



# SEPARATION TECHNOLOGY MANUFACTURE OF PLANT-BASED MILK ALTERNATIVES

Better product quality. Higher yields. Master various raw materials.



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# PRODUCE FLEXIBLY GROW DYNAMICALLY

## Your technology partner for a dynamic market

Plant-based milk alternatives are in demand worldwide. With the rapidly increasing demand, expectations in terms of quality, flavor and economy are also growing. Manufacturers are faced with the challenge of efficiently processing a wide variety of raw materials such as soy, oats, almonds or peas on one process line, while achieving the highest levels of product yield and purity.

This can be made possible by production lines that respond flexibly to changing raw material qualities and recipes. This is an area in which Flottweg industrial centrifuges (decanter centrifuges and separators) and belt presses play a key role: Our customers use these for a wide variety of raw materials, such as pulses and legumes (soy, pea), cereals (oats, rice), nuts and seeds (coconut, almond, cashew).

**Systems from Flottweg, the world's leading manufacturer of industrial centrifuges, combine efficient solid/liquid separation with the effective dewatering of the fibers and/or solids – for a high product yield and stable processes.**

**The result:**

**Maximum yield, reliable processes and maximum flexibility – adapted to your requirements.**



# SUCCESS IS... WHEN IDEAS BECOME BUSINESS

Would you like to produce plant-based milk alternatives and plant-based drinks both efficiently and flexibly? Our experts will be happy to advise you – from the choice of the raw materials through to the optimum machine design. Benefit from our many years of experience gained from hundreds of customer projects worldwide. Depending on the raw materials and processing step, we offer the optimum machine or overall solution for your process:

- Flottweg decanter: For cereal, nut and pulses milk
- Flottweg Sedicanter®: For soy and finely ground raw materials
- Flottweg belt press for extraction (e.g. coconut milk) or dewatering (e.g. okara)
- Flottweg separators for clarification or degreasing

**With the technology from Flottweg you can make your product ideas for the following products and more into a reality**



#### **Legumes and pulses (rich in protein)**

- Soy drinks
- Pea drinks



#### **Nuts and seeds (aromatic, creamy)**

- Hemp drinks
- Almond drinks
- Macadamia drinks
- Cashew drinks



#### **Cereals and starch (mild, sweet)**

- Oat drinks
- Rice drinks
- Quinoa drinks



#### **Fruit pulp**

- Coconut milk





## The benefits of our key technology

### Flexible manufacture of oat milk, soy milk or nut milk on a single production line

- Industrial manufacture of soy milk or soy drink
- Manufacture of cereal milk or rice milk
- Manufacture of oat drink and oat milk
- Manufacture of almond milk or nut milk varieties

### Engineered For Your Success

- Constant and consistent quality of plant-based milk and/or plant-based drinks
- Flexible processing of changing products and recipes thanks to adjustable impeller and Simp Drive® technology
- Recipe control, intuitive operation and control thanks to Flottweg InGo HMI
- Easy integration into existing fully automatic processing lines and CIP processes
- Machines specially designed for the manufacture of plant-based drinks
- Wide range of different machine sizes, from approx. 0.5 to 20 m³/h

Flottweg is certified according to DIN EN ISO 9001:2015 and manufactures its products according to the latest technical standards.

**The use of Flottweg separators, decanters and belt presses in the production of plant-based drinks allows for a wide range of products with consistently high quality. Allow us to tell you all about the benefits of the latest separation technology, “Engineered For Your Success”!**





# STATE-OF-THE-ART SEPARATION TECHNOLOGY FOR SUCCESSFUL PLANT-BASED DRINKS

Plant-based drinks start their life as vegan, water-based extracts from plant-based raw materials such as soy, oats or almonds. Depending on the desired end product, vitamins, minerals, oils and flavors are then added to create a fully-fledged milk substitute, for instance.

The manufacture starts with the comminution and soaking of the raw materials. Enzymatic treatments improve extraction and have a positive influence on the texture. The mixture is then filtered, homogenized, heat-treated and processed further.

Centrifuges play a central role here: They efficiently separate the liquid extract from the solid phase – with a high clarification performance, maximum product yield and constantly high throughflow. The decanters, Sedicanter® and separators used work with high centrifugal forces (g-forces) to enable particularly effective dewatering.

Flottweg machines meet the highest hygiene standards, can be seamlessly integrated into automated process lines with CIP cleaning, and offer the maximum operational reliability. Thanks to intelligent drive technology (e.g. Simp Drive®), sophisticated hygiene design and intuitive user guidance (e.g. Flottweg InGo), you also benefit from

- high system availability
- ease of use
- low operating costs

... and the flexibility of the machines allows for different raw materials to be processed on a single line.

