



SoilTain® Dewatering

High-flow Sludge Dewatering System

GEOSYNTIA

 **HUESKER**
Ideen. Ingenieure. Innovationen.



State-of-the-art sludge disposal

Sludge is generated by processes in a variety of economic sectors and often poses major challenges: sediments can obstruct navigation channels; industrial and mining operations generate large amounts of sludge that require eco-friendly disposal; enormous quantities of sewage sludge are produced every day across the globe, with disused sewage sludge lagoons in particular posing a problematic legacy.

As a general rule, all types of sludge require dewatering as part of any treatment process. This can be achieved by a variety of procedures:

SoilTain	Spoil area	Chamber filter press
Belt filter press	Centrifuge	Direct removal

By providing a fast and economical means of sludge dewatering, **SoilTain Dewatering Tubes** can provide the ideal solution. The large-format tubes offer high process capacity and dewatering performance while occupying relatively little area. The tubes can also be used for the permanent containment of the dewatered sludge cake.

SoilTain sludge dewatering applications

The direct removal of waterlogged sediments and residues from mines, industrial plants, construction sites and sewage works often involves high cost and effort. It therefore tends to be more economical to dewater the sludge prior to any disposal operation.

SoilTain tubes offer a fast and cost-effective dewatering solution that is suitable for many different sludge types.



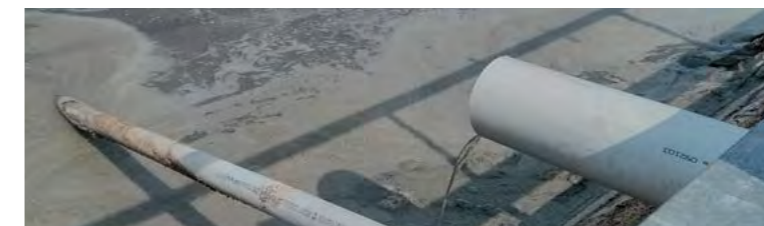
Sediments

Sediments, which comprise a mixture of mineral and organic material, are often polluted by TBT, PCB and heavy metals such as Mercury or Lead.



Mining residuals

Mining operations continuously generate large volumes of sludge which, depending on the constituents, may pose an environmental hazard.



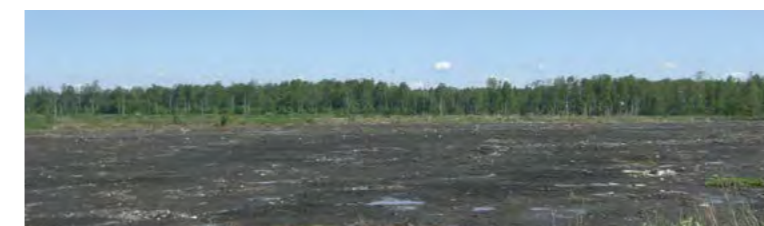
Industrial sludge

Industrial processes also produce mineral and organic sludges that are easier to store, transport or dispose of in a cake form.



Infrastructural sludges

These types of sludge typically arise on construction sites where often there may be little space available for storage.

