

**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

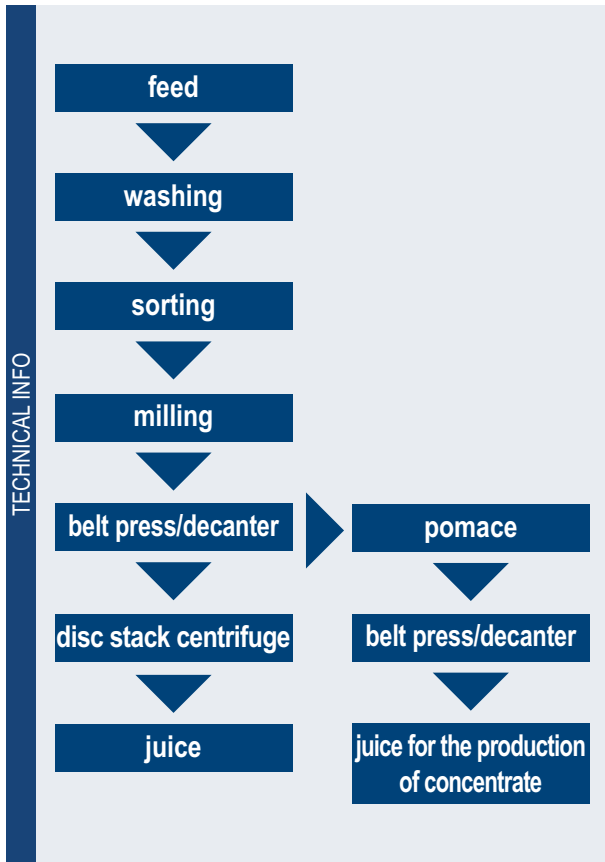
- Herbs
- Mushrooms
- Peas
- Soya (okara)
- Coffee products
- Medicinal plants (nettles, echinacea)
- Beverages from grain mash





# FROM FRUIT TO JUICE

## Scope of Supply and Services



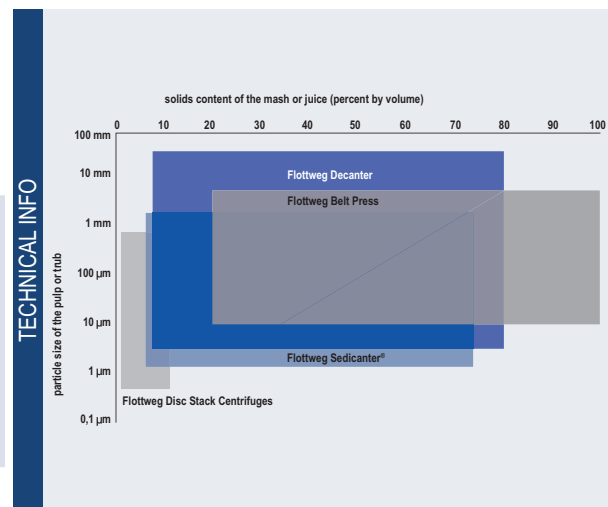
Flottweg Systems for the production of juice



# 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, Tricanter<sup>®</sup>, 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

