

Revolutionary Vacuum Drying Concept

Planex® System: multi-patented paddle dryer with ZeroFriction® planetary movement eccentric agitator.

talvacuum, one of the most known manufacturers of vacuum dryers and vacuum pumps for the production processes of chemical, pharmaceutical and cosmetics industries, has recently introduced on the market an innovative horizontal paddle dryer. It is Planex System, a multi-patented machine, which is conquering the most demanding operators from all around the world, by guaranteeing results that were unthinkable till now with conventional systems, both horizontal and vertical.

Designed to dry wet feed from filtration and centrifuging processes Planex System is ideal for the production of active pharmaceutical ingredients (API), fine chemicals and intermediates.

The major added-value of Planex System is the eccentric agitator with two independent movements that can simultaneously revolve around its own axis and rotate tangentially to the drying chamber.

The combined rotations of the agitator and its small size compared to the drying chamber diameter, ensures the perfect mixing of the entire batch, and allows consuming at least three times less energy than conventional dryers with concentric agitators. This means a



Planex System front view.

three-fold reduction in mechanical and thermal stresses on the batch being dried (Analysis by Politecnico di Torino's Department of Materials Science and Chemical Engineering). As a result, even the most delicate and temperature-sensitive products are treated with maximum care.

But there is more. The Planex System control software allows to automatically command the agitator movements with the Stop & Swing program. In this way, the agitator swings back and forth, thus remaining all the time immersed in the product, and guaranteeing its continuous mixing. This approach is particularly effective when processing small batches.

Moreover Planex System, thanks to its agitator's ZeroFriction planetary movement, prevents the product from being rubbed against the drying chamber walls and thus heating up due to friction, a typical problem in conventional paddle systems. In addition, the rotation of the paddles tangentially to the chamber walls, conveys the product into the small clearance between the agitator and the chamber surface, preventing lumps formation and guaranteeing an even more effective drying and a controlled final particle size distribution, which is impossible to achieve with conventional dryers.

The minimum clearance between agitator profile and chamber walls not only prevents product build-ups, but it also makes discharge significantly easier. In addition, there is a specific automatic program for the discharge operations. These operations are even more effective thanks to the "pendulum" movement of the agitator (the agitator "pendulum" movement), which swings by 90 degrees in the discharge area. As a result, the amount of product left in the Planex System chamber after

discharge is truly minimal, averaging less than 1% of the volume.

Planex System also features outstanding loading flexibility. The system is available with total volumes ranging from 150 to 3,200 liters. Maximum loading capacity depends on the product to be processed, and can vary from 15% to 80% of the chamber volume. The system can meet all the production needs of the pharmaceutical and chemical industries, as it is capable of processing small amounts of product as well as large batches.

Planex System is safe for operators, the environment and the product, because it is designed and manufactured in compliance with European Union ATEX Directives and CE marking requirements, as well as with the increasingly stringent US FDA standards and cGMP Current Good Manufacturing Practice Regulations.

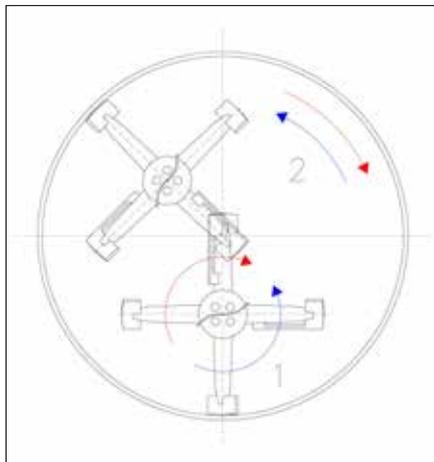
Manufacturing Materials

All the parts of Planex System that come into contact with the product are made of AISI 316L stainless steel, but other weldable materials such as Alloy C-22 and AISI 904L are available on request. The drying chamber walls, the agitator shaft and the access hatch are heated by diathermal fluid circulation to prevent cold spots that could cause solvent condensation or product buildup.

Internal surfaces of the drying chamber are lapped or electropolished to optimize corrosion resistance, reduce adhesion



Eccentric agitator profile.



Agitator movements.

and friction on the product, improve powder flow behaviour and facilitate cleaning operations.

The shaft of the agitator is complete with a double mechanical seal system, studied to guarantee the perfect vacuum tightness and the absolute purity of the dried batch, avoiding any risk of contamination of the product. The mechanical seal may be of conventional type with wet flushing or run dry with nitrogen immission.

Cleaning

Planex System is designed and developed to make cleaning operations outstandingly fast and effective. This is an important consideration for any machine, and one that is absolutely essential for a dryer that customers from all around the world have selected for its versatility and ability to be used in multi-product assets. Ease of cleaning, in fact, means that all the operations involved in washing the interior of the dryer, removing the internal parts, inspecting the unit and cleaning the exterior are simple and straightforward.



Clean room installation.

Internal Washing

The fully accessible chamber interior, with no hard-to-reach zones or areas that could trap product residues, ensures that the entire dryer can be perfectly cleaned. To make the washing operation even more effective, the dryer is equipped with an efficient CIP system with retractable rotating washing head. Equipping Planex System with the CIP washing unit not only guarantees perfect cleaning, it also provides significant savings: the agitator's off-centered position enables it to rotate during washing, thus reducing the amount of liquid needed.

Internal Parts Removal

Thanks to its special structure, the agitator can be readily disassembled into removable sectors, thus making cleaning operations even more effective. This is an exclusive feature that makes Planex System a one-of-a-kind dryer: in conventional systems, the agitator is made of a single structure and removing it requires the use of bulky equipment and long system downtimes.

