

JBT's Filling and Closing technology for liquid dairy products and nutraceuticals in metal cans



High-quality liquid dairy products
Deserve the best filling &
closing Solutions

Take a deeper look inside the JBT equipment and line solutions for canned liquid dairy.

Get to know what makes the JBT offering unique, and how it satisfies quality conscious consumers, securing product safety while keeping your production cost per unit low.





Dairy Still a growing market

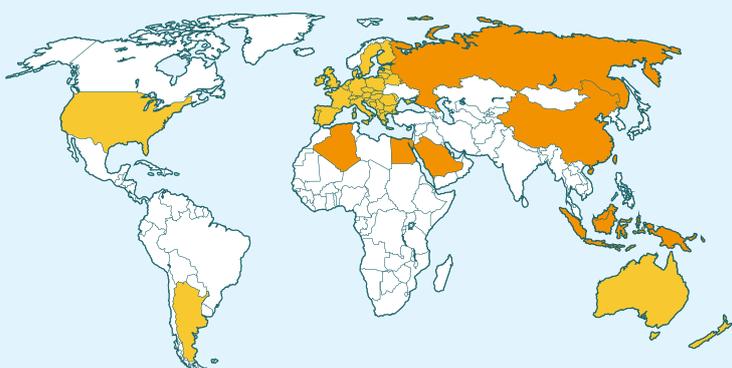
The global dairy & soy food sector was worth \$666.2 billion in 2022 and is expected to record a value CAGR of 4.31% over 2022-27, reaching \$822.9 billion in 2027. Over the forecast period, the sector is anticipated to register a volume CAGR of 1.23%, increasing from 205.9 billion kg in 2022 to 218.9 billion kg in 2027. The Asia-Pacific region was the largest market for the sector in 2022, with value sales of \$201.6 billion and volume sales of 74.1 billion kg.

While liquid milk still accounts for the largest value, fermented and evaporated milk are growing almost as fast.

Rising disposable incomes and rapid urbanisation are driving demand for dairy & soy food products in the Middle East and Africa, while Western Europe, the third largest region in the global dairy & soy sector, is expected to grow at a moderate pace due to market saturation and slow population growth.

Eastern and Western European consumers, like their American counterparts, are increasingly looking for food products with health claims.

Major Dairy Exporters and Importers



■ Major Exporters ■ Major Importers

Added-value liquid dairy products and nutraceuticals

Given the extreme price pressure on milk, the production costs of “everyday” dairy products are under heavy pressure. The production must be done at the highest possible level of efficiency and at ever-lower cost in order to bring the products to market at a competitive price. These types of products are usually processed on dedicated lines, i.e. lines designed for the production of large volumes of a single product and just one specific type of packaging.

The price is an important element in the purchase decision, but today’s consumers of dairy products also expect high nutritional quality. These ‘added-value’ dairy products, also known as nutraceuticals, are milk-based with added flavor, reduced fat content and/or containing various complementary nutrients (vitamins, minerals, dietary supplements). Growing consumer interest in the health benefits of dairy products is driving growth among specific age segments, most notably kids and babies, and older consumers. These groups will consume dairy products with claims such as natural, organic, preservative-free, and low in sugar/fat (GlobalData, 2023).

Condensed and evaporated milk are other high-value dairy products that can be found in kitchens around the world, from the U.S. to Europe to Latin America to Asia. Concentrated milk is commonly used in baked goods, deserts, soups and sauces to enhance taste and texture, and in coffee and tea as a whitener.

While production and consumption of concentrated milk is slowly declining in Eastern and Western Europe, many producers in Asia, Latin America and the Middle East are forecasting double-digit growth rates in the coming years.

