



FLOTTWEG CENTRIFUGE TECHNOLOGY FOR THE EXTRACTION OF AVOCADO OIL

Satisfying Customer Needs by Using
High Quality Separation Technology



FLOTTWEG TECHNOLOGY FOR THE PRODUCTION OF AVOCADO OIL

Efficient Centrifuge Technology Made by Flottweg

Not so long ago, an avocado was an indicator of luxury and well-being, nowadays this view has changed due to a widespread use and purpose of this green fruit with the highest fat content of all known fruit and vegetable varieties. Today, the avocado is often used as a raw material for pharmaceutical or cosmetic purposes, or even for cooking as a natural cooking oil.

These arguments show that avocado is becoming increasingly important for modern industries. The production of avocado oil is similar to the production of olive oil where Flottweg Technology is the benchmark and convinces customers all over the world with its outstanding performance.

FLOTTWEG TECHNOLOGY FOR THE EXTRACTION OF AVOCADO OIL

- Tricanter® for three-phase separation of avocado oil, fruit flesh and water
- Separator for purifying avocado oil

PROCESSING AVOCADO OIL USING THE FLOTTWEG TRICANTER® AND SEPARATOR

The Tricanter® separates the avocado pulp into the fruit pulp, oil and water phases (more about the process itself on page 3). Then, the separator purifies the oil phase and removes ultrafine impurities. This process is gentle to the product and is appropriate for producing the highest grade of avocado oil. Processing with Flottweg Separation Technology results in a high oil yield and clear avocado oil, in other words: in highest possible yield and customer satisfaction.

THE FLOTTWEG SEPARATOR WITH SOFT SHOT® DISCHARGE SYSTEM

The Flottweg Separator is available in the following configurations:

- Clarifier: for continuous separation of solids from liquids
- Clarifier with hydrohermetic system: For clarification of products that are susceptible to oxidation
- Purifier: for separation of three-phase mixtures comprising two immiscible liquid phases and one solid phase



The Flottweg Tricanter® and its customer benefits

- Highest possible purity of the liquids to be separated by using the impeller
- Experience of more than 40 years enables maximum continuity, versatility and performance
- Other processing / separating stages can be dispensed with, or are no longer required, thereby offering cost savings for the plant owner
- Adaptation to changing conditions (product in the feed) possible at any time
- Automation is possible
- Developed and manufactured in Germany, for the highest possible production quality

The Flottweg Soft Shot® discharge system and its advantages

- Solid discharge operations that make hardly any noise
- Precise partial or full discharges in any combination for maximum product yield
- Reduced wear on the highly loaded components
- Reduced number of bowl seals
- Meet an extremely wide range of customers' requirements because of variable control of the separator



FLOTTWEG TECHNOLOGY FOR PROCESSING AVOCADO

The Process of Obtaining High-Quality Avocado Oil

WASHING AND CRUSHING

After being harvested, avocados are cleaned properly to remove leaves, soil and other impurities, which in turn makes it possible to obtain a high-quality oil in the end of the process. After cleaning, a mash is produced by crushing the avocados together with the avocado stones. Whether you're processing entire avocados or depitted ones, Flottweg Centrifuges provide the optimum separation performance.

MALAXING

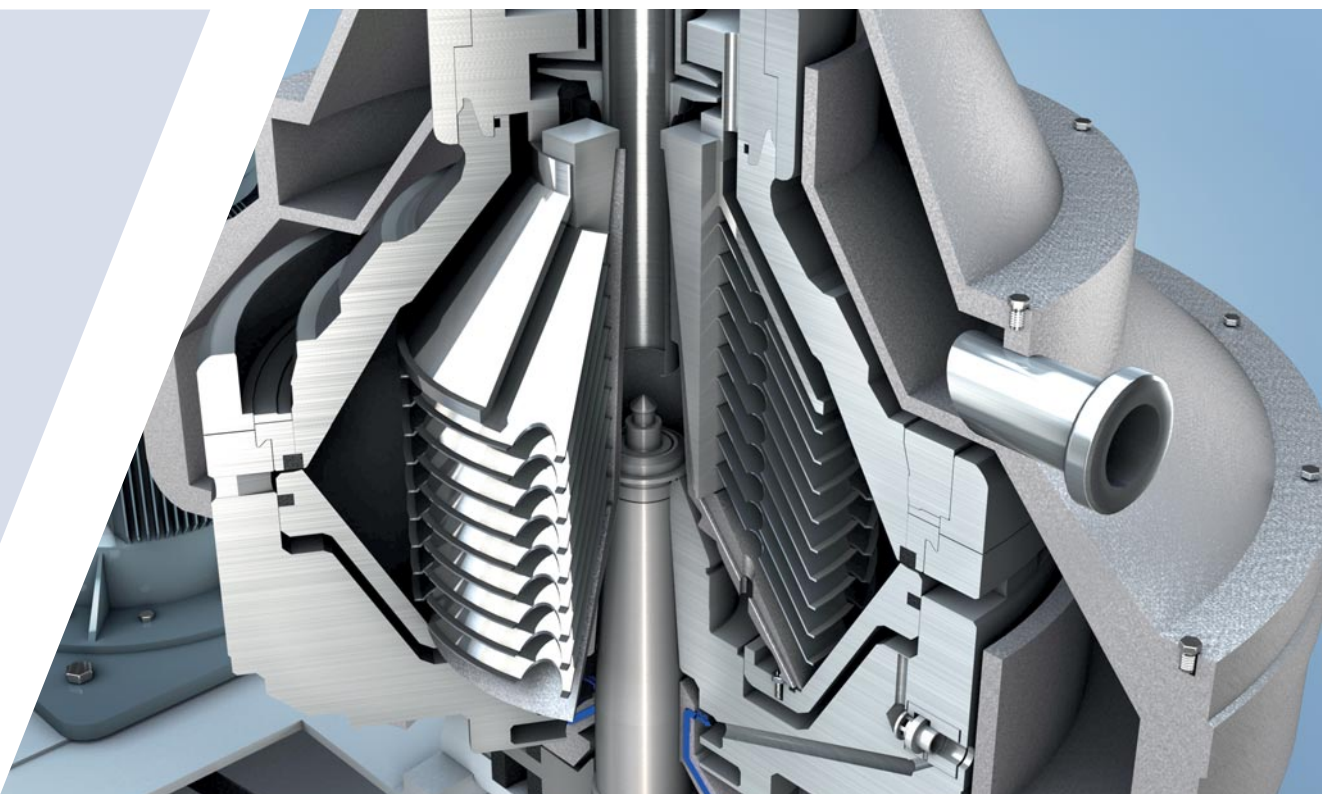
The produced mash is conveyed to the malaxer or kneading mill. Through malaxing, the oil is released from the oil cells by which it is encapsulated. Moreover, the malaxing procedure is critical for oil yield and oil quality.

SEPARATION

After malaxing, the mash is pumped to a Flottweg Decanter/Tricanter® (2-phase/3-phase) for separation. As a result, the mash is separated into oil, fruit water and solids (3-phase). Additionally, dilution water is added to the feed, in order to fluidize the mash. In contrast to the 3-phase process, in the 2-phase process using a Flottweg Decanter, the mash is separated into oil as liquid phase and solid phase (pomace). The 2-phase process requires neither or a minimum amount of dilution water to the feed, depending on the moisture content of the raw material.



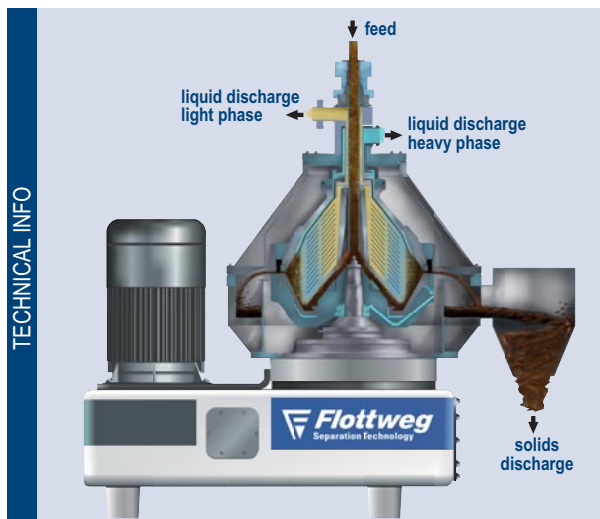
Flottweg Separator
AC 1500 for obtaining
high-quality avocado oil



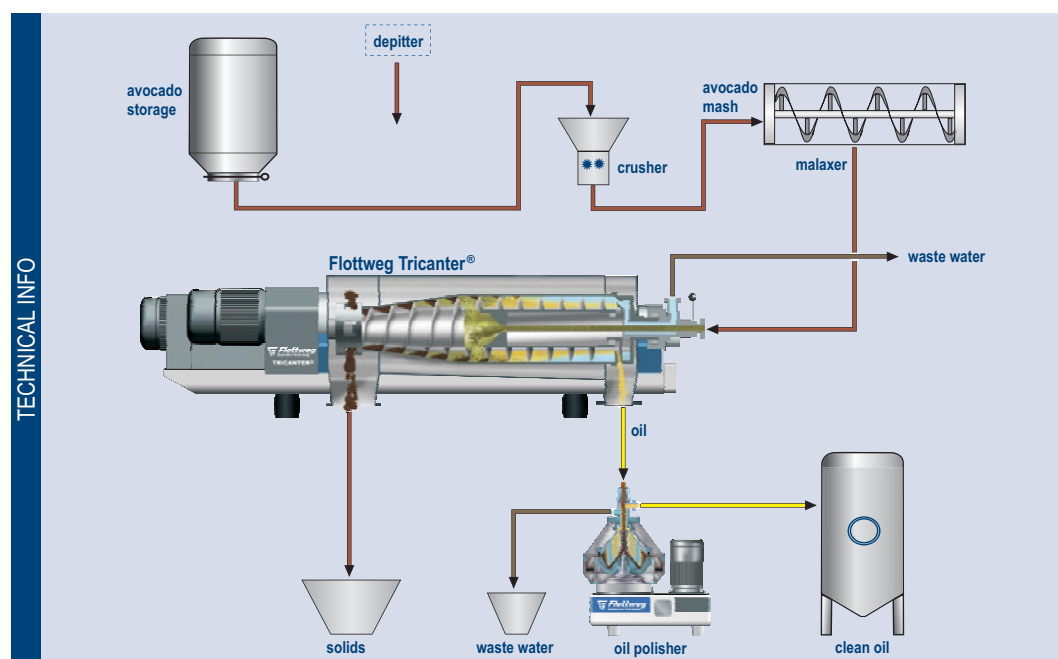
PURIFICATION

The oil coming from a Flottweg Decanter/Tricanter®, is then polished via a Flottweg Separator and represents the final step of the process. This enables to separate the oil from any residual solids and water applying a significantly higher g-force than a decanter/Tricanter®, so that high-quality avocado oil results.

The decision whether to apply 2- or 3-phase processing depends on local as well as on individual circumstances. However, Flottweg provides competent support to achieve the best possible performance.



Flottweg Separator for the separation of two immiscible liquids with simultaneous separation of solids



The process of getting high-quality avocado oil



OPERATING PRINCIPLE 2-PHASE

The Flottweg Decanter

FEED

The product is fed through a stationary pipe into the feed zone located in the center of the rotating assembly. The product is then accelerated circumferentially and delivered through ports in the scroll into the bowl.



SCROLL

The scroll rotates with a slightly different speed than the bowl and conveys the separated solids towards the conical end of the bowl. This differential speed determines the residence time of the solids in the bowl. Residence time is a critical factor for cake dryness. It can be automatically adjusted by changing the differential speed of the scroll thus providing optimal separation. Depending on the physical properties of the product, Flottweg Decanters can be supplied with a different scroll design or by modifying an existing scroll. Scroll pitch and single or multiple lead configurations are important design variables.



BOWL

The bowl has a cylindrical and conical section. The rotational speed is pre-set optimally to the application and requirements. The slurry rotates with the bowl at the operating speed and forms a concentric layer on the bowl wall. The solids contained in the product are packed against the bowl wall by centrifugal force. The length of the cylindrical bowl section and the cone angle are selected to meet the specific requirements of an application.

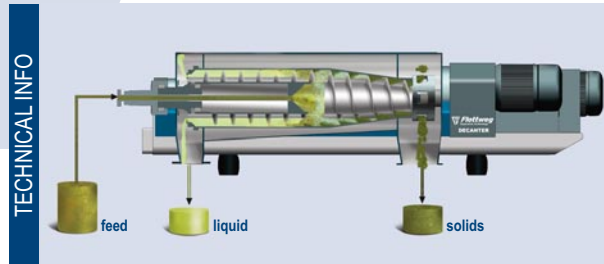
SOLIDS DISCHARGE

Settled solids are ejected through ports at the conical end of the bowl into the solids housing and fall vertically through the discharge chute.



OVERFLOW WEIRS

The clarified liquids flow to the cylindrical end of the bowl where they exit over weir plates. Easily adjustable weir plates allow for precise adjustment of the pond depth in the bowl. The liquid overflow is then collected in a centrate chamber and discharged by gravity.



Flow of liquids and solids in a Flottweg Decanter

TECHNICAL INFO

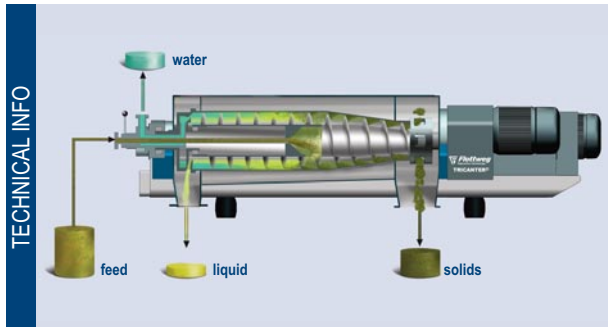
The picture shows a decanter scroll

OPERATING PRINCIPLE 3-PHASE

The Flottweg Tricanter®

The Flottweg Tricanter® performs a three-phase separation, i.e. the simultaneous separation of two immiscible liquids with different densities and one solid phase, provided that the solid phase is the heaviest

phase. The main difference from a decanter is the separate discharge of the two liquid phases.



Flow of liquids and solids in a Flottweg Tricanter®



Customer benefits of the variable impeller

- Immediate adjustment of the pond depth and liquid-liquid separation zone
▶ optimum results
- Savings in costs due to the needlessness of a separate chamber pump
- Easy reading of the variable impeller scale ▶ ease of adjustment

NO MATTER IF FEED CONCENTRATION VARIES

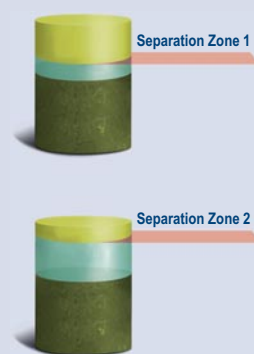
The Flottweg Tricanter® discharges the heavy liquid through an adjustable impeller under pressure and the light phase by gravity. The variable impeller allows for precise on-the-fly adjustment of the pond

depth and liquid-liquid separation zone. This optimizes the purity of the liquids and may eliminate downstream equipment.



Feed and discharge devices with control lever for the adjustable impeller of the Flottweg Tricanter®

TECHNICAL INFO



No matter if feed concentration varies: Best separation results with the Flottweg Tricanter® System

FLOTTWEG PRODUCT FEATURES

Customer Benefits by Using Flottweg Equipment



SIMP DRIVE®: SIMPLE, INTELLIGENT, MODULAR AND POWERFUL

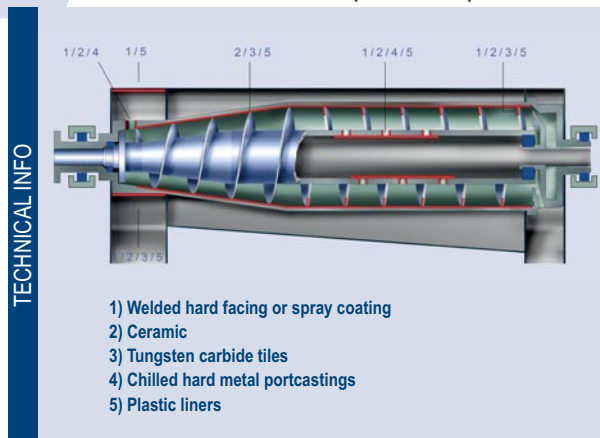
The Simp Drive® regulates the differential speed between the decanter bowl and scroll depending on the prevailing scroll torque. The differential speed determines the dwell time the solids remain in the bowl, and thus has a significant influence on the separation performance. The bowl speed and differential speed can be adjusted independently of one another during ongoing operation. This is provided by the special transmission mechanism of the Simp Drive® (special planetary epicyclic gear unit).



WEAR PROTECTION

An optimum wear protection is crucial when using a decanter or Tri-canter® for many applications. All wear parts are protected by special hard surfaces utilizing tungsten carbide or SIC, as well as replaceable wear bushings. Under operating conditions, the Flottweg Wear Protection lasts more than 15,000 operating hours (depending on applications).

Replaceable wear protection elements



TECHNICAL INFO

Customer benefits of the Flottweg Simp Drive®

- High flexibility in selection of the operating speed (differential speed can also be perfectly adjusted)
- High throughput performance due to high bowl speed and precisely adjusted differential speed
- Simp Drive® for a broad range of applications in which continuous adaptation of the operating parameters is required
- Lower energy requirements than conventional gear units due to higher efficiency (cost-saving)
- Machine can be cleared out even at no bowl rotation, because the scroll can nevertheless still be turned (no need to dismantle system components)

Customer benefits of the Flottweg Wear Protection

- Increased temperature resistance
- Improved corrosion resistance
- High hardness and protection
- Enhanced surface characteristics
- Improved durability of the decanter
- Increased consistency and reliability of the process



LUBRICATION

Various customer requirements demand different lubrication systems, to ensure a long service life and problem-free processes in Flottweg Decanter Centrifuges. Maintenance overhead (operating modes such as continuous operation, seasonal use, etc.) determines the selection of a lubrication system. The availability of the different lubrication systems also depends on the centrifuge model. Regardless these requirements, Flottweg provides unique customer benefits by offering different lubrication systems. These systems are listed below and are the following:

- Manual grease lubrication
- Central lubrication systems
- Automatic grease lubrication system
- Automatic oil/air lubrication system

Customer benefits of the Flottweg Lubrication

- Lowest maintenance cost, since the grease gun can be used for multiple decanters (manual grease lubrication)
- Cost savings and environmental protection with optimum correct doses (central lubrication)
- Continual monitoring of the fill level (automatic grease lubrication)
- Always fresh oil and air at the lubrication points (oil/air lubrication)



The picture shows a replaceable bushing

FLOTTWEG SEPARATION TECHNOLOGY – ENGINEERED FOR YOUR SUCCESS

Flottweg has been developing and producing centrifuges for more than 60 years including more than 40 years of successfully providing high-end machinery for the recovery of oil. Flottweg convinces customers all over the world with an unique experience as well as an outstanding expertise, especially when it comes to applying and using separation technology for the purpose of processing avocado.

Even more, by using Flottweg Systems and Equipment, customers receive significant and unique benefits in comparison to other providers of mechanical separation equipment or systems.

The Flottweg benefits for the processing of avocado

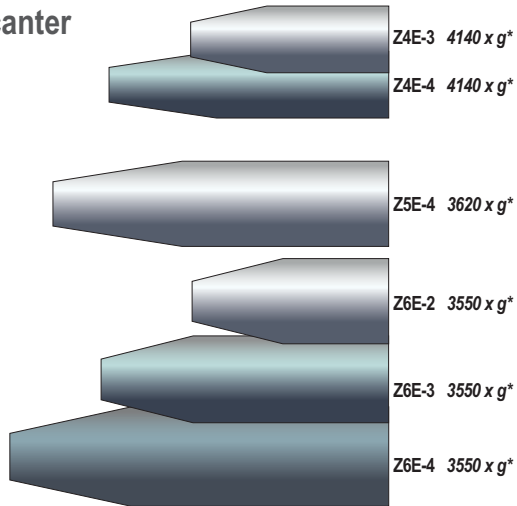
- Maximum oil yield due to appropriate machine design adapted to market requirements
- Tailor-made Flottweg Systems for avocado oil processing together with partners all over the world
- Automatic and continuous operation even at varying feed composition with a Flottweg Tricanter®
- The Flottweg Separator with Soft Shot® discharge system for solid discharge operations that make hardly any noise
- More than 100 different edible oil references
- Flottweg Products are designed and manufactured in Germany. That symbolizes high-quality, durability and efficiency.
- Service and customer service at Flottweg are known for their competence, speed and availability at fair conditions. These three words aren't just bullet points - they define our obligation to our customers.



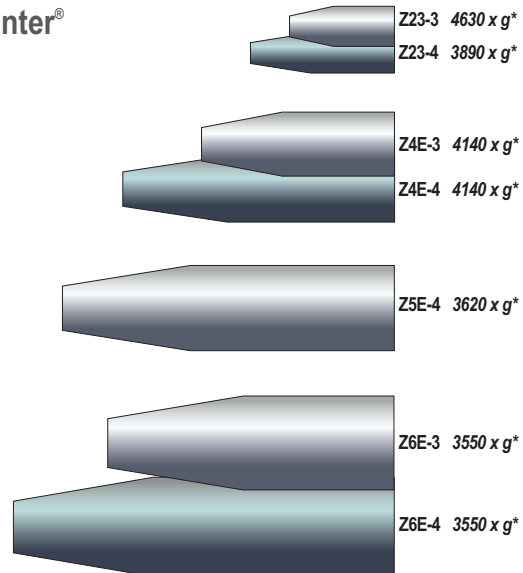
TECHNICAL DATA

Decanter C-Series, Z-Series and Tricanter®

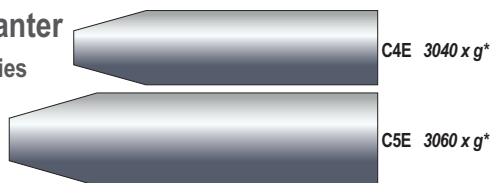
Decanter



Tricanter®



Decanter C-Series



*Acceleration in g, depending on the temperature and the density of the product

Flottweg Decanter Centrifuges (Decanters and Tricanter®) for the extraction of avocado oil are available in 11 sizes for different capacities. So Flottweg offers you the right size combined with unique customer support. Please contact us via

- phone: +49 8741 301 0
- fax: +49 8741 301 300
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- www.flottweg.com

...and let's be successful together!



Flottweg Separation Technology – Engineered For Your Success

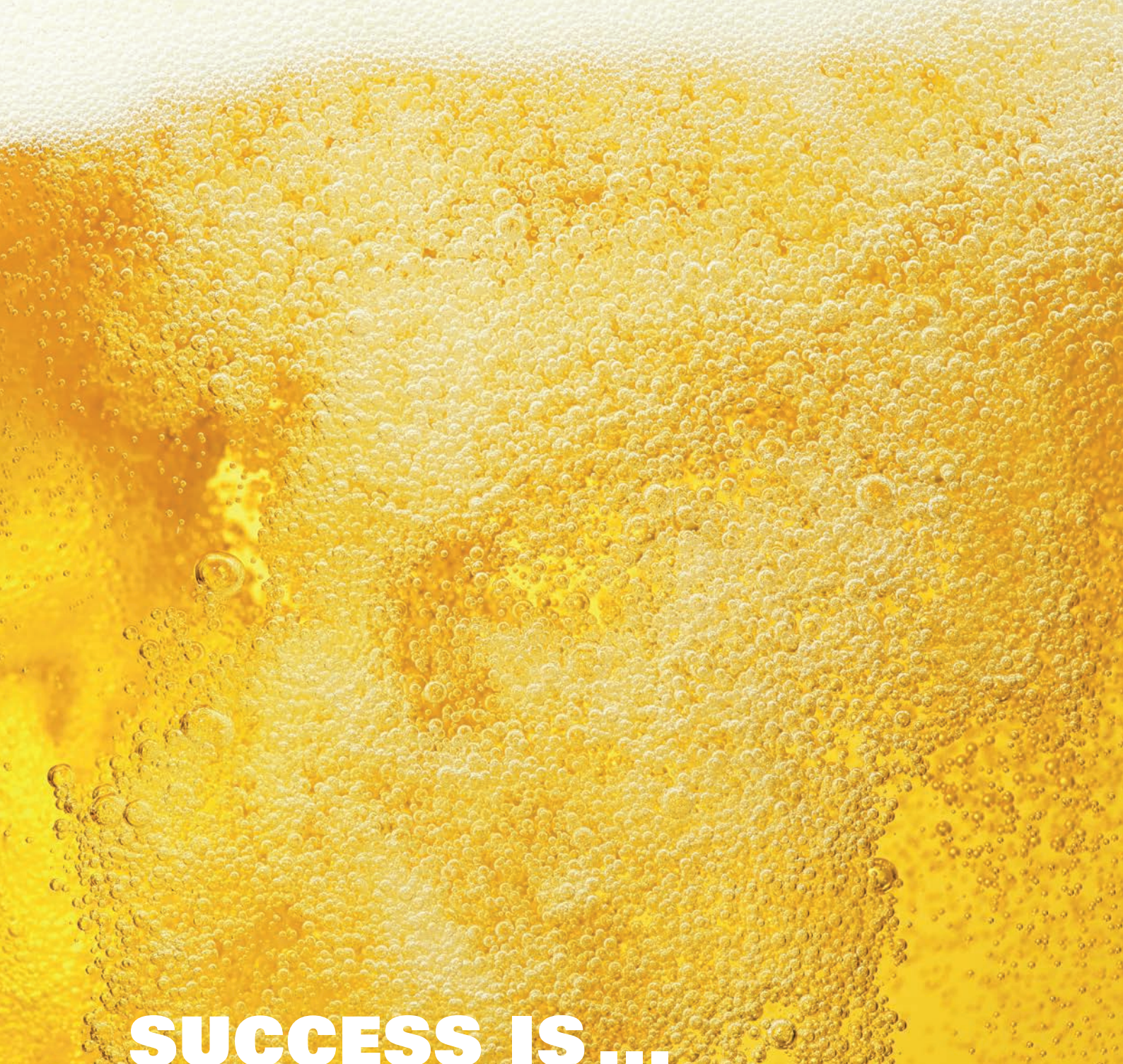


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REPRESENTATIVE



SUCCESS IS KEEPING HOP AND MALT FROM EVER BEING WASTED

Optimizing the Brewing Process
by Using Fewer Resources



We offer customized solutions in separation technology for the entire brewing industry – from the small craft brewer to large breweries.

When designing our machines, we already consider the process as a whole since every drop counts. With our technology, we support you in the brew house, in the cellar and in filtration in order to maximize work efficiency and conserve resources so that neither hop nor malt get lost.

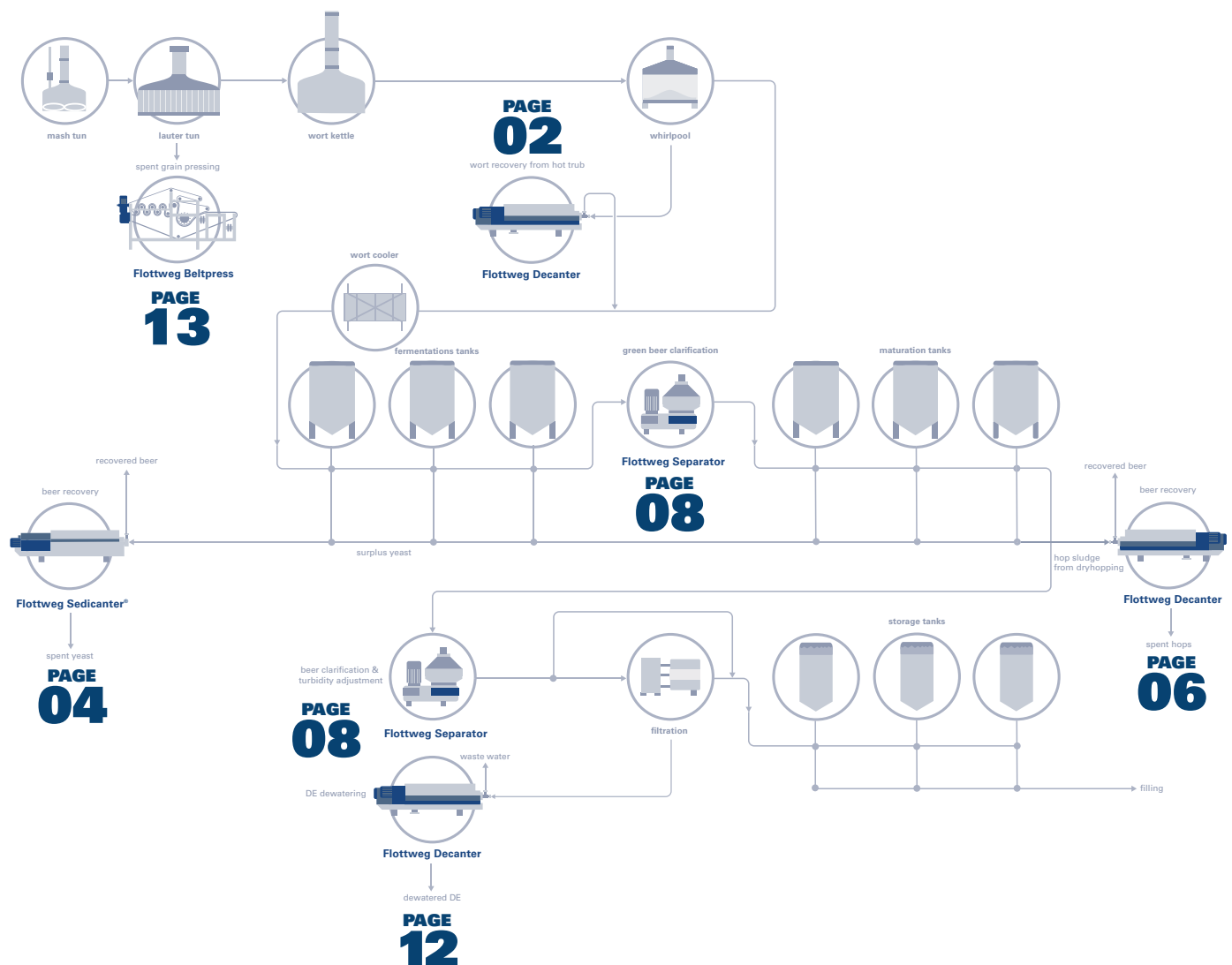




TABLE OF CONTENTS

Higher Yields in the Brewhouse

Wort Recovery from Hot Trub

page 02

Higher Yields in the Cellar

Beer Recovery

· After Fermentation

page 04

· After Dry Hopping

page 06

Optimizing Beer Quality

Green Beer Clarification or Trub Adjustment

page 08

Optimizing the Filtration Process

Pre-clarification Using the

Flottweg Disc Stack Centrifuge

page 08

The Flottweg Disc Stack Centrifuge in Detail

page 10

Waste Water Management and Upcycling

Sludge Treatment in the Waste Water

Treatment Plants of Breweries, Kieselgur and

Spent Grain Dewatering

page 12

Automatically Brewing Good Beer

Flottweg Automation Systems

page 14

Service and Aftersales Network

Always Having the Right Service

page 16



WORT RECOVERY FROM HOT TRUB

Higher Yields in the Brewhouse

The hot trub separated during wort clarification in the whirlpool still contains up to 75% liquid wort which may be recovered. The **Flottweg Decanter** in the brewery supplements the trub separation from hot wort. Even high feed trub content can be processed without problems. The separated hot trub is optimally concentrated. The recovered hot wort can be added directly to the clarified hot wort stream coming from the whirlpool.





Dry Solids Discharge

The Flottweg Simp Drive® automatically regulates the differential speed based on the scroll torque. This is how the machine automatically adjusts to different load conditions, e.g. higher quantities of hot trub, which are especially relevant for late hopping. Maximum recovery of hot trub is therefore always ensured.



Optimum Process Control

- Continuous and automatic operation
- Reduced retention time in the whirlpool



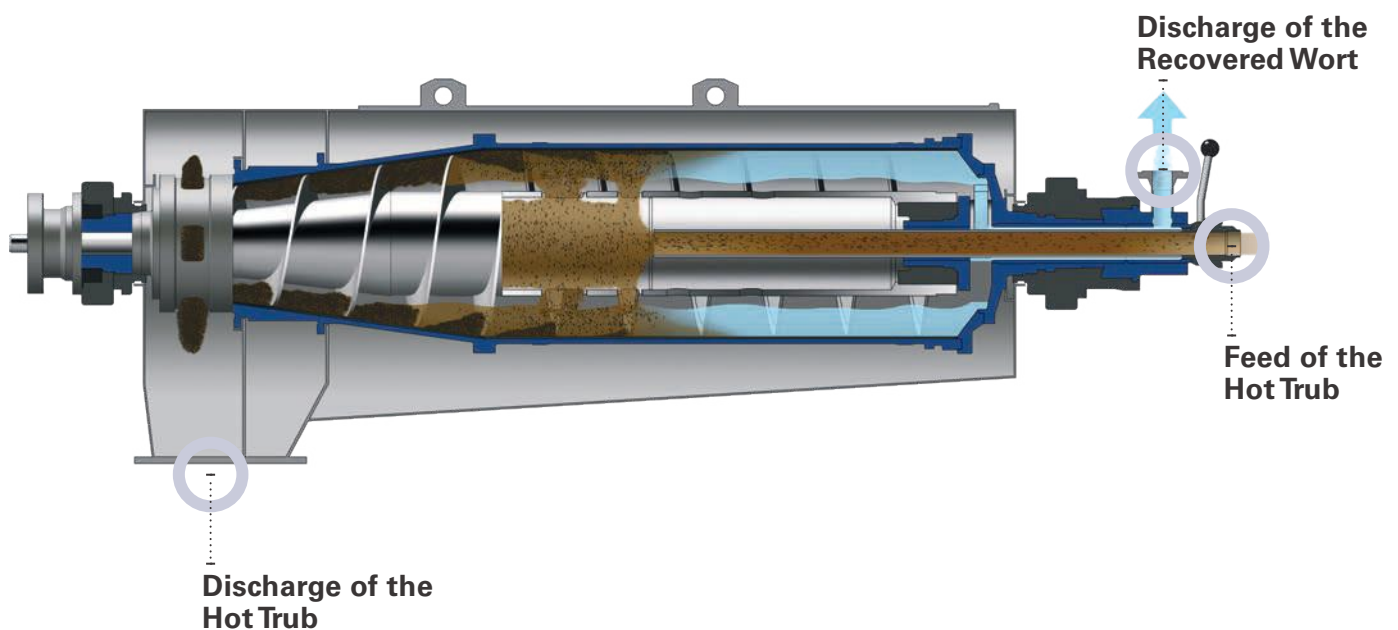
Clear Wort

- Optimum adaption to the requests of different recipes and hot trubs thanks to the adjustable impeller
- The clarified wort is discharged under pressure.



The Best Manufacturing Quality

- Hygienic design and use of seals in compliance with the food law
- Optimum adjustment of the machine to high product temperatures and aggressive media (CIP cleaning)



BEER RECOVERY FROM SURPLUS YEAST

Reducing Beer Losses

Beer recovery from surplus yeast after fermentation and/or storage is an ideal opportunity to reduce your beer losses.

Recovering beer from surplus yeast allows you to recover two resources: beer, which can be returned into your process, and yeast which can be sold, for instance, for further processing in the food industry, as a vitamin rich dietary supplement or as animal feed. Moreover, recovering beer from surplus yeast helps to reduce waste water.

Other systems for beer recovery such as disc stack centrifuges, membrane filtration or yeast presses exhibit big differences regarding beer quality, process ease, handling, as well as operation and maintenance costs. The **Flottweg Sedicanter®** represents an extremely interesting alternative, both technologically and economically.

Besides easy and gentle processing of the beer, it is also possible to process fluctuating quantities of yeast in the feed without problems. As well as producing higher yields, the system also has substantially lower investment and operating costs.





Safe and Gentle Processing

Continuously high product quality thanks to a clever design



Optimum Process Management

- Fine adjustment of the machine during operation thanks to the automatically adjustable impeller
- High yields even in case of varying feed conditions
- The recovered beer is discharged under pressure. Depending on the process, additional pumps may not be required.



High Beer Yields

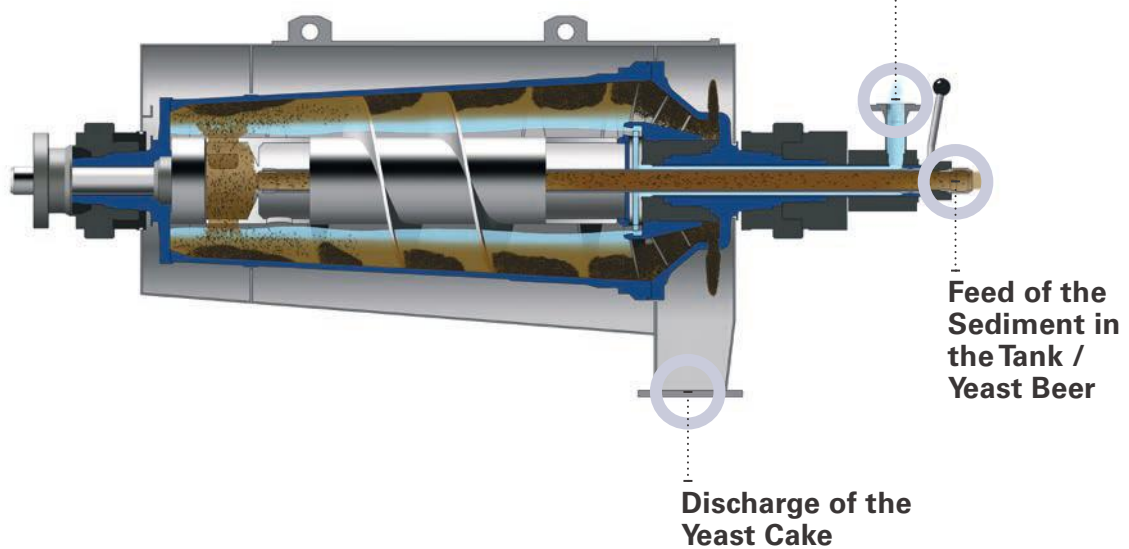
- Due to the high g-forces (up to 10,000 x g) and thus the high clarification impact in the centrifugal field, the recovered beer is almost free of yeast.
- Compact yield cake with a high dry matter content (between 24 and 28 per cent by weight)
- It is not necessary to dilute the surplus yeast before processing. This means saving process water, a higher capacity of the machine and reduced energy demand.



High Manufacturing Quality

- The machine design is specifically adapted to the high hygienic demands of breweries.
- Easy implementation into existing CIP systems

Discharge of the Recovered Beer





BEER RECOVERY WITH DRY HOPPING

Minimizing Losses and Automating Processes

Dry hopping has developed in recent years into an established technique in the entire brewing industry. It is used especially for beers that contain a large amount of hops. In general, hop pellets are used. They are introduced during extraction for the fermentation and maturation process, giving the desired flavoring agents to the beer and settling as trub at the bottom of the tank.

