



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.



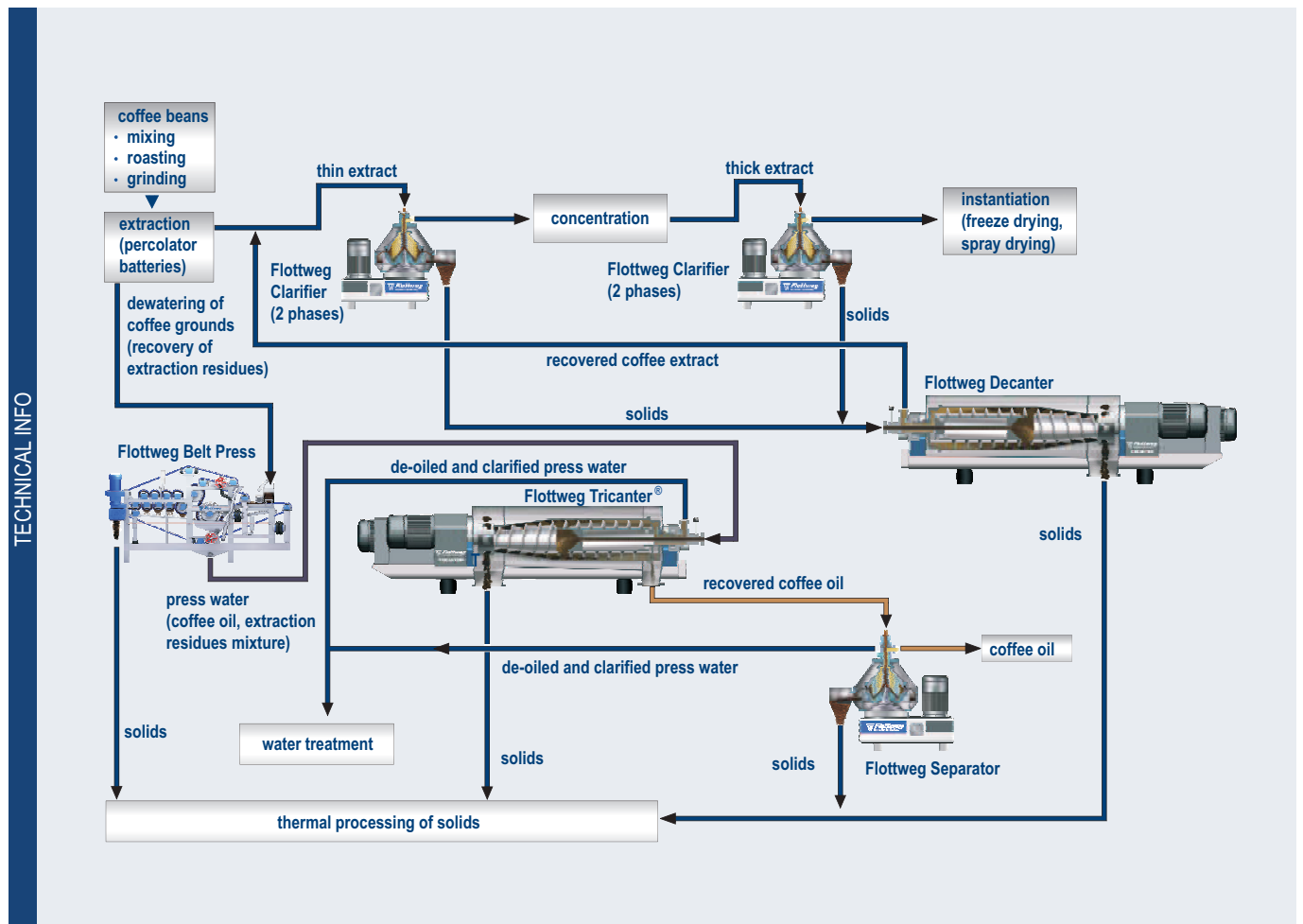
Overview: Flottweg Separation Technology for the production of instant coffee