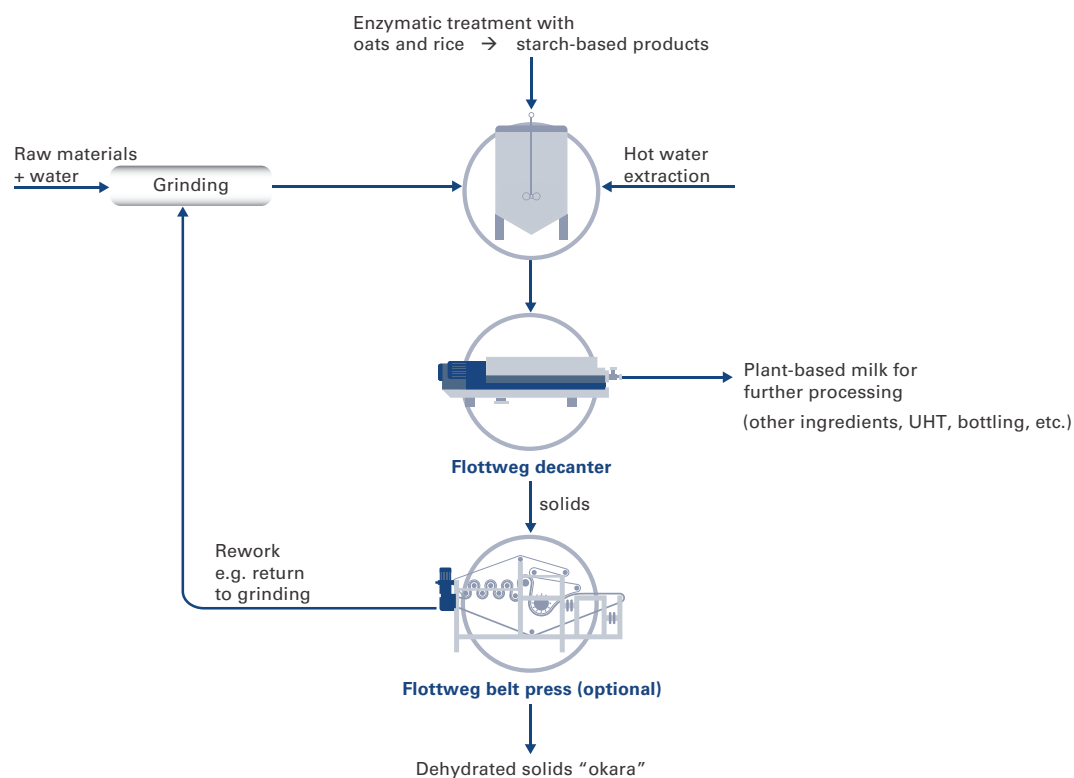
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## Flottweg enhances your value creation with these added values

- Higher yields from plant-based raw materials through efficient solid/liquid separation
- Targeted adjustment of the particle size for the perfect texture (mouthfeel) of the finished product
- Hygienic design for safe and automated CIP cleaning
- Energy savings during downstream drying processes thanks to optimum solids dewatering
- Tailor-made system solutions for improving yields, optimizing subprocesses and increasing the quality of your product
- Flexibility with changing raw materials and recipes
- Application tests on site or in the Flottweg laboratory and process center



# STANDARD EXTRACTION PROCESS FOR ALL RAW MATERIALS



Okara after the decanter: maximum yield thanks to the high dewatering of the solids.



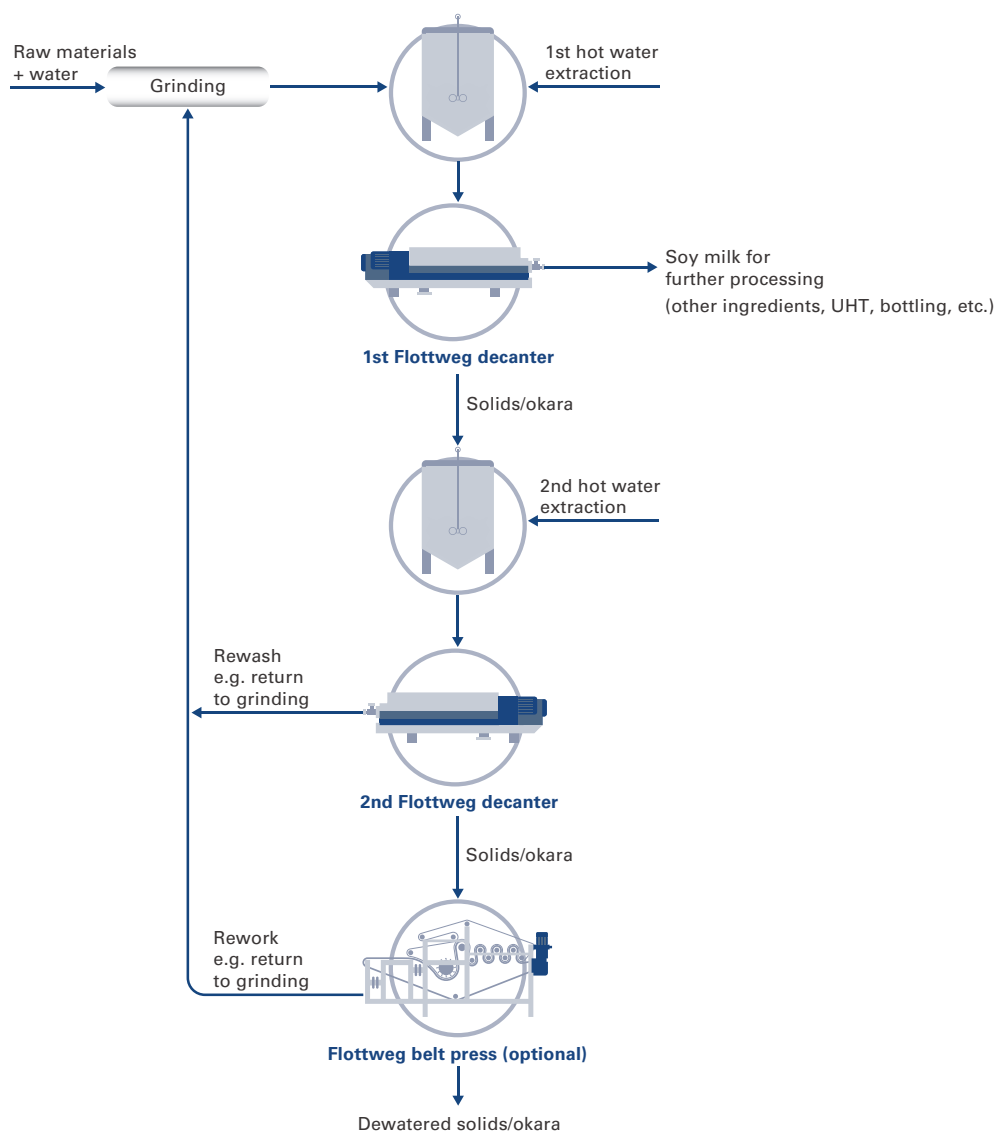
Oat milk before and after the centrifuge. Best product quality thanks to optimum separation.





