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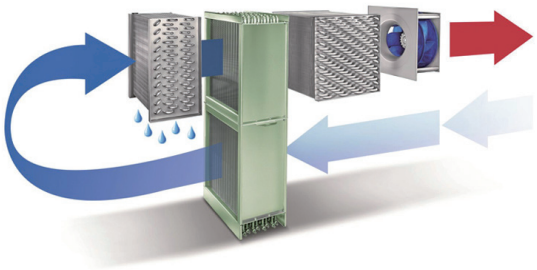
Efficient Drying for Faster Throughput

SMK GmbH of Oberlungwitz Uses Heat Pump Based Condensation Drying to Overcome Throughput Problem

To cope with jumps in orders operators need to think about the efficiency of each individual process. Drying is often a bottleneck in the production flow. It may pose a hindrance to faster throughput. The job plating company SMK saw itself confronted with this situation. Striking a new path in terms of drying has paved the way to a prosperous future.



Functional Schematic of Harter Dryer Technology

Metall- und Kunststoffveredelungs GmbH of Oberlungwitz, Saxony, planned to reduce the throughput time of one of its two automatic rack plating facilities upon a general overhaul. To achieve this target the drying station had to become much more efficient. The requirement was to cut the drying time almost in half, from a previous 22.5 to 12 minutes. Another challenge was that the existing drying technology failed to completely dry plated parts of complex geometry. So, a reduction in throughput /drying time was out of the question given this situation.

As obstacles come your way, striking new paths can be the road to success. SMK, a company established more than 40 years ago has a workforce of 165 and has specialised in refinement and chrome plating of sophisticated plastic products for engineering and decorative purposes. Since 2009, SMK has been a company of the Heinze Group, much as six other companies, among them HeRo Galvanotechnik GmbH of Bad Salzuflen. The latter had implemented a drying technology which has since proved to be both highly efficient and energy saving. This technology was now supposed to be used by SMK as well.

Drying Tests in Harter Pilot Plant Station for System Layout and Design

What we are talking about is heat pump based condensation drying by Harter of Stiefenhofen, Allgaeu. Drying system manufacturer Harter was not a company unknown to SMK; the Saxon job plating company had used a Harter sludge dryer for years to dry its filter pressed metal hydroxide sludges. Harter was now to demonstrate the efficiency of its technology in SMK's production process.

Drying Tests of OEM Parts

SMK products to be dried include parts of complex geometry susceptible to fluid entrapment. Such parts are extremely difficult to be dried. Harter, who developed heat pump based condensation drying 25 year ago and has installed more than 1,000 systems in various industrial applications ever since, has an in-house pilot plant station to run drying tests. Drying tests to determine the specific parameters for successful drying appear to be reasonable, particularly in case of complex drying challenges. These parameters are temperature, time, humidity, airflow rate and air speed. Test results demonstrated completely dried parts within 12 minutes time. Steffen Richter, SMK's responsible project manager, satisfied himself of the successful outcome of the tests. This cleared the way – for a new drying system and, ultimately, a higher throughput of the SMK facility.

Low Temperature and Low Energy

The solution found for the SMK project comprises an air blowing station and a drying station. Leaving the last rinse the hoist moves to the air blowing station where special nozzles move up and down to remove the bulk of the water. The blowing station is a non-compressed air type using a medium pressure fan. The dwell time in the blowing station is four minutes including 0.5 minutes carry-over time each. Subsequently, the hoist moves to the drying station. The time until complete drying is 12 min. The drying temperature is 60 °C which ensures gentle drying of the temperature sensitive parts.

The dryers have a so-called Airgenex® dehumidification module attached which controls the environmental conditions inside the dryers. Each dryer features a special air recirculation system with eight frequency controlled fans each. This enables air speeds as required for the parts to be dried. Light items require less air, complex items require maximum airflow and air speed.

The power requirement is also worth considering. The fans have a power rating of 0.9 kW each, the Airgenex® module and the blowing station 15 kW each. The drying system operates on maximum power only if complex items are to be dried. Less airflow is sufficient for all other items so that the power requirement is even lower.

Airflow and Air Routeing

For Harter's drying technology to be fully effective, two design features are critical. First, the core of each drying system, the Airgenex® dehumidification module. It supplies the drying chamber with extremely dry and thus unsaturated air. Following physical laws, this air quickly absorbs humidity from the products to be dried. The humidity laden air is cooled and the water condenses. Subsequently, the air is reheated and returned to the products in a closed loop.

This alone does not suffice to meet the difficult challenge of drying. The second critical factor is adequate air routeing. This means that the dry air must be

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Views of New SMK Drying System

routed exactly to where it is supposed to absorb humidity. Air, by its very nature, follows the path of least resistance. To force it to follow the appropriate path is one of the two routes to success. It is the perfect combination of these two features which makes drying successful. Each application requires an individual solution, says Reinhold Specht, general manager and co-owner of Harter, as appropriate for the customer's process and products. Realising such solutions is our specialty. A lot of know-how and experience goes into this effort. SMK's application required engineering wizardry to direct the dry air into recesses. Details may not be disclosed for secrecy reasons.

Advanced Fan Design

SMK and Harter share the same high quality standard and the same penchant for innovation. While the Saxon job plater optimised its process, Harter advanced its fan design.

Conventional fans have the standard motor attached laterally. Harter has long been using space-saving radial fans with built-in motors for its dryers. This design has been advanced in that a new plastic impeller was developed which is rugged enough for use in plating shops. The electric power required for the same fan power could be reduced from 1.2 kW to 0.9 kW. This new compact and low energy design was also used for the SMK system. We were soon convinced both by the technology and the smooth co-operation with Harter so that we had the new system in operation within very short time, summarises Richter.

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