Handling hot trub this way requires a lot of work, complicating subsequent process steps. The product flow (pipe works and valves) tends to block, and downstream separation and filtration are overloaded due to the high solids load. In general, this trub is separated from the beer by simply removing it (similar to yeast harvesting) before further processing. High-quality beer is contained in this hop sludge, so significant amounts of beer are wasted; around 5–20% of the tank content is typically lost. At the same time, the solids load which is conveyed to the waste water increases greatly.

The Flottweg Decanter separates the spent hops from the liquid beer phase and uses pressure to return this to storage or bottling. This significantly reduces beer losses and relieves the load placed on downstream centrifuges and filtration. Dry hopping can be further automated, and clarification times and thus tank occupancy can generally be reduced. The problem of waste water treatment is also resolved.

Besides hops, alternative flavor carriers such as fruits, coffee beans, herbs etc. can also efficiently be separated. Flottweg Decanters allow for considerable savings in a reproducible production process.





High Yields

By adjusting the centrifuge to different amounts of hops or to various recipes, between 75 and 97% of the beer may be recovered.



Safe and Smooth Processing

- No false flavors, e.g. hop burn thanks to a defined extraction process
- CO₂ blending to avoid oxygen pick-up in the beer



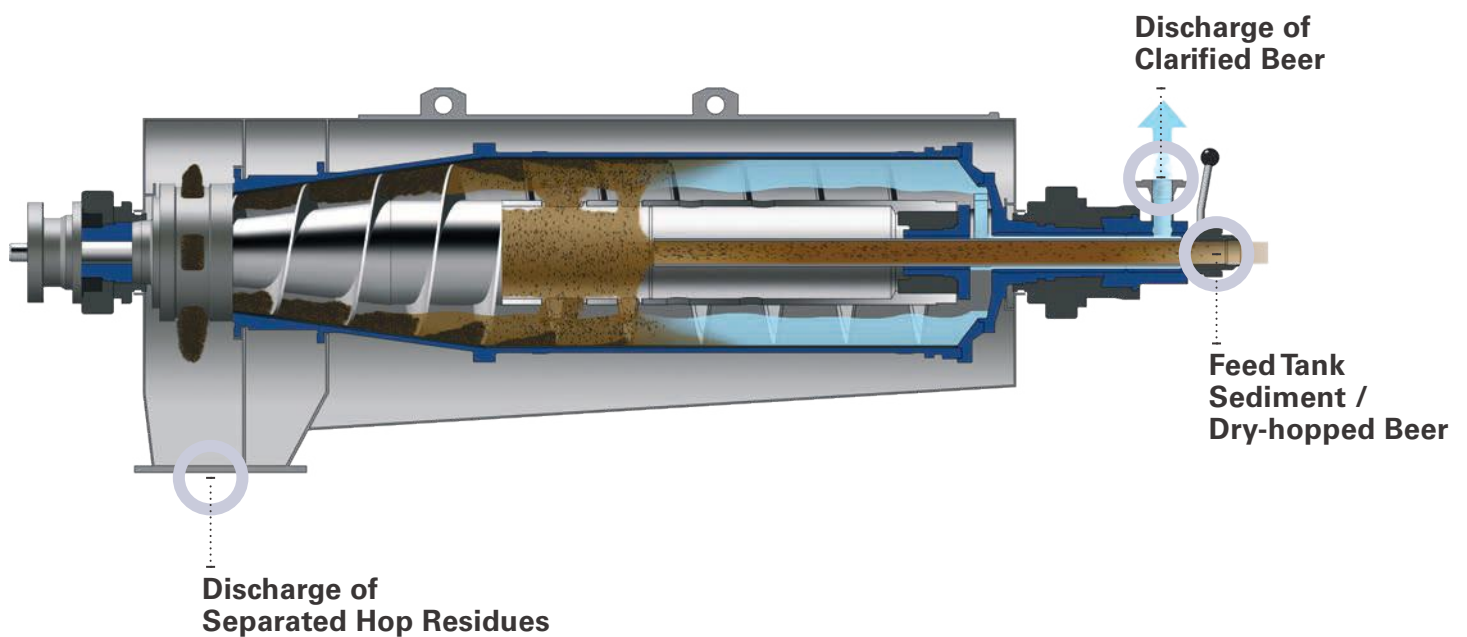
High Manufacturing Quality

- Hygienic design, food certificates for lubricants and seals
- Optimum adjustment of the machine to high product temperatures and aggressive process media (CIP cleaning)



Efficient Cleaning

All critical parts such as the hood, the rotor, the solids discharge system and other liquid-wetted parts are cleaned using spray nozzles.



BEER CLARIFICATION USING THE FLOTTWEG DISC STACK CENTRIFUGE

Optimizing the Filtration Process

Filtration often presents challenges to the brewer. Besides the varying quality of the raw material, the quality and the concentration of the yeast affect the filterability of the beer. These factors determine the length of the filter service life as well as the amount of filter additives consumed.

The **Flottweg Disc Stack Centrifuge** helps optimize workflows in the filter cellar, reduce beer losses and adjust the desired turbidity.

Longer filter service life

With the use of disc stack centrifuges, most of the yeast can be separated smoothly before filtration. Thus, filter service life can be extended by up to 100%. At the same time, the necessary quantity of kieselgur and thus the costs for its procurement, handling, and disposal are reduced. Additionally, beer losses as well as cleaning and waste water costs are reduced. Any filter system can be upgraded quickly and simply with the disc stack centrifuge for pre-clarification.

Turbidity adjustment for wheat and cloudy beer

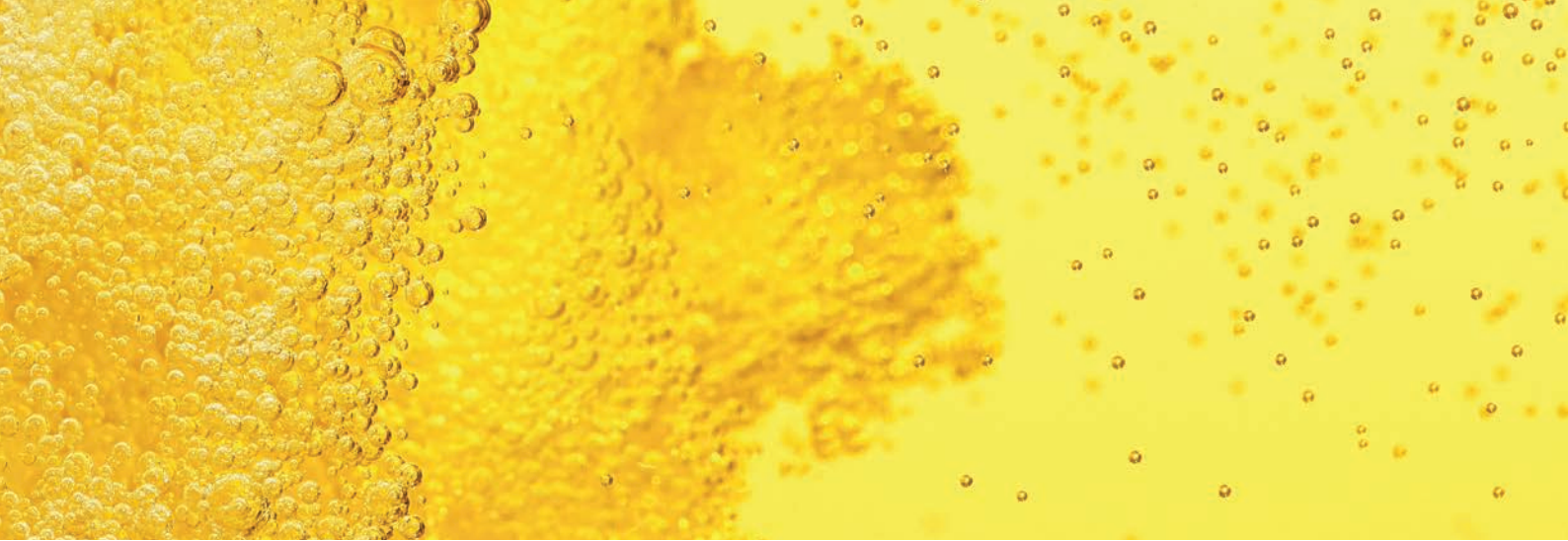
Especially during the storage of wheat beer or cloudy beers, the yeast content is irregular due to sedimentation in the tank. The disc stack centrifuge elegantly balances undesired yeast fluctuations. The brewer determines the required turbidity value in the beer. The rest is done automatically. The control system monitors the yeast concentration by measuring the turbidity in the feed and in the discharge systems. With automatic adjustment of the flow rate, the required separation efficiency can be maintained. Moreover, turbidity can be adjusted using the bypass method. Thus, the beer always shows the same turbidity and constant quality.

Optimizing the fermentation process with green beer clarification

By adjusting the desired number of yeast cells in the green beer (by means of the disc stack centrifuge), process conditions of maturation and secondary fermentation are standardized. This improved secondary fermentation allows for consistent beer quality. Yeast autolysis processes are reduced and relieved thanks to reduced yeast loads.

The disc stack centrifuge can also be used for the production of alcohol-free beers depending on the process, e.g. in case of stopped fermentation.





Plug & Play: Benefits of Our Skid Solutions

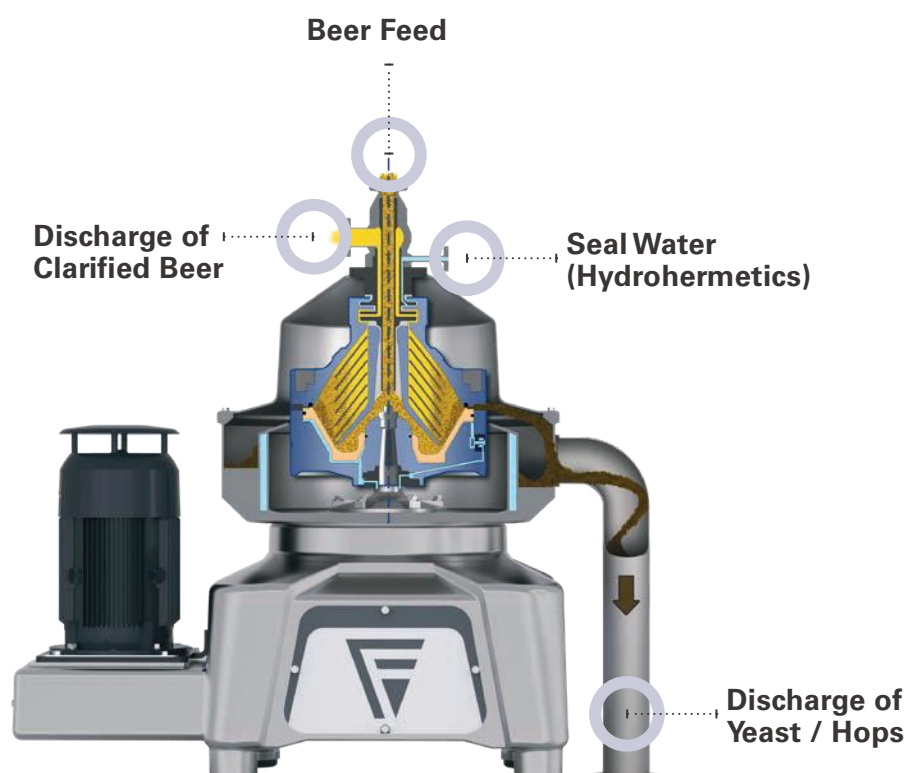
Our pre-configured platform solutions allow for an even easier integration into existing processes:

- Simple commissioning in existing production and CIP processes since all components and monitor devices (valves, sensors) are already pre-installed
- Fully automatic operation thanks to monitoring devices, e.g. turbidity measurement device
- Maximum flexibility thanks to recipe pre-selection for the beer to be processed





THE DISC STACK CENTRIFUGE IN DETAIL





Optimized Disc Stack Centrifuge Bowl

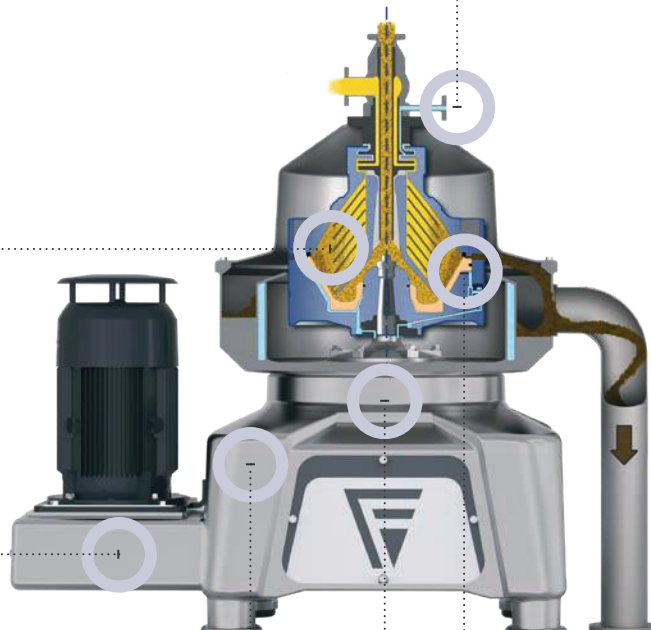
- High separation efficiency and productivity of the machine
- Easy maintenance thanks to the compact and sturdy design
- For the beverage and food industry:
High quality of surfaces for all product-wetted parts for safe production and efficient CIP cleaning
- Easy assembling and dismantling
- Reduced vibrations as well as smooth and silent operation



Safe Processing

thanks to the Flottweg hydrohermetics system. Building up a seal water ring, including de-gassed water, efficiently prevents oxygen pick-up

- No additional CO₂ gassing required
- No mechanic wear (in contrast to shaft seals)



Design

- Easy accessibility for maintenance
- Compact construction for a small footprint
- Easy and flexible integration into existing processes



High Beer Yields

- Accurate partial and total discharges ensure a high solids concentration in the discharged yields and thus high yields
- Reduced noise thanks to the Soft Shot® discharge system; no additional noise protection required
- Reduced amount of bowl seals, thus easy and economical in maintenance and operation



Efficient Belt Drive

- Energy efficient
- Reduced vibrations as well as smooth and silent operation
- Standard drive motors, thus high availability
- Economic in maintenance and servicing



Optimized Spindle Bearing

- Efficient power transfer from the gear to the bowl
- Easy construction reduces wear and operating costs



WASTE WATER MANAGEMENT & UPCYCLING OF RESIDUALS

Sustainability and environmental management are becoming increasingly important in the beer and beverage industry. Economic reasons like increasing disposal costs and legal requirements are not the only motivations. Ecological market requirements in particular, which sometimes influence buyers in their decision to buy a certain product, play an essential role when evaluating the existing processes.

Reducing the disposal costs of brewery sewage sludge treatment plants

Many breweries already profit from the advantages of biological wastewater treatment, thus generating sewage sludge, which can be used in agriculture, incinerated or taken to a landfill. The costs of sludge disposal are reduced with the increasing dryness of the sludge, regardless of the type of disposal. Decanter centrifuges help reduce these waste disposal costs considerably through sludge dewatering. Dewatering means to considerably increase the dry substance content of the sludge, thus reducing the amount of sludge to be disposed of and therefore also the disposal costs.

Reducing the amount of kieselguhr to be disposed of

Kieselgur filtration is still the technology which is used most for final beer clarification all over the world, generating a large amount of kieselgur sludge which makes disposal very expensive due to its large content of liquid. Similar to sewage sludge, special decanter centrifuges are used for dewatering. Kieselgur has a strongly abrasive impact. Therefore, Flottweg machines are equipped through special wear protect features, thus assuring longer service lifetimes and easy maintenance. Depending on the feed concentration, the amount of kieselgur is reduced to up to 80%, resulting in less disposal costs.



Dewatering Spent Grains for Improved Recycling

Spent grains represent the biggest part of waste and residues in breweries. In general, they are used for animal feed. Moreover, spent grains are used for recycling in biogas plants or as an alternative energy provider.

Spent grains, however, are becoming increasingly important for recycling and use in the food industry. Thanks to the high content of proteins and fibers, spent grains deliver precious substances and are thus predestined for sustainable upcycling.

Wet spent grains in breweries on average still contain a liquid content of approximately 80%. As a consequence, mechanical dewatering as a first step is inevitable for the applications mentioned above. Flottweg offers belt presses for this purpose. Thanks to efficient pressing, the liquids content is reduced so that it is under 58% and thus as dry as possible through mechanical separation technology for further process steps.



Feed of the Wet Spent Grains





Automatically Brewing Good Beer

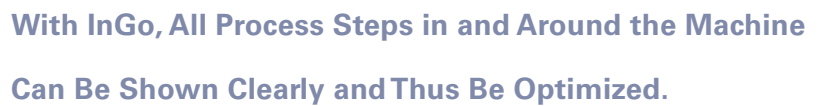
In order to reduce operating costs, nearly all breweries rely on a mostly fully automatic and unsupervised operation of their system. Our new user interface InGo makes it easy for the brewer to intervene if necessary. Thanks to the intuitive menu structure and a simplified user interface, our machines can be operated without requiring a long time to become familiar with them. Simply “into the system and go.”

Different types of beers and recipes can be stored in the control system. Thus, in the case of a product change, the machine can be adjusted to the required process parameters simply by pressing a button.

What is new at first glance is the revolutionary color design. We draw the eyes of the user deliberately to the most important information for every machine and system state. In contrast to some other user interfaces, with our visualization system, we do not only show the machine, but also the entire engineering process.

The sensors as well as the different process states of the machine can be captured to monitor, analyze and optimize your brewing process. Different BUS connections (Profibus, Anybus etc.) allow for easy integration into the overall process (PLC).

We also adapt our automation systems to individual existing brewery processes.



Adjust the machine parameters easily using the recipe selection.
Parameterizing is done on-site during commissioning and is adjusted individually to the product and the process.

00.01 SEPARATOR > RECIPE PRODUCT

Water	Speed_SP	Durchsatz_SP	Flow_max	Trub_SP	Trub_contr	Trub_Disch.Lim	Trub_Disch.Se	Bypass_SP	Bypass_Se	Sep_time
0	0	0	65	30	0	28	0	25	0	0

Feed turbidity	100	200	300	400	500	600	700	800	900	999	EBC
1	2	3	4	5	6	7	8	9	10	10	hl/h
55	50	45	40	35	30	25	20	15	10		

GK Flow	20	30	40	50	hl/h
1	2	3	4		
4	3.2	2.8	2.4		bar

GK Pressure	4	3.2	2.8	2.4	bar
1	2	3	4		
4	3.2	2.8	2.4		bar

beer

wheat beer

loaded recipe

Feed turbidity	10,0	20,0	30,0	40,0	50,0	60,0	70,0	80,0	90,0	100,0
1	2	3	4	5	6	7	8	9	10	
10,0	20,0	30,0	40,0	50,0	60,0	70,0	80,0	90,0	100,0	
10,0	20,0	30,0	40,0	50,0	60,0	70,0	80,0	90,0	100,0	

GK Flow

GK Flow	20,0	50,0	120,0	160,0
1	2	3	4	
20,0	50,0	120,0	160,0	



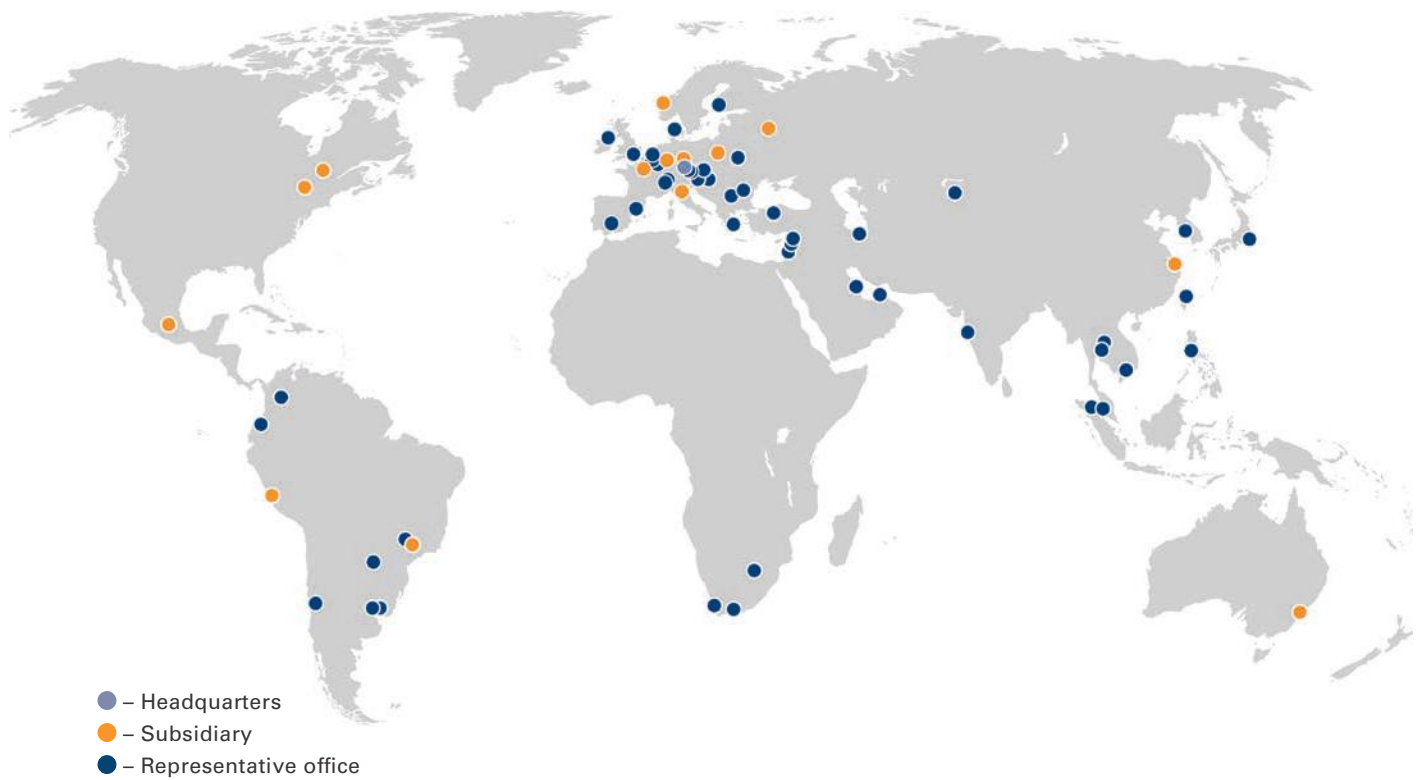
SUCCESS IS ALWAYS HAVING THE RIGHT SERVICE

Our Services

From the first consultation and the decision to buy, from commissioning to the utilization phase: when it comes to industrial centrifuges and belt presses, you need a reliable partner at your side. Somebody you can trust at any time, because our machines play a crucial role in a variety of industry sectors and processes. They are often in operation for 30 years or longer.

We Will Be Happy to Show You How Our Services Can Contribute to Your Success:

- Consultation and optimization of processes
- Product analysis in our laboratory
- On-site tests under real conditions
- Rental machines and long-term tests
- On-site service as well as maintenance in our workshop
- Training for your employees / operator training in our Flottweg Academy
- Customized maintenance contracts and measures for warranty extensions



We are able to serve customers all over the world, thanks to our vast global sales and service network. We're there when and where you need us, in more than 100 countries. All Flottweg subsidiaries and representative offices are staffed with skilled service technicians, each of whom has gone through specialized training at our Flottweg Academy.





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FLOTTWEG SEPARATION TECHNOLOGY FOR THE PRODUCTION OF INSTANT COFFEE

Use potentials, maximize yields



PRODUCTION OF INSTANT COFFEE

Using Flottweg Separation Technology

Simple and quick preparation of instant coffee is still very trendy, getting increasingly popular throughout the world. Particularly specialties like cappuccino and espresso flavored with vanilla and many more are getting more and more important on the market.

Due to this dynamic market, producers of coffee products have to face new challenges. Consumers' demands on the quality of the final product are continuously increasing. At the same time cost pressure and the need for sustainable and efficient production methods are also increasing.

Flottweg Separation Technology can efficiently contribute to quality and the clarity of the final instant product. We also offer efficient solutions to recover valuable downstream products. That means that our technology helps improve your overall yield and the efficiency of your process.



Overview: Flottweg Separation Technology for the production of instant coffee

- Flottweg Disc Stack Centrifuges for clarifying coffee thin extract
- Flottweg Disc Stack Centrifuges for clarifying coffee thick extract
- Increasing yields using the Flottweg Decanter (processing the solids discharged by the disc stack centrifuge)
- Flottweg Belt Press for dewatering coffee grounds (recovery of extraction residues)
- Recovery of valuable coffee oil from press water using the Flottweg Tricanter®
- Optionally: Polishing coffee oil for maximal purity using the Flottweg Disc Stack Centrifuge
- Connection to process control systems possible at any time
- Easy integration into existing CIP systems

FLOTTWEG SEPARATION TECHNOLOGY

Overview of Applications in Instant Coffee Production

FLOTTWEG SEPARATION TECHNOLOGY

Overview of Applications in Instant Coffee Production



THIN AND THICK EXTRACT CLARIFICATION

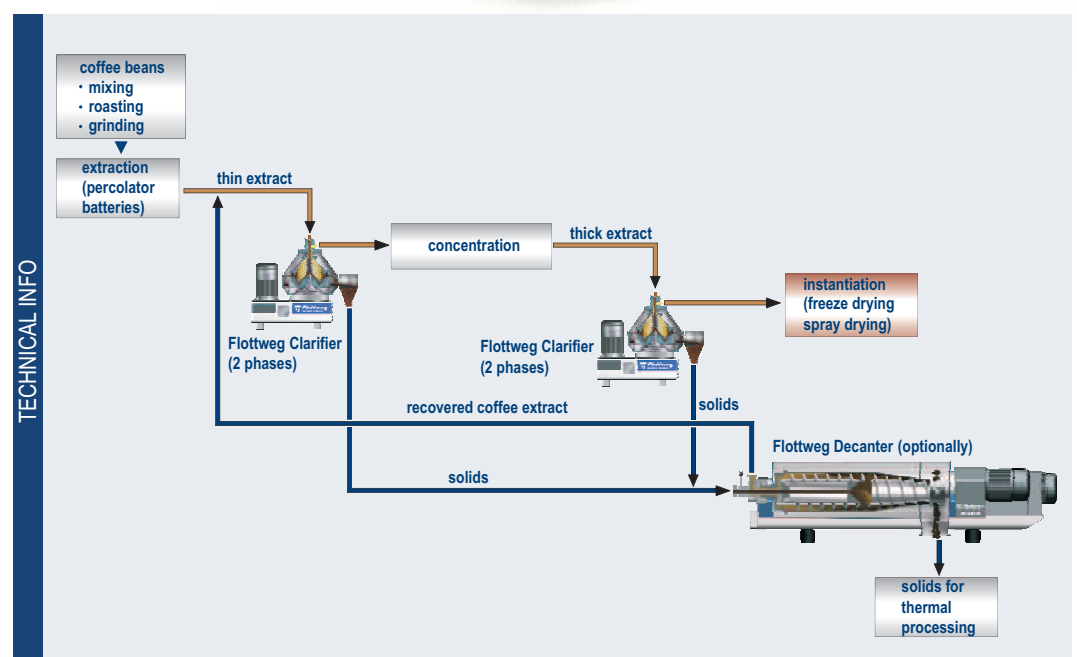
Improving Instant Characteristics

Soluble coffee or instant coffee mixtures are produced through the extraction of roasted coffee. First, the coffee beans coming from different countries of origin and producing regions are mixed. Afterwards, the beans are roasted and ground. This is important because now hot water used in subsequent extraction processes can easily penetrate into the coffee grounds. In contrast to traditional brewing procedures, in large-scale facilities hot water temperatures of up to 200 °C are used. The ground coffee is extracted in percolator batteries in batch quantities or in extractors, continuously and under pressure.

This extracted coffee solution partly contains insoluble components. If these were not removed, undesired residues would remain in the coffee cup when dissolving the instant products. It is exactly in this process that Flottweg Disc Stack Centrifuges are used. Visible particles are completely separated using the disc stack centrifuge and thus the quality of the final product, meaning instant characteristics are improved.

Due to the fact that the rotational speed of the disc stack centrifuge can be adjusted flexibly, it is possible to adjust separation efficiency to customer demands. Thus desired flavor enhancers remain in the product.

Depending on the number of disc stack centrifuges used, it is possible to further increase yields in this process step. The solids discharged by the disc stack centrifuge still contain traces of extract. Using a decanter subsequently, it is possible to recover this extract. The liquid extract is re-introduced into the process, thus helping to increase the overall yield.



MAXIMUM YIELD – SAFE DISCHARGE

The Flottweg Soft Shot®-System



THE FLOTTWEG SOFT SHOT®-SYSTEM

- Precise partial and total discharges of any combination, thus individual and flexible adjustment to the customer's process for optimum product yield
- **Total flush discharge** for discharging extraction residues for safe discharge and maximum cleaning efficiency
- Material friendly and silent, acoustically almost imperceptible solids discharge



THE BOWL OF THE DISC STACK CENTRIFUGE

Maintenance friendly

- Compact and sturdy design
- Easy assembling and disassembling

Reduced operation costs

- Reduced number of components and seals
- Quality "Made in Germany"

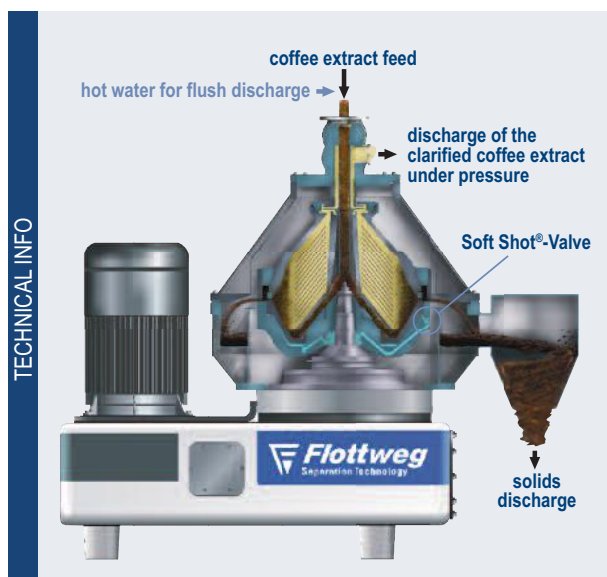


WEIR PROTECTION

- High weir resistance
- Long lifetime of the disc stack centrifuge
- Cost-effective because only wear parts have to be exchanged

The insoluble components of the coffee extract have a very chewy and adhesive consistence which can vary depending on the mixing ratio of the coffee types (share of robusta/arabica). During separation, these components settle in the bowl of the disc stack centrifuge. The challenge is to discharge the separated solids safely from the bowl. In order to assure maximum yields and the safe operation of the disc stack centrifuge, an adjustable bowl discharge system is required.

Thanks to the Flottweg Soft Shot®-System, it is possible to adjust the opening times of the bowl in a user-defined way. Therefore, the solids have enough time to separate from the solids chamber. A special characteristic of the Soft Shot®-System is that hot water can additionally be introduced into the open bowl during discharge which allows for optimum cleaning of the discharge chamber and the disc stacks, called total flush discharge (TFD): No matter what types of coffee are processed, the Soft Shot®-System enables partial and full discharges in any combination, thus assuring a safe process and optimum yield.



Cross-section of a Flottweg Disc Stack Centrifuge

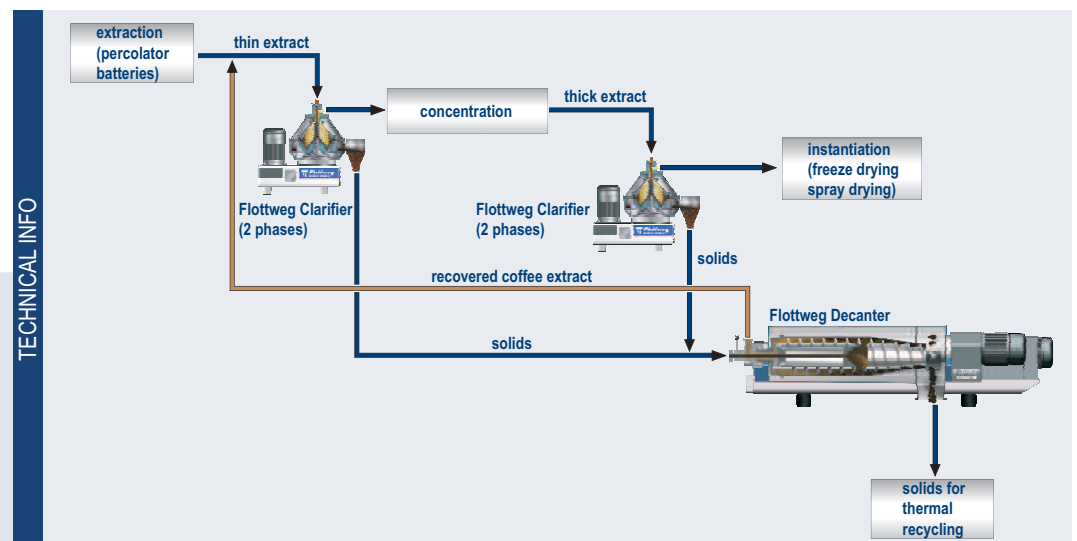


THIN AND THICK EXTRACT CLARIFICATION

Recover Re-usable Materials, Increase Overall Yield

Depending on the type of disc stack centrifuge, the number of used clarifiers and the process, quite a considerable amount of discharged solids are generated which contain valuable coffee extract.

That is why it might be worth to further process the mixture of extracted solids. For this purpose, the solids are mixed with hot water. A decanter separates the solids efficiently. The very dry solids (up to 50 % solids content) may be thermally recycled. The recovered extract is re-introduced into the process, thus minimizing product losses.



FLOTTWEG SIMP DRIVE®

- Excellent recovery of coffee extract due to a continuously dry substance content in the separated solids
- High yield thanks to completely automatic adaption of the operation parameters even in case of varying process conditions
- High creation of value due to an increased overall yield of coffee extract
- No clogging of the decanter bowl



FLOTTWEG ADVISORY SERVICE AND PROJECT ENGINEERING

- Simple retrofitting and integration of the machine, also in existing processes
- Individual adaption to your requirements for optimal efficiency
- On request tests under real conditions





FLOTTWEG IMPELLER

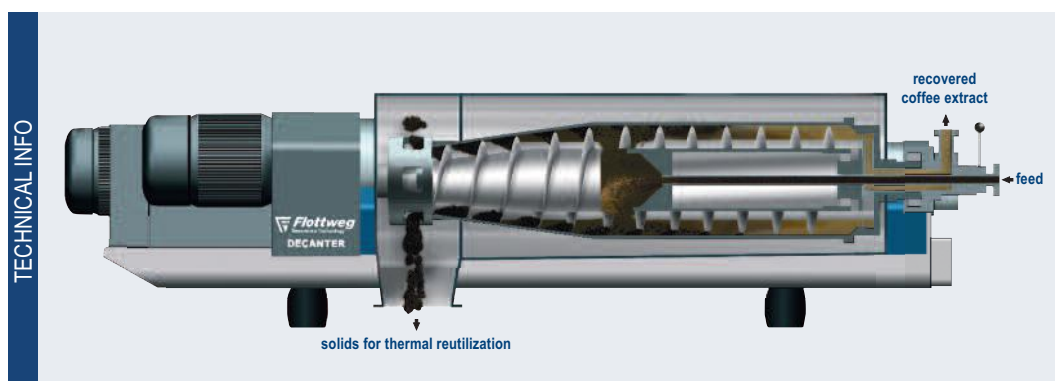
- Closed discharge system for the centrate under pressure, thus generating no foam
- Due to the discharge of the liquid under pressure, there is no conveyor pump needed, in contrast with the usual situation.
- The pond depth can be adjusted during operation, thus allowing for optimum adaption to varying conditions (product characteristics in the feed).
- Option: possibility to automation



FLOTTWEG OIL-AIR LUBRICATION SYSTEM

On request, our centrifuges are equipped with an oil-air lubrication system, which is minimum lubrication transporting the oil droplets to the bearings using air blast. Operation safety of the Flottweg Oil-Air Lubrication System is assured through permanent supervision.

- Continuous lubrication and cooling of rotor bearings
- No oil change required, thus oil consumption being reduced to a minimum
- A small overpressure at the bearings prevents penetration of gases and aerosols into the rotor bearings, thus ensuring longer service time.

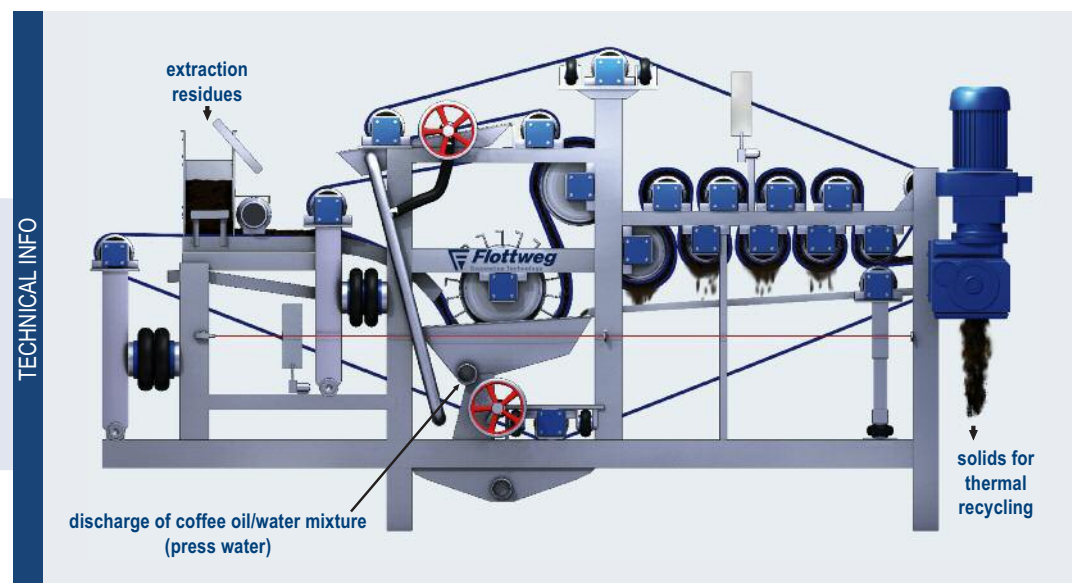


PRESSING OF COFFEE GROUNDS

Using the Flottweg Belt Press

The residues from the percolators and the extractors, called coffee grounds, contain different amounts of valuable coffee oil, depending on the overall process. In order to increase efficiency, the coffee grounds are first processed using a belt press for two reasons: First, the dry substance of the coffee grounds is increased, which

is a big advantage in case of thermal re-utilization of the solids. Second, press water is generated, which is a mixture of liquids consisting of extract residues, coffee oil, and traces of solids. The coffee oil can then be cleaned from water and solids in further separation steps. Using the Flottweg Belt Press, it is possible to actively dewater coffee grounds, even in case of very fine grinding.



