

## Test Center for Condensation Drying

# The Path to a Perfect Drying Solution

Drying is part of many manufacturing processes. Those who intend to optimise an existing process or place an entirely new product on the market are therefore well-advised to concern themselves with drying. Harter offers testing in their Test Center to find a suitable dehumidification technique while saving much energy and carbon emission.



Harter is a drying system manufacturer based in Southern Germany where the innovation-minded business developed their technology more than 30 years ago and has since optimised it. Heat pump assisted condensation drying is capable of gentle processing at low temperatures, short drying periods, and little energy input. The closed air system does not produce any exhaust air. Their dryers were classified future fit technology quite a few years ago and are eligible for government subsidy. High savings on energy and carbon emission makes heat pump assisted drying an attractive technology under environmental, quality and economic aspects.

To put this to the test, Harter offers their Test Center to perform food drying tests. Parameters such as drying period, temperature and humidity, airflow rate and air speed must be skilfully combined for drying to be successful. Air routing is also vital for precise dehumidification. Only if air is accurately passed over or – in the case of bulk material – through the products will uniform drying be achieved. The Harter Test Center allows to optimise all parameters and to demonstrate the necessity, if any, for additional time-at-temperature and cooling operations. The following examples shall illustrate the wide range of what is possible.

The barrel is ideal for defined and uniform drying of casein to 60 percent dry matter.

## Retention of Colour in Cherry Tomatoes

A snack producer intends to increase their sales of cherry tomatoes. Their existing dehydrator has two major disadvantages: it releases too much waste heat into the production area and the colour of the cherry tomatoes is not uniformly retained. Harter's condensation drying system is ideally suited to meet the appearance and energy saving requirements. Heat pump assisted drying intrinsically requires little energy. Also, drying in a closed air circuit does not produce any exhaust air. As there is also no need for taking in ambient fresh air, the technology makes the manufacturer independent of climatic and seasonal fluctuations.

The halved and salted cherry tomatoes were to be dried at 40 °C. A quantity of 2.7 kg of these tomatoes was subjected to the test in the Test Center. The keepability specified by the manufacturer was achieved after drying for 45 hours. This relatively long drying period is attributable to the high humidity of the tomatoes and the low drying temperature. The 60 hour drying period in the existing dehydrator, however, was reduced by 25 percent. The snack manufacturer is going to use a compact dryer accommodating 26 trays. This dryer is ideally suited for drying average 75 kg batches of cherry tomatoes. The customer also plans to dry sage leaves and other herbs. The chamber dryer has a power rating of only 3.5 kW in production operation. So, it fully meets all energy saving requirements.

## Energy Efficiency for Onion Powder

Drying of onions is another application. The onions are from controlled biological cultivation. They are sliced, dried, and pulverised subsequently. The onion powder is ultimately used in many instant meals. The onion rings used to be dried in a large, gas-operated belt dryer at 85 °C. The only purpose of this test project was to reduce energy consumption. The manufacturer was concerned that the onions would turn brownish at a low temperature. They provided 1.4 kg of onion rings for the drying tests. As a result of extensive testing in the Test Center the drying temperature could be reduced to 75 °C while maintaining the natural colour of the onions. The drying period was five hours. As belt dryers are very cost-intensive, the manufacturer



Cherry tomatoes are dried at 40 °C so that their colour is retained.



After five hours, onion rings have the desired dry matter content to be ground to powder subsequently.

was initially interested in retrofitting their equipment. So, the first drafted solution was to replace one gas burner with a heat pump and to reduce the size of the second gas burner or use it only at times. In view of calculated 500,000 kg of carbon savings and more than 100,000 Euro energy cost savings per annum the manufacturer finally decided to invest in an entirely new belt drying system and is, thus, best placed for the future.

## Barrel Solution for Casein

Casein drying tests for a well-known manufacturer of dairy products are a good example illustrating how testing can change the envisaged course to a drying solution. Casein is a protein part of milk and is processed to become cheese. The dairy company intended to develop a new product of which details were not disclosed to Harter. Harter's job was restricted to demonstrate, by testing, the feasibility of drying casein to exactly 60 percent dry matter content. The dried casein was intended to be extruded subsequently. Initial drying tests were performed on 11.3 kg of casein in a chamber dryer. The casein turned out to dry extremely rapidly, which is not always advantageous. In this case, the casein was placed about 40 mm high in pans loaded into the chamber dryer. Within very short time, the lowest portion of the casein was dry to the

point that it started to cake while the upper portion was still somewhat moist. So, static drying showed to be less than suited. Besides chamber dryers, Harter also offers barrel dryers for food. Barrel rotation is defined for each application. The barrel rotates slowly and is thus easy on the product. The final barrel test speed for casein was only five rpm. Slightly mixing the casein in the barrel made it much easier to achieve the exact dry matter content as compared with the chamber dryer. Therefore, tests were continued in the barrel dryer. The casein was dried to 60 percent dry matter within only two hours at 58 °C.

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