



CENTRIFUGATION, A WINNING TECHNOLOGY
Centrifugal decanters DDE series

CENTRIFUGATION



Continuous separation

Nowadays, in practically every sector of industry there is a need to separate solids from liquids to a certain point of the production processes. quattro Separator meets this needs by applying the centrifugal force in s decaners.

Assumption

“Solid particles suspended in a liquid tend to precipitate due to the gravity force”.

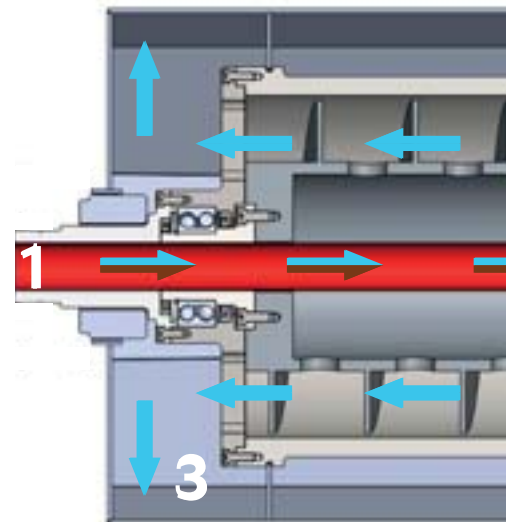
Working principle

The principle in which is based the operation of the decnater is the difference in density of the products to be separated, and as in a conventional sedimentation tank, the solid particles, much more dense than the liquid particles, tend to settle due to the gravity force.

Application

With the use of a centrifugal decanater this process is played within a cylindrical.conical drum, which given the high speed of rotation and mutiplies the gravity force making this separation nearly istantaneous.

This force is then used to separte solids from liquids with an efficient method and high precision, in a way that is easy to control. Depending on the particular configuration, a centrifugal decanater can be used to separate a wide range of solids other than one or two liquids, in a process of continuous separation.



1 - Feeding pipe

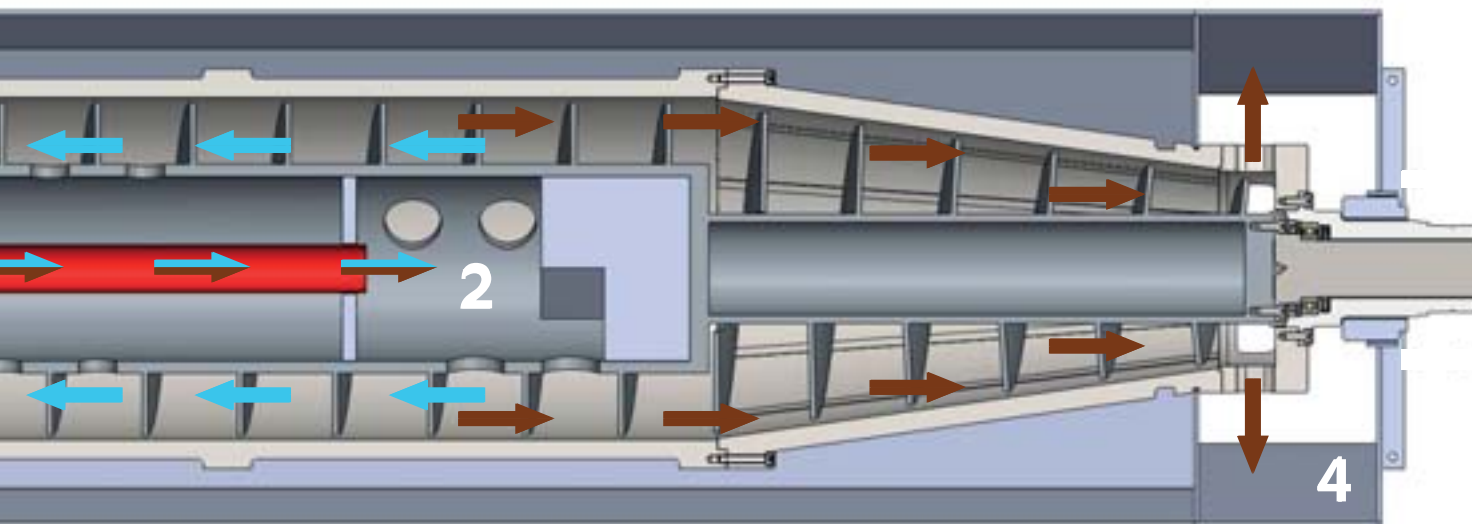
How it works

In the quattro Separator centrifugal extractor, the separation takes place thanks to the very high centrifugal acceleration developed by the rotation, which acts increasing the differences in specific weight of the various phases, and ensures high efficiency of operations.

