SPX®

Cheese technology

APV®

Cheese equipment selection guide

SPX's experience in cheese enables us to offer a wide range of equipment and solutions. The key to choose the right equipment is the cheese type, the below table may be of help (Please note that only the main cheese categories are listed)

Main groups of cheese	Types/ varieties	CurdMaster	CurdFinishing tank	FineSaving tank	OPD PrePress	Mould fillers	SaniPress system	Cheese mould washer	Mould emptier system	Rack filler	Rack brining system	Brine handling	Cheddar table	Cheddarmaster tower	Cheddarmaster all belt system	MozzarellaMaster dry curd	MozzarellaMaster batch system for sosft crd	Dry salted EPC system	SoftCurd (horizontal)	Cottage cheese system
	European pressed cheese																			
Extra hard cheese	Parmesan	x	x	x	x	x	x	x	x	x	x	x						x		
Extra hard cheese	Grana	x	x	x	x	x	x	x	x	x	x	x		(x)	(x)					
Hard cheese	Gryére	x	x	x	x	x	x	x	x	x	x	x								
Hard cheese	Emmental	x	x	x	x	x	x	x	x	x	x	x								
Hard cheese	Swiss	x	x	x	x	x	x	x	x	x	x	x		(x)	(x)			x		
Semi hard cheese	Gouda	x	x	x	x	x	x	x	x	x	x	x		(x)	(x)			x		
Semi hard cheese	Edam	x	x	x	x	x	x	x	x	x	x	x		(x)	(x)			x		
Semi hard cheese	Tilsit	x	x	x	x	x	x	x	x	x	x	x								
Hard/semi hard cheese	Manchego	x	x	x	x	x	x	x	x	x	x	x								
	Speciality cheese																			
Semi hard / soft cheese	Havarti	x	x	x	x	x	x	x	x	x	x	x								
Semi hard / soft cheese	Port Salut/St. Paulin	x	x	x																
Semi hard / soft cheese	Limburger	x																		
Semi hard / soft cheese	Blue mould	x																		
Soft cheese	Gorgonzola	x																		
Semi and soft cheese	Feta/Domiati	x																		
Semi soft / fresh cheese	White cheese	x																		
	Pasta filata																			
Hard / semi hard cheese	Provolone	x											x	(x)	(x)	x	x			
Semi hard cheese	Kashkaval	x											x	(x)	(x)	x	x			
Semi hard / fresh cheese	Pizza cheese	x											x	(x)	(x)	x	x			
Soft / fresh cheese	Italian Mozzarella	x											x	(x)	(x)	x	x			
	Cheddard types																			
Hard cheese	Cheddar	x											x	x	x			x		
Hard cheese	Stirred curd	x											x	x	x			x		
Hard cheese	English territorials	x											x	x	x			x		
	Fresh / others																			
Fresh cheese	Cottage cheese																		x	x
Soft / fresh cheese	Quarg 1)																			
SofT / fresh cheese	Cream cheese 1)																			
Soft / fresh cheese	Fromage frais 1)																			
Fresh cheese	Ricotta 2)																			

1) Process based on ultrafiltration 2) Based on combined ultrafiltration and microparticulation

Cheese plant logistics and cheese technology

As a leading global supplier of complete cheese plants to the dairy industry, SPX offers a comprehensive selection of flexible and cost-effective solutions for a wide range of cheese types and sizes with wide-ranging moisture content and fat in dry matter.

CheeseMaster plant

The CheeseMaster line is an automated, modulised processing line for manufacturing all variations of EPC cheeses (European Pressed Cheese) – hard and semi-hard, round and rectangular, round eyed and with irregular eyes – in sizes from 1 kg to 50 kg (2.2 to 110 lbs/h) or more.

The CheeseMaster line has a proven track record for its outstanding performance and yield.

