

A WORLD OF PRODUCTS FOR EGG HANDLING AND PROCESSING



Content

Egg Handling and Processing from A-Z	Page 4-5
Farm Packing	Page 6-7
Egg Grading	Page 8-9
Hatchery Packing	Page 10
Automatic Tray Stacking	Page 11
End-of-Line Automation & Robotics	Page 12-13
Egg Loading	Page 14
Egg Washing	Page 15
Egg Breaking and Separation	Page 16-17
Liquid Product Handling	Page 18-21
Functional Ingredients and Tests	Page 22-23
Egg White Treatment	Page 24
Spray Drying	Page 25
Hard-Boiled Egg Processing	Page 26
Tray- and Pallet Washing	Page 27
Eggshell Processing	Page 28
CIP - Automatic Cleaning in Place	Page 29
Production Automation	Page 29
Service and Maintenance Program	Page 30-31

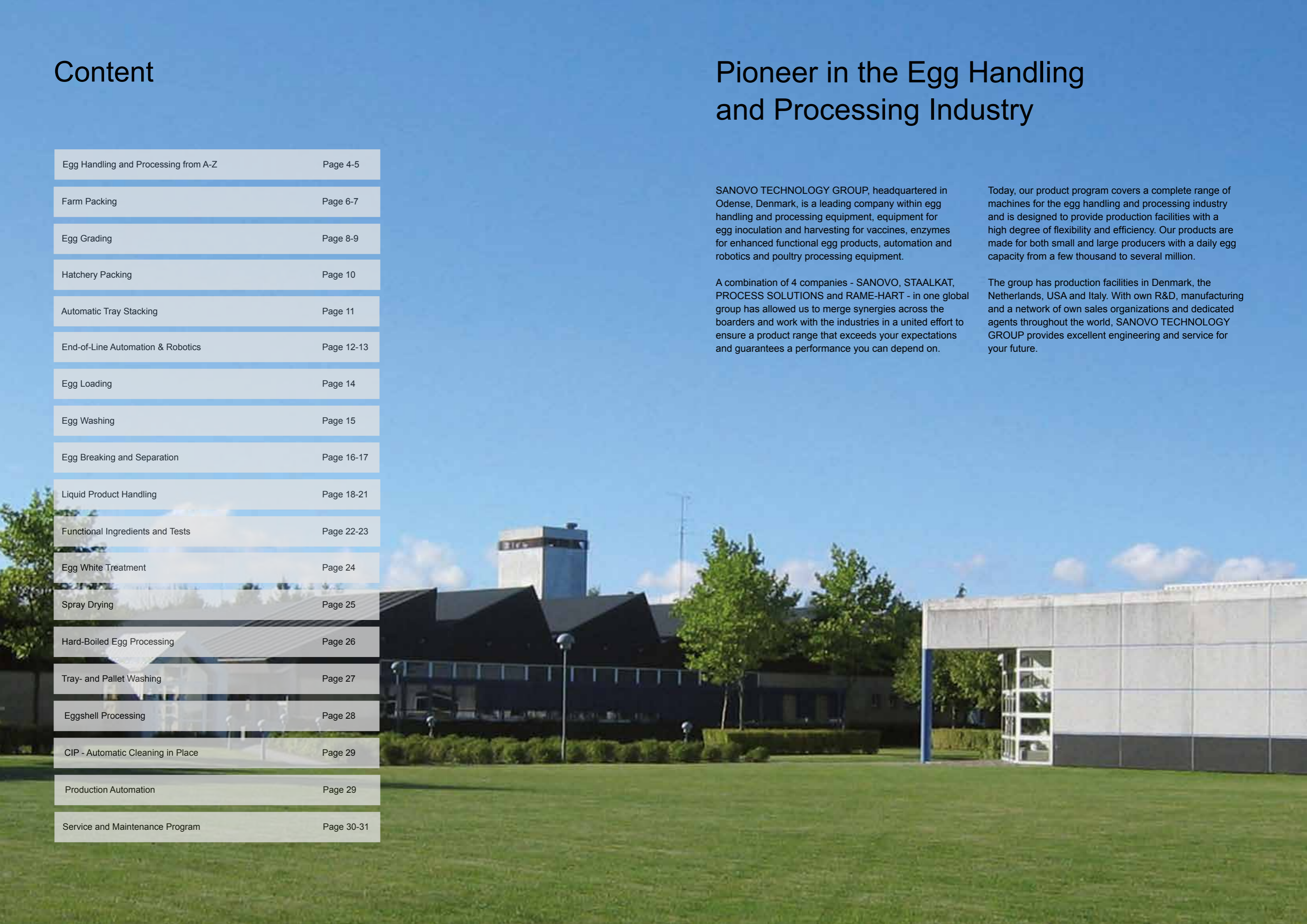
Pioneer in the Egg Handling and Processing Industry

SANOVO TECHNOLOGY GROUP, headquartered in Odense, Denmark, is a leading company within egg handling and processing equipment, equipment for egg inoculation and harvesting for vaccines, enzymes for enhanced functional egg products, automation and robotics and poultry processing equipment.

A combination of 4 companies - SANOVO, STAALKAT, PROCESS SOLUTIONS and RAME-HART - in one global group has allowed us to merge synergies across the borders and work with the industries in a united effort to ensure a product range that exceeds your expectations and guarantees a performance you can depend on.

Today, our product program covers a complete range of machines for the egg handling and processing industry and is designed to provide production facilities with a high degree of flexibility and efficiency. Our products are made for both small and large producers with a daily egg capacity from a few thousand to several million.

The group has production facilities in Denmark, the Netherlands, USA and Italy. With own R&D, manufacturing and a network of own sales organizations and dedicated agents throughout the world, SANOVO TECHNOLOGY GROUP provides excellent engineering and service for your future.



Egg Handling and Processing from A-Z

Eggs are the foundation of the SANOVO TECHNOLOGY GROUP. In their simple, yet unique nature, eggs can be marketed in an extensive variety of products. The possibilities vary from distribution of graded, packed and sanitized fresh shell eggs to separated and highly specialised liquid, dried or hard-boiled egg products.

