Spiral freezing systems for use in the meat industry

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Since its diversification in 1982, spiral systems in various executions are the basis of Heinen Freezing's business for the international frozen food industry. They offer the following freezing systems for use in the meat industry:

- **compact:** The single drum system for cooling and freezing with one belt width and four tier pitches. Preferably for small capacities and/or production of specialities. This small-sized system is fully assembled on a frame for of all kinds of deep frozen food with capacities up to 800kg/h. The system is fully assembled on a base frame as single drum or double drum, as upwards or downwards conveying system with a belt width of 457mm with the highest hygienic standard due to full stainless steel execution and optional cleaning system. Options like feeding and discharging conveyors, and frequency controlled fans are available.
- **compact duo**: The twin drum system for cooling and freezing with one belt width and four tier pitches. For small up to medium capacities. The compact duo consists of two drums inside the enclosure for cooling and freezing of products with longer retention times.
- **arctic**: The spiral system for cooling and freezing with various belt widths and tier pitches plus numerous options. For medium to high capacities.
- **pasturic**: The spiral system for pasteurising with various belt widths and tier pitches and numerous options. For medium to high capacities. This system is designed to meet the demands for pasteurising fresh convenience-products with dry or moist heat with air temperatures up to 95°C and approximate 85% relative humidity. The system is equipped with an exact climate control via temperature and moisture sensors inside the production room and a radial, open air flow with frequency controlled fans.

Universal and flexible system

The universal and flexible arctic spiral system is used for conveying, cooling and freezing of meat, fish, poultry and other food products in various shapes and sizes. Especially due to the wide range of standardised additional equipment this system offers the optimum and individual solution for food production needs, for example different throughputs due to smaller product charges, and limited production hall dimensions due to reduced ceiling heights etc.

Assembled from premounted modules, the arctic is installed in a short time on site. Executed as single drum or double drum, as upwards or downwards conveying system in belt widths from 660-1422mm and a layout tailored to the customers needs.

Depending on the product the arctic is equipped with 12-36 tiers for capacities from 500-5,000kg/h. The central drive is underneath the drum with no chains or any other open greasing points. To consider special needs of the product or of the process, the air flow can be selected as horizontal or vertical. For production times of 144h without interruption the sequential defrost phase is one further successful feature. With the sequential defrost the totally needed refrigeration capacity of the system is diverted on to several smaller and individual air coolers.

View into the spiral system.

The split on to individual air coolers, separated by insulated walls, allows the defrosting of one air cooler during production without interruption to achieve the stated long production times. Heinen Freezing supplies these systems especially for applications in the meat industry when it comes to direct freezing of fried or cooked products without any pre-cooling.

Furthermore, a modular system for extending the production time without

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The arctic spiral.

Premounted compact systems ready for shipment.

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defrost is possible. Apart from the standard shift defrost execution there are intermediate defrost systems, a snow blow off device and the sequential defrost as possible options and executions. The snow blow off device is a continuous running unit, which enormously extends the time of snow and ice building on the surface of the lamellas.

The snow blow off device and the intermediate defrost system can extend in this way the production time without stop for defrost from 8-72 hours. If there is a request for an extension in capacity additional production time can be realized with a low investment.

Today, sustainability and energy saving are the big issues. The arctic spiral freezer meets the requirements of its customers now by offering the 'energySav' system, which consists of high efficiency drives, increased insulation values of the enclosure, heat load oriented control of the requested refrigeration capacity and self-optimising defrost management.

Reduction of the energy consumption will be achieved at first by reducing the energy loss with a higher thickness of the insulating enclosure. With a thickness of 170mm an improvement of 20% in the heat-transfer coefficient (U-value, W/m2*K) can already be achieved. The next step is reducing the base (heat) load of the electrical motors.

Heinen Freezing offers the highly efficient energy saving motors from SEW-Eurodrive, which exceed the European Regulation EFF1. The optimised use of the refrigeration energy in the air cooler finally leads to some more energy saving. A special fin spacing and the change to a controlled air circulation in relation to the temperature difference reduces the energy consumption of the fans.

All energy saving measures require a higher investment in technique and technology, but do pay back in a very short time depending on the daily operation time.

All spirals can be realised with numerous options like stainless steel exterior, fully integrated cleaning system or frequency controlled fans.

