

# Citrus Processing Systems



The global leader in citrus processing technology



## Overview

With over 75% of the world's citrus juices produced with our technology, JBT is recognized globally as the leader in citrus processing solutions. Our 70+ year history in providing citrus processors with proven products and services makes JBT the logical choice to call on whenever new market demands require new solutions.

Whether the end product is Frozen Concentrated Orange Juice (FCOJ) or Not-From-Concentrate (NFC), JBT offers citrus processors multiple options to produce juice anywhere along the yield/quality curve that they desire to be on. The heart and soul of any citrus processing plant, as well as JBT's product line, is the citrus extractor.

The remarkable JBT Citrus Extractor has been designated as an American Society of Mechanical Engineers Historical Landmark because of its technological superiority and contribution to citrus processors worldwide. Of course, to achieve historical landmark status and maintain global leadership, JBT continuously invests in providing the

most advanced citrus processing technology available in the market today.

Our focused teams of engineering and research & development are constantly working to ensure we deliver systems and equipment that add the highest value to our customers.

By increasing product yields and quality, improving processor productivity and efficiency, and lowering overall processing costs, JBT technology delivers true competitive advantage to its customers.

To support our customers and continue building our base of expertise, JBT operates pilot plant facilities around the world, including the United States, Brazil, Argentina, and Spain. We are striving to ensure that JBT is providing the right solutions to meet the needs of each customer.

JBT is far and away the preferred supplier of citrus processing technology and services to the worldwide citrus industry. With manufacturing facilities in Lakeland (U.S.), Araraquara (Brazil),

Parma (Italy), Cape Town (South Africa), as well as sales and service centers in all the key citrus processing markets, JBT is the natural partner for citrus processors all over the world.

In addition to our worldwide sales and service network, our comprehensive product line including citrus extractors and finishers, citrus juice handling systems and equipment, and state-of-the-art process control systems allow our customers to use the best available tools to profitably compete in today's challenging business environment.

Our dedicated, global teams of sales, mechanical, technical, manufacturing, and customer service professionals draw upon any JBT resources they need to meet the requirements of our customers.

No other citrus processing solution provider can deliver as complete a package of convincing global leadership, proven technology, distinguished reputation for quality, and capable team dedicated to providing world-class customer service.

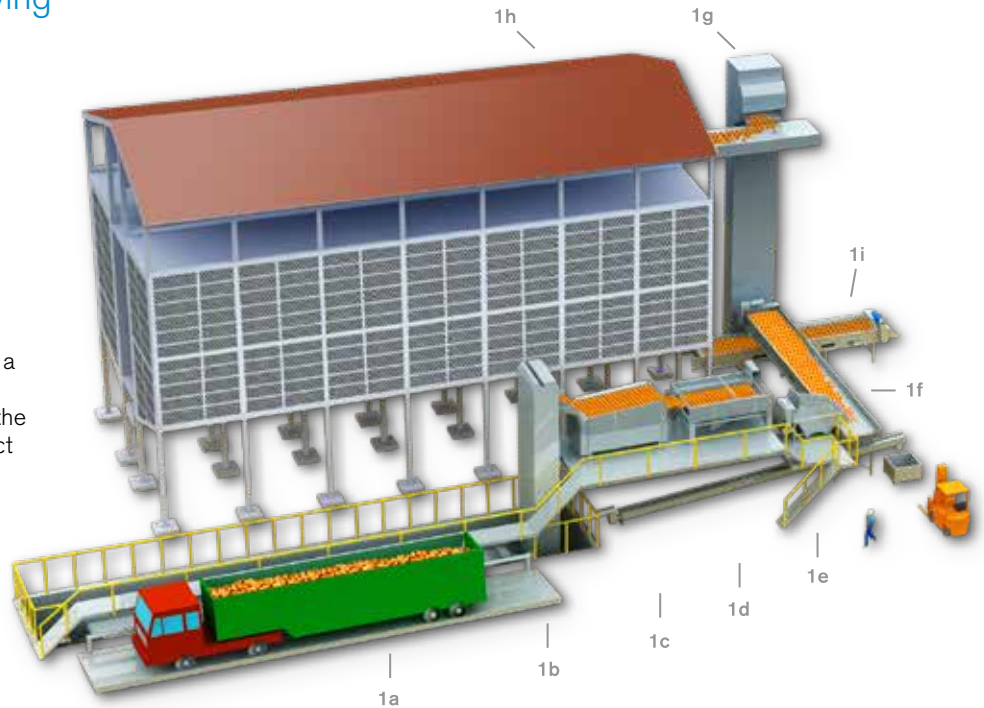
## JBT delivers full turn-key solutions

### 1. Fruit Storage/Receiving

- 1a Unloading Ramp
- 1b Bucket Elevator
- 1c Detrasher Roller Conveyor
- 1d Brush Washer
- 1e Destemmer
- 1f Belt Conveyor
- 1g Bucket Elevator
- 1h Dry Storage Silos
- 1i Belt Conveyor

Citrus fruit is typically unloaded via a dry system which includes aerated silos with sloping planes on which the product is placed in layers to protect the integrity of the fruit.

