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# Low Carbon Emission Sludge Drying

The use of low energy heat pump technology is rewarded. A company receives government subsidy and reduces disposal cost at that.

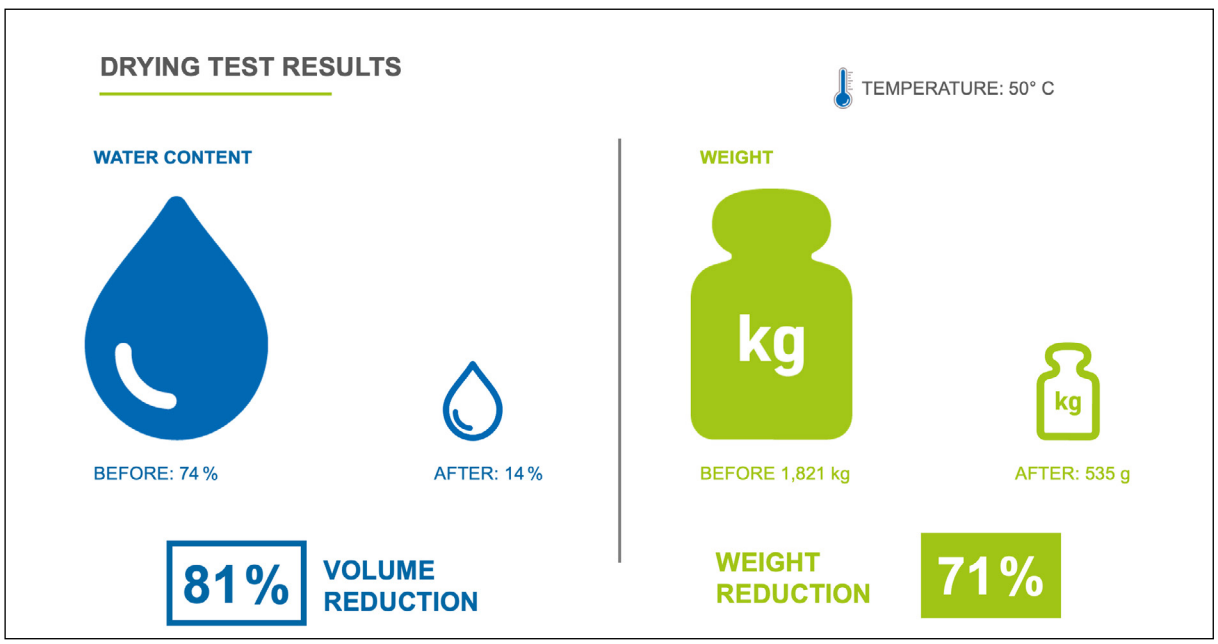


Fig. 1 – Drying test results demonstrate the sludge volume and weight reduction potential. This forms the basis for calculating the pay-off period.

A highly innovation driven company based in Baden-Wuerttemberg, Germany, realized how much money is involved in waste sludge – and acted accordingly. Sludge is a waste product of Aetztechnik Herz GmbH & Co. KG. It is the precipitate of the chemical solutions processed in their wastewater treatment plant.

The sludge used to be dewatered mechanically in a chamber filter press, placed in transport containers and hauled to a disposal site. "High transport and disposal cost have long been a thorn in our flesh" says Harald Mueller-Josten, Herz's chief engineer. "We identified the high cost saving potential of sludge drying." The government subsidy Herz received for their project was a welcome bonus.

»Dewater sludge before disposal«

Sludge predewatered mechanically has an average water content of between 60 and 70 percent. Thus, the operator pays the better part of their disposal cost for water. Drying may reduce weight and volume by as much as 60 percent depending on the type of sludge. The resulting decrease in disposal cost also amounts to as much as 60 percent. With high disposal cost, sludge drying becomes an interesting economic option. All the more interesting if the drying technology used consumes little energy.

Herz, a company globally operating in various industrial sectors, contacted drying system


Fig. 2 – Drying substantially reduces sludge volume, weight and, above all, disposal cost.

manufacturer Harter of Stiefenhofen, Germany. Harter developed the so-called heat pump based condensation drying technology 30 years ago and has since employed it in various applications. Drying of predewatered sludge was among Harter's initial mainstays. Herz had a sludge sample tested in Harter's test centre. The test showed that the sludge weight could be reduced by 71 percent (ref. fig. 1). An economic assessment also yielded a good ROI. So, the leader in etching technology invested in two sludge dryers

## Variable Setting of Air Dryness Degree.

These are two standard Drymex® M5 dryers with two drying containers each. The containers have a useful volume of 1.5 $m^3$ each. The process is as follows. Following pressing in a chamber filter press, the sludge is dropped in either of the two drying containers. The container is transported to and loaded into the sludge dryer using a fork lift truck. The doors of the compact system are closed, and the drying process started. Meanwhile, the second container is placed under the chamber filter press awaiting the next sludge load. About three tons of sludge a day are accumulated at Herz. The dry matter content is 26 percent initially and about 86 percent after about 20 to 24 hours drying. The M5 dryer has a water extraction rate of about 800 l / 24 h. 0.4 kWh are required to remove one litre of water. A moisture detector shuts down the system when the as-set degree of air dryness is reached. Each container has a tipping provision which helps to dump the complete sludge load into a transport container for subsequent transfer to the waste disposal site. The rated power of the M5 sludge dryer is 13.3 kW.

»Weight savings of up to 71 percent«

Heat pump assisted condensation drying uses extremely dry air in a circuit closed energetically. What exactly is special about this system? The core of each drying system is a dehumidification module in which the air is essentially stripped of moisture and heated. This extremely dry and thus unsaturated air is then passed through an air ducting system to the drying container holding the sludge to be dried. Owing to its relatively low relative moisture the recirculated air absorbs the humidity contained in the filter cake. Drying starts. The now moist air is returned to the dehumidification module to be cooled. The humidity


Fig. 3 – Type M5 dryer with two containers each. Each container has a useful volume of 1.5 m³.

condenses to form water which is drained off the system. Then, the dry air is reheated and passed to the container again. The air circuit is closed. Harter's system is the only one on the market to operate without any exhaust air.

## Air Routeing

The driest air, however, is worth nothing unless directed to the place where it is supposed to absorb humidity. Proper air routeing is essential in every drying application. For sludge drying, routing must be such that the unsaturated air is uniformly passed throughout the filter cake. To ensure this, the drying container design includes a purpose-developed ventilation bottom and customized air routeing. The high performance fans used for sludge drying are special types developed and built by Harter in co-operation with their suppliers. It is the perfect combination of air dehumidification and air routeing which makes it possible to evenly ventilate higher fill levels in order to dry the sludge uniformly and completely.

»Efficient guidance of the air flow«

Temperatures are normally between 40 °C and 50 °C.

## Government Subsidy

The heat pump technology integrated in Harter's dryers is exhaust-air-free and low-carbon-emission enough to be considered a future-oriented technology by BAFA ([German] Federal Office for Economic Affairs and Export Control). This qualifies Harter's dryers for various applicable promotion schemes. So, Aetztechnik Herz could also apply for a government subsidy. For customers to easily overcome bureaucratic barriers Harter has partnered with an energy consulting firm to see about the application for subsidy. "We seized this offer and benefitted from a substantial government subsidy on top of the future-oriented project realised" states Mueller-Josten contentedly.

**www.harter-gmbH.de /**
**www.aetztechnik-herz.de**