

CUSTOM DRYING OF SEWAGE SLUDGE

Condensation process for sewage sludge drying – Low energy drying to reduce sludge disposal cost. Read how a chemical company uses condensation drying to obtain significant cost savings.

The Lanxess Group, a specialty chemicals business, produces inorganic pigments for the dye and paint industry at its Ningbo, China, factory. The sludge accumulated in the on-site sewage water system is extremely difficult to dewater. Disposal of this sludge is costly. The high cost incurred is attributable to the very large

amount of water in the sludge so that, essentially, the better part of the money is spent on disposing water. This is the point in the process that bears high potential for cost savings which Lanxess wished to exploit. For this purpose, Lanxess invested in a gentle, low energy drying system.

About ten tons of sewage sludge accumulate in the Ningbo plant every day. The chemical company wanted to dry this sludge, reduce its weight by 75 percent and prevent its classification in a more expensive waste class.

Drying system manufacturer Harter designed a customized system meeting all customer requirements with a special drying technology. „Today, the sewage sludge with an 85 plus percent water content can be

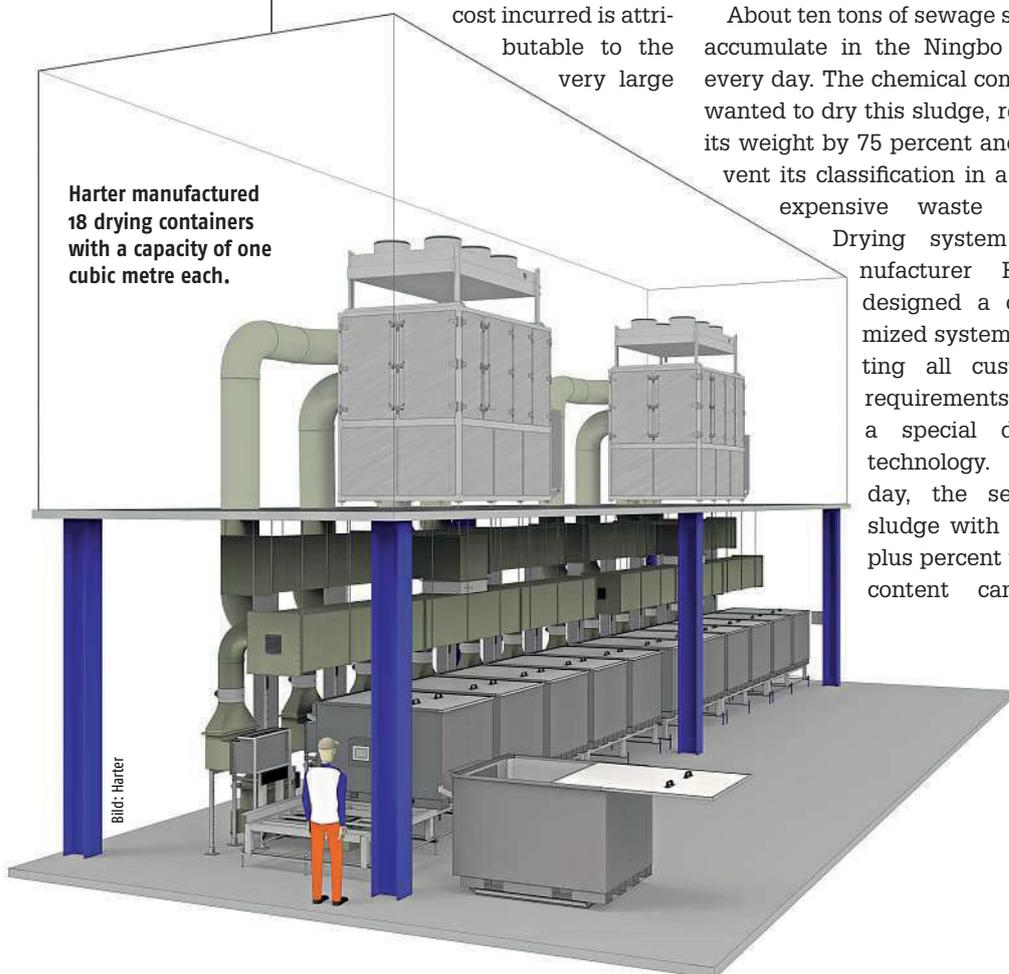
dried to below 30 percent and then disposed of as ordinary waste in an incineration plant“ says Dr. Wolfgang Oehlert, Vice President Technical Operations. „We could thus cut disposal cost by much more than half.“ And, Lanxess could fulfil governmental requirements to reduce waste.

