

Heat Pump Dryer Offers Manifold Opportunities

Heat pump based condensation drying is reliable and gentle while saving energy – Let us have a closer look at an alternative drying method.

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The defined dehumidification of food has been German drying system manufacturer Harter's daily bread for many years. Their low temperature technique developed in 1991 has been employed in various industrial areas. The innovative minded company has meanwhile furnished more than 2,000 solutions for drying issues. The heat pump technology integrated in each dryer may be used for all types of processes. That is to say that Harter can design and build systems including various chamber, barrel, and belt dryers.

The best solution for each product to be dried is normally established in their inhouse Test Center. It is there that the relevant parameters are defined in series of trial tests. They form the basis for further layout and design. And, after 30 years in drying, Harter has a wealth of experience that is reflected in all projects. Harter's drying systems provide pinpoint dehumidification, and temperature equalization and cooling stages, too. Some examples shall illustrate what Harter can offer.

Drying of apple rings

A manufacturer of organic and health products, for example, was dissatisfied with their drying process. They wanted to improve the quality and raise the production quantity of their product range. The focus was on drying apple rings which are now dehumidified in three chamber dryers. The chamber dryers include a multifunctional trolley that may be loaded with pans and/or trays. The operator may change, with little modification, from single-layer to bulk dehumidification. This offers maximum flexibility.

Said manufacturer places apple rings in single layer on trays. The dwell time in the dryer is 10 to 12 hours. The drying period depends on the temperature selected, which may be between 40 °C

and 45 °C. Once the defined residual humidity is obtained, drying in the relevant chamber is stopped. The drying chambers may be operated independently. An additional cooling provision was installed in the chamber dryer upon the customer's request to cool the apple rings to ambient temperature so that they may be packaged right away. According to the operator, their apple rings are richer in flavour and look much better now that they are dried in a closed air system.

Dehumidification of rooms

This project of room dehumidification was entirely different. A sausage factory with a workforce of 150 produces 60 tons of sausage a day. The sausage rods produced are stored at 2 °C in a refrigerator room pending the next operation. Subsequently, they are forwarded into a separate room for slicing and packaging in plastic trays. The temperature in this slicing and packaging room is 8 °C. The problem with the 6 °C temperature difference is that the sausage is instantly covered with a film of condensed steam. The condensate encourages undesired bacteria to take hold and proliferate thus speeding up spoilage of the food.

For the sausage manufacturer's application, the dehumidification system

was installed at a floor level above the processing room. It consists of three heat pump modules. With a temperature of 5 °C and a humidity of 2 g/m³, the dry air flows through openings in the ceiling into the processing area. The air ducting system forces this dry air to exactly flow to the individual work places at the processing machines. There, the unsaturated process air absorbs any humidity present. The now saturated air is then returned to the heat pump module. The daily production ends after two eight-hour shifts. During the third shift, the room is cleaned and turns into a literal wash-house. Harter's sophisticated dehumidification system restores the ambient conditions required for next morning's first production shift.

Tests of crystalline salt

Harter's Test Center used to be equipped with several chamber dryers and a barrel dryer. A belt dryer was now added because the demand for solutions with a higher degree of automation has been rising. One of the most interesting recent projects is a series of tests conducted on a product that is entirely new to Harter: coarse crystalline salt. The salt was tested in a barrel. Barrel drying is offered for less sensitive bulk material. These are frequently products which would stick together when subjected to regular batch drying, and therefore need to be minimally moved intermittently. Typical examples include pomace, horseradish, hemp seeds, and roots. Periodic and smooth movement of the material to be dried often reduces



Products are tested for feasibility and drying properties in Harter's Test Center – in this case coarse-grained table salt. Various dryers are available for testing.

the period required for drying. Barrel drying is also the answer to continuous production processes. Fabian Baur, the food engineer responsible for Harter's Test Center, reports of the salt test. „The customer wanted a reduction of the drying period plus a reproducible process.“ Baur tested a 5 kg sample in the lab barrel at the customer specified temperature of 50 °C. The initial humidity was about 8 %. So, the salt was no longer a brine but also not flowing freely. After 40 minutes, the dry matter content was in excess of 98 percent. „So, we had thoroughly surpassed the prospective customer's expectations,” says Fabian Baur. “Based on our experience it is safe to say that the drying period in the dryer finally designed and built will definitely be shorter.”

Exhaust air free and eligible for government subsidy

Harter systems do not release any exhaust air whether into production areas or into the environment. Drying takes place in a system closed in terms of energy and air. This system has additional advantages. The combination of low temperatures and closed air circuit has very positive effects on the ingredients, flavours, and the look and feel of products. Harter's heat pump drying is energy efficient enough to be eligible for government subsidy in Germany, Austria, and Switzerland since 2017.

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