



**SPX**<sup>®</sup>

SPX Flow Technology Innovation Centres  
- A Partnership that Pays





SEX

# Content

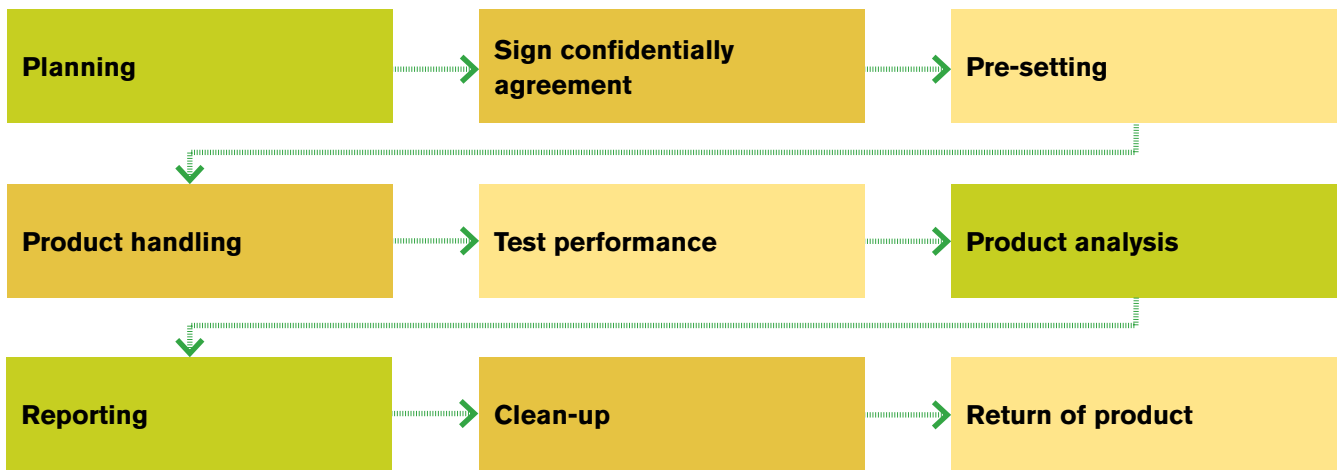
<b>Innovate with us . . . . .</b>	<b>4</b>
<b>Education and Training. . . . .</b>	<b>5</b>
<b>Contact us. . . . .</b>	<b>6</b>
<b>Dry Applications and Products . . . . .</b>	<b>8</b>
<b>Evaporation . . . . .</b>	<b>9</b>
<b>Drying . . . . .</b>	<b>10</b>
<b>Extraction, Evaporation &amp; Vacuum Drying . . . . .</b>	<b>14</b>
<b>Wet Applications and Products . . . . .</b>	<b>18</b>
<b>Heat Treatment . . . . .</b>	<b>20</b>
<b>Membrane Filtration . . . . .</b>	<b>25</b>
<b>Microparticulation . . . . .</b>	<b>27</b>
<b>Mixing and Blending . . . . .</b>	<b>28</b>
<b>Butter Technology . . . . .</b>	<b>34</b>
<b>Crystallisation. . . . .</b>	<b>35</b>
<b>Emulsifying . . . . .</b>	<b>37</b>
<b>Separation. . . . .</b>	<b>38</b>
<b>Deaeration . . . . .</b>	<b>39</b>
<b>Water Sanitation - SafeWater . . . . .</b>	<b>40</b>
<b>Homogeniser Application Laboratory. . . . .</b>	<b>41</b>
<b>Bag-in-Box Filling . . . . .</b>	<b>42</b>
<b>Data Logging and Controllers . . . . .</b>	<b>43</b>
<b>Soymilk Processing . . . . .</b>	<b>44</b>
<b>Competences and Application Capabilities . . . . .</b>	<b>45</b>
<b>How we can help You . . . . .</b>	<b>46</b>
<b>Technical and General Facilities. . . . .</b>	<b>48</b>
<b>Laboratory Facilities . . . . .</b>	<b>49</b>
<b>Rental Equipment. . . . .</b>	<b>50</b>



# Innovate with us

The SPX Innovation Centres leverages the extensive industry experience and expertise of a permanent staff of food technologists, process engineers and production engineers together with knowledge gained over many years to contribute actively to all types of development, testing and application of SPX equipment, systems and processing lines. All facilities and services are designed to provide added value by minimising waste and energy requirements, or by converting commodity ingredients into new, competitive products.

Important keywords for the Centres are innovation, optimum plant dimensioning, high-quality products, and up-to-date knowledge of market requirements. The trials are custom-tailored and can be performed in the Innovation Centres or on your site. All work performed together with you is subject to the strictest confidentiality and the highest standards of customer service.



# Education and Training

**The SPX Innovation Centres provide practical and theoretical training of customer employees in the following wet and dry processes:**

- Evaporation
- Fat & oil processing
- Fluid bed drying and agglomeration
- Heat treatment
- Membrane filtration
- Mixing and blending
- Separation
- Water Sanitation
- Soymilk processing
- Spin Flash drying
- Spray drying
- Freeze drying
- Extraction
- Concentration

Training courses can be customised for specific needs and take place at one of the SPX Innovation Centres or on your own premises.

We can also provide staff training in new equipment in connection with a delivery.



# Contact us

**We are easy to get in touch with if you would like to know more about how we can help you. We can assist you in the following ways:**

- General advice and guidance in connection with your test planning
- Suggestions of plant and equipment most suited to your purpose
- Booking of test facilities and, if required, our experts and technicians
- Product and process development
- Test of high-risk projects prior to order
- Troubleshooting of applications and products
- Product quality and yield optimisation
- Development and test of new recipes
- Assistance with product analyses in a laboratory
- Test and development of new equipment configurations
- Practical and theoretical training courses and seminars
- Pilot and full production plant rentals for trials on your own premises
- Scale-up of results for commercial plants

We look forward to hearing from you.



# Contact us

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- Wet applications and products
- Heat Treatment
- Membrane Filtration
- Microparticulation
- Mixing and Blending
- Butter Technology
- Separation
- Deaeration
- Water Sanitation (SafeWater)
- Homogeniser Application
- Soymilk Processing
- Bag-in-Box filling
- Data Logging and Controllers
- Rental Equipment

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- Dry applications and products
- Evaporation.
- Drying
- Crystallisation
- Emulsification
- Rental Equipment

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- Extraction
- Evaporation
- Vacuum Drying
- Vacuum Freeze Belt Drying
- Rental Equipment

# Dry Applications and Products

## Applications

- Agglomeration
- Aseptic drying
- Dedusting
- Drying and cooling
- Effluent treatment
- Encapsulation
- Coating
- Lecithination
- Spray coating
- Spray congealing
- Steam drying
- Concentration of liquids
- Granulation
- Crystallisation
- Emulsifying

## Products

- Agro chemicals
- Baby food
- Blood plasma
- Ceramics
- Chocolate drinks
- Dairy products
- Detergent ingredients
- Dyestuffs
- Feed products
- Fertilisers
- Flavours and fragrances
- Food ingredients
- Fruit juices
- Inorganic chemicals
- Milk
- Organic chemicals
- Pharmaceuticals
- Pigments and dyestuffs
- Plant extracts
- Soups
- Starches
- Tanning agents
- Yeast and yeast products
- Margarine
- Shortening
- Butter blends
- Spreads
- Bakery filling creams
- Fat flakes
- Mayonnaise
- Dressings
- Dips and sauces
- Ketchup





# Evaporation

## Low Temperature High Concentration of Liquids

The evaporators have several stages in order to minimise energy consumption. Falling film evaporation is widely applied for evaporation of low-viscosity products in the dairy, food & beverage, pharmaceutical and chemical industries.

Evaporation tests are carried out to establish maximum concentration, boiling point elevation, heat transfer coefficients and optimal boiling temperatures for each individual product. Evaporation takes place under vacuum.

### Products

- Dairy products
- Fruit juices
- Plant extracts
- Blood plasma
- A wide variety of pharmaceutical products
- Effluents
- Many other organic and inorganic products

### Advantages of falling film/forced circulation evaporation

- Minimum flavour impact on sensitive ingredients due to short residence time
- Recycling of heating medium for optimum energy utilisation by TVR or MVR recompression
- High heat transfer coefficients
- Single-pass evaporation
- Constant and even distribution of a thin film over the total inside surface of each tube for optimum liquid distribution
- Split calandria for correct wetting rate without product recirculation
- Forced circulation finisher for high-viscosity products
- Efficient separation of liquid and vapour
- Built-in CIP systems for faster cleaning

### Equipment

- Falling Film FIV four-stage TVR (tubular)  
- approx. 150 kg/h water evaporation
- Falling Film FII two-stage TVR (tubular)  
- approx. 100 kg/h water evaporation
- Forced Circulation FC one-stage (TVR using plate heat exchanger)  
- various plants for 20-150 kg/h water evaporation
- Rising/Falling Film FI-DS (plate)  
- approx. 50 kg/h water evaporation



## Production of Powders and Agglomerates

Today's competitive environment demands efficient spray drying solutions that protect heat-sensitive products, enable full control over particle size and distribution, and require minimum energy. Spray drying solutions are used in the dairy, food, feed, chemical, pharmaceutical and environmental sectors.