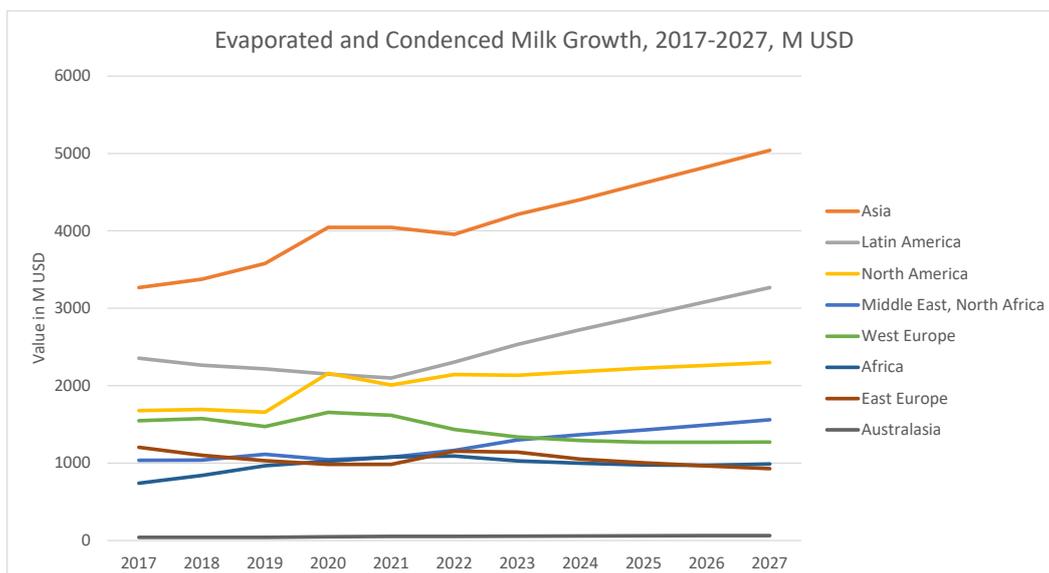
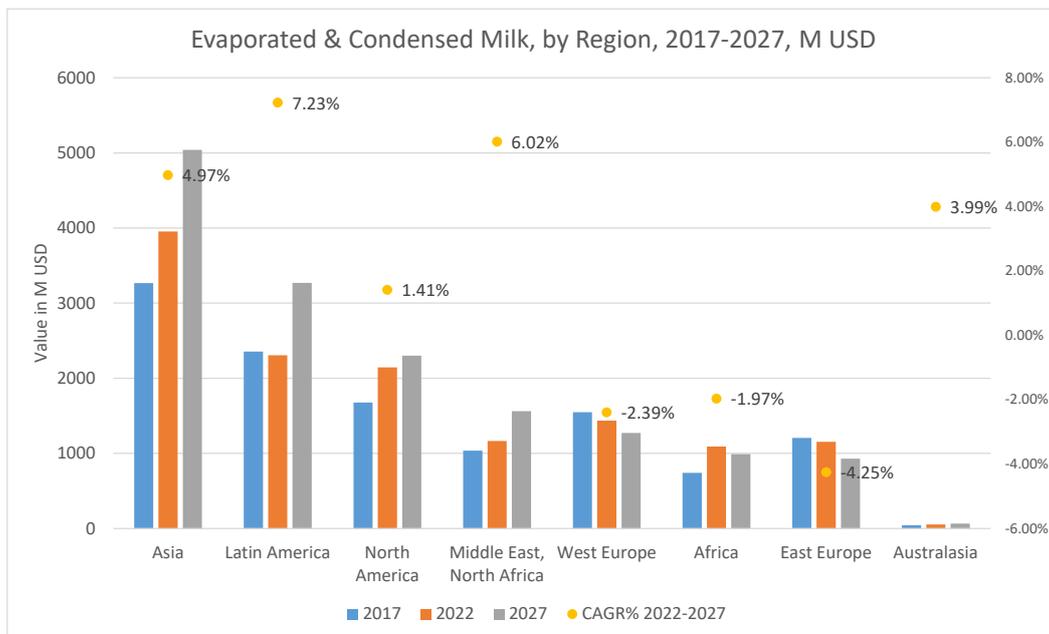
The increasing demand for Sweetened Condensed Milk and Evaporated Milk in these regions is mainly driven by the increasing buying power; the product also has a reputation

as a highly nutritious product that can be kept fresh for a few days after opening, without refrigeration. In addition, canned dairy products have a long shelf-life and are well adapted to the harsh logistical conditions in these tropical and sub-tropical countries when fresh milk is not available. It is also used as a substitute for breast milk, for cooking and as coffee cream, or for recombination in various processed foods such as breads and confectionery.

Both sweetened condensed milk and evaporated milk are forms of concentrated milk in which approximately 60 percent of the water content has been removed. The major difference that sets these two canned milk products apart is the sugar content; sweetened condensed milk, as the name implies, contains 40 to 45 percent sugar, while evaporated milk is unsweetened. Both products can be made from fresh milk or recombined milk (milk powder, fat and water).