How the belt press works

Advantages of the Flottweg Belt Press

- Good thermal re-utilization of the coffee grounds due to the high dry substance content after the treatment with the belt press
- Low amount of solids penetrating the filter belts, increasing efficiency in the subsequent recovery process of coffee oil
- Consequent use of stainless steel, thus high stability
- Clear design and easy access for cleaning and handling
- Pneumatic belt control system for reliable operation and minimum work for the operator

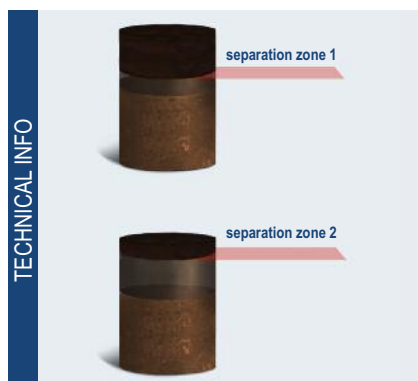
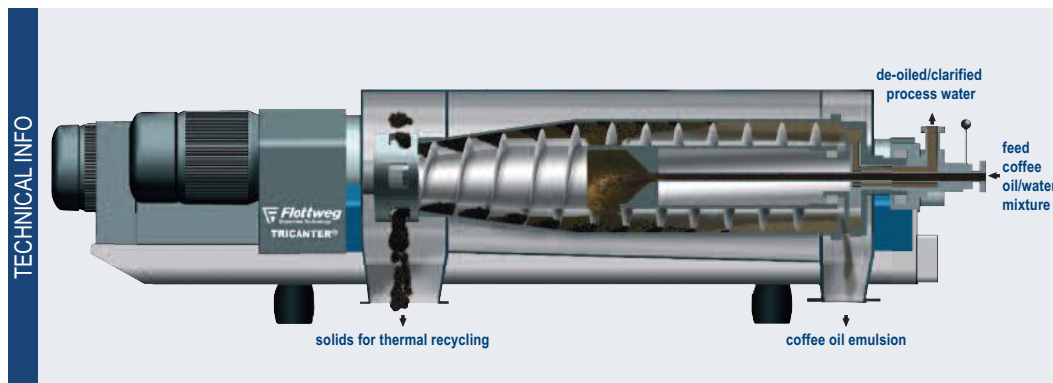


OIL REMOVAL OUT OF THE PRESS WATER

Using the Flottweg Tricanter®

The three phases contained in the press water can be separated into their individual components using the Flottweg Tricanter®. Solids residues are removed and can be re-introduced into the thermal reutilization process. The valuable coffee

oil is separated from the extraction residues. Depending on the amount and the purity of the recovered oil, it may be reasonable to use a subsequent disc stack centrifuge for polishing the oil phase. If extraction residues are to be recovered, the clarified and de-oiled press water may be reintroduced into the main stream.



Varying feed conditions may be compensated: optimum separation efficiency using the Flottweg Tricanter®

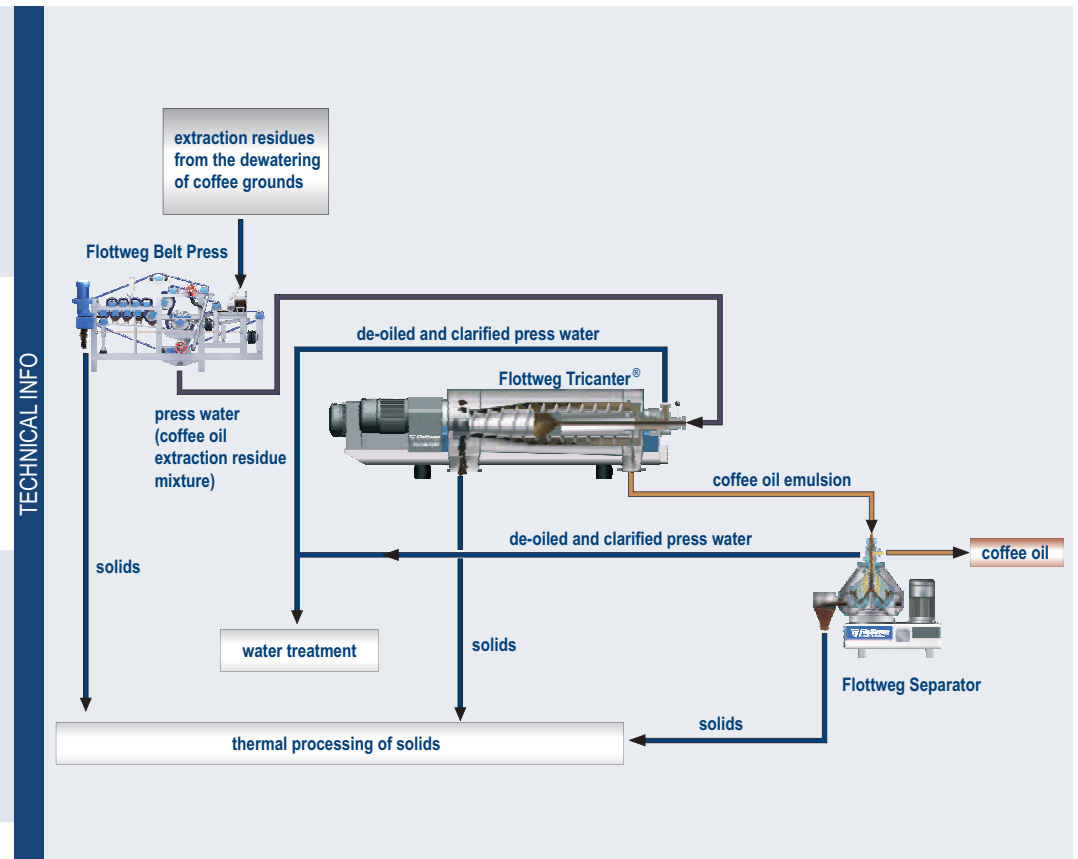
Advantages of the Flottweg Tricanter®

- Best separation results thanks to simple adjusting of the separation zones, also during operation
- Optimum coffee oil yield
- Discharge of the de-oiled process water under pressure; cost savings since a conveyor pump may not be needed



PRESSING OF COFFEE GROUNDS DE-OILING OF PRESS WATER

Process overview



COFFEE PROCESSING ON LOW SCALE

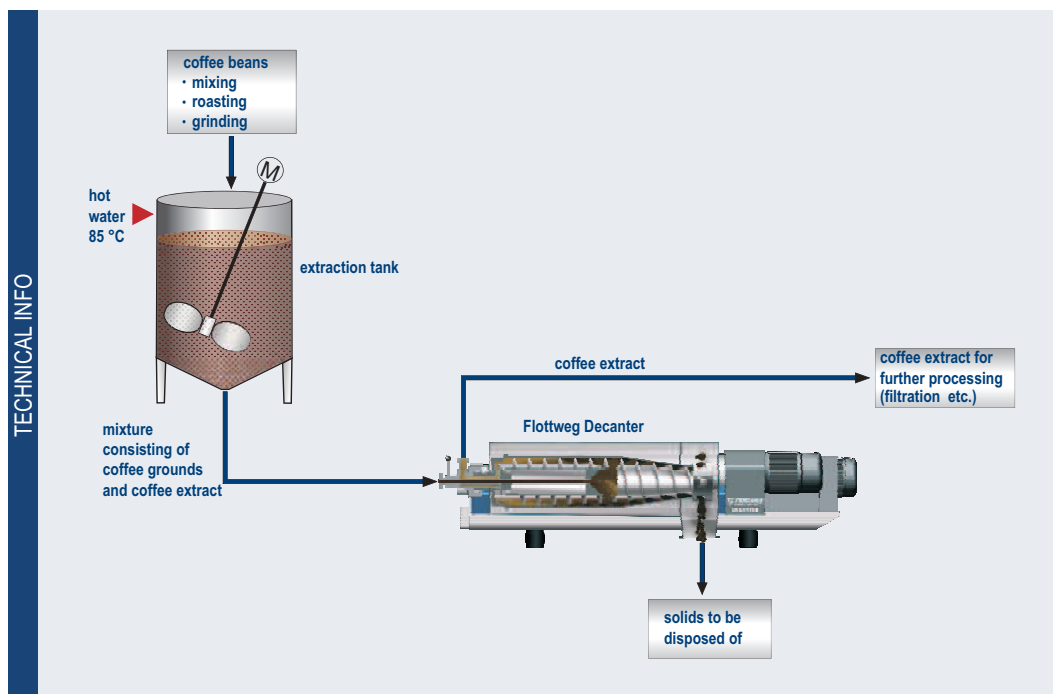
Increasing the Overall Yield, Even in Case of Small Quantities

In contrast to the fully automatic processing lines of big plants, smaller manufacturers are increasingly producing soluble coffee or instant coffee in batch quantities.

Hot water dissolves the coffee extract from the ground coffee beans in batches. The recovered extract is normally discharged from the tank using sieve plates and then filtrated. The extraction residues remaining in the tank still contain differ-

ent quantities of valuable coffee extract. In this process, the extract is lost together with the residues. Processing using a filter is practically impossible due to the high amount of solids.

It is, however, possible to separate the solids from the coffee extract using the Flottweg Decanter. Even high amounts of solids may be processed using a centrifuge. Due to the high dry substance content of the discharged solids, the yield extract is much higher than if using the sieve plate process.



Customer advantages of using Flottweg Decanters

- Considerable increase in yield thanks to the efficient dewatering of the coffee grounds
- Efficient dewatering also means the amount of coffee ground to be disposed of is reduced.
- Due to the separation of fine particles, the filter load is reduced, decreasing filtration costs

The picture shows the scroll
in a decanter bowl

OPTIMIZING PROCESS ENGINEERING

Support by Our Experts

Separation technology often has a considerable impact on the operating costs of the overall process. Each process is different and some pa-

rameters can influence separation efficiency considerably. If using the technology in the right way, costs can be significantly reduced increasing benefits.



Spin tests to evaluate the volumetric composition of different extracts as well as consistency of their solids



Filter test to evaluate the separation efficiency of the disc stack centrifuge

On the left: solids load in the feed of the Flottweg Disc Stack Centrifuge

On the right: after clarification using the Flottweg Disc Stack Centrifuge, no more solids particles can be seen



We support our customers throughout the decision-making process, from the first idea to optimization, and from engineering to acceptance tests and laboratory tests. Flottweg has everything you'll need to analyze your processes and find new potentials. You'll benefit from the short communication channels of a middle-sized company. Our custom-fit solutions offer considerable additional value. Systems adapted to the specific application work better, offering a higher performance.

Using our test machines at your site often offers complete security when choosing the right separation equipment. Flottweg can also provide test machines for difficult applications. Under actual conditions at your site, you will immediately see the first results for your process.

Our worldwide network means we can guarantee support and service for our customers. Thanks to our experience and our test options, we work together with our customers to develop custom solutions.

Our service and advice in a nutshell

- Worldwide advice
- Laboratory testing, especially for new products and processes
- Testing under actual circumstances at the customer's site anywhere in the world
- Solutions tailored to your process
- Worldwide repair and maintenance services
- Spare parts supply, guaranteed for 30 years
- Advice even after sales



Mobile test unit under actual conditions at the customer's site

REDUCING WASTE WATER DISPOSAL COSTS

The Flottweg C-Series for Processing Industrial Waste Water

In coffee processing, huge amounts of different types of waste water are generated. High solids loads and COD values are characteristic for industrial companies: Increasingly strict regulations make introducing this waste water into municipal systems difficult, thus creating additional costs.

Flottweg has developed the C-series especially for processing industrial waste water. Our indus-

trial centrifuges continuously separate the solids from process streams. Due to the high centrifugal forces, even very fine solids can be separated. Depending on its origin, this cleaned waste water may be reintroduced into the system as operation water for cleaning and flushing, thus reducing the demand on fresh water.

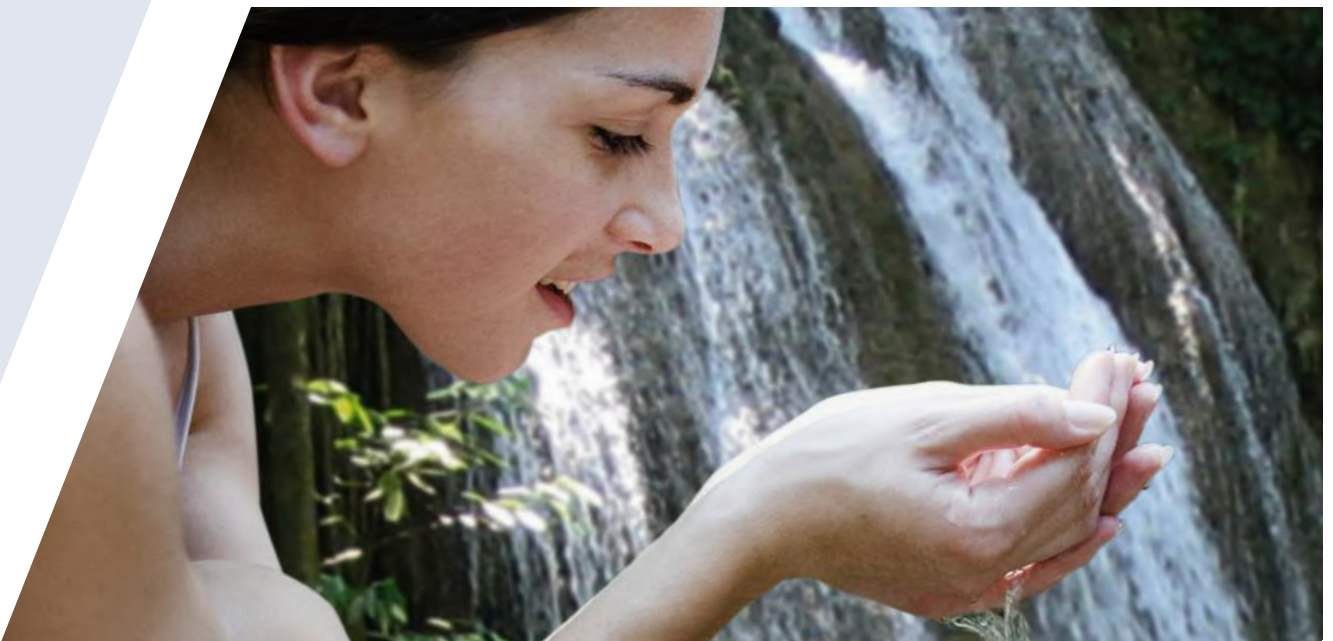
Reducing the COD values of waste water which is to be disposed of helps to save money for disposal.

Advantages of the Flottweg C-series for processing industrial and process waste water

- Efficient and continuous separation of solids – thus reduced waste water disposal costs
- Round-the-clock operation without monitoring
- Machines for high capacity but with small footprint
- Easy handling and monitoring thanks to continuous, automatic operation
- Closed construction to avoid odor emissions

Advantages when using the C-series machines in industrial sewage plants

- Efficient dewatering and thickening of sewage and flotation sludge, thus reducing the amount of sludge and therefore sludge disposal costs
- Continuous dry substance content in the dewatered sludge, even in case of varying feed conditions



GLOBAL AFTERMARKET SUPPORT NETWORK

No Matter Where You Are in the World



CUSTOMER SERVICE IS OUR STRENGTH

Application-based project planning, high-quality manufacturing, and professional after-sales service are essential for a trouble-free operation. The experienced and reliable service engineers in our customer service department are ready to respond quickly if needed. The Flottweg Service Group is also available to perform preventive maintenance in order to avoid interruptions in production.

QUALITY “MADE IN GERMANY”

Flottweg is ISO 9001 certified and manufactures its products in compliance with all the latest technical standards.



AFTER-SALES CUSTOMER SERVICE

Even the best machinery needs to be maintained and serviced. Flottweg has established a worldwide service network consisting of its own subsidiaries, branch offices, and representatives to provide our customers with localized service and spare parts.

Our service engineers and technicians are qualified for any kind of installation, commissioning, repair and maintenance.

FLOTTWEG WORLDWIDE

Flottweg is headquartered in Vilsbiburg (near Munich), Germany, and has branch offices in Cologne and Leipzig as well as subsidiaries in Australia, Brazil, Canada, China, France, Italy, Mexico, Peru, Poland, Russia, and the United States plus representatives in nearly every country in the world.

Flottweg Services include

- Experienced advice on separation processes
- Pilot tests on-site or at the Flottweg Laboratory and Test Center
- Selection and sizing of appropriate equipment
- Customer-specific automation/control systems and process integration
- Design and construction of complete process systems
- Installation, commissioning, maintenance, repair and spare parts, service worldwide

Check out our website at www.flottweg.com to find a competent contact person.



Flottweg Separation Technology – Engineered For Your Success



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REPRESENTATIVE



FLOTTWEG CENTRIFUGES

The Most Efficient Industrial Fish Processing



TRENDS AND FIGURES

The latest figures for the global production of fish, crustaceans and molluscs published by the FAO* in 2014 show that in recent years, the total amount has reached 160 million tons per year. This figure includes both the capture production which has been nearly constant with approx. 90 million tons per year, as well as the aquaculture production which currently amounts to approx. 70 million tons per year and has shown continuous growth over the last several years.

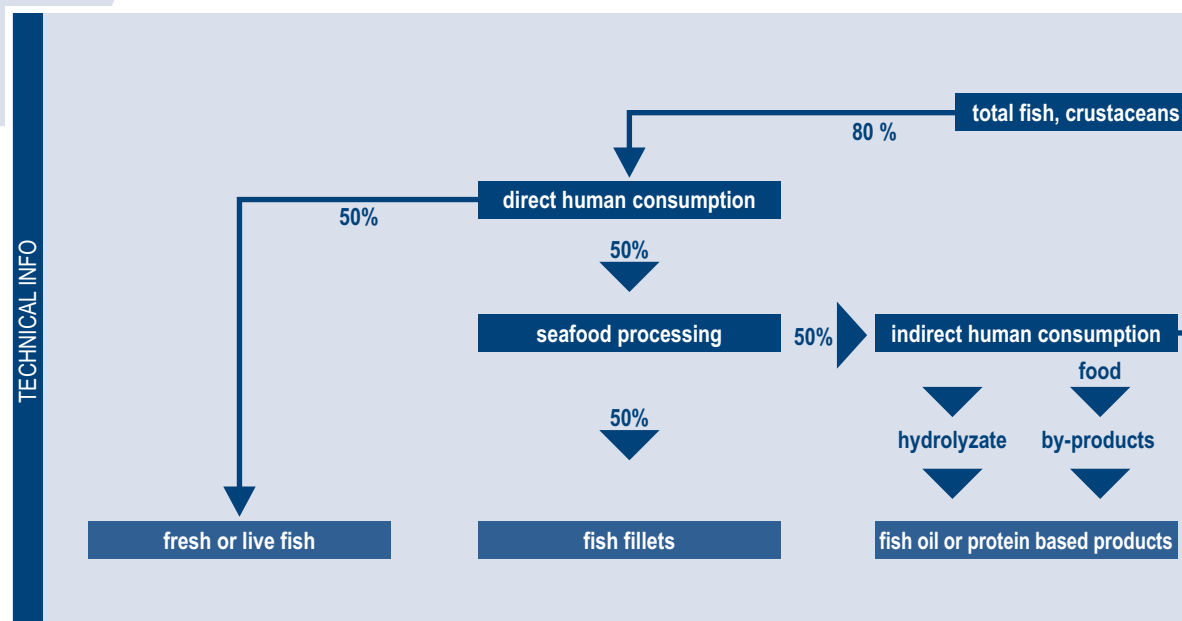
Nearly 80 percent, i.e. 130 million tons per year, are used for direct human consumption. The other 20 percent of the global production, 30 million tons per year, are by-products such as by-catch, heads, bones and skins which are separated during the various stages of industrial processing.

The amount destined for human consumption is divided into two: One half is sold live or fresh while the other half is processed into conven-

ience sea-food products, marinated or canned. Approximately 50 % of the raw material to be processed for seafood is edible. This means that a quarter of the production destined for human consumption is not useable for direct human consumption. A part of this portion is used for elaborated food products such as fish soup, sauces, flavors etc., whereas the rest ends up as residuals.

In total, each year there are globally approx. 50 million tons of residuals from fish production and processing which could either be a hazard when carelessly discarded into the environment or a source of additional profit when converted into something of value, e.g., fish oil and fish meal for feed, as well as for industrial use.

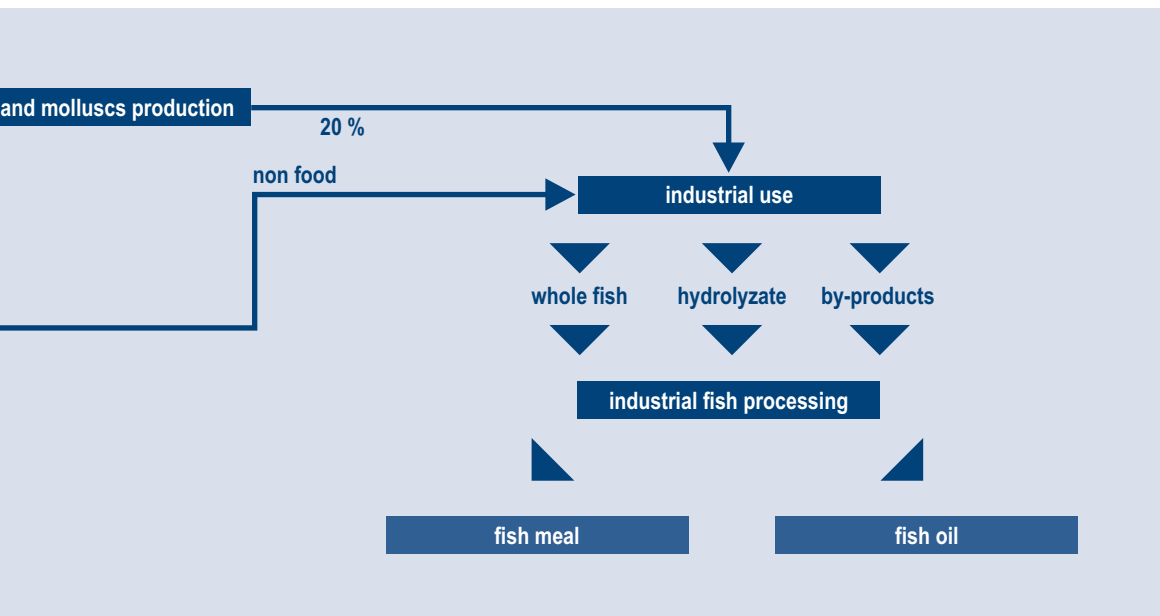
* Food and Agriculture Organization of the United Nations



Industrial centrifuges are able to separate oil from water, solids from water as well as oil, water and solids simultaneously. So they play a key role in all of the processes for the recovery of fish meal and fish oil as well as in some processes for seafood production, e. g. surimi. Many Flottweg Centrifuges have been in service for decades in all of the major fish processing regions worldwide. The reasons for this are the following key success factors:

Key success factors

- No alteration of the product due to quick processing, even in cases of large volume
- Reduced emissions of odors or vapors due to the closed design
- Cleaning in place (CIP) capability (option)
- High performance and separation efficiency
- High cost efficiency due to continuous and automatic operation
- High reliability and availability



THE TRICANTER® PROCESS

Recovery of Fish Meal and Fish Oil

The Tricanter® process is considered to be the standard fish meal process and was developed to recover fish meal and fish oil from whole fish or from residuals such as heads, fins, bones, etc. This procedure is usually applied in large scale fish filleting plants which process more than 8 tons per hour. In South America it is the most used process to produce fish meal and fish oil from anchoveta.

In the first process stage the raw material is heated so that it disintegrates and releases the fish oil. After cooking, the material passes through a screening stage to be separated into a protein-rich solid phase and a liquid phase containing oil, water and fine solids. Next, the solids phase from the screens is separated further via presses into a press cake and a liquid phase. Finally the press cake is dried to obtain the fish meal.

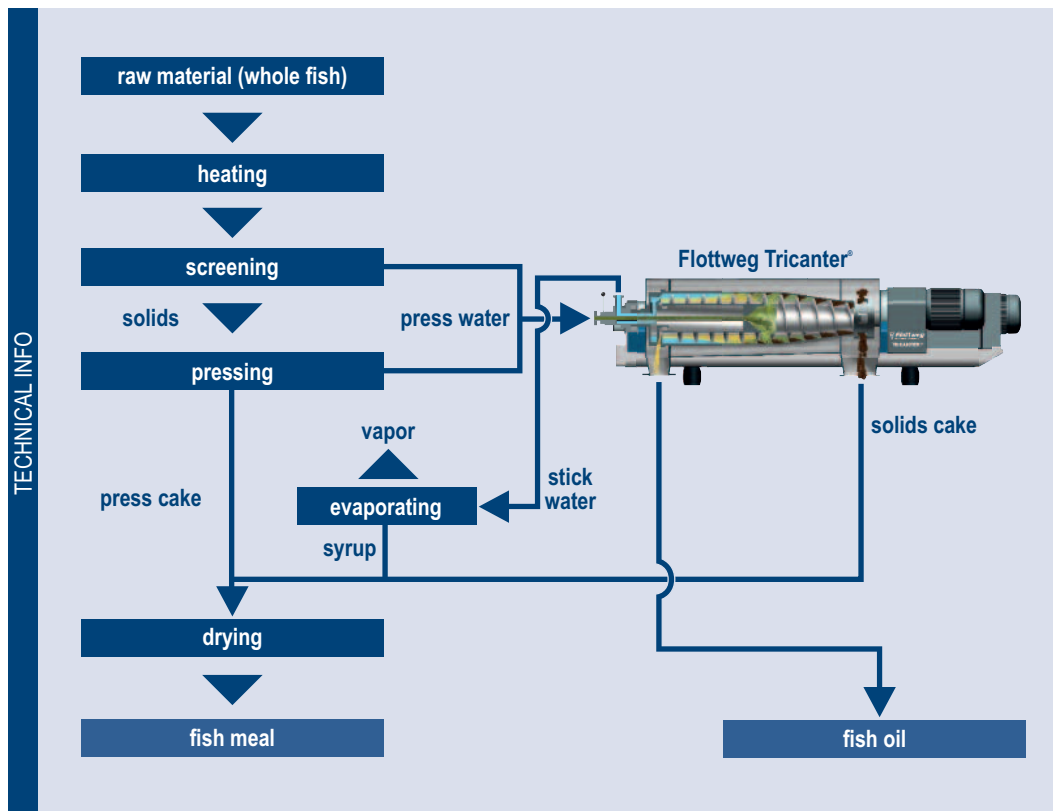
The liquid phase from the screening and pressing stages is separated into fish oil, stick water and solids. For this separation there are two options: A two-stage separation where a clarifying decanter separates the solid material followed by a disk stack centrifuge to skim the fish oil from the stick water. In contrast, the Flottweg Tricanter® enables this 3-phase separation in one single stage.

Benefits of the Flottweg Tricanter® in comparison to two-stage separation

- Faster processing
- Reduced investment costs for machines and accessories
- Saves operation costs for heating, maintenance and service
- Saves space inside the building
- Saves power consumption

Afterwards, the stick water is concentrated into a syrupy consistency through evaporation. This syrup and the solids cake from the Decanter/Tricanter® are mixed together with the press cake and thermally dried.





HYDROLYSIS

Innovation for Added Value

Hydrolysis is the enzymatic disintegration of proteins located in muscles or other tissues. Typical raw products are by-products and residuals from fish processing.

ENZYMATIC HYDROLYSIS

Another process is the production of fish oil and fish meal from fresh material which is not used for filleting or canning but is used for food or animal feed. Typical examples for use in human consumption are elaborated fish products or additives such as fish soup, fish sauces, flavors, energy drinks, etc.

The separation into fish oil, stick water and protein-rich solids is performed in one to three stages, depending on the raw material and the desired purity of the final products. In the first stage there is always a Tricanter®. Optionally the oil can be separated further using a disk stack centrifuge for higher purity. Another option is a second clarification via the Flottweg Sedicanter® to separate the fine solids from the stick water in order to reduce its viscosity for a higher concentration as well as to reduce fouling inside the evaporator.

Customer Benefits

Flottweg Tricanter® in hydrolysis processes

- Enables quick processing to avoid alteration of the product
- Energy efficient operation
- High flexibility

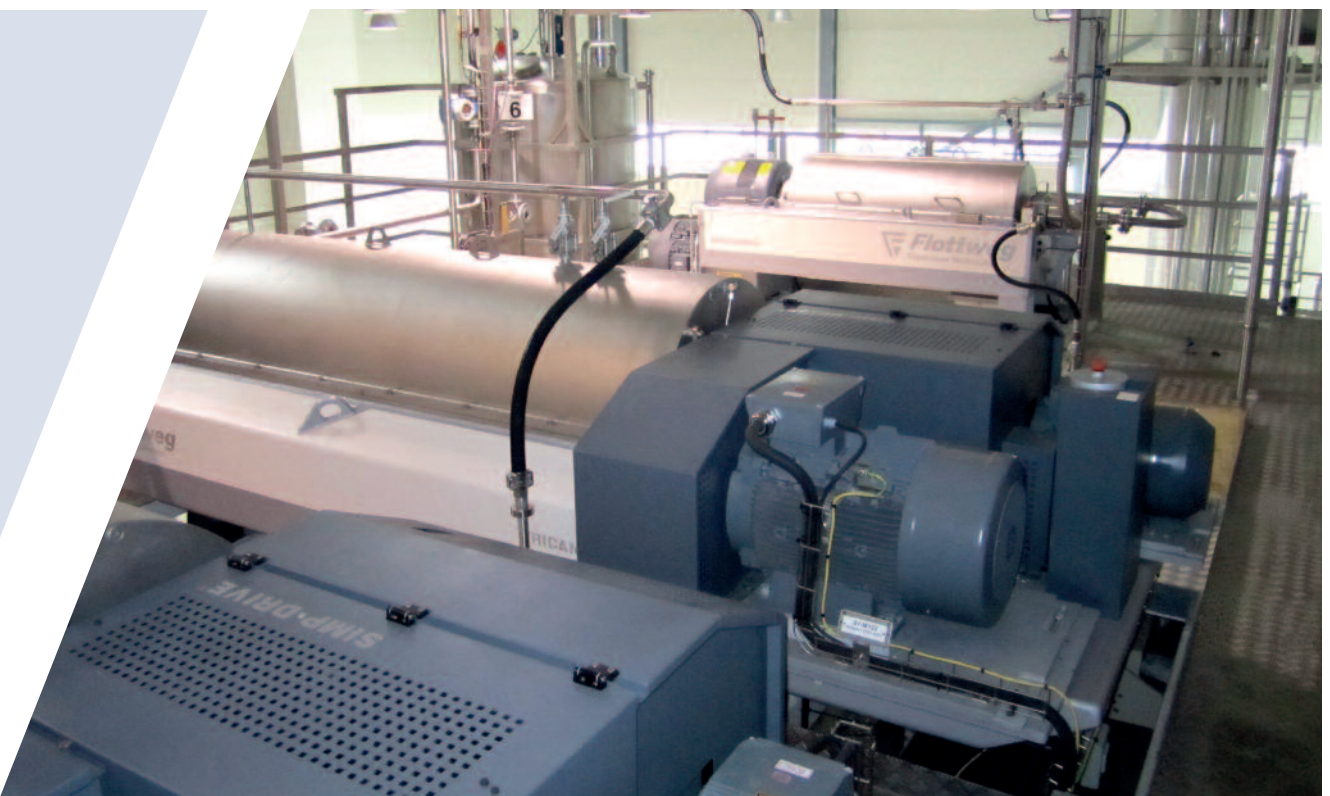
Flottweg Sedicanter®

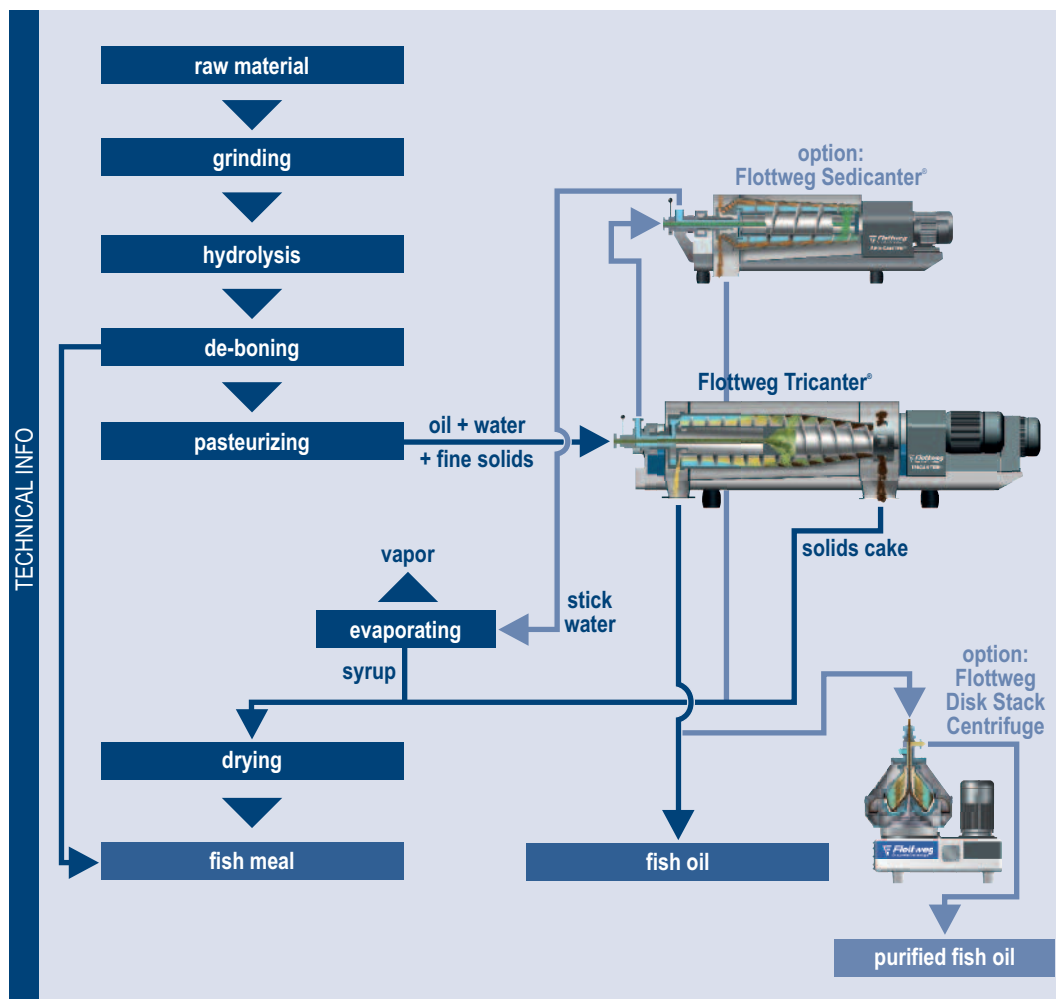
- Unique innovative centrifuge for enhanced efficiency of the entire process
- Higher yield in protein due to high separation efficiency
- Reduced cleaning efforts due to less fouling since a smaller quantity of solids go to the evaporator

Flottweg Disk Stack Centrifuge

- High purity fish oil
- High yield of purified oil due to partial bowl discharge

Flottweg Tricanter® Z5E and Sedicanter® S4E in a Norwegian facility for processing fish hydrolysis





Flottweg Disk Stack Centrifuge AC 1500 for oil purification



DIRECT PROCESSING OF FISH BY-PRODUCTS

Everything Has Value

Direct processing means that the raw material is ground up and then goes directly to the heater. After heating, it is separated into fish oil, stick water and a solids cake via the Flottweg Tricanter®. The stick water is concentrated to a syrupy consistency through evaporation. This syrup and the solids cake from the Tricanter® are blended for thermal drying.

Direct processing is suitable for the production of fish oil and fish meal from whole fish, by-catch, by-products from filleting plants as well as residuals from canning. Sometimes direct processing is also used with spoilt material, which causes problems when handling in screw presses, as well as for processing special species. Typical capacities range up to 6 tons per hour.

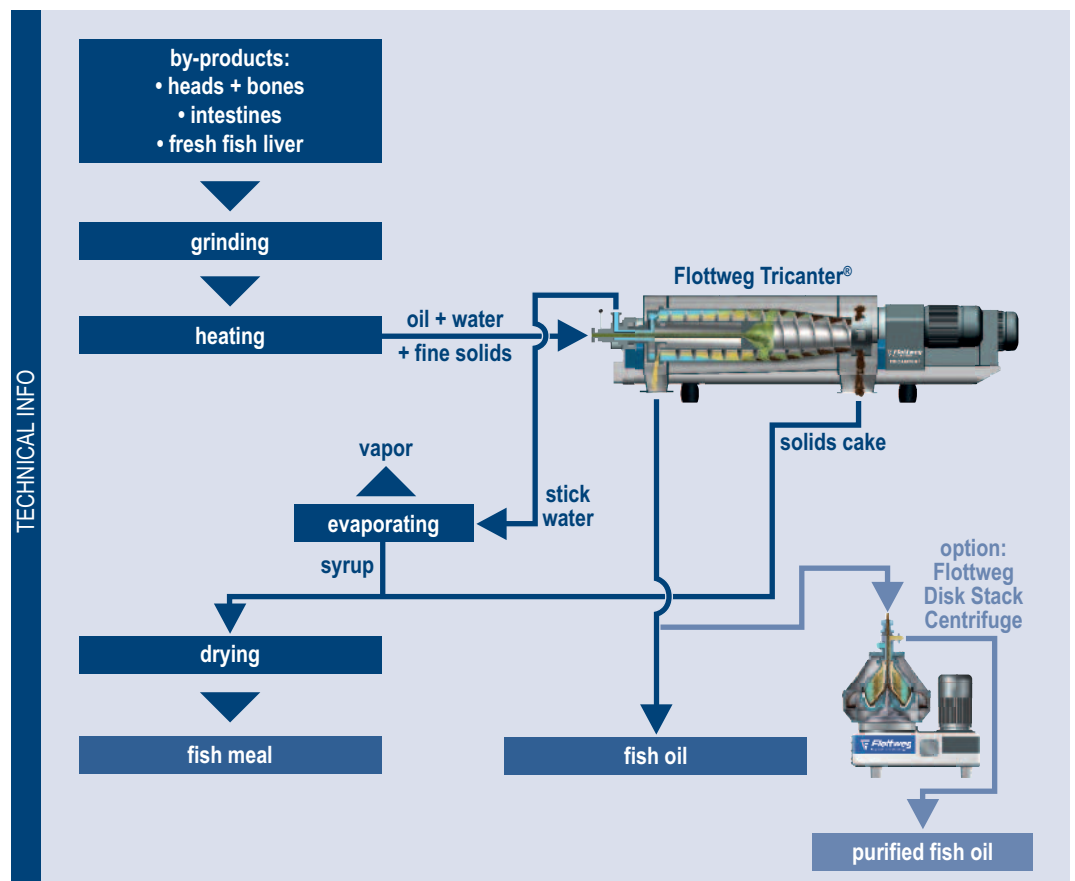
Direct processing is also used for the recovery of fish liver oil for direct human consumption. In this case the entire process line is laid out in hygienic design and nitrogen blanketing is available as an option in order to avoid oxidation of the liver oil.

An option in cases where a particularly high oil purity is needed, e.g. for recovery of Omega 3 fatty acids or high quality oil for human

Benefits of the Flottweg Tricanter® in direct processing

- Quick processing to avoid alteration of the product
- High quality fish oil without an increase in free fatty acid (ffa) content
- Reduced amount of waste to be disposed of
- Energy efficient operation
- Available as skid mounted package unit on a platform or inside a container

consumption, is to purify the oil coming from the Tricanter® using a disk stack centrifuge.