CheddarMaster and MozzarellaMaster

The famous CheddarMaster system is widely used for the manufacture of all types of Cheddar and dry salted cheeses. The CheddarMaster system is available both as a tower and all belt system with capacities from one to 10 tons per hour.

Based on the same technology as the CheddarMaster, the Mozzarella-Master handles Mozzarella or pizza cheese recipes.

SoftCurd Cottage cheese line

The SoftCurd cottage cheese line is made for cottage cheese with or without cream. The capacity ranges from 900 kg/batch to 2700 kg/batch dry Cottage cheese and approx. 1,600 kg/batch to 4,900 kg/batch creamed Cottage cheese. The concept of the SoftCurd line has proven it self successfully many decades.

Cheese technology and support

SPX cheese process technology is the result of many years of experience and close co-operation with cheese manufacturers throughout the world.

Our experience and wide range of technologies means that we can configure and modulise a world-class solution for a particular cheese production line, and provide all necessary support and service.

A dedicated team of specialists

- World-class innovation, engineering, sales and service competence
- Powerful and versatile technology platform
- Pioneers in innovative dairy applications and engineering solutions
- Advanced process automation solutions
- Innovation centre and pilot plant service
- Defined process knowledge and consultancy

Cheese vats – APV CurdMaster a vertical double O vat

Vertical double O type

Specifications	
Field of application	Cheese plants
Description	Cheese vats including various options to fit any type of cheese production
Capacity	Up to 30,000 l (8,000 U.S. gal)
Temperature	Dependent on individual cheese types

Advantages

- Fast foamless filling
- Rapid mixing of all added components including rennet
- Gentle and precise cutting
- High yield
- Fast whey draw
- Controlled and fast heating and cooling
- Vertical vat with 2 outlets for fast emptying
- Efficient and gentle stirring
- Fully automated with touch screen
- CIP cleanable vats

SoftCurd cheese vat type OCC horizontal

Cottage cheese production

Advantages

- Enclosed cheese tank with horizontal and vertical cutting tools
- Horizontal cutting frame parked outside product area when not in use
- Dedicated stirring shovels for gentle curd agitation
- Unique soft curd agitation programme
- Low product level
- Well-proven downstream equipment

Specifications	
Field of application	Mainly cottage cheese plants
Description	Horizontally enclosed cheese vat, filled only up to below the central, horizontal shaft. Two sets of cutting tools for vertical and horizontal cutting to create uniform curd cubes, followed by proven high-quality, downstream system for whey draining, washing and cooling, curd draining and creaming
Capacity	Tank size from 6,000 l to 18,000 l (1,585 - 4,755 U.S. gal) filling volume. Line capacity up to 5,000 kg (11,000 lbs) cottage cheese per hour
Temperature	PLC controlled cottage cheese cooking programme

- Fully CIP cleanable equipment
- High product quality and hygiene standard
- Tank also applicable for Blue Cheese, Feta and other cheeses

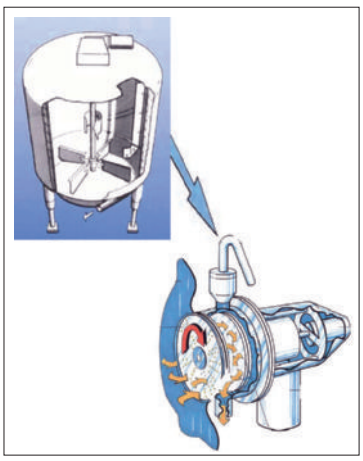
CurdFinishing tank

Final stirring and second whey draw between the cheese vats and the Pre-Press system

Specifications	
Field of application	Cheese plants
Description	The CurdFinishing tank is used for gentle final agitation as well as for the second whey draw which can be performed without stopping the agitator. This will minimise the lumps in the cheese mass to be pre-pressed which again will give a better cheese base without irregular holes
Capacity	Any
Temperature	Process-dependent

