Easy handling, precise result

THE LIEKEN AG FACTORY IN STOCKSTADT, GERMANY, PUT ITS DOUGH COOLING UNIT ON A COMPLETELY NEW FOOTING THIS SPRING. A CONTINUOUS FLOW ICE WATER PLANT NOW SUPPLIES THE NECESSARY COOLING, AND SAVES ENERGY AT THE SAME TIME

++ figure 1

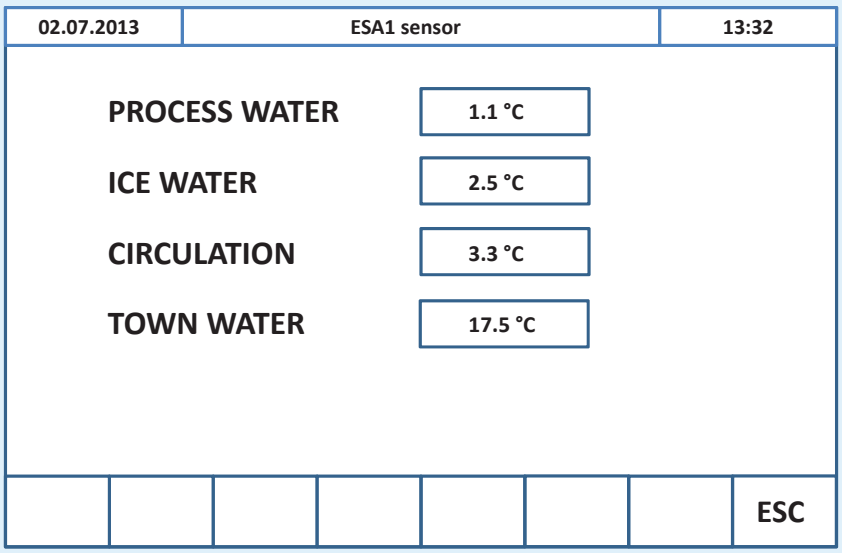
++ figure 1
View of the ice water plants with the refrigeration machines

The Lieken factory in Stockstadt previously produced frozen baked goods, and a large-sized ammonia plant supplied the refrigeration and was also responsible for cooling the water for dough preparation. The requirements changed with the removal of the production of frozen food. Plant Manager Markus Spitzer and his team were thus in a situation in which, although he had a gigantic refrigeration plant available, it no longer corresponded to the requirements of a modern ice water supply unit that was appropriate to the demand. Reliable maintenance of the dough temperatures was difficult mainly in the summer months, which certainly reach temperatures above 30 °C in the border district between Bavaria and the State of Hesse.

The consequence was a complete new investment in a powerful ice water plant. Although the requirement profile specified by Spitzer for the dough cooling unit sounds simple when summarized, that is precisely why it is so demanding: no additional input of ice, no room cooling, no mixing bowl cooling, absolutely faithful to the recipe and process with regard to the amount of water and mixing times, defined and thus reproducible temperature management, and finally with the ability to cope with production peaks at any time as well. And above all: simple to handle! The use of ice often requires longer kneading times, and thus process times that are different to usual, and cooling the raw materials and mixer needs additional large investments – so these methods were excluded. Ice water specialist Hubert Langheinz from Starzach in the state of Württemberg and refrigeration specialist Dirk Schlehuber from the Munz GmbH Refrigeration & Air Conditioning in Islfeld-Auenstein, Germany, jointly offered a logical solution that convinced Spitzer and the whole team.

The concept is based on two separately operating ice water plants in which the fresh water flowing through cools down only when it is needed immediately for dough preparation. The very high energy peaks and refrigeration energy needed for this are drawn from a so-called energy storage plant based on an ice bank. Ice with a very high energy density (80 times that of water) is stored at 0 °C in the ice bank, and due to its energy of melting it is guaranteed to be able to cool the water from the town's water main down to at least 2.5 °C for the dough, regardless of the incoming air temperature. It even reached ice water temperatures of 0.8 °C from time to time. This combination has the advantage that it needs a distinctly smaller floor space and volume compared to a cold water

++ figure 2



© Munz

++ figure 2

The four essential operating parameters: mains water inflow temperature, ice water delivery temperature, return flow temperature and process water temperature in the ice bank are displayed via the touch-screen. For quick visual checking, a remote display of the most important parameters plus a signal lamp indicating to the dough preparation staff that everything is running OK is installed in the dough preparation room

storage unit, because ice has an enthalpy 80 times larger than liquid water, with the result that the ice energy storage is markedly smaller than a water storage unit for the same power capacity. Moreover it would have been necessary to circulate the stored cold water due to the density anomaly of water: water displays the greatest density and thus maximum weight at 4 °C. Water at this temperature in a tank would sink to the bottom, while colder water would float above it. Buffer tanks need a circulation system due to this anomalous properties of water. Warmer water flowing in at the same time would cause added difficulty for the temperature constancy. ▶