FISH SILAGE

Raw materials from decentralized processing facilities are collected and stored in tanks; sometimes the material is ground. An enzymatic reaction is performed using either the native enzymes of the fish or bacterial activity. The biological reactions are controlled by adding acid, thus adjusting the pH-value. Due to this treatment the material becomes storable. Before processing it into fish oil and fish meal, it is pasteurized. This kind of hydrolysis is also suitable for processing material which comes from contaminated, virus infected or dead fish.

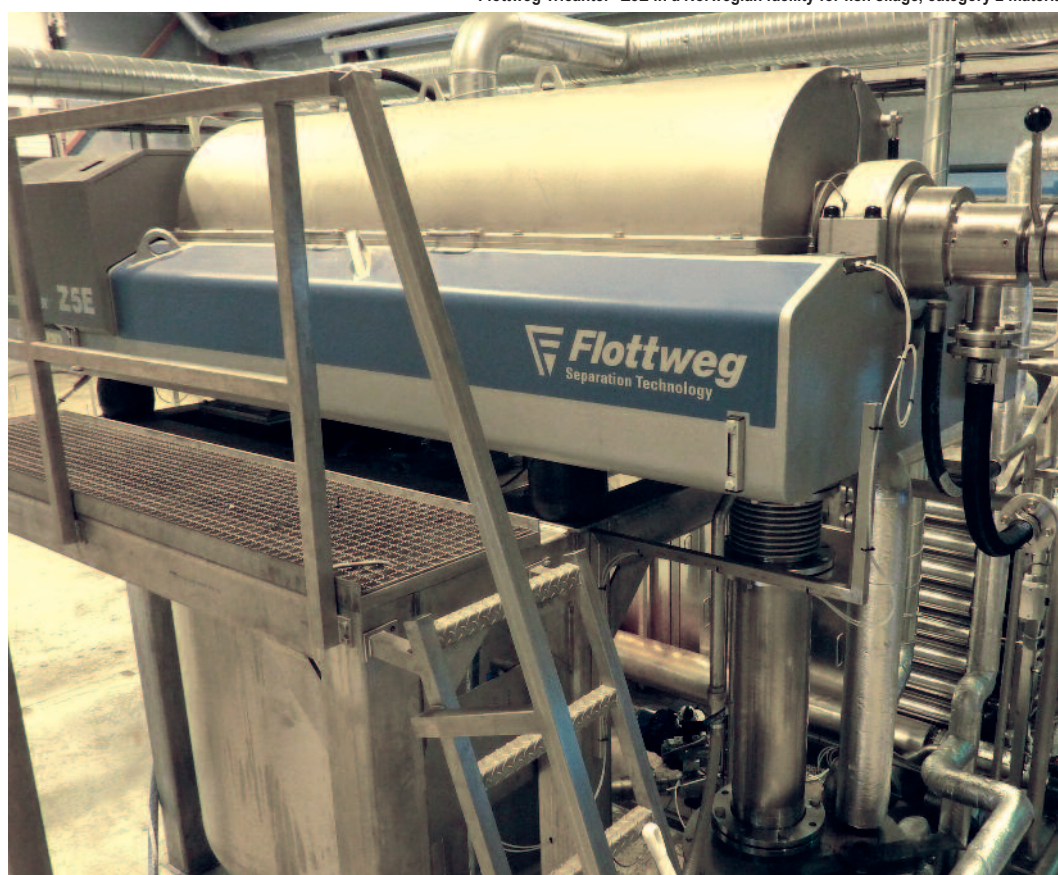
However, this so-called category 2 material must be strictly kept away from the food supply chain. So the oil from category 2 material is only suitable for industrial use or fuel. After continuous sterilization, protein substrate made from this material can be used for biogas production.

Customer Benefits

Flottweg Tricanter®
for processing fish silage

- Quick processing
- High oil purity in one separation stage
- Suitable for processing cat 2 material
- Process integration including continuous sterilization

Flottweg Tricanter® Z5E in a Norwegian facility for fish silage, category 2 material



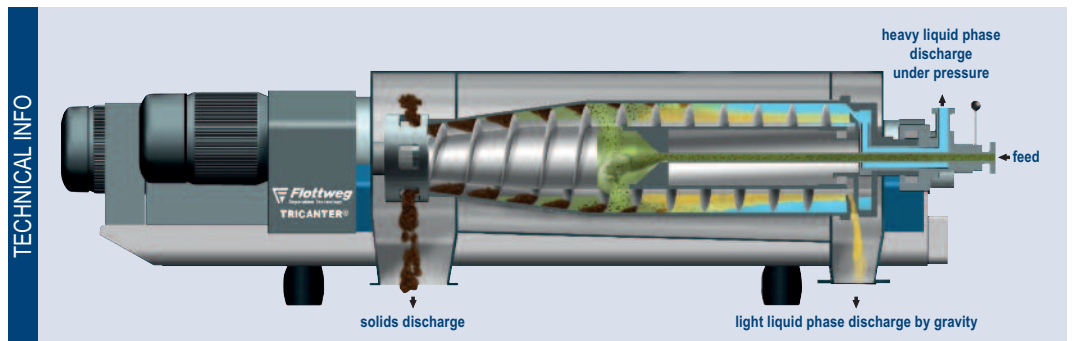
FLOTTWEG TRICANTERS®

a Proven and Convincing Technology

In 1971, Flottweg presented the first Tricanter®, a centrifuge which simultaneously separates oil, water and solids. Compared to other 3-phase decanters the Flottweg Tricanter® stands out by its high separation efficiency which results in high purity of the separated oil and virtually no oil losses in the separated water. The reason for this unique separation efficiency is an impeller disk which can be adjusted during operation. The adjustable impeller allows a fine adjustment of the boundary line between oil and water so that the separation of oil and water is always accurate.

Key success factors at a glance

- 24 hour operation with minimum supervision
- Low specific energy consumption
- Compact design, small footprint
- Easy control and monitoring due to continuous and automatic operation
- Differential speed control can be regulated for a consistent cake dryness using the Flottweg Simp Drive®
- Sealed construction that prevents odor emissions
- Accurate separation of water and oil since the impeller disk can be adjusted during operation at full speed
- Hygienic design available



Flottweg Tricanter® (Three Phase Decanter)
Discharge of the centrate: heavy liquid phase under pressure, light phase by gravity





TECHNICAL DATA FOR FLOTTWEG TRICANTERS®			
Type	Z4E-4	Z5E-4	Z6E-4
Materials of construction	All product wetted parts are made of high grade stainless steel such as 1.4463 (Duplex), 1.4571 (AISI 316 Ti), etc.		
Dimensions* (L x W x H)	3735 x 1000 x 1200 mm 147" x 39" x 47"	4524 x 1564 x 1121 mm 178" x 61" x 44"	5147 x 1705 x 1500 mm 203" x 67" x 59"
Gross weight*	3000 kg 6614 lb	6200 kg 13,670 lb	9750 kg 21,500 lb
Motor for bowl drive	22 kW 30 hp	45 kW 60 hp	75 kW 100 hp
Motor for scroll drive Flottweg Simp Drive®	11 kW 15 hp	15 kW 20 hp	30 kW 40 hp

* The listed figures are guidelines for information only.



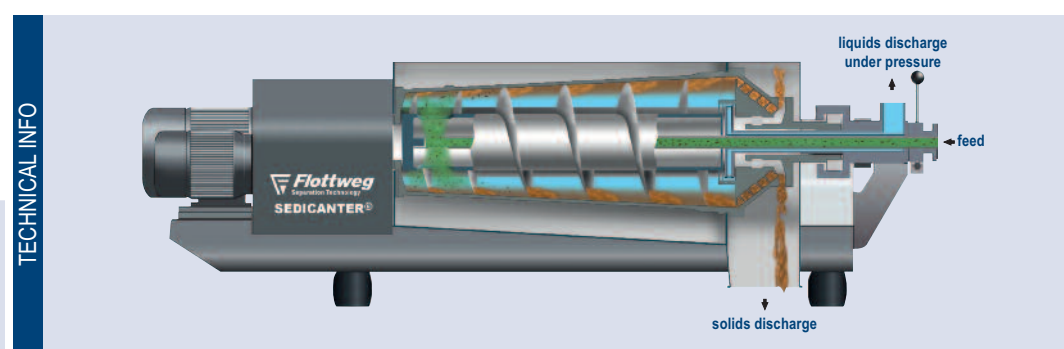
FLOTTWEG SEDICANTERS®

Perfection in Separation

The Flottweg Sedicanter® is an innovative centrifuge built for the separation of fine soft solids difficult to separate via a Decanter or Tricanter®. Due to its unique bowl design the Flottweg Sedicanter® operates at much higher g-force than a Decanter or Tricanter®. So in fish processing, the Flottweg Sedicanter® is the perfect option when fine protein rich material is to be separated from a water stream.

Benefits of the Flottweg Sedicanter®

- Unique design
- Outstanding separation efficiency
- High cake dryness
- Continuous processing



Flottweg Sedicanter®



TECHNICAL DATA FOR FLOTTWEG SEDICANTERS®

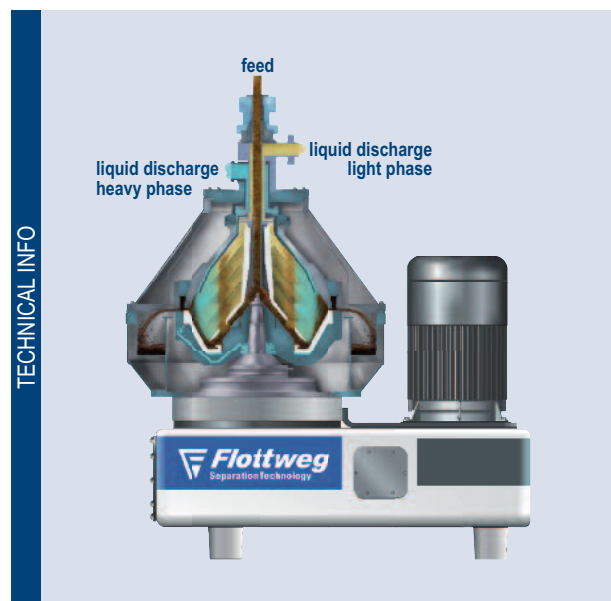
Type	S3E-3	S4E-3	S6E-3
Bowl diameter	300 mm / 12"	470 mm / 18"	670 mm / 26"
Bowl speed	7750 rpm	5000 rpm	3650 rpm
Differential speed	1.5 – 30 rpm	1.5 – 30 rpm	1.5 – 30 rpm
Materials of construction	All product wetted parts are made of high grade stainless steel such as Duplex, AISI 316 Ti and superior		
Dimensions* (L x W x H)	2304 x 700 x 752 mm 91" x 28" x 30"	3222 x 1000 x 1200 mm 127" x 39" x 47"	4527 x 1705 x 1270 mm 178" x 67" x 50"
Gross weight*	1210 kg / 2668 lb	3100 kg / 6834 lb	10,530 kg / 23,215 lb
Motor for bowl drive	15 kW / 20 hp	37 kW / 50 hp	75 kW / 100 hp
Motor for scroll drive Flottweg Simp Drive®	4 kW / 5 hp	5.5 kW / 7.5 hp	15 kW / 20 hp

* The listed figures are guidelines for information only.

® = registered trademark in various countries

FLOTTWEG DISK STACK CENTRIFUGES for Perfect Oil Purification

Disk stack centrifuges are the best option to polish the oil phase coming from the Tricanter® in cases where particularly high oil purity is required, e.g., recovery of Omega 3 fatty acid or fish oil for food production.



Flottweg Disk Stack Centrifuge

TECHNICAL DATA FOR FLOTTWEG DISK STACK CENTRIFUGES			
Type	AC1000	AC1500	AC2000
Bowl volume	4 liters	14 liters	25 liters
Solids space	1.5 liters	7 liters	11.5 liters
Dimensions* (L x W x H)	1100 x 600 x 1000 mm 43" x 24" x 39"	1500 x 1000 x 1700 mm 59" x 39" x 67"	2000 x 1100 x 2100 mm 79" x 43" x 83"
Gross weight*	390 kg / 860 lb	1600 kg / 3530 lb	2900 kg / 6400 lb
Bowl drive max.	5.5 kW / 7.5 hp	18.5 kW / 25 hp	37 kW / 50 hp

* The listed figures are guidelines for information only.



RECOVERY OF FISH MEAL FROM WATER TREATMENT

from Waste to Value

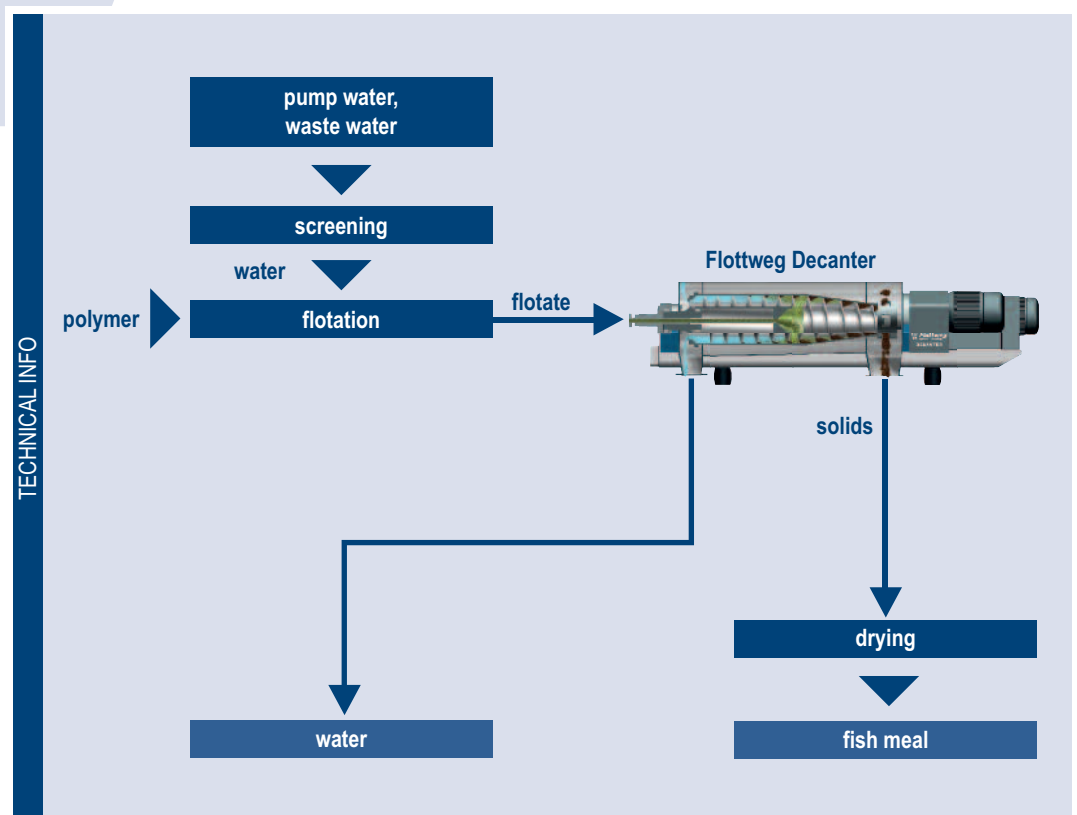
Water streams in the fish processing industry such as pump water, flush water from cleaning and waste water contain a remarkable portion of protein which should not be released into the environment. On the other hand, when recovered as fish meal it might be a source for additional income.

Incoming water passes a screening stage where the coarse material is separated. In a dissolved air flotation unit (DAF) the suspended solids build up as a floating layer which is pumped into a decanter centrifuge for dewatering. With the addition of polyelectrolytes, the fine solid particles clump together to form larger flakes which enhance the efficiency of the flotation as well the decanter performance. The solids cake from the decanter is dried in a process downstream.

Benefits of the Flottweg Decanter in comparison to other dewatering techniques

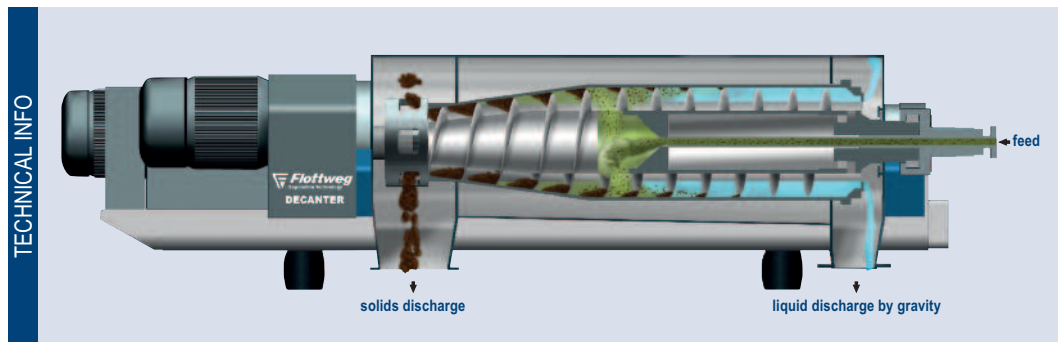
Optimized operation/labor costs by

- Continuous and automatic operation
- Easy cleaning by flushing without dismantling
- Durable wear protection and field-replaceable spare parts
- No consumables such as filter aids, filter cloth, etc.
- Reduced drying costs due to maximum cake dryness
- Outstanding energy efficiency



Just as the Flottweg Tricanter® for the 3- phase separation, the Flottweg Decanter is the right equipment for two phase separation tasks such as the dewatering of sewage sludge in industrial and municipal waste water facilities. Since the 1950s, when Flottweg started to build centrifuges, providing decanters for waste water treatment has been one of Flottweg's core strengths.

Today Flottweg Decanters efficiently operate in waste water facilities all over the world. In the fish industry Flottweg Decanters are in use for the dewatering of waste water sludge or flotat from pump water.



Flottweg Decanter for liquid-solid separation with gravity overflow of the liquid phase (centrate)



QUALITY “MADE
IN GERMANY”



Flottweg is ISO 9001 certified and manufactures its products in compliance with all the latest technical standards.

TECHNICAL DATA FOR FLOTTWEG DECANTERS				
Type	Z4E-4	Z5E-4	Z6E-4	Z73-4
Materials of construction	All product wetted parts are made of high grade stainless steel such as Duplex stainless steel 1.4571 (AISI 316 Ti), etc.			
Dimensions* (L x W x H)	3500 x 1000 x 1200 mm 138" x 40" x 47"	4180 x 1560 x 1400 mm 165" x 61" x 55"	4800 x 1705 x 1500 mm 190" x 67" x 60"	4815 x 2350 x 1500 mm 190" x 92" x 60"
Gross weight*	2600 kg 5700 lb	6200 kg 13,700 lb	9230 kg 20,350 lb	11,000 kg 24,250 lb
Motor for bowl drive*	22 kW 30 hp	45 kW 60 hp	75 kW 100 hp	90 kW 125 hp
Motor for scroll drive* Flottweg Simp Drive®	4 kW 5 hp	7.5 kW 10 hp	15 kW 20 hp	22 kW 30 hp

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Flottweg Separation Technology – Engineered For Your Success



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REPRESENTATIVE

**FLOTTWEG PROCESSING TECHNOLOGY
FOR THE PRODUCTION OF
FRUIT AND VEGETABLE JUICES**

From Fruit to Juice



FLOTTWEG PROCESSING TECHNOLOGY FOR THE PRODUCTION OF FRUIT AND VEGETABLE JUICES

Reliable and Complete Solutions from One Source

Separation technology plays a prominent role in the production of juices, helping to preserve the precious natural substances of fruits and vegetables. Flottweg offers various systems as well as individual components for the efficient production of high-quality fruit and vegetable juices.

We offer individual solutions from one source, adapted to your raw material and your process – from extraction and basic clarification to fine clarification – whether your production involves direct juices, raw juices for concentrates, or a combination of different processes.

- From fruit to juice: complete processing lines, from the feed of the raw material to juice
- Optimal extraction using Flottweg Separation Technology assures high yields in the production of fruit and vegetable juices
- Cost-conscious and gentle processing using belt presses, decanters and disc stack centrifuges especially adapted to the fruit juice industry; individually projected processing lines
- Competent and customized solutions; customer support by our projecting department, from the initial idea to the commissioning of the process line

OVERVIEW OF APPLICATIONS

Fruit Juices

- Apples and pears
- Berries (raspberries, redcurrants etc.)
- Cherries
- Elderberries
- Sallow thorn (sea buckthorn) berries
- Dates
- Grapes
- Citrus fruits (juices and essential oil)
- Tropical fruits (mangos, pineapples etc.)

Vegetable Juices

- Root vegetables (carrots, beets, celery, onions etc.)
- Fruit vegetables (tomatoes, peppers etc.)

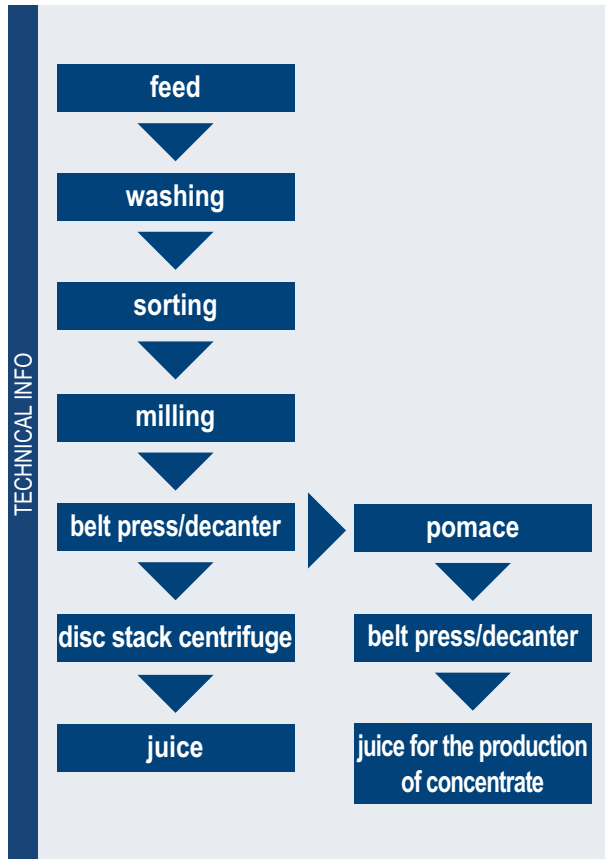
Special Products

- Herbs
- Mushrooms
- Peas
- Soya (okara)
- Coffee products
- Medicinal plants (nettles, echinacea)
- Beverages from grain mash



FROM FRUIT TO JUICE

Scope of Supply and Services



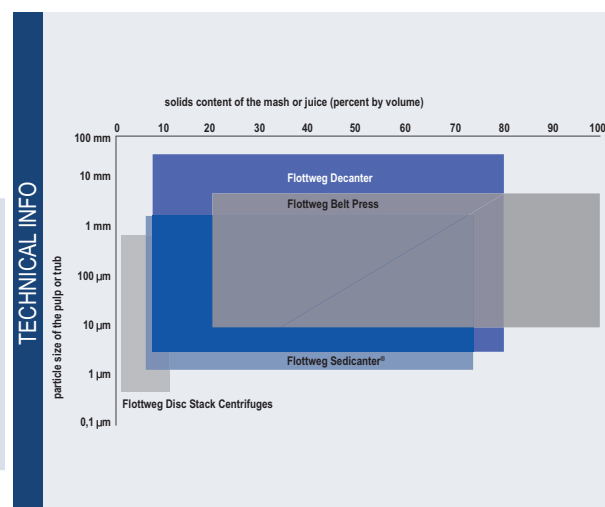
Flottweg Systems for the production of juice



THE OPTIMAL SEPARATION EQUIPMENT FOR EACH PROCESS

The decision of which separation equipment should be used depends basically on the type of fruit or vegetable to be processed. One important selection criterion is the pulping process. Other parameters such as the particle size of the trub to be separated as well as the quantity of solids contained in the mash are also decisive.

This diagram shows a simplified overview of applications for Flottweg Decanters, Disc Stack Centrifuges and Belt Presses.



Another decisive factor is the maturity status of the raw material. Our project engineering department works out the solution which fits best for your process and your products.

Rely on our experience and on numerous satisfied Flottweg customers. Flottweg offers the right separation equipment or the best combination of components for each application.

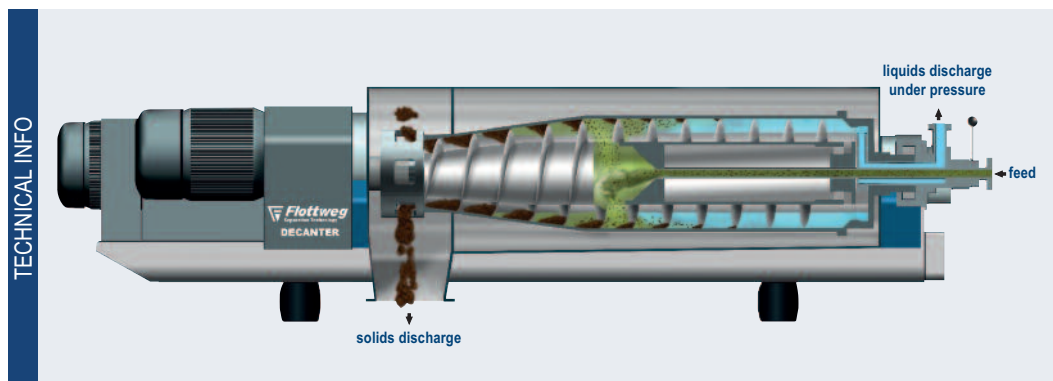
Flottweg advantages

- Elaboration of individual separation technology solutions by an in-house project engineering department
- Flottweg Decanters, Disc Stack Centrifuges, Tricanters®, Belt Presses and Systems especially adapted to the beverage industry
- Easy integration in existing processes, possible at any time
- “Made in Germany” – Flottweg Centrifuges and Belt Presses are manufactured exclusively in Germany by skilled specialist workers
- Long experience and extensive knowledge of the use of centrifuges and belt presses for the production of beverages

THE FLOTTWEG DECANTER

Application and Characteristics

Decaners are used for the extraction of finely solubilized fruit and vegetable mashes. They excel in high yields and can be used flexibly for different applications.



Flottweg Decanter for the separation of solids from liquids under pressure

Flottweg Decanter

Continuous operation

- Flexibility
- Quick and gentle processing
- Hygienic due to the closed system

Adjustable impeller

- High yields also in case of changing feed conditions
- Flexible and easy adaption to various types of fruit and vegetables
- Optimum cleaning
- Juice discharge under pressure

Modular construction

- Optimal adaptation to your specific requirements (e.g. hard-facing in case of "sandy" products)
- High yields due to optimum dimensioning (scroll, cone angle etc.)

Drive system Simp Drive®

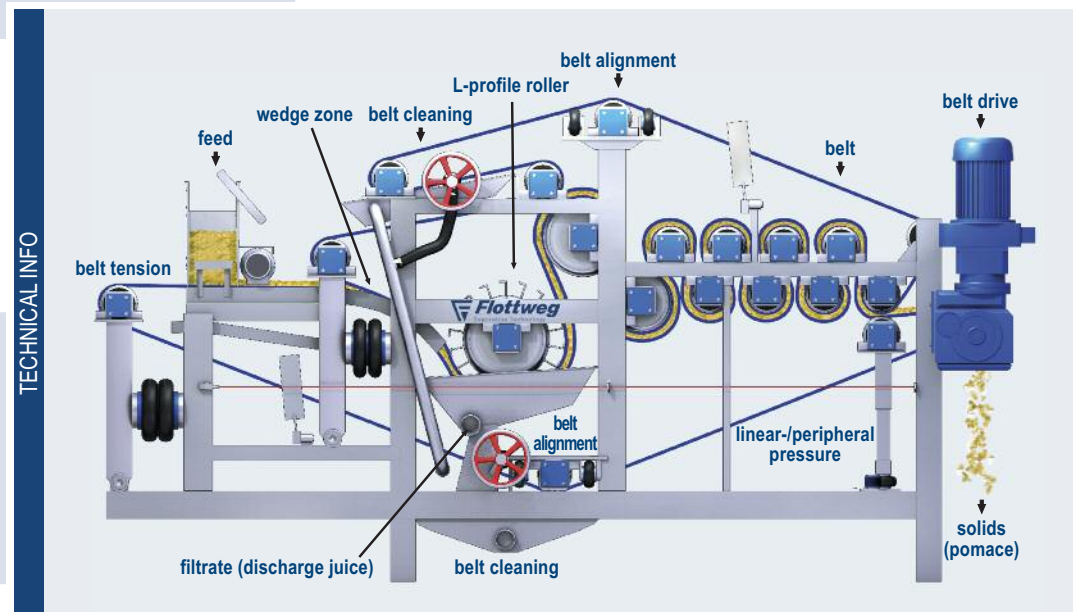
- Lower energy consumption due to high separation efficiency
- Constant differential speed, also in case of high torque, resulting in high yields
- The bowl is discharged when it is shut down (e.g. when production is finished)

THE FLOTTWEG BELT PRESS

Application and Characteristics

The Belt Press is used for dewatering products containing a large quantity of solids, e.g. for extracting fruit mashes. The machine excels in high yields and a high dry substance content in the pomace.

The special design of the profile rollers and the belt alignment results in high pressure and shear stress, thus assuring a fast and efficient extraction of the product.



How the Flottweg Belt Press works

Flottweg Belt Press

Continuous operation

- Easy operation
- Automatically adjusted belt tension
- Easy accessibility
- High yields

Long life-cycle

- Exclusive use of high-grade steel
- Sturdy design / German engineering



Fruit mash before the wedge zone

Flottweg Belt Presses for the production of apple juice



THE FLOTTWEG DISC STACK CENTRIFUGE

Application and Characteristics

Disc stack centrifuges with self-cleaning bowl are used as clarifiers for the separation of fine solids which are not desired in the final product. Due to the high g-forces, it is also possible to separate very fine particles. Flottweg Disc Stack Centrifuges can also be used as

separators (three-phase-separation) for the production of essential oil. In this process they concentrate and purify the oil derived from the peels of citrus fruits.



Flottweg Disc Stack Centrifuge AC 2500 for the clarification of fruit juice and fruit wine

Flottweg Disc Stack Centrifuge for the clarification of fruit and vegetable juices

Unique Soft Shot® discharge system

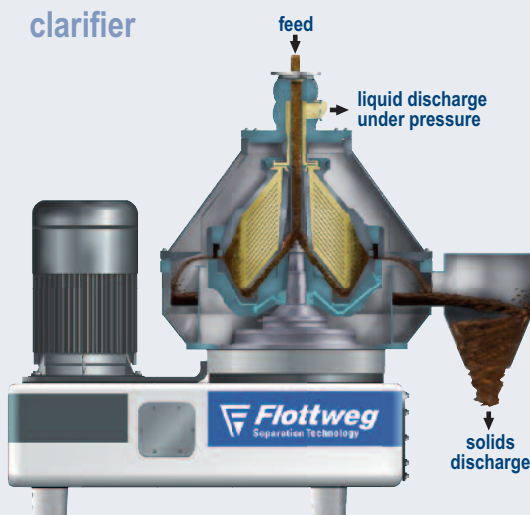
- Smooth, quiet run, no big bang during discharge
- Optional: “self-thinking” machine with trub monitoring

Made in Germany

- Sturdy and reliable design
- Low operating costs due to simple maintenance

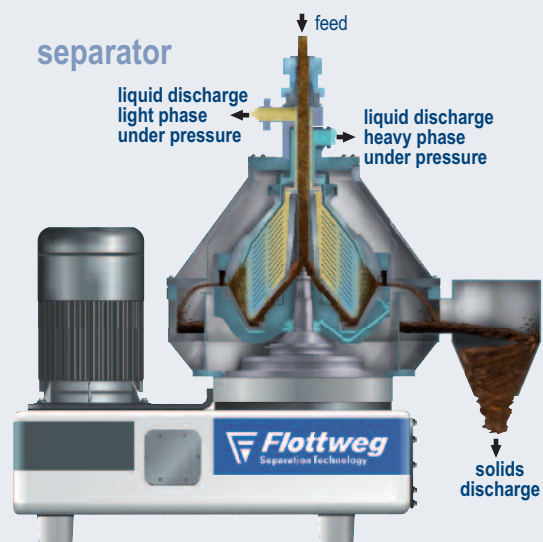
TECHNICAL INFO

clarifier



Flottweg Clarifier for the separation of solids from liquids

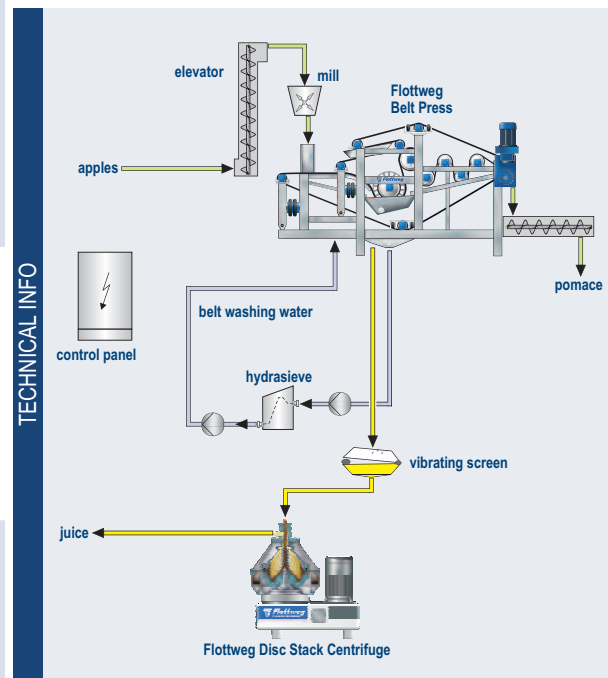
separator



Flottweg Separator for the separation of two immiscible liquids with simultaneous separation of solids

PRODUCTION OF CLOUDY JUICES

The Example of Apple Juice



Example of the production of cloudy apple juice

The demand for natural and untreated products is continuously increasing. Consumers attach great importance to high quality. Cloudy apple juice, for instance, should have a light color and a clear and stable turbidity. Production should be fast and continuous in order to prevent the product as far as possible from getting a brown color. These requirements can best be met by using a combination consisting of a belt press followed by a disc stack centrifuge.

FLOTTWEG BELT PRESS						
Type	BFRU 500	BFRU 800	BFRU 1200	BFRU 1500	BFRU 1750	BFRU 2500
Maximum capacity [t/h]	1 - 2	2 - 6	4 - 8	8 - 12	10 - 15	17 - 25
Yield [% by weight]	78 - 84 %* for all types					

Capacity and yields of Flottweg Belt Presses in the production of cloudy apple juices

* Data to be understood as values for cider apples which are immaculate and not overripe

FLOTTWEG CLARIFIER FOR JUICES					
Type	AC 1000	AC 1200	AC 1500	AC 2000	AC 2500
Maximum capacity [l/h]*	500 - 1500	2000 - 4000	4000 - 6000	8000 - 12000	18000 - 27000

* The listed figures are to be understood as guidelines. Actual capacity will depend on the individual characteristics of the feed product.

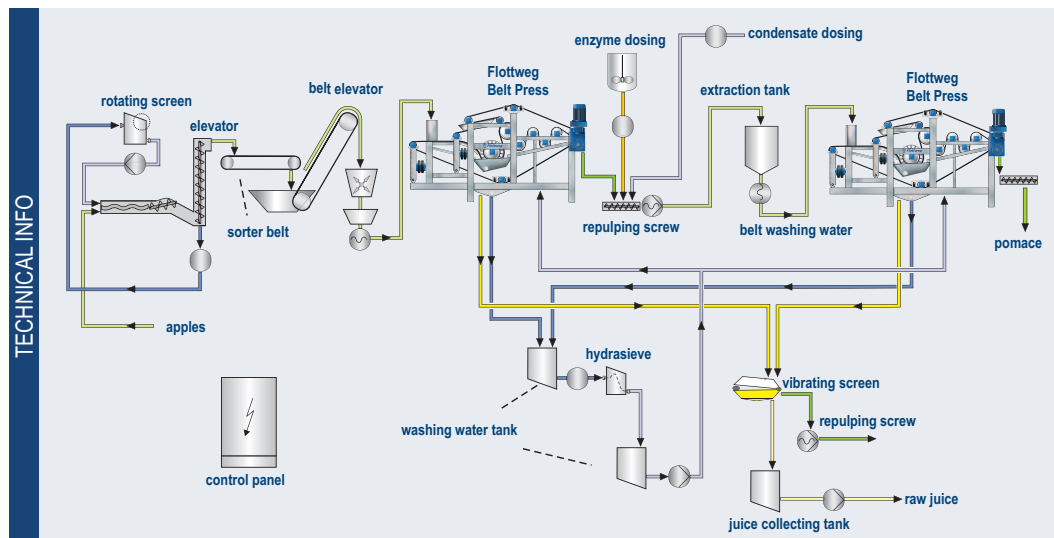
PRODUCTION OF CLOUDY JUICES

Two-Phase Juice Pressing

Due to the increasing competition on the worldwide fruit juice market, producers are always interested in obtaining the maximum yield from the raw material.

One possibility for this is post-extraction, if the pomace is not used for the recovery of pectin. With this two-phase process, it is possible to obtain yields of up to 92 percent by weight. The pomace is mixed with water vapors and, if requested, with enzymes, and extracted again after a short residence time. For this process, the Flottweg Belt Press is the best solution.

Flottweg Decaners can also be used in combination with belt presses for the production of apple juice or juice concentrates. While the Flottweg Belt Press is the best solution for extraction during the first phase (high capacity and high yields as well as high quality juices), the Flottweg Decaners are perfect for post-extraction, especially if the pomace is liquefied.



Example of two-phase apple juice processing using a belt press and pomace treatment with enzymes.

TWO-PHASE PRESSING			
Capacity [t/h]	10	15	20
Yields [% by weight]	88 - 92 % for all capacities		



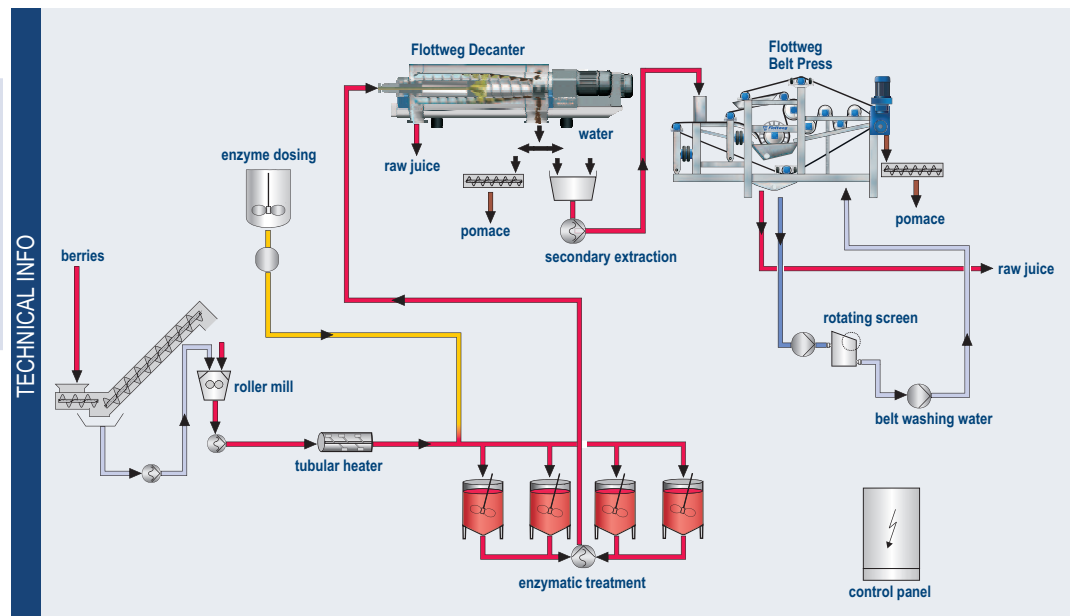
PRODUCTION OF BERRY JUICE

The Flottweg Decanter in combination with the belt press is the best solution for the flexible processing of different types of fruits and vegetables. Besides the production of pomaceous fruit juices (such as e.g. apple juice), it is also possible to process berries and other fruits and vegetables using the same production line.