A transfer system consists of a set of conveyor belts that moves the fruit from the storage bins to a bucket elevator prior to entering the juice extraction area.



Bucket Elevator



Dry Storage Silos

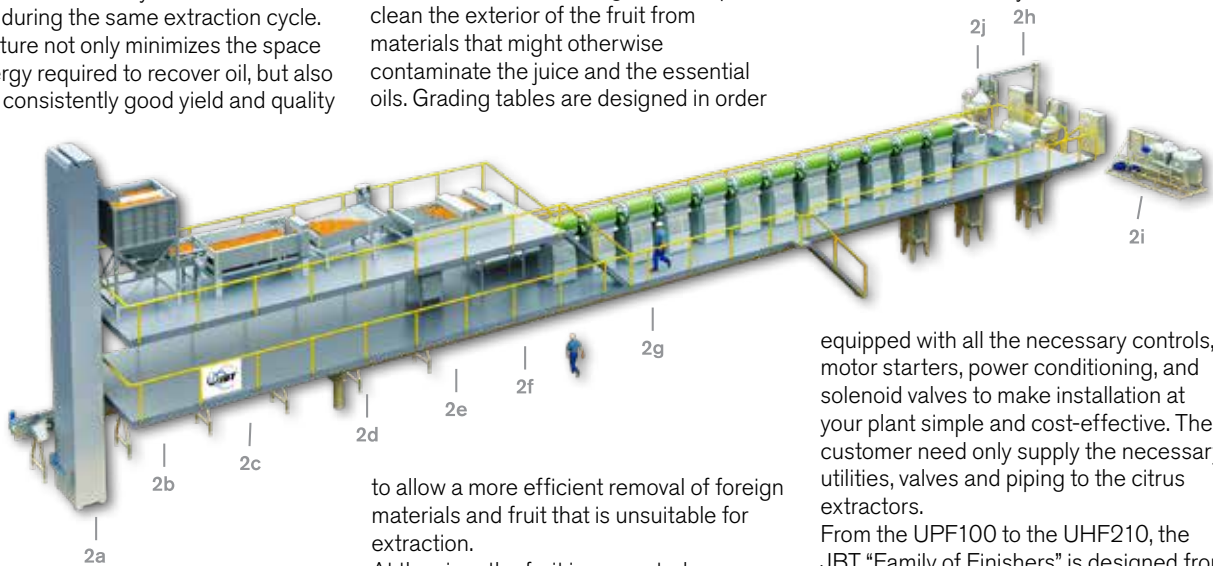
## 2. Juice Room Equipment

- 2a Bucket Elevator
- 2b Surge Bin
- 2c Brush Washer
- 2d Roller Grader
- 2e Belt Roll Sizer
- 2f Platform
- 2g JBT Citrus Extractors
- 2h Cold Pressed Peel Oil Recovery
- 2i READYGo CITRUSAN
- 2j Primary Juice Finisher

The JBT citrus extraction system is unique in that it simultaneously recovers oil as well as juice during the same extraction cycle. This feature not only minimizes the space and energy required to recover oil, but also delivers consistently good yield and quality

are collected and sent to a finisher for initial separation of the larger particles and oil emulsion. The finished emulsion is sent to a two-stage centrifugation process for concentration and recovery of the final cold-pressed oil. The first stage de-sludging centrifuge separates most of the water and solids from the emulsion. The second stage centrifuge is the "polishing" stage where the remaining water and fine peel particles are removed producing cold pressed oil. The cold pressed oil is then winterized and stored until ready for shipment. The brush washer is designed to help clean the exterior of the fruit from materials that might otherwise contaminate the juice and the essential oils. Grading tables are designed in order

comparable functionality as the larger custom-engineered CIP systems offered by JBT at a reduced capital investment. The READYGo CITRUSAN system injects cleaning solutions back through the juice piping and into the internal extractor juicing components (known as backflushing). In addition, up to 45 spray nozzles are mounted on each extractor to clean the external surfaces. The juice room operator has a choice of several different cleaning and rinse cycles in order to meet production and quality requirements. The self-contained system comes



throughout the entire processing season. The high quality oil emulsion recovered in the JBT Citrus Extractor allows processors to produce and market both cold pressed oil (CPO) and/or d-limonene.

The oil:water emulsion initially created at the moment of extraction, small particles of peel called "frit", and other soluble and insoluble solids flow from the extractor and



**Cold Pressed Peel Oil Recovery**

to allow a more efficient removal of foreign materials and fruit that is unsuitable for extraction.

At the sizer, the fruit is separated according to the sizes that best match the cups of the JBT Citrus Extractors in order to achieve optimal juice quality and yield. Sizing is achieved by rotating the fruit along belts with a series of rotating horizontal rollers that can easily be adjusted during operation. After sizing, the fruit is conveyed to the Citrus Extractors by means of a tilted feed belt conveyor equipped with the appropriate diverters. The tilted feed belt is set up at the appropriate angle to promote proper fruit feeding to the extractors regardless of fruit shape. Excess fruit is returned to the grading table by means of a return fruit conveyor.