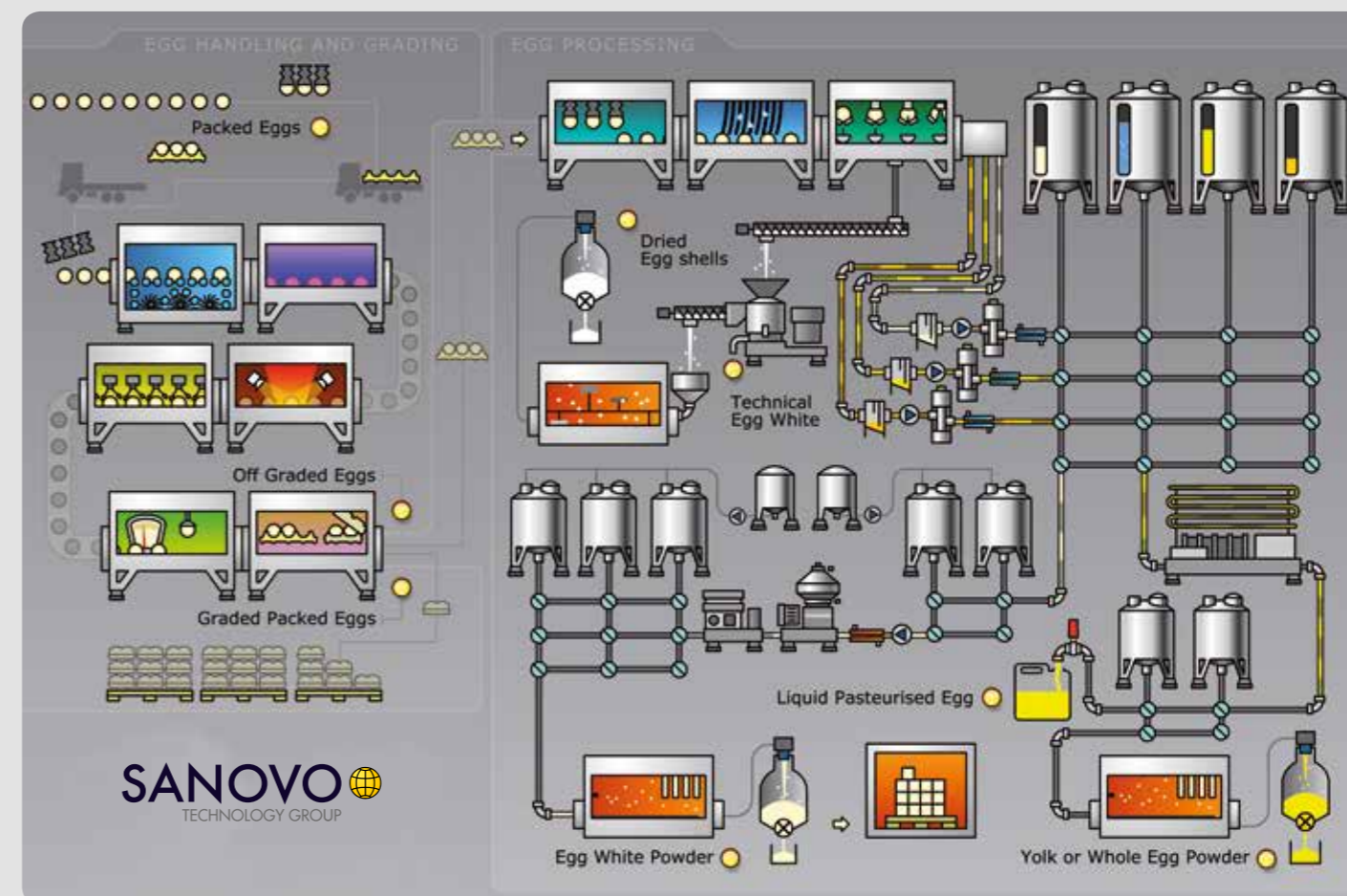
meet international requirements and standards. As a turnkey supplier, SANOVO TECHNOLOGY GROUP offers every aspect of the construction of an egg processing and egg handling plant – from building design over layouts, engineering and installation, to commissioning and training of local staff.

Focusing on the egg, SANOVO TECHNOLOGY GROUP supplies total solutions for our customers. Our products

SANOVO TECHNOLOGY GROUP offers advice on any of your requirements.



EGG HANDLING & PROCESSING FLOW DIAGRAM



EGG HANDLING & GRADING

- Farm packing
- Hatchery packing
- In-line and off-line solutions
- Washing
- Detection
- Weighing
- UV
- Grading
- Packing
- CIP
- End-of-line automation

EGG PROCESSING

- In-line and off-line solutions
- Washing
- Breaking and separation
- Shell processing
- Hard-boiled processing
- Filtration
- CIP
- Robotic automation

LIQUID PRODUCT HANDLING

- Enzyme treatment
- Pasteurization
- Extended shelf life
- Filling
- Ultra filtration
- Reverse osmosis
- Fermentation
- Storage
- CIP
- Robotic automation
- Functional ingredients and test

EGG POWDER

- Spray drying
- Packing solutions
- Storage
- Hot room
- CIP
- Robotic automation
- Functional ingredients and test

PRODUCT SPECIALISTS

- Maintenance program
- Supervision
- Training of local staff
- Functional ingredients and test
- Factory Management

UTILITY WASHING

- Tray washing
- Pallet washing



Farm Packing

Investing in packaging systems is a long-term relationship. We understand this and design to-the-point packers that do just what you need: Pack your eggs.

spot for eggs! Providing you with reliability and ease of mind, without worrying about maintenance and down-time, the STAALKAT Farmpackers just keep working.

STAALKAT Farmpackers are built sturdy with a soft

The STAALKAT Farmpackers - pack your eggs, straight line, point down! Really simple - really smart.



PACKING MADE EASY

STAALKAT Farmpackers - what you see is what you get. Successful design is more than just shapes and great lines. It's also about sensing that the equipment is exactly right. This is experienced with STAALKAT Farmpackers.

A dynamic robust design with the smallest footprint, made to pack eggs in the most natural way – straight line, point down!



THE FOLLOWING MODELS ARE AVAILABLE:

FARMPACKER 40	14,400 eggs/hour (40 cases/hour)
FARMPACKER 70	25,200 eggs/hour (70 cases/hour)
FARMPACKER 100	36,000 eggs/hour (100 cases/hour)
FARMPACKER 200	72,000 eggs/hour (200 cases/hour)

UNPACK, PLUG IN, PACK EGGS

Thanks to outstanding performance, proven robustness, low energy consumption and easy maintenance, STAALKAT Farmpackers are your best bet day in and day out.

BEST WARRANTY PROGRAM ANYWHERE!

With the world's best Farmpacker program, of course we also give you the world's best warranty program. 2 years warranty on the machine.

This is why STAALKAT Farmpackers are found in all corners of the world.

Delivered with additional parts for your ease of mind.