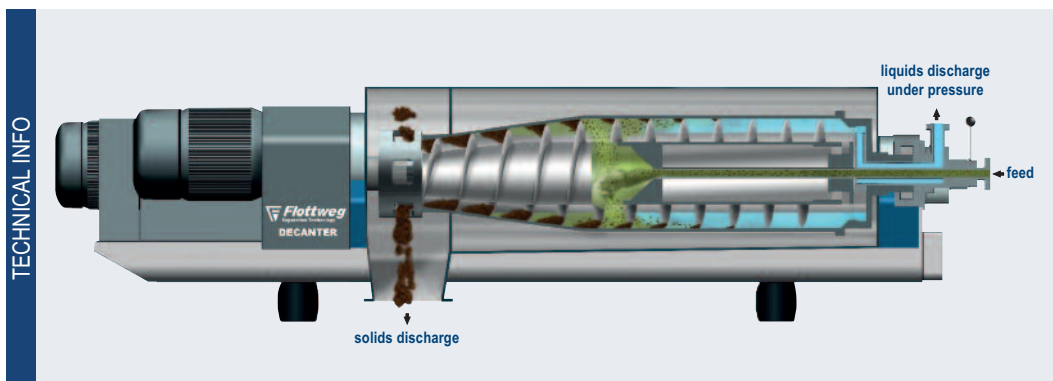




# THE FLOTTWEG DECANTER

## Application and Characteristics

Decanters 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®

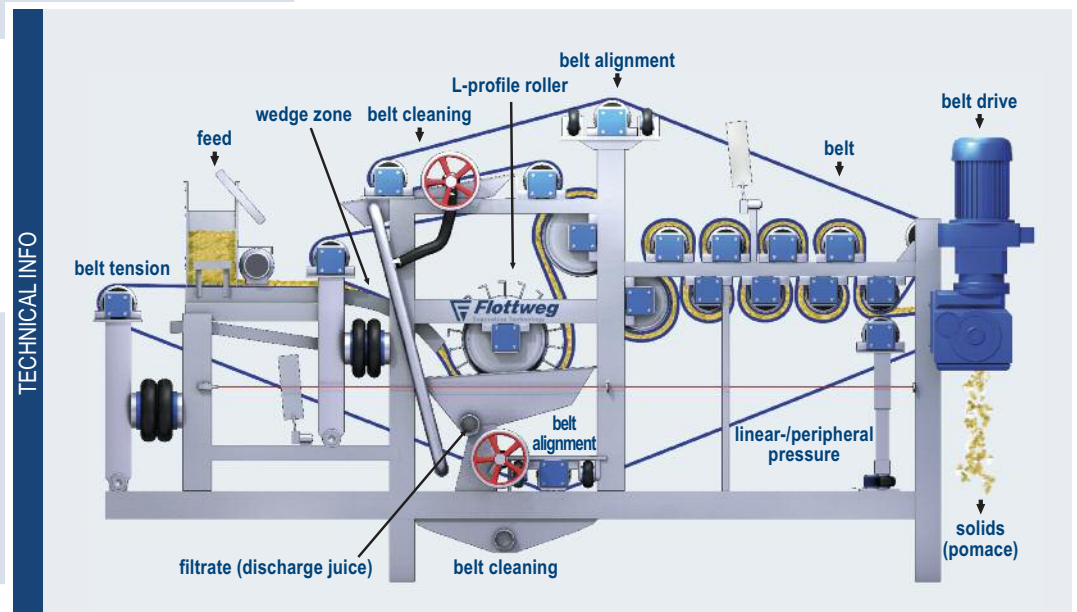
- Lower energy consumption due to high separation efficiency
- Constant differential speed, also in case of high torque, resulting in high yields
- The bowl is discharged when it is shut down (e.g. when production is finished)

# 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

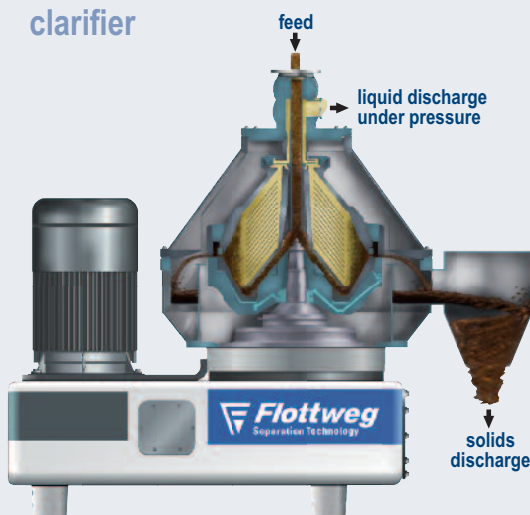
- Smooth, quiet run, no big bang during discharge
- Optional: “self-thinking” machine with trub monitoring

