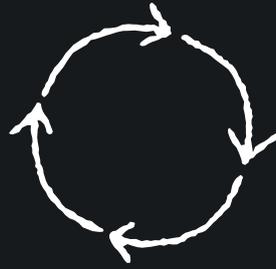




HILLER

separation & process



In the middle of the 19th century, Hermann von Helmholtz formulated the General Law on the Conservation of Energy, according to which the total energy in a closed system remains constant, although the individual forms of energy can be converted into one another.

Overcome gravitation with easyness!



Innovative Shell offshore platform „Stena Tay“ in the waters of Trinidad.



Centrifuge technology for solid-liquid separation Solutions for the petroleum industry



„Water is the principle of all things.“
(Thales, Greek philosopher, approx. 620-540 b.c.)

Principle of operation

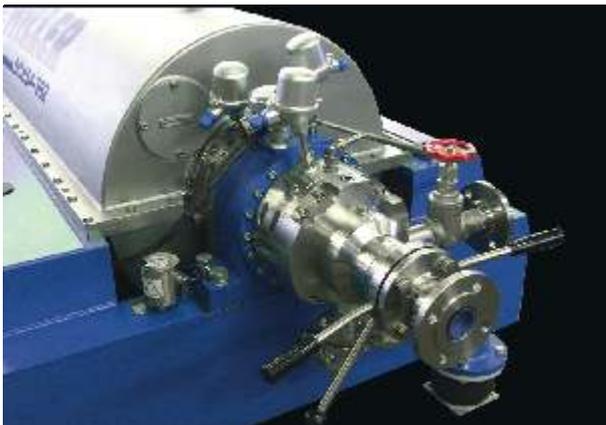
HILLER - Leading supplier of decanter centrifuge technology

HILLER is a professional manufacturer of centrifuges in Vilsbiburg, Bavaria, since 1971. As one of the most famous suppliers of decanter centrifuges, **HILLER** has rich experience in technology design and development, centrifuge production and turn-key project contracting in all areas of 2-phase and 3-phase separation applications. This includes applications such as mining, off-shore, slop oil etc. Further to our very large range of standard machines and plants, we can provide tailor-made solutions for your special requirements. **HILLER** supplies you with German-made, high-performance centrifuges and systems, as well as a perfect after-sales service.

Typical petroleum industry applications:

- Drilling mud solids control
- Refinery slop oil
- Oil lagoon sludge
- Storage tank bottom sludge
- Mixed refinery sludges (e.g. "3-sludge")
- API separator sludge
- Fresh water production waste
- Effluent treatment waste
- Sludge from on-site sewage treatment

Your application is not included?
Please, talk to us. We have the solution.



HILLER servicing the petroleum industry's needs

The petroleum industry is one of the global key industries, providing energy for households, industry and public power generation, as well as raw materials for the petrochemical industry. Spanning from exploration and production (oilfield) via storage and transportation to refining and distribution, the range of applications and processes where solid-liquid separation expertise is of the essence is vast.

HILLER delivers first class service to the petroleum industry wherever solid-liquid separation by means of centrifugation is in demand.

Depending on the project requirements, **HILLER** can cover various scopes of supply, from simple delivery of high-performance decanter centrifuges only, up to complete turn-key processing plants including all ancillaries and control systems.

Depending on the process requirements, **HILLER** centrifuges and plants can be designed for 2-phase separation (solid-liquid separation) or 3-phase separation (solid-liquid-liquid separation), and for operation in hazardous or in non-hazardous areas.

Depending on the customer requirements, **HILLER** can design and deliver all goods in accordance to various standards. For example explosion protection as per European ATEX, or as per CENELEC, or mechanical design as per API, ASME, ASTM, or DIN/EN standards, to name just a few.

Depending on the product properties, **HILLER** can customise their centrifuges and plants with plenty of features in order to arrive at the best possible solution, for each particular product, even if it should have non-standard specifications. Customising can be done for almost all aspects of the centrifuges and plants, for example in regards to selection of materials, selection of drive systems, selection of wear protection, or selection of control philosophy and systems.

HILLER high-performance centrifuges and plants guarantee optimal process results with the highest level of reliability.

You set the task - we provide the solution.



Night shot: petrochemical plant in Singapore



Features:

- German-made high quality and high performance product
- Short payback period, less than 1 year possible
- Delivery of "decanter only" or complete turn-key plants
- Completely ISO 9001 certified, from design to commissioning
- Production according to all relevant standards, in-house engineering
- 2- or 3-phase separation technology
- Various explosion-proof designs and various levels of wear protection
- Fully automated operation with our highly developed proprietary control systems
- All modern scroll drive systems
- In-house R&D department for special applications and field tests



Application example 1: Processing of slop oil

Slop oils are usually characterised by a relatively high oil content (in the order of 50-90% by volume). If collected near to the source, the solids content is usually rather low (in the order of 0-15% by volume). Often slop oils are collected in open lagoons, which leads to different product properties, typically an increase in viscosity due to the evaporation of lighter hydrocarbons, and a higher solids content as a result of evaporation and sediment carry-over when the sludge is dredged from the lagoon. Another result of the storage in lagoons is that those sludges require thorough mixing in order to revert the effects of stratification, usually after removal of coarse solids. Slop oils very often contain a 4th, emulsified phase. For the sake of improved solids removal and optimal oil-water separation, those emulsions are normally destroyed by dosing of demulsifier before the feed product is processed.