Egg Grading

The STAALKAT Egg Graders represent decades of engineering and user experience globally in the grading business. The rugged simple design meets the demands of a grading farm or packing station.

The STAALKAT Egg Graders handle all popular packaging throughout the world. Egg loaders, egg washers and tray washers can be added based on the market requirements. STAALKAT offers a wide range of electronical graders which are flexible to be configured to local needs and demands. The lower capacity graders meet all the needs of free-range and cage-free producers. Increase your GRADE A final packaging with our

gentle egg handling and advanced software of the new generation STAALKAT OptiGraders:

- In-line capacity of 144,000 and 216,000 eggs/hour (400 and 600 cases/hour)
- Double denester option
- Newly designed washers
- Fully automated handling
- Washable automatic packers
- Automatic CIP cleaning on the loader
- Simple, reliable and washable conveyance system
- Operator interfaces can be seen throughout the plant



THE HIGHEST CAPACITY EGG GRADER IN HISTORY IS HERE - THE STAALKAT OPTIGRADER

The new STAALKAT OptiGrader 600 gently takes your eggs to each carton through the most advanced technology available. Each egg receives individual care by a new generation of graders and packers all the way to the carton with superior labour efficiency and low parts usage. Compared to other systems, the robust crack detector and weighing scales are both positioned in the machine frame and need almost zero maintenance. They both have no complicated and delicate moving parts. The transfer from 18 to 4 rows is the simplest in the industry without compound motions and delicate moving parts. Just wash it all down at the end of the day in record time with no need to disassemble into parts and bring the parts to a parts washer.



STAALKAT ALPHA SERIES

The STAALKAT Alpha Egg Graders can be equipped with loaders to be used in both in-line as well as off-line or in combination. Hygienic features like brush and UV units are available. With its cleanable and low profile design, the STAALKAT Alpha Series is a robust and reliable egg grading system designed for egg producers that require a mid-range capacity, want to pack special eggs, or need to be flexible in relation to the business and the egg markets.



STAALKAT ARDENTA SERIES

The STAALKAT ARDENTA Series has a tailored infeed system for eggs and is equipped with a unique control system for optimum output. With all the optional features regarding hygiene, quality detection and traceability of the eggs, the clearly set out and accessible construction as well as the use of top-quality materials make the STAALKAT Ardent Series a very low-maintenance and user-friendly machine.

THE FOLLOWING MODELS ARE AVAILABLE:

OPTIGRADER 600 in-line	216,000 eggs / hour (600 cases / hour)
OPTIGRADER 600 off-line	201,600 eggs / hour (560 cases / hour)
OPTIGRADER 400 in-line	144,000 eggs / hour (400 cases / hour)
OPTIGRADER 400 off-line	134,280 eggs / hour (373 cases / hour)
ARDENTA 6	54,000 eggs / hour (150 cases / hour)
ARDENTA 300	108,000 eggs / hour (300 cases / hour)
ALPHA 125	45,000 eggs / hour (125 cases / hour)
ALPHA 100	36,000 eggs / hour (100 cases / hour)
ALPHA 70	25,200 eggs / hour (70 cases / hour)

Hatchery Packing

The STAALKAT Hatchery Packers not only take care of maintaining high hatchability by careful treatment of the hatching eggs, they are also considerably labor-saving.

The STAALKAT Hatchery Packers are robust and built in an ergonomic design, made from non-corrosive material and can be used in a flexible way. With the integrated hatchery tray denester the hatchery packer can also be placed in a small room.

The STAALKAT Hatchery Packers offer a capacity of 24,000 eggs/hour in 30-pcs. egg trays. Depending on

the type of setter, the tray capacities range from 20,000 eggs/hour for a straight 10x15 model up to 24,000 eggs/hour for staggered models.

The STAALKAT Hatchery Packers can be equipped with STAALKAT Farmgrader 80. The farmgrader can be used as stand-alone or in combination with a Hatchery Packer. This stand-alone unit will be able to separate the non-hatching egg sizes from the incoming egg flow. Therefore maximizing output for hatcheries and breeder farms or any poultry farm where pre-weight selection is required.



BEST OUTPUT FOR YOUR EGGS

Investing in packing systems is a long-term relationship. We understand this and make packers that do just what you need: pack your eggs.

STAALKAT Hatchery Packers are built tough with a soft spot for eggs. Providing you with reliability and ease of mind, without worrying about maintenance and up time. The STAALKAT Hatchery Packers just keep working. Designed with your farm environment in mind. Simple, robust, reliable and flexible. Maximum up time – 100% correct packing – easy to maintain – all day – every day is the key to optimizing your business.



Automatic Tray Stacking

The STAALKAT Traystacker; a sturdy and reliable traystacker is integrated with a Farmpacker or a packing lane to stack the trays that have been filled by the packer.

The standard stack height is 6 trays. Stacks of two or four trays high are possible as an option. The STAALKAT Traystacker is mainly built from stainless steel. It has a very low sound level thanks to its design and quality. Moreover the design of the infeed lane and take-away conveyor prevents soiling.

Capacity:
1200 trays/hour = 36,000 eggs/hour (100 cases/hour).



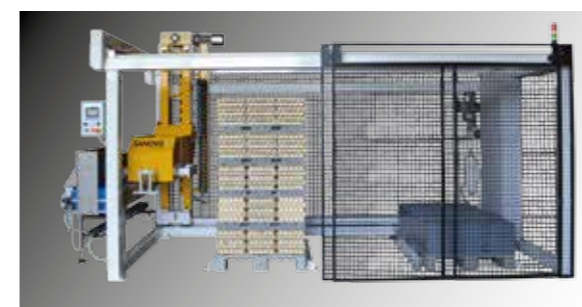


End-of-Line Automation & Robotics

Our product programme covers a complete range of machines designed to provide production facilities with a high degree of flexibility and efficiency.

All products pass an extensive test in our facilities before being shipped to customers located in every corner of the world.

New products are constantly being developed, and considerable emphasis has always been put on innovation and product functionality. An unflagging focus on R&D is the only way in which we can continue to design and supply total solutions for our customers.



MINI PALLETIZER

The SANOVO Mini Palletizer is a Cartesian robot able to palletize at a speed of 72.000 eggs/hour with plastic trays* or pulp trays. It can handle plastic or carton interlayers as well as plastic or wooden pallets within the most used dimension standards. The SANOVO Mini Palletizer can be installed downstream of a Farmpacker as well as a Grader,



CASE PACKER AND DISPLAY LOADER

With the SANOVO Case Packer we have increased the ability to pack different products in a wide range of containers installed in line with the grader. The SANOVO Case Packer is, at the same time, a display-loader, and it is able to insert consumer packs into cases, crates, display pallets or shippers.