### Conical and Flat Bottom Spray Dryers

Correct atomisation and air distribution are the keys to the spray drying process, as both greatly influence the final powder structure and quality. Often, spray dryers are equipped with high-speed centrifugal atomisers ensuring sturdy and reliable operation.

High-Pressure nozzle atomisation is used especially for products where a rather coarse powder with narrow particle distribution and high bulk density is required.

The liquid is dried, collected and delivered for further treatment without any intermediate manual handling. The spray drying process is applicable to a wide range of products and industries, and plant capacities from a few gr/h to 80 tons/h are available. SPX handles projects ranging from laboratory size to large industrial spray dryer processing lines and turnkey plants.

Spray drying tests are made to show the possibilities of achieving the requested powder properties such as particle size, solubility, bulk density and residual moisture at optimised operation conditions.

### Applications

- Drying
- Agglomeration
- Encapsulation
- Spray cooling
- Steam drying
- Aseptic drying

### Advantages

- High thermal efficiency
- Complete control of moisture content, particle structure, particle size distribution, solubility, and wettability, and retention of natural aromas and flavours
- Energy efficient components, continuous and rapid drying, ease of operation and process automation provide complete control over yield and costs.
- Customised plant design for complete compliance with individual requirements.
- Top-quality, reliable components, efficient and straight-forward CIP and expert engineering increase service life and availability for maximum performance.
- High yield at lowest possible cost
- High application flexibility
- Traceability and compliance with food regulations
- Especially suited for new product development with short time to market
- Straight-forward CIP



# Spray Bed Dryers

## Spray Bed Dryers

Spray bed dryers are designed to combine spray drying and fluid bed agglomeration in one process to dry and agglomerate heat-sensitive materials in a wide range of applications under hygienic conditions and in an energy-efficient manner. The result is uniform, non-dusty powders with consistent powder quality.

The system combines a conventional conical spray drying plant with fluid bed technology. Improvements of powder quality as well as reduction in operating costs compared to standard spray drying plants are the most important benefits of spray bed technology.

The SPX spray bed dryer is widely used in the food, dairy, pharmaceutical, and chemical industries. Spray bed drying tests are carried out to demonstrate feasibility of achieving the requested average particle size and particle size distribution in optimised operating conditions.

### Products

- Food ingredients
- Yeast products
- Plant extracts
- Flavours and fragrances
- Agro chemicals
- Tanning agents
- Dyestuffs
- Fertilisers
- Detergent ingredients

### Advantages

- High powder quality – uniform, stable agglomerated powders with a consistent powder structure that is easily dissolvable or dispersible
- Reduced operating costs – 10-15 per cent reduction in energy consumption due to multi-stage drying, compared with traditional single-stage drying at low temperatures
- Gentle drying process, well suited for heat sensitive products, as product temperatures are generally lower compared to standard dryers
- High plant availability due to optimised process conditions
- High flexibility

### Equipment

- Production-scale, single-stage spray drying and agglomeration
- Capacities from 15-350 kg/h water evaporation
- Conical spray dryers/spray bed dryers in which the dried particles are separated by gravity into a coarser main fraction and the fines are collected from the exhaust air
- Flat bottom spray dryer in which product particles fall on to the floor of the chamber and leave with the exhaust air
- Various small-scale MicroSpray dryers – particularly suited to pharmaceutical applications



# Fluid Bed Dryers

## Fluid Bed Dryers

SPX's fluid beds are used in the pharmaceutical, dairy, food and chemical industries for processing most types of powdered products, using intimate air-to-product contact.

Our fluid beds are designed to ensure good heat transfer coefficients and to avoid degradation reactions in heat-sensitive products. Processing is performed in a single step or as part of a multi-stage drying operation.

Fluid bed processes consist of agglomeration, drying, cooling, coating and de-dusting. Fluid bed tests are made to establish fluidisation rates and residence time in order to achieve the required powder characteristics in optimised operating conditions.

### Applications

- Drying and cooling
- Drying and cooling with agitated first section
- Contact drying and cooling with heating panels
- Agglomeration
- Spray coating
- Cooling
- Dedusting
- Lecithination

### Products

- Baby food
- Dairy products
- Chocolate drinks
- Soups
- Juices
- Dye pigments
- Chemicals
- Starches
- Yeast

### Equipment

Fluid bed dryers with capacities ranging from a few kg/h to 20 t/h

### Capacities

From a few kg/h to 20 t/h

### Advantages

- Very intensive contact conditions between the fluidisation air and the product
- Highly efficient heat and mass transfer between the fluidisation air and the product
- Highly efficient heat transfer between the product and the heating panels
- Gentle and efficient mixing
- Uniform processing conditions
- Low mechanical impact on the product
- Improved control over particle size distribution
- Removal of fines
- GMP and 3A compliant versions available



# Spin Flash Dryers

## Spin Flash Dryers

Spin Flash® Dryers are designed for continuous drying of cohesive and non-cohesive pastes and filler cakes as well as high-viscosity liquids. The main components are a feed system, the patented drying chamber and a bag filler.

The important parameters are solids content in the feed material, drying temperatures, and air velocity. These parameters are determined by the nature of the product and the desired powder density, moisture content, particle size, etc. Typical air inlet temperatures are between 150 and 700°C, while outlet temperatures are determined by the required powder moisture content.

### Products

- Organic chemicals
- Inorganic chemicals
- Agro chemicals
- Pigments and dyestuffs
- Ceramics
- Food and feed products
- Waste products

### Equipment

- SFD55 – production-scale
- SFD47 – small-scale
- SFD51 – small-scale

### Capacities

Ranging from a few kilos to 40 t/h

### Advantages

- High drying efficiency ensuring low energy costs
- Continuous processing with short processing time
- Low operator overheads and minimum maintenance costs
- Controlled residence time enabling high temperature drying
- Controlled particle size
- Very fine powder production eliminating requirement for milling
- Limited space requirements
- High-pressure, shock-resistant chamber for safe drying of flammable products
- Available in FDA and cGMP compliant configurations



# Extraction, Evaporation, Vacuum Drying

## Continuous Extraction, Evaporation and Vacuum Drying

Pilot extraction, pilot evaporation, vacuum belt and freeze drying plants enable customers to determine necessary process parameters prior to the purchase of a production plant.

### Applications

- Extraction
- Aroma rectification
- Concentration
- Drying

### Products

- Plant extracts
- Fruit juice concentrates
- Food/Instant products
- Pharmaceutical products
- Coffee, tea, etc.
- Soluble dried malt extract
- Bakery products
- Meat extracts

### Product Samples

For trials we need the following product quantities:

- Drying: App. 20 kg of concentrate
- Extraction: 10-100 kg raw material, depending on the yield
- Evaporation: app. 600 kg of liquid extract

### Advantages

- Controlled testing conditions
- Short process times
- Continuous and batch processing
- Controlled adjustment of end-product properties including bulk density, colour and flavour
- Scale-up of results for commercial plants
- Product development resulting in representative product sample

### Equipment

- Pilot extraction unit, 2 x 50 l
- Pilot evaporation unit, water evaporation rate: 50 kg/h
- Pilot vacuum belt and freeze dryer: 0,3 mbar – 100 mbar
- Rotary evaporator (laboratory scale), quick analysing of product concentration characteristics
- Aroma rectification plant, aroma recovery of strip-condensates from extraction and evaporation processes
- Pilot liquid gas extraction plant



# Extraction and Evaporation

## Pilot Extraction Plant, ATEX

The SPX Pilot Extraction Plant is designed to extract small batches of raw material by means of water or ethanol solvent. The sealing material needs to be adapted for other organic solvents (chlorinated).

The plant is equipped with 2 percolators, each 50 l volume. Additionally, the plant features a condensation unit consisting of a condenser and a stainless steel vacuum pump, together with a solvent balance tank and a miscella outlet.



## Pilot Evaporation Plant, ATEX

The SPX Pilot Evaporation Plant is designed to concentrate small batches of extracts or other liquid products based on water or ethanol solvent.

