Press release

BIBKO® INFRATEC - Recycling of drilling fluid - an alternative approach

Feeding of drilling fluid to recycled aggregate

With more than 275 million tons, mineral waste represents the largest waste stream in Germany. In addition to construction and demolition waste, this also includes excavated soil, slag and ash that result from incineration processes, as well as other mineral construction waste.
Mineral waste has a significant recycling potential. Up to 90% can currently be recycled. A large proportion of the recycled waste is used as a substitute building material in the construction industry.

Construction waste (left) becomes sustitute building material (right)

Examples of use include road and railroad construction. In building construction, recycled building materials are used as an ingredient in recycled concrete. In addition, recycled waste is used as landfill substitute or backfill material.
Due to the high level of construction activity and the goals of resource conservation, the recycling of mineral waste will continue to be of great importance in the future.

Drilling fluids

Drilling fluids are fluids used in the backfilling and grouting of cavities, as well as in horizontal and geothermal drilling.

In addition to cleaning the borehole, the drilling fluid also cools the drilling tools, stabilises the borehole wall and reduces the friction between the drill string and the rock.
Drilling fluids are initially a mixture of water, bentonite and mineral components. Other substances are added to control the properties.

Emptying drilling fluid from silo vehicle

Due to the wide range of applications, large quantities of used drilling fluids are produced that have lost their construction-related properties. Further use is no longer possible, so they have to be disposed of. However, since these are stable and do not separate or only separate very slowly, disposal is difficult. Due to the high liquid content, disposal at landfills without prior treatment is not possible for technical reasons related to landfill construction.

Recycling solutions for drilling fluids

Both mobile and stationary recycling systems are available today for recycling drilling fluids. The recycling systems are designed to achieve the following objectives in particular:

- Volume reduction by separating the water content
- Recovery of the minerals contained (sand + gravel)
- Recovery of the remaining solids in compacted form
- Recovery of the water content

Stationary recycling systems

Stationary recycling systems usually consist of the following process stages:

Process stage 1: Material recycling
Process stage 2: Fines separation
Process stage 3: Process water recycling

Process stage 1: Material recycling

First, the drilling fluid is continuously fed into the recycling system via a feed system. There, the mineral components >250 µm are separated in a wet-mechanical process. The separated and washed mineral components are discharged into a material box or a container via a discharge system.

Austragsystem für mineralische Bestandteile >250 µm

The process water generated during the recycling process is first buffered and then fed to process stage 2.

Process stage 2: Fines separation

In this process stage, the mineral components >60 µm are separated.

The resulting process water is first buffered again and then fed into process stage 3.

Fines separation for components >60 µm

Process stage 3: Process water recycling

In this process stage, the mineral components ≤60 µm still contained in the process water are separated and thickened. The process water is then clear.

Process water recycling with centrifuge

The recycling process thus results in the following material flows:

- Mineral components >60 µm
  (from recycling machine/ no. 1)
- Solids ≤60 µm
  (from centrifuge/ no. 2)
- Centrate
  (from centrifuge/ no. 3)

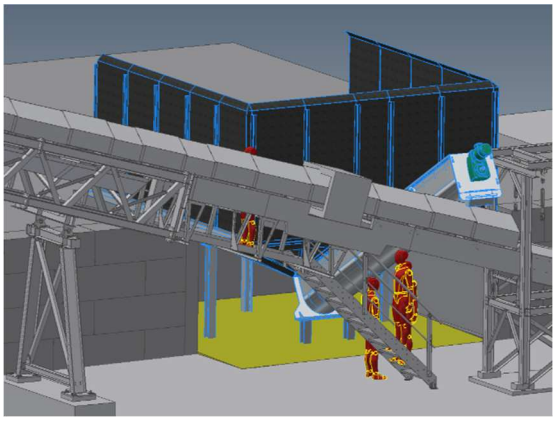
Material flows 1 - 3 after recycling process

Stationary or mobile recycling system?

The main difference between the two systems is that with the mobile recycling system, the drilling fluid is recycled on site. The aim here is to reuse the process water several times. This minimizes the amount of water that needs to be disposed of and also water consumption.
In contrast, the objective of the stationary recycling systems is to recover the mineral components >60 µm. These can be sold as a type-tested building material or secondary raw material.
The mobile design of the recycling system, for example on a truck, also makes it possible to use it at different locations with little effort.

Alternative approach

In the systems described so far, the recycling of the drilling fluid is done by separating the components of water and minerals (with bentonite). An alternative to this is the metered addition of the drilling fluid to another material stream. In this case, drilling fluid is added to recycled building material.
Large quantities of mineral waste are produced when buildings are demolished. After processing in appropriate recycling plants, these materials can be reused in buildings as certified recycled building materials (RC building materials).
If these are produced, quality-controlled, classified and installed in accordance with the applicable requirements of the German Substitute Building Materials Ordinance, primary raw materials can be replaced to a considerable extent.


Feeding bunker with inclined conveyor

Material blending

The drilling fluid is delivered in suction or silo vehicles. The BIBKO® INFRA-*TEC* feeding bunker is used for the subsequent addition of the drilling fluid to the recycled building material. The feeding bunker has two functions here:

- Buffering the drilling fluid
- Controlled addition of the drilling fluid to the recycled building material

The feeding bunker consists of a hopper with a capacity of approx. 9 m³ for buffering the drilling fluid. The sloping hopper walls ensure that the drilling fluid is transported to the conveyor screw.


Feeding hopper for emptying/ cleaning the vehicles

The drilling fluid is then added to the recycled building material via the screw conveyor when it is fed into the material silos via an inclined belt.

Screw conveyor with inclined belt

The drilling fluid is added as soon as the inclined conveyor is started and residual construction material is conveyed. The amount added can be easily adjusted via the frequency-controlled speed of the screw conveyor.


Conveyor screw with recesses and wear protection

To reduce the starting torque when starting the screw after a long period of inactivity, the screw conveyor was not closed, but designed with recesses. This allows the screw to be operated forwards and backwards, thus loosening and homogenizing the material.
The polyurethane wear protection ensures a long service life for the screw conveyor.

Summary

The solution presented here represents an alternative to the systems commonly used today, in which recycling is carried out by separating the components of water and minerals (with bentonite).

In this alternative solution, the drilling fluid is added to the recycled construction material as it is delivered. The components are therefore not separated.
This solution may be of particular interest to companies that already produce and process recycled building materials. If this is not the case, mobile or stationary recycling systems are used. While the objective of mobile systems is the multiple use of the process water, that of stationary recycling systems is the recovery of the mineral components contained in the water. These can then be sold again as a suitability-tested building material or secondary raw material.

BIBKO® INFRATEC
RECYCLING TECHNOLOGIES FOR INFRASTRUCTURE WASTE & PROCESS WATER

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