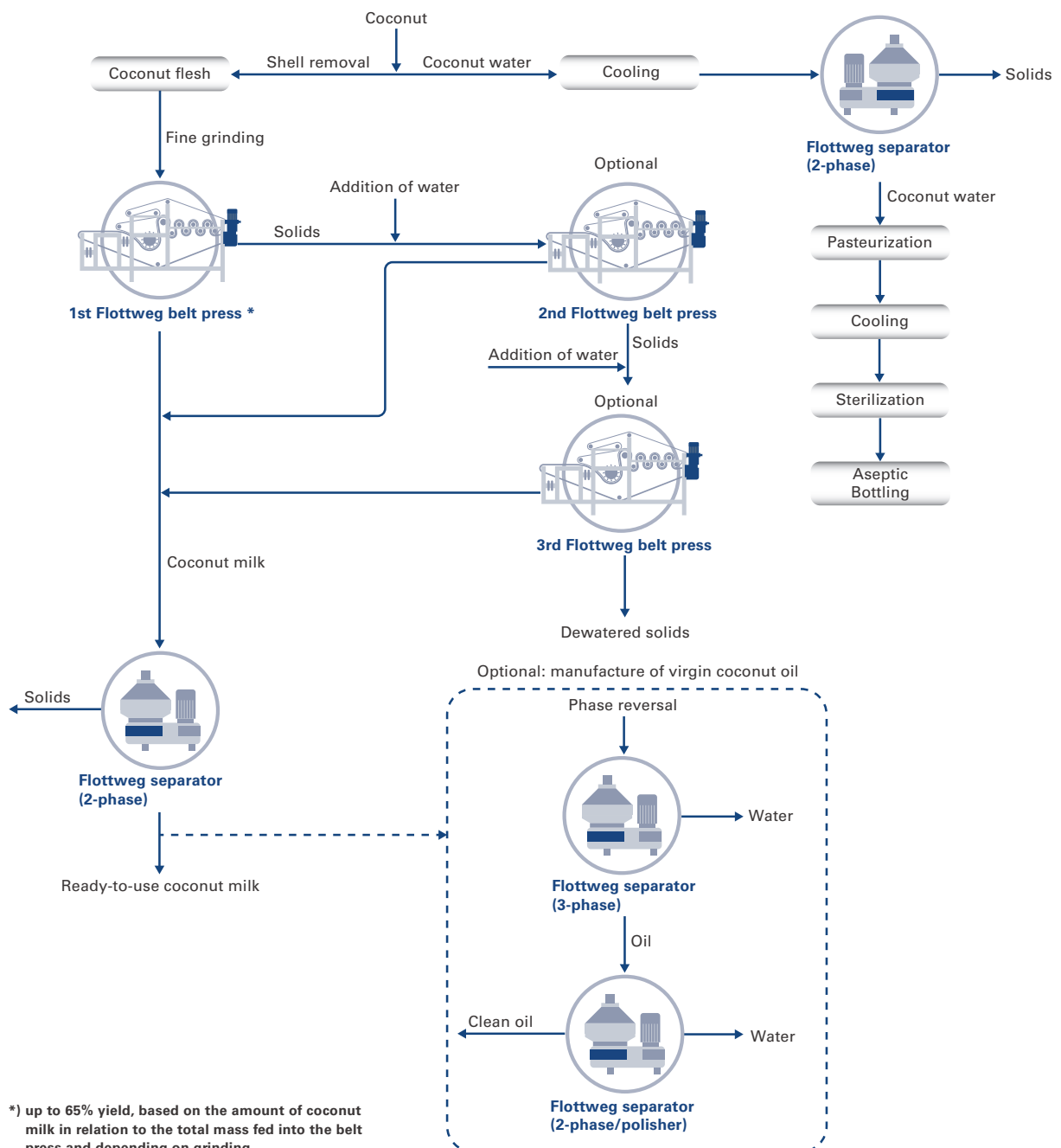
# EXTRACTION PROCESS FOR SOY MILK

## With second extraction stage





# COCONUT WATER, MILK AND OIL, EFFICIENTLY PROCESSED



\*) up to 65% yield, based on the amount of coconut milk in relation to the total mass fed into the belt press and depending on grinding