The concentration rate is limited to the viscosity of the concentrated liquid up to approx. 500 cP. The plant consists of a plate evaporator with a downstream centrifugal separator. The evaporated vapours are condensed in a plate condenser.

A vacuum pump is connected to the condenser, and the vacuum can be adjusted between 20 and 800 mbar.

The evaporation temperature can be adjusted according to the product-specific boiling curve through the applied vacuum, also enabling concentration of temperature-sensitive extracts.



## Vacuum Belt and Vacuum Freeze Belt Dryers

These dryers are designed for the examination and development of different drying processes for solid and liquid products. Depending on customer requirements, we offer vacuum or freeze drying processing. Either tray or belt drying is used, depending on the product characteristics and efficiency.

The plant enables gentle drying of a wide range of products including:

- Plant extracts
- Fruit juice concentrates
- Food/Instant products
- Pharmaceutical products
- Coffee, tea, etc.
- Soluble dried malt extract
- Bakery products
- Meat and meat extracts
- Fruits
- Technical products

### Drying options for the e&e pilot vacuum belt dryer

TYPE	VACUUM DRYING	VACUUM DRYING	LYOPHILISATION
Drying temperature	40°C - 70°C	10°C - 40°C	-2°C - 40°C
Pretreatment of products	Extraction Evaporation	Extraction Evaporation Sterilisation	Extraction Evaporation Foaming and prefreezing unit Freezing of instant products Milling of instant products
Water evaporation*	0,9 - 2,5 kg/m <sup>2</sup> /h	0,9 - 2,5 kg/m <sup>2</sup> /h	0,9 - 2,0 kg/m <sup>2</sup> /h
Drying pressure	70 - 300 mbar	10 - 100 mbar	0,1 - 6 mbar
Vacuum devices	Condenser and water ring pump	Condenser and water ring pump with gas injector	Ice condenser and dry compressing vacuum pump with FC control
Dry product handling	Discharging, packing in bags	Discharging, packing in bags	Discharging, packing in bags

\* Depending on the product properties

Numerous parameters can be selected including product feed by swivel arm, nozzle or vacuum sluice, belt width and product temperature. Temperatures of -50°C are realizable for freeze drying. Depending on the task, water ring pumps or dry compressing vacuum pumps are used for vacuum generation.





# Drying

The Pilot Vacuum Belt Dryer is a continuous dryer. Products can be introduced in both liquid and solid form (through a sluice) without interruption of or impact on the drying process. The drying process can be directly observed via two large sight glasses, thus enabling an exact adjustment of drying properties.

The special arrangement of the heating plates enables variation of the drying plate temperature of each heating zone.

Numerous parameters can be selected including product feed by swivel arm, nozzle or vacuum sluice, belt width and product temperature. Temperatures of  $-50\text{ }^{\circ}\text{C}$  can be achieved for freeze drying. Vacuum can be generated via water ring pumps or dry compressing vacuum pumps, depending on the assignment.

SPX also offers the possibility of characterising and developing drying product properties. Drying test runs can be carried out in order to determine important product properties such as water content, adsorption and desorption behaviour, relative product humidity, and glass transition temperature.

## Advantages

- Controlled drying conditions
- Short drying times
- Drying in trays or continuous drying
- Adjustment of the dried product properties, such as bulk density, colour and flavour
- Scale-up of drying results for commercial plants
- Product development in reasonable scale (representative product sample)



# Wet Applications and Products



## Wet process testings

Wet processes involving heat transfer, homogenising and mixing, dehydration and dispersion, filtration and separation, pumps and valves.

## Applications

- Heat treatment
- Membrane filtration
- Microparticulation of whey protein concentrate
- Mixing and blending
- Soymilk processing
- Wastewater treatment
- Product deaeration
- Homogeniser applications



# Wet Products

## Products

- Baby food
- Beverages
- Butter and margarine
- Candy and confectionery
- Chocolate
- Chocolate milk
- Chocolate mousse
- Concentrated milk, whey, UF permeate
- Concentrates
- Condensed milk
- Convenience food products
- Cream
- Cream cheese and cheese spreads
- Custards, puddings, etc.
- Dairy cream
- Dairy ingredient processing
- Demineralisation and concentration of milk, whey, UF permeate
- Dessert mix
- Desserts
- Dips
- Dispersion of gums
- Dressings
- Egg processing
- Fermented milk products
- Fermented products, e.g. soy-yoghurt
- Fillings
- Flavoured milk and creams
- Food emulsions
- Fruit filling and preserves
- Fruit purée
- Gravies
- High-viscosity products
- High-yield cream cheese, Feta and Queso Fresco
- Ice cream
- Ice cream mix
- Juice (incl. pulp)
- Ketchup
- Low fat cheeses
- Low fat spreads
- Mayonnaise
- Milk
- Milk concentrate (max 58% TS) for spray drying
- Milk powder
- Nutritional drink
- Personal care emulsions
- Pet food
- Pigments and paints
- Powdered milk
- Processed cheese
- Products with particles
- Protein concentrate
- Puddings
- Purée
- Recombined dairy products
- Sauces
- Soft ice mix, ice cream mix
- Soft serve mix
- Soups
- Soy beverages, smoothies, etc.
- Soy milk products
- Soymilk
- Spreads
- Starched and hydrocolloid slurries
- Sweetened Condensed Milk
- Syrup
- Tomato ketchup
- Vegetable cream
- Vegetable oil
- Vla, custard, pudding
- Whey powder
- Yogurt drinks



# Heat Treatment

## Pasteurisation of Dairy Products

### Quality, consistency and cost-efficiency

Correct heat treatment is essential to the manufacture of safe products with the right consistency, flavour, nutritional value and appearance. Heat treatment trials using a wide choice of technologies enable consistent and cost-effective production of attractive and safe product over its entire market lifetime.

### Products

- Milk
- Recombined milk
- Chocolate milk
- Flavoured milk
- Dairy cream
- Vegetable cream
- Chocolate mousse
- Soymilk
- Soft serve mix
- Ice cream mix
- Various desserts
- Various puddings
- Nutritional drinks
- Products with particles

### Production advantages

All test results can be consistently repeated in production using the same equipment. In the case of pilot plant testing, all results can be repeated using corresponding production-scale equipment from SPX.

### High yield, low operational costs, fast payback and an attractive ROI throughout the lifetime of the plant are assured by the following advantages:

- Modular systems – complete flexibility
- Simply connect and run – short time to production
- Automatic control – consistent quality
- Less product loss – higher yield
- Integration with existing control system – lower investment
- Skid-mounted and small footprint flexibility in limited space



# Heat Treatment

## UHT Sterilising Plant

### Flexible handling of a wide range of traditional UHT products

#### Testing solutions

With its easy operation and wide range of capacities, SPX's latest technology UHT pilot plant can be configured with a wide selection of direct and indirect heating options to accommodate a wide range of product applications.

#### Processes

Any combination of:

- Indirect heating and cooling using three-stage tubular or plate heat exchanger
- Indirect heating and cooling using scraped surface heat exchanger
- Direct injection heating
- Direct infusion heating – standard infusion for UHT & ESL or High Heat Infusion™ for extreme high kill rate
- Non-aseptic and aseptic two-stage homogenisation

#### Pilot plant

- Multipurpose pilot UHT plants (SPP)
  - capacity from 50 to 1000 l/h
- Sterile tanks
- Bag-in-box fillers for aseptic filling
- Homogenisers up to 350 bar
- Instrumentation (temperatures, pressures, flows)
- Sophisticated data logging system

#### Production advantages

- Highly flexible and reliable system for product trials
  - assurance of up-scaling to commercial production
- Easy to operate – less risk of human error
- Flexibility – suitable for almost all commercial UHT applications
- Traceability – online, automatic registration of all process data
- Individual configurations – customisation as required
- Inline sterile bag-in-box filler – trials with multiple parameters in the same test
- Quick and easy installation – short time to production



## Instant Infusion SII

### Ultra-short, high-temperature treatment with precision-controlled holding time

The SPX SII Instant Infusion process is particularly suitable for baby food and milk concentrates that are subsequently spray dried.

Using a very high and precisely controlled temperature and a very short holding time, it delivers a kill rate up to 7 log higher than standard process while reducing vitamin loss by 70 per cent.

