



Pictures: Harter

In-barrel drying with minimal intermittent movement at temperatures of 70 °C leaves bulk material completely dry while being gentle and energy saving.

# Proper Drying – Very Decent Saving

## Cutting Cost of Operation by Condensation Drying in an Electroplating Company

Low energy air recirculation type condensation drying – both of sludge and bulk material - is very much conducive to saving cost in electroplating companies.

Using heat pump technology may significantly reduce energy consumption and disposal cost of an electroplating operator. This is what brothers Remo and Daniel Hutter, owners of Verzin-keri Kriessern AG, Switzerland, have

been experiencing for many years. The Swiss market leader in galvanizing and duplex coating has known condensation drying since 1993 when industrial condensation drying brought up an entirely new idea – drying of galvanic sludge.

Operators became aware of the cost saving potential of sludge drying as disposal cost soared. The issue has meanwhile entered the agenda of a growing number of companies.

## High Waste Disposal Cost Boost Sludge Drying

Following mechanical dewatering in a chamber filter press, metal hydroxide sludges still contain more than 50 percent of water. Thus, half the money to be paid on disposal is ultimately spent for water. The Swiss entrepreneurs found this to be absurd and were thrilled at the idea of drying sludges prior to disposal. As disposal cost was high at the time investment in a sludge dryer was expected to pay off quickly. So, Verzinkerei Kriessern became one of the first customers of drying system manufacturer Harter who had first marketed their heat pump based condensation dryers in 1991. The technology was exclusively used to dry galvanic sludges at the time and set new standards of cost saving through low energy consumption.

## Energy-saving Heat Pump System

This is why Daniel Hutter became one of the early adopters of a Drymex M4 type sludge dryer. The dryer was capable of drying 1,000 kg of sludge per working day thereby reducing the sludge weight by about 50 percent to a final 500 kg.

The drying process is as follows. Following mechanical dewatering in a chamber filter press, the sludge is filled in one of the two carts of the dryer. The cart is then manually moved into the sludge dryer. Drying starts once the dryer door is closed. The drying temperature is 50 °C. The process is fully automated and runs until the residual moisture content set is reached. Upon completion of the drying process, the sludge is dumped into a container and transported to a waste disposal site. While one cart is inside the dryer, the other cart stands below the chamber filter press ready to be filled.

Dewatering reduced disposal cost by 50 percent. Plus transportation and associated cost was also cut because the amount of sludge produced now had significantly less weight. So, investment in the new sludge drying technology proved to be very profitable underlining the Swiss galvanizing company's philosophy focussed on latest technology and processes.

Today, Verzinkerei Kriessern has two sludge dryers in operation, one at their Kriessern site and one at their new Montlingen site. The sludge dryers with integrated heat pump technology require only 0.4 kW per litre of water extracted. Conventional drying systems, by contrast, require 1.2 kW. The type M4 dryer has a water extraction rate of 500 litres/24 hours so that the power consumption is 200 kW per 24 hours.

## Reliable Drying of Bulk Material

The German drying system manufacturer Harter continued to advance their drying process. Within few years, the technology was also employed for in-process drying where products need to be completely dried at a minute's pace. One of the special applications developed was ►