The READYGo CITRUSAN skid-mounted, automatic clean-up system from JBT is more than just a single-purpose CIP system. READYGo CITRUSAN offers

equipped with all the necessary controls, motor starters, power conditioning, and solenoid valves to make installation at your plant simple and cost-effective. The customer need only supply the necessary utilities, valves and piping to the citrus extractors.

From the UPF100 to the UHF210, the JBT "Family of Finishers" is designed from the ground up to handle the full range of juice finishing (separating juice from pomace), oil finishing (separating frit from the oil and water emulsion) and recovery of water extracted secondary solids (WESOS). From the motor drive to the easily accessible intake chute, JBT's design and development of these reliable machines makes them easy to clean and easy to operate.

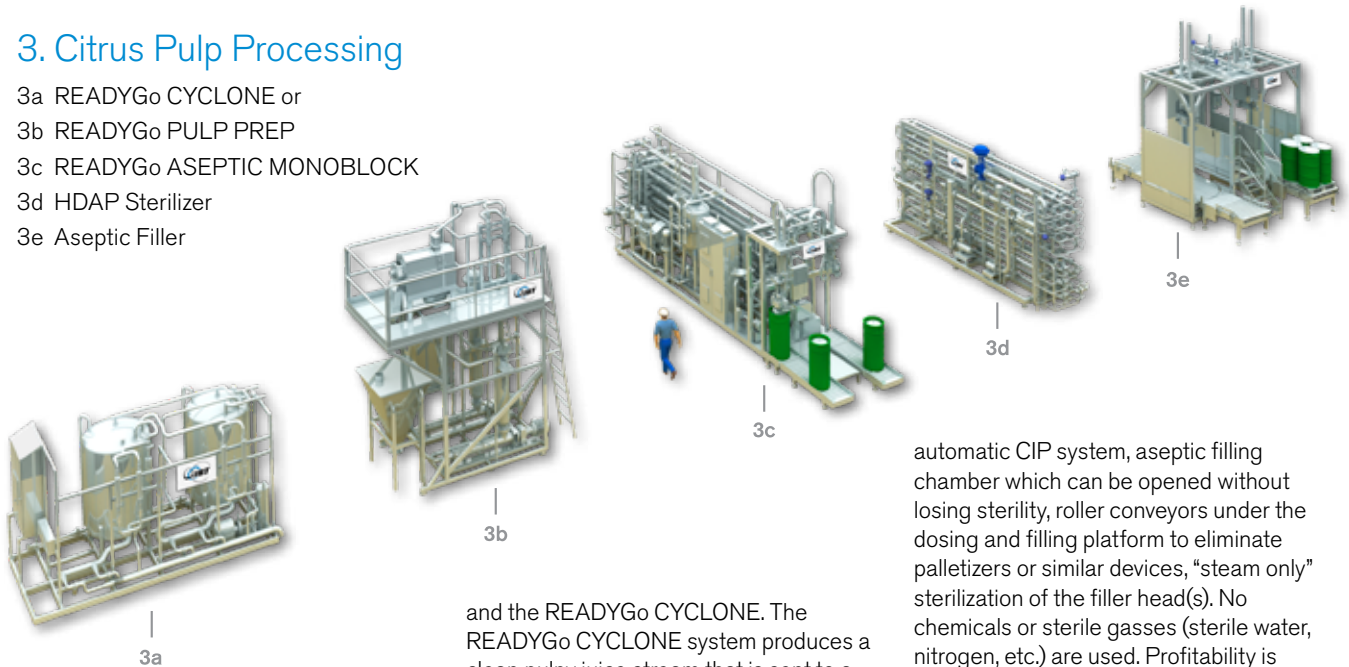
Common features include all-stainless steel construction, a fully enclosed and guarded drive system, an adaptable intake to meet customer requirements, and a spray ring that is used to minimize screen blinding.



**Citrus Juice Extractors**

### 3. Citrus Pulp Processing

- 3a READYGo CYCLONE or
- 3b READYGo PULP PREP
- 3c READYGo ASEPTIC MONOBLOCK
- 3d HDAP Sterilizer
- 3e Aseptic Filler



No matter where along the pulp process you are, JBT has a solution for you. From production of high quality citrus pulp at the point of extraction to thermal treatment to filling and blending, JBT has the proven technology to optimize your particular process.

The JBT citrus extraction system offers various methods of pulp recovery. Juice cell sac size can be custom tailored to the needs of the processor and their customers. In one configuration, the JBT extraction system can produce pure juice sacs of normal size typically used in concentrated juices and other products. The JBT extraction system can also be configured to produce high quality premium pulp cells as part of the JBT Pulp Recovery System. Juice sacs from this system are primarily used for the marketing of NFC juices. The juice sacs produced by this system range in size and are virtually free of peel and seed particles or embryonic seeds. Up to 90% of these juice sacs retain their floating characteristics.