#### Products

- Baby food
- Milk concentrate (max 58% TS) for spray drying

#### Pilot plant

- Capacity range of 250 to 800 l/h
- Maximum viscosity at sterilisation: 500 cP
- Maximum total solids (depending on viscosity): 50 to 60%
- Instrumentation (temperatures, pressures, flows)
- Sophisticated data logging system

#### Simulation of the following UHT plant types:

- STH tubular UHT process
- SIH plate UHT process
- SDH Infusion UHT and ESL process
- SDI Injector UHT process
- SHH High heat infusion process

#### Production advantages

- Gentle heat treatment of products with medium to high total solid content
- Small temperature difference between product and steam
- Efficient kill rate
- Low protein denaturation
- Less fouling due to the elimination of hot surface contact during heating
- Deaeration of the product in the infusion chamber during heating
- Very high and precisely controlled temperature
- Well-defined and accurate holding time
- Uniform heating-holding-cooling time profile for low and high viscosity (1 to 500 cP) products through the same installation
- Uniform bacteriological kill rate for low and high viscosity products
- Uniform chemical heat damage for low and high viscosity products (protein denaturation, Maillard reaction)
- Constant product quality
- High nutritional value of the product due to low chemical changes
- Proven long operating times
- Gentler heat treatment compared with steam injection
- Differences between SII and Standard Infusion System SDH
- Instant infusion is designed for heat treatment of products with medium to high total solid content
- SII features an SPX patented positive displacement pump at the base of the infusion chamber
- SII has no UHT holding tube or back pressure valve
- The product is heat treated in the infusion chamber and flash cooled directly after the positive displacement pump. The extremely short holding time at high temperature ensures gentle product treatment



## Spiratherm®

### UHT production including high-fouling products

The Spiratherm® Processor offers a unique type of UHT process system. The heart of the Spiratherm® Processor is the unique design of the Coiled Tubular heat Exchanger.

The natural scrubbing action of high velocity product through the Spiratherm® heaters reduces product build-up that is common in conventional heat exchangers. This boosts productivity with fewer and shorter cleaning cycles, and longer run times. Spiratherm® is the perfect selection for UHT production of a wide range of products, including high-fouling products.

#### Products

- Milk, flavoured milk and creams
- Soy milk products
- Vla, custard, pudding
- Soft ice mix, ice cream mix
- Baby food, condensed milk
- Processed cheese
- Sauces

#### Features

- Piston pump for both product and CIP
- Flexible selection between Plate HE and mono tubular HE for pre-heating and cooling
- Three Spiratherm® coils, ID 4,1 mm., are used for final heating up to maximum 150°C
- Typical holding time is 3 seconds, but can be tailored to meet any specific client needs
- Four Spiratherm® coils, ID 4,1 mm., are used for cooling
- Downstream aseptic remote homogenising valve
- Product filling in aseptic Bag-in-Box filler or in Laminar Flow Cabinet
- Semi-automatic system controlling
- Feed flow (150-250 l/h)
- Temperature in pre heating, main heating and cooling section
- Temperature on service water in heating section
- Pressure in Spiratherm® coils (up to 250 bar)
- Logging of all data

#### Advantages

- High up-time
- Flexible product range
- Easy inspection of product and medium surface
- High pressure tolerance
- Low energy cost
- Low maintenance cost
- Operator-friendly
- Pre-assembled and factory-tested
- As option designed according to ASME, PMO, 3A



## Scraped Surface Heat Exchanger

### For heating/UHT and cooling of products with very high viscosity and/or containing particulates

The scraped surface heat exchanger (SSHE) pilot is available for pilot testing of high-viscosity products and/or products containing particulates (5-10 mm). The pilot unit can be configured to meet specific product and duty requirements.

#### Equipment

- Product feed pump with variable speed drive
- Volume and mass flow meter
- Four variable speed SSHE cylinders
- Control of dasher speed
- Timing/back pressure pump
- Control panel and process data logging system

#### Configuration

- Automatic product flow control and temperature controls for heating and cooling
- Designed for aseptic operation and can be connected to an aseptic bag filler
- Service media for the SSHE jackets can be hot water, steam, cooling water, ice water or glycol

#### Capacities

- 100 to 500 l/h depending on product and duty

#### Advantages

- Operator-friendly
- Pre-assembled and factory-tested
- High-precision machined and polished Duplex quality and Bimetal cylinders
- Also suitable for evaporative refrigerants (R717, R404a etc.)
- Various dasher diameters and scraper blade types available





# Membrane Filtration

## Opportunities for Pilot Scale Testing

Single or multiple process conditions can be simulated depending on the customer's needs, using plant equipped with logging devices to facilitate process data collection. Product can also be subjected to other treatment before or after filtration using other equipment at the Innovation Centre. Our laboratory facility enables quick feedback on key membrane process indicators in order to secure efficient and flexible test conditions. Standard CIP chemicals for membrane plants are available to facilitate membrane recovery after tests.

Membrane filtration pilot plants can be rented for on-site trials where conditions permit. Pilot plant is built using standard parts normally used for industrial installations. Commissioning engineers can participate in part or throughout on-site trials.

Testing enables selection of optimum process parameters for a specific application in order to secure optimal performance of future commercial-scale installations. 5-8,000 l of feed product can be taken in from a tank truck. Alternatively feed product can be received in pallet containers or recombined from dry and wet ingredients.

Multiple filtration technologies allow for different membrane types. We can provide assistance to help you find the right membrane solution for the project.



# Membrane Filtration

## Typical products/applications

### **MF – Microfiltration (ceramic or spiral wound, hollow fiber or flat sheet (plate/frame) membrane types)**

- Bacteria removal
- Fat removal
- Protein fractionation

### **UF – Ultrafiltration (ceramic, spiral wound, hollow fiber or flat sheet (plate/frame) membrane types)**

- Protein standardisation
- MPC
- WPC
- Cream/white Cheese
- Gelatine

### **NF – Nanofiltration (spiral wound membrane types)**

- Partial demineralisation
- Concentration
- Gelatine

### **RO – Reverse Osmosis (spiral wound membrane types)**

- Concentration
- Polishing
- Egg white

## Advantages – pilot and production equipment

- Simulation of single or multiple process conditions
- Logging devices to facilitate process data collection
- Fast feedback on key membrane process indicators
- Efficient and secure test conditions
- Multiple filtration technologies with different membrane types
- Standard industrial installation components



## LeanCreme™ Process

The APV LeanCreme™ process is based on heat treatment of whey protein concentrate (WPC) using APV Shear Agglomerator (ASA) technology, to achieve simultaneous heat denaturation and formation of microparticles under controlled high shear. The synergy between heat and shear brings a new functional dimension to whey protein concentrates.

LeanCreme™ has the high nutritional quality of whey protein concentrates combined with an enhanced functionality giving a full-fat mouth feel. This makes LeanCreme™ a perfect ingredient for a wide array of innovative and proprietary low-fat recipes.

LeanCreme™ can be incorporated into a range of dairy products to increase total process yield and improve taste and texture in low fat cheese, i.e. European pressed type, fresh cheese types and Ricotta type cheeses.

LeanCreme™ can be used in dressings, dairy drinks, fermented products, ice cream, etc. to improve functional properties and nutritional value.

LeanCreme™ can be spray dried to make a LeanCreme™ powder product for applications in the food industry.

### Advantages of the LeanCreme™ concept

- All-in-one manufacturing unit
- Small footprint
- Plug & produce
- Consistent particle size
- Precise process control
- Varying dry matter percentages according to recipe
- Proven, high-quality system design

### LeanCreme™ types

- LeanCreme™ Whey from acid whey, sweet whey and WPCs
- LeanCreme™ Plus from whey combined with milk fat or vegetable oil
- LeanCreme™ Mix from whey combined with casein

### Available LeanCreme™ pilot units

#### MP 150 pilot plant

- Capacity of 150 l/h
- Flexible holding cell
- Semi-automatic regulators
- 16-channel data logger

#### MP 500 Pilot Plant

- Capacity of 500 l/h
- Flexible holding cell with variable holding times
- Semi-automatic regulators
- 16-channel data logger



# Mixing and Blending

## Flex-Mix™ Range

The APV Flex-Mix™ range is designed to help customers in the dairy, processed food, beverage and personal care industries:

- Develop new products and processes
- Sustain consistent quality
- Achieve enhanced production performance
- Reduce production costs

## Flex-Mix™ Processor

The Flex-Mix™ Processor is an all-in-one unit for high shear, high-viscosity batch mixing. It manages intake of liquid and powdered ingredients via vacuum, mixing and emulsification, indirect/direct heating and cooling.

The plant consists of a mixing tank with a scraper blade agitator, a bottom-mounted high-shear mixer for circulation of the mixture back into the tank, a number of powder intake valves, and powder hoppers. A positive displacement pump enables external circulation of the mix over to the process tank. The mixer tank is pressure approved (full vacuum to 3 bar) and equipped with steam injectors and jacket for cooling/heating.