Advantages

- Improved cheese quality - better cheese base with minimum lumps and no irregular holes
- Shorter cheese processing time
- Very gentle, efficient and homogeneous agitation to eliminate feed variations in the Pre-Press system
- Continuous whey suction system enabling whey draw from the tank without stopping the agitator
- Separate in- and outlets
- Tangential inlet
- Enables high concentration of cheese curd before emptying to the Pre-Press system



FinesSaving tank

For recovery and reintroduction of cheese fines into the cheese

Specifications	
Field of application	Cheese plants
Description	During the second whey draw, the cheese fines in the whey are sedimented in a FinesSaving tank.The sediment fines will continuously be in motion to prevent fines lumps until they are forwarded to the Pre-Press, where they are distributed in the cheese mat and joint with the cheese grains
Capacity	Any
Temperature	Process-dependent

Advantages

- Increased yield through recovery and reintroduction of cheese fines
- Ability to flush out the filling line with clear whey
- Elimination of any increased fines losses from the second whey draw
- Improved cheese quality in connection with the second continuous whey draw
- Quick filling of the bottom of the Pre-Press with clear whey
- Less fines sediment in the bottom of the Pre-Press

APV OPD Pre-Press

Flexible pre-pressing of all kinds of semi-hard and hard cheese types

Specifications	
Field of application	Cheese plants for production of semi-hard and hard cheeses from about 2.0 kg to 100 kg (4.4 to 220 lbs)
Description	Pre-pressing of all types of semi-hard and hard cheese in all sizes and shapes within a frame of 1,200 x 1,200 mm (47.2 x 47.e inch). Available with a number of cheese production optimisation features such as laser scanning and adjustable knives
Capacity	5,000 - 20,000 l/batch (1,320 - 5,280 U.S. g/batch) Maximum batch size 13,000 x 1,700 x 200 mm (512 x 67 x 8 inch)
Temperature	Dependent on cheese type

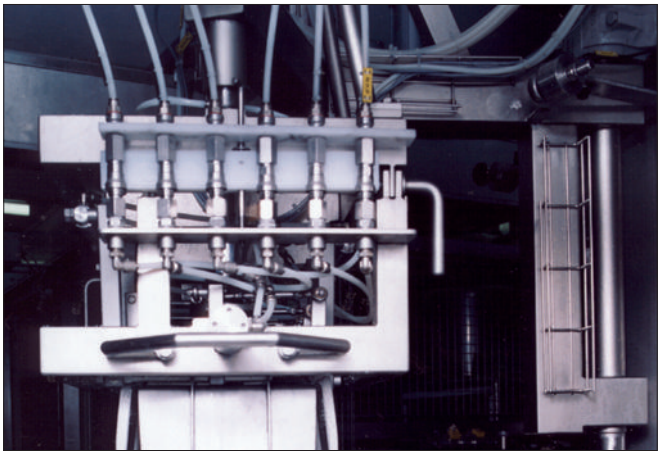
Advantages

- Flexible Pre-Press for all cheese types and a wide range of sizes and shapes
- Adapts easily to variations in fat and water content
- Physical separation between the individual batches for clear batch identification
- Fewer cheese vats required
- Easy change of cheese dimension and shape
- Same unit can make Gouda- and Tilsit-type cheeses
- Long running time between CIP cleaning
- Higher yield
- Uniform water content
- High weight accuracy due to uniform curd distribution, laser scanning and adjustable knives

Mould fillers

Flexible filling solutions for cheeses of various dimensions and shapes, and with different structures and firmness

Specifications	
Field of application	Cheese plants
Description	Filling of pre-pressed cheeses. Simultaneous filling of more than one cheese depending on the capacity requirements of the processing line
Capacity	Up to about 5,000 cheeses per hour
Temperature	Process-dependent



