

Overview: spiral freezers

GROWING INTERNATIONALIZATION ACROSS GERMANY AND BEYOND THE FRONTIERS OF EUROPE IS ALSO LEADING TO GROWTH IN THE MARKET FOR SPIRAL SYSTEMS



++ Alco

©Alco

+ There are a few manufacturers of spiral conveyor systems on the national and the international market, some like Heinen Freezing and JBT FoodTech or Tecnopool that have specialized in this area, others like the WP BAKERYGROUP for which refrigeration systems of this kind are a customized but rather small business area. One thing they have in common is that they all rely on one of the three different systems for spiral freezers:

- + systems with a drum
- + self-stacking/self-supporting systems
- + stage-to-stage systems



++ Alit

©Alit

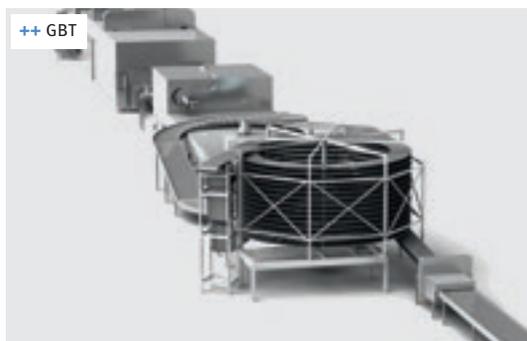
As the name suggests, the first variant is driven by a drum. The drum is in the center of the spiral tower, around which is wrapped a spiral stack with an endless belt on a rail. The main drive is by a motor arranged under the drum and which turns this drum, e.g. via a planetary gear. Often there is another geared motor, located at the exit from the spiral, which maintains the belt tension. Both the tension drive and the main drive are equipped with frequency converters, so the residence time of the product in the spiral can be adjusted to the respective requirements via the belt speed. Suppliers such as Heinen, Kaak or Vulganus use mainly systems of this type.



++ BVT

©BVT

A self-stacking spiral conveyor belt has guides at the side of the belt that are higher than the belt, so the upper belt is carried by the belt below it. This construction eliminates the slide rails that would otherwise be used. In this case the drive is situated under the lowermost level and turns the entire stack. There is no drum for an additional belt drive. This system is used mainly by JBT, although GEA also uses it.



++ GBT

©GBT

Finally, the stage-to-stage system means that the drive is via a drive shaft on the outside of the tower. Thus there is a separate drive wheel on each stage. The interior of the tower itself is empty, and allow a better airflow, thus it can be serviced and cleaned from the inside and from the outside. A small motor is located either together with the drive shaft at the bottom at floor level or at the top on the uppermost stage. This system does not need a tensioning device at the entry or exit. Tecnopool has specialized in this system, but Alit also uses it and describes it as “positive/external drive”. The Italian company explains that the energy needed with this system can be reduced by 60 % on the basis of frictional force etc.



++ GEA

©GEA

Overall the various spiral systems are built as single or double towers and as downward or upward conveyors, which can also operate under cleanroom conditions. They are used for cooling, freezing and proofing, although many suppliers (Kaak, Tecnopool, Alco Foods, Alit and JBT FoodTech) also use them for pasteurizing. They can have one or several belt widths depending on the client's requirements. These conveyor belts are made from stainless metal or plastic, with or without side edges and with a variety of mesh widths and belt widths. With its Multi-curve belts, for example, Kaak offers as standard widths from 375 mm up to 1375 mm, which can be increased in steps of 100 mm. There is also no need for the stage spacing

