SPECIAL ISSUE

LEBENSMITTEL TECHNIK

OFFIZIELLES ORGAN DER GESELLSCHAFT DEUTSCHER LEBENSMITTELTECHNOLOGEN E.V. (GDL)

3|15
März
47. Jahrgang
H 4007

Drying technology

Drying Pomace the Gentle Way

Efficient condensation drying at low temperatures

Drying Pomace the Gentle Way

Efficient condensation drying at low temperatures

A drying technology tried and tested in other sectors is now entering the food industry. One of the first striking projects was the development of a quality product from apple pomace. This could be realised by including a special condensation drying technology.

A cider press in the Austrian Bramberg am Wildkogel has been in operation for almost ten years. You can have your apples pressed there to make apple juice. Large quantities of the so-called apple pomace are a by-product of this process. A Salzburg University of Applied Sciences student in co-operation with the Bramberg Cider Press and the Neukirchen am Großvenediger based Tauriska Culture Club applied themselves, for over one year, to develop and market a new regional product from the pomace. The result of this effort was „Bramberger Apfeltresterpulver“ (Bramberg Apple Pomace Powder) which came out in autumn 2014. But how important was an industrial drying technology in this project?

Apple pomace had been a process residue used as stable or wild animal feed at best, or just composted at worst. Despite the fact that it contains many valuable ingredients from which humans may benefit now that the pomace is upcycled.

This innovative product has been on the market since autumn 2014.

Apple pomace is now dried, ground packaged. Apple powder may be used as a baking or cooking ingredient, or it may be eaten raw. Both the manufacturing process and the product are unique in Austria. Yet, an innovative drying technology had to be employed to realise this new idea. A technology capable of drying the sheer bulk of pomace gently, at low temperatures, and efficiently while, at the same time, retaining its nutrients and aromas. And, on top of it all, this should be done in an energy-efficient way.

The person responsible for the project was Salzburg University of Applied Sciences student Verena Olschnögger, who qualified with this work for the award of Master of Arts in Business for Design and Product Management. She conducted an internet search and came

Official dedication of the drying system at Bramberg

across Harter Oberflächen- und Umwelttechnik GmbH of Stiefenhofen, Germany. She learnt that Harter had developed and manufactured, for more than 20 years, energy-saving drying systems for various industrial, predominantly automobile, applications. The pharmaceutical industry learnt of this alternative drying method some years ago. And, for some time now, this low temperature drying method has attracted food and feed manufacturers' wide interest. HARTER has an in-house pilot plant station which offers a unique opportunity to test the drying response of products to be processed or finished products. "We run a series of tests to determine the relevant drying parameters, such as temperature, time, humidity, air speed and airflow", says Jochen Schumacher of Harter Technical Sales. „The product's reluctance or inclination to release water is also a factor." Such tests were also conducted for the purpose of the pomace drying pilot project. A 2 kg sample of pomace containing 48% of dry matter was subjected to a drying test. It showed that 95% dry matter content was achieved in no more than two thirds of the time specified by the operator. The original weight was reduced by 50% in the process. As pomace levels are much higher in the field and pomace is difficult to be aerated, HARTER recommended to integrate in the drying container a so-called rabble rake to agitate the digested residue being dried in order to help obtain a uniform drying result. This is exactly what the final drying system design reflects.

