Dr. Harnisch Publications

35. Jahrgang ISSN 1616-2323 ZKZ30360 www.food-technologie.de

5 2024 MARCH

food TECHNOLOGIE

Magazine for ingredients, production and packaging

ENERGY-SAVING DRYING
WITHOUT EXHAUST AIR

(Photo: AdobeStock/ Picture Partners)

DRYING WITH HEAT PUMP

Gentle energy-efficient dehumidification with condensation dryers

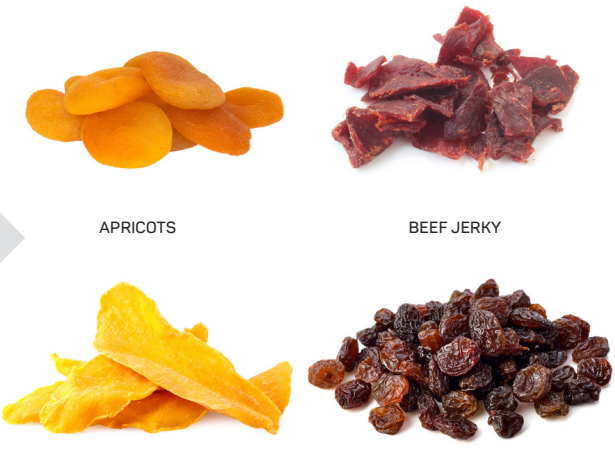
The German company Harter has been exclusively about drying for more than 30 years. The heat pump based condensation drying they developed was a novum at that time. This energy-efficient drying method is more than ever in line with market trends today. An insight into the market segment "food".

More than 2,000 Harter drying systems are in operation today in production sites of various branches of industry, primarily in Germany, Austria, and Switzerland. 12 years ago, Harter entered the food sector which has since become a lasting and important cornerstone of their business. Many food producers have come to know the advantages of their technology. And Harter has advanced their low temperature drying. Harter's Test Center is certainly one of the foundations of their success. Prospective customers may have their products tested there. The tests are used to determine the parameters for successful drying. They form the basis for layout, design, and installation of the optimal solution for the specific product and process.

It all started with the initial project, namely the drying of organic apricots. The drying period of this product could be reduced from two to one hour, at only 45 °C. The solution consisted of a chamber dryer including a trolley holding ten europallets. Another pioneer project was the development of a barrel dryer for apple pomace. What was thought to be waste should be dried for subsequent grinding to produce apple pomace flour. The manufacturer, in co-operation with Harter, could thus create a marketable upcycle product. One of the initial projects was about the rich pomace of quality sea buckthorn. To preserve the enzymes and proteins of the seaberries the drying temperature had to be below 40 °C. 1.5 m³ of pomace are dried in a container to obtain 90 percent dry matter. Subsequently, the dried seaberry residues are processed to become high-priced cosmetic products.

A renowned manufacturer of organic products invested in a larger container drying system to dry their almonds to obtain less than five percent residual humidity. These almonds are then ground and processed to become almond butter. Four containers holding 500 kg of almonds are dehumidified at a time. A Middle-East manufacturer of date products processes dates aka "desert bread" to produce snacks, bars, spreads or sirup. Their idea was to make date flour. For this purpose, the dates are dried at 60 °C for 24 hours to obtain a residual humidity of less than 5 percent. Harter has also repeatedly designed and built dryers for apple rings. The rings are always dried in chamber dryers. Harter developed a series model for this purpose. It includes a multifunctional trolley which may be loaded with pans and/or trays. The operator may thus dehumidify the apple rings in single layer or in bulk. This is important for manufacturing products such as apple rings. There are companies with a focus on retaining more ingredients and have softer apple rings. They use shorter drying periods and lower temperatures. Other companies prefer crunchy apple rings which requires longer drying periods and somewhat elevated temperatures. Chokeberries, too, are dried in the same chamber dryer at only 40 °C. A manufacturer of NFC juice expanded their product portfolio with dried chokeberries. The berries are dried in bulk heights of 70 mm. The total batch volume is 0.65 m³.

Chamber dryer with material dried therein *



APRICOTS

BEEF JERKY

MANGOES

RAISINS

Today, there is a long list of companies who established new or optimized existing processes using Harter's low temperature drying method. It includes grasses for food supplement, germinated seeds, seeds, mushrooms, herbs, spices and so on. Meat and sausage products as well as their vegan counterparts have also become a big issue. A big pioneer project was a 35 m long belt dryer for mushrooms to be processed for soups and sauces after drying.