Condition monitoring

Production time is valuable. Every minute of useable plant time is important and every minute of downtime due to maintenance or cleaning causes added costs. This applies in particular to plants that are continuously operating in multiple shifts. Therefore this kind of maintenance is different from the cost-intensive variants of preventative maintenance (where expensive components might be replaced too early) and condition-oriented maintenance (where components might become damaged to a degree that prolonged plant downtime is inevitable).

As an example, the condiMOT system monitors all drives as well as the ventilator motors in order to ensure its proper functioning. The signals are forwarded to the control unit via an evaluation unit. In this way the actual condition of the monitored components is shown on the control unit's display. The belt agitators and air evaluation are also continuously monitored in order to detect operating errors or damage prior to a fault, which will cause plant downtime or impaired plant operation.

The user is given essential instructions in time via the display so that he can request specific maintenance work to be carried out and he is notified of the need to intervene as early as possible. This means that he will have sufficient time for planning and implementing the necessary measures.

Hygienic cabling

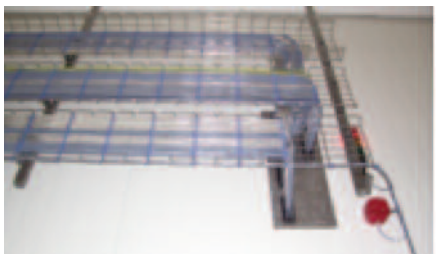
Hygienic cabling is an option for improving general hygiene and cleanliness around the plant. Hygienic cabling means that all cables from the consumer are routed out of the insulated housing via the shortest possible route. Outside the housing the cables are routed using the 'single cable layering' process. They are collected via a bus system and routed to the control cabinet. This way the overall cable length within the system and the necessary installation technology (grids, individual cable ducts) is reduced.

The remaining cables outside of the insulated housing are routed in open special steel grids and mounted with spacers in a manner that easy and optimised cleaning can be achieved. Combined with the fully welded insulated housing, which is placed on the flat floor of the building, as well as a base frame or concrete foundations, Heinen offer the highest possible hygiene standards for food production.

Bulk freezing

Today, many international meat product specialists manufacture today with the new generation of IQF fluidised bed systems made by Heinen Freezing. The freezelite for small and medium throughput and the blizzard for medium and high capacities are designed for cooling and freezing of bulk products such as diced meat, poultry pieces and seafood – all lumpy products that may be taken off from the frozen plastic bag in small amounts from the entire package where the user does not need the complete content of the bag.

Cabling outside the insulated housing.



The integrated cleaning system.

The small dimensions assure the application of the freezelite, where only limited space is available. Completely pre-mounted on a frame maximum flexibility in a growing or changing production environment is guaranteed. With its capacity range up to 15,000kg/h, a metal or plastic belt width, an integrated belt cleaning system, its stainless steel design as well as its integrated cleaning system, both IQF systems offer a very extensive standard configuration.

While developing the freezelite the engineers of Heinen Freezing attached great importance to a wide field of applications for the fluidised bed system. Special features of the new freezelite series include:

- Frequency-controlled fans (individual control for the pre-freezing and main freezing zones).
- Standard industrial components as well as DIN and standard parts increase production reliability and decrease costs for spare parts.
- Inspection bridge between air cooler and conveyor system for supervision of the freezing process and for cleaning purposes.
- Easy disassembly of system parts for maintenance and cleaning without tools.
- Multi-language and symbol-controlled operation via touch-screen display.
- Program selection for freezing/cooling, defrosting and cleaning via comfortable recipe administration and quick selection by means of customer-specific product images.
- Modem for remote control included in basic version.

The design of the freezelite considers the latest development in terms of service life extension (production time without defrost). A modified air flow through the air cooler optimises the distribution of frost and ice on the fin surface. Thus, the process time available before pressure loss due to snow building and defrost of the air cooler, can be increased considerably.

Research and development

Heinen Freezing is working on several improvements on existing machinery as well as on new equipment, for instance a new generation of edge freezers for making the slicing procedure of logs or other meat products more simple, comfortable and reliable. Their service personnel are working on site worldwide. Online diagnostics units and camera monitoring allow immediate access to the system. ■