



Modula: the high-efficiency drying solution

New line of auto-adaptive multiple hopper drying systems delivering optimal and consistent operating conditions and lower energy consumption. First patent issued in Europe for a high-efficiency polymer drying system.

The plastics industry processes non-hygroscopic and hygroscopic polymers. In non-hygroscopic polymers, the moisture is superficial and therefore eliminated by routine drying. With hygroscopic polymers, on the other hand, the moisture also penetrates into the resin, and so a drying system generating dry air using aluminium silicate, a material capable of trapping water molecules, is required.

Modern drying systems do not stop at drastically lowering residual moisture, instead they regulate the exact content to required levels for polymer processing. The systems are highly reliable - which means operating consistency and repeatable results - and energy efficient.

In developing the new Modula, Piovan has incorporated process control elements in addition to these bonus features (high operating reliability, energy efficiency):

- consistency in the physical characteristics of the polymer after drying;
- the system is adapted automatically to the initial conditions of the polymer and those required by the process.

There are many variables in the drying process:

- drying temperature;
- air dew-point (the quantity of residual moisture);
- the airflow capacity and the properties of the plastic granule to be processed;
- ambient temperature;
- initial moisture;
- instantaneous quantity of material processed;
- residual moisture.

All these parameters have been taken into account in the Modula project, launched by Piovan in 2010 and now offered in a new range of systems.

Modula is a multi-hopper, central, fully automatic drying system

It can adapt and automatically control operating parameters based on ambient temperature, initial moisture level, type and quantity of polymer, the final moisture content of the polymer, and granule size. In the case of applications that involve a number of materials of different kinds, a central unit is commonly used to generate dry air, which is then distributed to a series of hoppers, one for each material. Each hopper requires specific conditions for optimum operation (air flow, temperature and pressure) depending on the different process variables.

A safety condition is systematically adopted and the drying system is sized based on the most critical processing parameters, at maximum material consumption, at maximum temperature, with the highest airflow. However, this goes against any principle of energy efficiency and raises running costs, as these extreme conditions rarely occur. Instead, Modula software adjusts and controls optimal operating settings for each hopper using only the overall amount of energy strictly required. The settings are constantly compared with the data collected by the sensors installed on the system. A patented measuring unit, located in the air supply line at each hopper, adjusts and control the air flow instantaneously

and independently. The total airflow is modulated automatically by the central drying unit, resulting in optimum process operating conditions. This way, a medium capacity Modula system (drying 200-250 kg/h of polymer) provides savings of as much as 50% with respect to traditional central drying systems of equivalent capacity.

Today Modula is the only central drying system capable of calculating exactly how much material, for each type, is used by the presses and adjusts the operating parameters accordingly. In addition to maintaining a constant dew-point, Modula adjusts the airflow to the quantity of material effectively used, regulating the thermal load for each kg of polymer processed.

The control system of Modula is provided with an algorithm which varies the quantity of air supplied to each individual hopper, circulating the air content required to keep the thermal load constant. Maximum operating efficiency is achieved when the entire thermal energy in the hopper is transferred to the material.

The air returning from the hopper to the dryer therefore does not require cooling water in order to ensure system operation and absorption by the aluminium silicate molecular sieves. In May 2013, Piovan obtained for Modula the first patent issued in Europe for a high-efficiency polymer drying system.

Modula: configurations and features

The new configuration features an air generation unit that connects to up to 16 hoppers. The unit can be set up to operate in parallel to guarantee 100 per cent redundancy, in other words delivering absolute operating consistency. In this instance, the 2 generation units always work in partial load mode to maximise the energy efficiency of the inverter-controlled, IE3 class process blowers.

Each hopper has an independent heating chamber to control the polymer temperature and a measuring system for the air flow designed and patented by Piovan that instantaneously measures the quality of the air flow, even if turbulent and at changing temperatures and pressures.

The Modula range today comes in 3 configurations – SMART, PLUS and ADAPTIVE – to meet diverse operating needs.

A microprocessor, controlled by Piovan propriety software, provides electronic control. The operator's interface is an 8-inch, colour touch screen. The central panel offers access to all the system's components, while each hopper is fitted with local control panel for specific adjustments or settings.

The hoppers have new shock-resistant finish and maintain the exclusive Piovan design which, in addition to ensuring operator safety – independently from the internal temperature, the external surface temperature never exceeds 40°C – also enables maximum thermal exchange between air and the material.