Advantages

- Gentle handling of the cheeses
- Possibilities for laser controlled filling for accurate placement of the cheeses in the moulds (large cheeses)
- Can fill up to 24 cheeses in the same operation
- All fillers are product adapted according to cheese type
- Choice of filling heads and filling systems
- Choice of type and amount of filling heads
- Several filling tools can be integrated in the automatic filler or changed for production of various dimensions and shapes of cheeses
- Operation with single or multiple moulds
- Optional: Fully CIP cleanable filling unit

APV SaniPress system

Highly flexible system for final pressing of semi-hard and hard cheeses

Specifications	
Field of application	Cheese plants
Description	Pressing takes place in closed tunnels by means of a diaphragm pressing on the entire surface of the mould lid
Capacity	Tailored to cheese processing line
Temperature	Dependent on individual cheese types

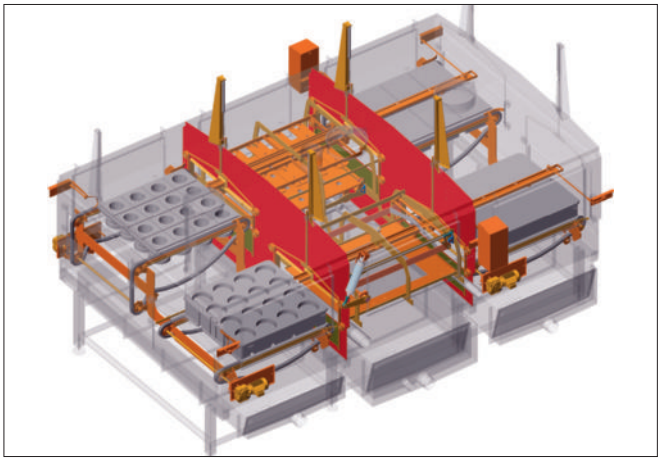
Advantages

- Even pressing of cheeses in individual moulds or multiple moulds without using spring-loaded lids
- A specific pressure of 400 g/cm² (5.7 lbs/sq.in.) is achieved at only 0.3 bar (4.3 lbs/sq.in. air pressure)
- Optional available with pressing cylinders
- Applicable to a wide variety of cheese types
- Applicable to a wide variety of shapes and sizes
- Integrated mould storage
- Collecting of whey and CIP liquid

Cheese mould washer

Special, patented design for cleaning micro-perforated plastic cheese moulds

Specifications	
Field of application	Cheese plants
Description	The cheese mould washer consists of three sections - pre-rinse, pressure washing and final rinse. Cheese particles and whey residues are removed by simple flushing in the pre-rinse section. The moulds are fixed in an upside down position in the pressure washing section and detergent is circulated through the micro-perforation. Finally the moulds are rinsed with fresh water, which is recycled to the pre-rinse section
Capacity	Adapted to the individual cheese plant
Temperature	75°C (167°F) in the pressure washing section



Advantages

- Patented pressure washing system for efficient cleaning of all micro-perforated drain channels, thus preserving the whey draining capacity of the moulds

Mould emptier system

Highly flexible system for final pressing of semi-hard and hard cheeses

Advantages

- Customised to individual cheese types, shapes and sizes
- Additional emptying tools can be integrated in the automatic filler or changed to accommodate various cheese shapes and sizes
- Choice of two methods enables the optimum solution for any cheese type

Specifications	
Field of application	Cheese plants
Description	Compressed air emptying: The moulds are turned 180° and fixed after which the cheese is released by blowing compressed air through the micro-perforated holes in the bottom and sides of the mould. Vacuum emptying: Specially designed, fixed vacuum heads on the mould are lowered on to the cheese. The cheese is liftet out of the mould
Capacity	Adapted to the individual cheese plant
Temperature	Dependent on cheese types