The procedure for processing the coconut starts with the opening and separation of the coconut water and coconut flesh. The coconut water is clarified immediately with the use of a Flottweg separator. It reliably removes solids and provides a clear liquid which is then pasteurized, cooled and aseptically bottled. At the same time as this, the coconut flesh is finely crushed following the husking. The grinding process is crucial as a fine comminution increases the surface area and therefore enables the best possible pressing and the maximum yield in the following process steps.

The coconut milk is obtained in up to three pressing stages with the Flottweg belt press. The first stage achieves a yield of up to 65% without the addition of more water, assuming an optimal grinding process of the coconut flesh and a suitable moisture content (yield = quantity of coconut milk based on the total mass fed to the belt press). With a second and third pressing/washing stage, additional coconut fat can be washed out and the amount of coconut milk (depending on the fat content in the end product) can be increased. The multi-stage pressing therefore achieves a maximum product yield, while the belt presses guarantee a gentle treatment of the product.

The finished coconut milk is then purified by using a Flottweg separator to reliably separate any remaining solids.

The industrial manufacture of VCO (virgin coconut oil) starts with the concentration of the fat content in the coconut milk. A phase reversal then takes place, in which the oil phase separates from the water phase. This enables separation of the coconut oil from the water phase using a 3-phase Flottweg separator. In the next step, the oil is refined to maximum purity with a further Flottweg separator so that the moisture content drops to only 0.1 – 0.2%. Finally, the finished oil is bottled – in natural form and ready for consumption.

All the machines used are designed for straightforward integration into existing lines and offer plug-and-play functionality. They feature high product yield, process safety and straightforward cleaning (CIP). Thanks to their modular design, subsequent adaptations, such as the processing of additional process flows or the increase in yield, can also be realized flexibly.

**In addition, Flottweg doesn't just operate as a supplier of individual machines, but also as a provider of complete processing lines. From the acceptance of the raw materials, to their comminution, pressing and separation, all the way through to the end product preparation – Flottweg offers tailor-made solutions from a single source that are perfectly aligned to the requirements of coconut processing.**



# **FLOTTWEG PRODUCT PORTFOLIO FOR THE MANUFACTURE OF PLANT-BASED MILK ALTERNATIVES**





### **Decanter centrifuge**

- Separates plant milk from solids with high g-force
- Adjustable impeller for flexible texture control
- Hygienic design, CIP-capable



### **Sedicanter®**

- Ideal for finely ground raw materials (e.g. soy)
- Efficiently separates soft, flowable solids
- Up to 10,000 x g for maximum yield



### **Belt press**

- Effective processing of fibrous mashes such as coconut fruit
- Dewateres residues before drying
- Saves thermal energy, increases dryer capacity
- Easy to use and clean



### **Separator**

- Clarifies liquid and separates oil
- Prevents oxidation and discoloration
- Soft Shot® FLEX for flexible processing and high yields

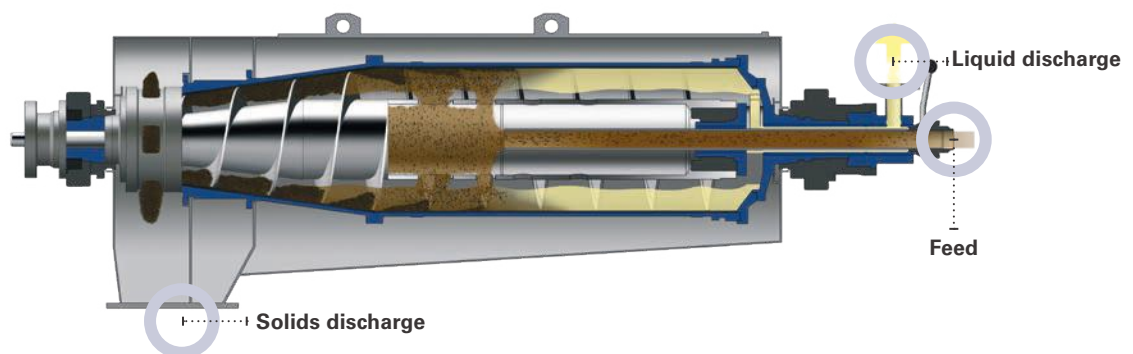


# PRINCIPLE OF THE FLOTTWEG DECANTER AND SEDICANTER®

## Flottweg decanter

Flottweg decanter centrifuges that are used for processing plant-based drinks are hygienically optimized in accordance with EHEDG guidelines and fully CIP-capable. Some plant fibers can become abrasive after extended operations. Flottweg therefore makes optional use of Stellite® wear protection on the scroll helix to ensure a long service life of the machine.