Longer shelf life for canned liquid dairy products and nutraceuticals

There are many strong commercial advantages for the food processor, retailer and consumer if a dairy product does not require refrigeration and can be shipped and stored unrefrigerated on the shelves without spoiling. Manufacturers can reach geographically wider markets and reduce return of unsold products. Shelf handling becomes also quite easier and less time consuming for the retailer, and internal logistics are simplified. The consumer of canned dairy products also gains in convenience. The nonrefrigeration of more expensive products such as cream, condensed or evaporated milk greatly reduces product spoilage at home. Finally, the rigid metal can is well adapted to the harsh distribution channels in developing countries and – due to its unmatched barrier properties – offers an unmatched shelf life, also in (sub) tropical countries.







Integrated filling | closing | sterilization lines for canned liquid dairy products and nutraceuticals

In this white paper we take a closer look at specific packaging solutions for canned liquid dairy products and nutraceuticals. This category of products includes sweetened condensed milk, evaporated milk, cream, plain milk, flavored dairy drinks, and dairy-based nutraceuticals.

The canned liquid dairy products business is a high production volume business. To gain full efficiency and lowest cost per unit produced, processors use standardized can sizes and operate minimum container and product change-overs on lines that are almost running 24/7 at medium to high speed. Line speeds have recently gone up to 1200 cpm (can per minute).

Besides monitoring yield and lowest cost per can produced, processors focus on following KPI's:

- ✓ Minimum machine down time for maintenance and cleaning
- ✓ Minimize product give away & spill during filling and closing process
- ✓ Relentless light weighting of cans
- ✓ Absolute product quality and safety
- ✓ Hygienic design and automatic Clean-In-Place (CIP)

JBT Dairy Solutions

JBT has a long experience of helping processors to improve the quality and shelf life of their ambient shelf stable and refrigerated dairy products. With the acquisition of the Dutch company, Stork Food & Dairy Systems, JBT now offers a comprehensive range of processing and packaging solutions to extend shelf life for dairy based products. Whether you are making fresh or ESL (Extended Shelf Life) milk, UHT milk, concentrated milk, cream or dairy-based nutraceuticals, JBT has a proven track record of successfully processing and packaging these sensitive products. JBT has supplied literally thousands of UHT processing systems, aseptic, ultra-clean and conventional filling & closing systems, and batch and continuous in-container sterilization systems.

All these JBT installations preserve the quality of shelf-stable and refrigerated products while producing them at the lowest cost per unit.

JBT supplies a full range of integrated systems and equipment for dairy processing and packaging:

- ✓ Lines for pasteurized and ESL products
- ✓ Lines for UHT sterilized and aseptically filled products including bottle blow molders
- ✓ Lines for filling, closing and in-container sterilization of canned and bottled dairy products







The filling and closing challenge for canned liquid dairy products and nutraceuticals

Taking a closer look at the production of canned dairy products, precise, spill-free and hygienic can filling and consistent high-quality can seaming are critical for the cost, shelf-life, safety and quality of the product. The overall canning line efficiency and the cost per unit produced are strongly influenced by the performance of the filler / closer group.

Let's take a closer look to the JBT fillers and seamers with proven track record and market leadership position in the canned dairy industry.

A JBT Unifiller XLU with 81 filling stations synchronized with a JBT 12-spindle seamer



JBT Unifiller Model XLU-1281

JBT Seamer Model 1259-TS

Sweetened Condensed Milk (SCM)

SCM undergoes thermal pasteurization before filling and seaming of the cans. The high sugar concentration in sweetened condensed milk increases the osmotic pressure to such a level that most of the microorganisms are destroyed. This product is, thus, not heat-treated after packaging as its high sugar content preserves it for a long shelf-life.

In order to avoid so-called microbiological postcontamination of the product it is essential to effectively sanitize cans and covers prior to filling/seaming and to operate the filler-seamer group in an ultra-clean, high hygiene controlled atmosphere room. The JBT Unifiller/Closer technology is playing here its trump cards: high precision of filling, CIP without dismantling of the filling station, spill-free filling and closing and highly sanitary design.

Since SCM contains vegetable or dairy fats, the product is very sensitive to quality deterioration by oxidation. Product oxidation is minimized by minimizing the can headspace, and by nitrogen (undercover gassing) prior to seaming. To avoid post-contamination, the filling/closing equipment must keep the can headspace to an absolute minimum and achieve a consistent double seam without product spillage.