The Flex-Mix™ Processor operates typically in a batch setup where a batch is completely produced and transferred to a storage tank. It can also work in a continuous production flow via a flip-flop setup with two Processors working side by side with one mixing while the other one is emptying to a buffer tank or a filler.

### Applications

- Mixing
- Gentle blending
- Heat transfer (heating/cooling)
- Deaeration

### Products

- High-viscous products
- Fruit filling and preserves
- Baby food
- Confectionery
- Sauces, soups and gravies
- Tomato ketchup
- Mayonnaise and dressings
- Processed cheese
- 

### Equipment

- 250 l pressure vessel / under vacuum
- Mixing agitator with scraper blades
- High-shear bottom mixer (removable)
- Vacuum pump
- DW-(NGA) discharge and recirculation pump
- Control panel with data logger

### Advantages

- Gentle agitation, internal circulation
- High shear mixing for emulsification
- Handles particulate inclusion
- Heating via jacket or direct steam injection
- Closed system with vacuum/flash options
- Minimum floor space requirement to a high variety final product range



# Mixing and Blending

## Flex-Mix™ Liquiverter (standard)

Mixing of liquid/liquid, liquid/powder

The Flex-Mix™ Liquiverter is designed for the fluid food industry and is suitable for mixing any liquid foods within the lower to medium viscosity ranges. The characteristic square design provides for full control of the mixing process by ensuring a controlled vortex formation.

The principle is based on vortex-driven mixing. The liquid collapses around the powder and is forced towards the mixer head at the bottom.

### Applications

- Mixing solid/liquid
- Mixing liquid/liquid
- Heat transfer

### Products

- Recombined dairy products
- Dispersion of gums and starch slurries
- Ice cream mix
- SCM - Sweetened Condensed Milk
- Flavoured milk
- Beverages
- Confectionery
- Gravies, soups and sauces
- Syrup

### Advantages

- Simple but versatile
- Large dissolution capacity due to free vortex and square shape
- Fully drainable for improved hygiene and minimum waste
- Direct drive reduces spare parts wear
- Double flushed mechanical shaft seal

### Equipment

- 250 l square vessel
- Heat transfer jacket
- High shear bottom mixer (Ø150/18,5 kW), (Ø250/30,0 kW)
- Frequency converter



## Flex-Mix™ Power Mixer

Aseptic in-line mixer designed for gas/liquid dispersion technology

The Flex-Mix™ Power Mixer handles high-shear inline gas mixing to decrease air bubble sizes to a stable foam. This fully aseptic system meets stringent food hygiene and processing requirements.

Aseptic gas injection is used since aeration occurs after thermal treatment. Liquid is dosed into a rotor/stator pin mixer for high-shear emulsification.

### Applications

- Aeration
- Gas/liquid

### Products

- Desserts
- Confectionery
- Mayonnaise
- Spreads

### Equipment

- PM 750 (250 - 1,110 kg/h)
- PM 2250 (2,500 - 5,100 kg/h)
- Vacuum pump
- Aseptic valve arrangement
- Control panel with data logger

### Advantages

- Aseptic aeration
- Emulsification
- Continuous mixing
- PLC standard in all aseptic systems
- Operator-friendly, smooth and trouble-free operation



# Mixing and Blending

## Flex-Mix™ Instant

Vacuum mixing for recombination and high shear emulsification

The Flex-Mix™ Instant handles powder mixing processes in low- to medium-viscosity liquids. The powder is sucked in using the vacuum level in the tank; powder will be washed out direct into the circulating liquid, below the liquid surface. Due to the special designed mixer tank with a conic bottom – and by placing the mixer on site of the tank, the flow rates and thereby the powder intake capacity can be maximised compared to other mixers on the market.

Powder is sucked in via a specially developed powder intake valve, allowing for secure intake of powder with minimum risk of back flush.

### Applications

- High solid mixing
- Emulsification
- Deaeration

### Products

- Infant Formulas
- Recombined dairy products Milk
- Beverage
- Desserts and Ice cream
- Baby food
- Sauces
- Recombined cheese (low viscosity)

### Equipment

- 700 l / 1000 l / 5000 l
- Available with different mixer heads
- High-shear rotor system for enhanced particle dispersion and emulsions
- High powder intake capacity, depending on powder characteristics
- Temperature profile/range -10 to 110°C
- Pressure -1.0 to 0.5 bar

### Advantages

- Very reliable Powder Intake Valve System with reduced risk of back flush
- Shear rates maximised, improving mixer performance for lower energy usage
- Physical placement of mixer – maximised flow rates enable higher powder intake potential
- Shear rates maximised, improving mixer performance (emulsification power) for lower energy usage
- Air is efficiently removed during mixing prolonging running time and ensuring consistent quality
- Allows closed, continuous production, resulting in higher throughput and reduced dust issues
- Handles a large number of formulations



# Mixing and Blending

## Flex-Mix™ Multiverter

High shear, high viscosity batch mixing

The Flex-Mix™ Multiverter is an all-in-one unit for high shear, high viscosity batch mixing. It manages intake of liquid and powdered ingredients via vacuum, mixing and emulsification, indirect/direct heating and cooling.

The plant consists of a mixing tank with a top-entry scraper blade anchor agitator, a bottom-mounted high shear mixer for circulation of the mixture back into the tank, a number of powder intake valves, and powder hoppers. A positive displacement pump enables external circulation of the mix over to the process tank. The mixer tank is pressure approved (full vacuum to 3 bar) and equipped with steam injectors and jacket for cooling/heating.

The Flex-Mix™ Multiverter operates typically in a batch setup where a batch is completely produced and transferred to a storage tank. It can also work in a continuous production flow via a flip-flop setup with two Multiverters working side by side – one mixing while the other is emptying to a buffer tank or a filler.

### Applications

- Mixing
- Gentle blending
- Heat transfer (e.g. sterilisation /cooling)
- Deaeration

### Products

- Food emulsions
- Mayonnaise/dressings/dip and sauces
- Starched and hydrocolloid slurries
- Personal care emulsions
- High-viscosity products in general

### Advantages

- All-in-one mixing unit
- Mounted on a stainless steel frame ready for operation after connection of utilities and product/CIP lines
- 2 zone heating cooling zones for indirect heating cooling for smaller batch possibilities

### Equipment

- Cylindrical vacuum tank, 500 l
- High-shear bottom mixer with VLT
- Vacuum pump
- DW-(NGA) discharge and re-circulation pump
- Control panel with data logger



# Mixing and Blending

## Flex-Mix™ TPM+ Powder Mixer

A reliable in-line powder mixer

The Flex-Mix™ TPM+ Powder Mixer is a low-cost mixer suitable for adding easily dissolvable powders to low-concentration, low-viscosity liquids.

### Applications

- Dissolution
- Dispersion
- Recombination of powder/granulates

### Products

- Powdered milk
- Chocolate milk
- Sugar
- Low concentration recombination of easy to dissolve powders

### Advantages

- Easy to maintain - easy-to-change shaft seals
- Reliable design due to the sturdy construction
- Hygienic, CIP-friendly design



### Equipment

- Max. flow:
  - TPM+1: 25,000 l/h
  - TPM+2: 50,000 l/h
- Temperature profile/range:  
Max. product temperature of 60°C during mixing
- Max. head: 1.5 bar

## Flex-Mix™ DAR

In-line mixer for mixing of butter and butter blends

The Flex-Mix™ DAR is a low-cost highly efficient mixer, suitable for mixing high- and low-viscosity liquids to ensure a homogeneous product.

### Applications

- In-line blending and mixing
- Homogenisation to larger particle sizes than can be achieved with high-shear mixers
- Dosing of minor liquid ingredients into a mainstream product line

### Products

- Low-fat spreads
- Butter and margarine
- Addition of culture – rennets and colouring etc. in recombined cheese processing
- Fruit purée without particulates
- Dips
- Smoothing of yoghurts desserts before filling



### Advantages

- Applicable for high- and low-viscosity products
- Easy to dose low/volume into a major flow in line i.e. culture
- Ensures a homogeneous product
- Easy to install in line mixer
- No product-contacting bearings
- Compact design
- Cleaning simultaneously with the pipeline

### Equipment

- Can be connected to a frequency converter for speed regulation, enabling adjustment and change of mixing intensity
- Can be installed directly in a pipeline enabling cleaning simultaneously with the pipeline
- Adjustable mixing/emulsifying intensity



# Mixing and Blending

## APV Cavimator

Scale-free thermal processing and microscopic mixing

Controlled cavitation is a new breakthrough technology for microscopic mixing, dispersion/homogenisation/aeration and scale-free heating based on hydrodynamic cavitation.

