PPS Preform Production Systems





PPS: an efficient answer to numerous production needs

SIPA preform production systems, ranging from 16 to 96 cavities, display various characteristics and performances while maintaining consistent quality.

Packaging solutions

Extensive experience. During the last 20 years, SIPA has gained a wide range of experience in the development and optimization of bottles and preforms. Over these years it has designed thousands of containers for a multitude of applications, from beverages to food, cosmetics, detergents and pharmaceutical products.

SIPA is able to support its customers by offering the preform and container solution which best suits the customer's specific needs, from the design and supply of samples up to quality certification. SIPA's container prototype department is equipped with two-stage and single-stage unit-cavity machines and a laboratory for the quality certification of the products. The laboratory is fully equipped to perform all the tests normally required on preforms and containers - including dimensional analyses and mechanical, chemical and

physical property tests (e.g. AA, gas permeability) - as well as filling simulations.

Complete solutions. Over the years, SIPA has developed both single-stage and two-stage technologies for a wide range of applications, implementing turn-key industrial plants and acquiring a thorough knowledge of production processes. The company is able to guarantee the functionality and optimization of the packaging as a whole: preform, container, closure, label, packaging and palletizing.

PPS range. Our PPS range includes 3 models: 2 high speed hydraulic injection systems, PPS 96 and PPS 72 and a toggle press, PPS 48. Each model displays characteristics that suit even the most specific production needs: from heavy preform production, to standard or lightened ones.

Materials: PET, OPP, recycled PET, reground PET

Model	N. of cavities	Pitch between Cavities	Productivity* (p/h)	Neck diameter
PPS 96/96	96	50x120	Up to 46,000	30 mm
PPS 96/72	12	60X120	Up to 34,500	38 mm
PPS 72/72	72	50x120	Up to 34,500	30 mm
PPS 72/56	56	50x152	Up to 26,900	30 mm
PPS 72/48	48	60x152	Up to 23,000	38 mm
PPS 72/32	32	75x172	Up to 15,400	48 mm
PPS 48/48	48	50x152	Up to 21,600	30 mm
PPS 48/32	32	65x152	Up to 14,400	43 mm
PPS 48/24	24	75x172	Up to 10,800	48 mm
PPS 48/16	16	75x172	Up to 7,200	48 mm

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





PPS machines are extremely versatile even in terms of their productivity: there are models suited for medium-low productivity as well as for particular applications, such as for the production of heavy and long preforms (up to 240g in weight and 220mm in length), with neck diameters up to 48 mm or machines with higher number of cavities for higher output. The models now available are: PPS 96, capable of running 96 cavity molds for the production of necks measuring up to 30 mm and 72 cavity molds with neck diameters up to 38 mm.

The PPS 72 model operates molds with 72, 56, 48 and 32 cavities. This press can produce neck diameters from 30 mm up to 48 mm for the 32 cavity injection model.

The third model, PPS 48 can be equipped with 48, 32, 24, 16 cavity molds.





Different architectures for a wide range of preforms

SIPA's injection systems for the production of preforms are highly versatile systems, both in terms of productive range as well as for the various types of preforms to be produced.







Plastification. Previously dehumidified PET granules are plasticized in the extruder using a screw specifically designed by SIPA. During the plastification stage the material is melted, homogenized and slowly transported by the screw in order not to generate shear stress and consequently produce AA.

2 Preform injection. The melted material is injected into the mold by means of an optimized injection profile aimed at obtaining high quality preforms.

3 Preform cooling. Once the injection cycle has been completed, the preforms are picked up by an integrated transport cooling system, which cools both the body as well as the neck of the preform without ever coming in contact with the interior.

4 Preform unloading. Preforms are removed from the cooling robot by means of an external grip on the support ring. They are then unloaded onto an expulsion conveyor belt by means of a soft-drop system integrated to the cooling robot.







PPS: a guarantee of simplicity, quality and cleanliness for preforms

Great range of preforms

SIPA's PPS range of machines was first developed and then expanded to offer a simple product capable of addressing the needs of any specific project. The various models in the range allow the production of different types of preforms while guaranteeing constant quality and high savings.