PALLETIZER

The SANOVO Palletizer is an anthropomorphic robot capable of palletizing at a speed of up to 160,000 eggs/hour (444 cases/hour) with plastic trays, paper trays or both, while keeping the different products separate.

The system can handle plastic or carton dividers as well as plastic or wooden pallets of the most common dimensions. It picks up 4 stacks at a time of both paper and plastic trays* with a special head fork system. Paper tray stacks on full pallets can also be turned 90°. SANOVO Palletizer can be installed downstream a Farmpacker as well as a Grader.



DE-PALLETIZER

The SANOVO De-Palletizer is capable of de-palletizing at a speed of up to 180,000 eggs/hour (500 cases/hour) with plastic trays (Egg Cargo System).

The head handles trays, dividers and pallets. The system can be installed upstream with any kind of Grader loader. Solutions range from 1 to 2 stack loading conveyors and from 1 to 2 full pallet positions. The system includes a pallet aligner to ensure stable egg pallets.

Egg Loading

In most grading / packing companies and egg breaking plants, the production begins with loading of eggs. In order to run an efficient plant it is therefore absolutely vital to have efficient and stable loading of eggs.

SANOVO is specialized in supplying loading solutions for wet and dry conditions and in optimum handling of different types and qualities of eggs, whatever paper or plastic tray or combination is

used.

The SANOVO Loaders are available for capacities up to 201,600 eggs/hour (560 cases/hour).

All loaders are constructed by several symmetric modules, which can be put together in various layouts according to the layout requirements. Limitation in process plant layout is no longer an issue.



OPTILOADER PLUS SERIES

The SANOVO OptiLoader PLUS series is a completely new generation of egg loaders. Our target is increased capacity and system optimization.



NEW FEATURES ON THE PLUS SERIES

- Increased capacity
- New stack infeed system ensuring the most accurate alignment in the de-stacker module. Based on a dual-speed belt infeed
- New retaining system for stuck eggs
- New empty tray stack handling system ensuring more stable and gentle stacking of empty trays
- New vacuum system, improved suction, less energy consumption.
- Optimization of the drive system
- New CIP recycling system
- More layout variations possible due to flexible configurations and compact size

LOADING INTO EGG GRADERS

These PLUS features are available on the 12 and 18 row OptiLoaders and are also available in Combi-versions (In-line / Off-line) for the grading industry.

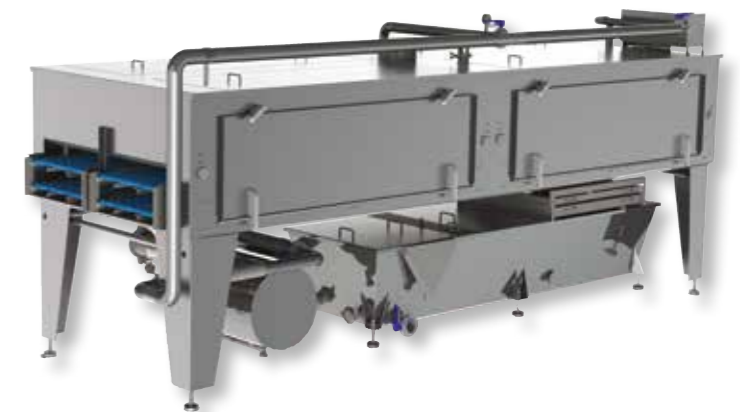
With the combi-versions, it is possible to operate with a number of rows on the infeed table to be filled from the accumulator and the rest by the loader. The special swing arm construction ensures a synchronized speed between the eggs in the suction cups and the spools on the roller infeed conveyor.



Egg Washing

The SANOVO Egg Washers are the result of an intensive project, analyzing new ideas for egg washing in combination with the knowhow of year-long experience in solving the challenges that our customers are faced with.

The egg washers are capable of working with all kinds of eggs (nest-runs, grader eggs, dirt, leakers, "mud balls", etc.) and are suitable in both in-line and off-line operations. No matter the conditions, the egg washers will always clean optimally with a minimum loss of eggs and low power and water consumption.





Egg Breaking

The SANOVO Egg Breaking and Separating Machine is the heart of any egg processing facility. Due to the high cost of eggs it is vital that every single egg is broken and drained completely. This may seem an easy job, but with the different sizes and qualities of eggs it requires highly specialised equipment.

A second requirement for today's manufacturer is separation of the yolk from the albumen. The demand for specialised egg products is increasing and the foundation for this is clean albumen and dry yolk.

SANOVO TECHNOLOGY GROUP is specialized in the process of breaking, draining and separating eggs, which allows us to supply a complete range of breaking and separation machines.

OPTILINE

The SANOVO OptiLine represents state-of-the-art machinery within loading, washing, breaking and separation machinery, incorporating all the latest and most advanced technologies. Traditionally, the focus has been on speed and capacity, but in an OptiLine all aspects of the production process have been optimised. The line is fully automatic, requiring no operators during production (except USA and Canada) and at production end cleaning is performed by the built-in CIP system.

Clean albumen and dry yolk are basic ingredients for supplying increasingly specialised and sophisticated products

of the highest quality. At the same time it is absolutely crucial to keep focus on costs by minimising product loss as much as possible, reduce maintenance and reduce or remove manual work. These are all parameters optimised in an OptiLine.

For egg breaking and separation of albumen from yolk, SANOVO TECHNOLOGY GROUP has developed three different groups of machines – the OptiBreaker, OptiBreaker Basic and the OptiBreaker Compact.

The **OptiBreaker** is designed for high capacity and high performance factories requiring the most advanced separation technology available.

The **OptiBreaker Basic** is designed for small and medium-sized operations and with the same high performance as the OptiBreakers. The OptiBreaker Basic is available in a basic version with a number of options available.

The **OptiBreaker Compact** is the right choice for small to medium volume factories producing whole egg or only separating small product quantities.

The OptiBreaker, OptiBreaker Basic and the OptiBreaker Compact share the same highly advanced in-feed technique and optimized breaking units ensuring a minimum quantity of whole egg and maximum yield.