- 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



THIN AND THICK EXTRACT CLARIFICATION

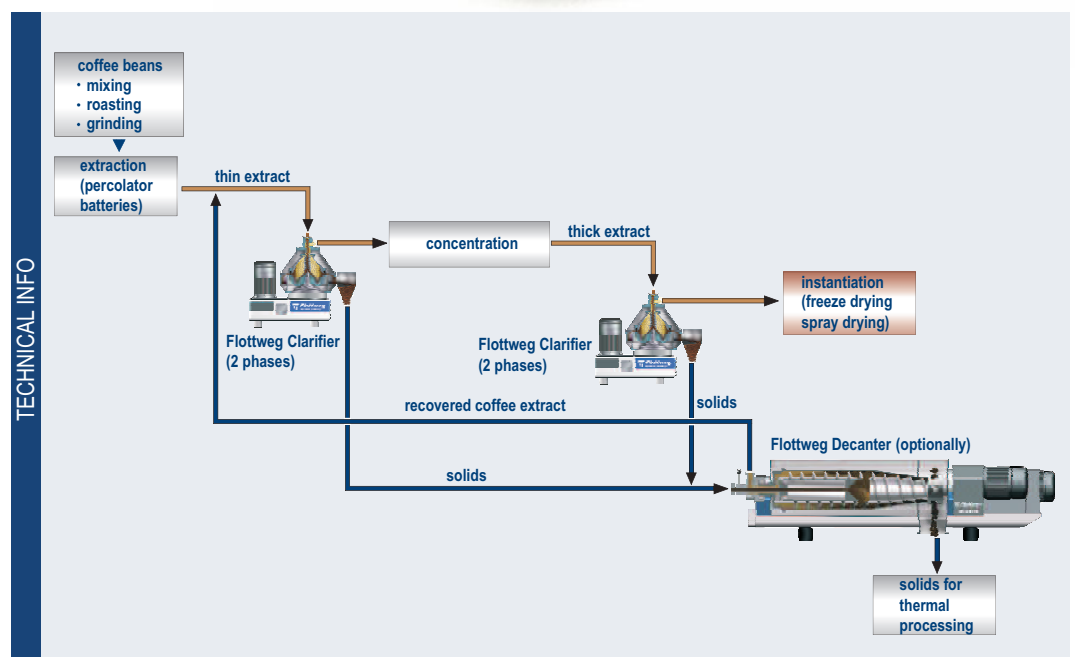
Improving Instant Characteristics

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"