In case product spillage occurs during filling/closing, cans need to be washed and subsequently dried prior to labeling and secondary packaging. The JBT filler/closer group, however, achieves dry, spill-free filling and seaming, such that the cans can go directly to the labeler. The washing step can simply be eliminated. This represents not only a financial saving but also eliminates the risks of product post-contamination.



JBT Unifiller High hygienic & accuracy

The Unifiller is a unique volumetric filler that differentiates itself from conventional piston fillers by (i) the complete absence of seals in the filling stations, (ii) a self-draining fill station and filler bowl design, and (iii) large valve porting and a short product path.



For dairy applications, these unique Unifiller features deliver the following key benefits (i) superior fill accuracy with minimum give-away and consistent headspace, (ii) fully automatic cleaning in place (CIP) without fill station disassembly and (iii) the flexibility to fill products with or without particles.

The Unifiller's automatic CIP - without disassembly of the fill station - is confirmed by EHEDG and NIZO (The Dutch Dairy Research Institute). This outstanding feature of the JBT Unifiller is made technically possible by 2 unique design features:

- ✓ 3 Only metal to metal contact parts and no seals. The Unifiller is supplied with Waukesha non-galling alloys for valve and piston. The use of this unique material, combined with close tolerance manufacturing capabilities at JBT completely eliminates the need for seals in the piston.
- ✓ 3 Self-draining design of filler bowl and fill stations. The Unifiller's unmatched fill accuracy is achieved by the high precision manufacturing of the fill stations, the very short product path from filler bowl to container and the low residual volume in the fill nozzle at the end of the filling cycle. The Unifiller's robust machine design assures that product give away remain at minimum level during the entire machine life.

The Unifiller is available from 12 to 81 fill stations available in 100cc to 1500cc. The 1200 frame high-capacity version - with 69 or 81 filling stations - handles up to 90.000 containers per hour (1.500 cpm)



JBT X-59 Seamer

The high performance seamer

With its solid stainless steel base, stainless steel infeed and discharge table and solid timing gears, the X59 stands for robustness, low maintenance and long life. The X59 can closer sets new standards in hygienic design and cleanability, operator safety and ergonomics, can format changeover and maintenance.

The all stainless steel or non-corrosive material selection, the extensive elimination of dead spots, hard to clean spaces and hollow bodies, and the dry floor execution, make the X59 particularly suitable for applications requiring high standards of hygiene as dairy canning.

The X59 can be fitted with an optional automatic CIP system, including foam cleaning and hot water rinsing. The optional steam vacuumizing system is designed for minimum product build-up and for easy clean-ability with minimum down time.

Wide transparent guarding doors on all sides, in combination with a very compact foot print allow easy access for seam adjustment and maintenance. Safety guards are standard electrically and mechanically interlocked for maximum operator safety. An optional Total Production Management (TPM) package including easy to inspect periodic replacement parts, LED lighting, transparent upper and lower guarding, is available

Quick can format change-over is achieved by an (optional) automatic height adjustment and quick change seaming rolls.

Individual seaming arms for first and second operation offer unmatched seam adjustment accuracy and seam consistency over time. Optional separately driven spindles allow maximum flexibility for setting seam quality.

All machine gearing is located in one oil bath in the closer top housing. The fully automatic oil flow lubrication system with optional oil filtration and recovery system lubricates all machine parts, including seaming heads and lifters tables, without stopping the machine. Fully automatic grease lubrication of the drive system is available as an option. This unique lubrication concept is essential to guarantee troublefree operation, extreme reliability and low maintenance costs. The X59 seamers can be fitted with an optional performance and maintenance monitoring package.

The X59 can be delivered from 3 to 12 spindles to seam 100 to 1500 can per minute. The X59 is perfectly synchronized with a JBT Unifiller to compose an applicationspecific filler/closer group with smooth transfer of the open can from filler to seamer.





JBT TwinTec™ A Unifiller | Seamer monobloc

The JBT TwinTec is a unique Two-in-One design of a JBT UniFiller/seamer monobloc for medium line speed solutions (from 100 to 600 cpm). JBT is the first to integrate the filling and seaming operation in one single machine; with one robust, sanitary base, one control system, one drive, one lubrication system and one guarding. The compact 2-in-1 concept drastically minimizes installation, start-up and commissioning time, and saves valuable factory space. But most of all, the TwinTec eliminates the complex synchronization between filler and seamer providing short, gentle and highly reliable can transfer from filling to seaming station.