OPTIBREAKER SERIES - BREAKING AND SEPARATION LINES

Breaker type	Cases / hour in line	Eggs / hour in line	Loader type	Cases / hour off line	Eggs / hour off line
OptiBreaker 6	185	66,600	FlexLoader 5-6	135	48,600
			OptiLoader 6	150	54,000
			JW 6	185	66,600
OptiBreaker 8	250	90,000	OptiLoader PLUS 12	250	90,000
			JW 8	250	90,000
OptiBreaker 12	375	135,000	OptiLoader PLUS 12	375	135,000
			JW 12	375	135,000
OptiBreaker PLUS 16	533	191,880	OptiLoader PLUS 18	533	191,880
OptiBreaker PLUS 18	600	216,500	OptiLoader PLUS 18	560	201,600

OPTIBREAKER BASIC SERIES - BREAKING AND SEPARATION LINES

Breaker type	Cases / hour in line	Eggs / hour in line	Loader type	Cases / hour off line	Eggs / hour off line
OptiBreaker Basic 2 ¹	60	21,600	Manual SL 30	Operator dependent	
OptiBreaker Basic 5	110	39,600	FlexLoader 5-6	110	39,600
			JW6	110	39,600
OptiBreaker Basic 6	135	47,520	FlexLoader 5-6	135	48,600
			JW6	135	48,600

OPTIBREAKER COMPACT SERIES

Breaker type	Cases / hour in line	Eggs / hour in line	Loader type	Cases / hour off line	Eggs / hour off line
OptiBreaker Compact 2	60	21,600	Manual SL 30	Operator dependent	
OptiBreaker Compact 6	185	66,600	FlexLoader 5-6	135	48,600
			OptiLoader 6	150	54,000
			JW6	185	66,600
OptiBreaker Compact 8	250	90,000	OptiLoader PLUS 12	250	90,000
			JW8	250	90,000
OptiBreaker Compact 12 ²	375	135,000	OptiLoader Plus 12	375	135,000
			JW12	375	135,000

1) OptiManagement system not available

2) No separation possible



SANOVO OptiBreaker



SANOVO OptiBreaker Basic



SANOVO OptiBreaker Compact

Liquid product handling

Pasteurization

After breaking the egg into whole egg or separating the yolk from the albumen, the egg must be filtered, cooled and if necessary mixed with salt or sugar to match the need of the end-user. In order to maintain a superior quality and secure a long shelf life it is vital to keep this process as clean and cool as possible.

With the patented automatic filter systems in combination with a specialized knowhow on plant design, SANOVO is able to supply installations which will meet the hygiene requirements of today as well as tomorrow.

SANOVO Pasteurizers are specially designed for the egg processing industry and are available with either plate and/or tubular heat exchangers. A gentle handling and accurate temperature control are two of the key elements that have been optimized in the pasteurizer to ensure highly efficient pasteurization and achieve a high-quality output.

The challenge of pasteurizing is first of all to achieve as long a shelf life as possible while at the same time maintaining the unique product properties of the egg and supplying the specialized products which will match the needs of your customers. The product properties must be



secured Irrespective of whether standard whole egg or specialized salted or sugared products are pasteurized.


From the wide selection of different modules we customize the pasteurizer to match your specific requirements with regard to the raw material fed to the pasteurizer and the requirements of your customer. The pasteurizers are available with capacities from 600 – 10,000 l/h in standard configurations. Lower and higher capacities are available on demand. All SANOVO pasteurizers are built in accordance with the EC rules or USDA or CFIA, depending on the country of destination.




STANDARD PASTEURIZATION




WAVE PASTEURIZATION




COLLECTION VATS
Receive the egg liquid, e.g. from the breaking machine




PRODUCT COOLING
Immediately after breaking and separation of the yolk, albumen and whole egg is cooled with ice water.




PUMPING SYSTEM
Pumping of egg liquid through the system



HOMOGENIZER
To avoid separation of the whole egg after pasteurization and to increase production time between cleanings.



AUTOMATIC FILTERS
Remove eggshells and other impurities from the egg liquid. The filters incorporate a patented self-cleaning system.



ENERGY RECOVERY
Reduces the energy required in a pasteurization plant to a minimum and increases the production time between cleanings at the same time, thus reducing the risk of cross contamination between raw and pasteurized product to zero.

Liquid product handling

Wave technology for extended shelf life



SANOVO WAVE TECHNOLOGY is the first real innovative system that can claim production of extended shelf life while products maintain their functional properties.

The SANOVO's patented WAVE TECHNOLOGY is a system that exposes the liquid egg to electric waves generated by a variable electric field. During this process, the molecules point in the same direction as

the electric field. The continuous reversion of the electric field generates kinetic energy which creates heating. This heating is created by intermolecular friction, stressing bacteria but not the functional properties.

The SANOVO WAVE TECHNOLOGY instantaneously transfers a tremendous quantity of energy in a fraction of a second. The energy is transferred to the entire product mass, offering uniform heating. As the product is heated directly by the kinetic energy, heating of the product is allowed to just below the coagulation point.

With the SANOVO WAVE TECHNOLOGY, bacterial inactivation is improved 10 times, compared with any other pasteurizers, without influencing the functional properties.

With the SANOVO WAVE TECHNOLOGY, the functional properties are improved by 20%, compared to results obtained with traditional pasteurizers.

Liquid product handling

Effective, small scale plant capable of producing pasteurized egg products of a quality equal to that of large processing facilities.

SANOVO TECHNOLOGY GROUP design and build processing solutions for some of the largest egg processing factories in the world. The pasteurization of egg products is energy consuming and require the staff to have special training. However with the SANOVO StreamLine it is now possible for small scale liquid plants to produce the same high quality of finished egg product as the large processing facilities. At the same time it only requires little training for the staff to operate the plant.

The SANOVO StreamLine is ideal for small producers like layer farms or grading/packing stations that want to further

process off grades into safe, convenient pasteurized egg products.

For existing egg processing plants the SANOVO StreamLine is ideal as a secondary line suitable for running special products like organic products or products with enzymes or additives.

- "Plug and Go" concept for fast and simple installation
- Small footprint
- Self cleaning, with built in CIP
- Connect to a SANOVO Breaker and Filling System



SANOVO StreamLine 1000-1



SANOVO StreamLine 1000-2



SANOVO StreamLine 200-1



Liquid product handling

Filling

After pasteurization it is essential that the liquid egg is filled into clean containers to ensure a long shelf life. The filling range is designed to meet the filling requirements of egg liquids (e.g. to prevent foaming) and covers different packaging needs, depending on customer requirements.

traditional, ultra-clean or aseptic. Both ultra-clean filling and aseptic filling will increase product shelf life.

