Ice world

THE DOUGH TEMPERATURE IS A PROCESSING PARAMETER THAT AFFECTS THE VOLUME, CRUST CHARACTERISTICS, CRUMB STRUCTURE AND ENERGY BALANCE OF A BAKED GOOD. IT CAN BE CONTROLLED BY THE USE OF ICE

++ figure 1

Ice and ice are not the same even if they both are made from pure water. With the advent of frozen baked goods technology, lower dough temperatures are increasingly being demanded. Shaved ice was the first type of ice that was commercially used. The suppliers had copied the technology from the butchers who use this ice to cool down their sausage meat. Shaved ice is made on cooled rollers where the frozen water is scraped off. The ice produced in this way is pieces of 2 mm thickness that resemble a broken glass pane. The problem is, however, that the individual flakes easily stick to each other and are hard to distribute in the dough. In the worst case scenario, there will be cooled and non-cooled spots in the dough.

Flake, nugget or chip ice that is produced as small cubes in different sizes from 5x5x5 mm to 40x20x10 mm will agglomerate only during prolonged storage at temperatures below 0°C. This type of ice is produced in cooled vertical cylinders where a screw pushes the frozen water upwards while compacting it at the same time. A cap at the discharge opening defines the size of the ice pieces which, with a tem-

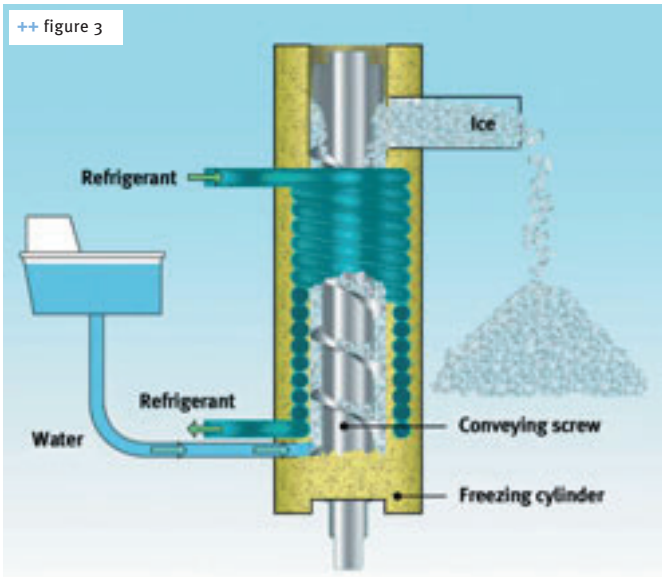
++ **figure 1**
StreamIce equipment

++ **figure 2**
Different conveying screws

++ **figure 3**
Shaved ice and StreamIce are made by a conveying screw that scrapes frozen water from the walls of a freezing cylinder. The ice is then compacted and transported to the discharge. The size of the discharge opening defines the particle size of the ice

++ figure 2

++ figure 3



perature of -0.5 °C have a less aggressive cooling action compared to shaved ice.

Another step ahead in terms of particle size, distribution behavior and cooling performance as well as possible automation was taken by Ziegra Eismaschinen GmbH, Isernhagen near Hanover, Germany. Being an international specialist for the production of ice for all food applications from fishing to delicatessen counters, Ziegra offers all scales of ice production technology. According to Johannes von Rohr, the fully automatic StreamIce® equipment would be suited for the best for bakery applications.

When looking into a StreamIce storage tank, ice and water can hardly be distinguished. Only when taking a closer look, it becomes visible that the surface of the liquid changes its structure and that this is not only because of the agitation of the obligatory stirrer. Tiny ice particles with an edge length of 2-3 mm move in the water. Strictly speaking, ice particles with a temperature of -0.5 °C are floating in water with a temperature ▶

Ziegra GmbH, Isernhagen

The company was founded in 1957 in Hanover and first distributed ice machines amongst others. It started with the development of their own ice machines in 1969. At that time the most important customers were from the fish and meat industry. In 1971, the brothers Rafold and later Gisilot von Rohr took over the company and relocated to Isernhagen in 1979. Since then the product range and list of customers has been expanded and internationalized. In 1994, Johannes von Rohr joined the company. Together with his father Rafold he has been a partner in the company since 2007.

About 50 years after its foundation, Ziegra now employs about 80 refrigeration specialists and supplies ice machines from small stationary units to large container solutions on a global scale. Their own national and international customer service, subsidiaries and representative ensure the required support for all installations. +++

of 0 °C. The amount of ice particles in a certain amount of water defines the cooling performance of the mixture.
This is precisely what allows the automation of the dough cooling with ice, explains Johannes von Rohr. Batch quantities, temperatures of the raw material, predominantly of the flour, and the energy introduced by the mixer will be determined by a control. The required cooling performance can be calculated under consideration of the desired dough temperature and the amount of water needed in the dough. According to Johannes von Rohr, in practice, it is not the entire amount of water that is added at refrigeration temperature but rather it is calculated how much of the water can be replaced by the StreamIce with its standardized ice density. This has the advantages that all recipes can be served from the same ice storage tank and that there is a certain reserve in case the flour is very warm in summer. Then a simple change in the ratio tap water and StreamIce will take care of that problem. The product with the highest cooling demand defines the composition and with that the cooling performance of the StreamIce. In general, the bakeries use a StreamIce ice density between 20-25%.
The automatic dosing of the ice allows integration of the dough temperature into a process control; it also eliminates the exhausting manual transport and addition of large amounts of ice. Added to that, the closed system has the advantage that any contamination is excluded and that there is one critical control point less to monitor within the HACCP process. Another fact is also favorable. Compacter and evaporator as well as the control cabinet do not have to be in the production area.
The quality assurance in dough production is valuably facilitated by automatic dosing: The correct amount of ice added is automatically calculated by the system and the actual quantity used is also reported to the control system.
StreamIce equipment qualifies best for ice quantities of 2.5 tons and more per day. These machines are the matter of choice for industrial and large bakeries focusing on quality oriented and hygienic control of the dough temperature. +++

++ **figure 4**
Johannes von Rohr,
CEO of Ziegra GmbH

++ **figure 5**
Sectional model of the freezing unit

++ **figure 6**
StreamIce added to dough