

Reliable Drying While Saving Energy

A manufacturer of retaining elements was looking for a dryer to meet the requirements posed by their very widespread part portfolio. They chose a heat pump based condensation system for in-barrel drying of their bulk items.

The heat pump based condensation drying technique developed by drying system manufacturer Harter proved to be the solution of choice to replace the obsolete dryer of the retaining element specialist by state-of-the-art technology. The projects started with drying tests in Harter's in-house test center. The tests established the parameters to ensure successful drying, namely time, temperature, air humidity, airflow rate, air speed, and air routing.

"When it comes to bulk material applications, prospective customers are highly

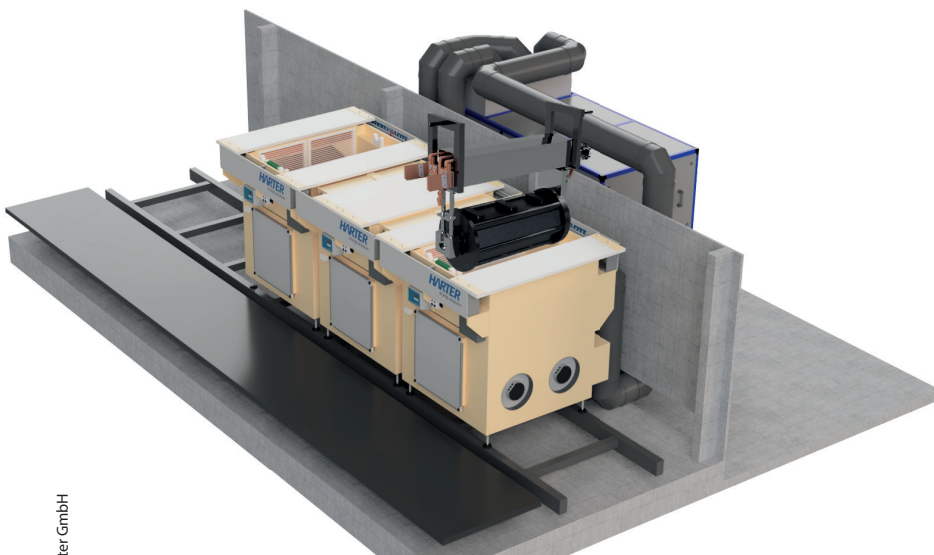
sceptical," reports Jonas List of Harter Technical Sales. "Although we built our first bulk material drying system as early as in 1996, the view, in some circles, that in-barrel drying is impossible has persisted." In this project, a large mass of parts had to be dried - retaining rings, lock washers, wire form parts, snap rings, stampings, fine blanking parts, bent wire parts as well as bent sheet metal parts. The parts were completely dry after processing at 60 °C for only 11 minutes. The solution consisted of three barrel dryers. The original parts were

drying tested in the finished systems prior to commissioning, to be on the safe side.

Air routing and dehumidification

"The big question, of course, is always how we engineer bulk material drying" says List. A closer look at the workings of the manufacturer's drying technique reveals that it is based on two pillars. First, air dehumidification using an alternative physical approach in that the process air is highly dehumidified. This dry and, thus, unsaturated air is passed over or through the items to be dried inside the dryer. A heat pump module conditions the process air and is also responsible for the condensation process. Dryer and module are connected through insulated piping. The circuit is closed in terms of air and energy. The second pillar is air routing which is particularly important for bulk material. Air follows the path of least resistance. Here is where a special development by the German company is employed because the dry process air must be perfectly passed into the barrel, through the bulk items, and out of the barrel again.

Bulk material is in-barrel dried – primarily in static mode. This is easy on the parts and ensures the integrity of their precious surfaces.



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The in-barrel drying system processes a large mass of parts such as retaining rings, wire form parts, snap rings, and bent sheet metal parts.

The drying process

The three dryers installed are supplied with process air by a single heat pump module. Space is a precious asset in many operator sites. So, the module may be installed in another room, at a higher level or on another floor. In this application, the heat pump module was installed in an adjoining room upon the customer's request.

Each dryer features an air recirculation system with special fans purpose-developed for the manufacturer. The internal air recirculation system for the barrel dryers includes four fans each with a power rating totalling 6.4 kW and provide an airflow rate of 3,000 m³/h maximum. All dryers feature an automatic lid system. It opens only as the barrels are inserted or removed to keep the precious heat inside the system.

The process temperature of the new system is only 60 °C, which is half of the former 120 °C in the previous hot air dryer. The previous high temperature dryer was heated using thermal oil, which is now dispensable and saves resources. The cycle time of the line is three minutes. The bulk material is completely dry after 11 minutes with transfer times included. In-barrel drying takes place with minimal intermittent movement, sometimes even without any movement. The retaining element manufacturer's barrel is rotated once a minute.

Government subsidized technology

The entire system including the twelve fans and the heat pump module has a power rating of only 35 kW in production operation. A heat pump provides

high efficiency of the drying process. The closed air circuit, in turn, forms a basis for a reliable and reproducible process, and makes the operator independent of the seasons and climatic fluctuations. Staff and production areas are spared of the negative effects of exhaust air. The low drying temperatures are also easy on the barrels and, above all, on their precious contents.

The heat pump dryers of the German manufacturer were classified by the government as future fit technology as early as in 2017. Customers investing in this technology may claim government subsidy ever since.

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