The TwinTec™ technology also sets new standards in hygienic design and machine cleanability. All product contact parts are executed in stainless steel or noncorrosive material. The filling and seaming stations are positioned on one single stainless steel, sanitary bottom plate with large drainage channels and a single drainage point. Full-length stainless steel sanitary guards with integrated cable trunking and large transparent doors give easy access to an open, easy-to-clean construction. Food safety is further enhanced by the elimination of an external transfer section between filler and seamer.





JBT high-capacity sterilization solutions for canned dairy products



In contrast to Sweetened Condensed Milk, canned evaporated milk, cream, sterilized milk and dairy-based nutraceuticals need in-container heat-sterilization to become shelf-stable and avoid microbiological spoilage. We will now provide a brief overview of the JBT in-container sterilization solutions for these type of canned or bottled liquid dairy products. JBT offers two types of sterilization processing lines for canned dairy products: batch retorts (static or agitating) and Continuous Rotary Pressure Sterilizers.

Batch retorts process containers into baskets or crates. A steady flow of containers moves onto an accumulation table to a basket loader. The filled baskets form a train of product and are moved into a retort vessel for thermal processing. Once the cycle is complete, the baskets leave the retort vessel and are unloaded on a conveyor for further handling.

Retorts can easily be configured to handle a large range of container types and process a wide array of product recipes. Batch retorts offer high product and container flexibility. Today's batch retorts are configured to run multiple processes to afford food processors maximum flexibility.

Continuous Rotary Pressure Sterilizers, on the other hand, process a constant steady flow of containers in a continuous way. This system ensures the continuous infeed, processing and discharge of the containers. By means of container guides, containers move through a series of shells to pre-heat, cook, pressure cool and cool each single container exiting the system.

Continuous Rotary Pressure Sterilizers are typically used for high volume products of a similar container type or size. These sterilizers permit short-time, high temperature cooking and rapid, efficient cooling in an automatic, continuous operation. Every container is cooked and cooled in the same manner and receives exactly the same thermal process for consistent product quality. Reduced processing time helps preserve the product's natural flavor, nutrients and appearance.

Generally speaking, continuous sterilizers offer enhanced reproducibility and consistency. A batch retort, on the other hand, offers more product, container and production flexibility.

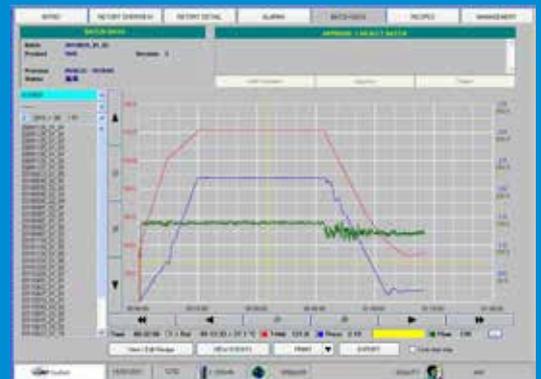
Another important concern is product agitation during the heatsterilization. Canned dairy products benefit from agitation during the thermal process by induced convection heating and by protecting the product nearest to the outside from 'burning' at higher temperatures. The agitation speeds up the heat transfer in products. The shorter the required exposure time to ensure commercial sterility, the less the heat affects the quality of the finished dairy product.

JBT Process Technology Centers over the world can assist you with Thermal Process Design and Container Performance Testing.