Recovering citrus pulp with minimal defects at the right concentration in the proper quantity has always been a tricky affair – until now. JBT offers two alternatives to prepare pulp for further processing; the READYGo PULP PREP

and the READYGo CYCLONE. The READYGo CYCLONE system produces a clean pulpy juice stream that is sent to a concentrating finisher for concentration before being sent for pasteurization or sterilization. It is designed to recover pulp from citrus juice delivered by a wide variety of pumping systems, and the level of defect removal is determined by configuration and processing parameters determined by the operator. The included control system enables control of tank levels, flow rates, and other process parameters, support for CIP, and requires minimal training. In addition to offering multiple solutions for producing high quality juices, JBT also offers processors state-of-the-art product sterilization technology for juice and pulp. JBT sterilizers are specifically designed for the application to ensure that whatever product is being processed undergoes the optimal thermal treatment, thereby guaranteeing commercial sterility while maintaining the highest possible product flavor attributes.

Designed to fill fluids, concentrates, and particulate products, JBT's aseptic fillers provide: high production speed achieved by a newly designed head system, improved reliability from a fully PLC controlled self-diagnostic operational mode, greater versatility by meeting various packing standards with different products, complete sanitation by an

automatic CIP system, aseptic filling chamber which can be opened without losing sterility, roller conveyors under the dosing and filling platform to eliminate palletizers or similar devices, "steam only" sterilization of the filler head(s). No chemicals or sterile gasses (sterile water, nitrogen, etc.) are used. Profitability is increased by keeping consistent fill weight accuracy and by reducing labor costs.

The READYGo ASEPTIC MONOBLOCK is designed to supply the food processing industry with a small/medium-sized unit for aseptic processing and filling with the same high quality and aseptic reliability as large-scale units. The unit features extremely compact overall dimensions, is quick to install, and is both flexible and easy to use. All the components are installed onto a single stainless steel mainframe where they are supplied with all the relevant piping and electrical connections.

The unit undergoes complete factory acceptance testing prior to shipment and is ready for installation at customer's site in minimal time. Only electricity, water, air and steam utilities need be connected. READYGo ASEPTIC MONOBLOCKS are available with capacities ranging from 500 to 6000 kg/h, and are designed for the aseptic filling of 5 to 200 liter bags.



**Primary Juice Finisher**

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**4. NFC Production**

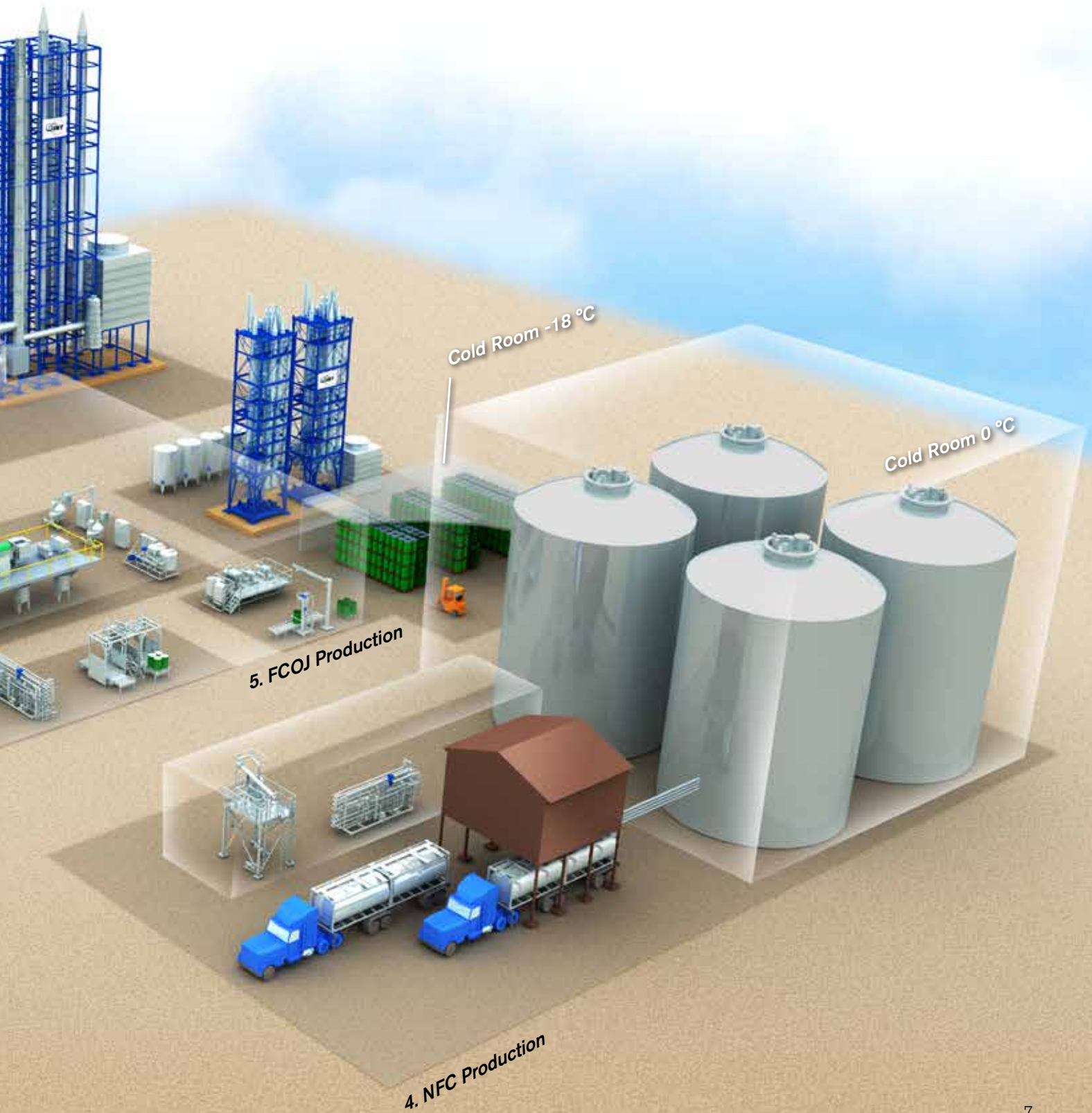
- 4a Deaerator
- 4b Sterilizer
- 4c Aseptic Storage Tank Farm
- 4d Aseptic Juice Loading Station