The Cavimator is an inline, perforated rotor spinning in a chamber filled with liquid (product). The spinning action generates internal liquid frictions (disk friction) and the holes generate hydrodynamic cavitation. The cavitation creates high shear, ensuring a highly efficient homogenisation effect, and friction that generates heating away from the metal surface, thus avoiding fouling. The Cavimator is coupled to a heat exchanger in a hybrid solution.

### Applications

- Emulsification and dispersion
- Scale-free heating of high protein containing products
- Mixing of high-viscosity liquids
- Hydration of powders

### Products

- Egg and WPC processing
- Beverage and beer
- Dairy products and ice cream
- Food emulsions
- Pet food and meat products
- Personal care products

### Advantages

- Lower operational cost due to longer run times, fewer CIP processes and low-pressure homogenisation
- Lower investment cost when replacing a high-pressure homogeniser with the Cavimator
- Lower maintenance time and cost
- Lower cost of functional ingredients due to higher hydration efficiency
- Highly reproducible processing results
- Very finely dispersed gas distribution in foamed/high-gas products
- Highly reliable and sanitary design meeting 3A and EHEDG standards
- Enhanced product quality, yield and/or raw material savings from increased mass transfer
- Smaller footprint than traditional technology
- Designed for easy disassembly, and fully CIP-able
- Makes high-quality emulsions with the desired particle size
- Efficient liquid heating without performance loss over time due to fouling

### Features

- Fine and uniform emulsification (2-5 micron range)
- Mixing of thick and viscous fluids
- Aeration
- Fast processing
- Easy retrofitting for existing operations
- Elimination or reduction of process downtime from maintenance requirements
- Produces homogeneous gel, gum or polymer hydration at the proper viscosity without "fish eyes" or other non-hydrated powder



## Butter Blend - Pilot Butter Plant

SPX is well-known as a leading manufacturer of food processing equipment. Our core expertise in continuous butter production is supplemented by a number of technologies. Extensive customer trials and production on installed SPX butter plants have delivered outstanding results.

You can run product optimisation tests on all types of butter spreads using the SPX butter equipment series at the SPX Innovation Centre in Silkeborg, Denmark.

### Equipment

- Butter reworker
- Mixing unit with two in-line mixer Flex-Mix™ DAR
- Dosing unit for liquid ingredients with two pumps
- SSHE cooling unit with ice water
- Each unit has its own control panel with frequency converters, displays for temperature, rpm's etc.
- Capacity: 500 to 1500 kg/h depending on recipe.

### Products

- Spreadable butter products with added vegetable oil, fat content from approx. 40% to 80%
- Low fat butter products with an added water phase, fat content from approx. 25% to 80%
- Low fat butter products with added water, fat content from approx. 60% to 80%
- Spicy butter products with added herbs
- Butter ingredients with added powder and/or a vegetable oil, flavour etc.
- Powders: sugar, flour, caseinate, salt, etc.
- Liquids: rapeseed oil, palm oil, soyoil, etc.
- Yoghurt butter



# Crystallisation

## Flexible Crystallisation Unit

The high-pressure scraped surface heat exchanger pilot plant is ideal for crystallisation of all kinds of fat product. These highly flexible units ensure efficient and cost-effective product development. The pilot plants for testing are available at the SPX Innovation Centre in Copenhagen based on either Freon or new high-efficient CO<sub>2</sub> refrigerant technology. The pilot plants provide everything you need for optimal, small-scale production. These modular units feature a high-pressure pump, chilling tubes, various kneading units and a resting tube.

## Nexus Pilot Plant

High-capacity, low-energy crystallisation of a variety of food products

The Nexus pilot plant is ideal for crystallisation and cooling of various kinds of food products. Utilising CO<sub>2</sub> a cooling medium, it offers higher capacity and lower energy consumption than NH<sub>3</sub> and Freon.



### Equipment

- Preparation equipment for emulsions
- Three high-pressure, scraped surface heat exchangers
- Two pin rotor machines with adaptable volume
- Nitrogen dosing including back pressure valve
- Resting tube with various volumes and extrusion heads
- High-shear mixer for inversion or mixing
- Process control using GS Logic Professional with all process settings logged during testing
- Fat flake equipment (separate)

### Products

- Margarine
- Shortening
- Butter blends
- Spreads
- Bakery filling creams

### Capacity

- Maximum throughput: 240 l/h
- Cooling capacity at -20°C: 5.5 kW per tube

### Advantages

- High flexibility
- Easy scale-up
- Significant cost savings
- Various scraper system options
- Easy maintenance and cleaning
- Design pressure up to 120 bar

## Fat Flake Equipment

Hygienic, high-pressure production of fat flakes

The fat flake equipment is available as a pilot unit. This innovative equipment offers fat flake producers numerous advantages compared to traditional chilling drums.

The fat flake equipment consist of an add-on, high-pressure unit connected to the standard crystallisation process line after the scraped surface heat exchanger (SSHE) system. The crystallisation process takes place inside the closed SSHE process, enabling hygienic production.

### Product

- Fat flakes

### Advantages

- Hygienic, in-line production
- Large number of processing parameters for optimal consistency and quality
- Small footprint
- Lower energy consumption

### Capacity

- Pilot unit: 20 – 120 l/h depending on crystallisation behaviour of the product

### Fat flake dimensions

- Thickness: 0.2 – 2 mm

### Product pressure

- Pilot equipment: up to 80 bar



# Emulsifying

## Continuous Emulsifying Units

Fine food products, such as mayonnaises, dressings or sauces, can be tested on the batch and continuous emulsifying equipment available at the SPX Innovation Centre in Soeborg, Denmark. Here, you can find ideal conditions for and, if necessary, assistance in testing recipe alterations in order to optimise production processes to deliver the desired viscosity.

### Emulsifying System ERS

High shear with no risk of oxidation

The continuous ERS system consists of an emulsifying machine type EG and a visco rotor. The oil-in-water (o/w) pre-emulsion is produced in the EG machine. The pre-emulsion is subsequently processed under high shear in the visco rotor, which is a colloid mill featuring a specially designed spiral gearing. This ensures that the oil drops are continuously reduced in size and distributed homogeneously.

#### Products

- Mayonnaise
- Dressings
- Sauces

#### Advantages

- High shear pre-emulsion process
- Homogeneous distribution of oil drops
- Completely sealed system – no risk of oxidation
- Fast and easy CIP cleaning

#### Capacity

- 50-100 kg/h



### Emulsifying Machine EM

Continuous, combined pre-emulsion and high shear process

This simple and well-proven emulsifying machine is for continuous fine food production and the capacity depends on the oil content of the product.

The EM machine combines the pre-emulsification and high shear process into one step. Continuous production reduces the use of e.g. starch, egg yolk and preservatives, which means saving on raw materials. Production costs can be kept at a minimum as the equipment is easy to operate and takes very little floor space.

#### Products

- Mayonnaise
- Dressings
- Sauces

#### Advantages

- Continuous emulsification
- Easy regulation of oil drop size and distribution
- Homogeneous distribution of oil drops
- Minimum production costs

#### Capacity

- 50 – 100 kg/h



## Separation, Clarification and Solids Recovery

The Vertical Disk Stack Centrifuges are highly efficient and compact, providing high levels of performance at competitive prices.

The pilot plant is an SE15XX-Q3P2 disc separator, which can be used as an:

- Liquid/Liquid/Solid concentrator: when the heavy liquid phase is the main part of the incoming stream (e.g. milk skimmer)
- Liquid/Liquid/Solid purifier when the light liquid phase is the main part of the incoming stream (e.g. butter oil purifier)
- Liquid/Solid clarifier with and without hydraulic seal: for any kind of clarification (milk, juices, oils, fermentation broths etc.)
- Liquid/Solid clarifier internal recirculation type: for example for milk bacteria clarification

### Applications

- Dairy
- Alcoholic beverages
- Non-alcoholic beverages
- Fats & Oils
- Chemical & Industrial
- Pharma & Biotech

### Features

- Skid-mounted units
- Customised attomation to meet specific needs
- High dynamic stability
- Remote monitoring systems
- Complete sound proofing
- All parts in contact with product are in stainless steel
- Hermetic mechanical seals
- Precise control of discharged volume
- Vibration monitoring
- Continuous research and development program
- Expert service team
- Frequency converter driven

### Advantages

- Compact solutions, no need for concrete bases, no electrical or hydraulic work required on field job
- User-friendly units, adaptable to any customer need
- Absence of vibrations improving mechanical reliability and reducing maintenance requirements
- Functionality checks for higher uptime from technical office with real-time operational diagnostics
- Lower noise level for workplace comfort
- Reduced energy losses
- Minimisation of losses in different product types
- High hygienic standards for avoiding contamination in all separate streams
- Minimum risk of oxidation, making the centrifuge ideal for sparkling products using carbon dioxide, such as wine or beer
- State-of-the-art with a commitment to developing and improving process performance and efficiency
- Seital Separation Technology engineering achieves unbeatable separation with designs that minimise installation and ongoing maintenance costs while optimising production.