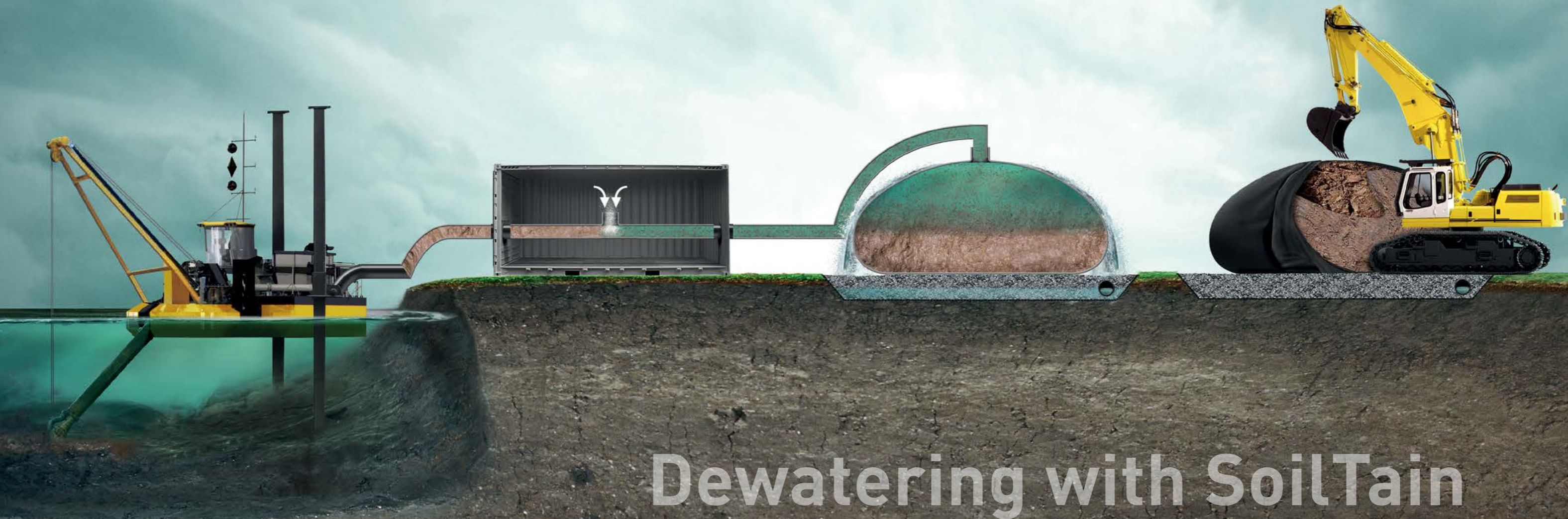


Sewage sludge

Sewage sludge is the product of biological waste water treatment processes. Small treatment plants frequently have no mechanical dewatering equipment.

Problems posed by sludge

The SoilTain process



Dewatering with SoilTain

1. Extraction

The first step is to remove the sludge. Sediments, for instance, can be extracted by a suction dredger. Other sludges may be continuously produced as a by-product.

Benefits of SoilTain

- Extremely high hourly processing rates
- Handling without the need for any interim storage
- System mobility

2. Conditioning

The sludge is conditioned through the addition of a flocculating agent. This causes the particles suspended in the water to agglomerate together into larger flakes, so-called flocs.

Benefits of SoilTain

- Low mechanical loads acting on flocs
- Low plant requirement (only one machine needed)

3. Dewatering

The gravity drainage process ensures the steady removal of water from the sludge in the technical textile tube. The specific opening size of the high-performance woven textile ensures retention of the solid fraction of the sludge while allowing the water to escape from the tube.

Benefits of SoilTain

- Recirculation of water is possible
- Very high filling volume capacity
- Stackability of tubes
- Flexible extension (through addition of tubes)

4. Disposal

Through the steady process of consolidation, the water content in the tubes decreases until it can be tipped, incinerated or otherwise used for a particular purpose.

Benefits of SoilTain

- Sludge encapsulation prevents rewetting
- Tubes are also suitable for permanent containment
- Low area requirement



The ideal solution SoilTain Dewatering Tubes



SoilTain tubes offer a fast and economical means of sludge dewatering. The large-format tubes offer high process capacity and dewatering performance while taking up relatively little space. This helps to speed up progress on site.

The tubes, which are made of purpose-developed, high-performance woven technical textile material, can be stacked to increase storage capacity still further. Cost savings are also achieved by the lower machinery and associated power and fuel demands for dewatering and transportation of the sludge from the site. The tubes can be used for permanent containment of the dewatered and consolidated material. There is no risk of rewetting, e.g. by rainwater, even where the tubes are in use for longer periods. As a result, a higher quantity of dry solid residue is achievable than by spoil area dewatering. SoilTain not only acts as a reliable, long-term containment system, it also minimizes the odour emissions from the sludge.

SoilTain offers a state-of-the-art solution to sludge dewatering.



HIGH EFFICIENCY

- Rapid dewatering within a short period
- Flexible filling capacity through variation of tube size and tube number
- High resource efficiency (low energy, capital and labour requirement)
- High dry residue quantity
- Flexible use for temporary project-specific or continuous dewatering processes

SoilTain range

Standard tube sizes from 8 m circumference and 10 m length to 28 m circumference, 65 m length providing a 1,600 m³ storage capacity. Tube sizes can also be customised to meet project-specific requirements. HUESKER employs a unique weaving process in conjunction with special stitching techniques and sewing machines in order to optimise the seam layout and achieve high tensile strengths at the seams. The tubes are typically supplied on steel cored rolls. The product has been successfully tested for environmental soundness. HUESKER operates a quality management system and has been certified to ISO 9001.