**5. FCOJ Production**

- 5a READYGo PULPWASH
- 5b T.A.S.T.E. Evaporator
- 5c Drum Filler
- 5d Frozen Concentrate Tank Farm

**6. Peel/Waste Processing**

- 6a Waste Heat Evaporator
- 6b Peel Drying System
- 6c Pellet Silos
- 6d READYGo d-LIMONENE



## 4. NFC Production

- 4a Deaerator
- 4b Sterilizer
- 4c Aseptic Storage Tank Farm
- 4d Aseptic Juice Loading Station

With global demand for high quality Not-From-Concentrate juices growing, JBT has focused even more attention on the NFC production process. The JBT extractor can be equipped with special juicing components which reduce the presence of peel oil and other negative attributes in the juice for producing optimal NFC.

There is no such thing as a universal heat exchanger. To properly select the appropriate configuration and dimensions, it is important to understand the product's characteristics and process parameters. An optimum dimensioning ensures the appropriate mixing of the treated product, with subsequent uniform temperature distribution and uniform treatment in every point.

JBT tubular heat exchangers are available in various configurations and include product hold and process controls to assure critical temperatures and hold times are satisfied. They follow a similar construction format with a single tube or number of smaller tubes enclosed within an outer shell.

For aseptic systems, finished and chilled juice is fed to an aseptic processing system consisting of a tube-in-shell dimple tube sterilizer with optional direct product-to-product heat recovery.

A specially designed flash deaerator for aroma recovery and oil separation, as well as an independent CIP tank and associated piping, are also part of the system. Sterilized juice is then pumped into bulk storage tanks or aseptic bags.

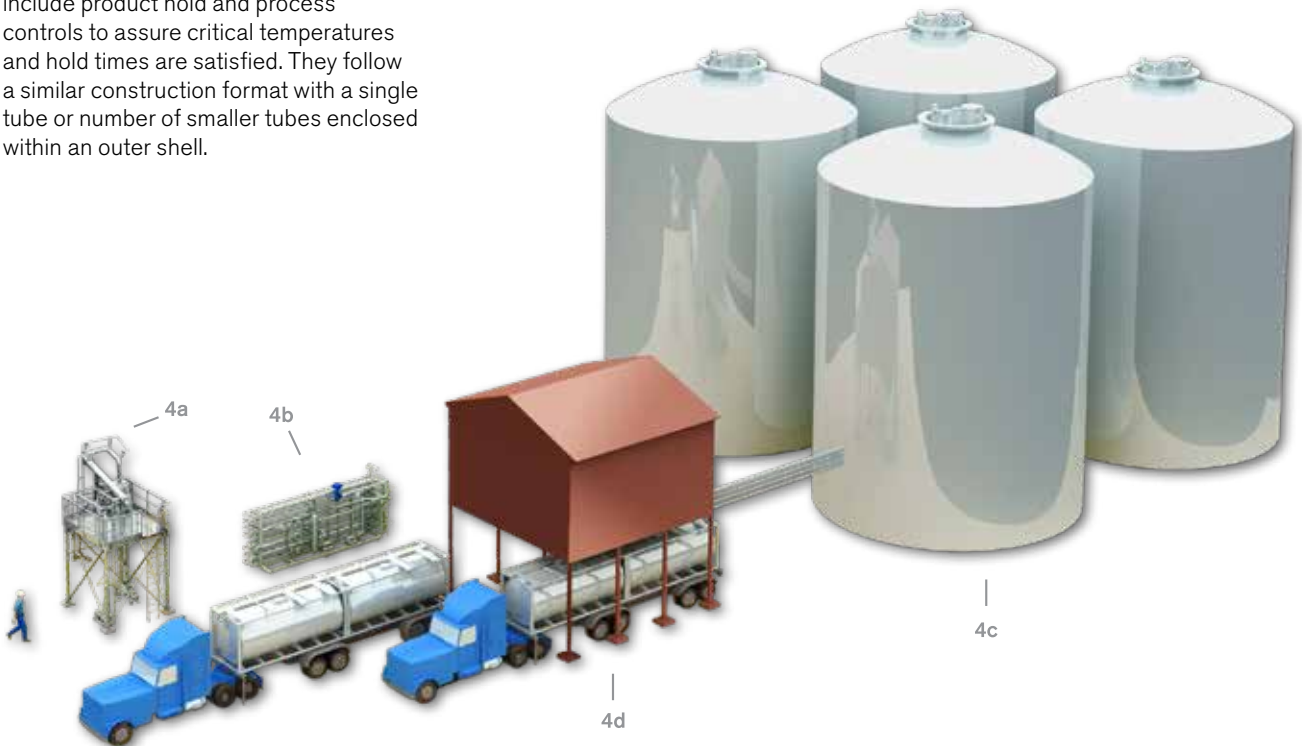
The stored juice can then be exported directly to filling lines with optional blending and aseptic flavor injection systems, or to tankers for transport to other destinations.

