With four decades of presence in the plastic industry, Piovan acquired global expertise in all fields of application. Four are the businesses of focus for its worldwide organisation:

> Injection & Blow Moulding
> Extrusion
> Optical Disc
> PET Perform

Specific knowledge and experience are fundamental requirements to manage every one of these areas of business. Piovan’s exposure in the field of PET preform, with more than 2,000 installations in the world and a market share of above 60%, is the basis to gather unique and exceptional understanding to respond to every and any demand.

Reliability is key. Uninterrupted operation proved in years, twenty-four hours a day, seven days a week, makes the Piovan equipment for PET preform applications the unequivocal choice for the industry.

Innovation is a must. Piovan’s R&D activities are behind every solution introduced in the market. Industry-leading standards for machine performance with the minimal energy utilisation is the result.

Applications, technologies and processes are in continuous growth and the direction entertained by the industry leads Piovan to constant development of new solutions. Innovation is required on several fronts, such as recycling and energy conservation.
Resin handling systems

No matter what the source is, the wide range of solutions that Piovan offers makes resin handling smooth and easy. Outdoor or indoor silos, octabin, gaylords or bulk-bags, close or far, represent the various circumstances to manage. Virgin PET, reprocessed granules, regrind, PCR, additives and master-batches can be conveyed from any distance and at every capacity in respect to all specific mechanical and physical characteristics.

Silo loading systems, bulk-bag unloading systems, PCR handling equipment and reject recovery solutions are part of the range of applications possible.

One central control with touch-screen operator interface manages all vacuum conveying operations and provides full monitoring and ease of use.
The most delicate phase of the overall production process is represented by the drying cycle. The treatment of drying and thermal conditioning of the PET granules is vital and in case that it be performed incorrectly or incompletely no recovery is possible at the plastification barrel of the I.M.M.

The New Series of DP Dryers of Piovan is designed for optimised and constant operation conditions under all process circumstances:

- variable moisture content and temperature of the PET granules depending on storage manners
- variation of powder content of the PET granules depending on supply and methods of transportation
- unexpected, irregular and variable in time interruptions of the I.M.M.
- preservation of PET granule characteristics during planned and extended I.M.M. shut downs

The auto-adaptive operation principal of the New DP Series Dryers ensures optimal performance and constant feed of quality resin to the I.M.M.
At start-up or after an extended shutdown period, wet and cold PET granules are fed from storage into the drying hopper. It is, at this point, imperative that maximum capacity of the drying system be available to minimise the waiting period prior to the I.M.M. start-up.

During steady operation conditions the drying system self adjusts all the process parameters, like temperature, dew point and flow of the air and the residence time of the PET granules in the hopper, to achieve the highest process optimisation with the lowest energy utilisation possible.
For high throughput systems the use of a return air cyclone filter is recommended. The cyclone filter separates most of the dust and fines before the process air enter the dryer, drastically reducing the need for ordinary filter cleaning. The cyclone filter is equipped with a dust collector box that can be emptied without stopping the dryer.

All PET Drying Hoppers are manufactured out of stainless steel and are fully insulated. Regular mass flow and resin descent is guaranteed in combination with optimal heat/energy transfer from process air to PET granules.
The new PLC based control of the DP Series Dryers with touch-screen operator interface provides full accessibility and monitoring of all operation parameters. The Automatic Energy Management Kit (EMK) performs self adjustment of all the process parameters of the drying system to obtain excellent drying and thermal conditioning of the PET granules with the lowest energy utilisation possible.

Maintenance is of the essence for a continuous and performing operation. The Piovan DP Dryer Series stands out thanks to very minimal requirements of routine maintenance. The activities of cleaning or replacement of process filters can be performed without interrupting the regular operation of the dryer.
Proper moisture removal is achieved by heating every PET granule uniformly.

Optional solutions to conventional electrical process air heating are available. The new GH Gas Heater Series of Piovan, supplied with either natural gas, propane or butane, offers extraordinary energy cost savings. Electricity cost has constantly increased in the latest ten years and will further increase in the years to come. Gas heating has been and will still be the best way to lower the cost of drying. With efficiency of exchange in excess of 90%, the GH’s are the most performing gas heaters available in the industry. Compliance with CSA, UL and EC standards.

Cost per year GAS vs ELECTRIC

(Figures based on European average cost)
The New Automatic EMK provides adaptability and flexibility to the PET drying systems so to self adjust all process and operating parameters. The New DP Dryer Series incorporates the EMK to achieve the highest level of dryness and thermal conditioning of the PET granules with the lowest energy utilisation possible.

The Automatic EMK controls the following system functions:
- process air flow
- heating power
- material level in the hopper
- cooling water
__DOSERS__

In PET preform production processes the addition of additives, solid or liquid, may be needed. The range of equipment that Piovan offers for the various applications covers masterbatch/colorant, liquid additives and regrind dosing.

__masterbatch dosing__

The MDT3CH is the Volumetric Masterbatch Doser to be installed on the feed-throat of the I.M.M. that can handle regular and micro granules with conventional and low melting point temperatures.

All parts in contact with the masterbatch are made of stainless steel. A continuous cooling water circulation prevents melting of the masterbatch.

Additive materials such as AA blocker, MXD6 and others, can also be dosed. The precision of dosage is obtained by a microprocessor based control unit that detects the number of revolutions of the dosing auger.
_liquid colorant dosing

The LD10 is the doser for liquid colorants. It consists of a volumetric high precision pump that transfers the colorant to the I.M.M. feed-throat. The microprocessor control performs accurate operation of the brush-less motor drive. Quick colour changes can be carried out by replacing the pump body which is easily detachable by means of quick connects. The level of colorant left is monitored by an ultrasound level sensor.