For drying manufacturer Harter, sludge drying was the first string to its bow. Specializing in low temperature drying, the heat pump based condensation drying technology developed more than 25 years back was initially used exclusively for drying filter pressed sludge with a residual water content of about 70 to 80 percent. Today, the technology is also used to dry off adherent water in production processes of various industries.

The Ningbo project presented some challenges to drying system manufacturer Harter. For one, the pre-dewatered sludge had a dry matter content of less than 15 percent – the amount of water was

Harter manufactured 18 drying containers with a capacity of one cubic metre each.

Bild: Harter



Contact Harter: Tel. +49-8383-9223-12
Contact Lanxess: Tel. +49-221-8885-2748

still very high. Also, the organic sludge was difficult to ventilate which is a major obstacle to successful drying. Plus, there were no roller containers available at Ningbo. The sludge used to be filled in big bags for transport by trucks. Larger containers, which are common on the European market, were not available for transport to the disposal site.

Custom Design

„Given all these conditions it was clear that the system had to be a custom build“ explains Norbert Fessler, Director of Harter. As the fill level of this particularly wet organic sludge had to be minimized, the following solution was devised.

Three sludge drying systems including six drying containers each were installed. So, a total of 18 drying containers, each having a capacity of one cubic metre, were manufactured. Each set of six containers is attached to a Drymex dehumidification station. So, there are three Drymex S8 type dehumidification modules that provide the necessary process air. Using a forklift truck empty containers are placed below either of the two chamber filter presses to be filled with sludge. When filled, the containers are moved to the drying station and hooked up. Following sensor detection the drying process starts automatically. This cycle is repeated with a container every three hours. The organic sludge is dried at a temperature between 50 °C and 60 °C for about 32 hours. The water extraction rate of the three systems is 8.7 tons a day.



Bild: Harter

About 10 tons of sewage sludge a day accumulate in the Ningbo production plant.

Dry Air

Heat pump based condensation drying is basically characterized by dehumidification of the air used for drying. Extremely dry and thus unsaturated air is passed, at high flow rates, over or through the items to be dried. The air absorbs humidity in this process. In the dehumidification module, the air is cooled, water condenses and is drained off the system. Subsequently, the air is reheated and returned to the drying container in a closed air circuit. Drying is thus almost emission free and absolutely independent of

the environmental conditions and the seasons. The heat pump integrated in each dehumidification module provides highest efficiency.

The dry air must also be directed to the place where humidity is present. In other words, adequate air routing is a major aspect in ensuring reliable and uniform sludge drying. For this purpose, the sludge contain-

ers include a special ventilation bottom and an air directing system.

Energy Efficiency

Low temperature drying at 60 °C maximum, as such, ensures that explosion protection criteria are met. Dust explosion protection is also provided by filters at the drying stations. The simple

logistic concept of this large system appealed to Lanxess from the very beginning. The low energy requirement of heat pump based condensation drying is also an aspect

that becomes more and more important. Between 0.25 and 0.40 kWh, only, are required to extract one kilogram of water. This spells excellent efficiency, when compared with the 1.2 kWh required by conventional contact drying. Operators will normally decide to invest in such a system because the potential for reduction of cost of energy and cost of waste disposal – through minimized sludge volume and weight – will normally be critical for operators' decision to invest in such a system.

„We could cut disposal cost by much more than half.“

WOLFGANG OEHLERT
LANXESS

„Given all these conditions it was clear that the system had to be a custom build.“

NORBERT FESSLER
HARTER