ABRS Automated Batch Retort System

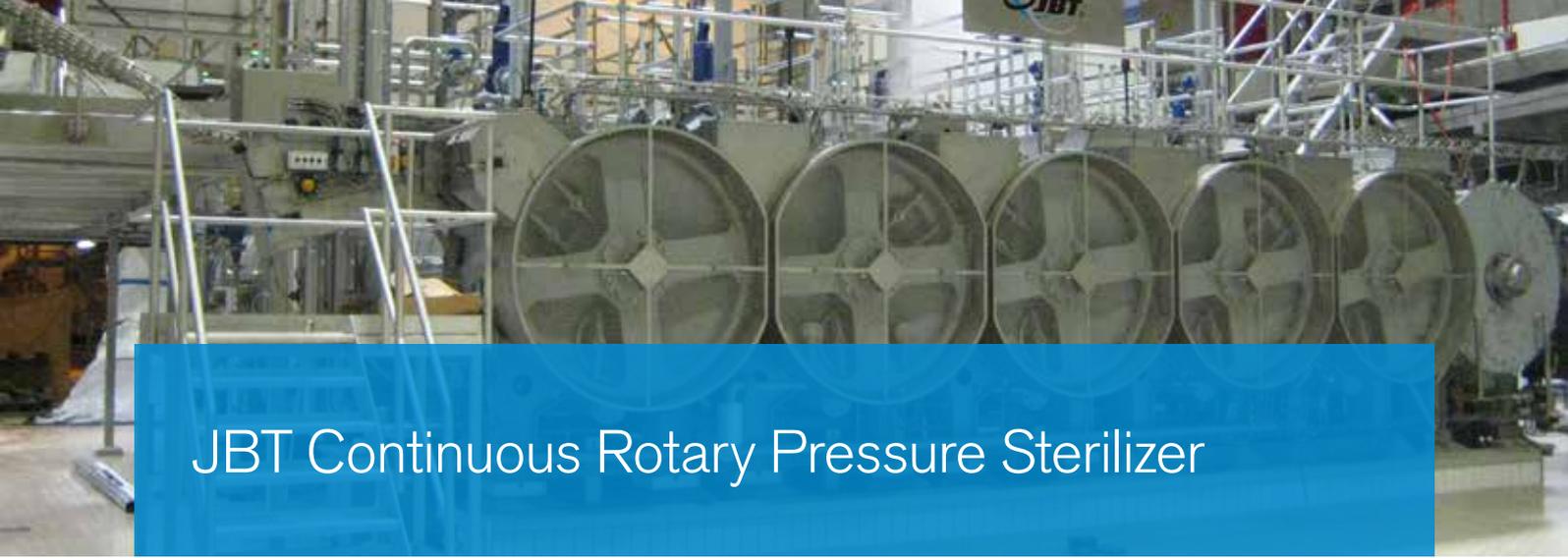
The trend in food processing is to move away from small retort vessels to larger shells to improve efficiency, product safety, and reduce cost. Larger vessels imply larger baskets that can't be handled manually. Large baskets are simply too bulky and too heavy for one person to move around. The need to handle these enormous baskets opens the way for ABRS 'Automated Batch Retort Systems' (ABRS) refers to the fully automated integration of all hardware required for transportation of baskets from loader station to sterilization retorts and from there on to an unload station and packaging area. The global handling system can be monitored by a basket/pallet tracking system.



JBT Process Technology Center

JBT will help you optimize your current process or develop the most advantageous one for your particular equipment/product/packaging combination. Our state-of-the-art pilot plants can simulate different thermal processes on any type of sterilizer to optimize the safety and quality of your products. Besides Process Validation and Thermal Process Development, JBT can also assist in Training & Audits and Container Performance Testing.

ptc.belgium@jbt.com



JBT Continuous Rotary Pressure Sterilizer



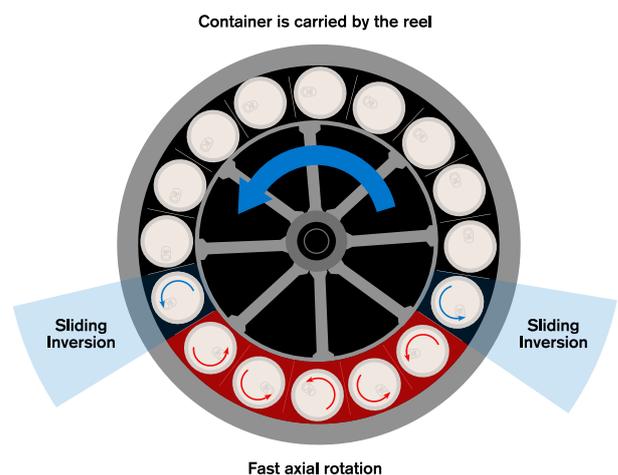
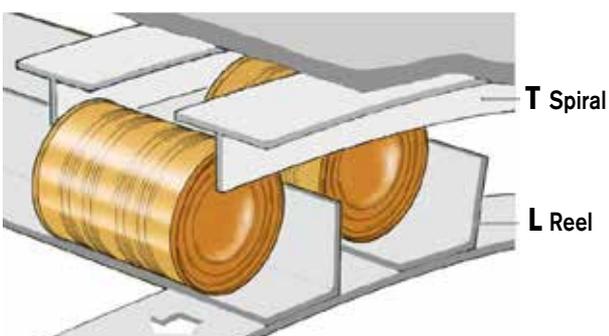
Practice makes perfect. 90% of the world's production of canned evaporated milk is sterilized on JBT's Continuous Rotary Pressure Sterilizers.