During operation, in the drum of the decanter is sent a product, which under the action of the high radial acceleration, stratifies, placing the heavy phase (usually solid) on the external part, while the light phase is placed towards the axis, within the heavy phase.

the liquid phase is expelled from the drum by means of the easy adjustable levels, placed at the end of the cylindrical part, while the solid phase is expelled from the holes at the end of the conical part of the drum. The product to be treated is fed inside the drum through a coaxial tube inside the centre of the screw. The separation happens according to the principle of the counter-current separation.

Centrifugation, a winning technology



2 - Feeder

3 - Liquid discharge

4 - Solid discharge

APPLICATIONS



Dewatering

In the wastewater treatment either municipal and industrial, the maximum sludge dewatering is the most critical factor. This procedure allows a huge reduction in the amount of material to dispose and therefore a huge reduction in cost of sludge management. In any type of activity, quattro Separator has developed a series of decanters called DDE (Dewatering Decanter) that due to the high rotation speed and the developed geometries of passage, you greatly reduce the residual content of moisture in the dewatered sludge. The result of continuous technological development is now the complete range of decanter series DDE for dewatering sludge.

Thickening

The excess sludge produced in the stages of the biological processes have solid content of below 1%. In order to reduce the amount of sludge to be treated is used to a phase of thickening to perform a first separation and bring the average content of solids in the order of 5-8%. At this stage is applied the decanter HIDE (High Thickening Decanter) specially developed for this purpose. The decanter HTDE, unlike other decanter, the principle of separation in the co-current. Recent studies, which take into account fixed costs (capital and labor) and variable (consumption of energy, water, polyelectrolyte and

also spare parts), show that there are advantages for the benefit of the use of decanters for sludge thickening compared to other thickening systems. These advantages become incredibly important when it has to do with high flow rates and long process times.

Clarifying

Having to separate solid-liquid mixtures at low density or solids with a particle size in the order of several microns is recommended the use of a decanter specially designed for the clarification of liquids. These decanters prefer the clarity of the liquid phase and the recovery of the solid particles, even the most sensitive. Precisely for this type of applications quattro Separator has developed the line of decanter CDE (Clarifying Decanter) exploiting the principle of separation co-current. This configuration allows even the smallest solid particles to settle in a short time and then to have a liquid phase more clear.



The solution for every separation problem

| | | |
|---------------------------|--------------------------------|---------------------------------|
| Alcohol | Fatty Acids | Proteins |
| Algae | Fermentation Broth | Pvc |
| Alkaloids | Fish Meal | Recovery Of Edible Oils |
| Amino Acids | From Drilling Mud | Recovery Of Starch |
| Animal Fats | Glucose | Recycling Of Metals |
| Antibiotics | Glutamic Acid | Recycling Plastic |
| Apple Juice | Graphite | Rendering |
| Bauxite | Gypsum | Residues Of Coffee |
| Beer | Juices | Resins |
| Bentonite | Kaolin | Salts (Organic And Inorganic) |
| Bio Diesel | Lacquers And Varnishes | Scp (Single Cell Protein) |
| Biosfenolo | Lactose | Sludge From Refinery |
| Blood | Latex | Sludge From Treatment Relflui |
| Bone Meal | Lecithin | Sodium Hydroxide |
| Brewer'S Yeast | Methyl Ester | Sodium Sulphate |
| Calcium Carbonate | Milk | Solvents |
| Carboxylic Acid | Molasses | Soybean Meal |
| Casein | Mud From Washing Aggregates | Surfactants |
| Cellulose | Municipal Wastewater Treatment | Tanneries |
| Citric Acid | Nucleic Acid | Tartar |
| Clay | Olive Oil | Tea |
| Coal | Palm Oil | Titanium Dioxide |
| Coke | Paper Mills | Transesterification |
| Corn Starch | Pectin | Vaccines |
| Degumming | Peroxides | Vegetable Fibers |
| Dehydration Fats And Oils | Pesticides | Vegetable Juices |
| Distillation Residues | Pharmaceuticals | Washing Wool |
| Dry Cement Mixers | Pigments | Wastewater From Washing Beet |
| Dry Cleaners | Polyethylene | Whey |
| Dry Distillers | Polymer Solutions | Wine |
| Dyes | Potassium | Wort |
| Enzymes | Potato Starch | Yeast |
| Fat Milk | Process Of Citrus | |

