

Press release

BIBKO® INFRA-TEC - Recycling system for oil and grease separator contents

A solution for producing raw materials for fuels

The quantities of grease separator and oil separator waste produced in Germany vary considerably, depending on the respective industry and regional requirements (e.g. industry, catering). Exact nationwide figures are not available due to differing regional regulations and industry-specific requirements. This waste is collected by specialised and certified companies that have vehicles approved for this purpose. It is then processed in approved facilities for oil residue and grease processing.



Oil separator (Light material separator)

Standard waste treatment steps

The first step in treating waste from grease separators is to separate the water and grease. Depending on its quality and composition, the grease is either further processed or used to generate energy, while the remaining solids are disposed of as waste.

In the case of waste from oil separators, the first step is also to separate the water. The remaining oil is further processed or used for energy. The remaining sludge and water content are disposed of separately.

Solution

In this solution, oil and grease separator waste is recycled by combining two systems:

» System 1

BIBKO® INFRA-TEC – Recycling machine for separating minerals

» System 2

Hiller - 3-Phase-centrifuge for processing the liquid phases

Recycling process for oil separator waste

Oil in the oil-water mixture from an oil separator typically appears as a thin, shimmering oil film on the water surface or as finely distributed oil droplets in the water. Higher temperatures increase the droplet size and thus facilitate separation. The proportion of oil in water is usually in the range of 8–10%.

System 1: Recycling machine

Before the liquid phase is processed in the centrifuge, impurities (branches, leaves, floating matter) and minerals (sand) must be separated from the waste. This is done in the **BIBKO® INFRA-TEC** -recycling machine.



Oil separator waste collecting point

The separation of impurities and mineral components takes place in a two-stage process.

- Process stage 1:
Separation of impurities from the liquid phase

- Process stage 2:
Separation of mineral components from the solid-liquid-phase.

Process stage 1: Liquid phase

To separate the impurities, the liquid phase (oil-water-mixture) from the vehicle is first fed into a helical screen. To do this, a hose is connected between the vehicle connection and the helical screen and the liquid phase is emptied.



Helical screen with container

Function helical screen

The liquid phase first flows through a perforated screening zone in the helix screen. Contaminants are retained by the screen. The fill level is detected by a sensor in the inlet area of the screening zone.

When the switch-on point is reached, the shaftless spiral removes the screened material from the screen basket, transports it to the pressing and dewatering zone and discharges it into a container.



Impurities from helical screen

While the remaining liquid phase (oil-water-mixture) flows into the **BIBKO® INFRA TEC** - recycling machine for separation of the mineral components it contains, the screened material (impurities) is fed into the incinerator.

Process stage 2: Solid-liquid-phase

After the liquid phase has been emptied from the vehicle in process stage 1, the oil-water-solid-mixture remaining in the vehicle is fed into the **BIBKO® IN-FRA TEC** - recycling machine via the feed hopper in process stage 2.



Recycling machine with feed hopper (right)

At the recycling machine, the material enters the washing chamber, which contains a liquid bath. A rotating spiral conveys the material through the liquid bath, separating it in the process.



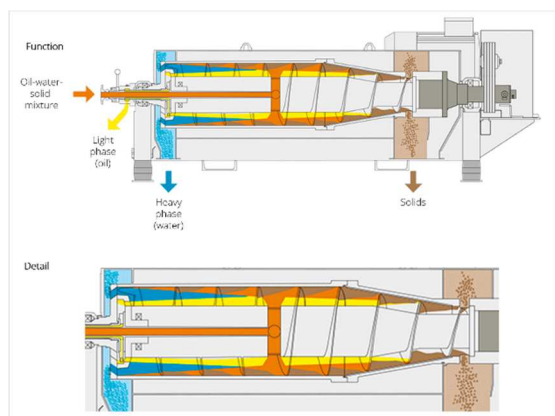
Mineral components from recycling machine

Excess oil-water-mixture is drained from the recycling machine and fed into an intermediate buffer. This intermediate buffer serves as a storage tank for the centrifuge.

The mineral components (oil-solid-mixture) are removed from the washing chamber of the recycling machine via a bucket elevator and conveyed to a container. This material is then also sent for incineration.

System 2: Centrifuge

Once the impurities have been separated, the oil-water-mixture containing the remaining fine particles is treated. To do this, the oil-water mixture is pumped from the intermediate buffer into the centrifuge. A TricaPress centrifuge is used for this purpose. Unlike conventional decanter centrifuges, this centrifuge can separate two immiscible liquids of different densities (oil/water) and a solid phase in a single process step. Centrifugal force ensures separation, with the heavier liquid settling in the middle between the lighter liquid and the solids. All three phases can then be discharged separately from the centrifuge.



Function of the TricaPress decanter centrifuge – Hiller GmbH

Functional principle

Centrifugal force causes the phases to arrange themselves according to their density. The light liquid (oil) collects in the area of the axis of rotation, while the heavy liquid (water) collects in the area of the drum wall. An overflow weir in the liquid discharge zone separates the two phases, allowing oil and water to flow out of the rotor area separately. The discharge of the light phase (oil) can be adjusted during operation by means of a peeling disc and thus adapted to different qualities of the input product.

The peeling disc 'pumps' the light phase out of the decanter.

The solids collect on the housing wall and are transported to the discharge opening via the screw conveyor.