Made in Germany

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

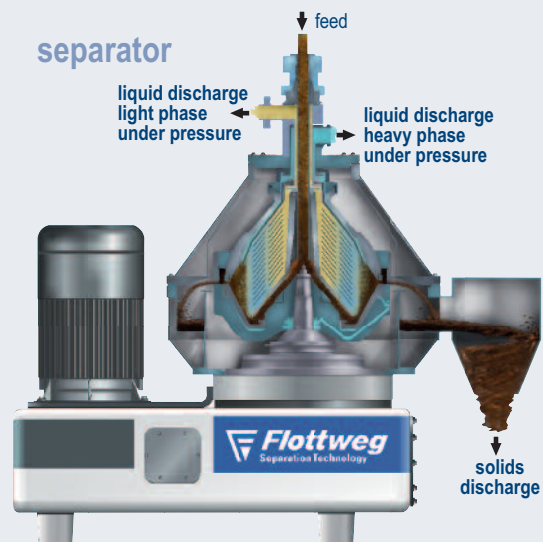
TECHNICAL INFO

#### clarifier



Flottweg Clarifier for the separation of solids from liquids

#### separator

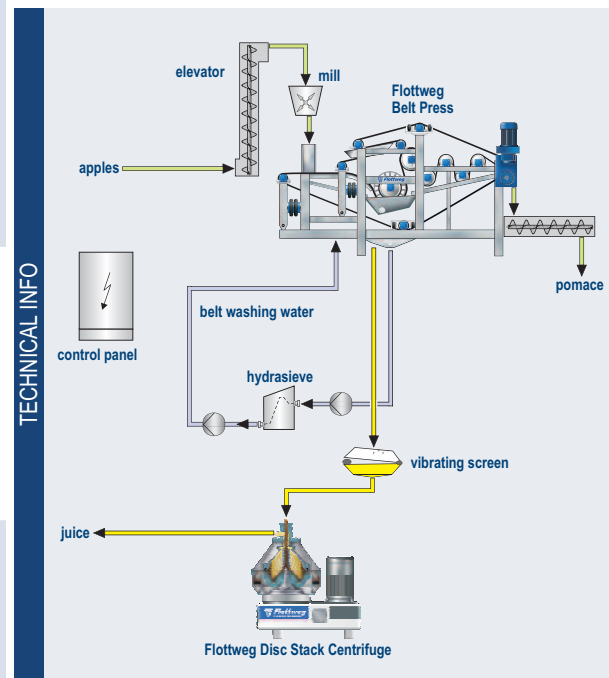


Flottweg Separator for the separation of two immiscible liquids with simultaneous separation of solids



# 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.





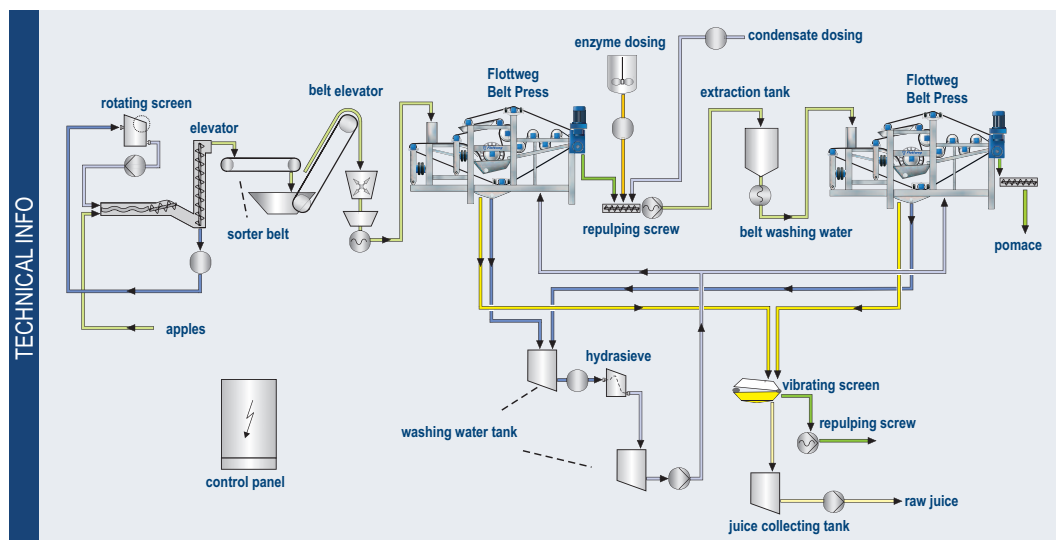
# PRODUCTION OF CLOUDY JUICES

## 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 Decanters 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 Decanters 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		