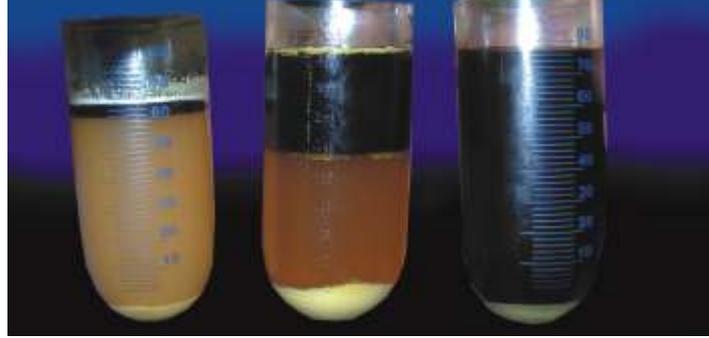
Application example 2: Processing of 3-sludge

The term "3-sludge" refers to a mixture of three typical refinery waste streams:

- Biological sludge (waste activated sludge)
- Flotation scum
- Oil sludge

3-phase decanter technology offers a means to recover the oil from this waste. Due to the typically high water content of more than 95%, the viscosity of this product is very low (basically the same as water), which in turn means that the throughput capacity of any given centrifuge is relatively high, compared to the capacity for e.g. slop oil processing. Demulsifying is usually not necessary and because of the very high water content heating can be by direct steam injection without risk of emulsion-forming.

All this results in a rather simple plant layout, compared to slop oil or storage tank sludge treatment. However, it is advisable to take into account the nature of waste that can be contained in the flotation scum and equip the feed end of a 3-sludge plant with a shredder or macerator to protect downstream machinery from blockage.



Application example 3: Processing of storage tank bottom sludge

Crude oil tanks are an essential part of all major operations in the petroleum industry.

They can be found:

- at production sites
- at harbours (for export and/or import)
- at refineries

Due to the solids content of crude oil, those tanks loose storage capacity over the years, as they slowly fill up with settled solids from the crude. Those tanks therefore require regular cleaning in order to maintain their storage capacity. For that purpose that tank is emptied of crude oil and isolated. The sediment and residues adhering to the tank walls are then removed with high pressure water jets.

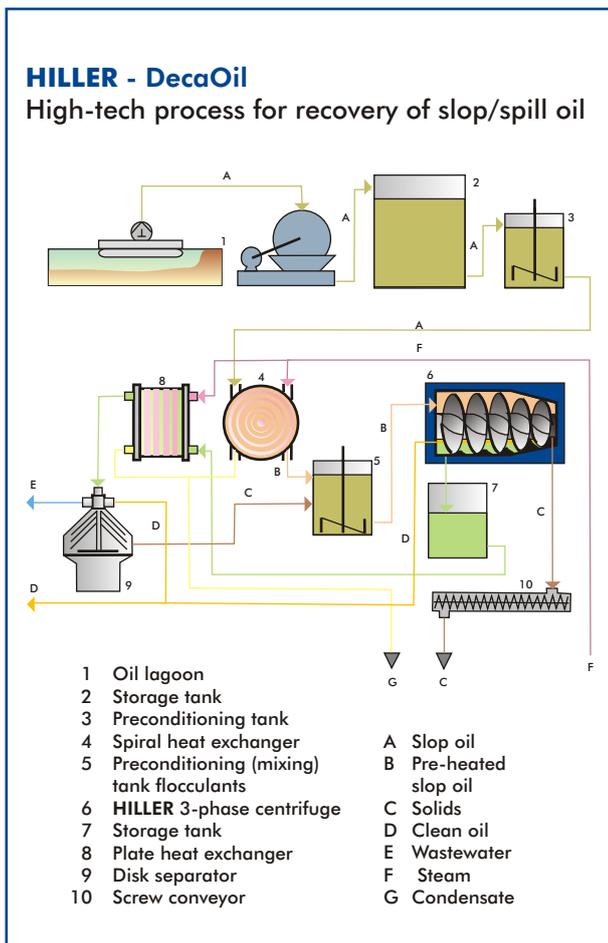
This product is characterised by a considerable water content (in the order of 30-60% by volume), an oil phase with rather high viscosity, often the presence of an emulsified phase, and a high solids content (in the order of 10-40% by volume).