- Works with single and multiple moulds
- Available with full CIP cleaning

Rack filler

Gentle loading of cheeses on the rack

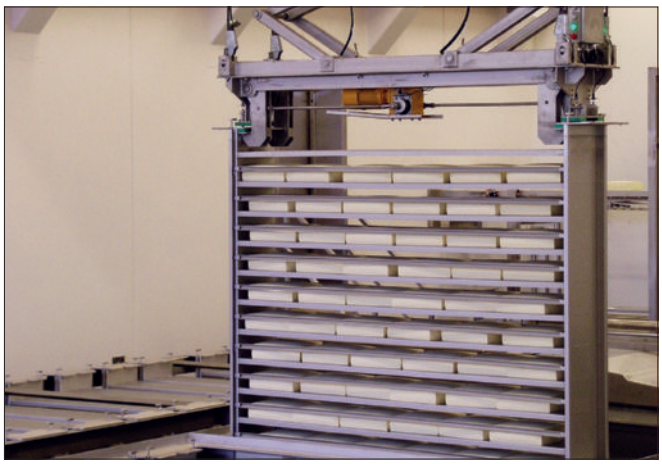
Specifications	
Field of application	Cheese plants
Description	Pressed cheeses are conveyed on a belt conveyor from the mould emptier to rack filler where they are loaded on the roller conveyor in the rack loading vat. After the roller conveyor is lowered below water level, the rack elevator pulls an empty rack from the rack storage system, and places it with the lowest shelf in the loading position on a level with the roller conveyor. One shelf is loaded at a time by means of a pneumatically controlled pushing device, after which the rack elevator steps the rack to the next position. When the rack is loaded and all cheeses under liquid, the rack is pulled out of the elevator to the position for crane collection to the brining vat
Capacity	Adapted to the individual cheese plant
Temperature	Dependent on the various cheese types

Advantages

- Specially designed rack filling system with filling below water level for gentle treatment of soft, pressed cheeses
- Flexible to accommodate various cheese sizes and shapes

RackBrine system

For round and rectangular hard and semi-hard cheeses – water cooling and brining



Advantages

- Highly flexible to accommodate various cheese types, sizes and shapes
- Suitable for both cheese cooling and cheese brining
- Available with full CIP to enable full batch control

Specifications	
Field of application	Cheese plants
Description	A flexible modular system made of stainless steel (AISI316) consisting of brining racks, cooling/brining vats, and an overhead crane for rack conveyance. The brining racks consist of a frame with perforated profiled shelves equipped with safety gratings, as well as grip fittings for crane transportation and for hanging from the edge of the vat. The cooling/brining vats are made of stainless steel, and the edge of the vats feature rack fittings to make sure the racks do not touch the vat during lowering/lifting. The overhead crane is mounted on epoxy-covered steel pillars and covers the area containing the loading/unloading systems and the cooling/brining vats. It features a special gripper that fits closely with the grip fittings on the racks, and a semi- or fully automatic PLC system
Capacity	Adapted to the individual cheese plant
Temperature	Dependent on the individual cheese process

Brine handling and treatment

Ensures forward flow of clean, saturated brine at the right temperature to the brine vats

Specifications	
Field of application	Cheese plants
Description	The brine handling system consists of brine storage, salt storage and salt dosing system, MF plant for brine cleaning, plate heat exchanger for temperature adjustment, and a forward flow and return system. The brine storage system consists of a tank for brine returned from the brining plant, and a tank for cleaned, saturated brine. The returned brine is pumped through the salt dosing system where the salt content is adjusted, and through the MF plant for cleaning. Finally the cleaned, saturated brine is stored in the relevant tank prior to temperature adjustment in the plate heat exchanger and forwarding to the brining vats
Capacity	Tailored to the individual brining plant
Temperature	Dependent on the actual cheese types

