The next generation

VACUUM COOLING HAS BEEN USED FOR NEARLY 20 YEARS TO STORE BAKED GOODS FOR SEVERAL DAYS WITHOUT REFRIGERATION OR TO COOL SLICED BREAD QUICKLY SO IT CAN BE SLICED. DEVELOPMENT HAS ADVANCED, E.G. THE ENERGY BALANCE IS SOMETHING TO BE PROUD OF

++ figure 1

© WP

++ figure 1
The vacuum cooler "Vacuspeed" from WP

++ figure 2

© WP

++ figure 2
Bread (l.) stays more appealing due to vacuum cooling

++ figure 3

© WP

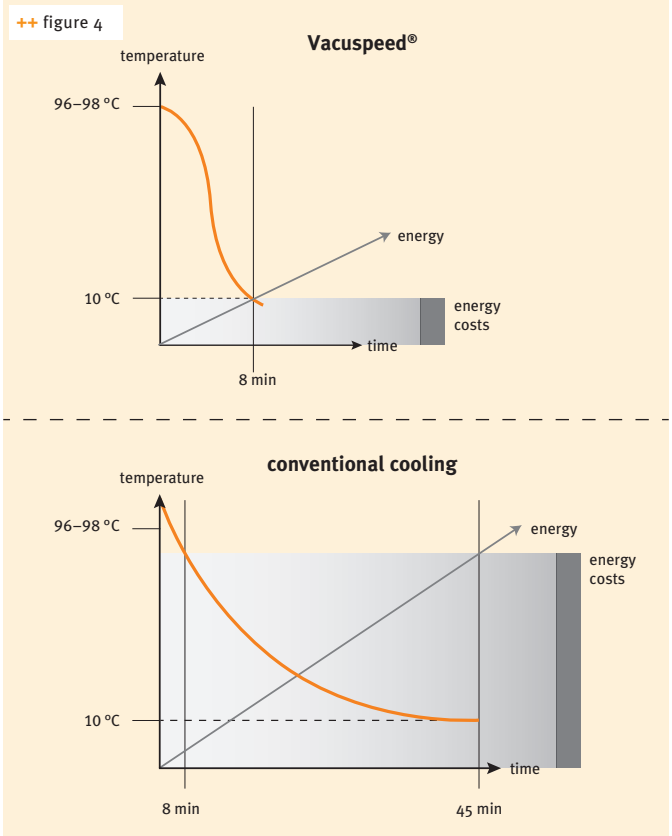
++ figure 3
A measuring needle reports values from the interior of the roll

The WP BAKERYGROUP in Dinkelsbühl, Germany, recently presented such a more advanced version of its "Vacuspeed" in Dinkelsbühl. In addition to the finely differentiating controller, its conspicuous features comprise a few technical details that broaden its area of use compared to previous plants to include sweet and filled products as well as gluten-free products.

The controlling of the two vacuum circuits served by frequency-controlled pumps is based on a differential pressure measurement a) in the cell and b) in the product. For this purpose a measuring needle is pushed into one of the products on the rack trolleys and reports to the controller the corresponding values from the interior of the baked goods during the pressure reduction in the chamber. According to Ulrich Hirsch, Project Manager at WP, this patented process allows the effects on structure, flavor and for example the behavior of fillings to be controlled in a product-specific way during the cooling process and stored in the program. By spraying steam in with simultaneous circulation at the start of the process, WP also ensures that the water condenses on the increasingly cold surface of the product, where it remains until the vacuum is restored. According to Hirsch, this reduces the loss of moisture during the vacuuming of the cell and thus also the risk that water-soluble flavorings will evaporate.

A general rule is that the pressure and temperature curves should be adjusted to the respective product, raw materials, recipe and process. However, extensive series of tests have now revealed that breads that are to be dispatched without refrigeration and breads that are to be cut soon after baking show the best results if they are cooled down to approx. 30 °C by vacuum cooling. The advantage of the double pressure measurement inside the chamber and inside the product is particularly positively apparent with sweet and filled baked goods, because firstly it stabilizes the shape of the products and avoids volume losses, and secondly it can also prevent fillings leaking out. According to Hirsch, in the case of fillings the important factor is the binder used in each case, which is why fillings should be tested to ascertain their specific behavior in the vacuum cell. The volume-stabilizing action of vacuum cooling is also effective with gluten-free products.

++ figure 4



© WP

++ figure 34
Energy efficiency and time saving with Vacuspeed in comparison to conventional cooling

The vacuum cell now being sold by WP accommodates up to three rack trolleys with trays measuring 60 x 80 cm. The developers are currently working on a push-through version that delivers the products directly into a cleanroom after the pressure has been relieved. According to Hirsch, as a rule the vacuum-cooled products have a shelf life of up to three weeks even without a cleanroom.

Instead of being sudden, the cell's pressure relief also takes place in a controlled way that is specific to each product. Cold air highly saturated with moisture is fed into the vacuum cell during this time, which causes the cooled baked goods at a pressure of approx. 500 mbar to absorb moisture uniformly. This in turn has the advantage that the surfaces lose their brittleness and can be sliced immediately if necessary.

The increasing energy costs in most countries have now also caused businesses to pay attention to processes that are extensively supplied with refrigeration capacities. WP has therefore programmed an energy computer that is supplied with variables such as the electricity price, process parameters, number of trolleys and number of products on a trolley, and outputs the electricity costs per piece. Charmingly, and in contrast to conventional refrigeration plants, the costs of vacuum cooling decrease as more goods are refrigerated simultaneously. This is because the less air that is present in the cell and needing to be removed, the shorter is the use of the vacuum pumps. According to WP, the end result is that the energy use of vacuum cooling is around 10 % of that of a conventional freezer plant. +++