HUESKER SoilTain service

- Engineering support for customised tube design
- Placement planning and area calculation
- Optimisation of tube sizes and numbers
- Custom-manufacture of tubes to meet project requirements
- Recommendation of local specialist operators

SoilTain – large sludge volumes rapidly dewatered at comparatively low costs



SoilTain strengths

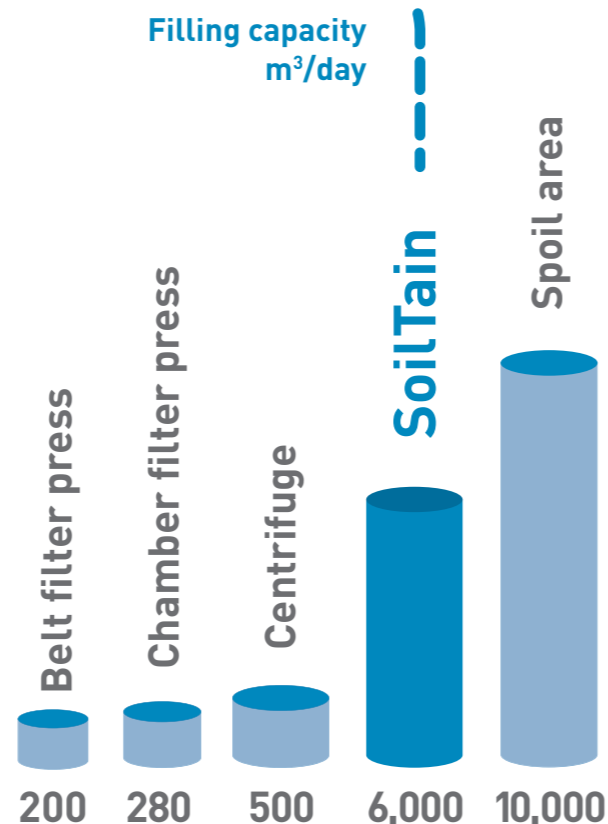


Three crucial factors

Various factors require consideration when choosing the best system for a particular sludge dewatering and disposal application.

Decision-making criteria include the necessary dewatering capacity and speed, water quality, mobility, available space and maintenance requirement, and, not least, the associated investment. Experience has shown that system efficiency is ultimately the decisive factor on the majority of projects. It is important to remove the sludge from the problem zone as rapidly as possible and quickly reduce its volume to facilitate disposal while at the same time helping to minimise the overall project costs.

The three crucial factors are illustrated by the following example of a project with 100,000 m³ in-situ sludge with a dredged volume of 345,000 m³.



Filling capacity

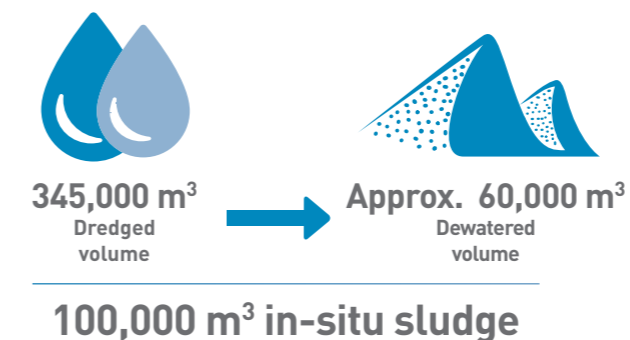
This denotes the sludge volume that can be fed to the dewatering medium within a predetermined period (here, within one day or ten working hours). This step entails the highest process costs due to the required expenditure on labour and plant. The faster the sludge is removed, the lower the costs for the overall dewatering operation.

Process time

In addition to the filling operation, the dewatering process also includes the subsequent volume reduction phase. The cake, i.e. dry mass, remaining at the end of this process is then suitable for disposal. The short process time achieved by SoilTain could only be matched by mechanical means through the use of some 12 centrifuges, 22 chamber filter presses or 30 belt filter presses.

The diagram presents a comparison based on the use of a single centrifuge or press.