However, making high quality NFC is only one of today's market challenges. Not only must processors produce NFC and other pumpable food products with all the desirable attributes that the market demands, but solutions need to be in place to ensure that aseptically produced products retain all those attributes throughout the storage, transportation, and distribution chain.

To this end, JBT has teamed up with other leaders in their respective fields to supply a comprehensive bulk aseptic storage and transportation solution to the food processing industry.



**Deaerator**





## 5. FCOJ Production

5a READYGo PULPWASH

5b T.A.S.T.E. Evaporator

5c Drum Filler

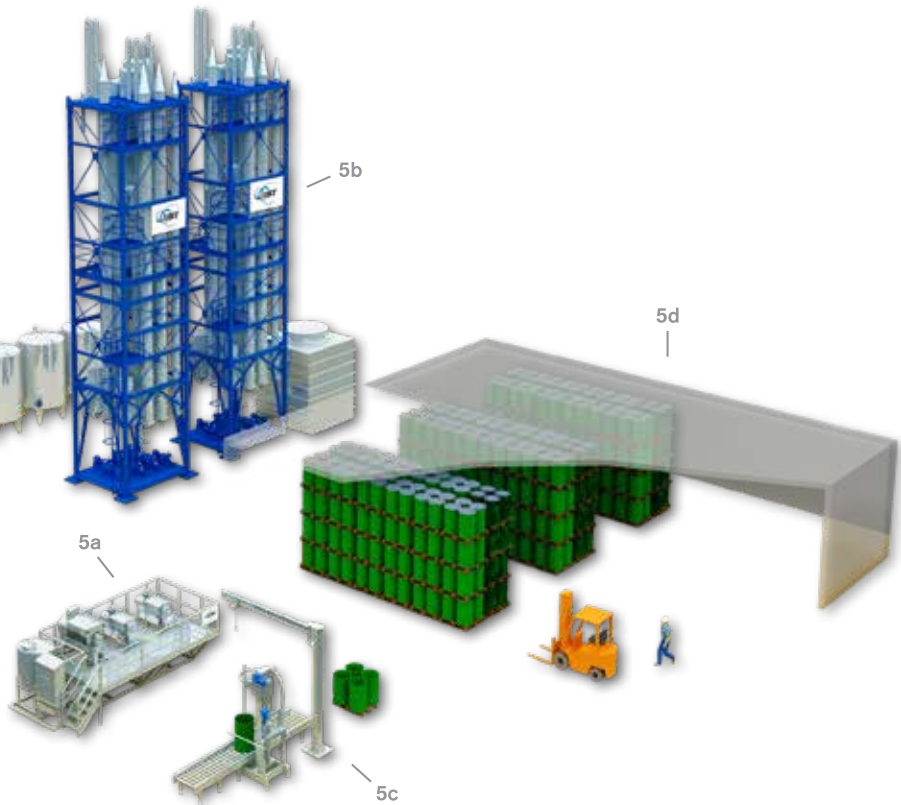
5d Frozen Concentrate Tank Farm

The recovery of secondary solids from citrus pulp is one of the most straightforward methods to increase primary juice yield by up to 8%. Up to now, installation of a three-stage pulp wash system has been an expensive endeavor requiring customized design and extensive on-site installation time. As part of JBT's READYGo™ family of skid-mounted citrus processing systems, READYGo PULPWASH simplifies installation and operation of a complete four stage secondary solids recovery process.

The skid utilizes the latest PLC and color graphical user interface technology to create a simple-to-operate process system. Operation and cleaning of the unit are accomplished via a large color touch screen mounted on the electrical panel. The intuitive graphical interface minimal training required. Water addition to the system is automatically calculated by inputting the number of extractors currently running and the estimated pulp content of the juice. The sophisticated software then automatically regulates the water flow to the system.

Juice concentration up to 65° Brix is obtained in the JBT TASTE Evaporator in a total cycle time of 2½ minutes. The basic advantage of the «THERMALLY ACCELERATED SHORT TIME EVAPORATION» technology is that at each evaporation stage the juice is introduced into the tube nest in the form of a turbulent fog, enabling a much faster and higher heat transfer than would be expected under any other conditions.