- Special CIP nozzles ensure effective cleaning of the critical areas
- The Flottweg Simp Drive® ensures the highest yield
- The gearboxes are installed outside the product area

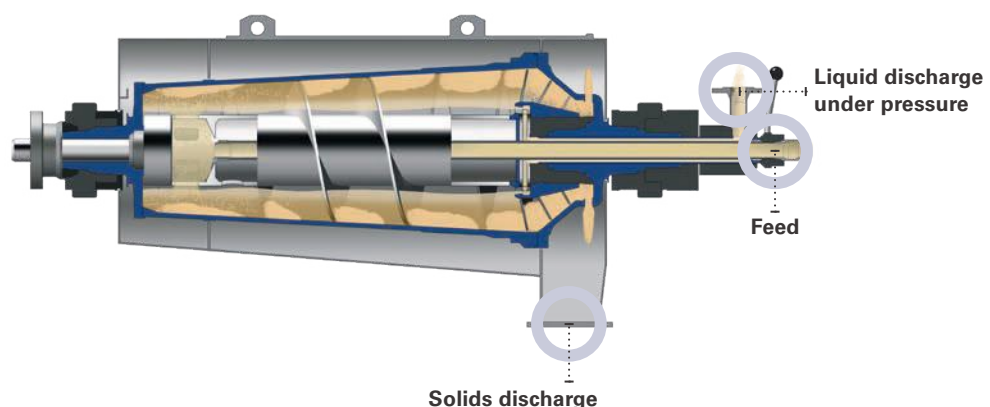


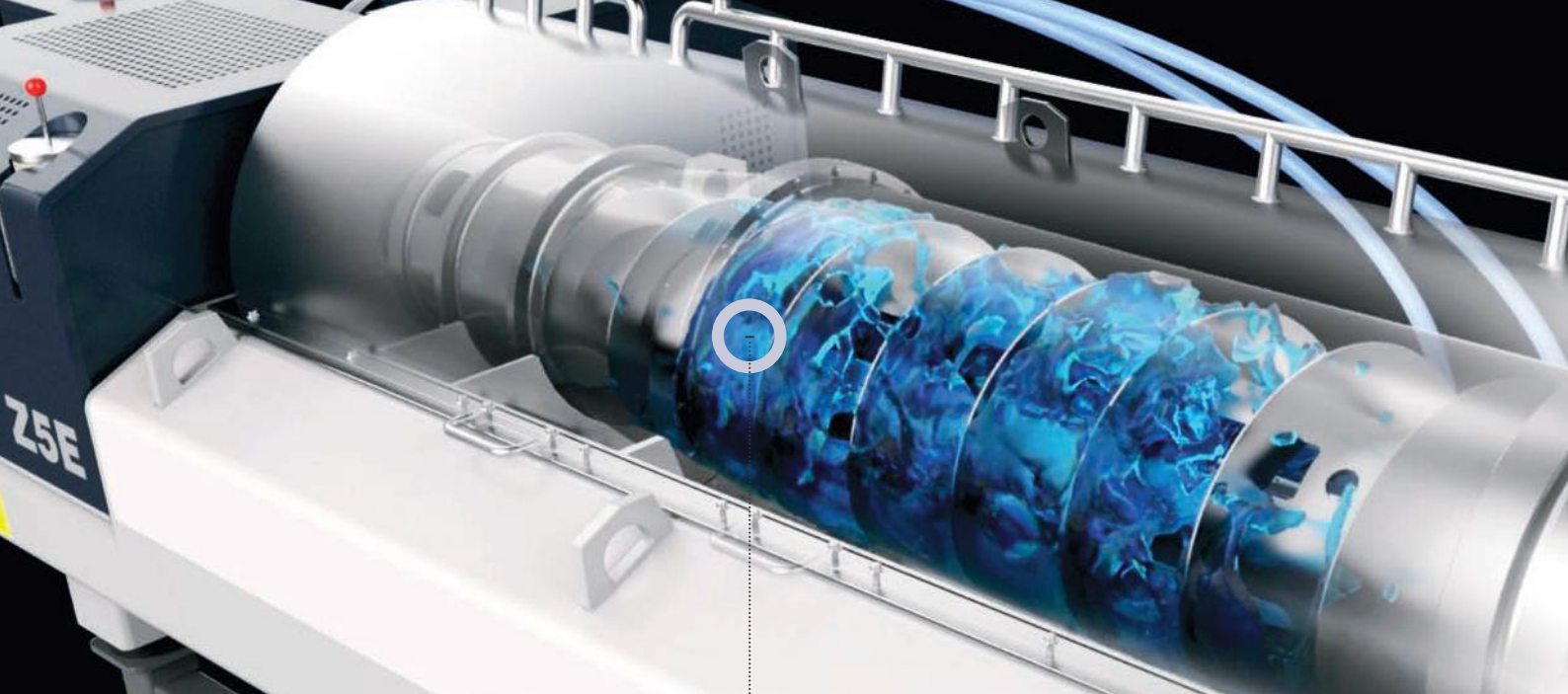
## Flottweg Sedicanter®

A standard decanter can only process soft and/or flowable solids such as vegetable proteins relatively poorly.