DECANTER

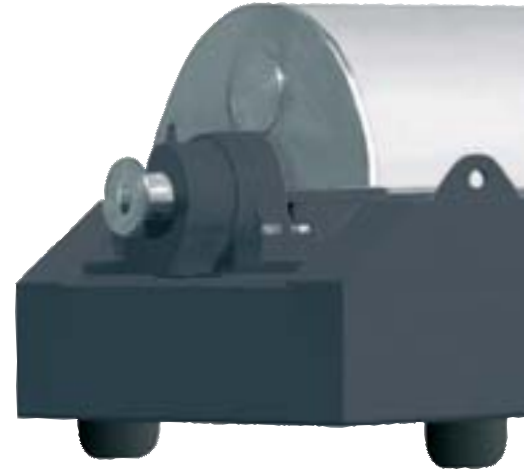


Structure and Housing

The rotating parts are housed inside a cylindrical structure made of stainless steel AISI 304 (EN 1.4403), especially designed to minimize leakage outside of the decanter and reduce noise. The support frame is constituted by tubular steel coated with multilayer system resistant to corrosion. The entire structure rests on the ground using special rubber shock absorbers, able to combine high capacity to absorb vibration at high stability anchor.

Drum

The drum consists of a cylindrical part and a truncated - conical, both made of stainless steel DUPLEX (EN 1.4470) with high surface hardness and high resistance to corrosion. This material makes superfluous the use of additional treatments to reduce the wear. The drum has been designed to operate in extremely harsh conditions: up to more than 3,500 [g] of radial acceleration, which is why the raw materials from which we make in our product are subjected to stringent quality tests in acceptance. Finally, the finished product is performed balancing computed, in order to make perfectly coincide the centre of gravity of the rotating



body with its axis of rotation. The level of the liquid phase is adjustable by the user in different diameters, by acting on the adjustment plates, accessible from the outside; this enables the 'user' to modify the yields of the centrifuge. In terms of clarifying or dehydration. The outlet holes of the solid phase are protected by bushings material highly resistant to abrasion (tungsten carbides IS 457 Super); these also easily replaceable from the outside, making it possible in turn to use the most suitable material for use.

Scroll

The internal scroll is formed by a stem and a spiral wrapped to it, both made of stainless steel AISI 304 (AISI 316/EN 1.4470 optional). On the stem of the auger there are radial openings, alternating with the spirals, thus allowing the product to flow towards the drum. The main task of this component is to transport the solid deposited on the drum towards the conical part of the drum, taking care to keep as much as possible the state of rest.

Gear-box

For the drive of the drum and the auger pivoted on the same axis is



using a two-stage planetary gearbox, oil bath, of primary importance for the proper functioning of the decanter. For the choice of this component is of vital importance, there is a choice between different systems, all provided by leading companies.

Bearings

The whole assembly rotating decanter (drum and scroll) is supported by two ball bearings and roller bearings. These components are lubricated with grease high resistance to centrifugation (oil lubrication optional

and at high temperatures and are also protected by a series of labyrinths, oil seals and seals to avoid any contamination of the product being processed with the lubricant. These seals may be provided in different material, this allows to use the one more suitable for the type of work to be done, thus ensuring greater reliability of the machine and the lengthening of the period of its life.

Noise and vibrations

The average sound pressure level of all our decanter, does not exceed 82 dB (A) (value measu-

red in accordance with the relevant legislation). The machines are designed in such a way as to minimize the generation and propagation of vibrations. For this reason, the rotating parts are subjected to computerized balancing and the entire structure rests on damping elements. Qualified companies certified that the average value of the vertical acceleration transmitted to the ground is approximately of 3.9 [m/sec²].

Paintings

In accordance with quattro Separator specifications.

Design and implementation of decanters for heavy applications

Oil lubrication

In order to increase our decanter applications limit, we have developed a lubrication 'Oil drop' system (options~. This system allows a much higher rotation and therefore a higher centrifugal force. An optional automatic lubrication system is available.

