# Vegetable Processing Systems

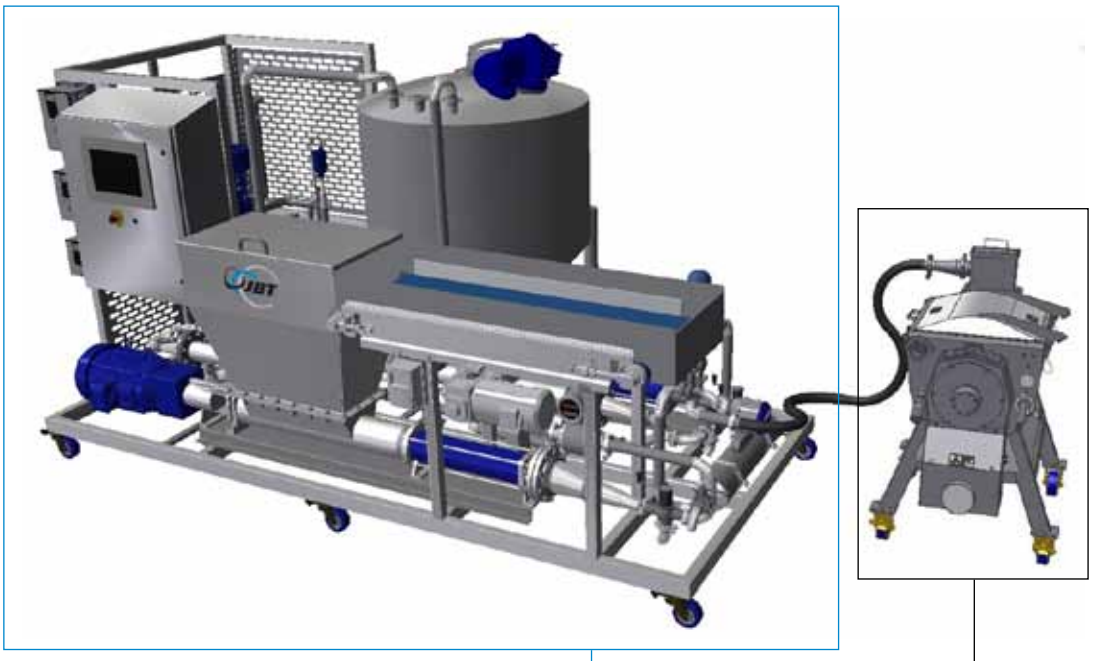
# At a Glance

Consumers are demanding safer, more hygienic and healthier foods. While the share of conventional fruit juices in western markets is declining, a growing number of vegetable and superfruit based juices are found in the beverage section of supermarkets.

Product diversification has led to an increased emphasis on developing machines that are hygienic, cleanable and offer greater flexibility for processing a variety of vegetable matrices.

As the demand for better, higher-quality value-added vegetable products intensifies, processors need the best machinery available to maintain and gain greater market share, especially in the face of growing competition. From chopping to filling, JBT offers single machines, as well as complete processing lines for creating value-added vegetable products.

