EFFICIENT DRYING TECHNOLOGY

CUTTING COST THROUGH SLUDGE DRYING

Waste incineration plant operators know the topic well - Flue gas cleaning produces waste sludges which contain heavy metals. Following mechanical dewatering, these sludges are taken by metallurgical processing plants as secondary raw material, subject to payment to be sure. Much money is spent for these highly aqueous sludges. This is where sludge drying with its high cost-cutting potential comes in. Let‘s have a look at this useful technology.

We are talking about „heat pump based condensation drying“. This technology is capable of drying any aqueous sludges and substrates at low temperatures. It uses extremely dry air in an energetically closed system. The process is employed for filter-pressed sludges with a residual water content of between 60 and 75 percent. When subjected to subsequent drying, such filter-pressed sludges may be reduced in weight and volume by as much as 60 percent. This will result in a commensurate reduction in disposal cost by as much as 60 percent. Condensation drying is a flexible system which may be used both for batch and continuous drying processes.

The KVA Linth waste-to-energy plant at Niederurnen, Switzerland, produces an annual 1,200 tons of hydroxide sludge resulting from flue gas cleaning and fly ash washing. The heavy metal hydroxides precipitated from process waters form a thin sludge which is dewatered in an automatic diaphragm filter press. The dry matter content is 28 to 32 percent at this stage. The incinerator‘s philosophy is to employ state-of-the-art technologies at any time. „In 2001, we could boast of being cutting edge technology-wise among European incinerators“, says Stefan Ringmann, Assistant Director of KVA Linth. „Our focus has continued to be on current process technology. It was, thus, only a short step to sludge drying as the last operation in the flue gas cleaning and fly ash washing process and it was meant to be the icing on the cake - also for partner plants.“

Upon recommendation by consultant André Reisser, contact was established between KVA Linth and the drying system manufacturer Harter, who developed the above condensation drying technology 25 years ago and has since built up a reputation in various market segments as a specialist for low temperature drying. One of the mainstays of the Harter enterprise – the oldest to put it precisely - is the manufacture of sludge drying systems. Harter had sold many hundreds of sludge dryers for industry to Germany, Austria and Switzerland in the first years. Once waste disposal cost plummeted in the nineties, Harter‘s sales also dropped and Harter focussed on retained water drying. For some years now the trend seems to be reversing, again. This is also reflected by incinerators becoming more and more attracted by drying and especially by our technology. A particularly interesting project was realised for the KVA Linth incinerator.

DRYING IN THE TRANSPORT CONTAINER

The sludge drying system for the Swiss incinerator was designed is an in-container type. It includes four special drying/transport containers with a useful volume of 22 m³ each and one Drymex® S9 dehumidification module with a water extraction rate of 200 to 240 litres per hour. The drying procedure is as follows. A container is placed below the automatic diaphragm filter press, which was installed on a raised platform, and filled with filter cake. Filter cake with a dry matter content of about 32 percent amounts to a daily five tons approximately. So, it takes two to three days to fill a container. Once filled, the container, which rests on a transport trailer, is moved to the drying station and connected by air piping/hosing with the Drymex® dehumidification module. Now, the drying process proper starts. The drying temperature is 40 °C to 45 °C. Drying is completed after about 48 hours when the dry matter content has reached 85 percent approx. 8,000 to 12,000 litres of water are extracted in the process. The container is then transported to the recycling company while another container is being filled with filter cake from the diaphragm filter press. But how exactly is drying accomplished and how is reliable in-container drying of large amounts of filter cake ensured?