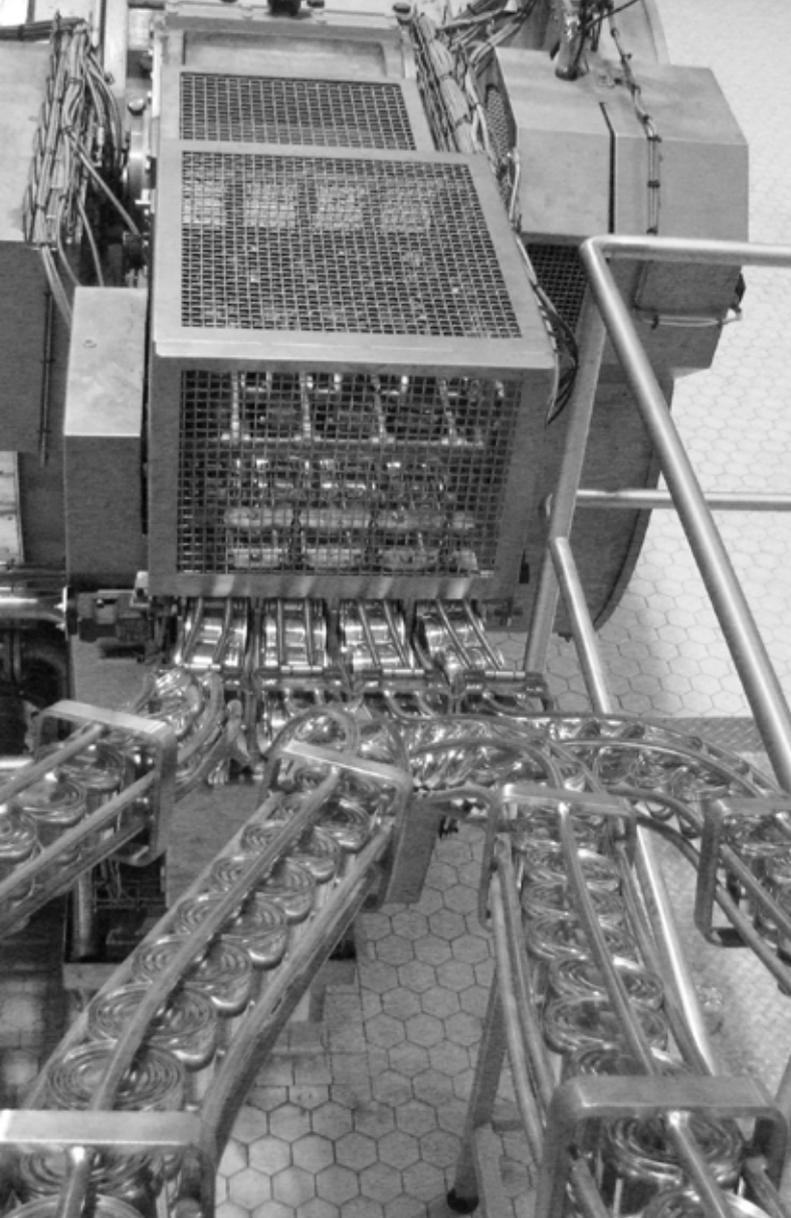
Closed cans enter the sterilizer directly from the closing machine with minimum waiting time. A feed device delivers the cans into the revolving reel of the first vessel. The reel, working in conjunction with the stationary spiral, advances the cans through the vessel. Cans never stand still.

The continuous spiralling motion and rotation of the container through the vessel provide an even cook to every container. Every can is treated individually and undergoes exactly the same thermal process. At the end of the cooking process the cans are transferred to a water-filled cooling vessel where a similar process efficiently cools them.

INCREASED HEAT PENETRATION AND REDUCED COOKING TIME

The Continuous Rotary Pressure Sterilizer agitates the can, permitting short-time, high-temperature cooking and rapid, efficient cooling in an automatic, continuous operation. For each turn of the reel, the can undergoes a 3-phase movement cycle. This intermittent axial agitation induces convection heating and results in faster cooking and cooling of the product.