## JBT Process for Raw Vegetable Juices and Purees

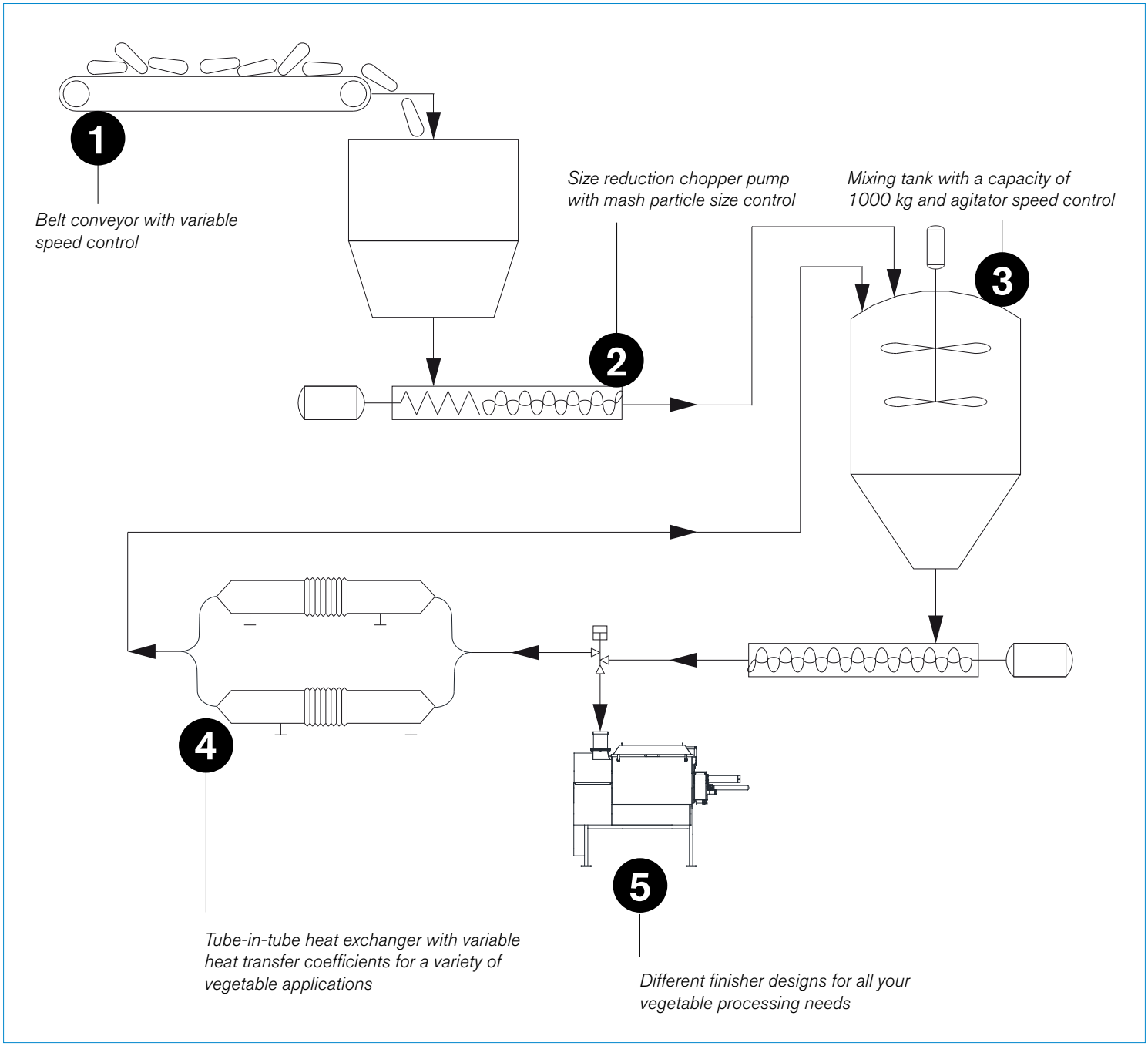


## JBT Process for Raw Vegetable Juices and Purees

The JBT READYGo™ VEGETABLE/FRUIT PROCESSING TEST SKID integrates a series of primary processing steps including conveying, size reduction, and heating operations on a single, compact stainless steel frame. JBT process skids are easily installed as all the relevant piping and electrical connections are pre-installed and pre-tested, making it ideal for product testing at any location.

The vegetable/fruit skid is designed to extract juice and/or puree, from a variety of different vegetables and fruits. The ability to use different finishing technologies to separate the juice/puree from the pulp/pomace further downstream provides flexibility to the processor given that the same system can be used for juice, puree and concentrate production. Two heat exchangers with different sized tubes allow easy handling of low, medium and highly viscous fluids. The skid comes with a range of data recording sensors including flow meters, pressure, temperature and level transmitters.