MF BRINE CLARIFICATION

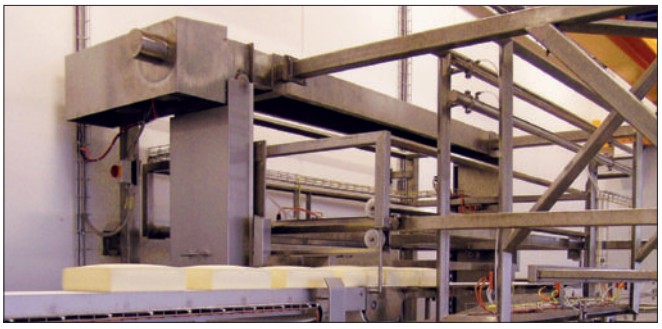
Advantages

- Forward flow to each brine vat of clean, saturated and temperature-adjusted brine, enabling real batch traceability
- The system is fully CIP cleanable
- Automatically controlled
- Cheese brine of high hygienic standard

Rack unloader and rack washer

Automatic unloading of brined cheeses to cheese conveyance system prior to rack cleaning

Specifications	
Field of application	Cheese plants
Description	The automatic unloading system consists of an elevator with a slat conveyor and a pneumatically controlled cheese pushing device, a chain conveyor positioning the rack for unloading, and a gripping device to lift the safety grating during unloading. After unloading, the rack is conveyed by the chain conveyor to the washing cabin. Unloading and rack washing are controlled by an integrated PLC system
Capacity	Tailored for the actual brine plant
Temperature	Dependent on the various cheese types



Advantages

- Highly flexible unloading system for a wide variety of cheese types, shapes and sizes
- Precise positioning of cheese pushing device
- Assurance that all racks are cleaned after each circulation - fresh cheeses always loaded on clean racks
- The system is fully controlled by a PLC system

TrayBrine system

Specifications	
Field of application	Cheese plants
Description	Automatic tray brining system with manuel handling (loading/unloading) of cheeses
Capacity	From very low capacity to very high as the system is extendable

Advantages

- Wide capacity range
- Good use of floor area
- Flexibility
- Low investment
- Extendable
- Little brine use
- Cleanable
- Automation system based on time
- Brining can be stopped on time and cheeses rest without brine

CheddarMaster – tower system

High-performance, high-quality curd draining, cheddaring, milling, salting and mellowing

Specifications	
Field of application	Cheddar and other dry salted cheese plants
Description	Batch and continuous curd draining, cheddaring, milling, salting and mellowing system
Capacity	1,000 - 9,000 kg/h (2,200 - 20,000 lbs/h) cheese curd
Temperature	Potentially no or very low temperature loss during holding time

Advantages

- Superior for handling non-continuous curd flow
- Proven capacity of 9,000 kg/h (20,000 lbs/h) cheddar curd
- Rapid filling facility - fewer and larger cheese tanks required
- Batch filling - continuous discharge
- High salting accuracy by volume or weight control
- No thin walled hollow bodies
- No curd and whey build-up in the machine
- Customised solutions based on standardised modules
- Easy recipe control and recording of process parameters
- Patented belt edge sealing to machine wall
- High-velocity, low-volume CIP philosophy
- High production flexibility and product quality
- Cost effective on small capacities
- 3A sanitary standard

CheddarMaster – all belt system

High-volume continuous curd draining, cheddaring, milling, salting and mellowing

Specifications	
Field of application	Cheddar and other dry salted cheese plants
Description	Continuous curd draining, cheddaring, milling, salting and mellowing system
Capacity	1,000 - 12,000 kg/h (2,200 - 26,500 lbs/h) cheese curd
Temperature	Potentially no or very low temperature loss during the holding time

Advantages

- Superior for handling continuous curd flow
- Preferred high capacity system
- Proven capacity up to 12,000 kg/h (17,600 lbs/h) cheddar curd
- Continuous operation - wide range of configurations
- High salting accuracy by volume or weight control
- No thin-walled hollow bodies
- No curd and whey build-up in the machine
- Customised solutions based on standardised modules
- Easy recipe control and recording of process parameters
- Easy vat ID
- Patented belt edge sealing to machine wall
- High-velocity, low-volume CIP philosophy
- High production flexibility and product quality
- 3A sanitary standard