Integrated packaging line solutions from one single source

JBT has a history of more than 50 years in the canned dairy industry, resulting in a vast experience and a large installed base of fillers, closers and sterilizers. More than 75% of canned dairy products on the globe are filled, closed or sterilized on JBT equipment. This makes JBT as a trusted and leading supplier and engineering partner to the key players in the milk canning industry.

JBT typically supplies the heart of the line (filling, closing, sterilization), but can also deliver and install integrated packaging lines for canned dairy and nutraceuticals: from reception of the empty cans, covers and primary product, to a filled, closed, and sterilized end product.

JBT lines are renowned for their high line efficiency. To achieve this, JBT works with trusted, quality suppliers for can and cover handling. Experienced JBT project managers take ownership for the project's scope, line efficiency, installation and start-up.

Prior to the design of your dairy line, JBT Process technology centers over the 6 continents can assist you with expertise and testing capabilities in filling, seaming and thermal process development.

hello@jbt.com

The fastest dairy canning line on the planet

1200 cans per minute or 72 000 cans per hour. This is the line speed of a canned dairy line of a famous Dutch dairy processor in the Netherlands.

At this speed, the line is nowadays the fastest canned dairy line on the planet. The cans are innovative light weight cans, necked-in on both sides and labeled with a plastic sleeve that provides a modern, attractive new look.

The heart of this line, a JBT Unifiller synchronized with a JBT seamer and, at the end, a JBT Continuous Rotary Pressure Sterilizer, has been engineered, manufactured and successfully commissioned by JBT.





Food processing expertise at your service, around the globe

Our mission: providing you with maximum uptime and smooth operation. Therefore, you can count on JBT for technological support, installation supervision, training and after-sales support anywhere in the world.

JBT has a long history of food processing equipment. Having sold over 40,000 machines worldwide our service technicians have faced and solved some of the toughest problems for processors within the food industry. JBT offers OEM parts for repairs and maintenance. Over 6,000 parts can be shipped within 24 hours to all continents. Other examples of JBT customer service include the standard exchange assemblies and preassembled kit to reduce downtime due to maintenance and repair. Our range of service packages make sure your equipment keeps running as profitably as possible, for as long as possible. With minimum downtime.

More than 50% of the world's shelf-stable foods are filled, seamed or sterilized on JBT equipment. With several thousands of canning lines in operation worldwide, JBT is the world's leading supplier of integrated processing solutions for metal, glass and plastic containers. From single machines to complete processing lines, we enhance product value and safety. JBT equipment captures the quality, nutrition and taste of your product while producing them at the lowest cost per unit.

COUNT ON JBT TO

HELP PROTECT YOUR INVESTMENT

The profitability of your business depends on the performance, reliability and availability of your equipment. Our global team of experts are ready to provide technical advice/service, application adjustments, food safety advice, or productivity recommendations.

WP-A021-EN

North America

John Bean Technologies Corporation
2300 Industrial Avenue
Madera CA 93639 | USA
Tel: +1-559-661.3200
Fax: +1-559-661.3156
madera.fpsd@jbt.com

Europe

John Bean Technologies NV
Breedstraat 3
9100 Sint-Niklaas
Belgium
Phone: +32 3 780 1211
Fax: +32 3 777 7955
fpsd.info@jbt.com

Latin America

John Bean Technologies
Máq. e Equip. Ind. Ltda.
Av. Eng Camilo Dinucci 4605
14808-900 Araraquara, São Paulo
Brazil
Phone: +55 16 3301 2000
Fax: +55 16 3301 2144
latinamerica.info@jbt.com



JBT de México S de RL de CV
Camino Real a San Andrés Cholula No. 2612
Col. San Bernardino Tlaxcalancingo
72820 San Andrés Cholula, Puebla
México
Phone: +52 222 329 4902
Fax: +52 222 329 4903
citrus.info@jbt.com

Asia Pacific

John Bean Technologies (Thailand) Ltd.
No. 2525 FYI Center Building 2, 9th Floor
Unit No. 2/901-2/903, Rama IV Road
Klongtoei, Bangkok 10110
Thailand
Phone: +66 (0) 2257 4000
infoasia-jbtfoodtech@jbt.com

South Africa

John Bean Technologies (Pty) Ltd.
Koper Street
Brackenfell
Cape Town, South Africa 7560
Phone: +27 21 982 1130
Fax: +27 21 982 1136
capetown.sales@jbt.com

hello@jbt.com | jbt.com