SIPA prides itself of a broad experience both in the design of containers as well as preforms. This experience makes it possible to satisfy the client from the choice of the preform drawing to the design of the container to be produced, both for standard projects as well as for applications requiring particular preforms, for cleaning detergents, personal hygiene, in the cosmetics and pharmaceutical fields. Particular attention is paid to the optimization of the preform drawing when producing more than one format with the aim of reducing the costs involved in the personalization of the molds.

PPS injection systems are capable of processing a variety of materials for a wide range of applications. SIPA injection systems produce preforms in virgin PET resin as well as recycled PET, OPP, light and special preforms for hot-fill containers, heavy preforms and wide neck preforms for jars or for containers up to 20 liters.

Solutions developed and patented by SIPA offer the highest guarantee in terms of guality and cleanliness of the preforms. In all PPS models, the preforms remain onto the take out plate for up to 6 injection cycles. After preforms are removed from the robot, they have a temperature below 40° C at the neck and 20° C in the body. This efficient cooling method prevents necks and bodies from

High quality

and clean preforms

deformation and scratches. Handling and cooling is a clean operation since contact occurs between the external surface of the preform only. No air cooling system is used. Even extraction of the preforms from the take-out plate does not involve the use of air, but rather a mechanical system acting on the preform support ring. There is no other contact between the mechanical parts and the internal part of the preforms during the handling phase.

Optimized cycle times

Limited consumption and costs

SIPA's PPS Injection Systems make it possible for high quality preforms to be produced at fast cycle times. Such high production standards are maintained in all models of the range: PPS 96, PPS 72 and PPS 48.

Reduction of the cycle time is possible thanks to the reduction of the dry cycle, which is lower than similar machines currently on the market. A special mechanism for the press opening and closing further quickens the process, contributing to the overall reduction of cycle time. A specific software synchronizes the movement of the press with that of the handling/cooling robot, making it possible to further reduce the time of the robot in extracting the preforms. In this way the mold cycle is reduced while maintaining low stress in the mechanical parts of the machine.

The PPS press, thanks to newly developed technological solutions, has considerably reduced energy consumption. However, since consumption of the machine itself contributes only to 50% of the total energy consumption for the system, SIPA has developed personalized solutions for the client in order to further optimize consumption of auxiliaries, thus reaching an overall energy savings of 14% compared to other systems. Machine start-up operations are made easier by a hardware and software system that allows the operator to follow the cycle from outside the machine, managing in automatic mode the entire start-up phase and thus providing safety during the purging stage necessary at start-up. This system has made it possible to reduce the amount of material to purge (-50%) as well as purging times (from 20 to 5 minutes). All models are provided with an integrated water manifold and booster pump with great advantages in terms of costs and installation savings.





The heart of the system: the injection mold

Since 1990 molds and hot runner systems have been designed and built in-house to guarantee improved quality of preforms, functionality of the mold and on-time service.

SIPA's Mold Division designs and produces complete injection molds for PET preforms to be used in single-stage and two-stage machines and for other machine models present on the market, hot manifolds and closure molds, injection components, blow molds for machines produced by SIPA or others.

Thanks to the broad experience acquired through the years, SIPA has developed a layered structure injection mold. This idea presents numerous advantages both from the point of view of maintenance as well as for mold changing. The molds are provided with guick and independent user connections, facilitating quicker maintenance. Even during replacement of the nozzles or heating components and temperature control, it is possible to intervene without disassembling the mold.



A versatile, economical and reliable range

Plastification

- The many patented technological innovations highlight SIPA continuous improvements to offer a range of injection systems that guarantee versatility, reliability and savings.
- The extruder continuously plasticizes PET with a specially designed screw eliminating any back-flow of melted material. Thanks to the continuous extrusion, the average melting speed is decreased and results in a lower stress on the material and reduced production of AA.
- The extruder module allows the use of three types of injectors: 3500, 4500 and 6000 g.
- Two wide range screws: 120 mm and 140 mm to improve flexibility in the number of injection mold cavities.