The juice flows from one stage to the next without recycling. The initial juice evaporation occurring before pasteurization ensures better juice deaeration and a more efficient stripping of fresh aromas.



The best quality of the product is preserved only when deaeration, aroma recovery, pasteurization, stabilization, concentration, and cooling are performed in an extremely short time. The evaporator can also be equipped with an aroma recovery system where the aromas are extracted from the juice and concentrated 150 times before pasteurization, thereby avoiding any alteration to the freshness of the aromas due to heat. Before leaving the evaporator, the concentrated juice passes through a flash cooler which drops the temperature to 10 °C.

The dependable quality and quantity of the juice sacs expressed from the JBT system is a result of the proven extraction technology where bitter constituents such as cores, membranes and seeds are instantaneously separated from the juice and juice sacs by the prefinisher tube during the extraction cycle. The pulp separated from the primary finisher may be washed and added back as secondary

solids to the primary juice stream to increase overall juice yield or processed separately to serve as a citrus beverage base.



Drum Filler

## 6. Peel/Waste Processing

- 6a Waste Heat Evaporator
- 6b Peel Drying System
- 6c Pellet Silos
- 6d READYGo d-LIMONENE

Peel, core material, membranes, and other by-products discharged from the extraction process are available for livestock feed production.

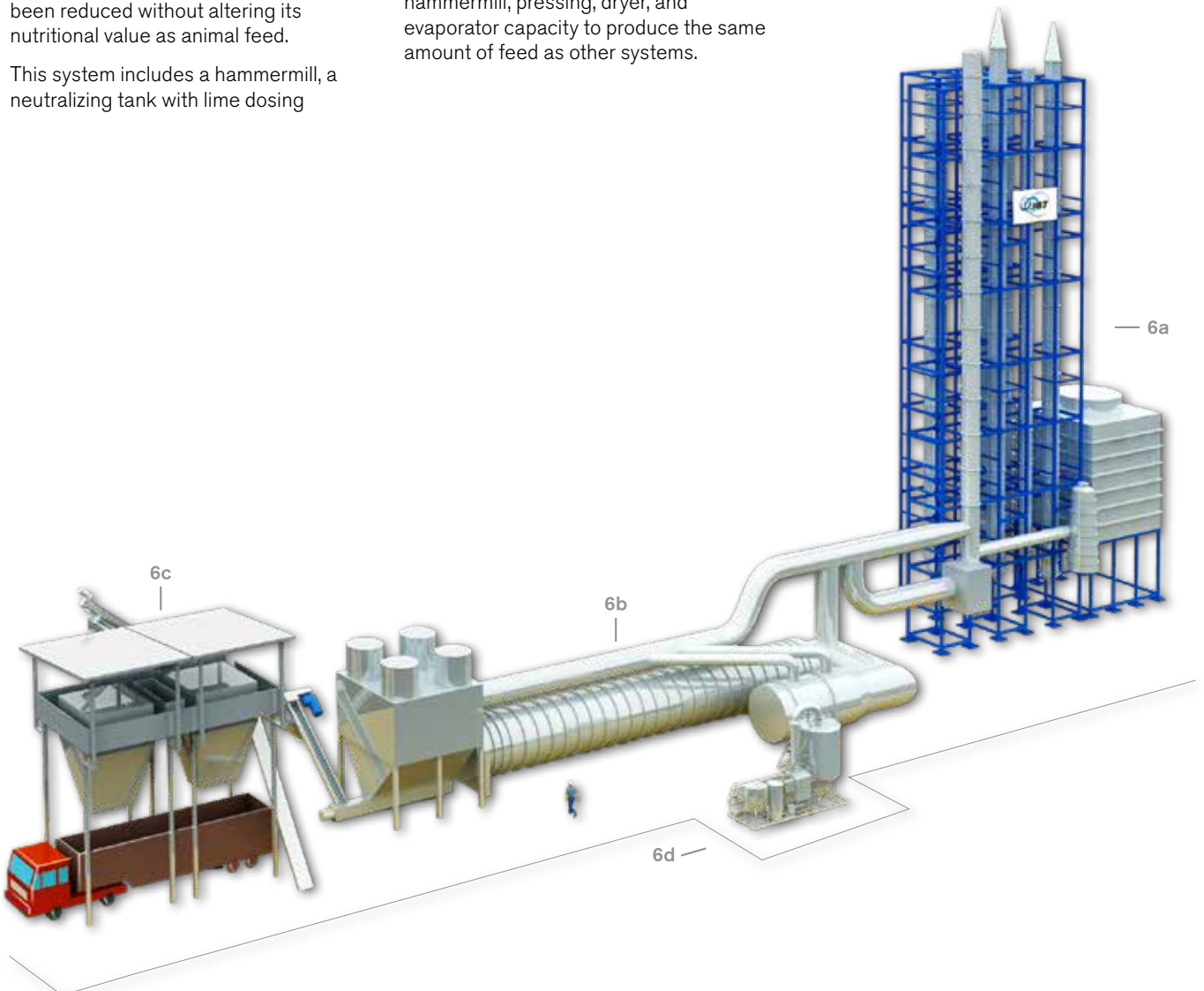
Peel drying systems are designed to reduce peel moisture content from the initial 82% to a final 8%; this allows the peel to be preserved after its volume has been reduced without altering its nutritional value as animal feed.