# Deaeration

## Deaeration Unit

Wide choice of product vacuum deaeration capabilities and options.

The Derox product deaeration unit is a universal, compact pilot skidded system comprising the major product vacuum deaeration capabilities and options within SPX, including parasol and tangential flash deaeration and recovery of volatile components.

## Derox

The Derox product deaeration unit is equipped with sophisticated inline oxygen measurement equipment on both the product inlet and outlet connections. This enables determination of the best suitable deaeration mode for a specific application, and simultaneously optimises the deaeration setting through scalable application testing.

### Products

- Milk
- Juice (incl. pulp)
- Dessert mix
- Vegetable oil
- Cream
- Baby food
- Ketchup
- Soups and sauces
- Syrup
- Ice cream mix

### Capacity

Up to 2,500 l/h

### Advantages

- Scale-free thermal processing of high protein containing products
- Superior aroma recovery system
- Unique adjustable parasol inlet with automatic Parasol regulating valve
- Tangential deaeration
- Inline oxygen measurement on product inlet and outlet
- Removal of off-flavours and odours
- Flavour recovery
- Anti-foam device
- Easy to operate
- Simplified, compact design
- Minimised cooling water consumption
- Improved hygiene with sanitary design throughout
- Reduced noise level
- Reduced energy consumption
- Data logging



# Water Sanitation - SafeWater

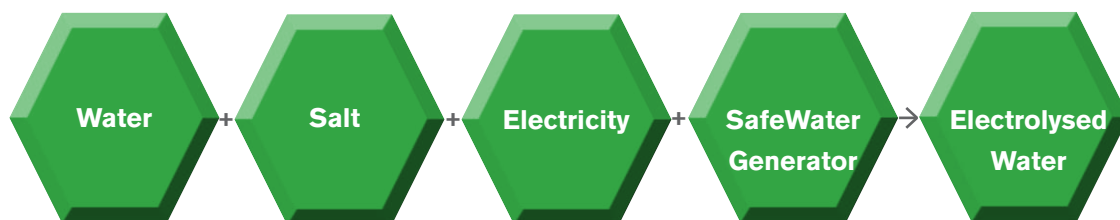
## Safe and sustainable sanitation of water

Originally developed for the production of chlorine in swimming pools, electrolysis technology has been advanced to enable the production of valuable cleaning and sanitising solutions. When sodium chloride is subjected to electrolysis with a dividing membrane between the electrodes, two separate solutions are produced. These are primarily hypochlorous acid and sodium hydroxide at the anode and cathode respectively.

### The SafeWater process

This new technology revolutionises CIP procedures, helping to reduce carbon footprint, shortening changeover time and saving energy as well as the costs of expensive, formulated chemicals. Deposit removal is fast and effective without the need for heating. When dealing with heavy mineral deposits and pronounced fouling it may be necessary to complement with traditional CIP procedures.

The fundamentals of using natural drinking water with a small amount of food salt added, and applying an electrical current to produce a natural disinfectant that is identical with nature's own, have elevated the status of natural disinfection in the dairy, food and beverage industries as an environmentally friendly solution.



The fact that the process is based upon simple electrolysis using only natural ingredients such as water and salt means that SafeWater is a truly sustainable solution.

### Advantages

- Increased plant uptime
- Safe for employees, the environment and product contact
- Reduced environmental impact
- Reduced water consumption/waste
- Replacement for expensive sanitisers and detergents, and cost of inventory
- On-site, on-demand generators to reduce storage requirements
- Lower energy footprint due to cold sanitisation.





# Homogeniser Application Laboratory



## High Pressure Homogenisers and the Opportunity for Small Scale Trials

The homogeniser application laboratory is an integrated part of the Innovation Centre in Silkeborg and offers homogenising trials and particle size distribution analyses. Homogenisation is an important part of liquid processing in the dairy, food and beverage, pharmaceutical, chemical and health care industries.

Homogenising pressures up to 2000 bar and flow rates as low as 11 l/h can be tested with single- as well as two-stage homogenisation. These small scale homogeniser trials can be conducted with all liquid emulsions and suspensions if not containing too large particles (though particles generally must be  $< 250 \mu\text{m}$ ). Low viscosity as well as high viscosity liquids can be tested and comprehensive trials at various pressures can be conducted with just a few litres of product. This enables the laboratory to recommend the homogeniser solution most suited for maximising homogenising efficiency and product quality.

The laboratory has one of the newest particle sizing instruments on the market based on laser diffraction (a Malvern Mastersizer 3000 with MIE as well as Fraunhofer theory,  $0.01 - 3500 \mu\text{m}$ ) as well as a dynamic light scattering instrument for analyses of particle sizes down to 3 nm (nanometer).

### Applications

- Particle size reduction
- Deagglomeration
- Intensive emulsification
- Cell disruption
- Microfibrillation and other macromolecular changes
- Phase inversion

### Advantages of high pressure homogenisation

- Extremely small and narrow particle size distributions obtainable
- Pressure and capacity can be adjusted independently
- Easy upscaling from lab size to production size.

### Equipment

- APV-2000 (2000 bar, 11 l/h), 1 – 2 l sample for trials (minimum 120 ml)
- Rannie 10.51VH (1500 bar, 70 l/h), 10 – 20 l sample for trials .

### Products

- Dairy products
- Ice cream
- Flavour emulsions
- Fruit juices
- Cream liqueurs
- Sauces
- Tomato ketchup
- Peanut butter
- Low fat products
- Wax emulsions
- Silicone emulsions
- Polymer emulsions
- Lubricating greases
- Fibre suspensions
- Latex
- Personal care emulsions
- Parenteral emulsions
- Liposomes
- Nanoparticle suspensions
- Microorganisms
- Algae

# Bag-in-Box Filling

## Intasept® Aseptic Filler for Aseptically Processed Products

### Products

High- and low-acid aseptically processed products in testing and development operations. Sizes up to 6 to 8 mm, and with modifications up to 12 mm, can be filled into sterile bags ranging from 1 to 200 l.

### Advantages

- High-speed filling
- Equipped with servomotors for high accuracy fill & consistent speed
- Quick & simple bag size changes without mechanical adjustment
- Easy operator interface
- CIP/SIP
- All fabricated components in stainless steel and engineering plastics
- Designed to European Hygienic Engineering & Design Group (EHEDG) standards.
- Compliance with EU Health and Safety work acts, e.g. noise level below 80 dB.

### Equipment

The compact filler can fill a wide range of Intasept® bag formats. The sterile transfer principle and process are identical to commercial Intasept® 32 mm filling equipment.



# Data Logging and Controllers



## Logging of Process Data over an Extended Period of Time

### Ethernet Network

- Modbus
- FTP
- Time Synchronisation (SMTP)

### Master Comms

- Ethernet and Serial connections
- Autoscan Devices
- Remote access

### CSV Output

- User Screens
- Custom graphic screens tailored to your application needs

### Bridge 5000

- Seamless interface from plant floor to PC

### Batch

- Batch specific logging of data
- Multiple batch functionality
- Automatic batch archive
- Batch search capabilities
- Operator details, time and data logged at start and stop of batch
- Simple configuration to meet specific process needs

### Groups

- Math, Totalisers, Counters
- Timers
- Security Manage
- Custom Messages
- Adaptive Recording
- Review

## Standard and Tailor-made Soy milk Processing Lines

Whole or dehulled soybeans can be processed into soymilk base, with or without blanching and/or soaking. Process parameters, such as times, temperatures, pressures, pH, solid content, etc. are variable and adjustable. The equipment is generally designed to produce soymilk-base with a protein content up to approx. 5%.

The equipment can also be used for processing of products made from other cereals/grains/legumes than soybeans such as, but not limited to: oat, rice, peanuts, lupins, peas, etc.

### Products

- Soymilk with desired composition and flavours, aseptically packed or fresh
- Soy beverages, smoothies, etc.
- Fermented products, e.g. soy-yoghurt
- Custards, puddings, etc.

