

SUSTAINABLE SOLUTIONS FOR PRECIOUS PRODUCTS

Tests in the Test Center are the bedrock on which the suitable drying system is designed.

Heat pump assisted drying is energy-saving, efficient, gentle and reliable. Harter runs tests in their in-house Test Center to determine how exactly it interacts with a given food. The series of tests form the foundation on which a suitable drying solution is built for each product.

Fabian Baur, food technologist, is responsible for Harter's Test Center. The German drying system manufacturer developed their heat pump based condensation drying technology more than 30 years ago and has since continually optimised it. More than 2,000 dryers are in operation in various segments of industry. For more than 15 years, their dryers are also used for food. Organic products have their very special qualities. Baur conducts drying tests to determine their response to drying. Baur explains: *"We determine parameters such as time, temperature, humidity, airflow rate, air speed and air routeing. And the customer's specifications are, of course, also basic."* Several examples sketch Baur's daily routine in the Test Center.

Plums in the Chamber Dryer

A cooperative society dries plums for sale as dried fruit. A new dryer is required for a special plum variety cultivated only in France and the US. Their existing dryer is gas-operated and extremely energy-guzzling. The cooperative now wants to have a state-of-the-art drying system that is energy-saving and can be used for batch operation. The plums shall be dried in single layer to a residual humidity of 23 percent. The temperature is of minor importance. Still, it must not be excessive, for the precious ingredients shall be preserved.

So, Baur tested 8 kg of plums at a temperature of 75 °C maximum. He used a chamber dryer in which the plums are placed on trays in single layer. The plums reached the specified 77 percent dry matter content after 20 hours. The customer was very pleased with the quality of the dried fruit.



Fig. 1 – Exhaust air free drying requires little energy and is capable of exactly meeting the specified residual humidity requirements. It preserves aromas and ingredients – as in these special plums.

This is sometimes attributable to the fact that Harter dryers are closed air systems. No ambient air can enter the process and no exhaust air can leave it. This has an extremely positive effect on the taste and appearance of the product. Exhaust air free drying also makes the system operator independent of the seasons and climatic fluctuations. The next project stage is planned for the summer. The cooperative will lend a chamber dryer to run further series of tests of the harvest to come.

Coffee Pomace in the Barrel Dryer

An altogether different project was the drying of coffee pomace of a manufacturer of coffee products. *"The coffee pomace consists of very fine particles. This is why I was somewhat sceptical before the first test in the chamber dryer,"* reports Baur. At this time, the food technologist already anticipated that drying would not work out other than in the barrel dryer, which was temporarily unavailable. The coffee

producer specified 97 percent dry matter content and microbial stability to be achieved for safe storage at room temperature. Again, the drying temperature was not a big factor. 12 kg of coffee pomace was more or less dry after processing at 70 °C for five hours. *“The result was not satisfactory to me. It rather confirmed my anticipation,”* says Baur. *“The pomace resists the passage of air through it and may only be dried in the barrel.”* The barrel is slowly and continuously rotated throughout the drying process – at five rpm maximum. The material to be dried is thus mixed so that uniform drying is achieved. *“From my experience, the drying period should be two hours to reach a better quality result”* predicts Baur. Time and again, the test series suggest that a different drying technique is suited better. For such findings, the Test Center is a blessing.

Apple Pomace in the Belt Dryer

A renowned Italian apple processor produces juices, concentrates, pulps, purees and much more. Now, they also wish to produce flour from apple pomace and look for a



Fig. 2 – Baur uses the barrel returned from off-site testing for test drying coffee pomace. The very fine particles require continuous mixing for uniform drying.

suitable technology. Interestingly enough, Harter's pioneer project in food was exactly that – drying apple pomace for subsequent grinding to be marketed as an upcycled product. The solution, then, was a barrel



Fig. 3 – The heat pump (on the left) is the source of energy. It conditions the required process air – in this case for drying apple pomace in a belt dryer.

dryer appropriate for the small quantity to be dried. Now, the situation is much different because the pilot system will process 60 kg of pomace an hour. So, the only viable solution is a belt dryer. Even larger systems may follow if the system works successfully.

The apple processor provided 10 kg of pomace to be subjected to series of tests. The drying period finally determined in the belt dryer was 4.5 hours to achieve the specified 95 percent dry matter content. As in the other tests, the appropriate temperature was 75 °C. In many other cases, however, the drying temperatures are 40 °C or less. The drying tests showed that the pomace is non-homogeneous. To prevent the pomace from clumping together a crusher was installed in the dryer. It crushes the larger pieces to ensure a finally uniform result. The bespoke five-belt dryer designed and built in the meantime is currently being put into operation.

Dry Air and Government Subsidy

Heat pump assisted drying has many advantages. The lower the drying temperature the gentler is the product dehumidified. The process is absolutely reliable because drying takes place in a closed circuit.

Extremely dry and, thus, unsaturated air is used for drying. By its physical nature, such air readily absorbs any humidity present. Heat pump based drying produces high quality results in terms of look and feel and the aroma retained, as often demonstrated. And it is extremely efficient. As early as in 2017, Harter's heat pump based drying was classified future fit technology and has since been eligible for government subsidy in Germany, Austria and Switzerland. Baur resumes: *“Our technology is innovative, and we are keen on innovation. We are the right technology partner for those who wish to convert their system, invest in a new system or develop a new system.”*

For further information contact:
www.harther-gmbh.de

Origin of photo material : HARTER