distances to be always the same, and they can vary from stage to stage instead. Another distinguishing criterion lies in the type of air flow management. Thus with all spiral systems this can flow horizontally, vertically or as a mix of the two, and can also include the use of ambient air. Horizontal air flow is used mainly for flat and larger products, which often have a longer freezing time, whereas a vertical air stream is more suitable for smaller, lightweight products because it is most likely to prevent liftoff from the belt. Alit also explains that the pressure drop here is larger and more uniform, which reduces the dehydration losses of the products. Optionally the air velocities are continuously adjustable, e.g. with Alco. The various spiral systems can be operated using conventional or cryogenic cooling. The latter means that the directly evaporating refrigerants, nitrogen and carbon dioxide CO₂, do not move in a circulation, which achieves considerably faster refrigeration. Moreover the various manufacturers offer different additional features such as enlarged surfaces, multi-zone air conditioning for continuous proofing, defrosting systems or even sequential thawing to allow operation for the longest possible time without an intermediate shutdown. More than 1,000 variants are available based on the wide variety of possible constructions and equipping of the spiral towers.

The various suppliers of spiral conveyor systems have adopted entirely different positions on the international market and

have placed emphasis on individual systems. Some of the important suppliers are presented below:

For the **alco-food-machines GmbH & Co. KG** in Bad Iburg, Germany, freezers are the strongest product in the spiral systems segment. They are especially suitable for rapidly chilling and freezing products in the IQF (Individually Quick Frozen) process. Last year the company installed spiral systems in a wide variety of sizes and designs with belt lengths from 200 to 2,500 m, both within the EU and also in the Arab countries, the USA and Russia.

Alit srl in Santa Giustina in colle (Padua) specializes in thermal process, in particular through spiral systems with an external drive for the baking industry. The Italian company offers this type of spiral freezer with vertical, horizontal and mixed air flow ventilation, with the coolant liquids CO₂, Freon or Ammonia, and with standard or sequential defrosting, with water, gas or electrical systems, in approx. 180,000 different configurations. In over 20 years of activity, the company has acquired a worldwide presence with over 1,000 spirals installed. Approx. 15 different spiral freezers were sold and installed last year. More than 65 % go abroad to countries outside of Europe. Alit is also able to provide racetrack, twin tower, or low-in low-out configurations in addition to classical round configuration. ▶

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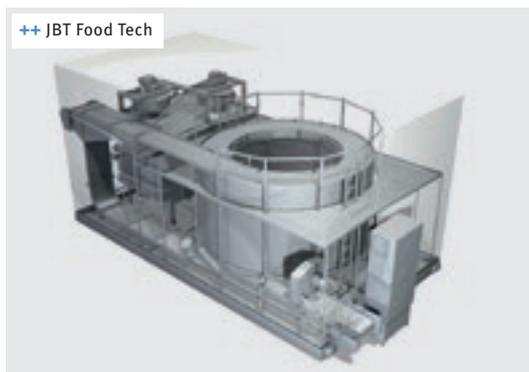
Iron: 4,1 mg, Magnesium: 122,8 mg, Calcium: 222,2 mg,
Folic Acid: 43,1 µg, Vitamin D3: 1,0 µg / 100 g of bakery product.





©Heinen Freezing

The **BVT Bakery Services BV** in Oss, the Netherlands, also supplies spiral freezers both with and without a drum. A Direct Drive System (DDS) belt technology from Intralox was added just over a year ago, and has already been installed for two clients in Europe. This operating principle of this technology is that the belt edge engages directly with the teeth of the drum and prevents drum-belt edge friction. According to the company, approx. 80 % of the spirals being sold still have drums, but the new system is popular with clients. Most spiral coolers and/or freezers are sold in combination with a turnkey project with complete handling and make-up. 60 % are used by European customers.



©JBT Food Tech

According to **GBT GmbH**, there will always be product cooling using spiral conveyors, because it allows a number of products to be chilled, frozen, firmed and proofed in a very small space. Consequently the company in Villingen-Schwenningen, Germany, also sold cooling, proofing and freezing spirals worldwide last year. The majority of these are offered as complete solutions from dough preparation and the oven to cooling followed by packing.



©Kaak

The **GEA Refrigeration Germany GmbH**, Berlin, uses the Direct Drive System, but with low-tension systems, and self-stacking systems. The strongest product is currently the GEA A-Tec Spiral Freezer, of which approx. 200 fully-welded plants are in use in North America alone. They are available as directly-driven and as low-tension systems. The latter operates as a system with a drum and an additional geared motor as belt drive. This results in little friction which is reduced with stainless steel belts running over sliding rails.