**HARTER**  
drying solutions

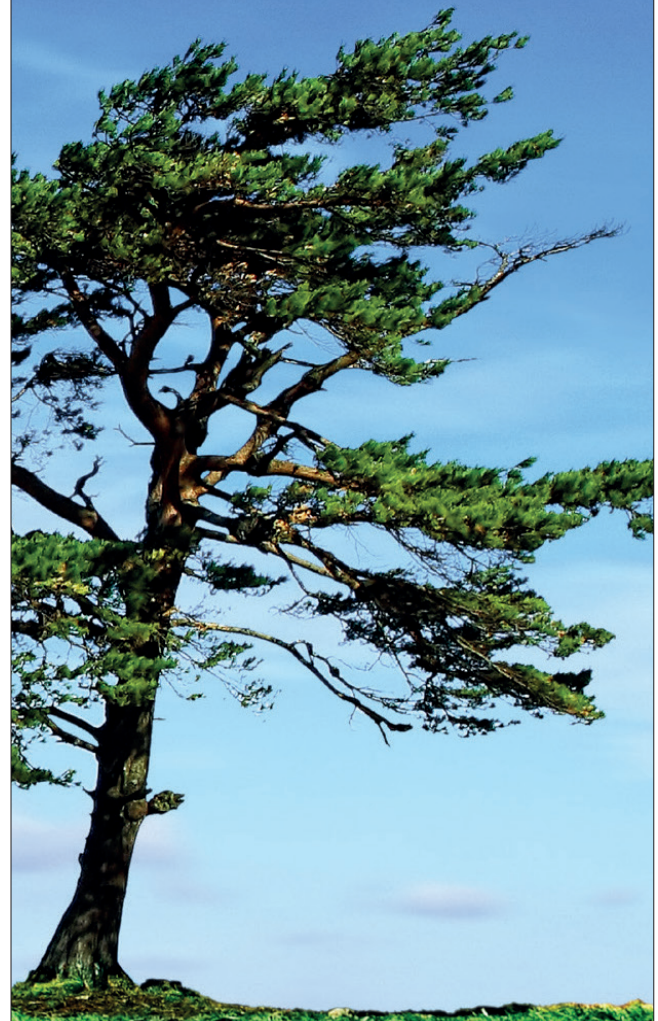
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drying of bulk material. The first barrel dryer was introduced into the market as early as in 1999. Verzinkerei Kriessern process bulk material, too, in the order of 2.5 million individual parts per year. Daniel Hutter originally used conventional centrifuge type drying. Yet, the operators were not much happy about the additional manpower and time required, not to mention quality issues. Building their new Montlingen plant created an opportunity for the company to bring their processes up to date from scratch. Today, the electroplating company operates fully automated facilities, including two Harter barrel dryers, which range among the latest and most complex ones in the world. In recognition thereof, brothers Hutter were awarded the “entrepreneur of the year 2007” UBS key trophy.

Efficiency and quality were top priority issues for the new Montlingen plant. Output bottlenecks were to be prevented by facility design. It was therefore decided to integrate in the process chain two Harter dryers capable of in-barrel drying to relieve the need for handling. Upon removal from the last rinse tank, the barrels are inserted in the dryer where the bulk material is dried completely, reliably and gently within ten minutes. The drying temperature is about 70 °C with minimal barrel



Drying of sludge may reduce weight and volume by as much as 60 percent – with resultant disposal cost saving of the same order.

movement while being dried. The standard design of each dryer includes an automatic lid system to retain the precious heat inside the system. Each dryer has four in-built air recirculation fans with a connected load of 1.6 kW each. Attached to the dryers are two so-called Airgenex modules to condition the process air. Each dryer has a total connected load of 14.45 kW. The two heat pump based condensation dryers have demonstrated to consume 60 percent less energy than comparable vented

dryers. Verzinkerei Kriessern thus enjoys more gentle drying with resulting quality improvement, higher potential output and drastically reduced energy cost. ●

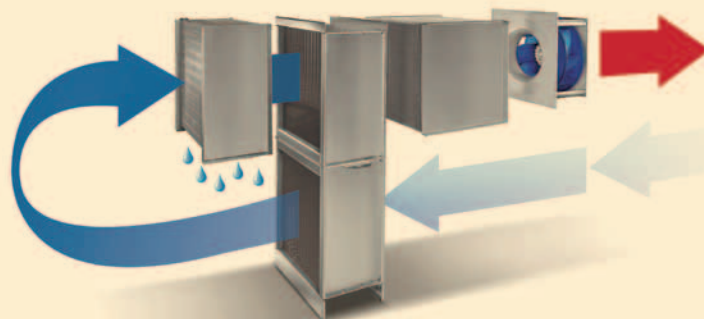
**i** Harter GmbH  
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### Closed System Condensation Drying

There are two factors governing successful drying – efficient conditioning of the process air and appropriate air routing. Both factors are duly reflected in Harter’s design.

Harter uses an alternative physical approach. The air used for drying is essentially stripped of any

moisture and heated in a dehumidification module before. This unsaturated air is passed into the dryer and through the items to be dried taking up moisture in this process. Subsequently, the saturated air is returned to the dehumidification module and cooled.



Water condenses and is drained off the system. The air is then reheated and available for further drying. This is a closed air system. Dry air for drying makes it possible to keep temperatures low. The temperatures may vary between 40 °C and 90 °C as required

for the specific application or as desired by the customer. The temperatures normally used are between 45 °C and 75 °C.

As for the second factor, without targeted air routing it would be impossible to dry fast and completely, particularly where bulk material is

concerned. For barrel drying, Harter uses the so-called half-shell technology which is brought in line with the customer’s existing barrel technology. Air routing is designed such that the dry air can actually enter the barrel and leave it again.