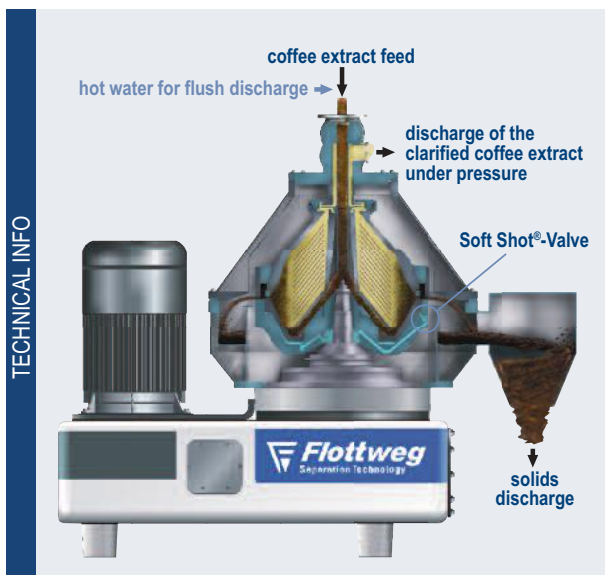


WEIR PROTECTION

- 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

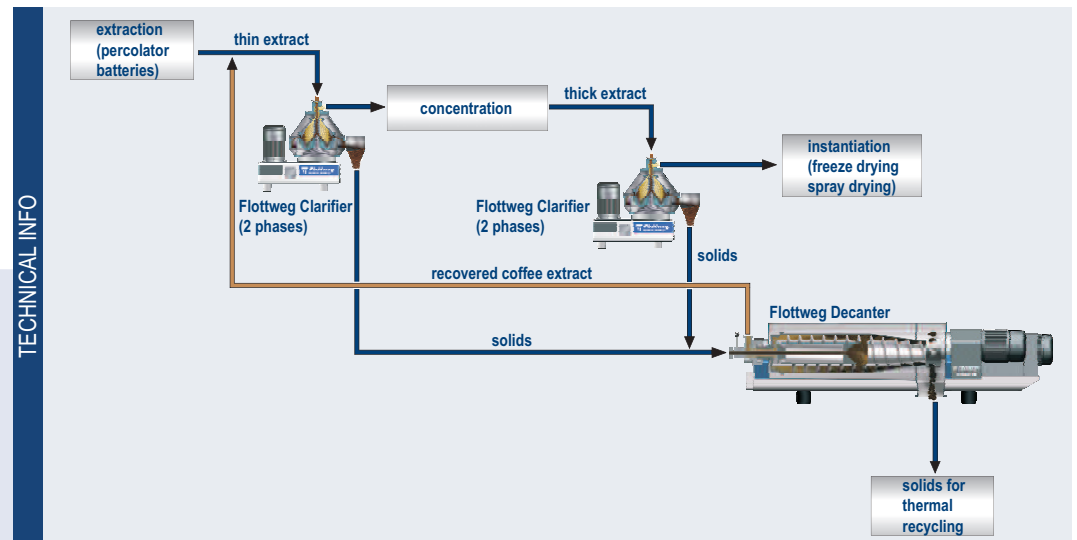


THIN AND THICK EXTRACT CLARIFICATION

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

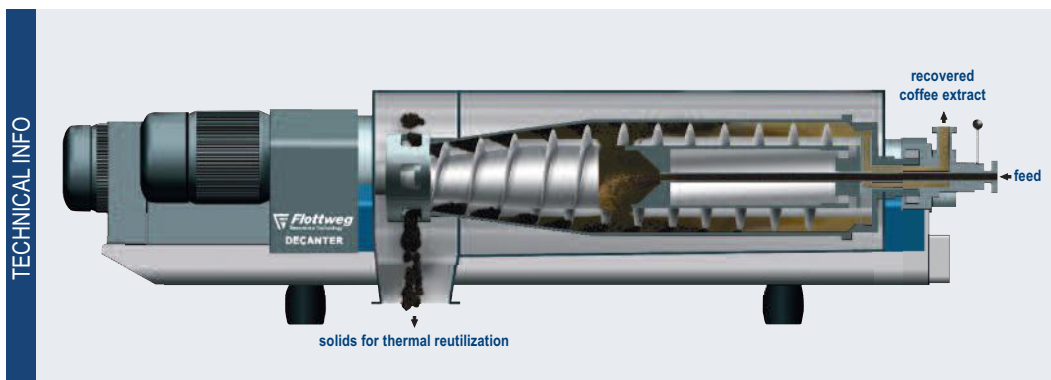
- Closed discharge system for the centrate under pressure, thus generating no foam
- Due to the discharge of the liquid under pressure, there is no conveyor pump needed, in contrast with the usual situation.
- The pond depth can be adjusted during operation, thus allowing for optimum adaption to varying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

