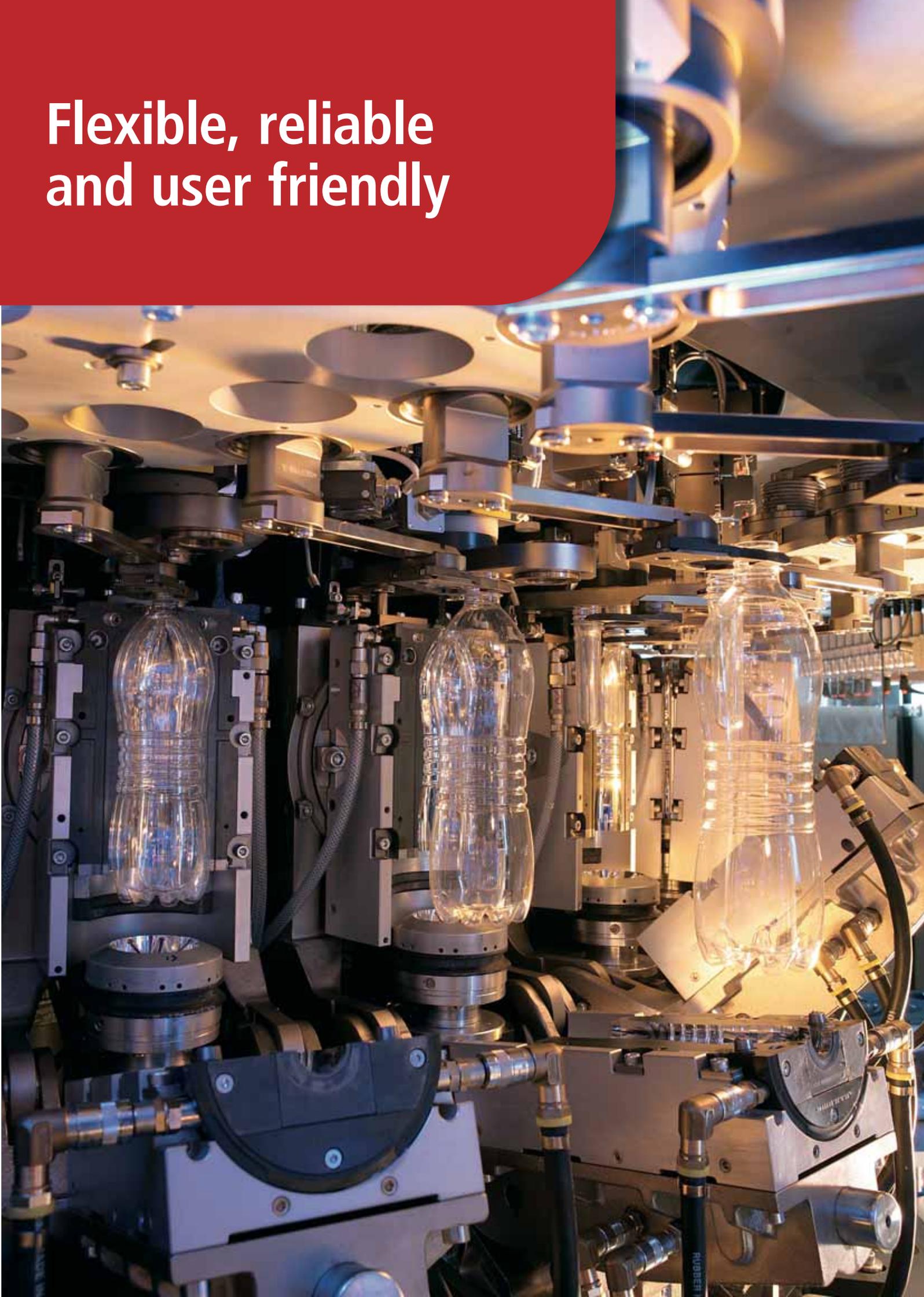
Ordinary maintenance of SFR Machines to be carried out by the operator is limited to checking the blowing circuit and valves with particular care to perfect service and blowing air quality and filtration. Meticulous regular checks must be done for all static position sensors. Their cleanliness and position is vital for the proper smooth running of the machine at such high speeds.

As far as Preventive Maintenance is concerned, the SIPA Service Organisation offers favourable conditions. Carrying out regular and correct Preventive Maintenance is in fact the only way to guarantee high machine utilization rates while minimizing downtime.

BEST PROCESS FLEXIBILITY



**Flexible, reliable
and user friendly**





SFR

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