GOODBYE WASTEWATER!

FLOTTWEG'S SEPARATION SOLUTIONS FOR INDUSTRIAL WASTEWATER TREATMENT: EFFICIENCY MEETS EXPERTISE

All wastewater generated by commercial manufacturing, fabrication, or processing operations is referred to as "industrial wastewater." Depending on the respective industry, industrial wastewater can contain a wide variety of substances, such as greases and oils, settleable or filterable substances, cleaning agents, or acids. This distinguishes industrial wastewater from municipal wastewater and makes it necessary for companies to treat the resulting wastewater in an intermediate step using special wastewater technologies. Only then may this wastewater be sent to public wastewater treatment plants, reused for internal purposes, or directly fed into receiving water such as a river.

CHALLENGES IN INDUSTRIAL WASTEWATER PROCESSING

Due to the different industrial wastewater types with diverse ingredients, a variety of processing approaches exist. In cheese factories or dairies, this can lead to wastewater with a higher fat content, but in the production of paper, the wastewater is contaminated with paper fibers. At the same time, the properties of the sludge separated from the wastewater differ due to the various industries. This, in turn, influences the processing methods of industrial wastewater: The processes vary depending on the industry, the wastewater generated, and how the sludge is used in the end. Special requirements are also placed on the material and plant design due to the different industrial wastewater components, such as product waste from the cleaning of production equipment, alkalis, acids, or cleaning agents.

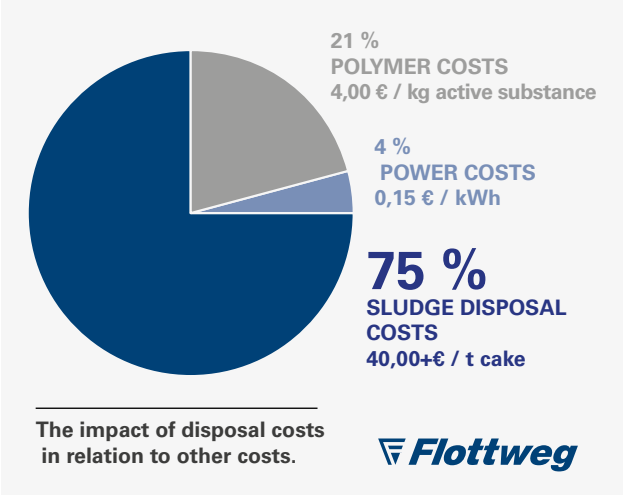
Below we would like to focus on the requirements placed on the treatment of sludge from the treatment phases of biological wastewater.

SLUDGE TREATMENT OF INDUSTRIAL WASTEWATER

Similar to the treatment of municipal wastewater, a distinction is also made between sludge thickening and sludge dewatering in the treatment of industrial wastewater:

1. SLUDGE THICKENING:

In the process of treating wastewater, fine biological sludge is constantly produced during the decomposition process at a wastewater treatment plant. For a stable decomposition process in the biological treatment phase, the sludge produced in the secondary sedimentation pond, also known as excess sludge, is removed and fed into the digestion tower. The aim is to concentrate the dry solids content from 1 percent or less to 5 to 8 percent before the excess sludge is pumped into the digestion tower. The sludge volume is thus reduced by 80 to around 90 percent. The dry solids content in the thickened sludge depends on the pumpability of the thick sludge and the thickening equipment used.



The impact of disposal costs in relation to other costs.

Flottweg's OSE decanter offers the optimal solution for thickening sludge. It is specially designed for sludge thickening.

2. SLUDGE DEWATERING

The transportation and disposal of the sludge produced account for most of the costs, which is also the case in the treatment of industrial wastewater. The lower the sludge volume, the lower the cost of transportation and disposal. High-performance sludge dewatering is the decisive criterion here. No matter how the dewatered sludge will ultimately be used, a high content of dry solids is ultimately of great or the greatest importance. Other key factors include efficient polymer, energy, and water consumption, and less need for replacement parts; in short, continuous, automated operation at minimal cost. High dry substance content also helps to reduce the carbon footprint and make sustainable sludge dewatering possible.

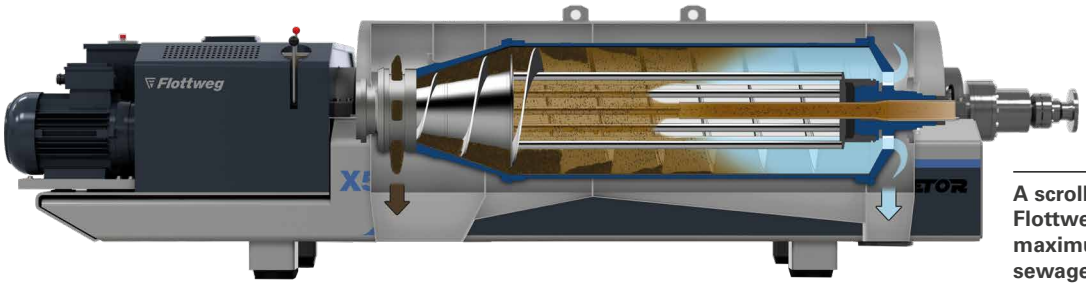
Flottweg presents two sludge dewatering solutions:

a) HTS decanter:

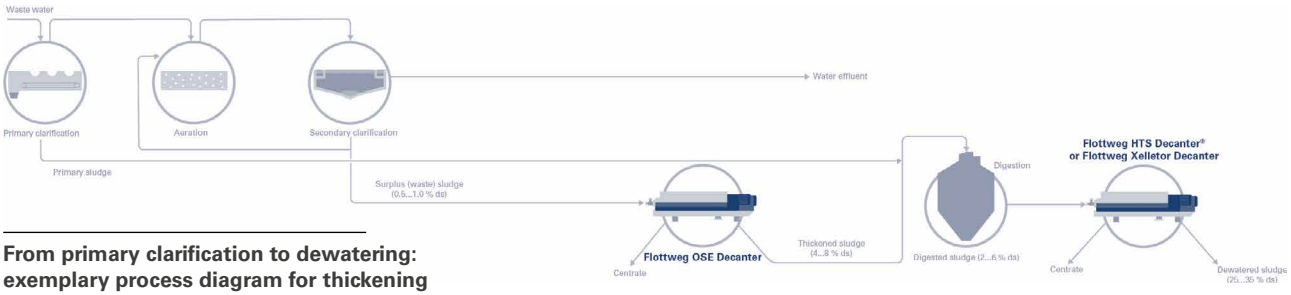
The Flottweg HTS decanter® was specially designed for sludge dewatering. The energy efficient and high-performance Flottweg Simp Drive® combined with the continuously optimized geometry of this decanter centrifuge ensure dry solids values that are several percentage points higher than those reached with other centrifuges.

b) Xelletor Series:

Flottweg has developed a unique centrifuge concept specifically for the high-level dewatering of sludge: The Flottweg Xelletor X model series: Inspired by the lightweight construction of high-performance sports cars and motorcycles, the idea for a new type of centrifuge design was born. The core elements—rotor and decanter scroll—were redeveloped from scratch. This resulted in a scroll without a scroll body. The Xelletor series stands out above all by saving energy and/or polymers, a particularly high-performance dewatering result, and increased capacity.



A scroll without a scroll body - Flottweg's X-series ensures maximum dewatering of the sewage sludge.



From primary clarification to dewatering: exemplary process diagram for thickening and dewatering of sewage sludge.

3. DIRECT DEWATERING:

Flottweg TDU decanter:
For industrial wastewater treatment plants in which sludge with a low dry substance content of around 0.3%–0.8% is generated after wastewater treatment, the question often arises as to whether a conventional two-stage process with thickening, followed directly by dewatering, is necessary or whether a single-phase system can be used instead. Flottweg's TDU decanters, which have been specially developed for direct dewatering, are the ideal choice in this case. CAPEX and OPEX can be drastically reduced as a result.

EXAMPLES FROM INDUSTRY:

Dairy Wastewater
Industrial wastewater generated during the treatment and processing of milk and dairy products as well as by all cleaning processes must be treated due to various contaminants, including milk fats or surfactants from the cleaning process. Nearly 1–2 m 3 of wastewater are generated every day for each ton of milk processed during the treatment of milk and the production of various dairy products.

Due to temperature variations and differences in the pH value, biological oxygen demand, chemical oxygen demand, total nitrogen, total phosphorus, and greases, oils, and lubricants vary. The concentration and composition of the wastewater depend on the production processes, systems, and machines used. It usually makes sense for companies to process the wastewater independently for it to be sent to municipal wastewater treatment plants or directly discharged into bodies of water.

Common wastewater treatment concepts in dairies include a mixing and balancing stage for neutralization, chemical-physical pretreatment for the separation of grease by flotation, aerobic biological treatment (including nitride and denitrification as well as bio-P), and downstream precipitation of phosphorus.

Paper Wastewater
The production of paper is one of the most water-intensive industrial production processes, meaning the sustainable and efficient use of water as a raw material plays an important role here. Both in the production of paper based on renewable raw materials and in recycling processes, the physical properties of the water are indispensable for the slurrying of the paper components. The fibers used in paper production consist mainly of wood pulp and cellulose as well as waste paper. In order to be able to use the fibers in the best way possible for paper production, a coherent mass of raw materials must be first extracted from the materials. In pulp and paper production, water is not only used as a suspension and transport medium for fibers and fillers, but also as a solvent for chemical auxiliaries.

The paper industry uses large quantities of process water. The requirements for wastewater treatment and energy-saving wastewater technology are correspondingly high. Wastewater from paper mills generally consists of residues from fibers or substances such as deinking chemicals, bleaching agents, process chemicals, and additives. They have a high chemical oxygen demand (COD) and are mainly processed by mechanical means before undergoing full biological treatment in factory-operated wastewater treatment plants. Disposal is very costly when it comes to the industrial cleaning of paper wastewater. Considerable savings can be made in particular with dewatering.

Chemical Wastewater

In the production of chemical products, industrial wastewater is usually contaminated with a variety of hazardous materials, such as medicines, dyes, or recycled plastics. In general, these are residues of the compounds which have been produced (i.e., residual products), but they also include solvents or cleaning agents and undesirable byproducts, as produced in many chemical processes.

Industrial chemical wastewater is made up of different mother liquors and wash wastewater. Each substream has its own specific composition. Due to its complex composition, wastewater from the chemical industry differs significantly from that of other industrial and commercial enterprises, whose wastewater is generally contaminated by hazardous materials that are comparatively manageable.

CONCLUSION:

Not all sludge is the same—nowhere else is this so apparent than in the field of industrial wastewater treatment. That's why having the necessary know-how, decades of experience, and proven separation solutions are considered indispensable here. Thanks to more than 60 years of experience in industrial wastewater applications, Flottweg provides the best separation solutions for a wide range of wastewater problems, various industry requirements, and respective sludge challenges.

Industrial wastewater treatment made easy with Flottweg's customized separation technology.

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DO YOU HAVE ANY QUESTIONS?
WE ARE HAPPY TO HELP YOU

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