Wear-resistant materials

The parts subject to wear are protected by ceramic material

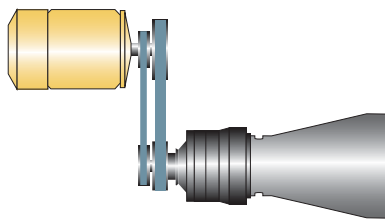
and I or with carryovers of tungsten carbides (TS Super 457), while the seals are rubber Buna-Viton or NBR I Viton. A special series of anti-wear kits and anti-chemical attack has been developed for each type of product to be treated.

Decanter for ATEX zone

The treatment of toxic, corrosive or flammable products is carried out with inerting gas in over-

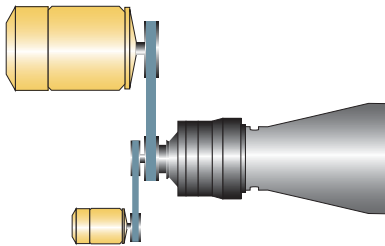
pressure. To ensure safety process are adopted and process chamber and centrifuge housing. Slight positive or negative pressures can be maintained in the process area by regulating the purge gas supply. Special sealing elements minimize the seal gas consumption. These centrifuges comply with ATEX 95 in zone 1, up to temperature class 13.

CONTROL



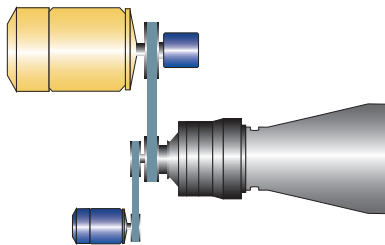
Single drive

A single electric motor controlled by means of a frequency converter controls the rotation of the drum as well as the screw. The gear ratio and thus the relative speed differential is established by replacing the belts and pulley on the output shaft of a planetary gearbox. This solution to the simplest and cheapest is indicated, in particular, in separation processes that do not require a continuous variation of the differential speed.



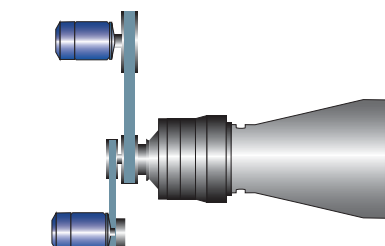
Double electric drive

This solution is the developed version of the single drive system. A second electric motor driven by an frequency converter acts directly on the auger making it independent from the main motor. This system, controlled by the management software (Structura ®) enables you to react to changes in the treated product and therefore allows automatic setting of the parameters to vary. The system also allows a recovery of energy from the secondary motor to the main engine.



Hybrid drive

The hybrid version adds an hydraulic circuit to single electric motor version. In this case a variable capacity hydraulic pump, driven by the same main motor drives an hydraulic motor, directly driving the auger. This system allows a wide range of variation of the differential speed at constant torque. Indicated mainly in applications where the variation of differential speed is key factor.



Full hydraulic

Two hydraulic motors separately drive the drum and the screw. These motors driven by two independent hydraulic circuits are controlled by two hydraulic variable pumps. In this case the control software (Structura ®) acting by controlling the torque, determines whether the speed of the drum than the differential speed of the screw. This system is particularly used for limit applications, and / or toxic, corrosive or flammable. Preferred for applications in ATEX zone.



Control system Structura®

The continuous variation of the solids concentration in the flow fed to a centrifuge may cause a reduction of the separation results, build-up or an overload.

To avoid this kind of problems and make the most out from decanter, it is essential to monitor and continuously adjust the differential speed between drum and screw.

The control system that equips all quattro Separator's decanters is based on the monitoring of the actual load to which it is subjected the decanter. This assessment is performed by measuring continuous and constant torque. Depending on the type of drive applied, the torque may correspond to the power demand (in the case of the electric motor) or the pressure of the hydraulic circuit (in the case of hybrid drive or fully hydraulic).

In all cases, however, the main purpose is to keep the load and the torque on optimal levels, acting on all those parameters that the plant in question provides.