©Technopool

The North German company **Heinen Freezing GmbH & Co. KG** in Varel specializes in the baked goods industry on proofing, cooling – using ambient air or conditioned air – and on freezing. There is a particular demand for the flexible arctic spiral system, which is built for medium to large capacities. The Heinen spiral conveyor systems are made of stainless steel and consist of open U-profiles 6 mm thick. The drive takes place via a planetary gearbox arranged directly below the drum, and thus has no chains or other open lubrication points. The spirals are kept as flexible systems on the modular principle, thus enabling the use of various belt variants, e.g. stainless steel or plastic, with or without side edges, in various different mesh widths and belt widths. Heinen offers its plants worldwide, and is currently focusing its active marketing effort on Germany, the entire European area including Russia and its associated countries, the Near and Middle East, and a few African countries.



©Vulganus Oy

JBT Food Tech in Helsingborg, Sweden, produces self-stacking spiral freezers and conventional freezers. The company is known for its Frigoscandia GYRoCOMPACT® spiral freezers which are mainly used for chilling, freezing, proofing, steaming and cooking. They are supplied all over the world; more than 4,000 are in operation for all kind of applications like bakery, meat, poultry, fish and seafood, and ready meals. The Frigoscandia GYRoCOMPACT® M-series spiral in particular is the company's showpiece for quality, hygiene, operating simplicity and reliability.

The **Kaak Group** specializes on spiral systems using the Lo-Tension system as Multispiral systems for the baking industry. This system consists of an endless conveyor belt system without any transfers, driven via a central drum with one single main drive. Cold, warm, dry, moist or

ambient air can be passed between the Multispiral tiers. Thus the company based in Terborg, the Netherlands, has supplied Multispiral systems for temperatures as low as -40°C and as high as 120°C over the last three decades. Kaak occasionally builds special Multispiral systems such as high temperature systems for drying and pasteurizing and sometimes also freezers for non-cereal products such as meat products. Most of the Multispiral systems are sold in conjunction with a more or less complete bread production plant, because the majority of such Kaak Multispiral systems are for cooling bread. Europe has proved to be a steady market for many years. Asia, Africa and the Americas are increasingly contributing to the overall sales of its spiral systems over the years.

Tecnopool S.p.a, San Giorgio in Bosco, Italy, uses the traction system from stage to stage for its spiral conveyor belts, in which friction is reduced to a minimum through the coupling of glide blocks and profiles made of self-lubricating plastic material. According to the company, the belt consists entirely of stainless steel with plastic glide shoes and guides, so the system has long-term resistance to wear and is easier to clean. It is suitable for the temperature range from -40°C to +300°C. Tecnopool uses horizontal air flow management for its spiral freezers, which are built mainly for the deep freeze range.

At **Vulganus Oy**, a subsidiary of the Leipurin Group in Vantaa, Finland, the Cleanline range of spiral coolers and freezers is becoming increasingly important. Its spirals are technically so-called conventional systems. They are mainly used for cooling, freezing and proofing; the focus is very different in different countries. Vulganus reports that in some markets the cooling business is more or less saturated, and freezing and proofing is starting to grow in some areas. Although the company produces much more than spirals, this business area has been increasing over the past year and supplies roughly 30-40 spiral freezers per year mainly to Europe and CIS countries. Vulganus has brought several innovations onto the market, such as the Tropicline spray humidifying system, Cleanline cooling technology and the Iceless patented ice prevention system.

Future prospects

Overall, the market participants take a positive view of the future in the spiral freezers area. The growing demand for deep freeze products with increasing capacities, especially in the neighboring countries and abroad outside Europe, which can be satisfied particularly well by spiral systems, offers the companies constant gains. The increasingly high hygiene requirements, long-term reliability of the systems and the greater importance of operating costs are seen as important trends. +++

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