The berry mash, to which enzymes have already been added, is extracted using the Flottweg Decanter. Thus high yields of juices with low turbidity content are obtained. During a second processing stage, which is optional, the solids from the decanter are extracted using a Flottweg Belt Press.

If a system of this kind is used, it is possible to achieve yields of over 95 percent by weight.

By using a decanter and a belt press in combination, fruit juice producers can considerably enhance their capacity utilization and the cost effectiveness of their entire system.

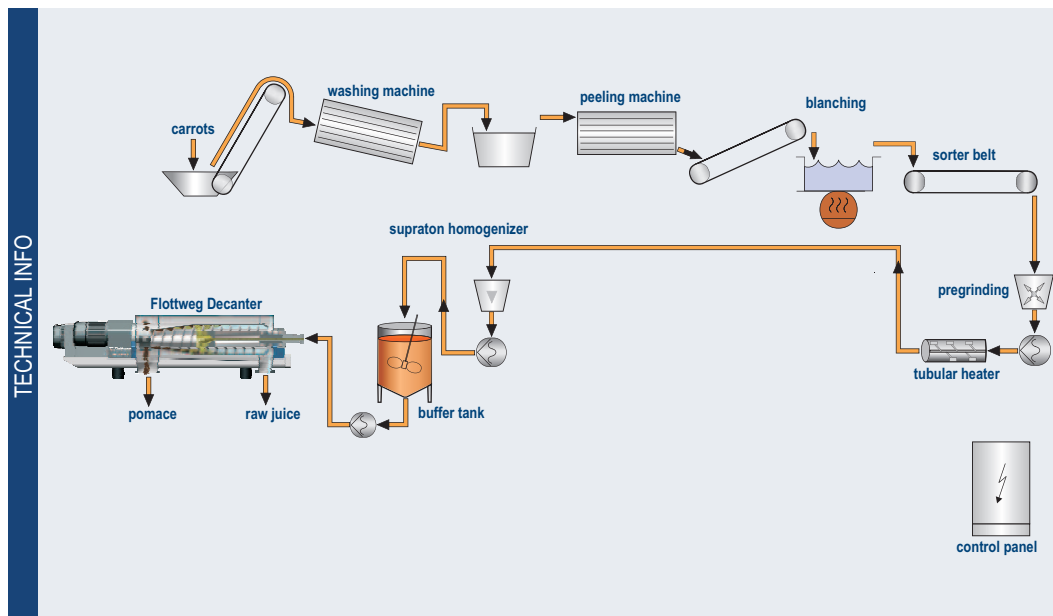


Example of a two-stage processing system for berries consisting of a decanter and a belt press



Depending on the type of vegetable, different processing systems for juice production are used. All processes have one thing in common: due to the high risk of deterioration of the raw material as well as the high quality demands of the consumers, stringently hygienic processing is a must. Thus highly efficient separation technologies are needed which ensure fast and gentle processing of the product plus high economic efficiency.

Flottweg Decaners designed especially for the production of vegetable juices assure fast, safe processing of the sensitive raw material. Continuous extraction with little or no oxidation takes place in a closed system. The Flottweg Simp Drive® ensures constant high yields, with reduced energy input. The adjustable impeller adjusts flexibly to varying conditions of the raw material. Of course, Flottweg Decaners are completely CIP capable and can easily be integrated into existing systems. Downtimes due to upgrades are thus reduced, and the hygienic advantages ensure the production of an optimum product.



Example: Process for the production of carrot juice



CITRUS FRUITS

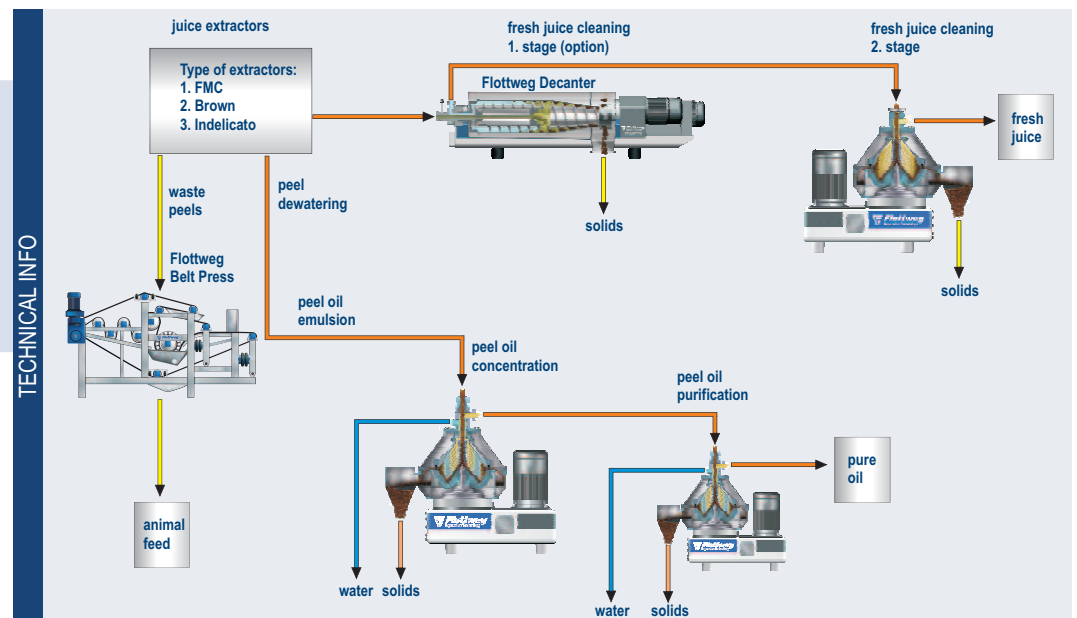
Production of Juices

Processing citrus fruits differs a lot from processing other kinds of fruits. The peel contains precious oil but also influences the taste of the juice. Thus, it does not make sense to completely mill the fruits or to press the mash.

For this reason, there are different technologies for fruit extraction; each fruit is processed individually, so to speak.

Orange juice obtained in this way contains a high quantity of trub particles after passing through extraction systems. Using centrifugal separation technology, the trub content in the juice can be adjusted.

The use of disc stack centrifuges and decanters also enables the production of juices which are very trub stable. Classification of the trub particles takes place within the centrifuge. Any undesired, coarse trub particles can be separated according to customer requirements. Thus it is possible to avoid undesired sediments in the juice.



Processing citrus fruits

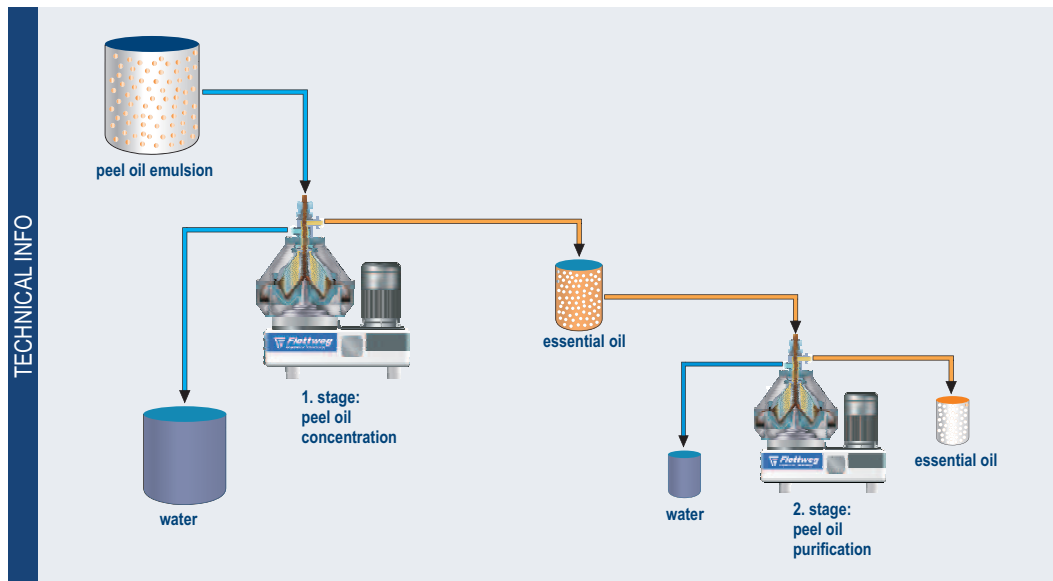


CITRUS FRUITS

Production of Essential Oil

When processing citrus fruits, essential oil is generated as a by-product. Depending on the type of fruit, between 0.5 and 2 percent by weight of this oil may be contained in the wash water.

Using Flottweg Separation Technology, it is possible to recover this oil from the wash water emulsion in order to use it, for example, in the food industry.



Example of two-phase production of essential oil

EXPLOITATION OF CITRUS PEELS

Depending on the extraction system, it may make sense to think of further uses for the citrus peels beyond the usual pelletizing. It is possible to de-water the milled peels using a Flottweg Belt Press in order to increase extraction yields. After that, the residues can be processed to produce animal feed.

The fructose contained in the press juice can be converted into alcohol via fermentation. Also during this process stage it may make sense to separate the solids, yeasts or other coagulants via centrifugal separation, e.g. using a Flottweg Sedicanter® or Disc Stack Centrifuge before further processing.



FURTHER APPLICATIONS FOR DECANTERS IN THE FRUIT JUICE INDUSTRY

PROCESSING RETENTATES

The main by-products in the fruit juice industry are retentates from ultra filtration and trub generated during the production of pure fruit juices.

One possibility for continuously processing generated trub is the use of Flottweg high capacity Decanters. Due to the high g-forces within the machine, solids are efficiently separated from the liquid, resulting in optimum dewatering. It is often possible to completely avoid the use of filter aids such as kieselgur. In any case, it is possible to considerably reduce the quantity of filter aids.

The challenging task of the centrifuge is to process the high quantities of solids in the feed without blocking. The high-torque Flottweg drive system Simp Drive® ensures the exact energy supply necessary for efficient dewatering of the trub particles.

During the processing of UF-retentate, the decanter is either used in the bypass between filter and retentate circuit or after filtration to recover juice before retentate disposal.

In both cases, the decanter enables reduction of the trub content in the retentate circuit, thus extending filter service life.

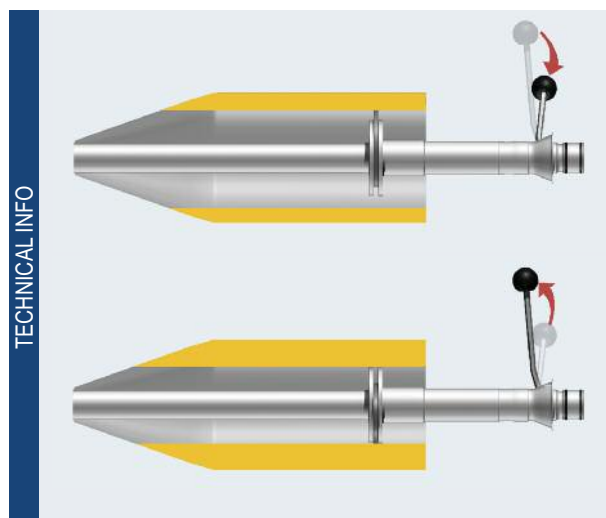
FRUIT JUICE FROM PUREE

Due to the special characteristics of certain types of fruit, it is necessary to produce purees in order to be able to produce fruit juices. The so-called serum and fruit pulp are separated using centrifugal separation technology. Both products can subsequently be processed separately.

Depending on customer preferences, purees with different characteristics are often required. Depending on the desired characteristics of the final products, some customers may prefer an almost liquid puree. Other customers, however, require concentrated, almost semi-solid products. The adjustable impeller, a special characteristic of the Flottweg Decanter, offers a decisive advantage: thanks to the adjustable impeller, it is possible to separate the requested quantity of pulp during operation. Thus the operator can adjust the viscosity of the puree according to customer requirements.



THE PRINCIPLE OF THE ADJUSTABLE IMPELLER IN THE PRODUCTION OF FRUIT PUREE



(Top): Position of the adjustable impeller for concentrated solids
(Bottom): Position of the adjustable impeller for a clear liquids phase



HIGH AVAILABILITY IS OUR STRENGTH

Application-based project planning, high-quality manufacturing and efficient maintenance are the prerequisites for trouble-free operation. Experienced and reliable service engineers from our customer service department are ready to respond quickly if needed. The Flottweg service group is also available to perform preventive maintenance, in order to avoid interruptions in production.



QUALITY "MADE IN GERMANY"

Flottweg is ISO 9001 certified and manufactures its products in compliance with the latest technical standards.

Flottweg Services include:

- Experienced advice on separation processes
- Pilot tests on-site or at the Flottweg Laboratory and Test Center
- Selection and dimensioning of appropriate equipment
- Customer-specific automation and process integration
- Design and construction of complete process systems
- Installation, commissioning, maintenance, repair and spare parts service worldwide



FLOTTWEG WORLDWIDE

Flottweg is headquartered in Vilsbiburg (near Munich), Germany, and has branch offices in Cologne and Leipzig as well as subsidiaries in Australia, Brazil, Canada, China, France, Italy, Mexico, Peru, Poland, Russia and the United States, plus representatives in nearly all countries worldwide.

Check out our website at www.flottweg.com to find a competent contact person.



Flottweg Separation Technology – Engineered For Your Success



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REPRESENTATIVE



**FLOTTWEG CENTRIFUGES
FOR OLIVE OIL PRODUCTION**
High Quality Separation Technology

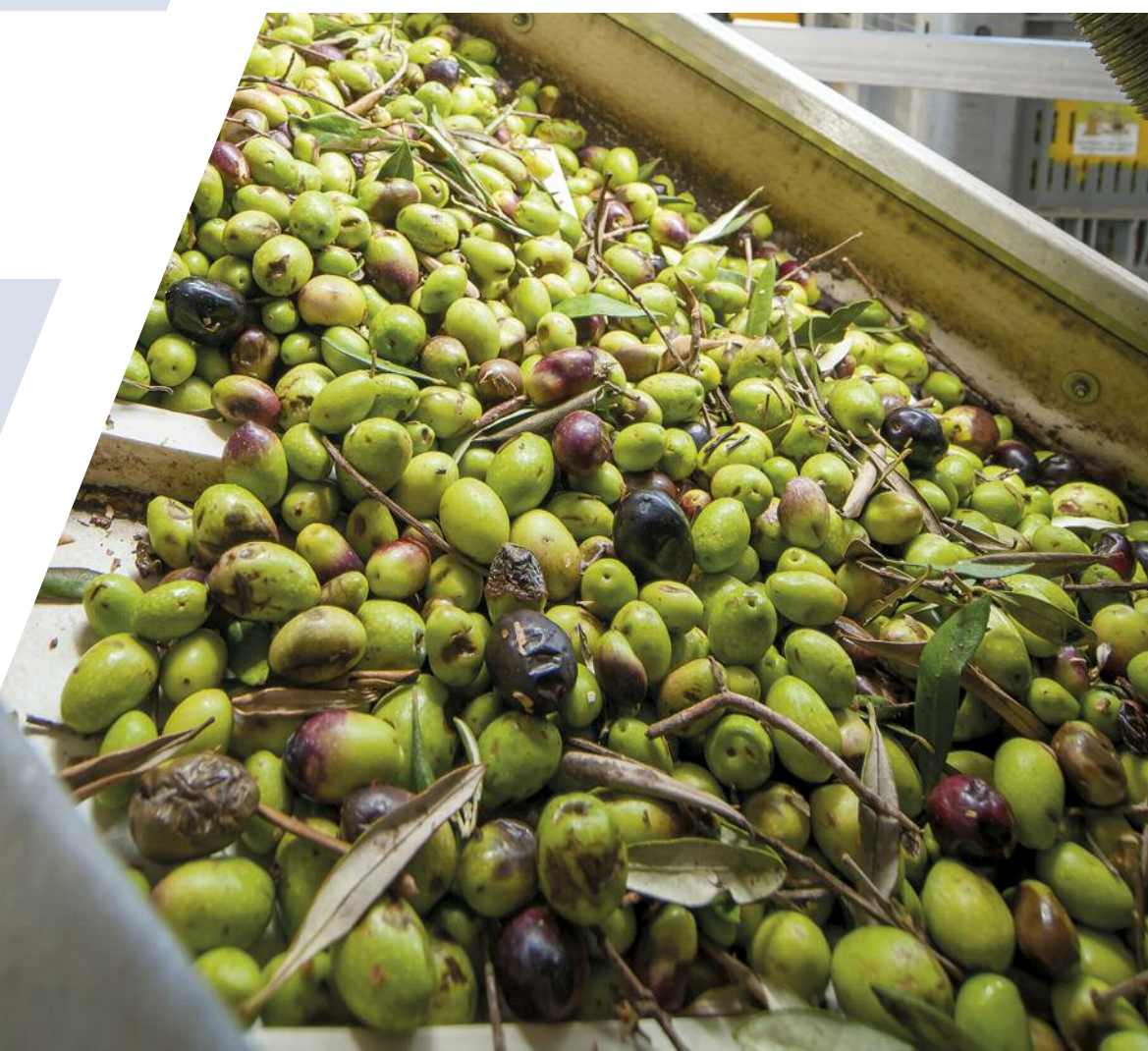


FLOTTWEG CENTRIFUGES

For Olive Oil Production

Olive oil has been produced since antiquity. Ancient olive-oil making was done exclusively by hand. Later on, simple machines such as mechanical presses and pan grinders driven by human or animal power were used. The separation of oil, fruit water, and pulp was done by static settling. At the present time, olive oil is manufactured in a process using modern machinery.

In the early 1970s, Flottweg was one of the first companies to introduce decanter centrifuges to the olive oil production process, replacing the existing hydraulic press method. At Flottweg, constant development has since been conducted in order to improve the decanter performance in terms of oil yield, throughput capacity, and machine lifetime. During this time, Flottweg has delivered thousands of decaners and Tricanter® to all olive oil producing countries in the world.

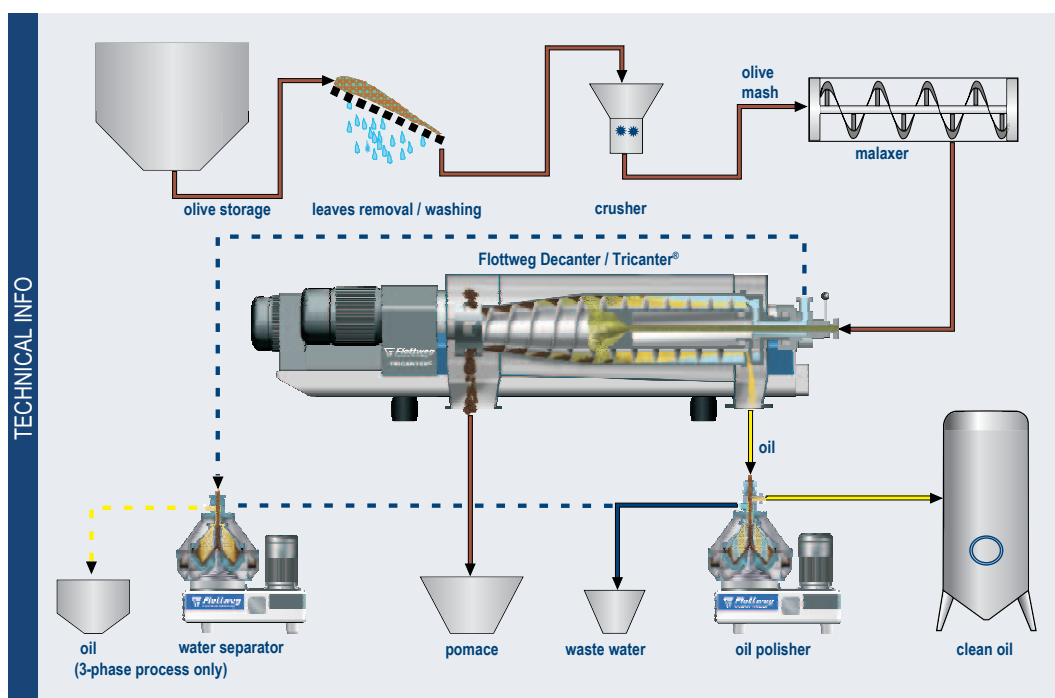


Prior to processing, olives are cleaned to remove leaves, bits of branches, stones, soil, and other impurities. Then a mash is produced by crushing the olives and the olive stones. This mash is conveyed to the malaxer or kneading mill. Through malaxing, the oil is released from the oil cells by which it is encapsulated. The malaxing procedure is critical for oil yield and oil quality. The influencing parameters are holding time and temperature. Then the mash is pumped to the Flottweg Decanter (2-phase) or Tricanter® (3-phase) for separation. In the Tricanter® (3-phase), the mash is separated into oil, fruit water and solids, i.e. olive stone debris and pulp. On the way to the Tricanter®, dilution water is added to the feed in order to fluidize the mash. In the 2-phase process, the mash is separated into oil as liquid phase and solid phase (pomace) consisting of olive stone debris, pulp and fruit water. The 2-phase process requires very little or no dilution water in the feed to the decanter. The oil from the Flottweg Decanter or Tricanter® is then polished using a disc stack centrifuge, which separates the residual amount of water and solid impurities to obtain a clean oil. In the 3-phase process, a second disc stack centrifuge is used to recover the residual oil from the water phase.

The advantage of the 2-phase process is low water consumption and a low amount of waste water produced; however, it delivers a solid phase with a high moisture content which is difficult to process further, such as thermal drying and solvent extraction of residual oil. Con-

versely, in the 3-phase process, the solid phase is significantly dryer and easier to handle for transportation and processing. Water consumption and related waste water production are noticeably higher than using the 2-phase process. The decision of whether to apply 2- or 3-phase processing depends on local and individual circumstances.

A certain amount of residual oil remains in the pomace from the extraction. In order to recover this oil, the pomace undergoes extraction again via a second stage. Generally, for the second extraction the same kind of equipment is used as for the first extraction. In some cases there is a de-pitter to separate the stone debris from the pulp prior to the second extraction. The products after the second extraction are oil for refining or industrial use depending on the quality, husk for incineration (fuel), pulp for fertilizer and black water for depuration.

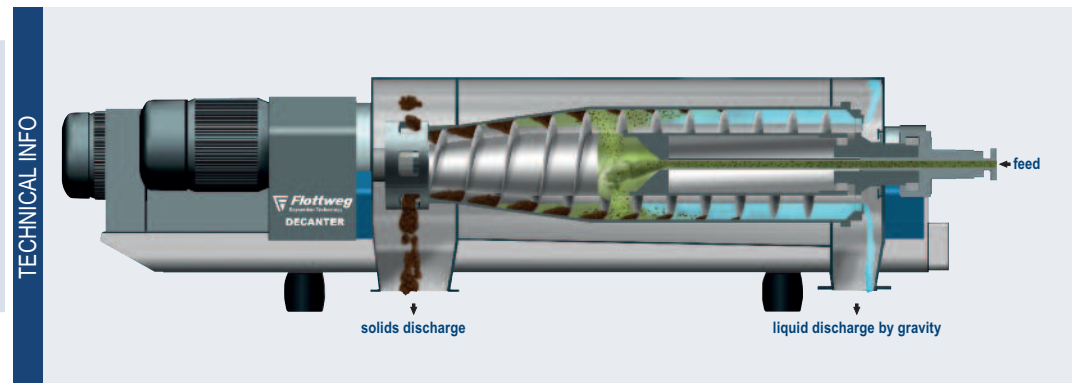


FLOTTWEG DECANTER/TRICANTER®

For Olive Oil Extraction

The essential part of the Flottweg Decanter/Tricanter® is the rotating part, consisting of a cylindrical/conical bowl with a conveyor scroll inside which rotates at a differential speed. The rotating part is driven by electric motors via belt transmission. Feed enters the bowl through a central feed pipe. Through ports in the scroll body, the feed passes into the bowl where separation by centrifugal force takes place. In a decanter, the product is separated into a liquid phase (oil) and a solid phase (stone debris, pulp, and fruit water).

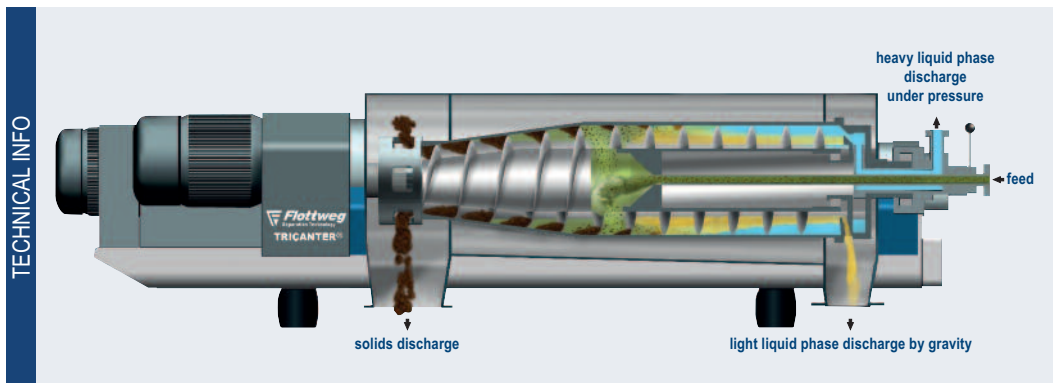
In a Tricanter®, the product is separated into a light liquid phase (oil), a heavy liquid phase (water), and a solid phase (stone debris and pulp). The separated oil is discharged by gravity in both cases, while in addition in a Tricanter®, the separated water phase is discharged by an impeller under pressure or by gravity. The separated solids are conveyed by the scroll to the conical end of the bowl and are discharged.



Flottweg Decanter for the separation of solids from liquids with discharge by gravity of the liquid phase (centrate)

Olive oil production line in Greece





Flottweg Tricanter® (three-phase decanter)



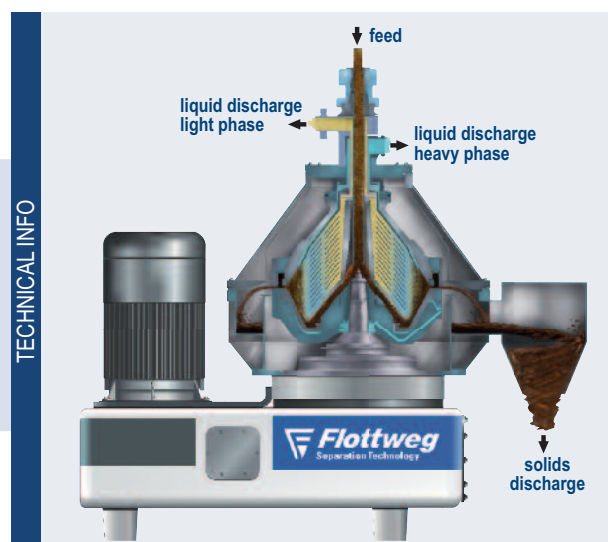
FLOTTWEG DISC STACK CENTRIFUGES

For Optimum Olive Oil Purification

Disc stack centrifuges with a self cleaning bowl are used for the separation of oil, water, and solids. Via a fixed feed pipe, the product to be separated enters the inside of the bowl which is rotating at high speed. The product flow is divided into multiple thin layers by the disc stack and a large surface area is created. From the disc stack, the separated liquids flow to the upper part of the bowl where the oil is discharged under pressure via an impeller. The separated water leaves the bowl by gravity over a ring dam. Due to high centrifugal force, the separated solids are packed tightly against the bowl wall. The separated solids

are ejected at full speed by means of a hydraulic system in the bowl bottom. The hydraulic system of the Flottweg AC-Centrifuge enables total and partial bowl discharges. The opening/closing procedure is released by a pulse of operation water directly before the discharge. Solenoid valves provide an exact proportioning of the operation water.

For power transmission, there is a sturdy and low maintenance belt drive. The drive-motor control via frequency converter ensures smooth acceleration up to operational speed and generator braking. All monitoring and control functions of the centrifuge are handled by a modern PLC control unit.



Flottweg Separator for the separation of two immiscible liquids with simultaneous separation of solids



Operator panel

After the first separation by means of the Flottweg Decanter/Tricanter®, the second separation via the Flottweg Disc Stack Centrifuge is critical for oil quality, yield, and overall efficiency.

Flottweg AC-series Disc Stack Centrifuges perform both partial and total bowl discharge in any combination. The operation is fully automated via PLC. Using automatic valves for feed and water, the oil content in the bowl is displaced by water prior to bowl discharge. Operation via partial discharge results in virtually no oil loss. Using the total discharge, the bowl stays clean for an extended period of time. Depending on olive quality and operational circumstances, the most suitable combination can easily be programmed.

Benefits

- Virtually no oil loss during bowl discharge by fully automated partial discharge and oil displacement.
- Reduced air contact by closed construction of feed and oil discharge (via impeller).
- User-friendly, continuous and automatic operation by control via PLC.
- Reduced downtime by enhanced cleaning capability.



SOME FACTORS THAT MAKE THE FLOTTWEG CENTRIFUGES UNIQUE

Optimal performance in terms of oil yield, cake dryness, and power consumption, even under varying olive quality and operation conditions, are achieved by:

GEAR DRIVE (VFD)

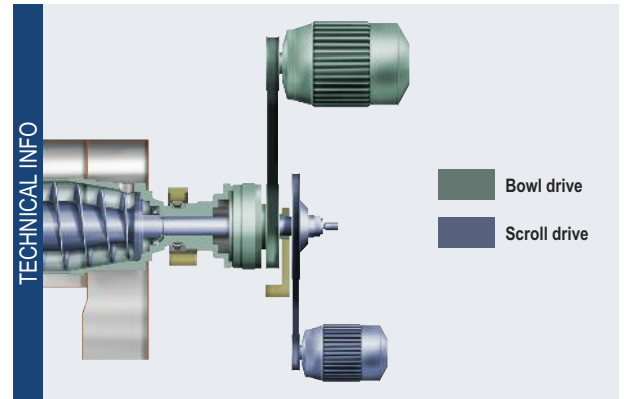
The bowl is driven via a frequency controlled motor enabling a continuously adjustable bowl speed and a fixed gear ratio for differential speed.

FLOTTWEG SIMP DRIVE®

In addition to the gear drive, the scroll is driven independently from the bowl by a secondary motor and via a special gear unit. This allows for torque-dependent differential speed control which results in optimum cake dryness when using the 3-phase process. The Flottweg Simp Drive® also allows for rotation of the scroll while the bowl is stationary, thus emptying the bowl content.

ADJUSTABLE IMPELLER

A highly precise setting in the liquid discharge is required for optimum oil-water separation. The Flottweg Tricanter® with impeller enables continuous adjustment even during operation.



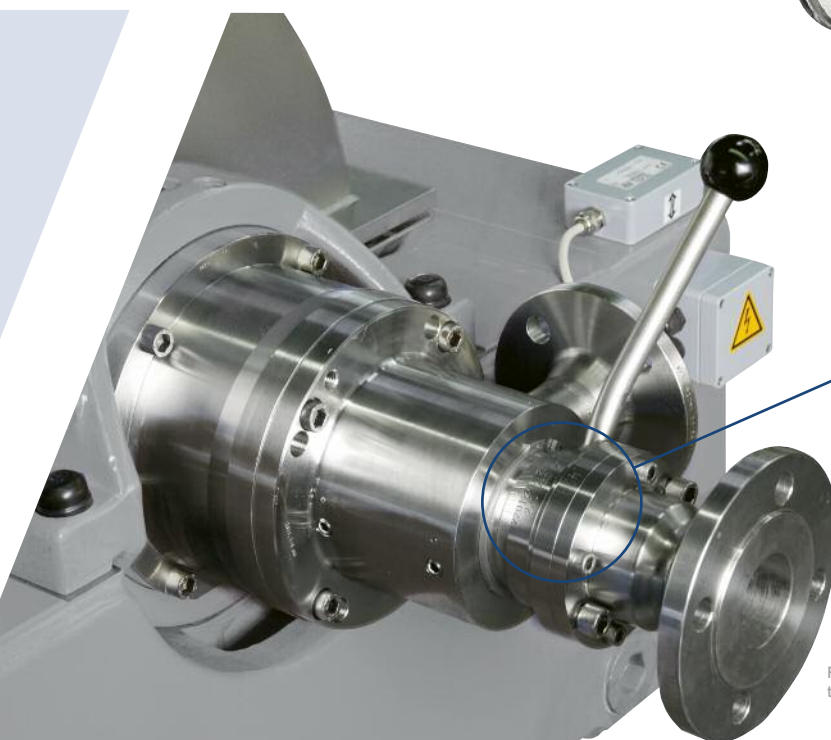
Torque-dependent differential speed control via Flottweg Simp Drive®



The picture shows the position of the adjustable impeller for maximum impeller diameter



The picture shows the position of the adjustable impeller for minimum impeller diameter



Adjustable impeller diameter

Feed and discharge devices with control lever for the adjustable impeller of the Flottweg Tricanter®

UNIQUE HIGHLY DURABLE WEAR PROTECTION

All parts exposed to wear are protected by means of features such as special hard facing, wear bushings, and inserts. Bushings and inserts are easily exchangeable, even under field conditions.

EFFICIENT BEARING LUBRICATION

Flottweg Decanters and Tricanter[®] can be equipped with a manually operated grease-lubrication device. All bearings are lubricated in a single step. The Flottweg Air-Oil (droplet) Lubrication is available as an option for the Z6E machine.

MAINTENANCE FRIENDLY

Z4E and Z5E models are equipped with covers for the bowl and drive which are able to be opened by a single person without the need for a lifting device. For service and repair jobs, the design allows the lifting of the entire rotor as a single piece. The gear unit is placed outside the area that comes into contact with the product.

Benefits

- Optimum oil yield by tailor-made scroll design for olive oil extraction in 2- and 3-phase separation.
- High cake dryness in 3-phase operation by torque-dependent differential speed control (Flottweg Simp Drive[®]).
- Long service life by sophisticated wear protection based on experience over decades.



Central lubrication system (manually)



Automatic grease lubrication



Oil-air lubrication system



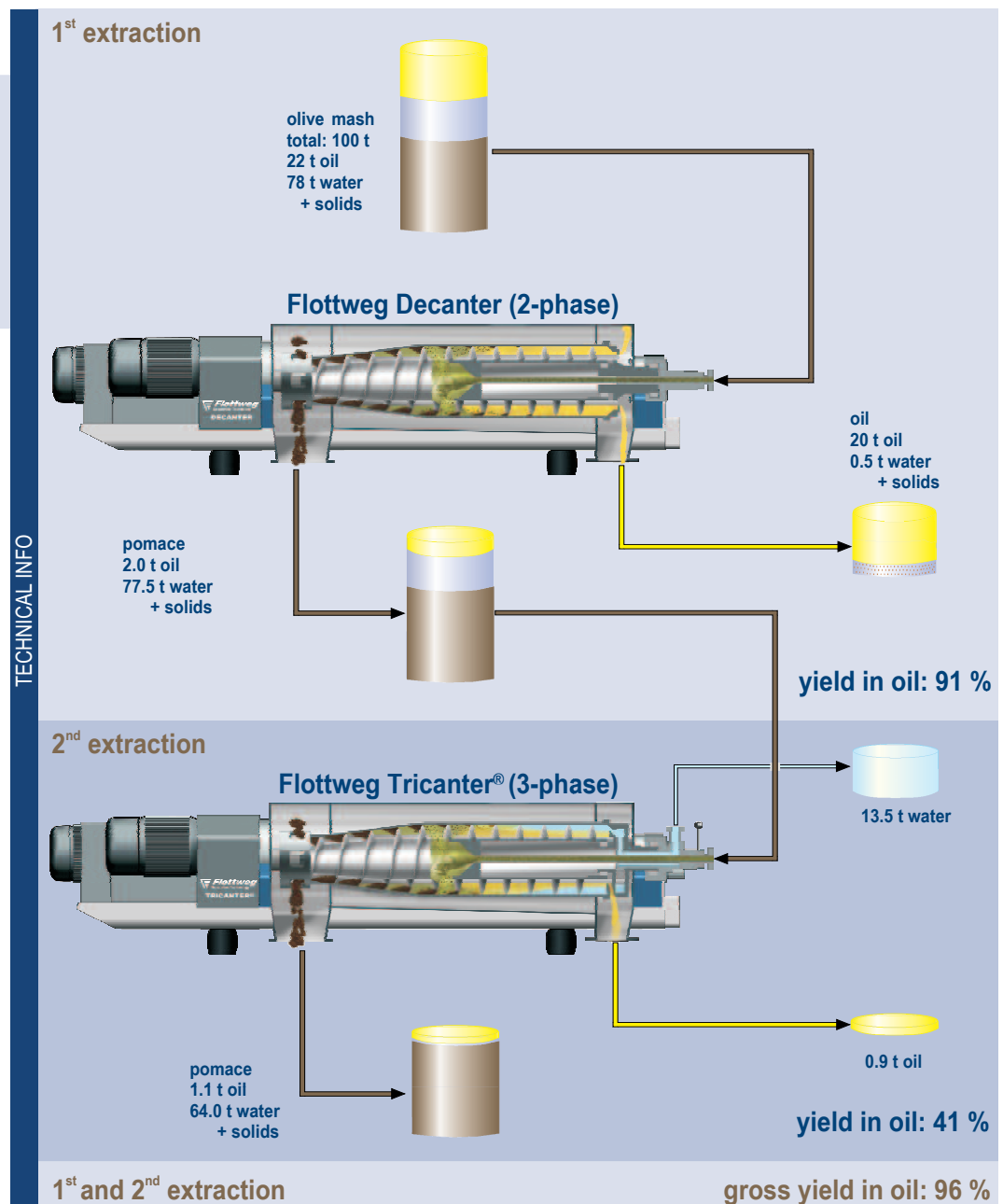
HIGHER PROFIT THROUGH SECOND EXTRACTION

Increasing the Oil Yield

Flottweg Decanters and Tricanter® are optimized for maximum oil yield. Nevertheless, the technical yield in oil during the first extraction is typically in the range between 85 to more than 90 %, due to the olive variety, operation temperature and other process parameters. This is true for 2- as well as 3-phase operation.

