



Outotec® Thickened tailings and Paste Solutions

Sustainability through better tailings management

Reclaim water and store your tailings in a safe modern way. Outotec has the ultimate environmentally sound total solution.

Paste technology is a modern way to environmentally friendly handle and store tailings from various processes like mine concentrators and other processes that creates tailings. The advantages of this process are multiple and the technology is now acknowledged.

Paste is created by significantly dewatered tailings to a point when it does not segregate as deposit and produce minimal bleed water when discharged. The viscosity is regulated so the paste is forming a conical pile, but still is flowing.

Benefits

- Smaller footprint will be required
- More efficient water recovery
- Energy efficient
- Limited embankment dams needed
- Minimized environmental risks

Outotec



So what is the difference between conventional and paste tailings disposal?

A conventional tailings pond is designed to store both the solid and water of the tailings, where the solids segregate and settle and process water is stored and recovered.

A thickened tailings or paste disposal area is designed to store solid and little excess water. Recovery of process water is done in the thickener prior deposition. Due to higher beach slope, the footprint of the area needed is half size compared with conventional tailings pond. High viscosity in tailings and less water in the pond results in lower embankments. Process water is directly recovered in the overflow from the thickener.



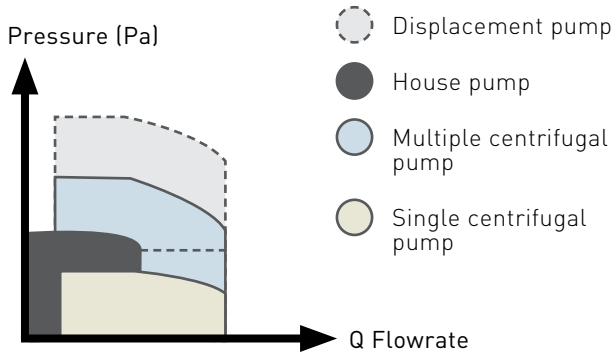
The paste-like material can be pumped to a disposal area for a final disposal or as an alternative be mixed with binder and used for backfill in the mine to stabilize the out mined stopes (rooms).

The direct recovery of water will come from the thickener operation and can in many cases directly be reused in the concentrator plants, limiting the fresh water needs. This is in many geographical areas a big constrains as water is a scarce resource.

As the tailing ponds with non-segregating paste material are quite stable and the low amount of free water, the risk for dam failure is significant reduced.



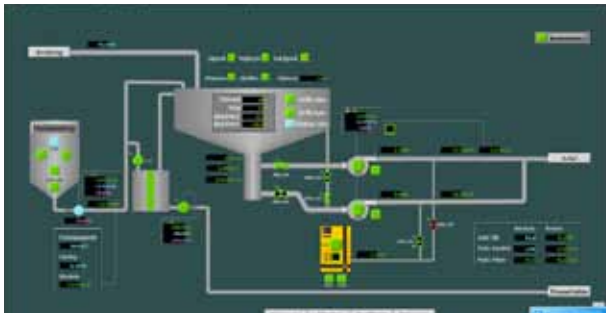
Pumping solution



Thickener underflow pumping

A critical and important part of the paste/thickened tailings plant is the underflow pumping for transporting material to the deposit. Frequency converted, heavy-duty, most cost effective and suitable pump type are selected, system individually designed for optimised solution.

The first choice for plants with lower tonnages is the hose pump, for its wider operation level, high pressure possibility and smoother operation. For higher tonnages with low head usually the centrifugal pump will suit best. The displacement pumps are included when either the hose pump or the centrifugal pump can achieve the required head.



Automation

A well working plant makes high demands on the automation system. Outotec offers individually designed automation system, with instruments of high quality. The thickener torque, the underflow density and the turbidity of the overflow are continuously monitored. The dosing of flocculent is based on the tonnage feed, which keeps the consumption of flocculent low and at the same time ensures the function of the thickener.

Outotec deliver complete package that normally consists of both equipment and services:

- Testing, Engineering and design.
- Thickener
- Civil work and buildings (normally only basic engineering)
- Pumping System
- Flocculent equipment
- Piping, valves
- Cement addition systems (Backfill only)
- Mixers (Backfill only)
- Electrical equipment
- Instrumentation
- Control system
- Erection
- Commissioning and start-up
- Training
- Spare Part Supply

Techniques:

- Thickening Technology Outotec Supaflo
- Thickeners (see brochure)
- Flocculent system for mixing and dosing
- Thickened tailings/Paste pumping dimensioning
- Backfill cement storing and dosing system
- Backfill selfcleaning mixing system
- Power supply and electrical installation
- Instrument and Automation system design
- Disposal method surface
- Disposal method backfill

Surface disposal:

- Less risk for dam failure
- Smaller footprint
- Better water management
- Energy savings by less pumping
- Improved total economy
- More efficient handling of fine tailings
- No or very little segregation
- No or very little seepage or leakage from the pond
- Minimized dusting
- Simplifies closure in many applications
- Limits environmental risks
- Applicable on all tailings

Mine Backfill:

- More consistent backfill quality and strength
- Direct water recovery
- Minimal water to pump to surface
- Less leakage of cement or other binder
- Simpler bulkheads
- Shorter fill cycle
- Minimal segregation

Outotec develops and provides technology solutions for the sustainable use of Earth's natural resources. As the global leader in minerals and metals processing technology, Outotec has developed over decades several breakthrough technologies. The company also offers innovative solutions for the chemical industry, industrial water treatment and the utilization of alternative energy sources. Outotec shares are listed on the NASDAQ OMX Helsinki.

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