_regrind dosing and blending

The percentage of regrind to recycle is very variable and depends on process, application and final product. Piovan offers a solution to every requirement.

Small percentages can easily and simply be dosed into the drying hopper using the VP proportional valve.

Regrind in higher percentages can be recycled by blending it with virgin PET granules using the MDW gravimetric blenders. Centralised or individual solutions are provided by Piovan for this more and more common application.
PREFORM AND BOTTLE RECYCLING

Handling, drying, blending and feeding of recycled materials requires knowledge of all possible consequences and implications. Piovan strives to make this and every other processes transparent to the end user in form of state of the art technological solutions and applications.

The new scrap recovery system of Piovan is suited for all those circumstances where reject preforms and/or bottles must be recycled.

This innovative and state of the art system of Piovan consists of the following components:
- in-feed conveyor for preforms and bottles c/w metal detector tunnel
- high power low speed rotation granulator
- evacuation system c/w blower, cyclone, powder separation and collection bin
- conveying auger to dust and fines separator
- dust and fines separator system c/w fines separator, powder evacuation blower and filter
- ferrous and non-ferrous metal separator
- stainless steel collection bin of clean and de-dusted regrind c/w suction box
Crystallisation process takes place in a hopper with agitator shaft. The stirring action of it prevents formation of lumps and bridges of the naturally flaky PCR.

All Piovan crystallizers are entirely made out of stainless steel and are totally insulated.

Country norms or company objectives encourage the use of Post Consumer Regrind (PCR). Existing technologies allow the use of PCR in the bottle-to-bottle process. Preform suppliers are looking more and more at ways to increase the percentage of in-house regrind from reject parts. Crystallisation is the answer.
Water condensation on mould surface and cavities severely affects quality of parts and system productivity. Also, prevent water condensation helps extending mould life expectancy.

The RPA mould dryer series of Piovan provides constant and stable environmental condition in the mould room enclosure under every atmospheric circumstance.

Small, medium and large application solutions cover the entire range of moulds and/or machines currently available in the market. The supply package from Piovan consists of RPA mould dryer, interconnection piping to the mould room enclosure of the I.M.M. and the enclosure itself. The RPA can be positioned beside the I.M.M. or on the mezzanine floor.
Specifically engineered solutions that respond to the stringent needs of the process are developed by the Piovan Cooling Centre.

Not only the wide range of Piovan chillers represent what the cooling centre can offer, in fact in typical applications for PET preform production a complete solution is required. If environmental conditions allow, the solution can comprise the utilisation of free-coolers or cooling towers to supply water to the 32°C circuit, thus obtaining significant savings in energy utilization. One set of pumps ensures constant water circulation at controlled pressure to mould and mould dryer.
One separate set of pumps is used for the circuit to machine and resin dryer. Pumps and water control valves, complete with power/control panel, can be supplied on integral skid.

The water pressure of both circuits is automatically kept stable by means of automatic by-pass valves. Also, frequency controlled pumps are available on request.

The temperature for both circuits, the functions for the chiller units, and the operation of water flow control valves are all managed by a central control panel, that also controls the interface to free-coolers or cooling towers.
SVS PLANT SUPERVISORY SYSTEMS

Plant distributed control systems for management, monitoring, production scheduling and equipment maintenance are more and more taking root in the industry.

Piovan’s SVS Plant Supervisory System is the solution to every specific need in the field of PET preform production. The remote access to all Piovan and non-Piovan equipment allows in-line monitoring and management of equipment functionality and performance and production scheduling. Diagnostics and troubleshooting and maintenance scheduling are also provided by the SVS.

All graphics and software development are customised and reproduce the exact plant and equipment layout.

The SVS is an open environment software and can be connected to every existing company’s business management system. Also, the SVS is remotely accessible and offers full availability of data, process conditions and production monitoring from designated and authorised locations.
The measurement of Acetaldehyde contained in PET preforms has become a key acceptance test that all producers must today perform. The PETes AA Analyzer of Piovan is the most accurate and the only repetitive and repeatable method to reliably determine the AA content in PET preforms, in an extremely simple, fast and guaranteed way, with precision of analysis greater than 99%.

With the conventional GP method (Ground Parison) the PET preform must be cut, ground, weighed and finally analysed. With the PETes method the whole preform is analysed, yet keeping the principle of the gaschromatography technology. The result is accuracy, stability and repeatability, as the analysis is not anymore subject to any preventative preparation of the sample.

In one single desktop type cabinet, the PETes AA Analyzer incorporates one de-adsorption cell, one gaschromatograph, one microprocessor control and one colour LCD interface to the operator.

Two versions for the PETes AA Analyser are available: Lab, for use in a laboratory environment and Turret, for industrial usage (production floor).
The usage of auxiliary equipment is extended to the process of handling the just moulded preforms in a suitable manner. Piovan provides its solutions for preform handling and storage systems, the Soft Drop.

With a single or dual preform container position assembly, the Soft Drops are the solution to problems of deformation or scratching of the preforms. The soft drop action of the pneumatically operated descending hoppers prevents visual and mechanical problems from occurring and ensures proper and complete filling of the preform container.

Optional vibrating pads or assemblies with three or more positions are available upon request.