A PERFECT MATCH: AIR DEHUMIDIFICATION AND AIR ROUTEING

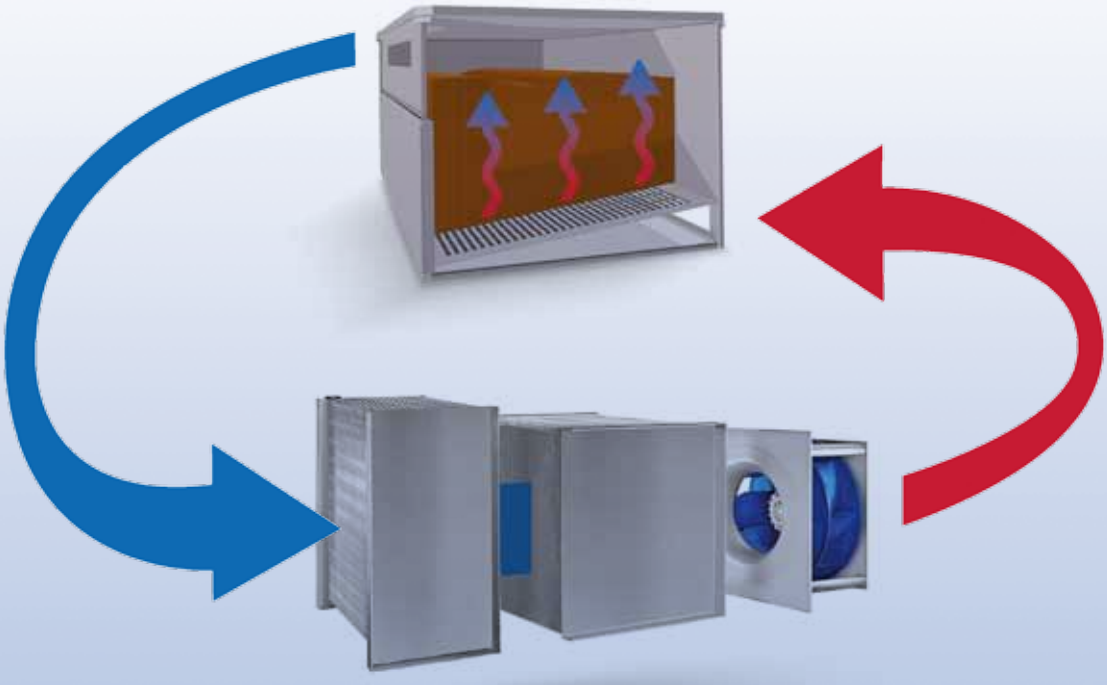
For Harter‘s „heat pump based condensation drying“ to be fully effective, two design features are critical. First, the core of each drying system, the Drymex® dehumidification module. It supplies the container with extremely dry and thus unsaturated air. This air quickly extracts humidity from the filter cake. The humidity laden air is cooled and the water condenses. Subsequently, the air is reheated and returned to the container in a closed loop. „This alone does not suffice to meet the difficult challenge of drying“, explains Reinhold Specht, Managing Owner of Harter. „The second critical factor is adequate air routeing.“ This means that the dry air must be routed exactly to where it is supposed to absorb humidity - which, in the case of KVA Linth, is through every part of the filter cake in a uniform manner. To ensure this, each container has a

purpose-built perforated bottom and a customised air routeing system. The powerful fans used for in-container drying are also purpose-built types. Additionally, each container has a hydraulic double hinged lid system which is open upon filling and closed upon drying. These sophisticated features are requisite for airing fill levels of 1,600 mm such that uniform and reliable drying is ensured.

EASE OF HANDLING

The combined use of PPS piping and flexible hosing was favoured for establishing the connection between the container and the Drymex® dehumidification module. This solution had to be adopted to reflect the fact that the heavy-weight filled container may not be easily positioned. The partly flexible hosing provides the necessary one metre allowance for the worker to easily position the transport trailer and connect the hoses. The latter is made possible by a ceiling-mounted balancer system to compensate the weight of the connecting fitting. The upper exit hose fittings can be connected with the worker standing on an adjustable platform. Space available allows flexible hoses to be mounted on the ceiling. The hosing system is designed such that two entry hoses feed the dry unsaturated air to the bottom of the container. The humid saturated air leaves the top of the container through two exit hoses. The drying system includes a PLC for continuous control of individual parameters such as temperature, air speed, airflow and cooling capacity. Harter also installed a special filtering system to ensure that the heat exchangers are always kept clean. Upon request by the customer, the filter cake drying system

includes four containers - one placed below the automatic diaphragm filter press, one connected with the dryer, and two on their way to and from the recycling company. The drying system is designed for year-round operation. „Using this effective and economically reasonable drying technology has added to reducing our cost while at the same time integrating a state-of-the-art component which also attracts friendly operators‘ interest“, summarizes Ringmann contentedly.



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