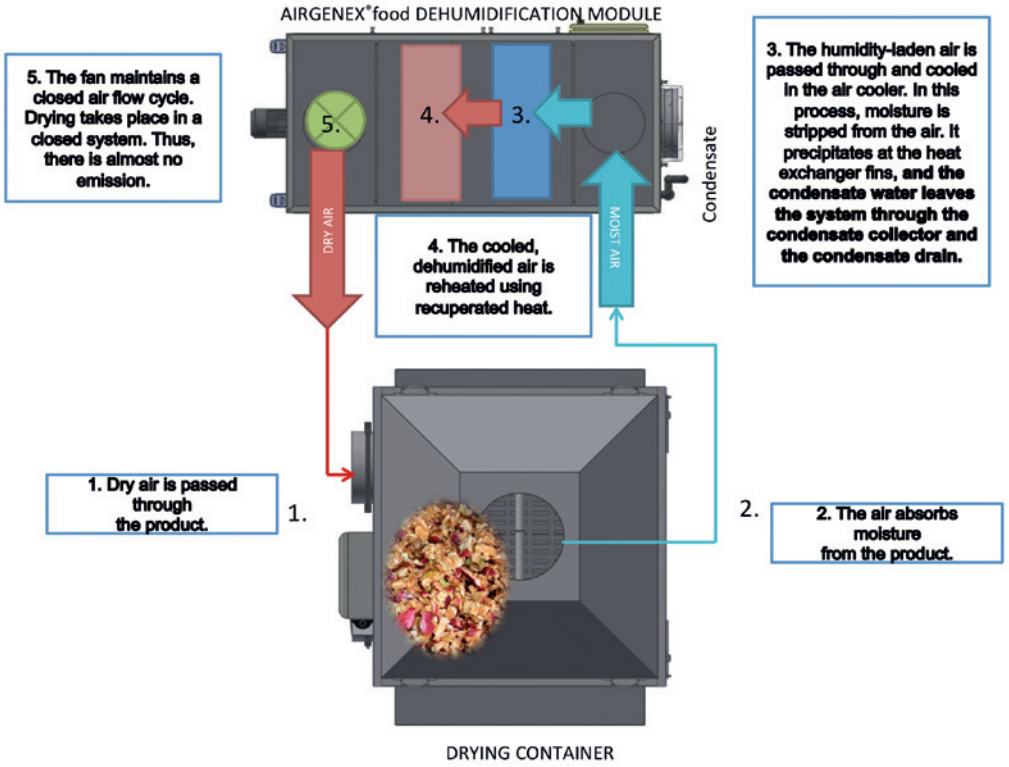
HARTER knows from many years of experience that successful drying requires more than just hot air. The air must be extremely dry to quickly absorb humidity from the pomace. And it must be passed through the material to be dried. A container with an aeration bottom and a rabble rake is much helpful in the case of pomace drying. This ensures thorough aeration and uniform drying, and it prevents local drying. Attached to the container is a so-called AIRGENEX®food dehumidification module to condition the process air as required. This module has an input power of only 4 kW. The extremely dry und thus unsaturated air, heated to 40 °C in this case, is passed through the pomace. The moisture absorbed from the pomace is subsequently condensed using the heat pump in the AIRGENEX®food module. The dehumidified air is then reheated in a two-stage heat recuperation process. The drying operation takes place in a closed system, without intake or discharge of air. 0.5 m^3 of humid pomace are dried at a time. The humidity remaining upon

Apple pomace container loads of half a cubic metre each have a residual humidity of five percent after drying.

PICTURES: HARTER, OBSTPRESSE BRAMBERG

completion of drying is 5%. The pomace is then dry enough to undergo further processing, that is grinding. The whole drying system is designed to meet the applicable food processing regulations. Christian Vötter of the Tauriska Culture Club was enthusiastic about this drying method. So they invested in a small cabinet dryer for drying apple rings. „The two products – the powder and the apple rings – are very aromatic after drying. The apple rings are much tastier than before. This is a result of drying in the closed system, we think“, says Vötter.

In summary, it can be said that heat pump based condensation drying has a lot of advantages for the operator. As far as food processing is concerned, drying temperatures of as low as 20 °C are certainly most important. Variable temperature settings can prevent undesired heating and resulting product deterioration. Condensation drying is very efficient even if low temperatures are used. This is due to the sophisticated combination of air conditioning and air routeing. But the technology may also be used at temperatures as high as 90 °C if required for the specific application. Drying in the closed system makes processes independent from the seasons and resulting variations in the environmental conditions inside the workshops. The weather is thus essentially blocked off. The low power consumption of the dehumidification modules saves much cost. The energy demand of heat pump based condensation drying is inherently and demonstrably low. „Energy saving is clearly becoming a critical factor when it comes to investing. Our technology, which is both gentle and energy saving, perfectly serves this trend“, says Schumacher in conclusion.



Schematic of the technology capable of drying a bulk of process residues in a gentle and efficient way at low temperatures

www.tauriska.at
www.epfoe-genuss.at
www.harter-gmbh.de

Dried apple pomace and apple powder produced therefrom

PICTURES: HARTER, OBSTPRESSE BRAMBERG