- SoilTain**
Approx. 4 months
- Spoil area**
Approx. 2 years
- Centrifuge**
Approx. 2 years
- Chamber filter press**
Approx. 3.5 years
- Belt filter press**
Approx. 4.5 years



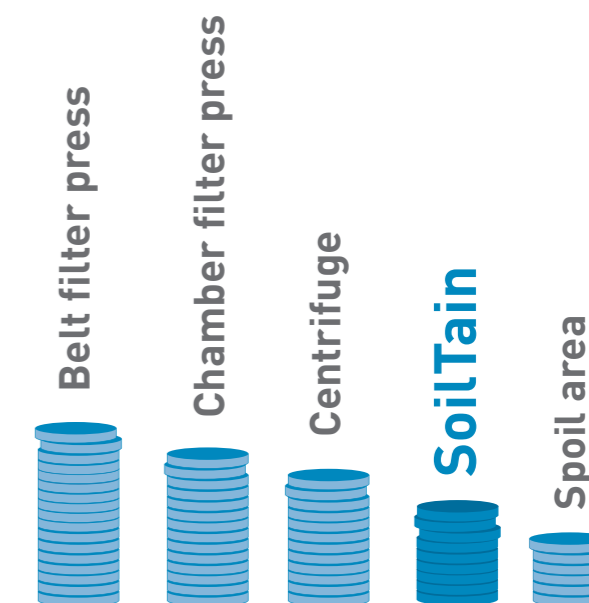
Process time

Total cost

Project costs

Even the most efficient system still has to add up financially. The cost of labour, plant, ancillaries and consumables needed for the different systems varies substantially. To facilitate project cost estimation, HUESKER can provide transparent, illustrative cost comparison calculations upon request.

Source: HUESKER cost simulation tool



SoilTain – high-flow sludge dewatering



Application example: Sediments

Dockside maintenance dredging



Tributyltin (TBT) was banned worldwide in 2003. It had previously been used as an anti-fouling agent in many ship hull coatings to prevent the growth of marine organisms. As a result, the sediments at Husum docks in northern Germany had been heavily polluted by the toxic chemical.

The maintenance dredging operations involved the extraction of 50,000 m³ of polluted dock silt by cutter-suction dredger. To optimise the use of the small area available for dewatering, the SoilTain Dewatering Tubes were stacked two layers high. The tubes served both to dewater and permanently encapsulate the sediments.

FACTS

- Disposal of 50,000 m³ of TBT-polluted sediments
- Tubes stacked in two layers to save space
- Simultaneous dewatering and encapsulation



Application example: Infrastructural sludge

Sludge removal from pit base



An excavation pit in Neuhoef in the German Federal State of Hesse contained a 1 m layer of sludge topped by 4 m of water. The sludge had to be pumped off to allow the pouring of an underwater concrete foundation. For excavation stability reasons, casting had to take place prior to removal of the water.

As no large areas were permanently free for sludge dewatering, the sludge was placed in custom-manufactured SoilTain Dewatering Tubes that fitted to the available space. After dewatering, the sludge cake was removed from the site.

FACTS

- Disposal of infrastructural sludge
- Small area available for dewatering
- Use of custom-manufactured SoilTain Dewatering Tubes



Application example: Sewage sludge

Filtration and dewatering at sewage plant



A bioreactor at the ETE Uberabinha sewage plant in Brazil produces waste water containing organic particles in suspension. The particles had previously been removed by means of a flotation process, with the floated sludge being returned to the bioreactor. However, the chemicals used in this method slowed down the reaction process.

SoilTain Dewatering Tubes proved to be the most straightforward and cost-effective alternative. The waste water is now treated with a flocculating agent and filtered by the tubes. The drained water is then readily available for reuse in the bioreactor while the dewatered sewage sludge is later disposed of at a landfill site.

FACTS

- Filtration of continuously produced waste water
- Dewatering and consolidation of sewage sludge
- Reuse of filtered water for bioreactor process



Application example: Mining residuals

Removal of gypsum sludge from open-cast mine



Nickel and zinc are mined near the Finnish village of Kajaani at Talvivaara. The mine has a production capacity of some 10 million tonnes of ore per year. Previously, the large quantities of gypsum sludge arising during the mining operations had been deposited in lagoons.

A leak in one of the lagoons prompted the trial application of SoilTain Dewatering Tubes. The tests proved so successful that the tubes are now used for the disposal and permanent containment of all gypsum sludge generated at the mine. As the tubes are stacked in a five-layer pyramidal arrangement, the site space requirement is greatly reduced compared to the original lagoon storage concept used.

FACTS

- Dewatering of large quantities of gypsum sludge
- Safe permanent containment of sludge cake
- Following successful trials, system now used for entire production

SoilTain® is a registered trademark of HUESKER Synthetic GmbH.
HUESKER Synthetic is certified to ISO 9001, ISO 14001 and ISO 50001.



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