HARTER GMBH

Energy Efficient Sludge Drying with a Heat Pump

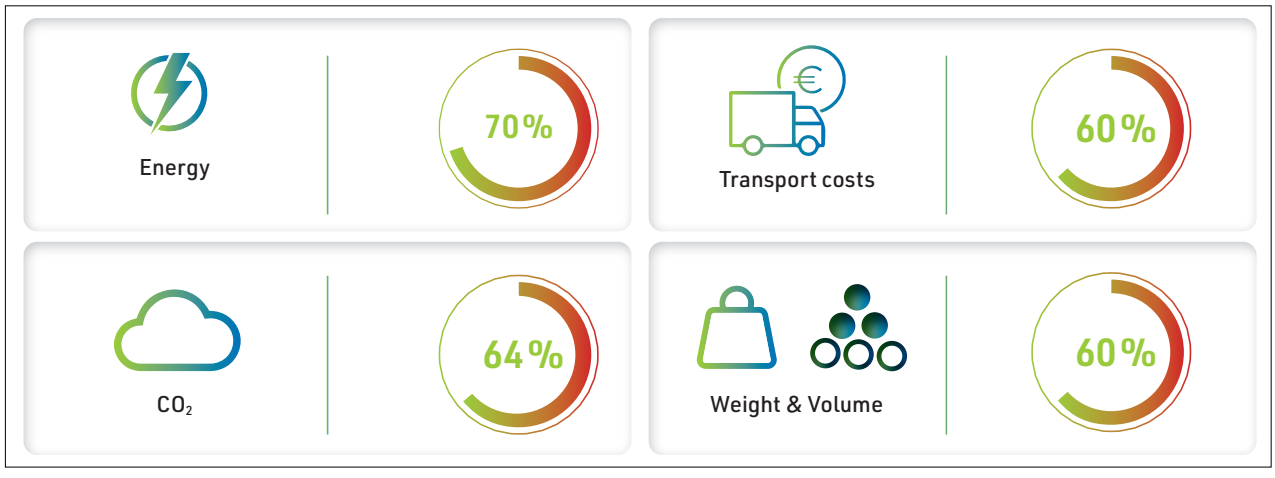
Harter, based at Stiefenhofen, Germany, has been regarded as a pioneer in energy efficient drying technology for more than 30 years. The company was early in developing an innovative process of condensation drying based on heat pump technology, and has successfully marketed it. Harter has specialised in the continuous advancement of this technology over the years. The process is presently used in many fields and is particularly suitable for effectively drying sludge of any origin.

The combination of mechanical dewatering and subsequent drying offers outstanding benefits to users in many fields. As far as sludge drying is concerned, the major challenge is the cost of operation, transport and energy. Pressed sludge, which still contains some 60% to 80% of water, causes high disposal cost because its fraction of water is what needs to be transported in the first place. This applies to both industrial sludge from electroplating processes as well as communal sewage sludge. «Most of the disposal cost goes on the transport of water», states Reinhold Specht, managing owner of Harter. Subsequent drying can reduce the residual humidity to about 15% which will result in substantial reduction of transport and disposal cost. «If sludge is dried its water content may be significantly reduced. An appreciable reduction of disposal cost is thus possible», continues Specht. If disposal cost is high investment in a sludge drying system will often pay within short. It should be emphasised that Harter's drying technology may save up to 60% of disposal and transport cost.

