Olaf Blömker, Managing Director of BMPE (Butcher & Meat Processing Equipment), was basking in the bright winter sunshine flooding into his Krugersdorp office when I visited him the other day. Having recently completed the installation of a state of the art RF (Radio Frequency) Defroster at one of RCL’s plants, he was enjoying the warm feeling of another project coming up. So far six machines have been sold in Southern Africa in the fish, meat and confectionery industries.

Olaf is passionate about the benefits of RF, for its ability to safely and rapidly defrost meats, poultry and fish without compromising quality. The equipment is manufactured by Italian RF specialist Stalam, which BMPE represents across the African continent.

“RF is replacing microwave around the world. It’s way more hygienic,” he says of the technology which was originally developed to speed-dry dyed yarn in India but has since been adapted with great success by Stalam for the food industry.

RF defrosting uses ultra-high speed vibration to increase temperatures from -25°C to -2°C in minutes without any blood loss. There’s also no human contact with the product, which can be defrosted inside the box.

The challenge
Stalam’s RF technology addresses many – if not all – of the challenges and problems of traditional defrosting methods such as:
• Heat transfer is an intrinsically slow process; the larger the size of product, the longer the time required for the defrosting process. This causes a long delay between the removal of the product from the cold store and the next processing or utilisation stage;
• Since bacteria can survive at negative storage temperatures, in the slow defrosting process there is considerable opportunity for bacteria growth;
• Proportionally high drip losses may result from lengthy defrosting times, causing changes in the product texture, leading to a significant financial loss;
• It is not possible to speed up the defrosting process by increasing the temperature, as this may cause severe deterioration of the product;
• Long defrosting time means a batch process is unavoidable, resulting in high handling costs with the additional risks;
• Since the heat required for defrosting is supplied by air, water or steam in processing rooms or equipment having large contact surfaces with the environment, the process speed is often influenced by the external ambient conditions, which are difficult to control.

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DEFROSTING REVOLUTION

How RF works

These drawbacks of conventional defrosting methods can be avoided thanks to the ability of RF’s electromagnetic fields to rapidly generate heat volumetrically within the product. The heating process is fast, uniform and controlled, resulting in a significant reduction of drip losses and minimising product deterioration caused by bacterial growth.

Olaf says the RF method offers flexibility in production scheduling, and is the ideal solution for many tempering, softening and defrosting processes.

The product is placed on the machine’s conveyor belt and is transferred continuously through the RF unit (tunnel), passing between upper and lower electrode plates. These electrodes form an electrical capacitor and the product moving between the plates becomes the dielectric element of that capacitor. The electrode plates are connected to a radio frequency generator oscillating at a frequency of several million cycles per second.

When the RF generator applies high frequency alternating voltage between the capacitor plates, the dipolar water molecules of the frozen product will vibrate and rotate, attempting to align themselves according to the fast-changing opposite plate polarities. This phenomenon causes intermolecular friction, which will in turn generate heat rapidly and uniformly within the whole product mass regardless of its size, weight, shape and thermal conductivity.

The amount of heat generated inside the product and the defrosting time are accurately controlled through the voltage applied on the electrode plates and the speed of the conveyor belt.

Benefits of RF

- Defrosting is achieved in minutes rather than hours/days, even for large product blocks and, if necessary, directly inside the packaging used for storage or retail distribution (carton boxes, polyethylene bags, etc.).
- The process speed and uniformity minimise the risk of product degradation (drip losses, deterioration of sensorial, chemical and physical characteristics, bacteria growth, etc.), thus helping to preserve best product quality.
- The product can be obtained at the correct temperature needed for the next stage of processing.
- Thanks to the high process speed, radio frequency defrosting can be carried out continuously, with significant advantages in product handling and production scheduling. Production can be organised according to “just-in-time” criteria – a great advantage in the case of sudden orders, last-minute changes etc;
- Weather and external ambient conditions do not affect the process, so it can be controlled accurately and consistently;
- RF equipment requires much less floor space compared to the traditional, large defrosting rooms/ equipment; relevant process costs can also be reduced drastically compared to conventional techniques.

Olaf is convinced that, as in much of the rest of the world, RF defrosting will become the technology of choice for food processors in Africa who are serious about quality and safety.

“After the recent Listeria outbreak, manufacturers are realising that there’s nowhere to hide when it comes to food safety, and a critical hazard point is defrosting. RF will help manufacturers – and their customers.”

The RF heating process is fast, uniform and controlled, resulting in a significant reduction of drip losses and minimising product deterioration caused by bacterial growth.

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