Press release

BIBKO® INFRA*TEC* - Recycling solution for bentonite suspensions

Reduction of the disposal volume by combination of recycling machine and vacuum belt filter

Bentonites are processed clays from natural deposits which, when suspended in water, are of great practical importance for special civil engineering. The bentonite suspensions have the task to stabilize boreholes and to transport the drilling material. Due to these properties, bentonite suspensions are used in horizontal and geothermal drilling, but also in the construction of diaphragm and sealing walls.

Discharge process at BIBKO®-Recycling machine

Due to their versatility, large quantities of used bentonite suspensions are produced on construction sites. Due to the concentration of drill cuttings, the bentonite suspension loses its relevant properties over time and must be disposed of. Since the bentonite suspension is stable and does not separate on its own, disposal is difficult.
Irrespective of its composition and potential for environmental damage, the bentonite suspension is waste, as it is no longer needed at the end of a construction project.

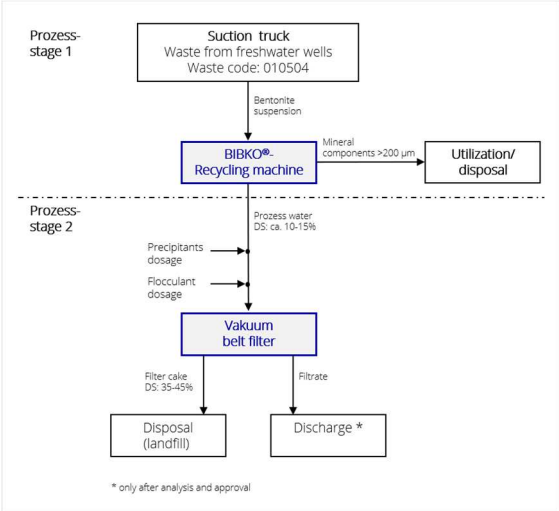
Recycling of bentonite suspensions - objectives and current solutions

The primary goal of recycling bentonite suspensions is to reduce the volume to be disposed of. Recycling machines separate the cuttings from the liquid phase. This excavatable material is disposed of in the usual way.

The bentonite particles must be removed from the remaining liquid phase in a further step. Today, centrifuges are often used for this purpose. With this solution, which is relatively cost-intensive to purchase and maintain, the entire solid and all cohesive components are removed.
The result is relatively clear water containing the dissolved contents of the drilling suspension.

BIBKO® INFRA*TEC* - Recycling solution

As an alternative to the use of a recycling machine with centrifuge, BIBKO®, INFRA*TEC* division, offers a recycling solution consisting of two process stages:



BIBKO® INFRA*TEC* - solution

The solution consists essentially of the following system components:

1. BIBKO®-Recycling machine
   for separation of mineral components >200 µm

2. Vacuum belt filter
   for the separation of the remaining solids and cohesive components from the process water and the production of a filter cake

Process stage 1: BIBKO®-Recycling machine

In process stage 1 the bentonite suspension is fed to the BIBKO® recycling machine. The suspension is then fed into the pre-wash chamber. In this chamber there is a water bath. A rotating spiral conveys the suspension through the water bath, thereby demixing it. At the same time, water flows through the chamber in a counter-current principle.
The mineral components <200 µm are washed out and fed together with the excess process water to the vacuum belt filter of process stage 2.

The pre-washed mineral components >200 µm are removed from the pre-wash chamber via a bucket elevator and fed into the main washing chamber. There, similar to the pre-wash chamber, the main washing process takes place, in which the waste is again mechanically conveyed through a water bath. In order to achieve an optimal washing result, water flows through the chamber in countercurrent principle again.

A second bucket elevator removes the washed material from the main washing chamber and feeds it to the screw conveyor. Via this conveyor the material is dewatered and transported into the material box.

Material after recycling process in material box

Process stage 2: Vacuum belt filter

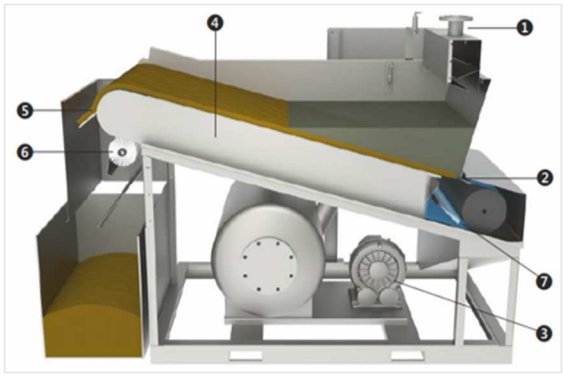
The process water from the BIBKO®-Recycling machine is pumped into the vacuum belt filter with a dry substance content (dry matter content) of approx. 10-15%. A precipitant is first added to the process water.

This precipitant breaks up the honeycomb structure in which the water molecules are embedded. This facilitates the subsequent flocculation of the process water.

In the next step, a flocculant is added to the process water. This causes the solids contained in the water to form corresponding flocs. This floc formation is decisive for the result that can be achieved with the vacuum belt filter with regard to the dry substance content of the filter cake and the cleanliness of the filtrate.
To determine the correct precipitation and flocculation agent, filtration tests are therefore carried out in advance.

Filtration process

The flocculated process water is fed into the vacuum belt filter via the inlet box and evenly distributed over the entire width of the filter belt (1).



Vakuum belt filter

The filter belt is inserted below the bath level (2). In the lower part the filtration takes place, while the dewatering of the filter cake takes place in the upper part: Air is continuously sucked out of the filter chamber (4) by a side channel compressor (3). This creates a slight negative pressure on the underside of the filter.
As soon as the liquid level exceeds a certain level, the vacuum is broken and the filter belt continues to cycle. The resulting filter cake is separated from the belt by a scraper (5). The belt is then cleaned with a brush roller (6) and additionally rinsed free with high pressure nozzles (7).

The resulting filter cake is non-puncturable and can be disposed of. The filtrate can be discharged after analysis and approval.

Projekt example

For a new project, in a first step filtration tests were carried out to determine the correct precipitant and flocculant.

Bentonite suspension - untreated

The bentonite suspension was originally used as a supporting fluid in the construction of diaphragm walls. As it no longer had its original properties, it was to be recycled.

Bentonite suspension - precipited and flocculated

After adding the optimal precipitant and flocculant to the bentonite suspension, the next step was to feed the flocculated suspension into the vacuum belt filter.

Vakuum belt filter in use

After the filtration process, the solids in this project were available as a compact filter cake with a DS content of approx. 35%.

Since the DS content depends strongly on the composition of the bentonite suspension, a DS content of 45% or more can be achieved in the ideal case.

Filter cake on vacuum belt filter

The resulting filtrate showed only a very low turbidity.

Filtrate after filtration process

Conclusion

The recycling solution from BIBKO®, INFRA*TEC* division, provides an alternative, economical solution for the recycling of bentonite suspensions. This solution pursues three goals, which make a more economical disposal of the bentonite suspensions possible:

- Reduction of the disposal volume by washing and removal of the mineral components >200 µm from the concrete suspension and the allocation of this material to a lower allocation value Z.
- Allocation of the stab-resistant filter cake to a lower allocation value Z.
- Production of a filtrate with minimum turbidity which can be discharged after analysis and approval.

These goals save money and make the purchase of a BIBKO® INFRA*TEC*-Recycling solution for bentonite suspensions a profitable investment.