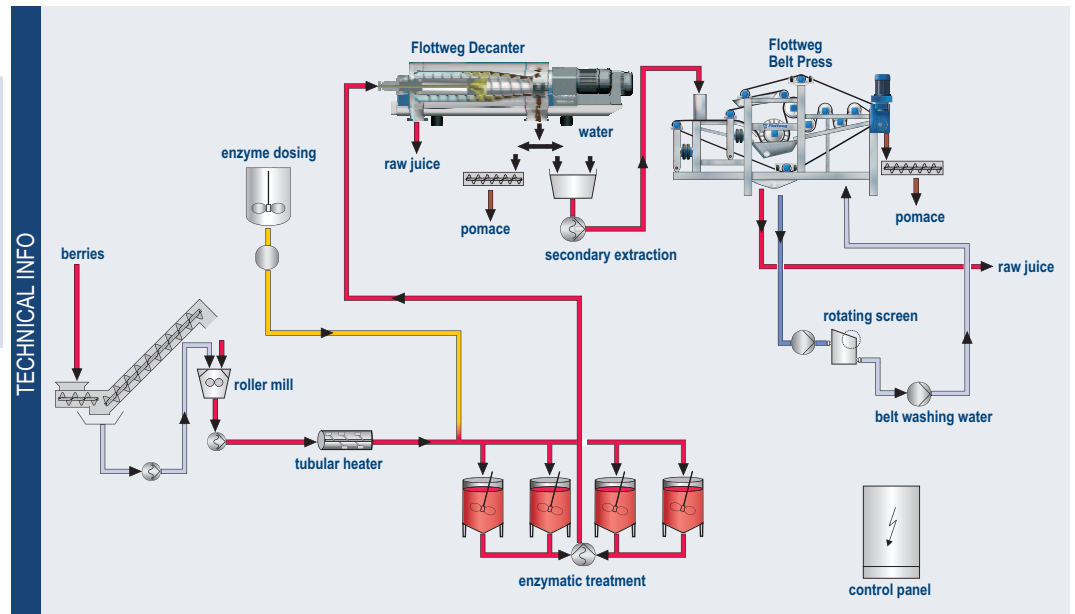
# PRODUCTION OF BERRY JUICE

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

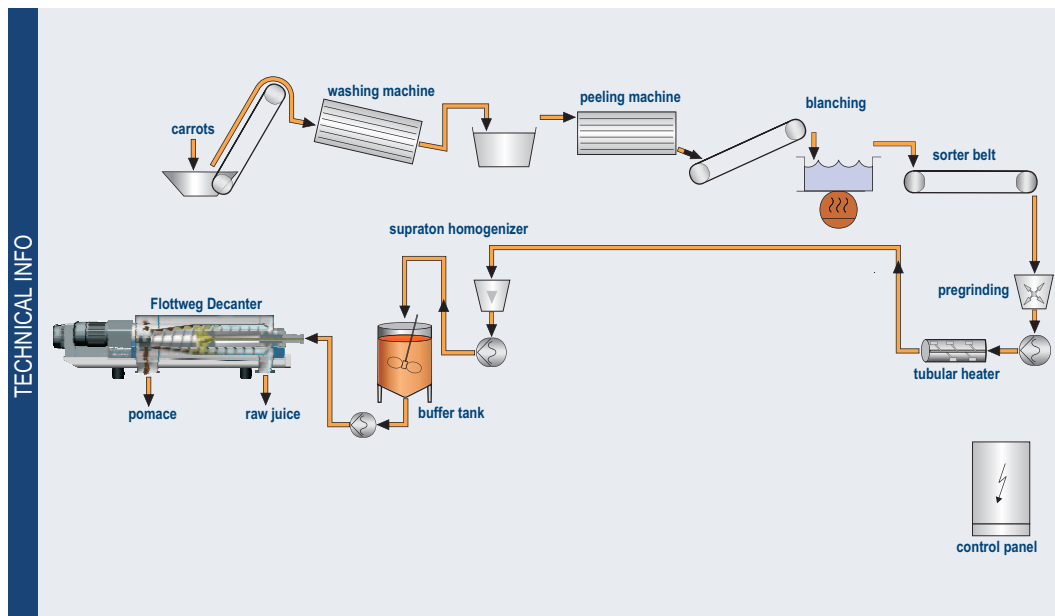




# PRODUCTION OF VEGETABLE JUICES

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 Decanters 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 Decanters 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