Depending on type of filling method, filling can be either

- Plastic buckets 2-10 liters
- Bag-in-box systems 2-20 liters
- Container filling



Functional Ingredients & Tests

SANOVO PROCESS SOLUTIONS has made a partnership with DSM Food Specialties in 2009. SANOVO PROCESS SOLUTIONS supplies functional ingredients and tests to the egg processing industry; including enzymes and analyzing equipment.

Improved functionalities in egg products are very important factors in the world of egg processing. A lot can be achieved by using first-class raw materials and state-of-the-art processing equipment, but new inventions and the use of new processes and processing aids are the facts of today's egg processing business.

With SANOVO PROCESS SOLUTIONS and DSM Food Specialties you have access to extensive know-how about egg processing from the experts of both companies.

This partnership is focused on bringing leading-edge technologies to the market including extensive process support and innovative processing enzymes.

SANOVO PROCESS SOLUTIONS exclusively represents DSM Food Specialties to the egg processing market.



ENZYMES FOR MODIFIED EGG PRODUCTS

Enzyme modified yolk and whole egg also called heat stable egg yolk/whole egg is one of the fastest growing products in the egg industry. It is widely used in the mayonnaise and dressing industry. We can supply you with the required enzymes, technology and processing parameters to produce these products.



IMPROVEMENT OF WHIPPING PROPERTIES

A new process developed by SANOVO PROCESS SOLUTIONS A/S has proved that by modifying the phospholipids present in yolk-contaminated egg white with Maxapal® A2 to lyso-phospholipids it is possible to restore the foaming properties and the foam stability. This is also possible in egg white where fat and phospholipids have migrated into the egg white during storage.



SHELF LIFE EXTENSION

Shelf life is a key factor of pasteurized egg products. Now, SANOVO PROCESS SOLUTIONS together with DSM Food Specialties introduce DELVO Nis and DELVO Plus, a natural preservative to prolong the shelf life of liquid pasteurized egg products.



DESUGARING OF EGG PRODUCTS

Desugaring of egg products prior to spray drying prevents maillard reaction/brown color in egg white powder during drying and pasteurization. In addition, it keeps the protein solubility of whole egg powder high for a longer period of time during storage. We have the enzymes and technology available for fast and reliable desugaring of your egg products



RANGE OF PRODUCTS:

MAXAPAL A2, Phospholipase A2

MAXAPAL C10, Catalase

MAXAPAL GO4, Glucose Oxidase

X-PRESS A2 testkit for enzyme modified egg products

Delvo Nis, Nisin

Delvo Plus, Nisin

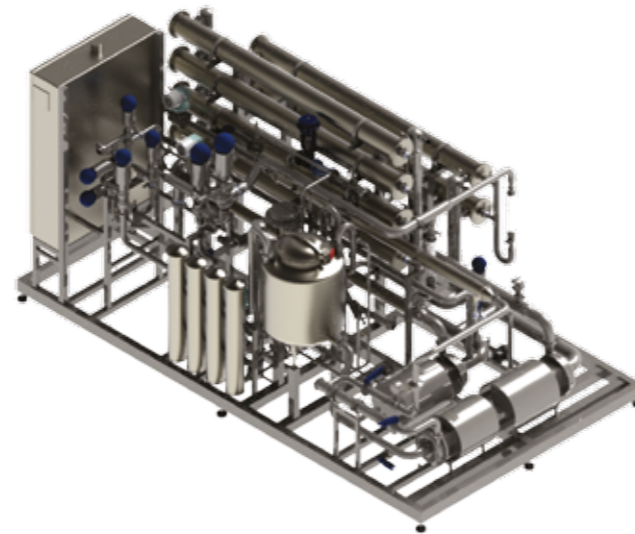
Egg white treatment

RO and UF

The principle of ultra filtration (UF) and reverse osmosis (RO) is a physical separation with the intention of increasing the dry matter content of the albumen prior to drying.

The extent to which dissolved solids, turbidity and microorganisms are separated is determined by the size of the pores in the membranes. Substances that are larger than the pores in the membranes are fully separated. Substances that are smaller than the pores of the membranes are partially separated, depending on the construction of a refuse layer on the membrane.

For albumen, the dry matter is increased from 10-12% up to 20-24%, thus reducing the load on the dryer to 50% compared to direct feeding of albumen into the dryer.



The total energy consumption of the dryer is reduced significantly or/and the total plant capacity can be increased.

SANOVO offers two different systems in order to meet the needs of our customers.

ULTRA FILTRATION

In Ultra Filtration, the albumen flows towards a membrane, allowing only water and some salt and sugar to pass. The entire process requires a working pressure of as little as 5-6 bars which means low energy consumption and a smaller investment in equipment compared to Reverse Osmosis.

REVERSE OSMOSIS

In the reverse osmosis process, the albumen is forced towards a membrane, allowing only water to pass without any product loss. This process requires a pressure of 20-30 bars with increased requirements to pumps and pipes and of course higher energy consumption.

Fermentation



Before drying, the sugar contents of the albumen must be controlled. This is done in a fermentation process where the sugar is removed by adding yeast, enzymes or culture. After removal of sugar, the fermentation process is stopped by cooling down the egg products.

Fermentation is a delicate process requiring product know-how as well as biological insight - SANOVO has both.

Spray Drying

The SANOVO Spray Drying Systems are designed for the production of powder from egg products and other similar food products and have been installed for use in a wide range of different industries. The SANOVO Spray Drying Systems has a capacity range of up to 2200 kg of water evaporation per hour.

Gentle-air spray drying conditions ensure that a high product quality is achieved. In the design, priority has been given to low energy consumption and ease of maintenance for a profitable and safe operation.

The horizontal spray drying principle results in a very compact design compared to other dryers with the same capacity. As such, they can often be installed

in an existing building. The Spray Drying Systems are available in various capacities and have been equipped with numerous types of custom-designed equipment.

A specially designed and easily cleanable heat recovery unit HRU makes considerable energy savings possible.

Additional energy savings can be achieved with the highly efficient indirect-fired SaNOx air heater. This system can be fired with gas or oil, but without any NOx contamination of the product.



OPTIONS

- SCADA control system
- Automatic opening and closing of nozzle valves
- Pre-heating of liquid in the feed line
- Sonic Horn for reduced powder build-up in the system
- Pneumatic powder conveying systems
- Powder silo's
- Semi- and fully automated packing systems
- Explosion membranes





Hard-Boiled Egg Processing



The SANOVO Hard-Boiled Egg Program handles capacities from 8,400 to 20,000 eggs/hour (25 to 55 cases/hour).

The design ensures a gentle cracking and peeling process which results in a high quality of de-shelled eggs. The system handles both white and the more difficult brown eggs.