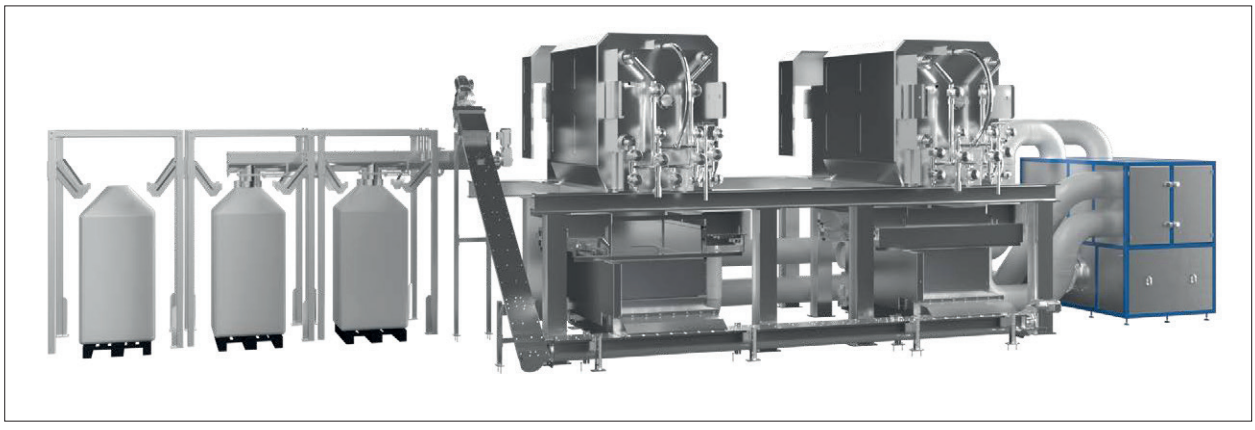
Drying Optimised by a Heat Pump

Harter's process is distinguished by the use of extremely dry air. This unsaturated air absorbs the humidity present in the sludge very quickly. Moreover, the process air is recirculated in a closed circuit – there is no exhaust air or loss of energy. For the German drying system manufacturer's «heat pump based condensation drying» to take full effect, two factors are of essential importance.

First, the core of each drying system – the Drymex® dehumidification technology. It provides extremely dry, unsaturated air to the containers. By physical



Heat pump assisted drying may reduce the cost of operation by 60% or more.



Sludge from the two chamber filter presses is gravity fed into the drying containers placed underneath. Once dried, the sludge is automatically conveyed to the big bags of the discharging station. The dehumidification module on the right conditions the required process air.

law, the humidity contained in the sludge is quickly absorbed – the sludge is efficiently dried. The humidity laden air is then cooled; the humidity condenses to form water. Then, the air is reheated and returned to the container in the closed air circuit. «All this is not enough, however, to do the difficult drying job », explains Specht. «The second crucial factor is adequate air routeing.» The dry air must be directed exactly to where it is supposed to absorb the humidity.

To ensure this each container features a specially developed ventilation bottom and a customised air routeing system. The high-performance fans used for in-container drying are also custom-made. Additionally, the container features a dual hydraulic hinged lid system that is open during loading and closed during drying. It is only by this sophisticated design that air may be passed evenly through fill heights of 2,000 mm so that uniform and reliable drying is ensured.

Government Subsidy

With prices for energy soaring and carbon reduction coming into companies' focus Harter's heat pump technology gains attraction. The technology was acknowledged by German Federal Office for Economic Affairs and Export Control (BAFA) as future fit technology in 2017. Companies choosing this sustainable technology may profit from subsidy awarded by German, Austrian or Swiss governments.

From Standard Dryer to Bespoke System

Harter has continuously advanced their drying technology to meet customers' specific requirements. The first dry air generators were compact systems with an integrated container. They first mechanically dewatered the sludge in a chamber filter press and then dried it using extremely dry air in a drying cabinet to obtain about 15% residual humidity. This technology proved to be extremely effective.

It was subject to several improvements over the years, particularly to minimize the formation of dust, which used to be a problem initially. In 2004, Harter launched a groundbreaking innovation – in-container drying. This was done by modifying existing skips such that they could also be used to dehumidify sludge. This solution offered various benefits – The customer did not have to acquire new containers, and dust formation was no longer a problem because the need for material transfer was relieved. Also, the drying process was now independent of the chamber filter press cycle.

So, fresh sludge could be added repeatedly without affecting the drying period. In 2008, a semi-automatic

Filter pressed sludge is dried to a residual humidity of about 15%. The integrated heat pump ensures energy efficiency and raises cost savings further.

sludge drying system was developed. For this solution, the container is placed directly underneath the chamber filter press. The lid of the container opens automatically at the push of a button and drying starts immediately after filling. «The container may be refilled repeatedly to ensure optimum utilisation », explains Specht. The possibility for repeated refills ensures uniform utilisation and constant drying.

Fully Automatic System for Dust-free Filling in Big Bags

Another highlight in Harter's progress is the fully automatic sludge drying system that is regarded as today's technological ne plus ultra. This system consists of two stainless steel containers, a traverse conveyor belt, a dehumidification module and a spiral conveyor system. The stainless steel containers feature a multifunctional intermediate bottom operated by rotary fins and subject to programmable logic control.

The whole system is controlled by a purpose developed programme that ensures absolutely dust-free drying. «The fully automated presses are installed on a structural steel platform about two metres above floor level. They are operating continuously, releasing their wet sludge into the drying containers underneath every 30 to 60 minutes.» describes Specht the operation of the system. The chamber filter presses release their wet sludge into the drying containers every 30 to 60 minutes. Once emptying is signalled, the quantity of sludge is automatically filled in the Big Bags through an automated conveying system. This fully automated solution ensures efficient and dust-free drying and disposal of the sludge. Besides sludge drying Harter also develops customised drying systems for automotive, electronics, optical, medical, pharma and food applications. ■

Further information:
Harter GmbH
Tel. +49 8383 9223 0
info@harter-gmbh.de
www.harter-gmbh.de