Optimal separation

By adjusting the liquid levels in the centrifuge and the difference in speed between the screw conveyor and the drum, optimal separation of the liquids and solids is achieved.

The aim here is to achieve the highest possible purity of the liquid phases and a low residual moisture content of the solids.



TricaPress centrifuge - Hiller GmbH

Material flows and their use

This type of oil separator waste treatment produces three material flows.

- Material flow 1: Oil
- Material flow 2: Water
- Material flow 3: Solids

Material flow 1: Oil

This material flow is the most important of the three material flows. The aim is to achieve a quality in this material flow that corresponds to that of waste oil. The water content in the oil must not exceed 2%. For this reason, the TricaPress decanter centrifuge from Hiller also extracts the light phase via the adjustable peeling disc. This makes it easy to make any necessary adjustments during operation. The low water content ensures that there are sales opportunities and that the oil can be reused as fuel, for example, after processing.

Material flow 2: Water

Before the water can be drained off, any oil content must be removed.

Material flow 3: Solids

As the separated solid material contains oil, it is fed into the combustion process.

Recycling process grease separator waste

Grease in the grease-water-mixture from a grease separator is typically present as an emulsion in which grease droplets are distributed in the water. Higher temperatures also increase the droplet size here, thus facilitating separation. The proportion of grease in water is usually in the range of 10–20%.

System 1: Recycling machine

This recycling process does not use a **BIBKO® INFRA TEC** - recycling machine, but a so-called macerator. The collected grease waste is first fed into this. The macerator shreds solid materials in the liquid medium. To do this, the macerator uses cutting wheels or cutting plates. The shredded material is then mixed with the liquid medium, making it homogeneous and pumpable.



Cutting mechanism macerator
Source: Vogelsang GmbH & Co. KG

This grease-water-mixture is then fed into an intermediate buffer. This intermediate buffer serves as a feed tank for the decanter centrifuge.

System 2: Decanter centrifuge

In order to process the grease-water-mixture in the decanter, it must first be heated. Processing then takes place. This produces the material flows already described for the processing of oil separator waste.

- Material flow 1: Oil (oily phase)
- Material flow 2: Water
- Material flow 3: Solids

Material flow 1: Oil (oily phase)

Since biodiesel or biofuel products can be produced from this oil, there is also a sales opportunity here. After processing, these can be reused, for example, in engines, combined heat and power plants (CHP) and cogeneration plants (CHP).

Material flow 2: Water

as with oil separator waste

Material flow 3: Solids

As with oil separator waste

Practical example grease separator waste

The following image shows the processing of a grease-water-mixture from a grease separator in a decanter centrifuge.



Results of test 1 - 3 (from left to right)

Experiment parameters

The experiments were carried out using the following parameters.

Experiment	1	2	3
Spin rate	3000 x g	3000 x g	3000 x g
Spin time	3 min.	3 min.	3 min.
Product temperature	20° C	60° C	80° C
Results			
Sediment volume	4 Vol.-%	2 Vol.-%	2 Vol.-%
Consistency	pasty	solid	solid
Water phase volume	70 Vol.-%	64 Vol.-%	64 Vol.-%
Appearance	clear	clear	clear
Oil phase volume	10 Vol.-%	28 Vol.-%	27 Vol.-%
Appearance	slightly cloudy	clear	clear
Residual grease volume	16 Vol.-%	6 Vol.-%	7 Vol.-%

Parameters and results of the experiments

Results

The result shows that the grease-water -mixture can be separated into the three desired phases using the decanter centrifuge. In order to obtain the most pronounced, clear oil phase and a solid sediment possible, heating to 60 - 80°C should be carried out.

One decanter centrifuge for both types of waste?

Waste from oil and grease separators can in principle be processed with the same decanter. However, depending on the further utilisation of the end material, it is advisable to clean the decanter when changing the waste (oil/grease).

The decanter can be cleaned with the following media:

- Cold water
- Hot water
- Lye (e.g. caustic soda solution - 1%)

Summary

The approach described above produces a raw material in the form of oil from oil and grease separator waste, which can be further processed into fuel.

Economic benefits

The oil produced can either be used as a raw material for biodiesel production (oil from fat) or processed for energy generation. This opens up both economic recycling opportunities and cost-optimised feeding into material recycling.

The oil produced can either be used as a raw material for biodiesel production (oil from grease) or processed for energy generation. This opens up both economic recycling opportunities and cost-optimised feeding into material recycling.

Special feature of the solution approach

The special feature of this solution approach is that a total of three material flows can be generated in a single process step:

- Material flow 1: Oil
- Material flow 2: Water
- Material flow 3: Solids

A TricaPress decanter centrifuge from Hiller GmbH, Vilsbiburg (<https://www.hillerzentri.de>), is used for this purpose. In addition to the well-known effect of separating solids, the density differences between the two liquids are used to separate them from each other. The Trica-Press decanter centrifuge is characterised in particular by the following properties:

- Maximum purity of the liquid phases maximises the value of the end product
- Adjustable peeling disc allows the recyclable phase (oil) to be adjusted during operation
- Low residual moisture in solids minimises disposal costs and maximises yield
- Various wear protection systems ensure a long service life
- Easy operation and a high degree of automation enable simple integration into existing operating processes

Further information

The following QR-Code will take you to the **BIBKO® INFRA TEC** - YouTube-channel.



A business division of
BIBKO® Recycling Technologies GmbH
Steinbeisstraße 1+2
71717 Beilstein