Flottweg Sedicanters® are suited to the manufacture of plant-based drinks for which the customer requires very fine grinding of the raw materials. In this context, the Sedicanter® combines the advantages of disk stack centrifuges

and decanter centrifuges. The Sedicanter® clarifies the suspension in a similar way to a separator, i.e. it provides an optimally clarified centrate. At the same time, like the decanter, it takes large quantities of solids at the feed inlet and produces dry solids (sediment) in the discharge. Even with fluctuating feed volumes, it achieves the best possible separation resolution thanks to its adjustable impeller.





### Material and hygienic design

- FDA certified sealing material
- All components that come into contact with the product are made of high-quality stainless steel
- CIP cleaning nozzles in all critical areas
- All components in contact with the product: Ra max. 0.8-1.6 µm
- Hygienically polished welded seams in the production space
- Hygienic wear protection (Stellite®): special hard stainless steel alloy that can be polished to a hygienic surface roughness
- All lubricants are suitable for use in the foodstuffs industry: NSF H1



### Flottweg Simp Drive®

Energy conserving and efficient: The Simp Drive® controls the differential speed between the decanter bowl and the scroll in accordance with the prevailing screw torque. The differential speed determines the retention time of the solid material in the bowl. It has a considerable influence on the separation process, and therefore on the yield of the plant-based liquid and/or the optimum dewatering of the solid.

- Maximum energy efficiency
- In-house development based on 25 years of experience, resulting in high availability
- Constant torque, including at high differential speeds, guaranteeing a high total dry solids content in the separated solids and/or a high liquid yield
- 100% integrable into existing CIP processes



### Adjustable impeller

An optimum yield requires high-precision adjustment in the fluid discharge. The Flottweg decanter and Sedicanter® with adjustable impeller allow for continuous adjustments, including during operations. This ensures a consistent separation efficiency, also under fluctuating process conditions. In addition, the impeller supports the CIP cleaning effect inside the machine.

- Maximum yield, also with product fluctuations
- Optimum cleaning effect
- Automated CIP cleaning
- Special impeller design prevents the foaming of the product
- Optionally automatable

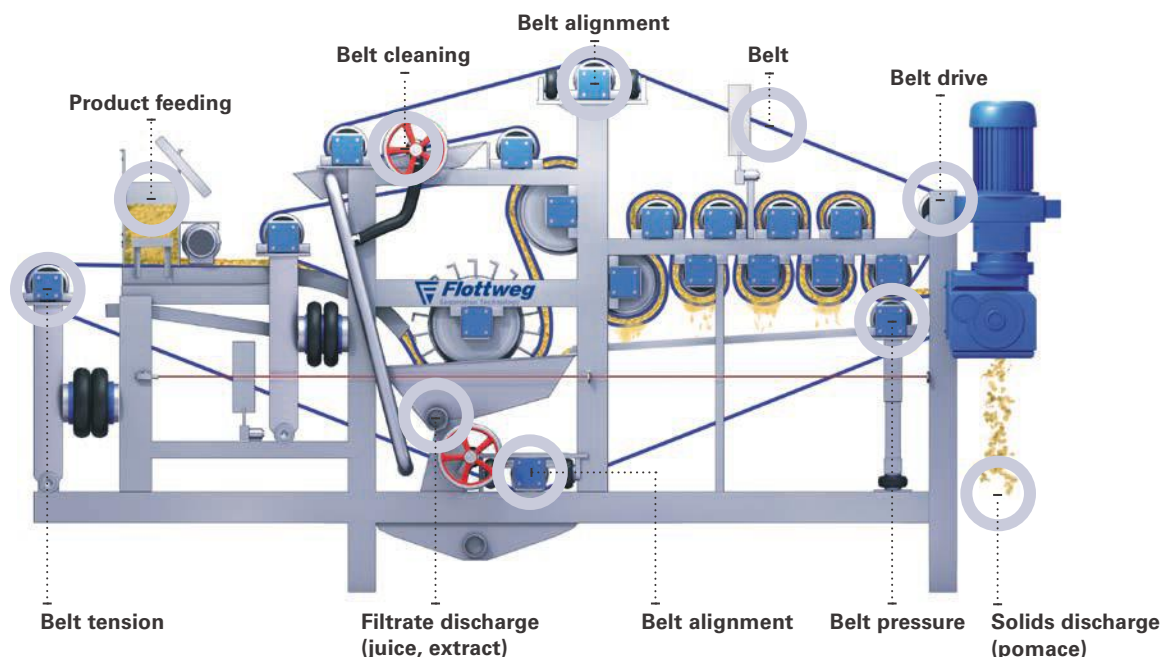




# PRINCIPLE OF THE FLOTTWEG BELT PRESSES

The entire design of the Flottweg belt press is configured for straightforward cleaning. No additional working platforms are necessary, and all areas are easily accessible and visible. This allows the cleaning to be checked by the operator at any time. Smooth and extensive surfaces in the filtrate area and the avoidance of inaccessible corners further support the cleaning effect. The consistent use of stainless steel and food-safe plastics enables the problem-free use of cleaning agents. Corresponding standards and certificates are available on request.

Belt presses process products with a high solids content in the feed-in. In the case of solid-liquid mixtures with the same density, very good separation results can be attained. The high yield is ensured by the targeted build-up of pressing and shearing forces. The continuous belt cleaning ensures optimum pressing conditions on a permanent basis.