Internal Inspection

The big front-opening hatch provides full access to the entire drying chamber. Other advantages include the agitator's off-centered position. This allows the operator to have more room to work, making it even faster and easier to carry out swab testing.

External Cleaning

The exterior of Planex System is also easy to clean. The entire machine is housed in a sealed external casing (cGMP particle-free configuration) which encloses the insulation and all electrical, hydraulic and pneumatic circuits. In addition, no support to the machine is present in the clean room, as the drying chamber is flange-mounted on the wall. In this way the chamber exterior can be cleaned quickly and effectively, avoiding product accumulations in slots or junctions.

These features, combined with the partitioning approach, permit clean room installation, so that the clean area can be pressurized and kept separate from the technical area.

Pilot Trials

In its factory Italtvacuum has a range of pilot systems, which allow carrying out semi-industrial scale drying tests on customer's products. During pilot trials, product samples can be taken for analysis without breaking the vacuum and the process parameters can be modified at any time in order to reach the ideal drying process. In this way customers can choose the Italtvacuum system that best meets their needs.

Turnkey Systems

In addition to the dryer, Italtvacuum is the only manufacturer in the world that can design and produce internally all the auxiliary units – vacuum system included – ensuring that they are sized to meet any processing requirements:

- Saurus939 high vacuum pump
- Vacuum condensation unit for drying time reduction and extracted solvent recovery
- External cyclone filter, designed in order to prevent pressure drop and condensation, for full vacuum line protection
- Heating/cooling units for system temperature regulation
- PLC control system with CFR 21 Part 11 certified software, able to guarantee reproducible dried batches and interface with centralized control systems.

Strengths

- 1) Energy consumption three times lower than in conventional dryers
- 2) Three-fold reduction in mechanical and thermal stresses, to the benefit of product purity
- 3) Eccentric agitator with ZeroFriction planetary movement:
 - no localized friction on the product
 - possibility to process very delicate temperature-sensitive products
 - no build-up
 - guaranteed final particle size
- 4) Ideal for processing also small batches, thanks to the automatic Stop & Swing program
- 5) Easy total discharge thanks to:
 - minimum clearance between agitator paddles and fully machined drying chamber walls



Saurus vacuum pump front view.

- special automatic program
- 6) Faster drying times thanks to the combined rotations of the agitator, which increases the product surface exposed to evaporation
 - 7) Very high final vacuum levels
 - 8) Easy cleaning of interior and exterior, with practical access for inspection and swab testing
 - 9) Simple agitator paddles dismantling and removal, without long machine downtimes
 - 10) Full system automation guarantees batch-to-batch process

Italvacuum Innovative by Tradition

Pushing forward the frontier of innovation every day, this, from the very beginning, has been Italvacuum's mission, among the world's leading manufacturers of vacuum pumps and vacuum dryers for the chemical and pharmaceutical industry. Thanks to over 75 years of experience, Italvacuum is able to realize cutting-edge equipment. Top quality, safety and productivity in any application, with a special care for sustainability and total respect for the environment.

A reliability guaranteed by an established presence all over the world, with a constantly growing number of installations, and by international patents.

Italvacuum in India

Italvacuum is well known in India for its vacuum pump, named Saurus939, which guarantees unrivalled performance in all the main chemical and pharmaceutical processes. A simply designed machine, that combines traditional robustness and reliability with the most evolved technology. Resistance, strength and consumption of oil virtually eliminated thanks to the innovative LubriZero® system, a solution which guarantees perfect operation and optimum results with total respect for the environment. Saurus939 has no fear of aggressive and corrosive solvents, powders and condensates, nor distillation by-products. But above all it does not fear confrontation because it is designed and manufactured to work 24 hours a day with a constant excellent performance and minimum operating costs, thanks to a low-energy motor, negligible oil consumption and easy, immediate maintenance. Powerful, efficient and absolutely safe: Saurus939 guarantees optimum safety through the whole process and complete purity of the final product.

Thanks to the cooperation with Vac Enterprises India LLP, based in Mumbai and well rooted in all the country, more than 500 Italvacuum vacuum pumps have been installed in India. With a very competent staff, Vac Enterprises India LLP is able to understand every client requirements. This

is also due to the training provided to all the salesmen and technicians that are constantly updated with regular courses.

Italvacuum is going to approach the Indian market also with its vacuum dryers line including:

- Planex® System, multi-patented paddle vacuum dryer with ZeroFriction® planetary movement eccentric agitator (Visit ChemTECH World Expo 2017, Mumbai, 14-17 February, Hall 1-Booth B13 C).
- CRIX® System, rotary vacuum dryer/powderer with motor-driven lump breaker units for patented quality acknowledged all around the world.
- MULTISPRAY® cabinet dryer, vacuum tray dryer with patented CIP MULTISPRAY fast washing system for fast cleaning of all internal parts.
- CosmoDry® System, paddle vacuum dryer with concentric agitator, fitted with a shaft that can be disassembled in sections, for maximum ease of cleaning and inspection.
- LaboDry, laboratory-scale vacuum tray drying oven designed for glove box installation.

Planex System has just won the Dry Trophy Innovation Award 2016, prize organized by NWGD (Dutch Working Group on Drying), sponsored by the Dutch government, which promotes innovation in the drying field, especially with regard to energy savings, as you may see from the below link and the enclosed winner prize certificate.

www.bulkgids.nl/nieuws/dry-trophy-voor-vacuudroger-italvacuum-4157.html

You may find further information on their Planex System on the following websites www.planexsystem.it/en/home / www.italvacuum.com ■



Visit Italvacuum
Hall 1-Booth B13 C at
ChemTECH World Expo 2017,
Mumbai
from 14-17 February 2017.