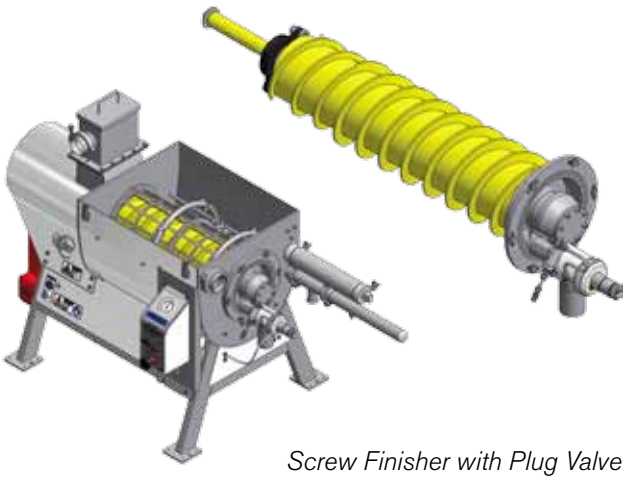
## JBT READYGo™ VEGETABLE/FRUIT PROCESSING SKID



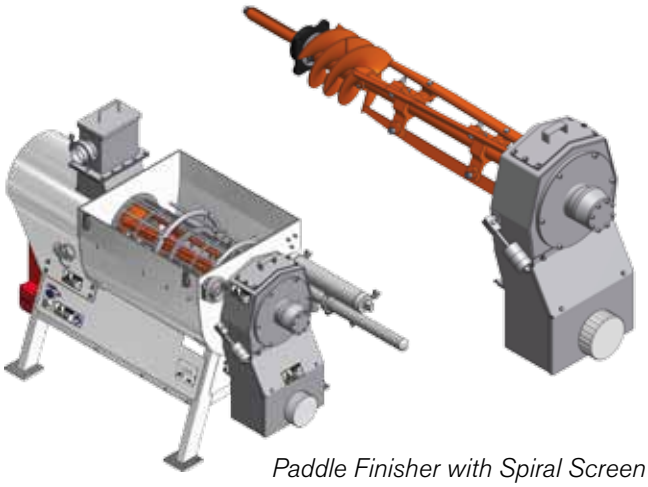
# Juice Extraction

## JBT Juice Finishers

Juice extraction is accomplished using a paddle style or a screw style JBT finisher. The feed mash from the JBT READYGo™ VEGETABLE/FRUIT SKID undergoes cold extraction through one of the two JBT finishers that imparts negligible thermal energy to the product. Having two different finishing technologies available allows for better process optimization and tighter control of both yield and quality, regardless of product input properties.



*Screw Finisher with Plug Valve*



*Paddle Finisher with Spiral Screen*

**Applications & Design Features of Finishers**

| Finisher Type | Screw* | Paddle |
|---|---|---|
| Vegetable Applications | Cucumber, Iceberg Lettuce, Butternut Squash | All |
| Key Design Element | Screw with constant channel volume and flight pitch | Inclined paddles with spiral screen |
| Variables for control | Screen size, plug valve pressure and screw speed | Paddle speed, screen size, screen to paddle clearance and exit gate weight control |

** Screw finisher gives higher juice yields with softer/pulpier matrices*

## Juice Yield & Quality

Fully automated and continuous processes reduce the required labor and ease production even with the toughest vegetables. Incorporating the JBT Automated Spray Ring into the process helps clear the screens, preventing blinding and ensuring a consistent juice yield and quality.

