# Systematic cooling

FRANK ROBERTS & SONS LTD FROM NORTHWICH, UK, PLANS TO GROW ITS ROBERTS BAKERY BRANCH INTO A BREAD MANUFACTURER WITH COUNTRY-WIDE REPRESENTATION. CHIEF ENGINEER CHRIS DANIELS USES STREAM-ICE, AN ICE-WATER MIXTURE MADE FROM FRESH-WATER, TO CONTROL THE BREAD DOUGH TEMPERATURE

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Ten years ago, Roberts Bakery was still a bakery producing barely 4,000 loaves of bread per hour, which it supplied exclusively regionally to supermarkets in the north-west of the British Isles. The family business, which operates a second production unit for sweet baked goods, ended this "infancy" phase long ago. Today, one line supplies 8,000 loaves of bread per hour, a second produces 5,000 sandwich loaves per hour and a small loaf line has an hourly capacity of 18,000 rolls, paninis or teacakes, which are sweet soft bread rolls with currants or other added ingredients. And production continues to expand.

The move of the logistic to new premises with simultaneous modernisation is now underway. In future the entire space this releases will be available for production. The sandwich bread line will be the first to expand, followed by the production unit rolls. So in the future there is a good chance of

++ figure 1

Two ice preparation plants and a storage tank ensure the line has an ice stream supply 24/7


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++ figure 2




++ figure 3



occupying fourth place on the British market after the Big Three, Warburtons Ltd., Associated British Foods plc and Premier Foods plc (Hovis). This is helped by the fact that the bread products from Northwich are now present on shelves throughout the country as private labels in a few high-level supermarket chains and as raw materials for sandwich makers.

Every day, Chris Daniels, Chief Engineer for more than ten years, must deliver an extensive product range containing not only 400 g and 800 g packs of sliced bread in varieties such as white, brown, wholemeal, malted wheatgrain, oatmeal or seeded but also including, depending on the time of year, exotic variants e.g. bread with a baked beans flavour. Specialities of this kind are in demand mainly by sandwich suppliers who use them to enhance their product range of imaginatively filled bread triangles marketed country-wide or throughout Europe.

Customers can also choose between three slice thicknesses as well as bread types and pack weight. The thickness of standard slices is 11.4 mm, 'thick' means 13 mm, and when the package says 'extra thick' the thickness of the individual slices is 17 mm. Of course the entire selection is available not only in the square format that is indispensable for classical sandwiches but also as semicircular bloomers developed specifically for sandwich makers and airline caterers. Rolls, paninis and sub-rolls for food service complete the daily production program.

Chris Daniels relies consistently on stream-ice for dough temperature control on all the bread lines. The plant for this was supplied to him by Patrick Gallagher, UK representative of the ZIEGRA Eismaschinen GmbH Company, Isernhagen, Germany. Two ice machines produce 5 t and 7.5 t of ice respectively from freshwater and feed it by gravity into a storage tank. This makes Roberts the first bakery in Great Britain to use a freshwater stream-ice plant. Daniels says, "In the past it was customary to use salt water to prepare ice. We decided in favour of a freshwater version because in that way we avoid any fluctuations in the salt content of the finished loaves and we achieve our aim of reducing the salt content in a much better way."

This insulated tank agitates the ice, keeping the crystals in suspension until the mixer software or operator calls for ice. Once it receives the instruction to deliver ice, the pumping system pumps the ice to the mixer and the dosing system ▶

++ figure 4



## Company information

Frank Roberts & Sons Ltd, based in the Cheshire market town of Northwich, was established in 1887. The site is home to both branches of the business; Roberts Bakery, which produces over 2m loaves, rolls and morning goods each week, and The Pastry Case, which specializes in sweet bakery products. Still run by the Roberts Family, the company is an integral part of the community and the cooling towers at the front of the bakery have become a renowned local landmark. +++

**++ figure 2**
Moulding is done by a Multitex 4 from APV (now Baker Perkins)

**++ figure 3**
All standard and sandwich bread doughs are placed in the moulds as four pieces. The moulds have a special geometry that avoids false geometry of the bread

**++ figure 4**
The dough for standard and sandwich bread is produced in Baker Perkins high-speed mixers

++ **figure 5**
Finger-thick bread slices are a popular accompaniment to soups

++ **figure 6**
Soft currant buns are a typical British accompaniment to tea

++ **figure 7**
White sub rolls in packs of two

++ **figure 8**
Semi-circular fruited bread slices are popular in the pre-Christmas season

++ **figure 9**
Roberts produces sandwich buns of various lengths on a Mecatherm line with a Gouet oven, ...

++ **figure 10**
... then a stripe pattern is seared onto the top

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accurately controls how much ice is delivered. Once the ice has been delivered a confirmation signal is sent back to the mixer. The ice to water ratio is 25–30 % ice to 70–75 % water.

The stream-ice plant at Roberts is an integral part of the production lines. The enclosed system is filled and emptied automatically, which protects against contamination of the water or ice. Stirrers ensure constant uniform distribution of the ice and water, and dispensing is fully automatic.

The target temperature for the dough moving from the two horizontal mixers towards the bread lines is 26–28 °C. Before the ice is dispensed into it, the plant control system calculates from the flour and water temperature the amount needed for the planned dough. Daniels says, "The maximum ΔT (delta-T) that we can achieve with ice is a temperature difference of 8 °C. The capacity is sufficient to reach the required temperature even in summer when the flour temperature is sometimes up to 33 °C." The cooling capacity of ice contains 80 kcal/kg, and this energy density makes ice around eight times as efficient as chilled water when cooling dough. Each dough batch needs a maximum of 50 l and there are a maximum of twelve dough batches per hour. The second stream-ice production unit to produce cookies/biscuits is already on Daniels' wish list. +++

## Video online

At *www.ziegra.co.uk/streamice/sif-presentation.htm* you will find a video showing the use of automatic stream-ice plants. +++

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