CheddarTable – CT

Efficient stirring and fast draining with minimum loss

Specifications	
Field of application	Cheddar & Pasta Filata cheese plants.
Description	Cheddar table to fit to the amount of Curd from a CurdMaster. In the Cheddar table the curd is being drained, matted, milled, salted and mellowed.
Capacity	600 to 2200 kg of dry curd. (Standard sizes: 1500 mm or 1750 mm in width and with 6 lengths) 1,000 - 12,000 kg/h (2,200 - 26,500 lbs/h) cheese curd

Advantages

- Simple and study stainless steel design which has proven track record
- Fast draining with minimum loss of fines.
- Efficient stirring with good salt distribution
- No pockets of unstirred curd
- Sanitary Agitator design securing no oil drips into curd
- Variable speed with infinite speed regulation and reduced maintenance.
- Table bottom inclined towards central whey drain
- Single walled or double walled for hot water heating
- Various tools for stirring, leveling and cutting
- Programmable curd unloading by trips
- CIP cleaning of all pipelines

MozzarellaMaster – dry curd system

Continuous Mozarella/pizza cheese curd draining and matting

Specifications	
Field of application	Pizza cheese and Pasta Filata plants
Description	Continuous curd draining and matting system, and potential milling, salting and mellowing system
Capacity	1,000 - 8,000 kg/h (2,200 - 17,600 lbs/h) cheese curd
Temperature	Potentially no or very low temperature loss during the holding time

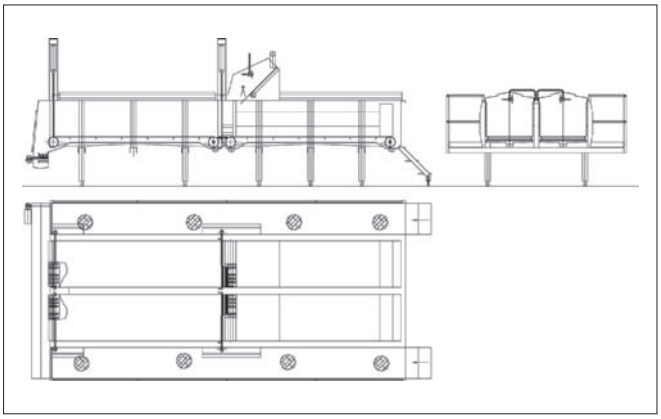
Advantages

- Superior for handling continuous curd flow
- Curd matting above whey level
- Capacity up to 8,000 kg/h (17,600 lbs/h) pizza cheese curd
- Preferred dry curd system for low-moisture Mozzarella/pizza cheese types
- No thin-walled hollow bodies
- No curd and whey build-up in the machine
- Customised solutions based on standardised modules
- Easy recipe control and recording of process parameters
- Easy vat ID
- Patented belt edge sealing to machine wall
- High-velocity low-volume CIP philosophy
- Optional curd washing facilities
- High production flexibility and product quality
- 3A sanitary standard

MozzarellaMaster – batch system for SoftCurd

Batch curd draining and matting for soft curd Mozzarella cheese

Specifications	
Field of application	Mozzarella and Pasta Filata plants
Description	Batch curd draining and matting system for curd acidification below or above whey level
Capacity	Up to 2,000 kg (4,400 lbs) curd per batch
Temperature	Uniform temperature in the curd mat



Advantages

- Designed for soft curd Mozzarella production
- Superior for non-continuous curd flow
- Provides quick fill and buffer facilities
- Proven design based on OPD technology
- High production flexibility and product quality
- High uniformity of curd moisture
- Controlled whey level
- Gentle curd treatment for improved yield
- Facilities both for soft and dry curd production
- Easy recipe control and recording of process parameters
- Enclosed fully CIP cleanable system
- Easy vat ID
- Optional curd washing facilities

Dry salted EPC system

Continuous production of high-quality, dry salted Cheddar, Gouda cheese types, Grana and Pasta Filata cheese types