"We are very proud" says Stephan Ortmann of Harter Technical Sales "that we could co-operate in so many development and improvement projects so far." And learning, researching, and developing goes on and on. Last year, Harter realized their first entofood project. N.B. Entofood is insects processed for human consumption. Such insects are either marketed as snacks or processed for sauces, soups or spreads.

Laboratory dryers and large systems

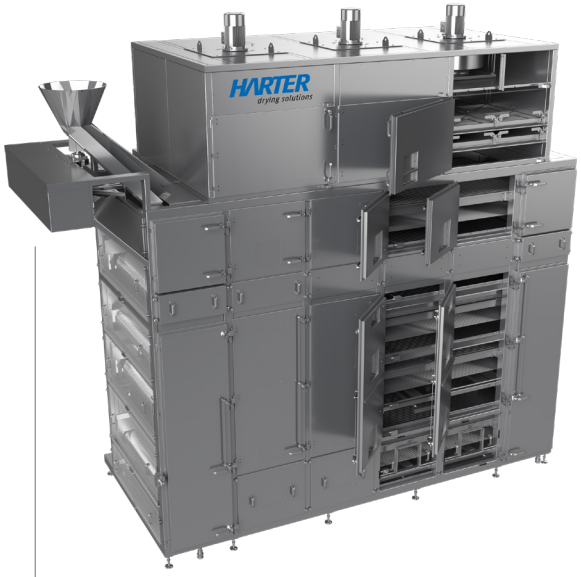
Some operators invest in so-called compact dryers ideally suited for laboratory use or product development. One of these operators is a research institute for agricultural and food development who supports both industry and universities. Another is a known German manufacturer of sweets who wants to go vegan. They use the laboratory dryer for their planned and very complex product conversion.

On the other end of Harter's product range are systems such as for fully automatic continuous barrel drying. This and other projects are the ones Harter loves the most. New engineering developments and special systems is the German company's metier. In this case, valuable rosehip seeds – a leftover from jam production – were to be dried. The idea was to press these seeds and process the resulting organic wild rose oil for upmarket body care. The renowned manufacturer found the right technology partner in Harter who got the continuous barrel drying system including cooling tunnel, metering tank and dust separator successfully off the ground.

Dehumidification, Temperature Equalization, and Cooling

Each dryer, designed for whatever process, has an integrated heat pump module. It is the core of each system. The heat pump based drying technology makes it possible to do various things. First, of course, dehumidification at low temperatures between 20 °C and 70 °C. Second, temperature equalization and cooling, if desired or required for the specific process, may be easily integrated. A manufacturer of quinoa, for example, uses a chamber dryer to dry at 60 °C, to sterilize at 90 °C and then to cool the product to 20 °C. All operations are performed in one system. In some cases, packaged products are to be processed. The famous packaged sausage stick is marketed in the UK, too, except that the sausage is cooked. This requires subsequent pasteurization of the packaged snack followed by drying. A combined drying-cooling system can do this. Its five chambers are adapted to the autoclave and ensures that the specified residual humidity of 0.015 g per package is met.

For drying stand-up pouches, Harter has designed and built a belt dryer. A robot loads the pouches into the system. The pouches are completely and reliably dry after a pass-through period of 9.3 seconds.



Belt dryer with material dried therein *

MUSHROOMS

CAMOMILE

SALAMI CHIPS

PACKAGED SAUSAGE SNACKS

The 45 °C processing temperature ensures that the consistency of the jelly in the pouches is maintained. Harter also dehumidifies rooms. A big German sausage manufacturer required the dehumidification of their production rooms that were 6 °C warmer than their refrigeration room. The goal was to prevent bacteria from taking hold and proliferating as a result of condensation on the sausage rods. Harter designed and built a sophisticated dehumidification system for each workplace in the production area

Exhaust Air Free and Eligible for Government Subsidy

Harter's systems use a completely closed air circuit. This has, of course, beneficial effects on the appearance, ingredients, and flavour of the products if important for marketing. Exhaust air free drying in a closed air system, however, offers more benefits. Operators become independent from climatic conditions and the seasons. Production areas, too, remain unaffected by humidity and air emitted by the dryer. Humans, material, and machines are spared from any detrimental effects.

The integrated heat pump makes Harter's drying systems efficient enough to be classified future fit technology eligible for government subsidy in Germany, Austria and Switzerland as of 2017. So, operators get best drying quality, high energy efficiency, and government subsidy on top.

* There are divers variants available for drying food. All dryers have an integrated heat pump module and are energy-efficient enough to be eligible for government subsidy.

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For further information refer to
www.harter-gmbh.de

Origin of photo material: Harter

APPLE POMACE

ALMONDS

HORSERADISH

SEA BUCKTHORN

Barrel dryer with material dried therein *