### Extraction system for maximum yields

- Special design of the profile roller
- Optimized belt alignment for maximum shearing and dewatering
- 2-belt system
- Various pressing zones
- Special pressing nozzle design
- Adjustable feed-in



### Hygienic design

- Configuration in stainless steel
- All materials that come into contact with products are of food-grade quality
- Operation with expanded pneumatic system for belt tension and pressure (no hydraulic oil)
- Automatic CIP system
- Open design to ensure straightforward accessibility and visibility



### Low operating costs/efficient configuration

- Low operating workload thanks to automation (simple operating philosophy)
- Continuous belt cleaning during circulation
- Low replacement part use
- Low energy requirement (approx. 5.5 kW drive motor)
- Low service costs
- Durable design/long service life
- High throughflow/continuous operation

### Customer benefits of the Flottweg belt press at a glance

- Up to 20% higher yield than competitors
- Better product quality
- Product/process optimized configuration
- More production time due to less and easier cleaning work
- Reduced risk of microbiological contamination
- Low total cost of ownership (maintenance, operation, consumables ...)



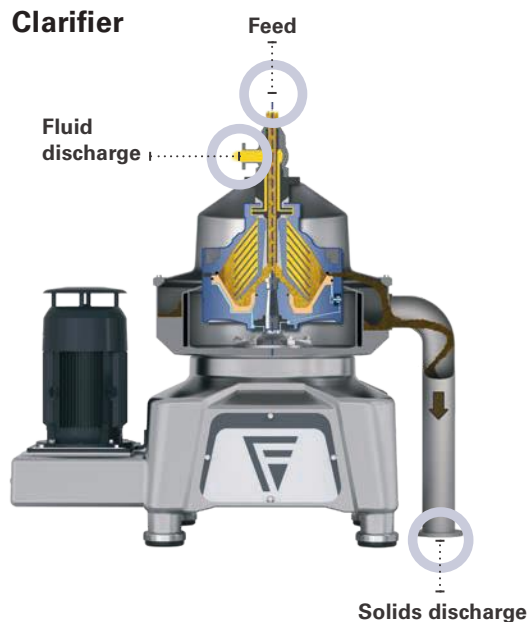




# PRINCIPLE OF THE FLOTTWEG SEPARATORS

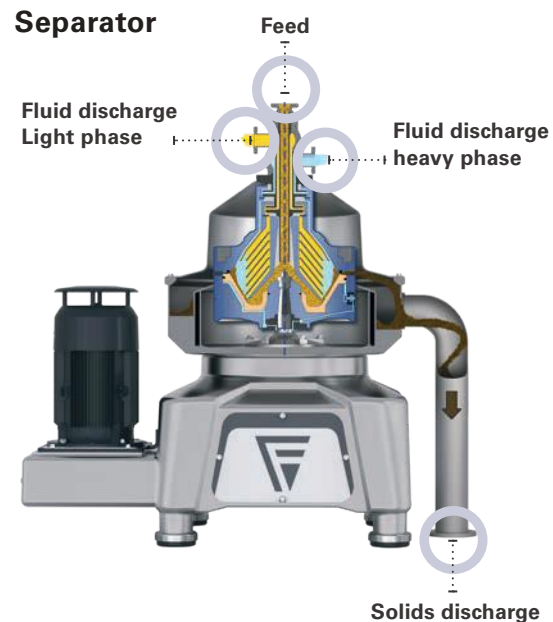
With their compact, robust design, Flottweg separators are characterized by their smooth running and ease of maintenance. The number of wear parts and seals is reduced to a minimum, reducing downtime and operating costs. The disk pack and the distributor ensure optimum flow behavior in the bowl. They enable a highly efficient solids separation and maximum separation resolution in the separation of liquid phases. The new SoftShot® FLEX discharge system ensures a high dry solids content in the discharged solid.

**Clarifier**



Flottweg clarification separator for the separation of solids

**Separator**



Flottweg separator for the separation of two insoluble liquids while simultaneously separating solids



## The Flottweg Longlife concept – durability for demanding processes

All Flottweg disk stack separators operate under extreme conditions due to their physical operating principle – high speeds, mechanical stress and continuous operation result in very high demands in terms of maintenance, wear resistance and availability.

This is exactly where the Flottweg Longlife concept steps in: It combines robust engineering, intelligent automation and maintenance-friendly design to create a solution that minimizes downtimes and maximizes the life of your machines.

### The Flottweg Longlife concept at a glance



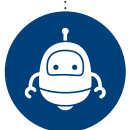
#### Bowl & discharge system

- “Made in Germany” – the central centrifuge components are of the highest quality
- Hydraulically damped Soft Shot® FLEX system for gentle, precise bowl discharge and long service life (with AC series)
- Contactless seals and minimum number of wearing parts for attractive operating costs
- Compact design for easy assembly/disassembly as a complete module