Specifications	
Field of application	Manufacture of dry salted cheese types
Description	Based on CheddarMaster tower and all belt systems. Batch and continuous based curd draining, washing, cheddaring, milling, salting and mellowing system
Capacity	1,000 - 9,000 kg/h (2,000 - 20,000 lbs/h) cheese curd
Temperature	Potentially no or very low temperature loss during the holding time

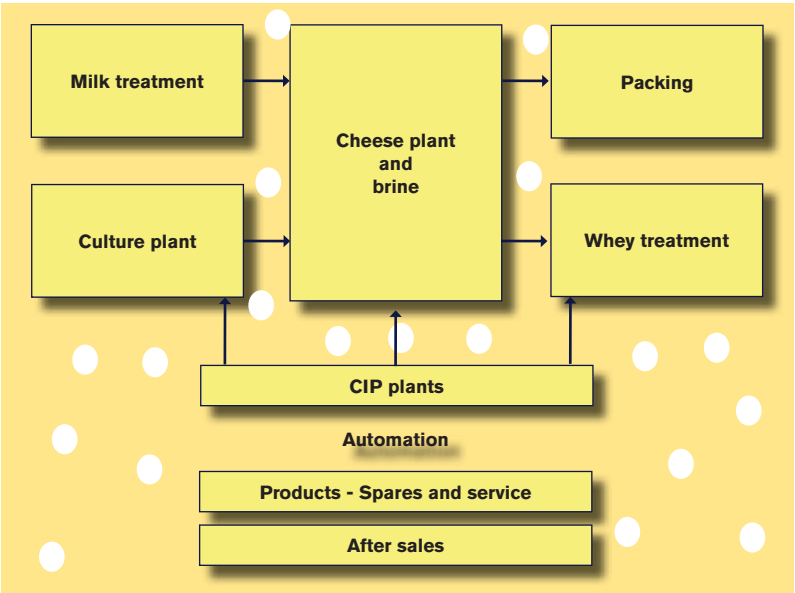
Advantages

- Easy recipe control and recording of process parameters
- High salting accuracy by volume or weight control
- No brining facilities required
- BlockFormer or HP SaniPress for block moulding
- Variable cheese block shape and weight using HP SaniPress system
- High accuracy block shape (± 20 g) (± 0.7 ounce) - ideal for fixed weight portioning
- Easy add-on for pizza cheese production
- Competitive supply to ingredients industry capital requirement reduced by 30% or more compared to traditional EPC (Gouda) plants
- Reduced production, maintenance and building cost
- 3A sanitary standard

Full support to ensure your succes

The SPX cheese department has a long tradition of working with cheese customers in order to find the best solution and equipment for your cheeses. This involves a lot of SPX core technologies, such as milk reception and standardization, culture preparation, whey treatment, CIP plants, automation, spares and service, as cheese plants involve many technologies as shown.

SPX offers all from; pre-projects, consultants work, equipment, line concepts, cheese technologists, project management to after sales service. In close co-operation with the customer and with an effective teamwork we are able to offer the whole range from single units to green-field projects. Automation ties it all together with visibility of key factors for the cheese production performance.



Research and development

The SPX Innovation Centre cooperates closely with SPX companies and customers around the world in order to provide a constant stream of innovative, world-class solutions that add decisive competitive value to the businesses of our customers.

Located in Central Jutland, the heart of Danish dairy farming country, the Centre is the focal point of SPX's dairy process development activities. The SPX Innovation Centre extends its reach far beyond this, however, offering a raft of services for the food industry in the broadest possible sense.

These include after sales service, laboratory analyses, technical information and training of SPX employees and SPX customers.

The SPX Innovation Centre 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 throughout the worldwide SPX Group 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 Centre 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 Centre or on customer site. All work on behalf of individual customers is subject to the strictest confidentiality and the highest standards of customer service.

SPX®

ABOUT SPX

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

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