This system includes a hammermill, a neutralizing tank with lime dosing

capabilities, a pressing unit, a rotary drum drier complete with combustion chamber and cooler for dried peels, a centrifugal dust separator, and a product filling system. An optional pelletizing machine is also available.

The benefits of the JBT Citrus Extractor by-products are lower initial capital outlay and lower operating costs. Based on a study performed by one of the largest manufacturers of citrus feed mill equipment in the world, by-products from the JBT Citrus Extractor require less hammermill, pressing, dryer, and evaporator capacity to produce the same amount of feed as other systems.

The air-vapor mixture coming from the peel dryer is separated from the fine powders and then conveyed to the JBT Waste Heat Evaporator to be used as a source of energy to concentrate the liquor coming from the pressing stage. Exploiting the vapors coming from the dryer, the waste heat evaporator provides enormous energy savings over alternative systems where the peels are fully dried solely by hot air. Additionally, the waste heat evaporator can also recover residual d-limonene contained in the peel.



## d-Limonene Recovery

Citrus processors, constantly challenged to find alternative sources of revenue given the maturity of the citrus juice market, have found selling d-limonene to be an increasingly important part of their overall business.

With the development of the JBT READYGo d-LIMONENE recovery system, now even smaller processors can recover this valuable product stream.

The complete, skid-mounted system for the recovery of d-limonene from various

oil-rich streams can help processing needs in a number of ways:

- As a cost-effective method to recover d-limonene for processors who are not prepared to make the significant investment required for a cold-pressed oil recovery system
- As a supplement for existing cold-pressed systems, eliminating the need to invest in a costly expansion

To remove residual d-limonene remaining in the discharge of cold-pressed oil systems and other waste streams, thus providing assistance to waste treatment or disposal systems.



READYGo d-LIMONENE

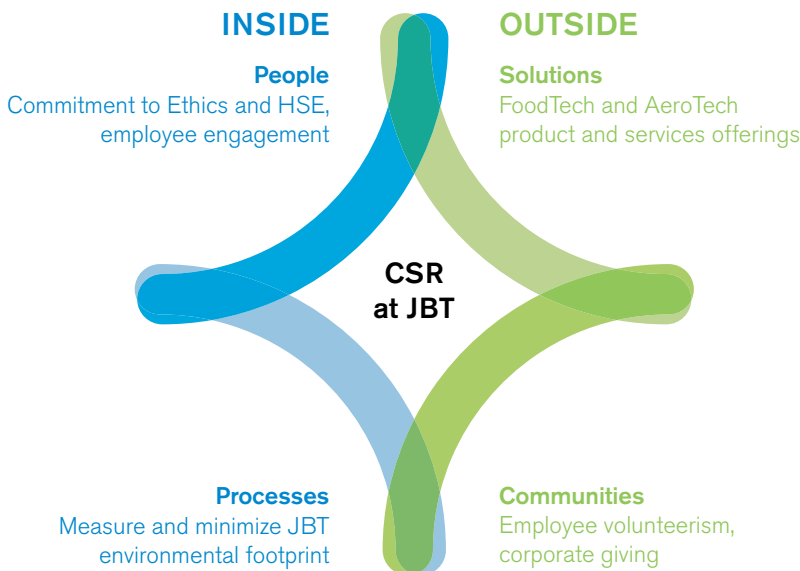
## Corporate Social Responsibility at JBT

# CSR starts **inside** JBT and radiates **outward.**

True Corporate Social Responsibility (CSR) begins inside each of us within our company. It's expressed in our beliefs and behaviors, and it drives our efforts and initiatives to improve continuously at operating safely, efficiently, responsibly and in ways that support long-term business success.

Within our company, profitable growth and long-term success cannot be separated from operating safely, efficiently and ethically.

Out in the world, we extend our positive impact through our products, and our contributions to the communities around us.



## COUNT ON JBT TO HELP PROTECT YOUR INVESTMENT

JBT's greatest value in PRCARE® services comes from preventing unexpected costs through smart, purposeful, and timely maintenance based on unmatched knowledge and expertise. PRCARE service packages are offered as a maintenance agreement in various service levels, depending on your production and cost management requirements.



### JBT LIQUID FOODS

FRESH PRODUCE TECHNOLOGIES | FRESH-CUT, ROBOTICS, STEAMING | FRUIT AND VEGETABLE PROCESSING | SECONDARY PROCESSING | ASEPTIC SYSTEMS | FILLING AND CLOSING | IN-CONTAINER STERILIZING | TRAY SEALING | HIGH-PRESSURE PROCESSING | POWDER PROCESSING | TUNA PROCESSING

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