- Boiler and peeler yield rate up to 98%
- Yolk centering system
- High cooling capacity
- Low energy consumption
- Optimal design for easy cleaning

NO-SCRATCH PEELING TECHNIQUE

The egg peeling concept is based on a no-scratch peeling technique. The peeler has been optimized to reduce the shell impact in the egg to nearly zero.

The peeler handles any type of eggs, brown or white, with a unique high yield rate > 98 %.

FOCUS ON ENERGY CONSUMPTION

Encapsulation of the egg boiler as well as automatic control of water level and temperature ensure low energy consumption.

Even with the low power consumption, a boiling process with a temperature of 97.5°C at 18 minutes is obtained for uniform boiling.

Tray Washing

The range of SANOVO Tray Washers offers de-stacking, washing, stacking and drying of plastic trays. The fully automatic process makes our tray washer the most labour-saving tray washer on the market.

The design of the machine is the most advanced design in the industry, offering high output and top-class washing performance.

By focusing heavily on reducing the number of staff required to operate the machinery, SANOVO has become the first company to develop a fully automatic spin dryer. This means that only one operator is required to handle the entire operation.



- Capacity from 6,500 plastic trays per hour
- Combining high output with washing performance
- Safe de-stacking of dirty trays
- Reducing operating costs
- Washing with power nozzles
- Stacking and counting prevents extra handling
- Bone-dry trays improve hygiene
- Monitored performance
- Labor-saving washer

Pallet Washing



With the extended use of plastic trays, plastic pallets and dividers in the industry, the SANOVO product program offers a wide range of pallets washers.

We offer automated solutions, handling transfer of trays and pallets/dividers from the loading area to the washing area and automatic packing of trays, dividers and pallets for return to the farms.

Eggshell Processing

Eggshell Dryer



The SANOVO Eggshell Dryers are available in various sizes and are specially made for large egg processing plants where depositing has become difficult and costly.

Drying of eggshells makes it possible to use the shells as a calcium fertilizer or as an ingredient in animal feed. When using the shells as animal feed, it is of great importance to have a controlled and secured decimation of the bacteria. The SANOVO SED range of Eggshell Dryers is specially designed for drying shells for animal feed. All drying temperatures are continuously measured and logged and the shells are kept at "pasteurization" temperature for a preset time.

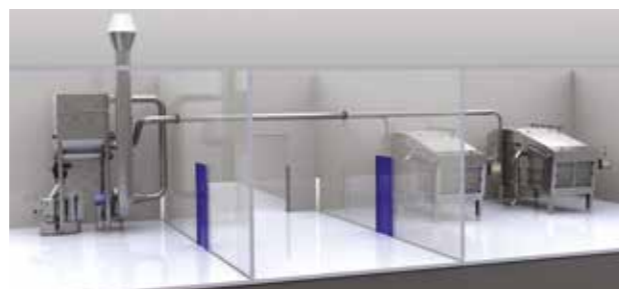
Conveying Systems



PNEUMATIC EGG SHELL CONVEYANCE

The system for conveying eggshells is available in various sizes and is custom-designed for different applications.

The pneumatic system is designed for conveying wet eggshells from an egg breaker, an eggshell centrifuge or an egg peeler, etc., or dried eggshells from an eggshell dryer to a centrifuge, a container or a silo.



VACUUM EGG SHELL CONVEYANCE

The system for conveying eggshells can be installed instead of screw conveyors in new installations or as a replacement for an existing screw conveyor system.

The vacuum system is typically used for conveying eggshells from multiple egg breaking machines to a centrifuge, a container or to another location.

Centrifuges

The SANOVO Eggshell Centrifuges, the SEC range, are developed for continuous centrifugation and reduction of the volume of eggshells coming from one or more egg breaking machines.

An inner sieve made of a perforated welded plate ensures efficient filtering of centrifuged egg liquid.

The following models are available:

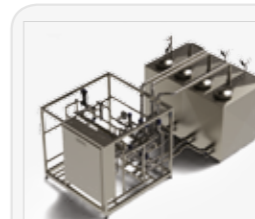
SEC 60	22,000 eggs/hour (60 cases/hour)
SEC 360	130,000 eggs/hour (360 cases/hour)
SEC 700D	252,000 eggs/hour (700 cases/hour)



CIP - Automatic Cleaning-in-Place

The SANOVO range of CIP plants is designed to meet the hygienic requirements of an egg processing factory. The SANOVO CIP program is highly flexible in terms of capacity, choice of chemicals and automation level which meets the requirements of the individual factory.

Three basic configurations are available



SANOMIDICIP

Designed for medium-sized plants, for semi-automatic or automatic control of the plant.

The construction with two or more tanks (lye, acid and water) allows a reduction of concentrates consumption.



SANOMINICIP

Designed for small-size plants for manual operation and filling into one tank. Standard execution foresees heating with tubular heat exchanger and the "Plug and GO" skid mount for easy installation.

It is available in two sizes: 10,000 l/h for traditional CIP and 40,000 l/h for cleaning of pneumatic eggshell conveyance systems.



SANOMAXICIP

Designed for fully automated plants for perfect cleaning of pipes and tanks and for completely automatic plant management.

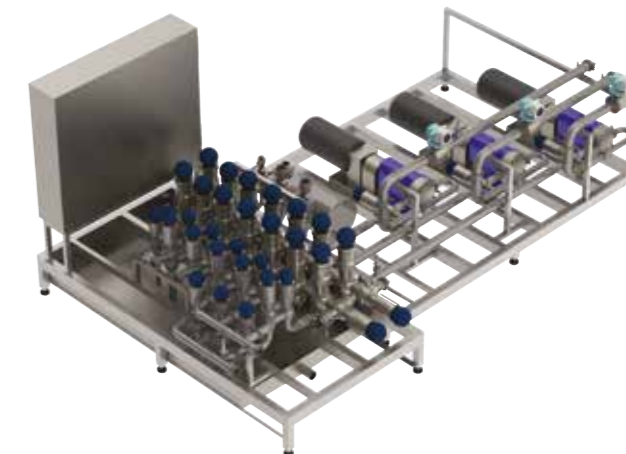
The SANOVO CCS (Computerized Control System) also controls all cleaning parameters and recipes.

Automation

Automation is not only a question of reducing manpower but relates just as much to increasing the product quality and safety in the production. In a modern egg processing plant, manual operation can be almost avoided by automating the time-consuming and central parts of the production.

SANOVO has extensive know-how in the automation process both in respect of the mechanical processes as well as using the latest technology for controlling and surveillance.