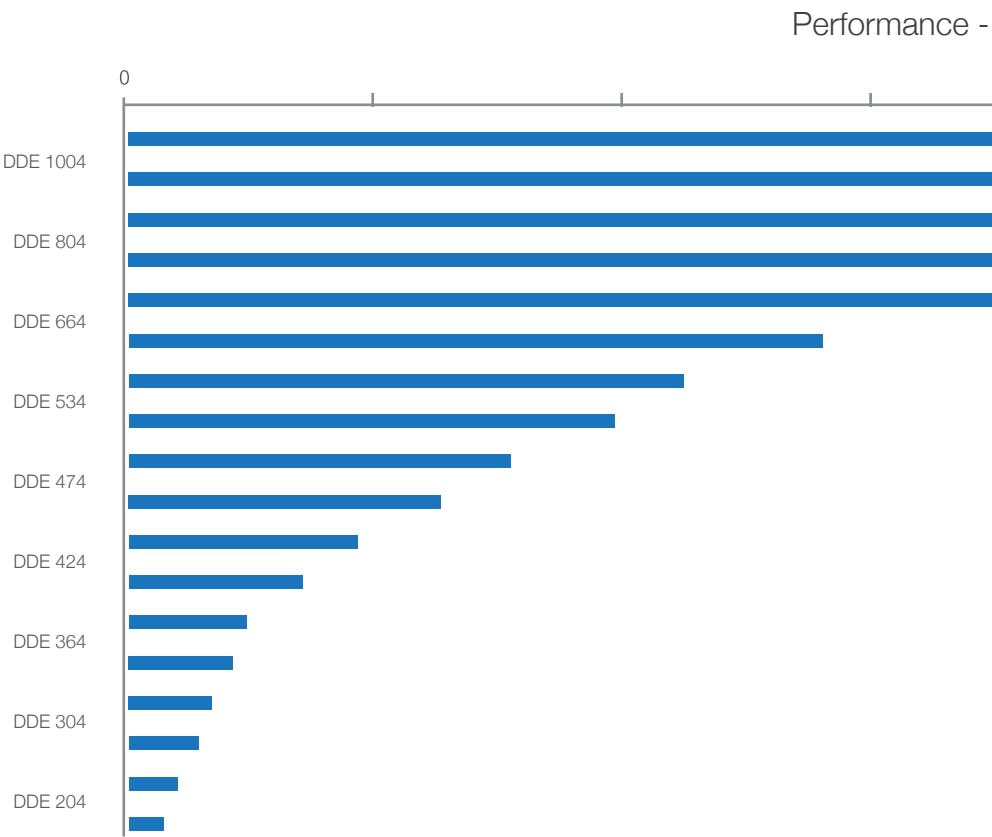
If the torque exceeds the optimum value, the control system Structura® progressively increases the differential speed in order to increase the release of solid in excess and restore the optimal values of work. Conversely, if the torque value detected tends to decrease the software acts on the differential speed by increasing the retention time of the solids inside the drum, thus restoring also in this case, the optimum load of work. In the case in which the variation of the differential speed is not sufficient to restore the optimal conditions of work set, the software Structura® fielding the second stage of management acting on the feeding.

In both cases the variation of the

torque to the outside of the allowed range, the feed is adjusted (in the case of pumps with variable frequency drive) or interrupted (in the case of variable speed motor manual) to return to the set parameters. Thanks to the continuous and constant control of the working parameters, software Structura® in addition to exploiting the full potential of the decanter to 100%, also avoids its clogging, thus reducing the need for maintenance and downtime. In case the control system is not sufficient and will come to a locking of the rotary group drum / screw, as for example for a voltage drop of the electricity network for a substantial time, Structura® has been equipped with a routine that provides unclogging/unlocking automatically, by means of a forced countercurrent washing, without having to remove the decanter.



TECHNICAL FACTS





Wastewater Dewatering @ 1% SSin

400



A balanced technology development

Product line DDE centrifugal decanter series

| Model | DDE 204 | DDE 304 | DDE 364 | DDE 424 | DDE 474 | DDE 534 | DDE 664 | DDE 804 | DDE 1004 |
|---------------------|---|---------|---------|---------|---------|---------|---------|---------|----------|
| Processing capacity | from 1 m ³ /h to 350 m ³ /h | | | | | | | | |
| Working volume | from 20 lt to 350 lt | | | | | | | | |
| G Force | from 1.800 Nm to 6.500 Nm | | | | | | | | |

- Chemical
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- Renewable energy
- Vegetable oils

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