In principle the treatment of storage tank bottom sludge is similar to that of slop oil dredged from lagoons. Although a 3-phase decanter only can be applied here with good results, the high solids content of the product means that a combination of 2-phase decanter plus 3-phase separator offers the advantage that solids removal can be optimised separately from oil-water separation.

Application example 4: Processing of oilfield sludges

In oilfield operations oily sludges are produced as sediments in tanks and apparatus, as well as from oil spills (e.g. in the course of maintenance / repair work, or due to pipeline leaks). Those sludges, in their original form, can have extremely high solids contents at moderate to high oil contents. However, at the time when the sludges from different sources are combined and prepared for treatment, the oil / water / solids ratios are such, that treatment with normal oil sludge processing equipment is easily possible. Very often oilfield sludges are collected in lagoons and withdrawn from there for processing, rather than being processed directly downstream of the source / collection point. A water content in the order of 40-80% by volume, approx. 10-50% by volume oil phase with rather high viscosity, and a high solids content (in the order of 10-40% by volume) with potentially very large particle sizes, as well as potential content of significant amounts of other debris characterise this product.

In view of the product properties the mechanical pre-treatment of the sludges is a part-aspect of oilfield sludge processing that requires special attention, compared to many other applications. Because the recovered oil is usually not refined on-site, but added to the crude oil stream before it is sent to refining, good oil quality is normally sufficient, which means that plants can be designed with one single 3-phase separation step only, using 3-phase decanter technology.





Typical processing plant layout

For most oily wastes from the petroleum industry, a typical treatment plant comprises:

- Mechanical removal of solids, if required
- Heating to reduce viscosity and thus enhance mobility of the phases
- Demulsifier dosing to break emulsions and make oil, water and solids bound in the emulsion accessible for centrifugal separation
- Polymer dosing to enhance solids removal rates and cake dryness

The general treatment plant layout varies, depending on the provenience of the raw product and the customer's requirements regarding quality of the products after processing.

Two well proven layouts are:

- Separation of oil, water, and solids in one machine = 3-phase decanter centrifuge. The oil quality produced in such a plant is usually good enough to be returned to the crude oil side of the refinery
- Removal of the bulk of the solids in a 2-phase decanter with downstream oil-water-solids separation in a 3-phase disk stack separator type centrifuge. Naturally this plant layout is more sophisticated and requires higher capital expenditure. However, at the same time the quality of the oil and water phases is an order of magnitude better than that produced by a 3-phase decanter only

Further applications in the oil & gas industry

Other, typical applications for **HILLER** high performance decanter centrifuges and plants in the oil & gas industry are:

- Solids control in drilling mud, i.e. recovery of bentonite or barite, or removal and dewatering of super-fine drill cuttings, clay and silt
- Dewatering of sulphur from natural gas desulphurisation
- Dewatering of sludges from river-water or bore-water treatment for freshwater supply
- Dewatering of biological sludges from on-site effluent treatment

HILLER technology for the world's future energy supply

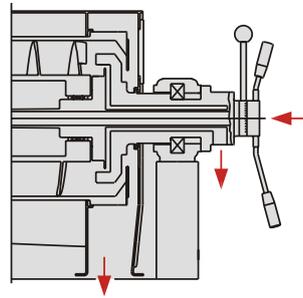


Apart from the numerous applications in the "traditional" oil and gas industry, **HILLER** high performance decanter centrifuges and plants are also well proven solutions for applications in the production of fuel from renewable sources:

- Clarification of various oils as feed stock for biodiesel production
- Separation of glycerine, fatty acids and salts in biodiesel production
- Separation of methanol and salts in biodiesel production
- Dewatering of whole stillage in bioethanol production
- Yeast separation in bioethanol production
- Separation of waste slurry as solids-free feed stock for biogas plants
- Dewatering of digested feed stock in biogas production
- Solids removal from screw press filtrate in biogas waste processing



HILLER mobile plant



DecaOil 3-phase decanter centrifuge series

Type	DO31-363	DO37-363	DO45-363	DO54-363	DO66-363
Capacity ¹⁾	1 - 6 m ³ /h	3 - 10 m ³ /h	6 - 20 m ³ /h	10 - 35 m ³ /h	20 - 65 m ³ /h
Material	All wetted parts are made of duplex or high standard stainless steels				
Drive	HILLER DecaTorque , HILLER DecaDrive , or tailor-made system				
Drive motor (kW)	from 11 kW up to 75/90 kW				

1) Subject to feed product properties

HILLER can provide competent solutions for these industries and special applications:

- Foods and beverages / DecaFood / OV
- Mineral oils, gas and regenerative energy / DecaOil
- Chemical, processing and pharmaceutical industry / DecaChem / DecaPharm
- Environmental technology / DecaPress / DecaThick / DecaDrain
- Mining, tunnel construction, mineral raw materials and drilling fluids / DecaDrillingFluid

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