The pomace after first extraction contains a certain amount of residual oil which is worthwhile recovering. Depending on the efficiency of the first extraction, i.e. oil concentration in the pomace, up to 50 % of the

oil can be recovered via a second mechanical extraction thus increasing the gross yield in oil significantly. The second extraction can be performed in 2- or 3-phase operation normally without addition of water. However, the 3-phase operation in the second extraction is the better option due to the lower moisture content in the pomace, which is favorable for further handling and processing.



The listed figures are to be understood as guidelines. Actual capacity depends on the individual characteristics of the product.

Residue becomes Value

The way that the byproducts of pulp and stone debris are used has changed. In the past, especially when the first extraction was performed via presses or 3-phase operation, the pomace was thermally dried and the residual oil extracted using organic solvents. The dry residue consisting of dry pulp and stone debris or pits was recycled to the oil mills to be used as fuel for the boiler.

After the introduction of the 2-phase operation, this process became less efficient because the pomace from 2-phase operation has a higher moisture content than in the case of 3-phase operation or extraction via presses. As a result, the residual oil is usually recovered via second mechanical extraction. The pomace is then separated into pulp and stone debris via a de-pitter. The separated pits are dry enough to be used as fuel for heat and power generation. The separated pulp is composted and used as fertilizer.



WHY YOU SHOULD RELY ON FLOTTWEG SEPARATION TECHNOLOGY

- More than 50 years of experience in centrifuge manufacturing including more than 30 years of successfully providing machinery for the recovery of olive oil.
- Maximum oil yield due to appropriate machine design adapted to the market requirements.
- Flottweg delivers tailor-made systems for olive oil together with partners in different countries.
- References in all olive oil-producing regions of the world: Spain, Italy, Greece, Turkey, North Africa, Middle East, Far East, etc.



Flottweg Decanter in a typical olive oil production plant in Spain

FLOTTWEG AFTER-SALES CUSTOMER SERVICE

Even the best machinery needs to be maintained and serviced. Flottweg has established a worldwide service network consisting of its own subsidiaries, branch offices, and representatives to provide our customers with localized service and spare parts. Our service engineers and technicians are qualified for any kind of installation, commissioning, repair and maintenance.

QUALITY "MADE IN GERMANY"

Flottweg is ISO 9001-certified and manufactures its products in compliance with all the latest technical standards.



FLOTTWEG WORLDWIDE

Flottweg is headquartered in Vilsbiburg (near Munich), Germany, and has branch offices in Cologne and Leipzig as well as subsidiaries in Australia, Brazil, Canada, China, France, Italy, Mexico, Peru, Poland, Russia and the United States plus representatives in nearly all countries worldwide.

Check out our website at www.flottweg.com to find a competent contact person.

TECHNICAL DATA

Flottweg Disc Stack Centrifuges



TECHNICAL DATA OF FLOTTWEG DISC STACK CENTRIFUGES		
Type	AC 1200-440 FO	AC 1510-440 FO
Materials used in construction	All parts that come into contact with the product are made of high grade stainless steel such as Duplex stainless steel, 1.4571 (AISI 316 Ti), etc.	
Max. bowl speed (rpm)	7800	6800
Overall dimensions (L x W x H)*	1200 x 970 x 1280 mm	1500 x 1000 x 1800 mm
Gross weight (kg)*	820	1650
Bowl drive motor size*	7.5 KW	15 KW
Capacity*	up to 1100 l/h	up to 2000 l/h

* Subject to technical changes. The listed figures are to be understood as guidelines. Actual capacity depends on the individual characteristics of the product.

Olive oil production line in Greece



TECHNICAL DATA

Flottweg Decaners C-Series



TECHNICAL DATA OF FLOTTWEG DECANTERS C-SERIES

Type	C3E-4	C4E/L	C4E-4	C5E/L	C5E-4
Materials used in construction	All parts that come into contact with the product are made of high grade stainless steel such as Duplex, AISI 316Ti (1.471), etc.				
Max. bowl speed (rpm)	4000	3520	3520	2800	2800
Overall dimensions (L x W x H)*	2980 x 940 x 900 mm	3520 x 1140 x 1030 mm	3520 x 1140 x 1030 mm	4100 x 1520 x 1210 mm	4100 x 1520 x 1210 mm
Gross weight (kg)*	1735	2660	2760	4940	5060
Bowl drive motor size (kW)*	18.5	30	30	30	30
Scroll drive motor size (kW)*	5.5	11	11 - 15	22 - 27	22 - 27
Capacity (kg/h)*	1800 - 2200	3000 - 4000	3500 - 4500	5000 - 6000	6000 - 7000

* Subject to technical changes. The listed figures are to be understood as guidelines. Actual capacity depends on the individual characteristics of the product.

Flottweg C-Series Decaners are configured for use in the 2-phase process. The separated oil is discharged by gravity.

The picture shows a decanter scroll

TECHNICAL DATA

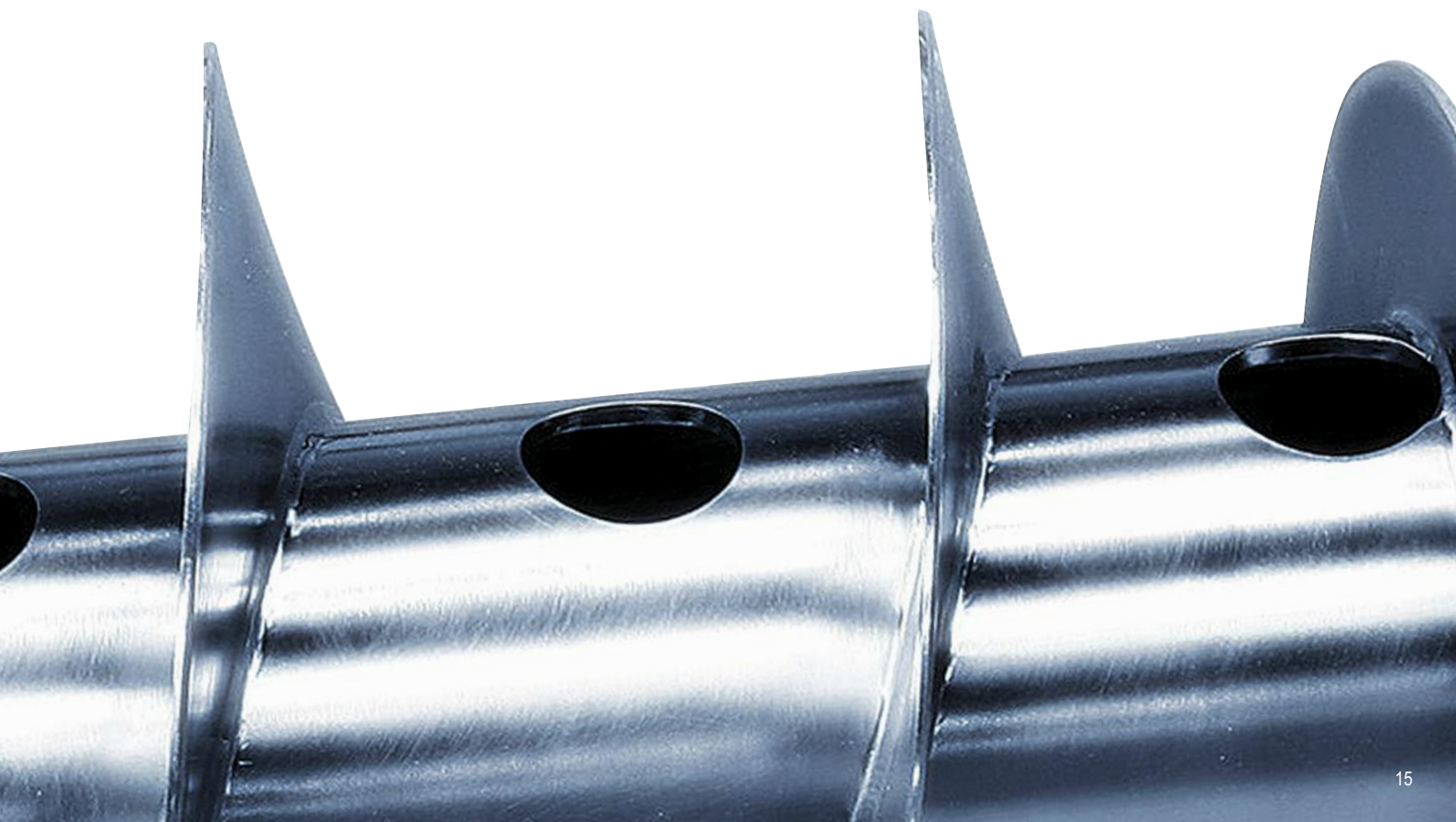
Flottweg Decanters and Tricanter[®] Z-Series



TECHNICAL DATA OF FLOTTWEG DECANTERS AND TRICANTERS [®] Z-SERIES							
Type	Z3E	Z4E	Z4E-4	Z5E	Z5E-4	Z6E	Z8E
Materials used in construction	All parts that come into contact with the product are made of high grade stainless steel such as Duplex, AISI 316TI (1.471), etc.						
Max. bowl speed (rpm)	5250	4200	4200	3500	3500	3200	2650
Overall dimensions (L x W x H)*	2645 x 1180 x 850 mm	3400 x 1000 x 1200 mm	3400 x 1000 x 1200 mm	4490 x 1590 x 1120 mm	4490 x 1590 x 1120 mm	5180 x 1770 x 1300 mm	6440 x 2000 x 1480 mm
Gross weight (kg)*	1850	2870	3000	6100	6200	8500	14140
Bowl drive motor size (kW)*	15	22 - 30	22	30 - 37	37	45 - 55	90
Scroll drive motor size (kW)* Flottweg Simp Drive [®]	5	n.a.	11	n.a.	22	22 - 37	75
Capacity (kg/h)*	1250 - 1800	2000 - 3000	3000 - 4000	4000 - 5000	4500 - 6300	8000 - 10000	13000 - 17000

* Subject to technical changes. The listed figures are to be understood as guidelines. Actual capacity depends on the individual characteristics of the product.

Flottweg Z-Series Decanters AND Tricanter[®] are available for the use in 2- or 3-phase processes. For 2-phase operation, the adjustable impeller disc is available as an option for discharging the oil under pressure. The Flottweg Tricanter[®] are equipped as standard with an adjustable impeller disc for discharging the water under pressure whereas the oil is discharged by gravity.



Flottweg Separation Technology – Engineered For Your Success



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REPRESENTATIVE



**FLOTTWEG TRICANTERS®
FOR THE PALM OIL INDUSTRY**

Make the Most Out of Your Natural Resources!



THREE-PHASE SEPARATION

Using the Flottweg Tricanter®

Palm oil is one of the world's most widely produced vegetable oils. It is the fruit of the oil palm tree, a tropical species that originated in West Africa, but now grows as a hybrid in many parts of the world, including Asia and Central America. Palm oil is used for a variety of purposes. The world demand for palm oil has soared in the last two decades, first for its use in food, consumer products and more recently as the raw material for biofuel. Palm oil is extracted in a multiple stage process.

The Flottweg Tricanter® enables three-phase separation, i.e. the simultaneous separation of two immiscible liquids with different densities and one solid phase, provided that the solid phase is the heaviest phase. The most important difference from a decanter is the separate discharge of the two liquid phases. The Flottweg Tricanter® discharges the heavy liquid (water) via an adjustable impeller under pressure and the light liquid phase (oil) by gravity. The adjustable impeller allows adjusting the separation zone inside the bowl and so the separation efficiency of the machine during operation. This optimizes the purity of the liquids and may possibly eliminate downstream equipment. This technical feature is available for the Flottweg Tricanter® models type Z4E, Z5E and Z6E.

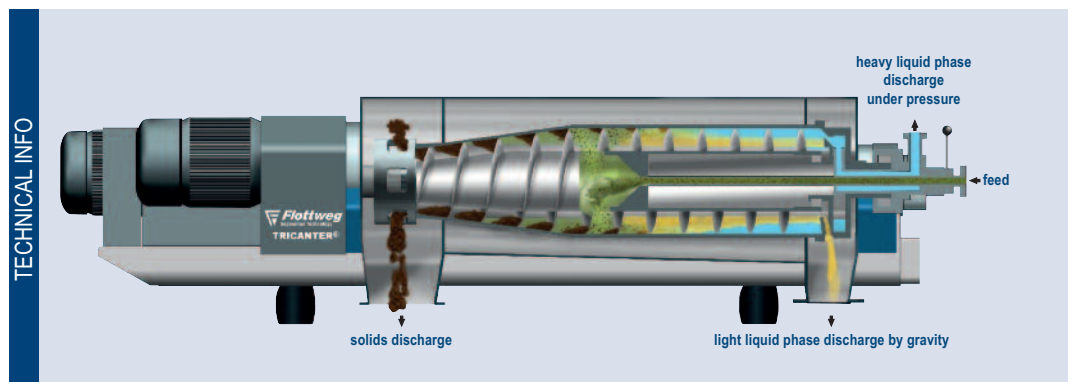
Flottweg Tricanter® are used for

- Direct treatment of crude palm oil after the screw press
- Oil recovery out of the underflow after the sludge tank or the pre-clarifier
- Oil recovery from the waste stream of palm oil mills.

QUALITY "MADE IN GERMANY"

Flottweg is ISO 9001 certified and manufactures its products

in compliance with the latest technical standards.



The Flottweg Tricanter® (three-phase decanter)

TECHNICAL INFO

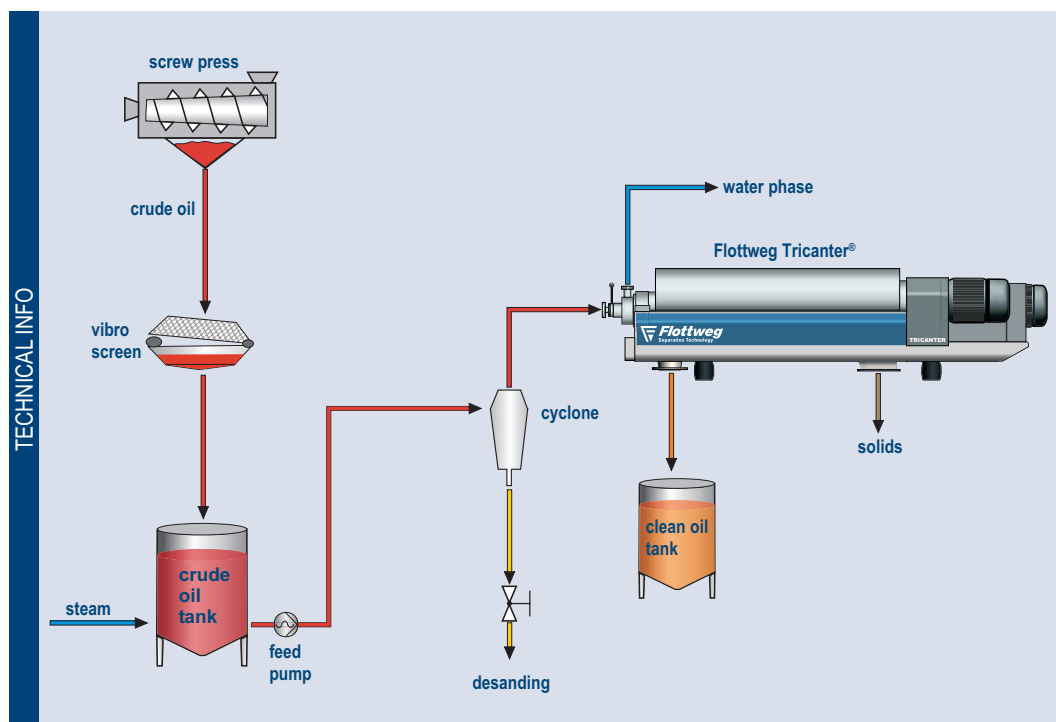
PROCESSING CRUDE PALM OIL (CPO)

Using the Flottweg Tricanter®

Crude palm oil (CPO) coming from the screw press passes through the vibration screen and is collected in the crude oil tank equipped with a heating device and optionally with a slowly rotating agitator. After the crude oil tank, a feed pump transfers the oil directly to the Flottweg Tricanter® by passing a de-sanding cyclone. In the Tricanter®, the three-phase separation takes place providing clean oil, water and solids.

Benefits

- Clean oil – no need of clarification stage
- Short processing time
- Minimum heat loss
- Virtually no alteration of the oil (low FFA)
- Minimum dilution water demand
- Minimum waste water stream
- Maximum flexibility



Flottweg CPO Process

® = registered trademark for various countries

The picture shows palm oil trees



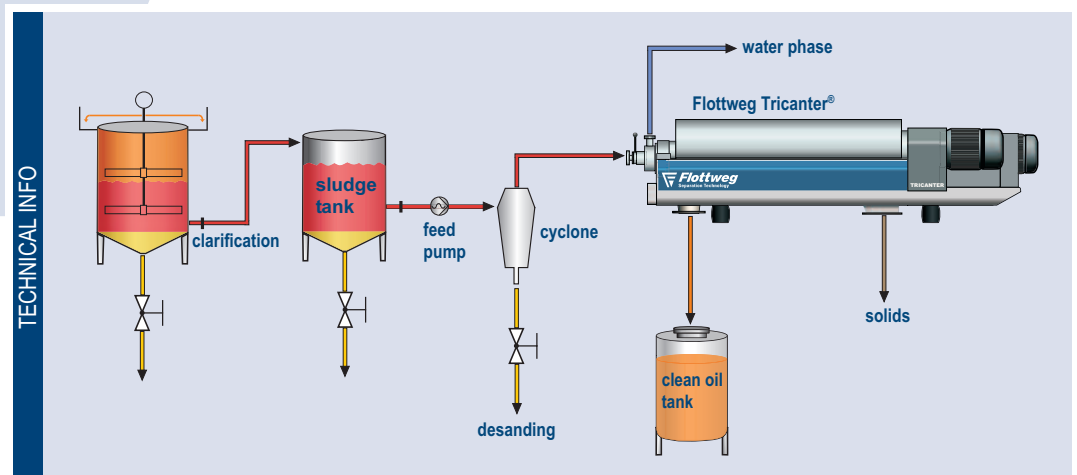
PROCESSING PALM OIL SLUDGE

Using the Flottweg Tricanter®

In the conventional palm oil process Flottweg Tricanter® are used for the recovery of palm oil from palm oil sludge. Sludge is collected in the CS-tank and prethickened in the sludge tank. Afterwards, the sludge is pumped through a de-sanding cyclone to the Tricanter®, where the sludge is separated into water, oil and solids. Changing feed conditions, especially during start up and shut down of the clarification station can be outbalanced easily by adapting the machine to the prevailing conditions. An outstanding feature to provide this kind of flexibility is Flottweg's Variable Impeller.

Benefits

- Sturdy and reliable design
- Flexible system (impeller)
- No dilution water
- Minimum oil loss
- Short downtime
- High oil quality
- Reduced labour and maintenance costs



Flottweg Tricanter® in the conventional palm oil process

SOME FACTORS

That Make the Flottweg Centrifuges Unique

Optimal performance in terms of oil yield, cake dryness, and power consumption, even under varying feed and operation conditions are achieved by:

- **Variable frequency drive (VFD)**

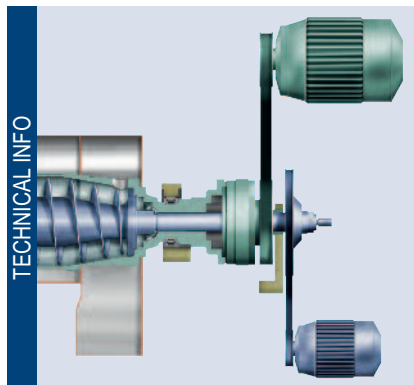
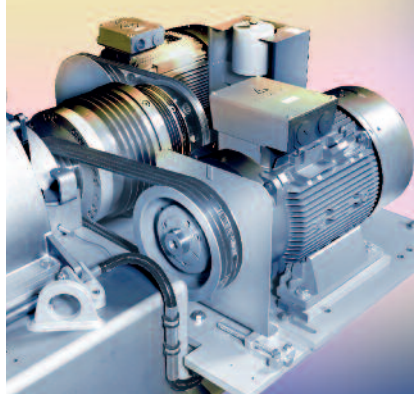
The bowl is driven via a frequency controlled motor enabling a continuously adjustable bowl speed and a fixed gear ratio for differential speed. A smooth start-up without peak loads for the grid and low energy consumption will be the benefit for our customers on top of the reduced maintenance costs.

- **Flottweg Simp Drive®**

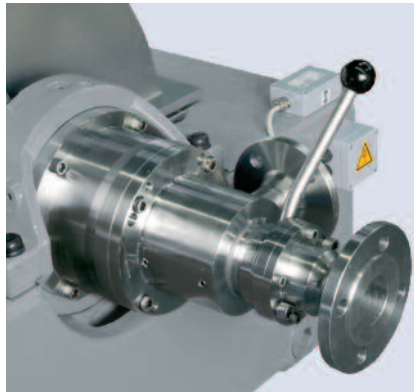
In addition to the gear drive, the scroll is driven independently from the bowl by a secondary motor and via a special gear box. This allows for a torque-dependent differential speed control which results in optimum cake dryness when using the 3-phase process. The Flottweg Simp Drive® also allows for rotation of the scroll while the bowl stands still, thus emptying the bowl content.

- **Adjustable impeller**

For optimum oil-water separation, a highly precise setting in the liquid discharge is required. The Flottweg Tricanter® with impeller enables a continuous adjustment even during operation.



Torque-dependent differential speed control via the Flottweg Simp Drive®



Adjustable impeller

® = registered trademark for various countries

The picture shows palm oil fruits



HIGH RELIABILITY AND AVAILABILITY BY:

- Manual central lubrication

In standard execution, all Flottweg Centrifuges are provided with a manually operated central grease pump.

No hassle with single grease fittings or defects caused by missed greasing of a bearing. Optionally Flottweg equips the machines with fully automatic oil-air-lubrication systems.

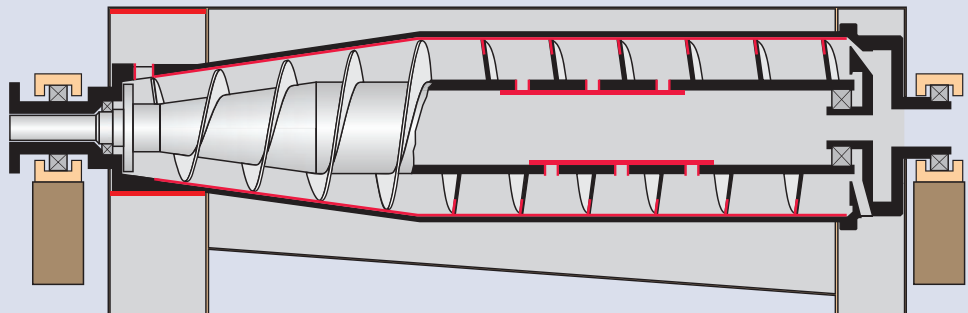
- Wear protection

Flottweg offers a wide range of wear protection to meet the requirements of the many different applications in which centrifuges are installed. All red coloured sections are protected by different exchangeable wear protection devices.



Manual central lubrication

TECHNICAL INFO



Red coloured sections = exchangeable wear protection devices

In order to minimize maintenance costs for applications involving highly abrasive products, all wear protection elements, except welded hard facings or spray coatings, are field-replaceable.

Installation in Indonesia

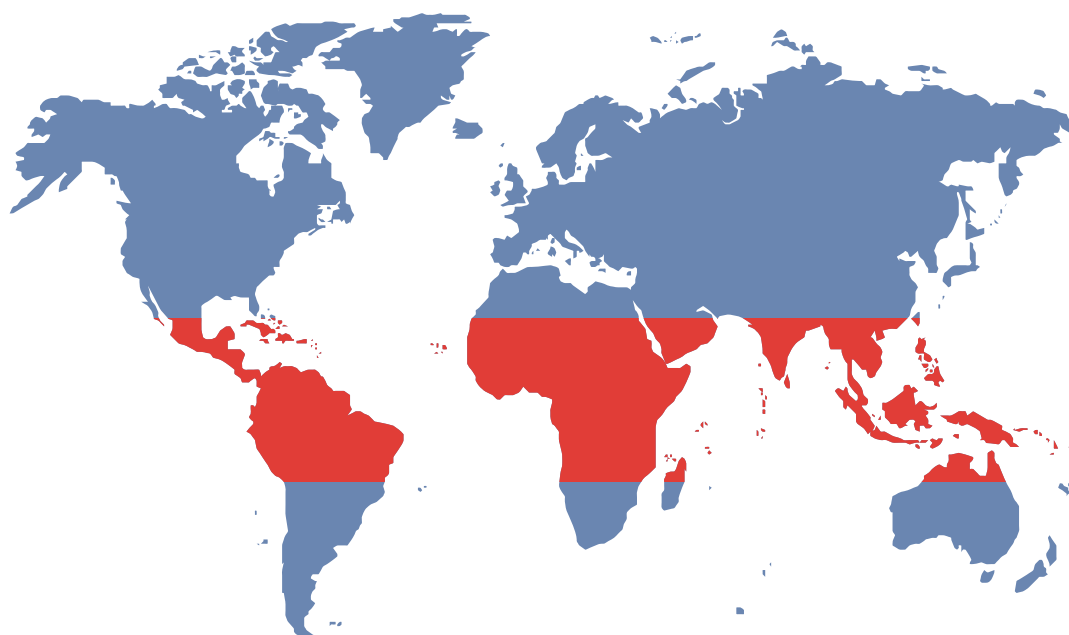


WHEREVER PALM OIL IS PRODUCED

There is Flottweg

Flottweg Tricanter® cover the whole throughput range required in the palm oil industry with capacities up to 75 t FFB/h. Since its entry into the palm oil market in 1982, Flottweg has sold hundreds of Flottweg Tricanter® into palm oil mills worldwide in South-East Asian countries as well as in Africa and South America. During that period Flottweg has earned reputation for both, the technical excellence of its machines and the reliability of its service. As part of the company's policy of continuous

development all service and sales activities are now focused in the hands of regional partners. In close cooperation with Flottweg Germany, the organizations in the different countries are continually improving customer care and service in the area.



The oil palm belt, covering the tropical countries all over the world

FLOTTWEG TRICANTER®			
Model	Z4E-4	Z5E-4	Z6E-4
Capacity m³/h (palm oil sludge)	12 – 15	22 – 30	30 – 40
Capacity tons ffb/h (palm oil sludge)	25 – 30	55 – 60	60 – 80
Capacity m³/h (crude palm oil)	6 – 8	10 – 15	16 – 20
Capacity tons ffb/h (crude palm oil)	12 – 16	20 – 30	32 – 40
Max. bowl speed rpm	3800	3500	3200
Installed power kW (bowl and scroll)	33	70	90
Gross weight (approx. kg)	3000	6400	9230

Data to be understood as guideline



Flottweg Separation Technology – Engineered For Your Success



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REPRESENTATIVE



MAXIMIZE YOUR PROFIT WITH FLOTTWEG
Innovative Solid/Liquid Separation
for the Production of Vegetable Milk Alternatives



MAKE INVESTMENTS TO INCREASE YOUR PROFIT

Key Technologies for the Production of Soy and Grain Milk

More and more people appreciate vegetable milk alternatives. Not only for ecological but also for health reasons (lactose intolerance, vegan diet, etc.), an increasing number of consumers are choosing this healthy alternative.

Producers of these products have to adapt flexibly to consumer demands. Industrial centrifuges like decanters and disk stack centrifuges as well as belt presses play an important role in the industrial production of milk alternatives, e.g. from grains or soy. Efficient solid-liquid separation

not only helps increase yields significantly but also improve the quality of the final product.

Whether in Australia, China, Europe, or the US, all over the world producers and plant manufacturers rely on Flottweg's core competences.



Decanter model Z6E used for the production of soy milk





Decanter Model Z4E in soy milk production

Your advantages

Take advantage of our years of experience! We offer:

- Customized systems to increase yields, optimize sub-processes, and increase the quality of your product
- Optimum adaptation of our industrial centrifuges to your application
- Pilot tests on-site or at the Flottweg Laboratory and Test Center
- More than 80 sales and service centers all over the world



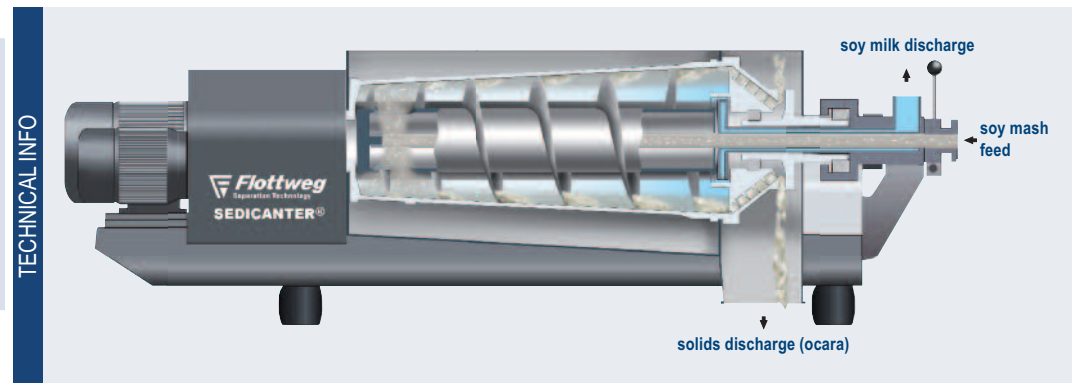
THE FLOTTWEG SEDICANTER®

A Unique Concept for Soy Milk Production

In soy milk production, the peeled beans are first milled and then cooked. The finer the milling of the raw material, the higher the yield of extract (e.g. high-quality proteins) in the final soy milk.

Especially during the fine grinding process of the soy beans, fine and soft solids are generated which then have to be separated efficiently from the soy milk. Due to its unique functional principles, a Flottweg Sedicanter® especially adapted to this application helps achieve optimum separation results with this type of solid/liquid mixture. High rota-

tional speed together with the right design allows for high soy milk yield. Separation efficiency of up to 99.5 percent by volume has been determined. And if feed conditions vary, the adjustable impeller provides the Sedicanter® with the same flexibility seen in the Flottweg Decanter.



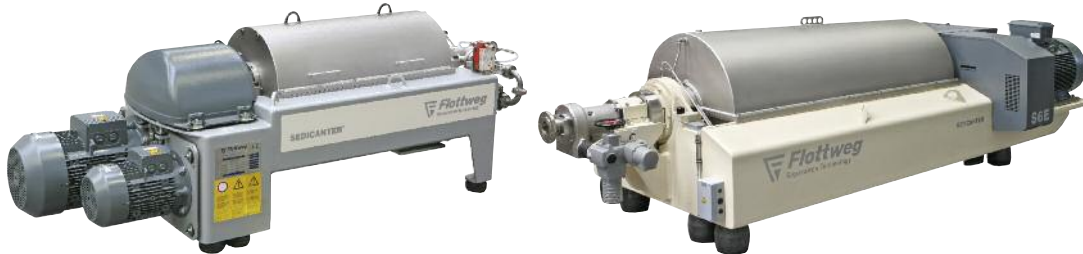
Flottweg Sedicanter®



Advantages of the Flottweg Sedicanter® in soy milk production

- High speed together with a unique centrifuge design for excellent separation results when processing soft or fine solids
- Optimum clarification and high purity in the final product, even with very fine grinding
 - Higher soy milk yield due to optimum dewatering
 - Higher dry substance in the discharged solids (ocara)
 - Adjustable impeller
 - Flexibility in production, even under varying feed conditions
 - Optimized CIP cleaning

TECHNICAL DATA FOR THE FLOTTWEG SEDICANTER®



TECHNICAL DATA FOR THE FLOTTWEG SEDICANTER® FOR SOY MILK PRODUCTION*			
Model	S3E	S4E	S6E
Bowl diameter	300 mm	470 mm	670 mm
Bowl speed	7750 rpm	5000 rpm	3650 rpm
Max. g force	10000 x g	6500 x g	5000 x g
Materials of construction	All product-wetted parts are made of rust-proof and acid-resistant stainless steel (1.4571 or better).		
Dimensions* (LxWxH)	2304 x 700 x 752 mm	3222 x 1000 x 1200 mm	4527 x 1705 x 1270 mm
Total weight*	1050 kg	2400 kg	8580 kg
Capacity**	500 - 2000 l/h	max. 8000 l/h	max. 16000 l/h

* The figures listed are to be understood as guidelines.

** The actual capacity will depend on the characteristics of the product.



ADVANTAGES AND TECHNICAL DATA OF THE FLOTTWEG DECANter



Advantages of the Flottweg Decanter in grain milk production

- High grain milk purity and maximum yields
- Adjustable impeller
 - Flexibility in production, even under changing feed conditions
 - Optimized CIP cleaning
- Easy integration into existing systems
- Hygienic design for highest possible product quality
 - Food certificates for lubricants and seals (in compliance with NSF H1)
 - Gaskets with FDA certificate or conformity if requested
- Optimum dimensioning of the machine for high product temperatures and aggressive media (e.g. CIP cleaning, cleaning media) in food processing companies

TECHNICAL DATA FOR THE FLOTTWEG DECANter FOR THE PRODUCTION OF MILK ALTERNATIVES FROM GRAIN*

Model	Z3E	Z4E	Z5E	Z6E
Bowl diameter	300 mm	420 mm	530 mm	620 mm
Bowl speed	5250 rpm	4200 rpm	3500 rpm	3200 rpm
Max. g force	4600 x g	4100 x g	3600 x g	3550 x g
Materials of construction	All product-wetted parts are made of rust-proof and acid-resistant stainless steel, e.g. 1.4463 (Duplex) and 1.4571 (AISI 316 TI), etc.			
Dimensions* (LxWxH)	2930 x 840 x 910 mm	3740 x 1000 x 1200 mm	4500 x 1600 x 1150 mm	4800 x 1800 x 1250 mm
Total weight*	1500 kg	3000 kg	6200 kg	9750 kg
Capacity**	1000 - 3000 l/h	3000 - 6000 l/h	6000 - 10000 l/h	10000 - 18000 l/h

* The figures listed are to be understood as guidelines.

** The actual capacity will depend on the characteristics of the product.

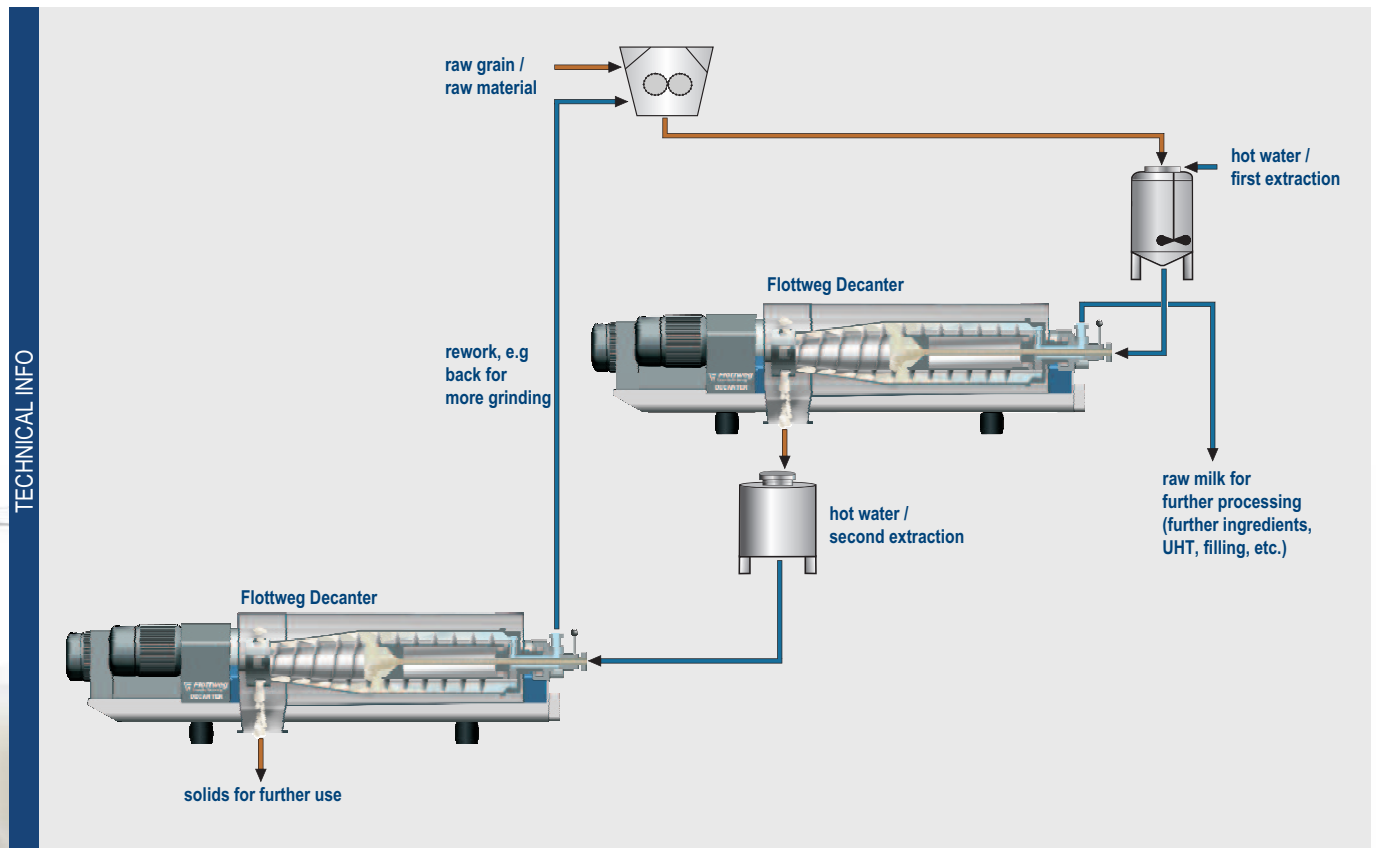
THE FLOTTWEG DECANTER

State-of-the-Art Separation Technology for the Production of Milk Alternatives

Grain milk is generated during saccharification of carbohydrates and is produced from flour or fermented grain. The demand for grain milk is continually increasing due to more and more people suffering from lactose and soy intolerance.

Milk alternatives can be produced from rice, nuts, or nearly any grain, such as oats, spelt, or rye. Decanter centrifuges play a key role in the industrial production of those milk alternatives. First, the raw material is ground. The grain flour is mashed, adding sufficient water. This results in a creamy mass which is then processed using a decanter. The decanter separates the grain milk from the solid grain residue.

Due to high g-forces, grain milk yield is high, and so is the separation efficiency. Thanks to the variable impeller, it is possible to adjust the desired consistency of the final product perfectly – even under changing feed conditions. This ensures continuous high quality in the final product.