Lieken AG

The Lieken Brot- und Backwaren GmbH business division, Garrel, Germany, delivers daily supplies of fresh bread and fresh baked goods under the GOLDEN TOAST and LIEKEN URKORN brands to around 15,500 branches of the food retail in Germany, as well as private brands for trading companies and bake-off products. The product range of the group's twelve industrial bakeries includes unsliced and sliced bread, toast, sandwiches, flan cases and bake-off products, e.g. bread rolls, ciabatta and baguettes, as well as sweet baked goods. According to a statement by the group, the bestsellers are "GOLDEN TOAST Butter Toast" and "Vollkorn Toast", followed by "GOLDEN TOAST Körnerharmonie Sandwich" and the bread varieties "Lieken Urkorn Bauernmild" and "Lieken Urkorn Kleine Sonne" and the "Lieken Urkorn Fit&Vital" series of wheat and vitamin breads. The Lieken group's turnover in 2012 was approx. EUR 780m. The company employs around 4,700 staff. Since 1st June 2013 Lieken AG has belonged to Agrofert, a global group of companies whose operations range from the seed business, animal feedstuffs and cereals trading to mills and the Penam a.s. bread factory, Prague, Czech Republic. The Stockstadt factory was built in 1996 and is one of the twelve industrial bakeries owned by the Lieken Brot und Backwaren GmbH. Unsliced and sliced bread, bread rolls under the Golden Toast and Lieken Urkorn brands, baked goods for private brands and bake-off products for the German retail are manufactured here round the clock on three lines. Annual production is 38,400 t. +++

++ figure 3
Markus Spitzer, Plant Manager of the Stockstadt factory from Lieken AG

In energy storage plants with an ice bank, a refrigerator and refrigerant are used to form ice from process water, separated from the drinking water, in an insulated stainless steel vessel. This cold process water at 0 °C remains there and releases its coldness via a large-sized water heat exchanger to the inflowing drinking water, which then flows into the dough preparation unit. This three-part structure consisting of refrigerant – process water – dough water simultaneously fulfills the requirements of the Drinking Water Ordinance, according to which a double-wall separation is necessary between refrigerant and drinking water. When the controller signals that dough water is needed, the ice water plant starts the built-in loading pump which ensures the circulation of the cold process water at 0 °C. If no dough water cooling is being used, the refrigerator loads up the ice bank until it is full, then switches off. Thus there is always sufficient reserve available to meet all the requirements, as Spitzer also confirms.

The two autonomous ice water plants with ice banks installed in his factory provide a total cooling capacity of up to 5,000 l of drinking water per hour down to at least 2.5 °C. Langheinz has built the plants entirely of stainless steel and according to the required industry standard. They conform to the requirements of both the IFS (International Food Standard) and the Drinking Water Ordinance. The refrigeration machines, design concept, project development and installation during on-going production originate from Munz. Each ice water plant is equipped with a refrigerator with a cooling power of 45 kW at an evaporation temperature of –10 °C. The two refrigeration machines are each equipped with a semi-hermetic 4-cylinder compressor. R507A is used as the refrigerant. The waste heat from the refrigeration machines, which are installed in a separate room above the dough production unit, is removed via air-cooled condenser with steplessly variable controlled rotation speed fans. An additional heat exchanger in the system absorbs the "residual cold" from the refrigerant leaving the evaporator and uses this to sub-cool the circulating liquid refrigerant before it is sprayed into the evaporator. According to Schlehuber, this small additional measure yields an increase in the cooling capacity and the coefficient of performance of the plants by a further approx. 10 %. At any rate, Spitzer and his colleagues are very satisfied. The plant runs faultlessly, always delivers the required water temperature, saves energy and promotes the group's objective of more sustainability in the works. +++

++ figure 4
The two refrigeration machines are each equipped with a semi-hermetic 4-cylinder compressor using R507A as refrigerant

DISCOVER THE WP TREASURES

Bakery Equipment that saves resources, ovens that guarantee perfect baking results or an intelligent diagnostic system – the WP treasures are versatile.

The high standards of quality we set for our machines, lines and concepts can be seen at a glance with our four quality labels:

- **CleanTec** // the WP hygiene concept
- **GreenEnergy** // minimal energy, maximal efficiency
- **SmartControl** // easy and standardized operation
- **BakingQuality** // baking with unique quality

Discover our WP treasures:
www.wpbakerygroup.com
www.facebook.com/wpbakerygroup
www.wp-iba.com

WP Kemper WP Bakery Technologies WP Haton WP Industrial Bakery Technologies WP food WP Green

WP BAKERYGROUP
think process!