The egg processing plants of today are so complex that it requires a system which optimizes each individual machine in the production line, while at the same time ensuring optimum performance



of the entire plant. This may be obtained by a "Supervisory Control and Data Acquisition System", also known as a SCADA system. The SCADA system will provide access to key figures, flexible reports and complete control of the production process.

INTEGRATED PROCESS CONTROL

SANOVO offers a complete customer-designed PLC- and PC-based supervision system (SCADA) for monitoring, process control and registration of operational parameters.

The supervision system offers many advantages such as data logging and trouble shooting. The system stores the manual for each machine, including part lists and electrical drawings.

An automatic maintenance program can be implemented into the supervision system as well. The supervision system is provided with a user-friendly interface that, if required, can be integrated into an existing office automation system.

Service & Maintenance Programs



you have come to expect from SANOVO TECHNOLOGY GROUP equipment.

Equipment is a critical part of your business and downtime can be one of the most costly consequences of an equipment failure. It is SANOVO TECHNOLOGY GROUP's experience that most failures would be avoided if regularly scheduled equipment reviews were in place. It also is our experience that operating personnel often do not have the detailed knowledge necessary for detecting all potential or occurring failures.

With a SANOVO TECHNOLOGY GROUP service package, your equipment will be maintained with regularly scheduled proactive maintenance visits, ensuring reliability and extending the life cycle of the equipment. Such maintenance can enable us to detect potential failures at a preliminary stage and keep your systems dependable and trouble-free. Early detection can also limit the scope of possible damage, before a failure has developed. With first-class service from SANOVO TECHNOLOGY GROUP, unplanned shutdowns will be minimized.

Enjoy total peace of mind for the entire servicing of your equipment. When you choose the best equipment on the market, you should also choose the best service and support for your equipment. Only then can you be sure that your processes proceed smoothly, delivering the uptime

Spare parts

Nothing is better than the original. Spare parts from SANOVO TECHNOLOGY GROUP not only have the advantage of being able to be fitted quickly and easily – they also have a long service life and can be supplied many years after the machine was first purchased. An intelligent, global storage and logistics system makes it possible to operate with short delivery times. We stock more than 10,000 parts in our warehouse.

We have divided our spare parts into three different categories:

CRITICAL PARTS

Thinking of those unforeseen problems – a burnt-out motor, a failing gearbox, etc – that usually occur right in the middle of production and might lead to expensive downtime, SANOVO TECHNOLOGY GROUP has created a "First Aid stock" that contains the critical parts you might need in such an emergency.

WEAR AND TEAR PARTS

With a regular shipment or an express shipment you can plan your scheduled maintenance or rebuild, knowing that

the parts will arrive on time. All you need is a little time for planning.

SPECIAL PARTS

SANOVO TECHNOLOGY GROUP'S equipment is built to last, and we often receive requests for parts for very old equipment. We do not stock large quantities of special parts, so, in these cases, please allow for a little longer delivery time.



Training

For optimum operation of an egg factory and to be able to meet the requirements of end users, the staff must be educated and trained in egg processing. Reliable operation and proactive maintenance are essential for the effective manufacture of top quality egg products. Health and safety are also priorities in an industry with growing regulatory requirements, where governments, authorities and the consumer expect total product integrity.

As the only company in the world, SANOVO TECHNOLOGY GROUP has specialists working in all areas of the egg handling and processing business. A SANOVO TECHNOLOGY GROUP customer will have this extensive know-how placed at his disposal, securing him the best conditions for a successful egg business.

Within the SANOVO TECHNOLOGY GROUP, we offer specialized training in all areas of production as well as methods of product analysis, whether you run a small packing facility or face the challenge of producing specialized dried or pasteurized egg products.



A dedicated partner to the egg industry

Most eggs in the world - before they end up as a consumer product as shell egg or egg product - have been handled by a SANOVO TECHNOLOGY GROUP product. All products pass an extensive test in our facilities before being shipped to customers located in every corner of the world.

New products are constantly being developed; innovation and product functionality are always given priority.

Focus on research and development is a key Issue, allowing us to continue to design and supply total solutions for our customers.

Our products meet international requirements and standards, and, as a turnkey supplier, SANOVO TECHNOLOGY GROUP offers every aspect of the construction of an egg plant – from building design over layouts, engineering and installation to commissioning and training of local staff.

SANOVO TECHNOLOGY GROUP is a global organization, represented in all regions of the world. With our network, service and spare parts are always within easy reach.



www.sanovogroup.com

SANOVO TECHNOLOGY GROUP

5210 Odense - Denmark
TEL +45 66 16 28 32
info@sanovogroup.com

SANOVO TECHNOLOGY NETHERLANDS

7122 MP Aalten - The Netherlands
TEL +31 543 473 868
info@sanovogroup.com

SANOVO TECHNOLOGY USA

Plymouth, MI 48170
TEL +1 248 662 1030
usa@sanovogroup.com

SANOVO TECHNOLOGY JAPAN

Tokyo 166-0003
TEL +81 3 5378 8784
japan@sanovogroup.com

SANOVO TECHNOLOGY VOSTOK

127106 - Moscow
TEL +7 985 991 3230
vostok@sanovogroup.com

SANOVO TECHNOLOGY CHINA

Shanghai 200031
TEL +86 21 5403 9207
china@sanovogroup.com

SANOVO TECHNOLOGY ITALY

36030 Montecchio Precalcino
TEL +39 0445 334505
italy@sanovogroup.com

SANOVO TECHNOLOGY BRAZIL

18087-180 Sorocaba SP
TEL +55 (15) 3238 2921
brazil@sanovogroup.com

SANOVO TECHNOLOGY ARGENTINA

C1107AAP, Buenos Aires
TEL +54 11 4314 1032
argentina@sanovogroup.com

SANOVO TECHNOLOGY TAIWAN

80145, Kaohsiung City
TEL +886 9333 17710
taiwan@sanovogroup.com

SANOVO TECHNOLOGY MALAYSIA

48000, Kuala Lumpur
TEL +60 12 2556 718
malaysia@sanovogroup.com

SANOVO TECHNOLOGY MEXICO

Cuajimalpa 05000 México D.F
TEL + 52 55 8994 2585
mexico@sanovogroup.com

SANOVO PROCESS SOLUTION

5210 Odense - Denmark
TEL +45 66 16 28 32
process@sanovogroup.com

RAME-HART INC.

NJ 07869 Randolph - USA
TEL +1 973 335 0560
ramehart@sanovogroup.com