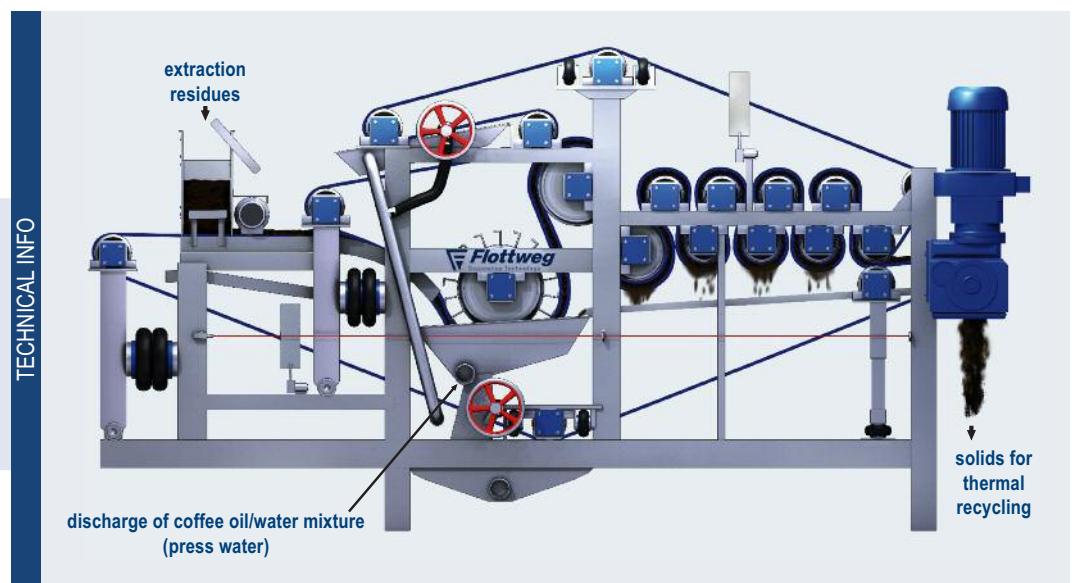


PRESSING OF COFFEE GROUNDS

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

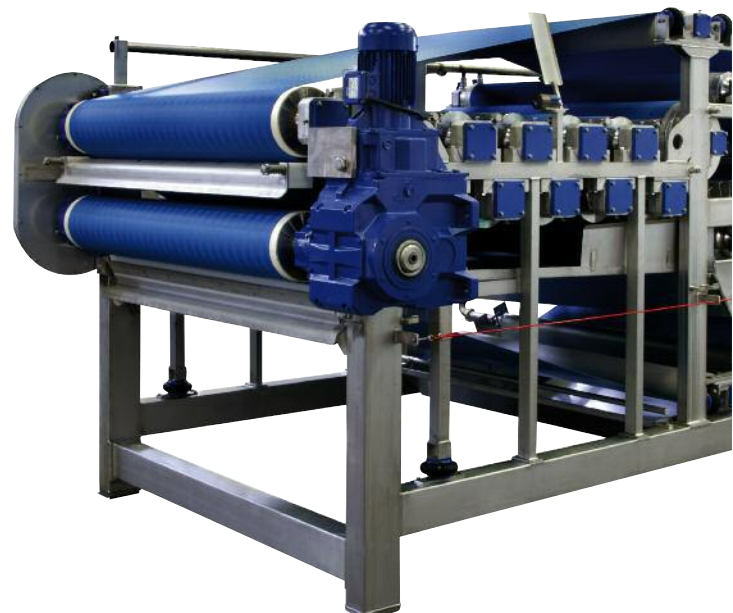
is a big advantage in case of thermal re-utilization of the solids. Second, press water is generated, which is a mixture of liquids consisting of extract residues, coffee oil, and traces of solids. The coffee oil can then be cleaned from water and solids in further separation steps. Using the Flottweg 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

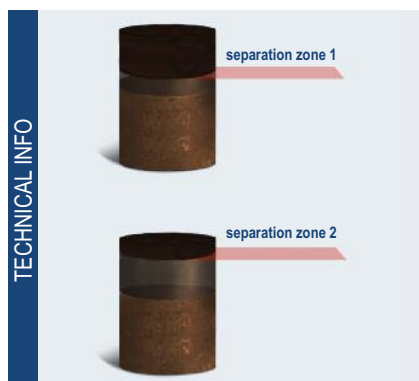
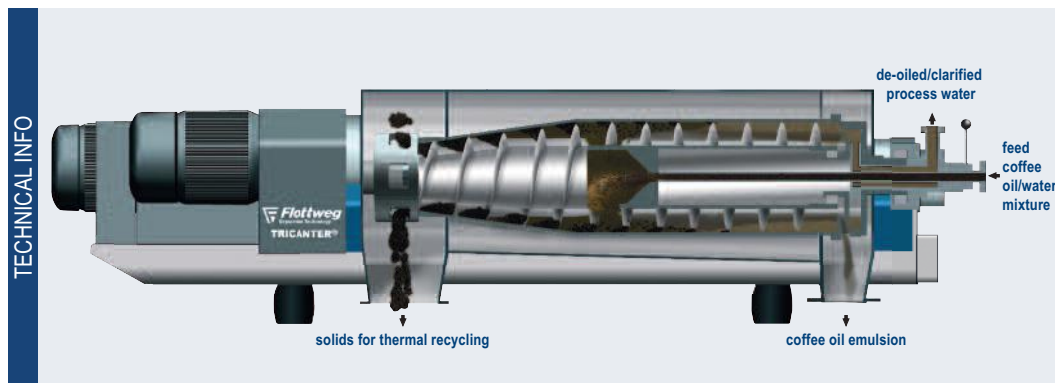