Simplified process diagram: Production of milk alternatives



THE FLOTTWEG DECANTER CENTRIFUGE IN A NUTSHELL

Advantages



MATERIALS

- All metallic, product-wetted parts are made of austenitic or austenitic-ferritic stainless steel
- Complete CIP cleaning and reproducible cleaning results
- Design according to EHEDG directives

HOUSING

- Spray nozzles for cleaning the cover, the rotor, the solids discharge device, and other parts in contact with liquids
- Surface roughness max. 0.8 µm (product-wetted surfaces, welding seams hygienically smoothed)



SCROLL

- Flushing device at the scroll body
- Smoothed scroll blade, surface roughness max. 0.8 µm
- Optimum adjustment for processing milk alternatives



FLOTTWEG SIMP DRIVE®

- Stepless adjustment of the bowl and rotational speed parameters depending on torque for high yields, even under changing feed conditions
- Gear mounted outside of the product zone
- Lubricants used in compliance with NSF H1



ADJUSTABLE IMPELLER

- Optimum adjustment to product requirements
- Adjustable from outside during operation
- Automated adjustment on request
- Additionally: cleaning support during CIP cleaning

INCREASING CAPACITY WHILE SAVING ENERGY

Using the Flottweg Belt Press Before Drying Processes

During the production of soy milk or milk alternatives, solids (e.g. ocara) are generated and retained as valuable byproducts. These solids separated by centrifuges still contain residual water and some are processed for the production of powder. Thermal drying, for example, is done using a fluidized bed or convection bed drying with internal waste heat recovery, using a lot of energy.

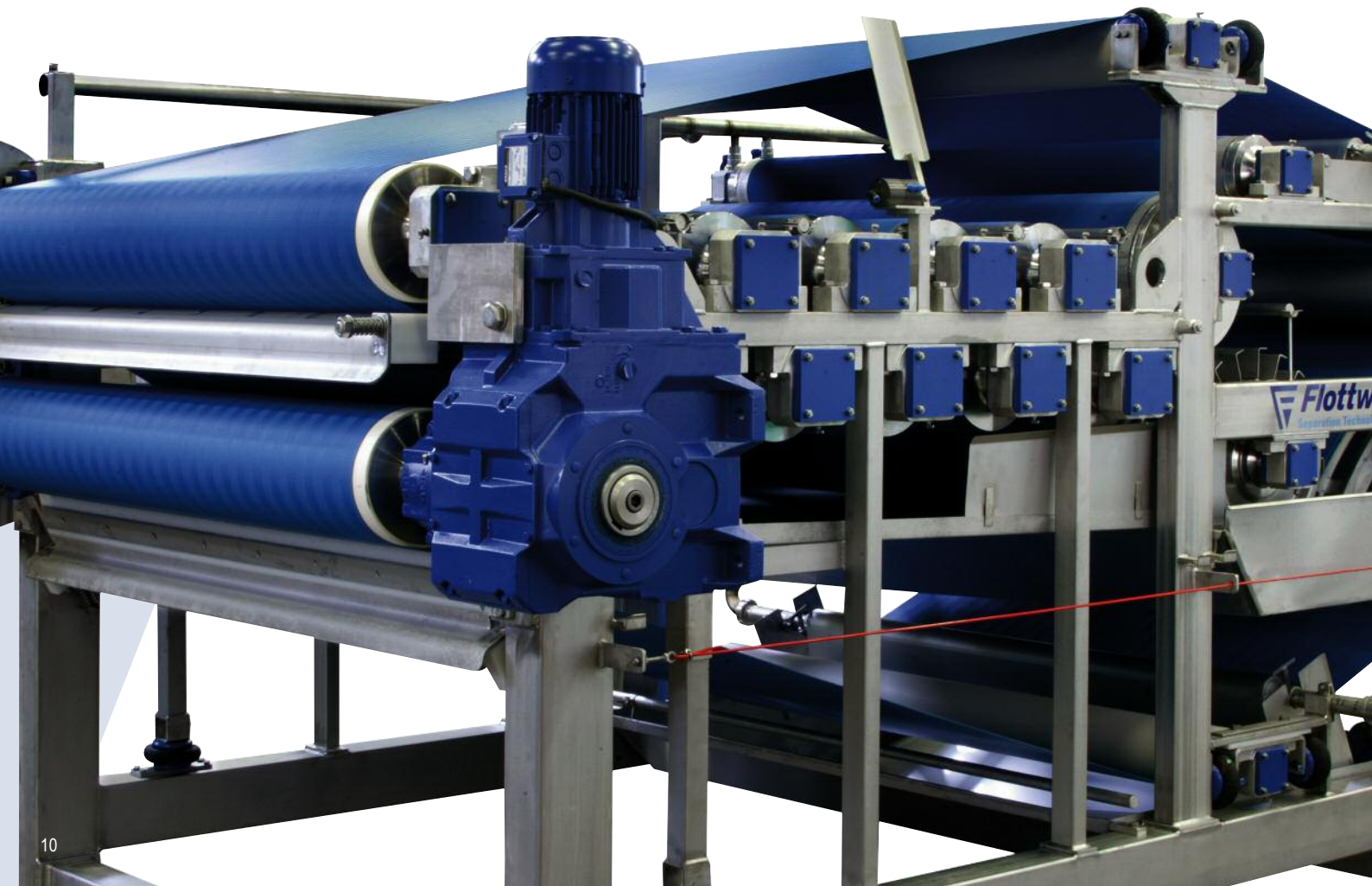
Using Flottweg Belt Presses before the drying process improves the solids' structure considerably, reducing the water content and consequently the required thermal energy in the dryer. The capacity of the dryer can sometimes also be significantly increased.



ADVANTAGES OF THE FLOTTWEG BELT PRESS

Advantages of the Flottweg Belt Press in the production of grain and soy milk

- Simple system – maintenance can easily be carried out by the customer
- Automatic system
- Efficient mechanic dewatering of solids from grain and soy milk production before subsequent drying processes
- Optimization of the solids' structure before drying (easier processing due to less compacting), increasing dryer capacity and saving thermal energy
- Optimized design for easy operation and cleaning



TECHNICAL DATA FOR THE FLOTTWEG BELT PRESS

TECHNICAL DATA FOR THE FLOTTWEG BELT PRESS FOR THE DEWATERING OF SOLIDS GENERATED IN THE PRODUCTION PROCESS*					
Model	BFRU800	BFRU1200	BFRU1500	BFRU1750	BFRU2500
Motor for belt drive	2,2 kW	2,2 kW	3,0 kW	3,0 - 5,5 kW	3,0 - 5,5 kW
Materials of construction	All product-wetted parts are made of AISI 304 or food safe plastics.				
Dimensions * (LxWxH)	4000 x 1600 x 2300 mm	4000 x 2000 x 2300 mm	4600 x 2400 x 2400 mm	5500 x 2700 x 2500 mm	5500 x 3450 x 2500 mm
Total weight*	2,3 t	2,6 t	4,5 t	7,0 t	8,8 t
Capacity**	4 m³/h	6 m³/h	8 m³/h	10 m³/h	15 m³/h

* The figures listed are to be understood as guidelines.

** The actual capacity will depend on the characteristics of the product.



Flottweg Separation Technology – Engineered For Your Success

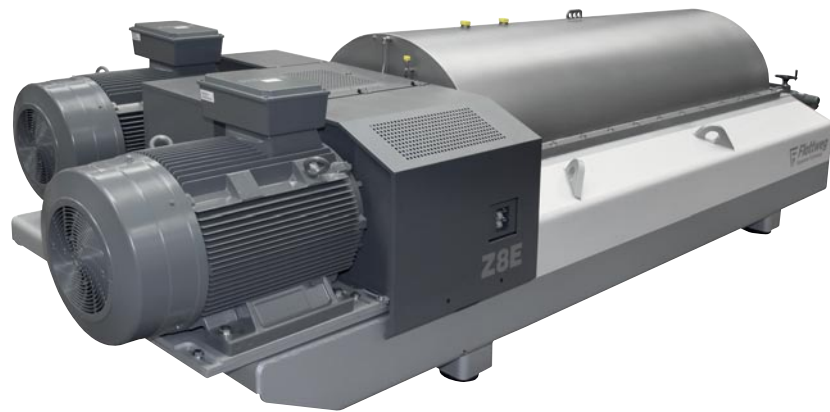


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REPRESENTATIVE



THE FLOTTWEG ISP PROCESS

Innovation in Soy Protein Extraction



SOY PROTEIN EXTRACTION

SOY PROTEIN

Soy protein has become one of the primary sources of vegetable protein for human and livestock consumption. The growing demand for soy products such as isolate and milk requires highly efficient production lines in terms of product quality and yield.

PROTEIN ISOLATE

The basic stages of the protein isolate extraction process have been known for a long time. They consist of slurry preparation using defatted soy flakes or flour and water, separation of non-protein solids and fibers, and finally precipitation, separation and drying of the protein.

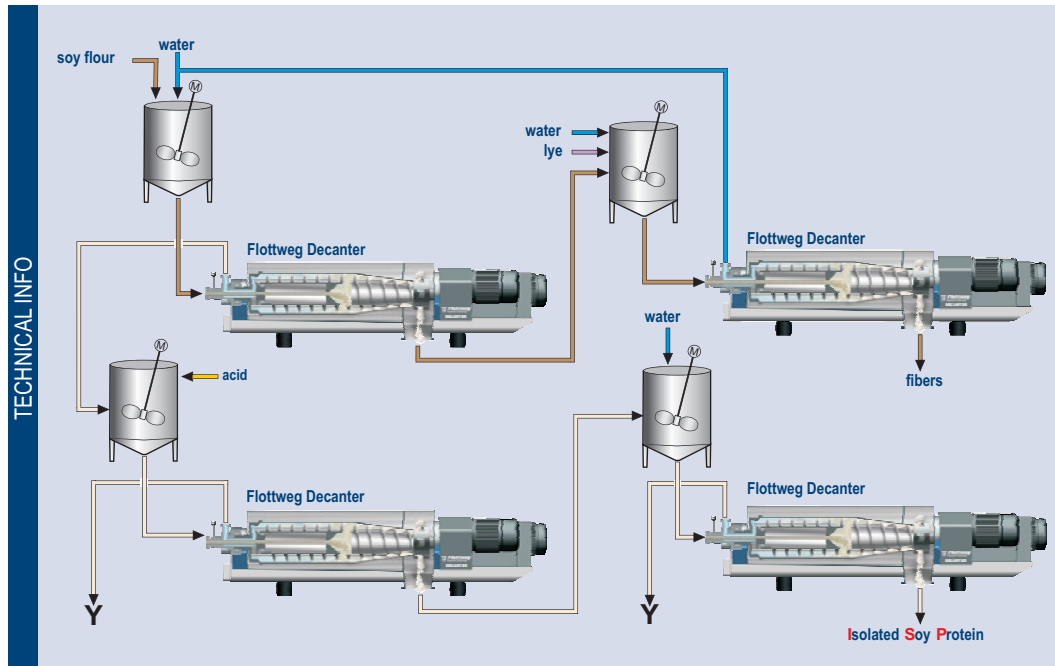
Up-to-date equipment and accurate engineering are the key requirements for the process in order to achieve:

- Optimum yield in protein
- High efficiency of the process
- Process line without bottleneck
- Product purity and quality
- Standardization of products
- Flexibility and stability of the process



PROCESS DETAILS

Complete Customized Systems Solutions



Flottweg Isolated Soy Protein Process

PROTEIN EXTRACTION

A slurry of soy flour and water is produced and the protein is brought into the solution. Then the low-protein fibers are separated from the protein-enriched solution by centrifugal force.

PROTEIN PRECIPITATION

The pH of the protein-enriched solution is adjusted to the isoelectrical point to precipitate protein particles, which then are separated from the mother liquor using centrifuges.

CURD WASHING

The precipitated and separated protein still contains some impurities of the mother liquor. Thus the protein is re-slurried using water and separated again.



BENEFITS OF THE FLOTTWEG ISP PROCESS

Characteristic for the **Flottweg Isolated Soy Protein Process** is the use of Flottweg Decanters in the extraction stage and in the precipitation and washing stages. The use of up-to-date Flottweg Centrifuge Technology makes the ISP process highly flexible and available.

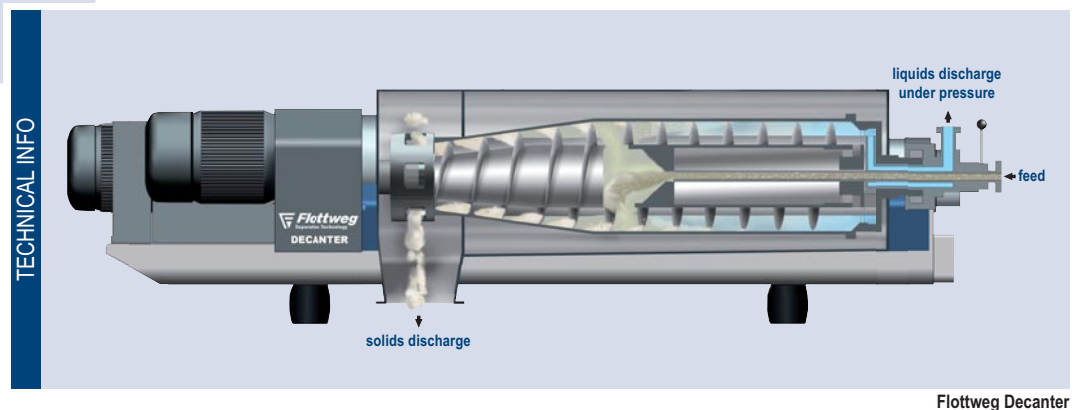
Flottweg Centrifuges can be easily adapted to varying feed conditions and are CIP-capable.

All components of the Flottweg ISP Process are closed systems with minimum air intake, which results in reduced foam formation, low oxygen pick-up, and reduced off-flavor.

Flottweg Decanters provide high centrate clarity and decent cake dryness resulting in a high yield in protein without the need for the use of disc stack centrifuges and their related costs of investment and maintenance.

The Flottweg ISP Process is suitable for new installations as well as for revamping and debottlenecking existing process lines

- Reduced foam formation
- Reduced off-flavor
- Low oxygen pick-up
- Increased yield
- Cost efficiency

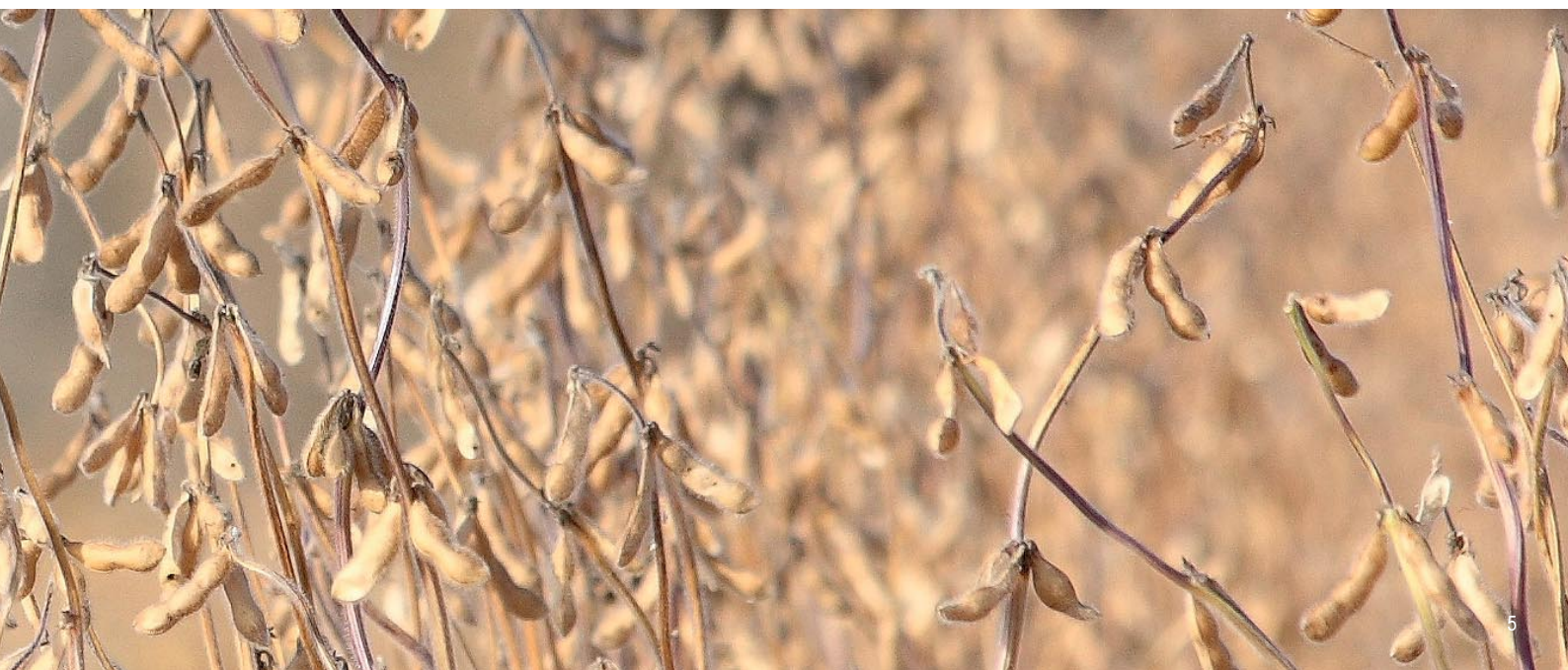


Flottweg Decaners applied in the ISP process are in compliance with the requirements of hygienic design and are fully CIP-capable. All product wetted parts are made of stainless steel with appropriate surface finish. Flottweg Centrifuges applied in the ISP process are equipped with both a servo-driven adjustable impeller for automatic adjustment of the liquid level inside the bowl, and with the patented Flottweg Simp Drive® for the automatic control of the differential speed.

The servo-driven adjustable impeller and the Flottweg Simp Drive® are self-thinking systems for an automatic adaptation to varying feed conditions.

Reasons why the use of Flottweg Centrifuges makes the ISP process so effective

- Fit-for-purpose lay-out to meet different requirements in different separation stages
- Hygienic design and CIP-capability for effective cleaning and minimum downtime
- Variable frequency drive (VFD) and control system – flexibility for easy adaptation to varying process conditions



SPECIAL DESIGN FEATURES

of Flottweg Centrifuges in Food Applications



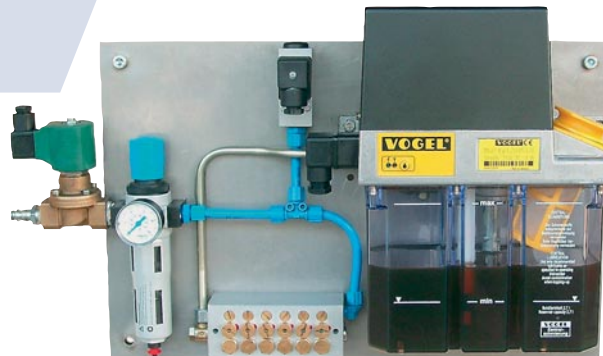
FLOTTWEG SIMP DRIVE® – ENERGY EFFICIENCY

The Flottweg Simp Drive® automatically controls the scroll differential speed according to the torque load that the feed stream generates. Thus, the Flottweg Decanter adapts itself to varying operating conditions, such as solids load and feed rate, resulting in optimum cake dryness. The Simp Drive® enables Flottweg to use standard “off-the-shelf” frequency converters and smaller motors, which will save the end user money during installation and on operation power over the lifetime of the equipment.



AIR/OIL LUBRICATION SYSTEM – INCREASED BEARING LIFETIME

Flottweg’s simple, compact, and effective air/oil (droplet) lubrication system guarantees that the bearings are continuously provided with the optimal amount of fresh, non-recycled oil, thereby minimizing bearing temperature and maximizing bearing life while reducing energy consumption and requiring virtually no maintenance.



Oil-air lubrication system



SERVO-DRIVEN ADJUSTABLE IMPELLER – HIGH FLEXIBILITY

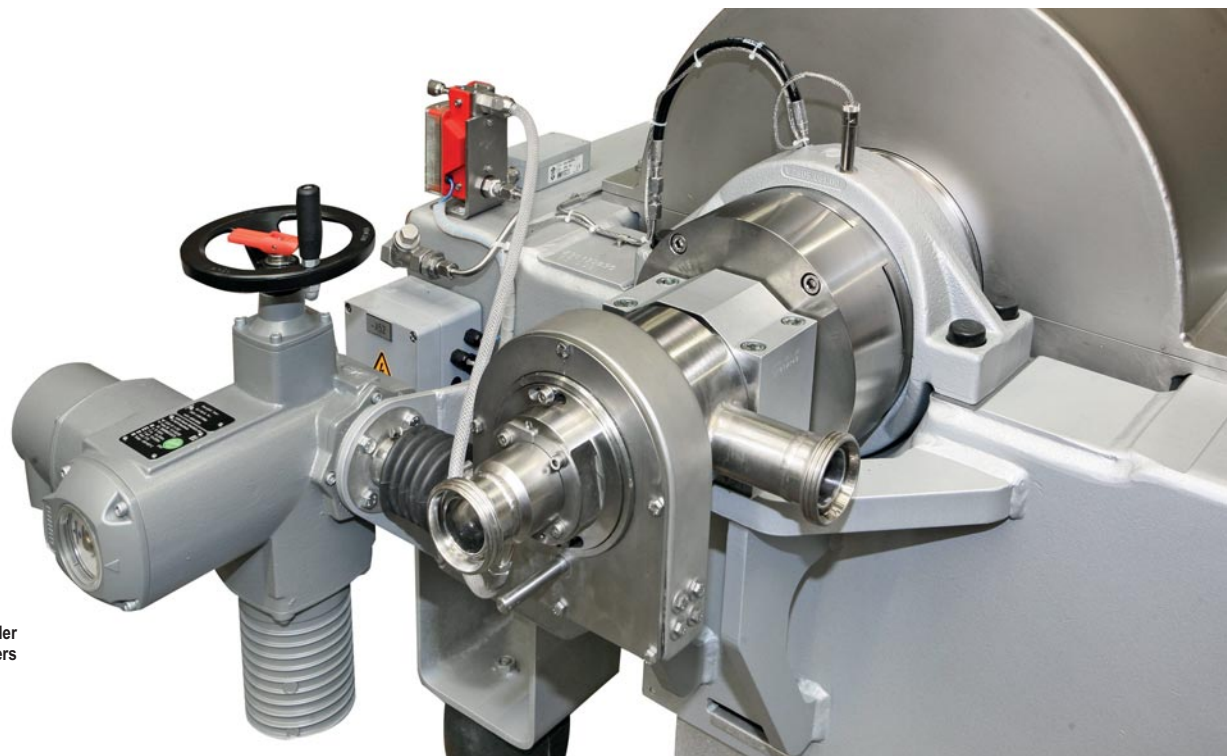
Quick and accurate adaptation to varying operating conditions: Flottweg’s Adjustable Impeller allows for continuous variation of the pond depth during machine operation.

COMPACT CONSTRUCTION – EFFECTIVE MAINTENANCE

Flottweg Decanters have the most compact machine and required machine maintenance footprints allowing the end user to maximize plant space utilization. In conjunction with the compact layout, Flottweg Machines have design features that make them the most ergonomic, maintenance friendly, and accessible centrifuges available.

HYGIENIC DESIGN – INCREASED AVAILABILITY

Flottweg Decanters are laid out in hygienic design as closed systems to avoid air intake and to enable CIP-capability.



Automatic adjustable impeller
of Flottweg Decanters

PROCESS ENGINEERING

Layout of components and package units for all process stages.

PROCESS OPTIMIZATION

Our specialists are qualified for process analysis and debottlenecking, as well as for modernization and expansion of existing installations.

PRODUCT DEVELOPMENT

In cooperation with our customers, we provide our capability for the development of soy products with different functional properties, hydrolizates, and lecithination.

PILOT TESTS

Our experienced and well-trained test engineers carry out pilot tests at the Flottweg Test Bay or field tests at the customer's facility.



DECANTER CONTROL

VIBRATION MONITORING (STANDARD)

Vibration sensors transmit acceleration signals to an analyzer that sounds an alarm or shuts the centrifuge down upon reaching the maximum permissible level.

SPEED MONITORING (STANDARD)

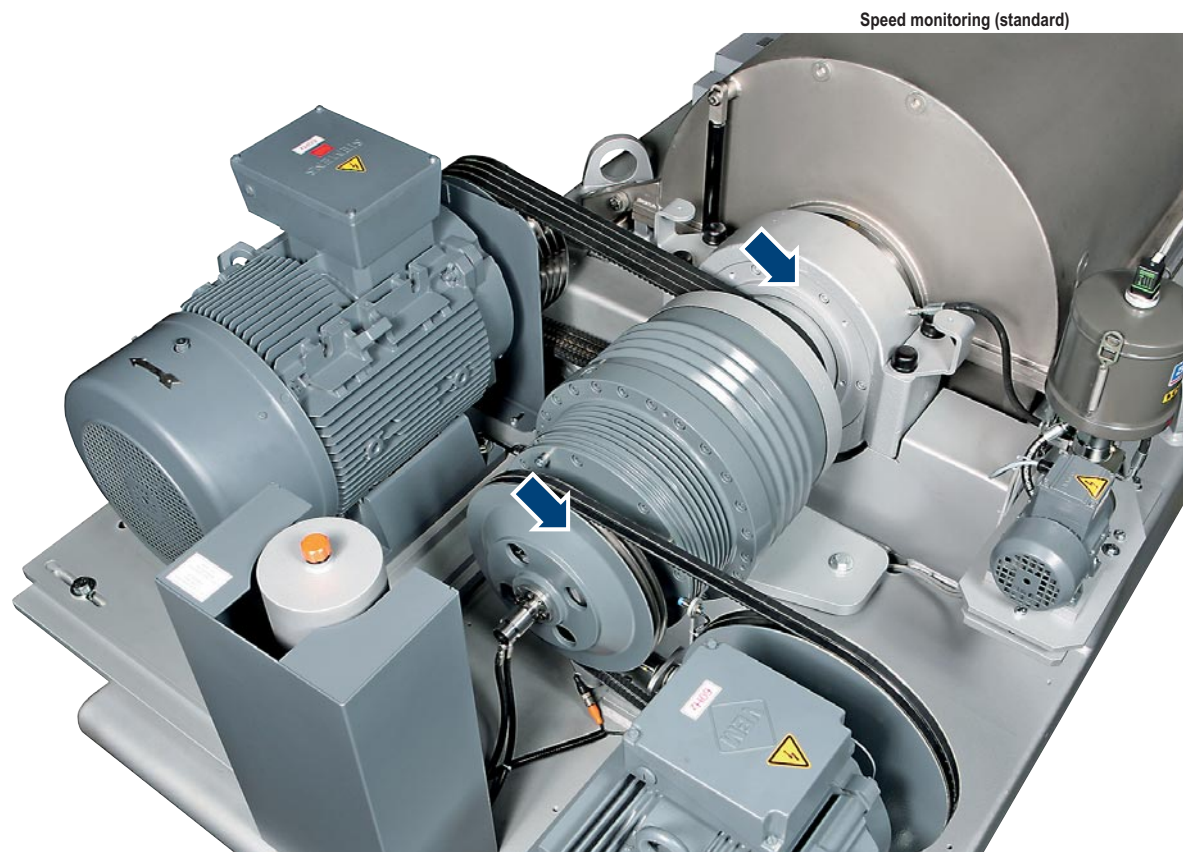
Bowl speed and scroll differential speed are each measured by an inductive proximity switch and shown on a digital display. Continuous monitoring of maximum and minimum values during operation helps to minimize preventable failures and maintain acceptable safety standards.

TEMPERATURE MONITORING (OPTIONAL)

Bearing temperatures are continuously monitored on Flottweg Centrifuges by means of resistance thermometers. Upon exceeding pre-set temperature limits – between 100°C and 130°C depending on the individual application –, the centrifuge gives an alarm or shuts down. This preventive measure safeguards against bearing failure or machine damage.



Vibration monitoring (standard)



Speed monitoring (standard)

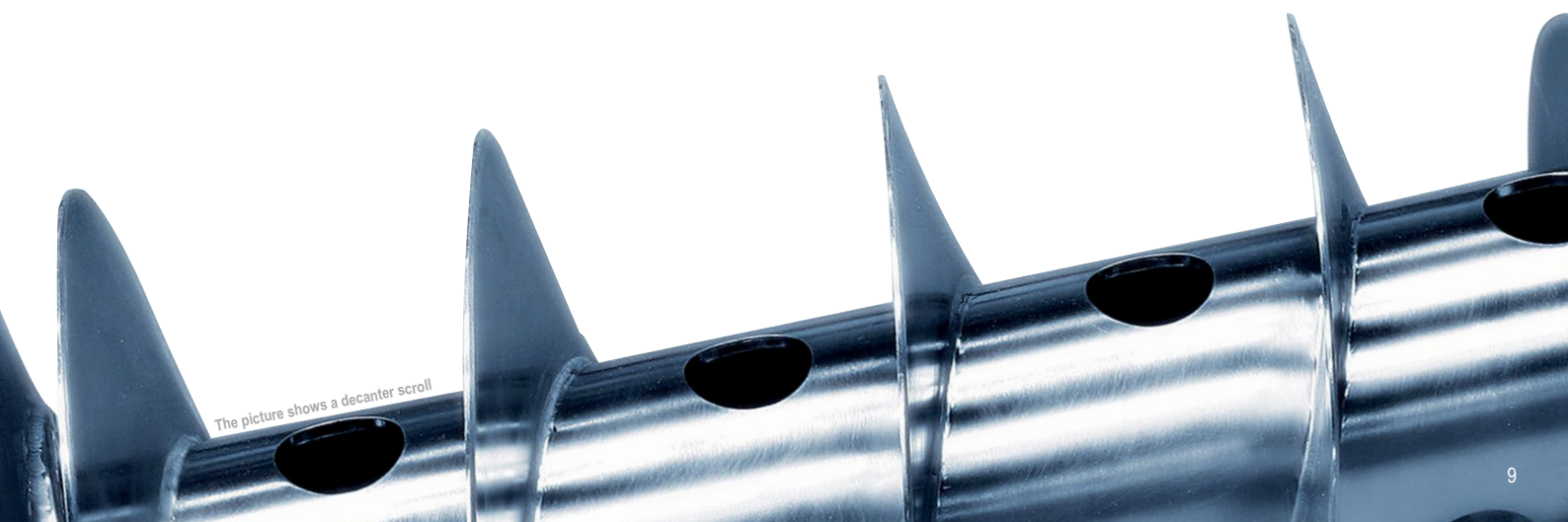
TECHNICAL DATA

of the Flottweg Decanter



TECHNICAL DATA – FLOTTWEG DECANTERS FOR THE ISP PROZESS			
Model	Z5E	Z6E	Z8E
Bowl diameter	530 mm (21")	620 mm (24")	770 mm (30")
Rotation speed of the bowl	3625 / min	3500 / min	3000 / min
Materials	All parts in contact with product are made of high-grade stainless steel, e.g. 1.4463 (Duplex), 1.4571 (AISI 316 Ti), etc.		
Dimensions (L x W x H)*	4500 x 1600 x 1200 mm	5150 x 1700 x 1500 mm	6400 x 2000 x 1500 mm
Gross weight*	6800 kg	8300 kg	14400 kg
Motor sizes	55 + 15 kW	90 + 30 kW	130 + 55 kW
Options	Electropolished surfaces, frame in stainless steel, hydraulic and drive motors		

* The figures listed are guidelines only. Actual capacity will depend on the individual characteristics of the feed product.



The picture shows a decanter scroll

GLOBAL AFTERMARKET SUPPORT NETWORK

No Matter Where You Are in the World



CUSTOMER SERVICE IS OUR STRENGTH

Application-based project planning, high-quality manufacturing and professional after-sales service are prerequisites for a trouble-free operation. Experienced and reliable service engineers from our customer service department are ready to respond quickly if needed. The Flottweg Service Group is also available to perform preventive maintenance in order to avoid interruptions in production.

QUALITY “MADE IN GERMANY”

Flottweg is ISO 9001 certified and manufactures its products in compliance with the latest technical standards.



Flottweg Services include:

- Experienced advise on separation processes
- Pilot tests on-site or at the Flottweg Laboratory and Test Center
- Selection and sizing of appropriate equipment
- Customer-specific automation/control systems and process integration
- Design and construction of complete process systems
- Installation, commissioning, maintenance, repair, and spare parts service worldwide



AFTER-SALES CUSTOMER SERVICE

Even the best machinery needs to be maintained and serviced. Flottweg has established a worldwide service network consisting of its own subsidiaries, branch offices, and representatives to provide our customers with local service and spare parts.

Our service engineers and technicians are qualified for any kind of installation, commissioning, repair, and maintenance.



Flottweg Service Technicians are always available for you

FLOTTWEG WORLDWIDE

Flottweg is headquartered in Vilsbiburg (near Munich), Germany, and has branch offices in Cologne and Leipzig as well as subsidiaries in Australia, Brazil, China, France, Italy, Mexico, Poland, Russia, and the United States, along with representatives in nearly all countries worldwide.

Check out our website at www.flottweg.com to find a competent contact person.



Flottweg Separation Technology – Engineered For Your Success

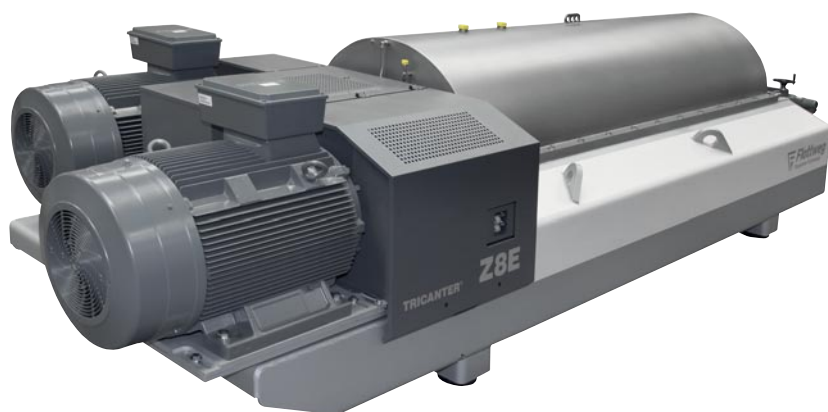


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REPRESENTATIVE



FLOTTWEG SEPARATION TECHNOLOGY FOR THE PRODUCTION OF STARCH AND GLUTEN

High-Quality, Efficiency, and Sustainability



RECOVERY OF STARCH AND GLUTEN

Highest Customer Satisfaction Thanks to Flottweg Equipment

Different raw materials are used for manufacturing starch and gluten. At the same time, manufacturers are particularly concerned with achieving effective and economical processing. This is the only way to guarantee a broad range of products and good environmental compatibility. Decanter centrifuges play a central role in this effort.

Our industrial centrifuges are used in the starch and gluten area for the production of:

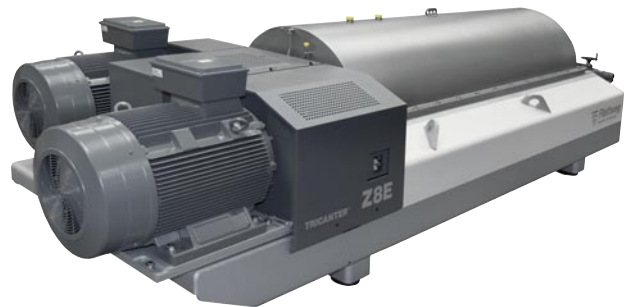
- Wheat starch and wheat gluten
- Potato starch, potato protein, potato pulp, and potato gratings
- Corn gluten
- Pea starch and pea protein

For each of these applications, Flottweg develops optimum process lines and provides appropriate decanter centrifuges. These make it possible to produce A- and B-starch, gluten, bran, and protein in a closed system. You increase your effectiveness while reducing process costs.

PRODUCTION OF STARCH USING THE FLOTTWEG TRICANTER®

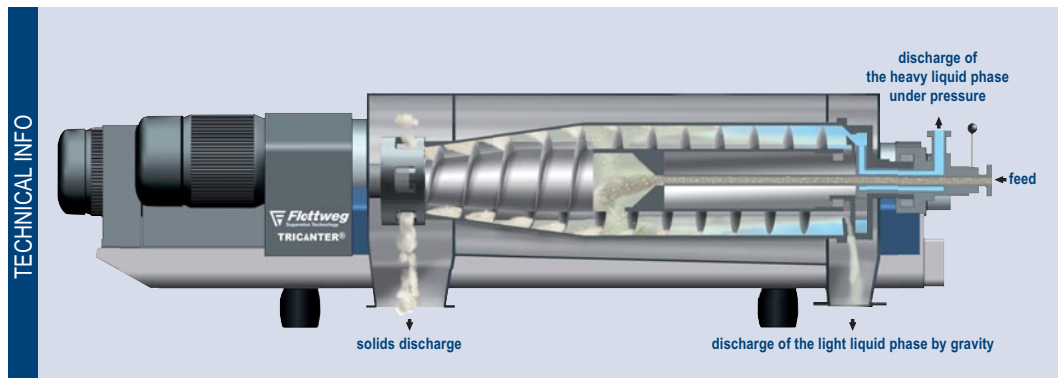
Wheat is one of the most important raw materials in the world for the production of starch and its byproducts. The production of starch involves breaking wheat flour down into its constituents of A-starch, pentosans, and gluten or B-starch. The most effective and efficient method of doing this is using the Flottweg Tricanter®, which impresses customers all over the world with its enormous performance and efficiency. What is more, the Tricanter® has a decisive advantage; it separates starch and other constituents directly in the first process step. The Tricanter® separates the entire A-starch as a concentrate, removes the gluten with the B-starch and separates off the light constituents.

The process steps to recover starch and gluten are explained in detail on page 4.



® = registered trademark for various countries





Flottweg Tricanter® (three-phase decanter)

The Flottweg Tricanter® and its benefits

- Greatest possible purity of the liquids to be separated and optimum adaptation to changing conditions of the product in the feed by using the adjustable impeller
- Other processing steps / separating stages can be eliminated or are no longer required, offering cost savings for the plant owner
- Optimum centrifuge model for any capacity
- The Flottweg Tricanter® meets current requirements for hygienic processing.
- Developed and manufactured in Germany for the highest possible production quality
- Experience and know-how – Flottweg has been manufacturing the Tricanter® for three phase separation for more than 40 years
- The Flottweg Tricanter® stands for maximum performance, quality, versatility, and continuity.

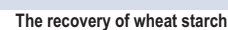


The Process for the Recovery of Starch and Gluten in Detail

Flottweg is one of the leading manufacturers of complete process lines for wheat starch production. Thanks to decades of experience in three-phase separation, Flottweg Systems for the recovery of wheat starch offer the following advantages:

Your benefits when using Flottweg Systems are:

- Efficient engineering in close cooperation with final customers and local contractors
- References all over the world and of all well-known wheat starch factories
- Approved cooperation with renowned sub-suppliers
- Reliable support during commissioning and optimization of the system



ENGINEERED FOR YOUR SUCCESS

Premium-quality, Efficient and Durable

EXPERIENCE

Flottweg has been a supplier for the starch industry all over the world for more than 30 years. The old system of gluten separation in the wheat starch process, called the "Martin Process," has been progressively replaced by the modern three-phase process based on the Tricanter®. Flottweg has accompanied this development from the very beginning and has worked with their customers to optimize the processes.

COMPLETE SYSTEMS

Flottweg is a well-known manufacturer of complete systems in the wheat starch industry, offering a complete process line for the so-called wet process, which starts with flour dosage and ends with the purified final products (humid gluten and starch suspension).