| Raw Juice Yields (%) | | |
|---|---|---|
| **Vegetable Juice** | **Juice Yield (%)** | **Finisher Type** |
| Lettuce | 85-90 | Screw Finisher |
| Spinach | 70-75 | Paddle Finisher |
| Kale | 65-70 | Paddle Finisher |
| Cucumber | 85-89 | Screw Finisher |
| Sweet Potato | 47-53 | Paddle Finisher |
| Celery | 80-85 | Paddle Finisher |

| Effect of pre-heating on carrot juice yield and quality | | | | | | |
|---|---|---|---|---|---|---|
| Sample | Screen Pore Size (inch) | Paddle VFD Setting (Hz) | Vitamin C (mg/100 g) | Pomace Moisture Content (%) | Feed Mash Temperature (°F) | **% Juice Yield** |
| 1 | 0.02 | 90 | 14.87 | 86.79 | 60 | **46.3** |
| 2 | 0.02 | 90 | 7.82 | 84.89 | 120 | **55.8** |

| Effect of finisher parameters on % centrifuge solids in raw iceberg lettuce juice | | | | | | |
|---|---|---|---|---|---|---|
| Sample | Screw Finisher Parameters | | % Juice Yield | **% Centrifuge Solids** | °Bx | pH |
| | Screen Pore Size (inch) | Plug Valve Pressure (psig) | | | | |
| 1 | 0.01 | 30 | 88.2 | **6** | 3.65 | 6.17 |
| 2 | 0.02 | | 89.3 | **9** | 3.67 | 6.18 |

# Puree Extraction

The JBT model FTE turbo extractor and refiner has been designed to provide efficient, high performance Hot Break or Cold Break puree extraction.

The FTE also works as a cold extractor for whole vegetables by adding a pre-rotor with six knives to the product inlet, thereby combining the size reduction and refining steps in a single operation.

| **Applications & Design Features of FTE Turbo FInisher** | |
|---|---|
| Finisher Type | FTE Turbo Finisher |
| Vegetable Applications | All |
| Key Design Element | 18 rotor paddles offset at an angle of 2.5° or 5° |
| Variables for control | 1. Screen size<br>2. Rotor Speed<br>3. Screen-to-paddle Clearance |

| **Vegetable Puree Yields (%)** | |
|---|---|
| **Raw Puree** | **Puree Yield (%)** |
| Carrot | >85 |
| Butternut Squash | >85 |
| Zucchini | >90 |
| Onion | >95 |

| **Fruit Puree Yields (%)** | |
|---|---|
| **Raw Puree** | **Puree Yield (%)** |
| Apples | >98 |
| Blueberry | >97 |
| Cranberry | >92 |
| Strawberry | >98 |

# More than just equipment...

## JBT Research & Technology Centers

1. With locations in the U.S., Europe, Latin America and Asia, our research and technology centers (RTC) offer a range of services including access to application-specific technology experts and laboratory testing as established by U.S., European and Asian regulatory authorities, as well as that of the market's demanding requirements.
2. The RTCs are equipped to process almost any produce with the primary objectives of optimizing the yield, quality and throughput of the processing equipment.
3. Changeable process and equipment parameters allow adjustments of important quality parameters such as:
    - Centrifuge Solids
    - Color
    - Polyphenols
    - Volatiles
    - Chlorophyll
    - Vitamin C

## Features & Benefits

JBT offers:

1. Continuous process for extracting vegetable juice/puree
2. Hygienic design and construction for enhanced cleanability
3. Adaptability to process a variety of products
4. Secondary processing equipment for sterilization, aseptic filling, concentration/evaporation
5. Extensive testing capabilities to help facilitate product development
6. Global support staff to help as needed.

Corporate Social Responsibility at JBT

# We are your single source for profitable processing solutions

JBT is a leading provider of integrated food processing solutions.

From single machines to complete processing lines, we enhance value and capture quality, nutrition and taste in food products.

With a local presence on six continents, JBT can quickly provide our customers and partners in the food processing industry with the know-how, service, and support needed to succeed in today's competitive marketplace.



A11000-EN - June 2016

Integrity
Accountability
Relentless Improvement
Teamwork

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