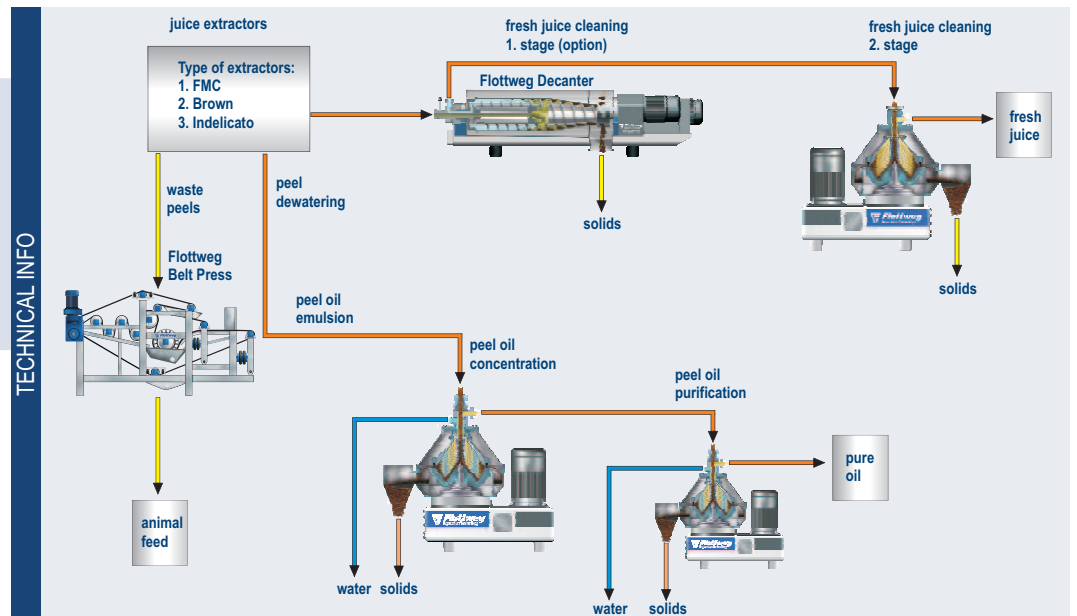
## Production of Juices

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

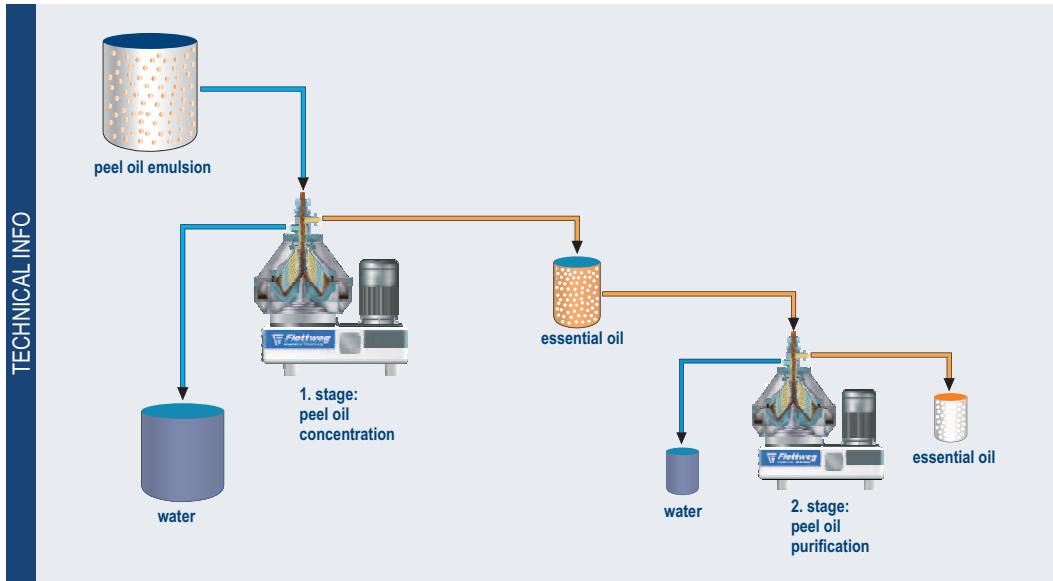


# CITRUS FRUITS

## 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 Sedicenter® 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.

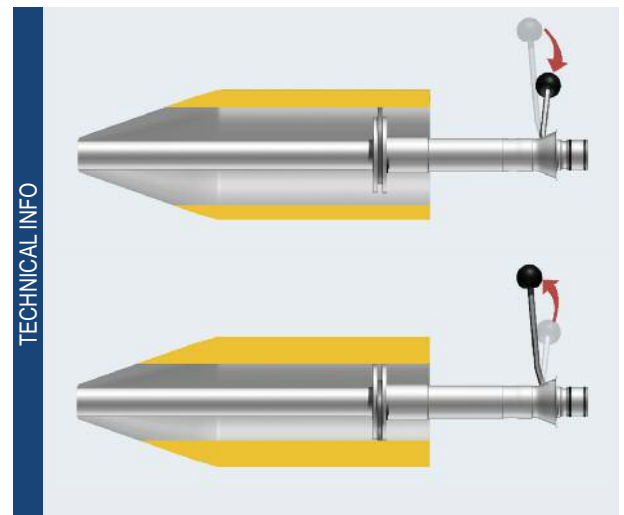
In both cases, the decanter enables reduction of the trub content in the retentate circuit, thus extending filter service life.

## 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 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, 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](http://www.flottweg.com) to find a competent contact person.



# Flottweg Separation Technology – Engineered For Your Success



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