REFERENCES

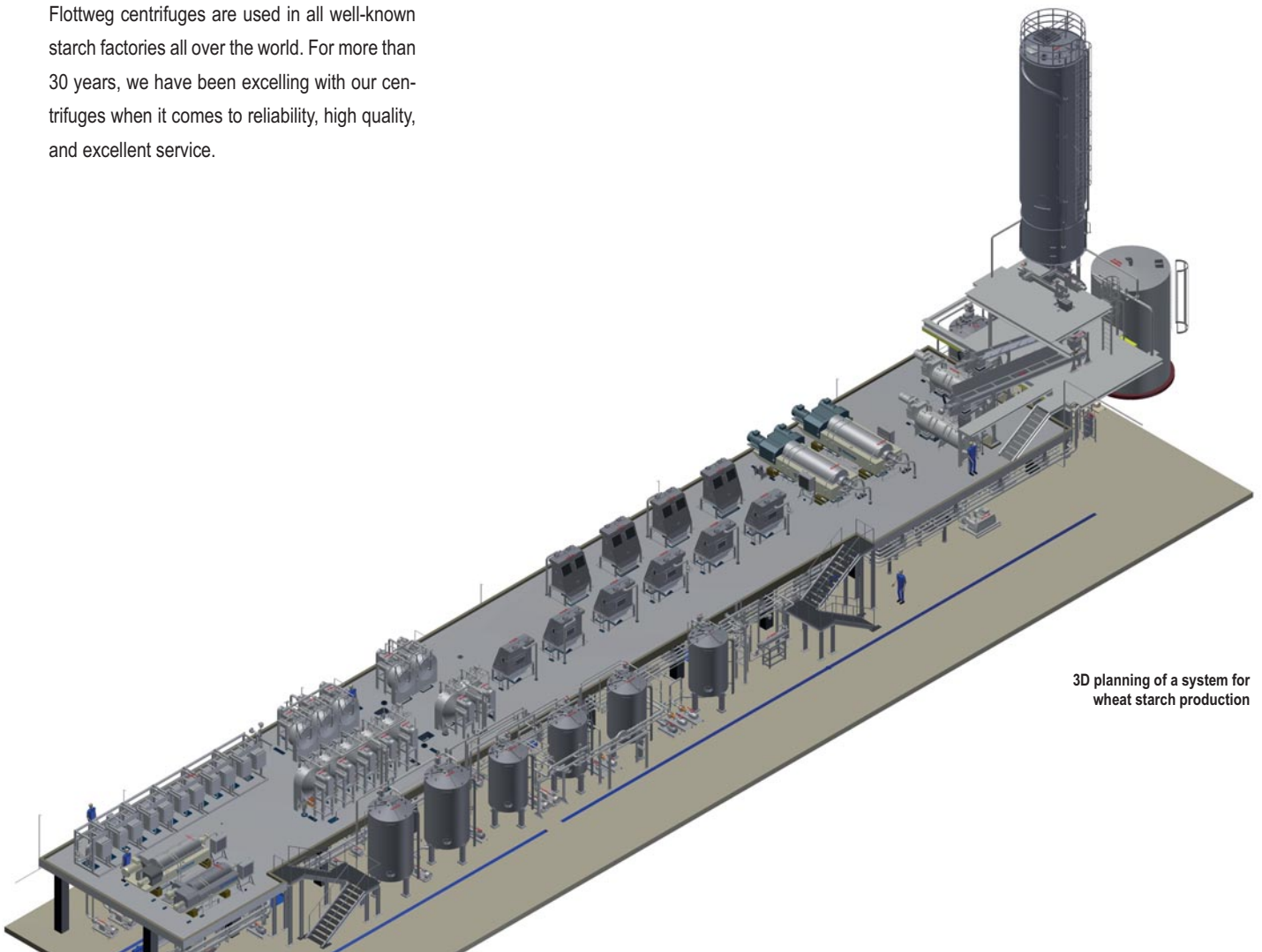
Flottweg centrifuges are used in all well-known starch factories all over the world. For more than 30 years, we have been excelling with our centrifuges when it comes to reliability, high quality, and excellent service.

ENGINEERING

Mechanical separation technology presents us and our customers with major challenges time and time again. Every process is unique, and the influencing factors vary widely. As a result, an "off the shelf" solution is usually impossible. Flottweg is your partner for individual solutions in mechanical separation technology. We offer you the best solution based on our technology and experience. Together, we'll find the best possible way to achieve the ideal overall process under the general conditions specified. We'll work out processes together and place emphasis on the details. Together, we'll achieve the optimum result.

Our engineering excels in the following central points:

- Flexibility in the selection of the right equipment considering local circumstances (sub-suppliers, laws etc.)
- Designated contact person during the whole project life span, from placement of order until acceptance
- Modern engineering tools (3D-layout and pipe planning)



3D planning of a system for wheat starch production

TAKE ADVANTAGE OF OUR EXPERTISE

and Many Years of Experience



Flottweg Separation Technology is used all over the world. Tricanter[®], disc stack centrifuges, and Sedicanters[®] are important components for consistently high customer satisfaction. Dough mixers, used in wheat starch production, are also designed by Flottweg Experts.



Efficient engineering thanks to close cooperation with final customers and sub-suppliers; worldwide references and excellent service, in short: Engineered For Your Success



Flottweg systems and machines are produced, manufactured, and developed in Germany, thus offering highest quality. Curved screens are used in the production of starch and gluten.



The Flottweg Tricanter[®] has been standing for high performance, quality, versatility, and continuity for more than 40 years.

For more detailed information, please ask our sales engineers.

THE FLOTTWEG SEDICANTER®

Soft and flowable solids like proteins, pentosan, and so on are hard to process using a standard decanter. Only the patented Flottweg Sedicanter® can provide an optimum result. Even under changing feed conditions, it gets the best separation results thanks to its adjustable impeller.

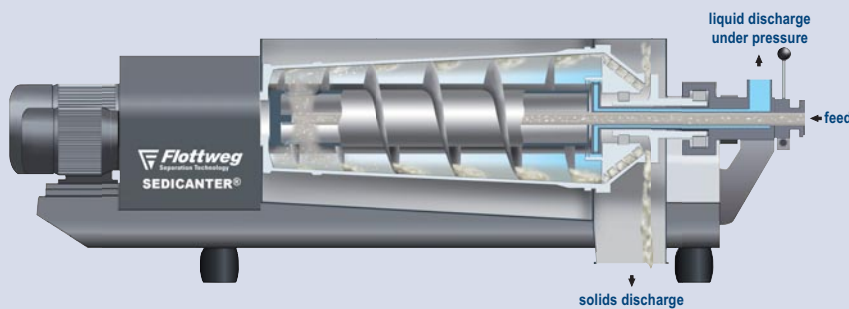
In wheat production, the Flottweg Sedicanter® can be used in the following applications:

- Separation of fine starch from different process waste water
- Clarification and concentration of pentosan
- Clarification of saccharized starch suspensions

Technical Characteristics of the Flottweg Sedicanter®

- Separation of difficult-to-sediment solids with an acceleration of up to 10,000 g
- Available with the approved Flottweg Simp Drive®
- Available in hygienic design
- Gastight operation is possible
- And many more...

TECHNICAL INFO



Flottweg Sedicanter®



MECHANICAL SEPARATION TECHNOLOGY ON THE HIGHEST LEVEL

Flottweg Disc Stack Centrifuges

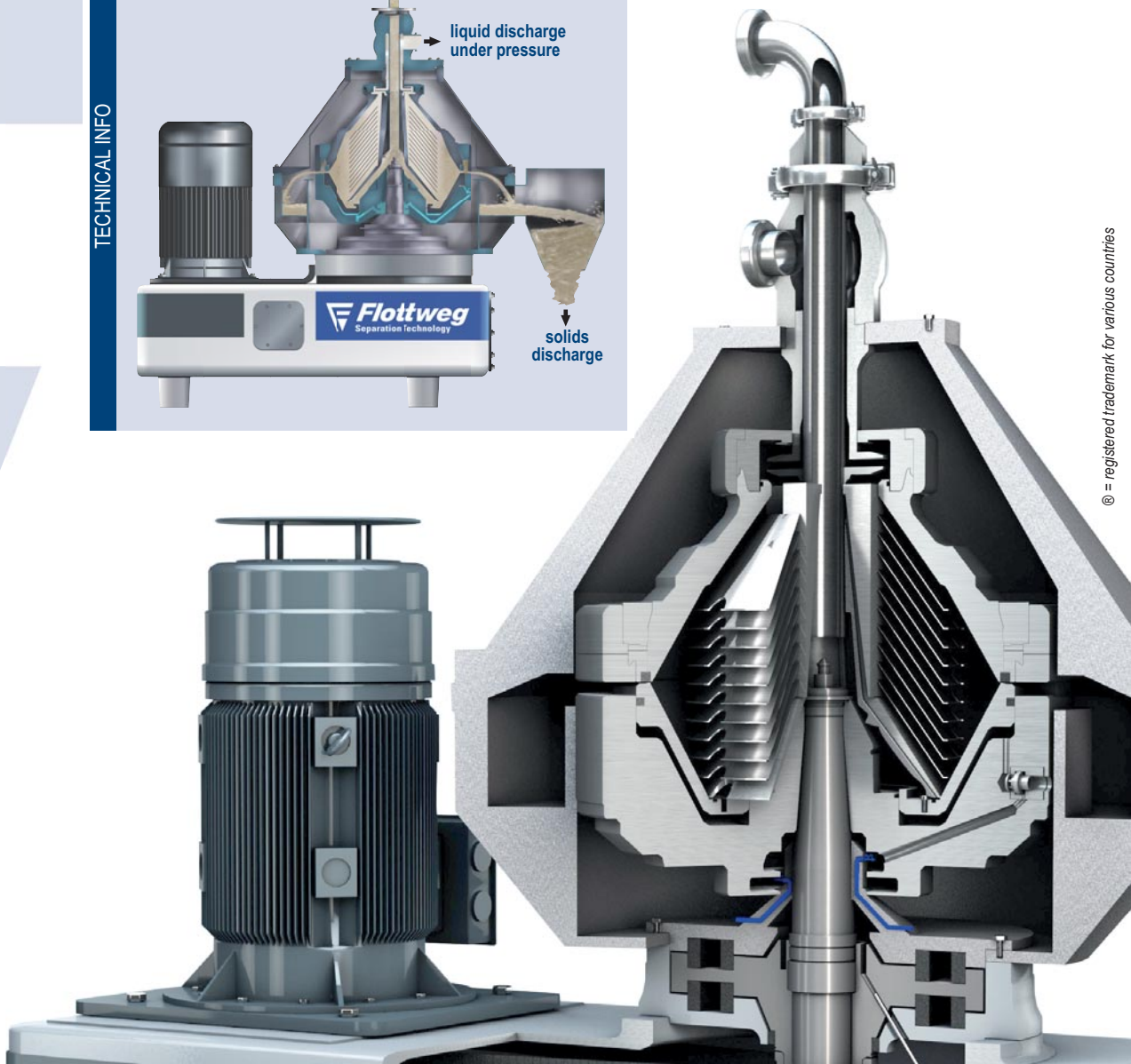
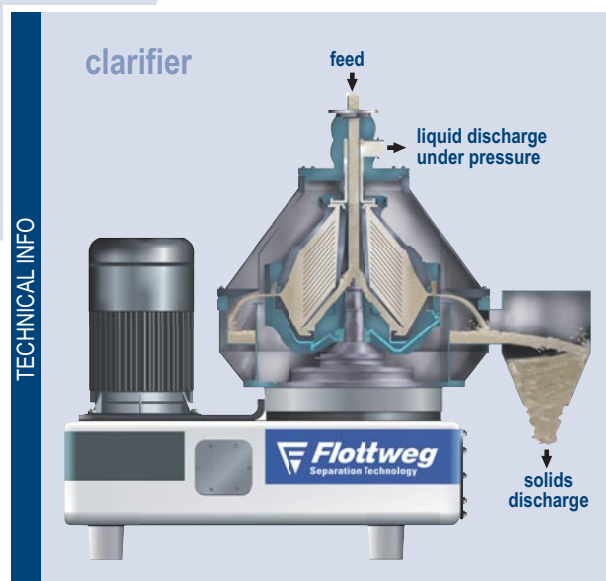
THE FLOTTWEG DISC STACK CENTRIFUGE

Excess water generated in the process during A-starch separation, B-starch concentration, and the fiber fraction using a Tricanter® can be processed using a Flottweg Disc Stack Centrifuge, separating even the finest of solids. Flottweg Disc Stack Centrifuges meet these requirements with flying colors, making an impression with their high quality and efficiency.

A special characteristic of Flottweg AC Separators is the Soft Shot® discharge system which enables exactly reproducible partial discharges as well as total discharges in any combination. The Soft Shot® makes hardly any noise and can therefore be used in rooms with no special or additional acoustic protection measures.

The Soft Shot® discharge system and customer benefits

- Solid discharge operations that make hardly any noise
- Precise partial or full discharges in any combination for maximum product yield
- Reduced wear on high-stress components

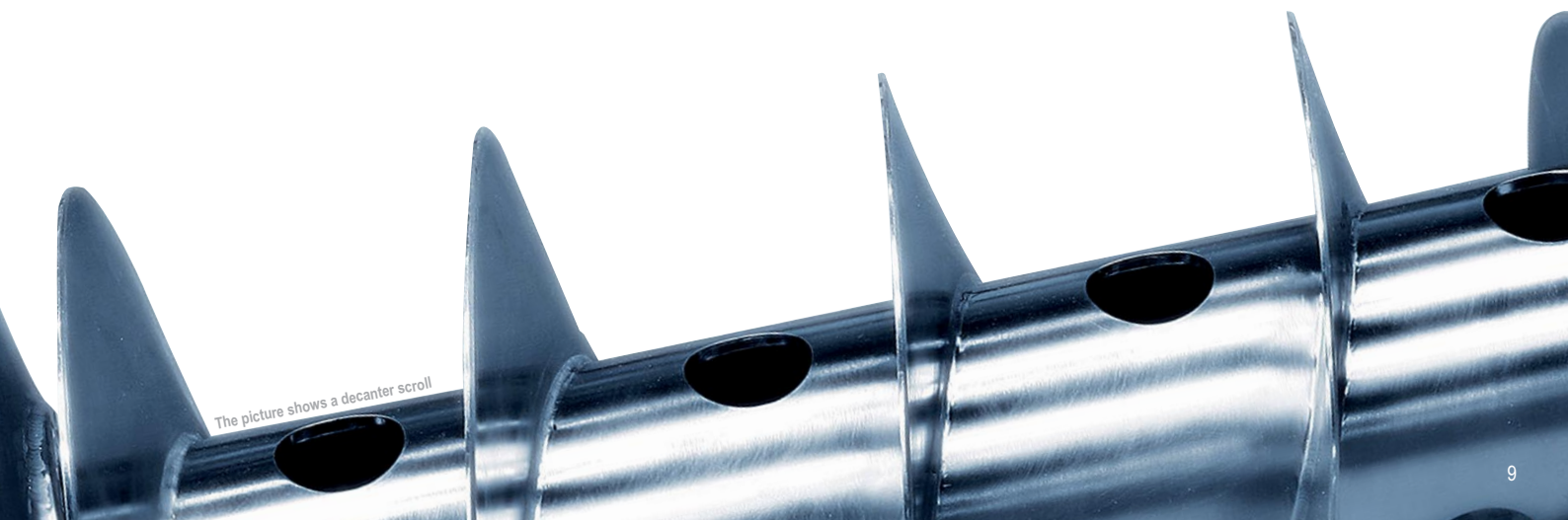


TECHNICAL DATA

of the Flottweg Tricanter®

TECHNICAL DATA FOR FLOTTWEG STARCH TRICANTERS®			
Model	Z5E	Z6E	Z8E
Bowl diameter	530 mm	620 mm	770 mm
Rotation speed of the bowl	3500 / min	3200 / min	2650 / min
Materials	All parts in contact with product are made of high-grade stainless steel, e.g. 1.4463 (Duplex), 1.4571 (AISI 316 Ti), etc.		
Dimensions (L x W x H)*	4525 x 1560 x 1140 mm	5200 x 1770 x 1260 mm	6400 x 2000 x 1500 mm
Gross weight*	6200 kg	9750 kg	14400 kg
Motor sizes	75 + 30 kW	90 + 90 kW	160 + 132 kW
Capacity (wheat flour)*	3 – 6 t/h	6 – 11 t/h	10 – 20 t/h
Options	Electropolished surfaces, frame in stainless steel, hydraulic and drive motors		

* The figures listed are guidelines only. Actual capacity will depend on the individual characteristics of the feed product.



The picture shows a decanter scroll

GLOBAL AFTERMARKET SUPPORT NETWORK

No Matter Where You Are in the World



CUSTOMER SERVICE IS OUR STRENGTH

Application-based project planning, high-quality manufacturing and professional after-sales service are prerequisites for a trouble-free operation. Experienced and reliable service engineers from our customer service department are ready to respond quickly if needed. The Flottweg Service Group is also available to perform preventive maintenance in order to avoid interruptions in production.

QUALITY “MADE IN GERMANY”

Flottweg is ISO 9001 certified and manufactures its products in compliance with the latest technical standards.



Flottweg Services include:

- Experienced advise on separation processes
- Pilot tests on-site or at the Flottweg Laboratory and Test Center
- Selection and sizing of appropriate equipment
- Customer-specific automation/control systems and process integration
- Design and construction of complete process systems
- Installation, commissioning, maintenance, repair, and spare parts service worldwide



AFTER-SALES CUSTOMER SERVICE

Even the best machinery needs to be maintained and serviced. Flottweg has established a worldwide service network consisting of its own subsidiaries, branch offices, and representatives to provide our customers with localized service and spare parts.

Our service engineers and technicians are qualified for any kind of installation, commissioning, repair, and maintenance.



Flottweg Service Technicians are always available for you

FLOTTWEG WORLDWIDE

Flottweg is headquartered in Vilsbiburg (near Munich), Germany, and has branch offices in Cologne and Leipzig as well as subsidiaries in Australia, Brazil, China, France, Italy, Mexico, Poland, Russia, and the United States, along with representatives in nearly all countries worldwide.

Check out our website at www.flottweg.com to find a competent contact person.



Flottweg Separation Technology – Engineered For Your Success



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REPRESENTATIVE



FLOTTWEG CENTRIFUGES FOR WINE PRODUCTION

Maximum Purity, Improved Quality, Higher Yields



FLOTTWEG DECANTER CENTRIFUGES AND DISC STACK CENTRIFUGES FOR THE WINE INDUSTRY

Optimum Yield, Improved Product Quality

Wine is a cultural asset. The grape vine is one of the oldest cultivated plants of the world. And its success story is continuing dramatically. Lifestyle and consumption habits are changing all over the world. Quick urbanization and raising incomes are resulting in increased wine consumption, thus leading to a positive development of the wine industry.

And it is still a challenge. The wine production process depends on the relatively short harvesting period. When it really matters, the vintner needs reliable and efficient equipment.

Wine yield and quality are subject to the grape type and the cultivation region as well as increasingly varying climatic conditions. Clarifying processes play an important role during the entire wine production process. Therefore, choosing the right separation technology is critical for the yield, purity and taste.

Flottweg Decanter Centrifuges and Disc Stack Centrifuges have been used in wineries for many years. No matter if it's must clarification, trub processing or fine clarification – Flottweg Centrifuges help the vintner produce great wines efficiently.



OVERVIEW: FLOTTWEG SEPARATION TECHNOLOGY FOR RED WINE PRODUCTION

Advantages of Flottweg Centrifuges in the wine industry

Decanter centrifuge for must clarification

- Quick processing of must and must residues, even in case of a high solids content
- Closed discharge of the clarified must reduces oxygen pick-up/oxidation
- Hygienic design and complete CIP capability for efficient cleaning, thus high product quality
- Adjustable impeller for optimum adjustment of the separation zone. Continuously high yields also in case of varying grape quality
- Continuous must clarification/grape extraction; alternative to the traditional wine press, which does not work continuously

Flottweg Disc Stack Centrifuge for fine clarification

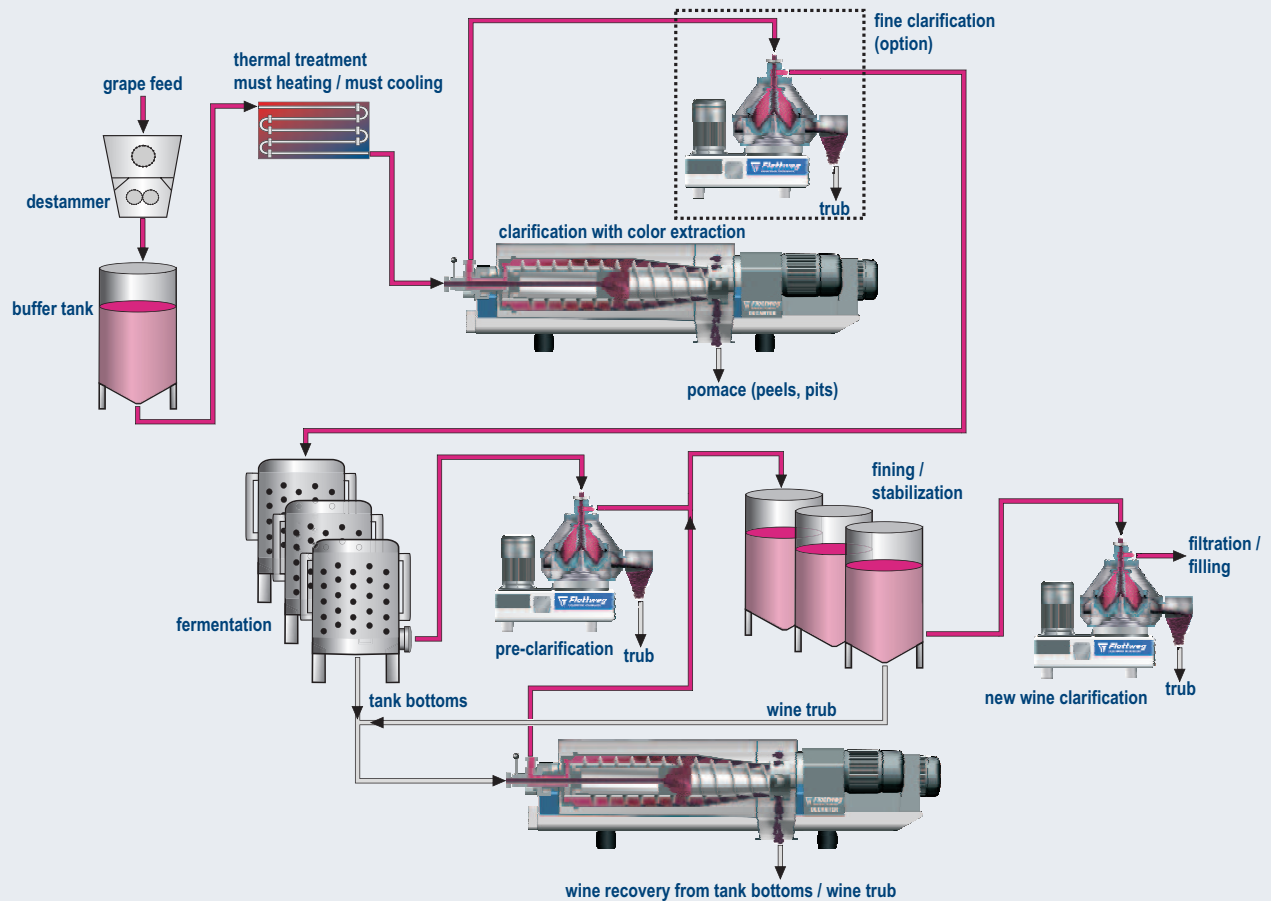
- Positive impact on quality thanks to optimum must clarification
- Flottweg Soft Shot® discharge system offers flexible partial and total discharges, thus increased yields thanks to dry solids

Flottweg's industrial centrifuges excel in excellent yields, sturdy design and relatively low operating costs.

FLOTTWEG SEPARATION TECHNOLOGY IN RED WINE PRODUCTION

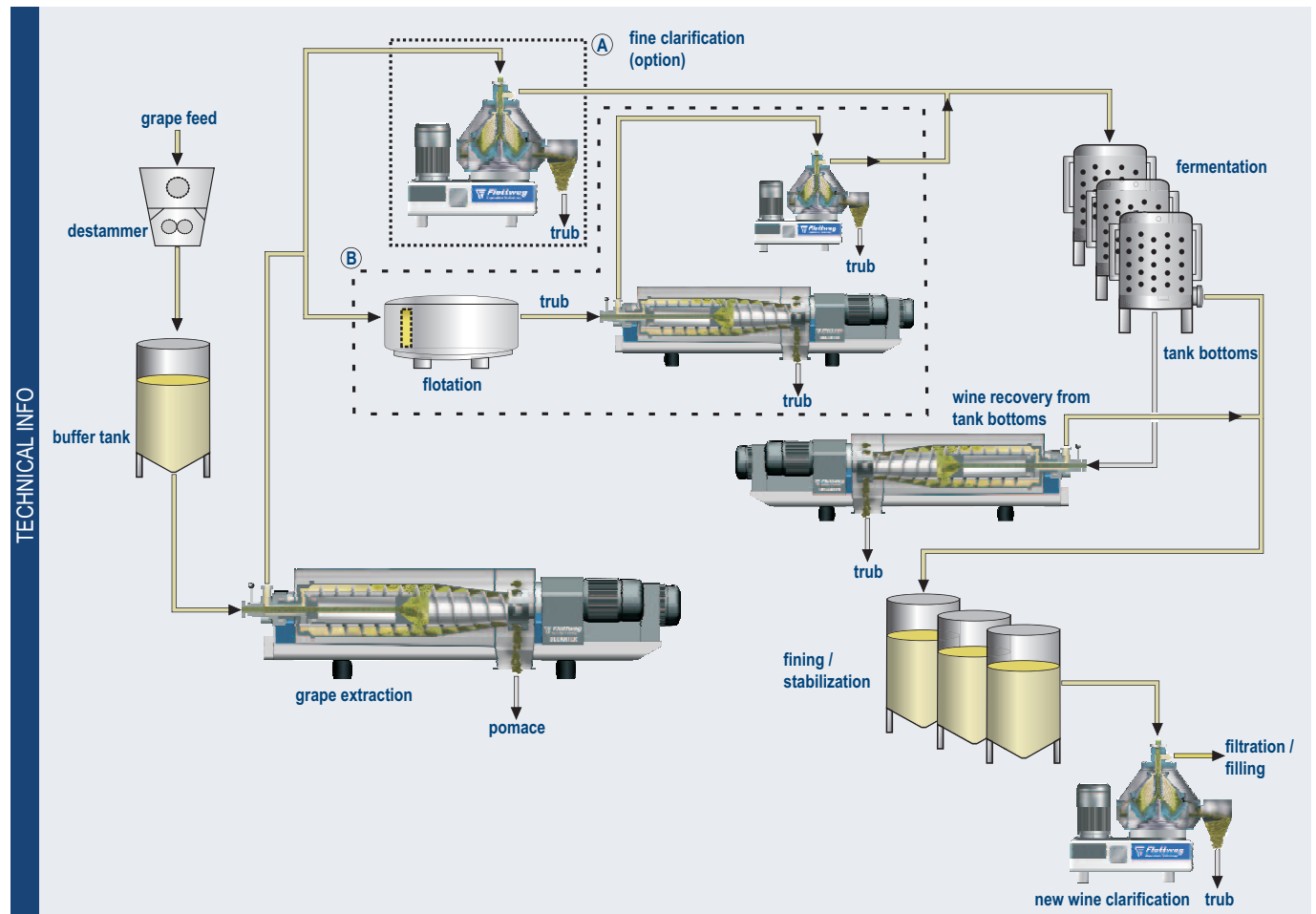
Overview

TECHNICAL INFO



FLOTTWEG SEPARATION TECHNOLOGY **IN WHITE WINE PRODUCTION**

Overview



MUST PRE-CLARIFICATION AND TANK BOTTOMS PROCESSING

Using the Flottweg Decanter

Everywhere that liquids containing a high solids content have to be clarified, decanter centrifuges are used. One of these applications is must pre-clarification. The specific construction of the Flottweg Decanter not only offers economic, but also quality advantages in must processing. For every vintner, it is essential to assure high wine quality and high yields.

The trub content of the grape must depends on the grapes' pre-treatment. Harvesting technology as well as the grape transport impact the composition of the must. In regions with high temperatures (e.g. Australia, South Africa, California), only mechanical harvesting is possible in order to protect humans and grapes. As a matter of fact it can be said that mechanically harvested grapes have a higher trub content than manually harvested grapes because of the higher mechanical load. The press system used has also a considerable impact on trub generation. Scroll presses tend to generate higher trub contents in the must than membrane presses.

Therefore efficient must clarification is critical for the further production process. The Flottweg Decanter offers several advantages compared to traditional must clarification.

INCREASING QUALITY

The machine separates trub particles from must within seconds, thus reducing the contact time considerably. Due to their high phenol content, trub particles may have negative impacts on must quality in case of long contact times (e.g. static sedimentation). The clarified must is discharged from the machine in a gentle way using an adjustable impeller. Due to this special discharge system, the precious liquid is discharged free of foam and under pressure. Must contact with oxygen and thus oxidation processes are minimized.

OPTIMUM CLARIFICATION, HIGH YIELD

The heart of the machine, the rotor together with the conveyor scroll, has been specifically adapted for efficient must and wine clarification. Thanks to the adjustable impeller, the separation zone within the machine can be optimally adjusted to the raw product. Even in the event of different trub contents of the grape must (different kinds of grapes, harvest season, harvest method etc.), the best clarification result may be obtained. In general, the discharged must only contains a solids content of < 1 %. Thanks to the Simp Drive® System, the differential speed of scroll and decanter bowl can be optimally adjusted, thus optimizing the solids residence time (pressing of the solids within the bowl cone). The yield of clarified must is considerably increased. The decanter can be flexibly used in wine production within different processes and is therefore real multi-function equipment for efficient trub management.





MUST CLARIFICATION ZONE

- High clarifying efficiency of the Flottweg Decanter thanks to the optimum adjustment of bowl and scroll to the requirements of the wine industry
- Flexible adjustment of the separation zone using the adjustable impeller; that means optimum clearing results, even in case of varying feed conditions



EXTRACTION ZONE

- Pressing of the solids in the bowl cone area, thus optimum adjustment of differential speed
- High dry substance content in the separated solids, high must yields

discharge of the clarified must
under pressure

feed must

discharge
pomace / trub particles



FLOTTWEG ADJUSTABLE IMPELLER

- Closed discharge of the clarified must under pressure; thus prevention of foam, minimized oxidation, higher quality in the final product
- Thanks to liquid discharge under pressure, no supply pump is required, which would normally be necessary
- Optimized CIP process
- Option for automation



FLOTTWEG SIMP DRIVE®

- Torque-controlled adjustment of differential speed; thus continuously high dry substance content in the separated solids
- High creation of value thanks to an increased overall yield of grape must
- Gear box located outside the product zone
- Lubricants used in compliance with NSF H1

Picture shows the scroll
in the decanter bowl

FINE CLARIFICATION

Using the Flottweg Disc Stack Centrifuge

Clarifying processes not only play an important role in must processing. During the entire wine production process, efficient clarification may have a significant impact on the taste of the wine and thus on its market value.

In wineries, some fine particles cannot be separated from the liquid using a decanter centrifuge due to their low density difference. This is where disc stack centrifuges are used. These liquid-orientated machines operate with a higher centrifugal acceleration due to their construction. Even very fine particles can be separated, thus clarifying must and (young) wine efficiently.

IMPROVED QUALITY

Early clarifying using disc stack centrifuges helps removing very fine trub particles, which could have a negative impact on the taste of the wine during additional production stages. Moreover, further fermentation is more consistent and can be better controlled. The development of the wine is optimized.

ECONOMIC ADVANTAGES

Wine made of finely separated must can be stabilized better and in a more economic way. Filter life time becomes longer, which results in cost savings for filter aids. Separation of trub particles in the must phase reduces the amount of sulfur dioxide to be added in additional production stages.



FUNCTIONAL PRINCIPLE OF THE Flottweg Disc Stack Centrifuge



FLOTTWEG SOFT SHOT® SYSTEM

- Accurate total or partial discharges in any combination. Discharge times can be precisely adjusted; thus higher yields in wine and must thanks to more compact solids
- Material-friendly, silent, nearly inaudible solids discharge
- Option: "self-thinking" machine with turbidity monitoring



WEAR PROTECTION

- High wear resistance thanks to specific wear protection components
- Easy mounting and dismantling
- Longer service lifetime of the bowl of the disc stack centrifuge in must clarification (sand residues) or clarification after fining (bentonite residues)



THE BOWL OF THE DISC STACK CENTRIFUGE

- Compact and sturdy design
- Easy mounting and dismantling
- Reduced number of components and seals for low operating costs



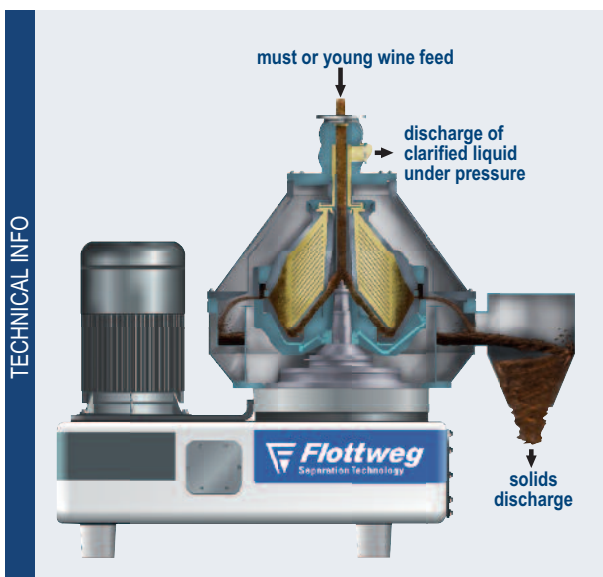
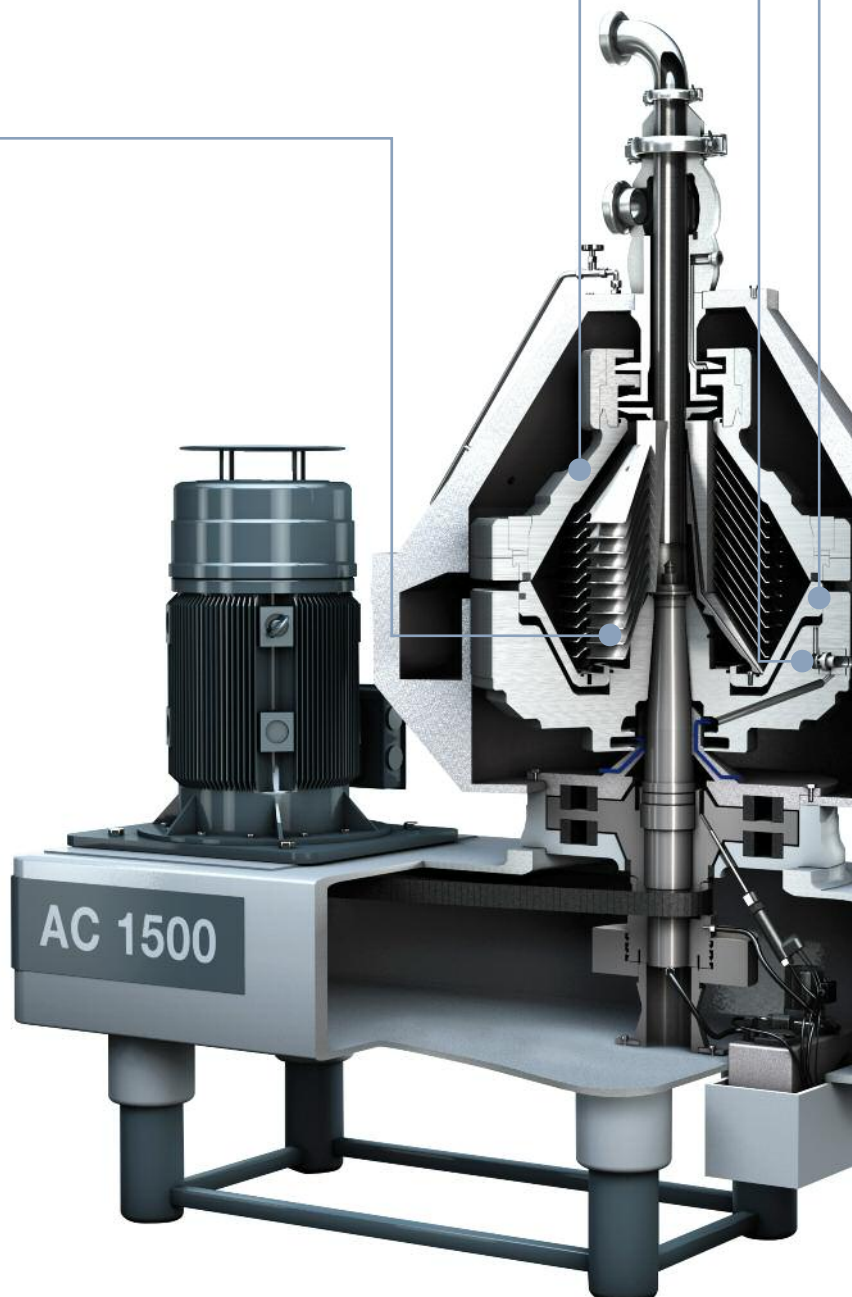
DISC STACK AND DISTRIBUTOR

Gentle

- Gentle acceleration of the liquid thanks to an optimized design of the distributor, thus gentle product treatment

Efficient

- Highly efficient solids separation and fine separation thanks to the large clarifying zone of the discs



TECHNICAL INFO

CAPACITIES OF THE DECANTER / DISC STACK CENTRIFUGE IN THE WINE INDUSTRY



CAPACITIES [m³/h] OF THE FLOTTWEG DECANTER IN THE WINE INDUSTRY					
Type	Z3E	Z4E	Z5E	Z6E	Z8E
Must ¹	up to 4	up to 12	up to 25	up to 30	up to 40
Sedimentation trub / tank bottom ²	1,8	up to 4	up to 6	–	–

¹⁾ subject to vintage and type of wine
²⁾ capacity depending on the solids charge in the feed



CAPACITIES [l/h] OF THE FLOTTWEG DISC STACK CENTRIFUGE IN THE WINE INDUSTRY					
Type	AC1000	AC1200	AC1500	AC2000	AC2500
Must ¹	800	2000	4000	8000	15000
Wine ²	1000	2500	5000	12000	25000

¹⁾ subject to vintage and type of wine
²⁾ The listed figures are guidelines to be used for information only and may differ according to the process and the pre-treatment



HIGH AVAILABILITY IS OUR STRENGTH

Application-based project planning, high-quality manufacturing and professional after-sales service are prerequisites for a trouble-free operation. Experienced and reliable engineers from our customer service department are ready to respond quickly if needed. The Flottweg Service Group is also available to perform preventive maintenance in order to avoid interruptions in production.



“MADE IN GERMANY” QUALITY

Flottweg is ISO 9001-certified and manufactures its products in compliance with the latest technical standards.

Flottweg Services include

- Experienced advice about separation processes
- Pilot tests on-site or at the Flottweg Laboratory and Test Center
- Selection and sizing of appropriate equipment
- Customer-specific automation/control systems and process integration
- Design and construction of complete process systems
- Installation, commissioning, maintenance, repair and spare parts service worldwide



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