Injection

- Continuous control of injection and holding phases as a guarantee of repeatability and quality of the process.
- INNOVATION: SIDAS SIDAS DAL New hydraulic buffer operated by a software is now available as standard for injection cycle completion in case of power cut-off thus allowing easier mold purge and scrap discharge after power cut-off.

MING FORCE

Injection Mold

- Layered injection mold structure (Adaptor plate - base plate - hot runner - nozzle plate - cavity plate - cores plate).
- Enhanced temperature control of molds (4 different cooling circuits).
- Individual control of each injection nozzle temperature.
- Each plate has individual cooling circuits.
- Mold with single cam: improved accessibility to facilitate maintenance, simpler hydraulic system, reduced component wear.
- Molds equipped with self-lubricating bushings and wear plates.

Cooling Robot RT

- The robot movements are electrically controlled, eliminating the risk of contamination of the preforms.
- Patented water cooling device is made up of 4 to 6 stations of post mold cooling.
- The robot configuration provides for long cooling time (preventing scratching and any possible ovalization of the neck) without interfering with the cycle time and hence with the productivity of the machine.
- The innovative preform take-out plate does not require cooled air jets or any further cooling devices inside the perform.
- · Fast changeovers of the quick format (only 4 screws, does not need to be in line with the mold)



Preform Unloading

- Two-way elevator integrated in the machine. Third independent elevator for non-compliant performs.
- Preforms unload from cooling belt by means of integrated soft drop.

Automation

- All SIPA machines are supplied with a Beckhoff industrial PC with software developed by SIPA using a Windows® operating system.
- Siemens electric-electronic components and Profibus and optical fibers communications.
- Touch-screen graphic interface: machine control and process, alarms and diagnostics, production statistics, recipe storage, maintenance and procedures videos, manuals and spare parts lists.
- Modem connection to SIPA's Customer Service.

Layer structure of SIPA's injection molds allows for easier maintenance operations.









PPS systems: easy to run and maintain

Operator interface

SIPA's injection systems have been designed with reduced components and moving parts while guaranteeing easier access to all machine parts for faster and easier maintenance.

Command and control of the system occurs through a color touch-screen graphic interface. The interface is intuitive allowing access to and storage of all control parameters of the machine, alarms and diagnostics, production statistics, maintenance and operation videos, manuals and spare parts lists. Furthermore, the machines are provided with a modem connection to SIPA's On-Line Customer Service.

Mold and cooling plate change

The mold is provided with a new fast loading/ unloading system. It can be easily removed from both sides of the machine through the use of rollers.

Each injection mold change must be followed by the replacement of the take-out plate, this action is also rather simple and quick, just replace the complete plate by loosening the four supporting bolts. A perfect mechanical interface is assured by the use of a single keyway. This means that a format can be changed in only 30 minutes irrespective of the number of cavities, from 16 to 96.

A recent invention is the fast core change, permitting core changes in one and a half hours.



Accessibility and maintenance

Simpler mechanics of the system, guaranteed high reliability standards.

Particular attention has been paid in order to ensure easy accessibility to all components. Many parts of the machine, in fact, can be easily accessed through sliding doors. The top of the machine is also provided with a sliding door to easily access even the most remote areas of the machine.

The new quick loading/unloading system makes it easier to remove the injection mold, sliding it along roller guides from either side of the machine. Thanks to the particular layered structure, typical of all SIPA injection molds, it is possible to easily intervene in the machine, for the replacement of the hot manifold and nozzles.

Furthermore, the machine can provide detailed diagnostics allowing immediate intervention. SIPA has then implemented a preventive maintenance plan: a useful tool to guarantee long term efficiency.

System engineering

SIPA supports the customer with a systems engineering service including:

- PET resin drying auxiliary sizing, room conditioning, compressed air, cooling water.
- Systems engineering: specific system layout and integration in the plant, piping and cabling distribution and P&I dimensioning.
- Study of the warehouse and material flow.
- Energy balance for the production systems.
- Analysis of the production costs and proposals for cost reductions.



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