OIL REMOVAL OUT OF THE PRESS WATER

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®

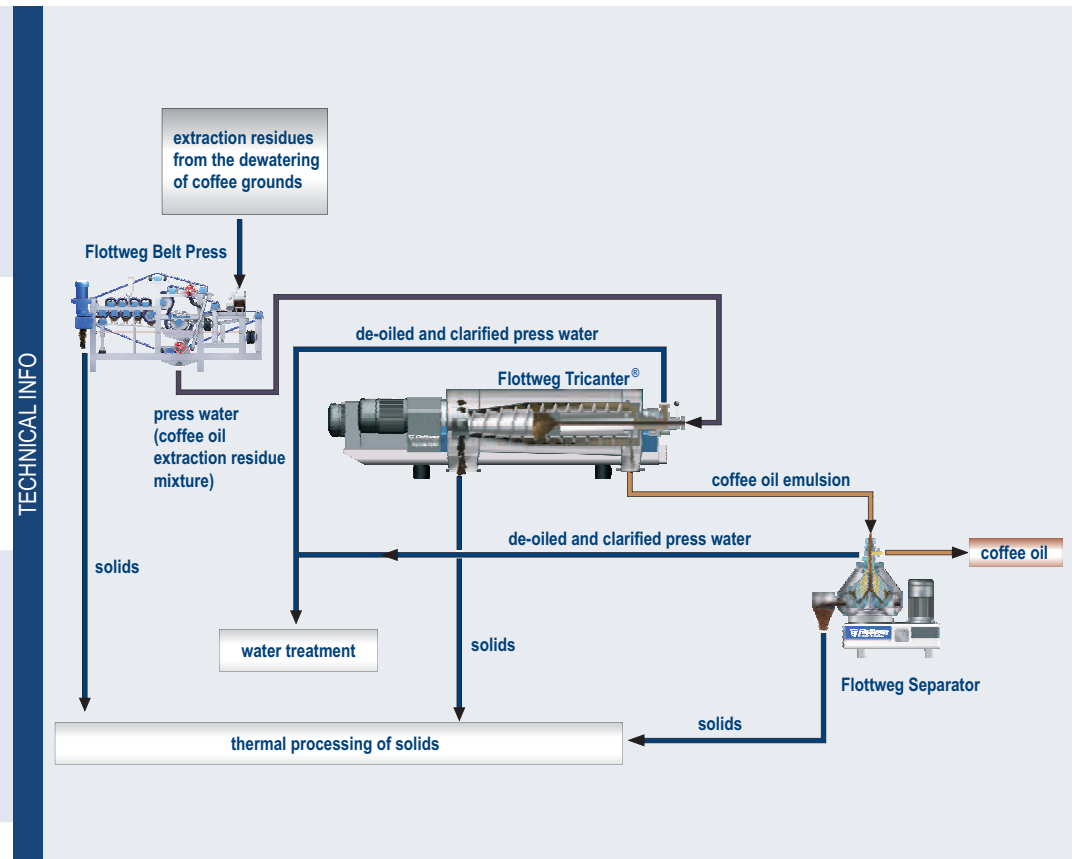
Advantages of the Flottweg Tricanter®

- 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

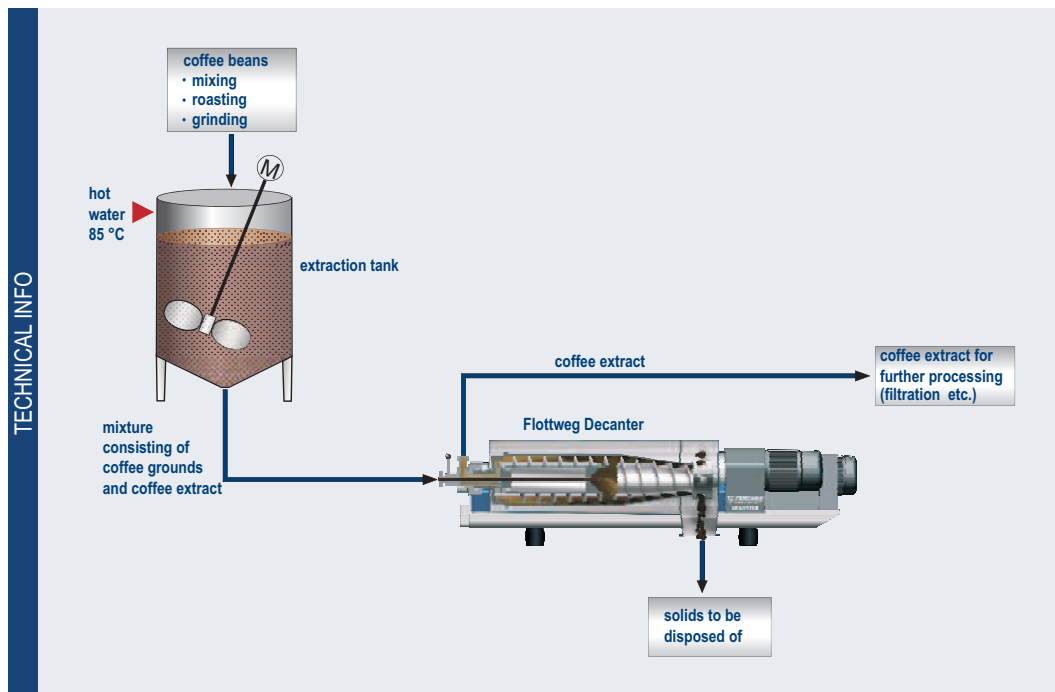
Increasing the Overall Yield, Even in Case of Small Quantities

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.