#### Drive unit

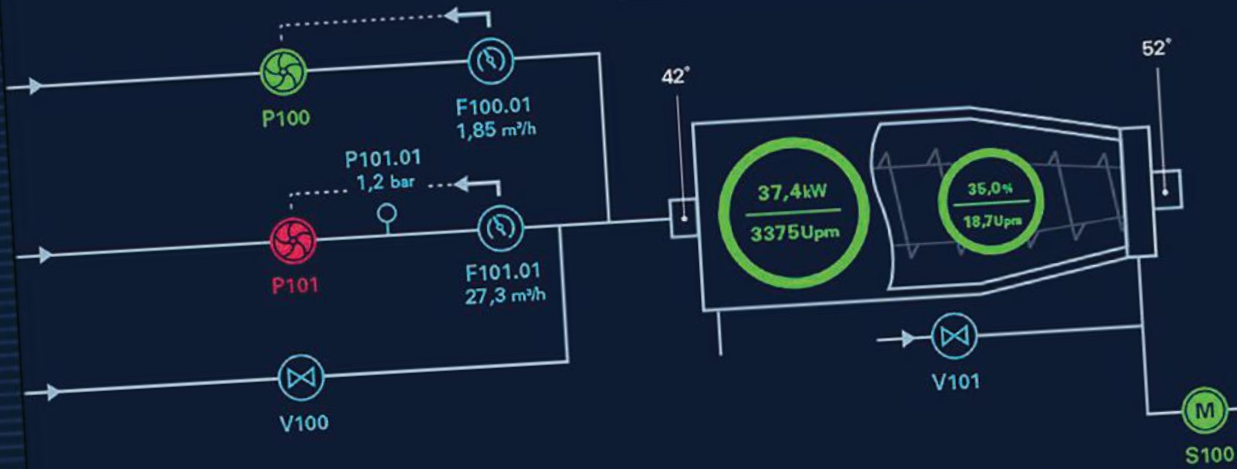
- Standard motors for high availability
- Closed lubrication circuit for long bearing life
- Maintenance-friendly compact spindle unit
- Low-vibration, quiet operation thanks to robust belt drive



#### Automation & monitoring

- Flottweg touch control for continuous monitoring of speed, vibration and temperature
- Early detection of abnormalities to avoid downtimes
- Advanced condition monitoring with the Motice Condition Monitoring system





# RELIABLE PROCESSES, LOWER COSTS

## INto the system and GO: Flottweg InGo user interface for easy control

Each Flottweg centrifuge is equipped with a pre-installed and factory-tested control package including the InGo operating concept. The Flottweg automation package offers you the following benefits:

- High process reliability combined with low costs thanks to an intuitive operating concept
- High functional reliability thanks to climate-controlled control cabinets for safe operation under extreme conditions such as heat, dust and moisture
- Worldwide support is possible thanks to the integrated remote maintenance system: direct, secure VPN connection to all network participants of the Flottweg control system (PLC, VFD, HMI, etc.)
- Simple data connection of the Flottweg control system to customer PLC or SCADA systems via individual protocols (Profibus, Profinet, Ethernet IP, Modbus, UPC-UA)
- Optional: Control of customer units (pumps, valves, etc.)



The modern machine control combined with the InGo operating system enables a fully automatic interplay between the individual process and system components. Users can see the operating state at a glance – including in poor lighting conditions or outdoors. The control system also meets the highest standards in terms of operational and machine safety. This ensures high process availability, including when FW control components are integrated into the customer's control system.

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### **With InGo ...**

- **you always have a complete overview and full control over all process components**
- **you save time and costs when operating the system**
- **you operate the centrifuge intuitively, as InGo is based on the established concepts of smartphones and PCs**
- **user acceptance is guaranteed – without the need for extensive training**
- **you always retain control over all process parameters**



# FLOTTWEG QUALITY AND SERVICE



## Guaranteed Flottweg quality

Typical “Made in Germany”: we have a clear understanding of what quality is and do not compromise on it. In the food industry, our products must comply with high standards of hygiene. Therefore, the Flottweg centrifuge components that come into direct contact with the medium to be processed (e.g. bowl, scroll, and feed) are made exclusively of high-grade, rust and acid-resistant stainless steels. This also makes it possible to increase the strength and improve the resistance.

Our machines are equipped to meet your requirements permanently – in extreme cases 24 hours a day, 7 days a week. Our strict quality controls (ISO 9001:2015) and the traceability of all critical components ensure additional product safety.



## Our service – always there for you!

Over 1,100 employees worldwide in a network of more than 60 sales and service locations are available to assist you. We not only strive for first-class advice on the selection and design of our systems, but we are also there for you afterward, whenever you need us – in more than 100 countries around the world.



## Success can be planned. In just three steps.

Are you planning your own success story for your products?

Then get in touch with Flottweg and benefit from our 3-step roadmap:

# 01

We discuss your separation task and business goals with you.

# 02

In the pre-engineering stage, we analyze your raw materials in our laboratory and carry out customized tests at the Flottweg Technical Center or on site at your business premises. The first product samples can also be provided at this point.

# 03

After the design and detailed development process, you will receive a concrete offer including all relevant line figures for your individual Flottweg application.

Make Flottweg the engineer of your success:

Our sales partners are looking forward to hearing about your ideas and challenges!



## Flottweg worldwide

To be able to serve our customers worldwide, we maintain an international sales and service network: we are represented in over 100 countries. All branches and representatives have specially trained service technicians, some of whom we train in our in-house Flottweg Academy.

**11**  
international  
subsidiaries

Projects in over  
**100**  
countries

Over  
**50**  
service centers

- – Headquarters
- – Subsidiary
- – Representative





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