### Soymilk extraction unit

- Soybean blanching/soaking vessel
- Continuous soybean dosing aggregate
- Process water supply and heating aggregate
- Product feed pump
- Continuous grinders (disc mill and colloid mill)
- Mixing and dosing system for  $\text{NaHCO}_3$
- Product cooling section
- Operation and control panel

### Capacities

- All units listed below: 100 - 400 l/h of soymilk base

### Fibre separation unit

- Balance tank
- Product feed pump
- Decanter centrifuge
- Operation and control panel

### Enzyme inactivation and deodorisation unit

Add-on infusion plant with direct steam heating and flash cooling. The unit consists of balance tank, product feed pump, steam infusion chamber, holding cell, flash chamber with vacuum system, necessary instruments and operation and control panel

*The SPX Soymilk processing equipment is currently located in Singapore. For more information please contact the Innovation Centre in Silkeborg. Tel.: +45 70 278 278 - E-mail: [ft.dk.silkeborg@spx.com](mailto:ft.dk.silkeborg@spx.com)*



# Competences and Application Capabilities

Our staff includes engineers, technology specialists, product and application specialists, project specialists and laboratory technicians with in-depth application and process knowledge, and many years of industrial experience in many different countries.

We specialise in a wide range of product applications in the following industries:



## Dairy

- Butter & butter blends
- Cheese spreads
- Chocolate drinks
- Dairy ingredients
- Fresh & UHT milk
- Ice cream
- Infant formula
- Low-fat dairy products
- Milk powders
- Pressed cheese
- Processed cheese
- Recombined milk products
- Shortening
- Soft cheese
- Spreads
- Whey powders
- Yogurt & fermented products

## Food & Fine Food

- Baby food
- Bakery filling creams
- Candy and confectionery
- Custards
- Desserts
- Dips
- Fat flakes
- Fine foods (mayo/ketchup/sauces)
- Freeze dried fruits
- Freeze dried food
- Fruit filling and preserves
- Gelatine and stabilizers
- Gravies
- Ingredients & Flavourings
- Margarine & margarine blends
- Puddings
- Purée
- Sauces
- Soymilk
- Starch and derivate
- Sweeteners
- Syrup
- Vegetable fats & margarines

## Beverages

- Beer
- Coffee
- Flavoured water
- Fruit juices
- Non-alcoholic beer
- Soft drinks
- Soya drinks
- Spirits
- Tea & coffee drinks
- Wine

## Chemicals

- Agro chemicals
- Carbohydrates and derivates
- Detergent
- Metal salts and complexes
- Pigment & dyestoff
- Silicates
- Waste and effluent

## Pharmaceuticals

- Active substances
- Antibiotics
- Healthcare
- Plant extracts
- Vitamins and micro minerals

## Other

- Blood plasma
- Ceramics
- Cosmetics
- Detergent ingredients
- Detergents
- Feed products
- Fertilisers
- Flavours and fragrances
- Personal care products
- Pet food
- Yeast and aroma derivate



# How We Can Help You

**Our specialists partner closely with you – either at one or both of our Innovation Centres, or at your own site – to realise solutions resulting in repeatable and scalable applications that enable smooth production of product with the specified quality parameters at the lowest possible cost.**

We offer the following application and product testing services:

- Comparison of different processes, e.g. direct versus indirect heating systems
- Test of high-risk projects prior to order
- Troubleshooting of applications and products
- Product quality and yield optimisation
- Reduction of energy costs
- Development and test of new recipes
- Assistance with product analyses in a laboratory
- Test and development of new equipment configurations
- Environmental compliance
- Practical and theoretical training courses and seminars for process employees
- Pilot and full production plant rentals for trials on your own premises
- Product and process development in close cooperation with the customer
- Product development in reasonable scale (representative product sample)
- Scale-up of results for commercial plants



# How We Can Help You

## High Flexibility

All SPX Innovation Centres adopt a flexible, customer-centric approach that focuses on the entire scope of the challenge facing the customer.

The availability of a wide range of equipment as well as product and application specialists together with technical support staff enables efficient and precise testing of many different types of products and applications using flexible and customised equipment setups.

All mobile and stationery equipment, including specialist equipment, can be easily installed and interconnected, enabling configuration of process lines to suit individual requirements. Most processes can be run batch-wise or continuously using equipment controlled by variable speed controllers (VLT).

## Research and Development

The SPX Innovation Centres play a decisive role in our own new equipment development programmes, building on experience gained together with our customers in various industries and markets all over the world.



# Technical and General Facilities



## Plant and equipment

Each SPX Innovation Centre contains a number of small-scale, full-scale and semi-industrial scale plants, providing certainty of production scale repeatability. Testing and trials can take place in a sealed room or hall, providing full privacy and confidentiality.

## Service facilities

Water, ice water, CO<sub>2</sub>, air, glycol, power (380 V, 220 V) and steam are already installed. The Silkeborg Centre is also connected to a large Airposal tank for transportation to biological waste treatment. At the Copenhagen Innovation Centre we have closed drains enabling the recovery of all waste and wastewater at the end of testing as well as our own controlled, below ground drainage tanks prior to discharge in the local sewage system.

## Tank and storage facilities

Various mobile tanks and temperature controlled (0 to 40°C) storage rooms are available.

## Workshop

Experienced fitters and electricians are responsible for the installation of trial plants, building new plants or modifying existing equipment for special trial runs. A fitter is always available during trial runs to undertake any on-site modifications, thus enabling maximum flexibility and rapid response.

## New equipment testing

SPX Innovation Centres have facilities for testing of new equipment including:

- Centrifugal and positive pumps with capacities from a few ml to more than 100,000 l/h
- Tanks with heating/cooling jackets
- Flow meters with portable data logging
- Differential pressure gauges
- Temperature probes with portable data logging
- Acidifying tanks – automatic





# Laboratory Facilities

The SPX Silkeborg laboratory performs mainly microbiological and functional analyses of all kinds of food products in accordance with international standards.

The laboratory at SPX Copenhagen handles functional analyses of dairy, food and chemical products as well as specialised fat & oil products in accordance with international standards.



## Chemical analyses including:

- Protein
- Fat (Gerber)
- Milkoscan
- Total solids
- Ash
- Chloride
- Lactose
- Lactulose
- pH
- Conductivity
- COD

## Functional and physical analyses including:

- Viscosity (rheomat)
- Density
- Whipping test
- Alcohol stability
- Digital microscopic image analysis (Leica digital camera)
- Particle size distribution
- Wettability
- Dispersibility
- Solubility
- Hygroscopicity
- Dispersibility
- Mechanical stability

## Water analyses

- pH
- Conductivity
- Turbidity
- Chloride
- Chemical COD

## Microbiological analyses

- Total plate count
- Thermophilic organisms
- Thermoresistant organisms
- Aerobic and anaerobic spores
- Psychrotrophic bacteria
- Lactic acid bacteria
- Coliforms
- Yeast and moulds



# Rental Equipment

**You can rent plants and equipment for testing and small-scale production purposes at your own site.**

The following equipment is available on a rental basis:

Description	For more information please contact
MicraSpray 150	SPX Flow Technology Østmarken 7 2860 Soeborg Denmark Tel: +45 70 278 222 Fax: +45 70 278 223 ft.dk.soeborg@spx.com
Spin Flash Type SFD 47	
Small Scale Spin Flash type SFD 51	
Laboratory Vacuum Evaporator	
Junior Plate Evaporator type 1RFPE-DS	
Dosing System	
Pilot extraction unit, 2 x 50 l	SPX Flow Technology Splieterstraße 70 a 48231 Warendorf Germany Tel: +49 2581 63601-0 Fax: +49 2581-63601-20 ee.info@spx.com
Pilot evaporation unit, water evaporation rate: 50 kg/h	
UHT Sterilising Plant	SPX Flow Technology Pasteursvej 1 8600 Silkeborg Denmark Tel: +45 70 278 278 Fax: +45 70 278 330 ft.dk.silkeborg@spx.com
Instant Infusion SII	
Spiratherm	
Membrane Filtration	
Microparticulation - LeanCreme™ Process	
Scraped Surface Heat Exchanger	
Flex-Mix™ Processor	
Flex-Mix™ Liquiverter	
Flex-Mix™ Power Mixer	
Flex-Mix™ Instant	
Flex-Mix™ Multiverter	
Flex-Mix™ TPM + Power mixer	
Flex-Mix™ DAR	
Cavitator	
Butter Blend, Pilot Butter Plant	
Derox Product Deaeration Pilot Plant	
Safe Water Plant	





#### **ABOUT SPX**

Based in Charlotte, North Carolina, SPX Corporation (NYSE: SPW) is a global Fortune 500 multi-industry manufacturing leader.

For more information, please visit [www.spx.com](http://www.spx.com).

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SPX-9013-GB Version 01/2013 Issued 09/2013

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