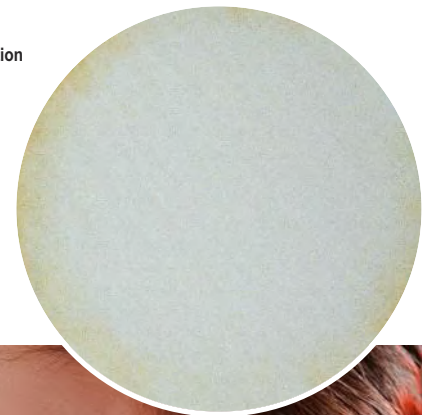
Spin tests to evaluate the volumetric composition of different extracts as well as consistency of their solids



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.

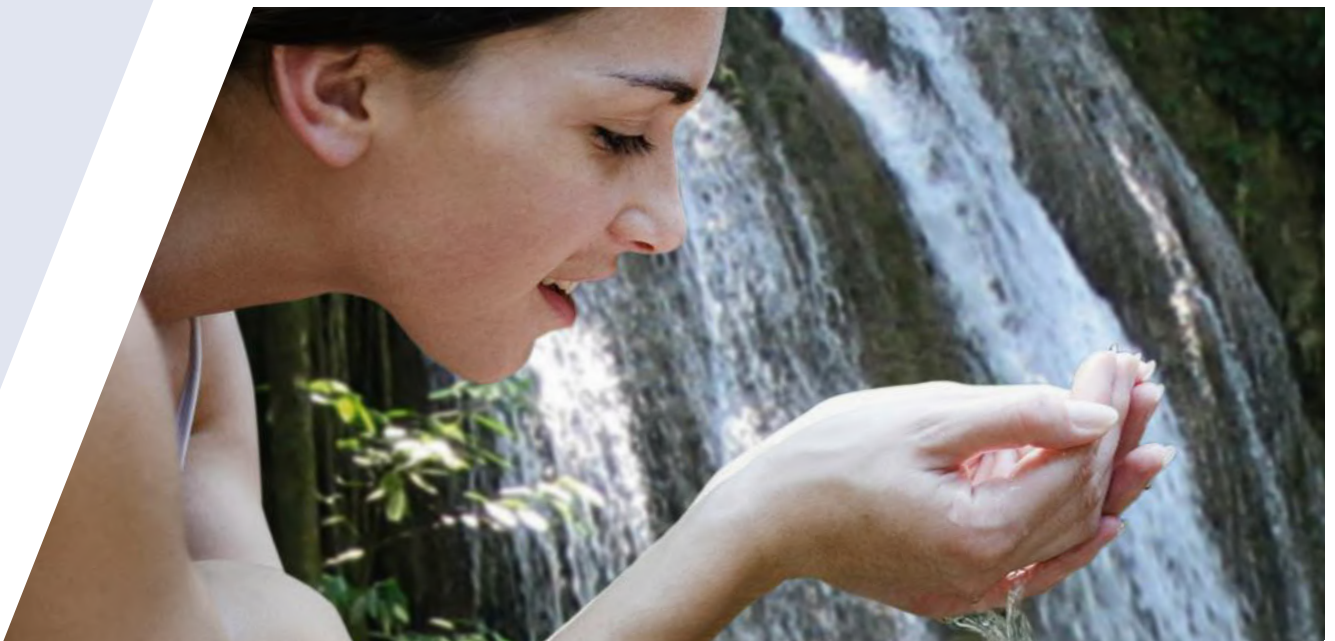
Reducing the COD values of waste water which is to be disposed of helps to save money for disposal.

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



Flottweg SE
Industriestraße 6-8
84137 Vilsbiburg
Deutschland (Germany)

Tel.: +49 8741 301-0
Fax: +49 8741 301-300

mail@flottweg.com
www.flottweg.com

REPRESENTATIVE