Paint Drying the Energy Efficient Way

Heat Pump Dryer Scores in Efficiency, Quality and Government Subsidy

Drying bears much potential for saving precious resources – power and gas, time and cycle time, rejects and rework, heat and exhaust air. Drying system manufacturer Harter develops heat pump based condensation dryers.

This drying technique has a physically alternative approach using extremely dry and unsaturated air for dehumidification. Plated and cleaned as well as paint coated surfaces are dried in a uniform, reliable and energy efficient way in a closed air system. Drying takes place at temperatures which may be varied between 20 °C and 90 °C as required for the specific component or process. The technique is versatile and may be used for batch and continuous operations, as demonstrated by recent application examples. The Swedish company Scania ranges among the biggest manufacturers of heavy trucks. At their Meppel, the Netherlands, site, a total of 30 robots, in four lines, apply primers and topcoats of various colours to plastic parts for the cab and chassis. To improve adhesion of this paint system, the action recommended was to further reduce the residual humidity of the basecoat prior to applying the clearcoat. Searching for an efficient drying technique Scania hit upon Harter. Preliminary test results were promising, and Scania invested in a low temperature drying system. The skid mounted plastic or SMC components run through the whole process from pretreatment, drying, paint coating to all subsequent operations. Following application of the basecoat, the skids pass through the drying chambers and a cooling zone. The painted surfaces dry uniformly from the inside out. Once the water has flashed off, the paint may cure. "This helped to further improve paint adhesion. Now that moisture is effectively removed by the air, the curing oven works much better" explains Anton van Steeg, Scania's Senior Paint Specialist. "We obtain better results using the same temperature." Harter passes dry and, thus, unsaturated air into the flashing-off zone such that the air humidity could be reduced from 65 percent to 23 percent.

Extremely dry process air enables surfaces to be dried in a uniform, gentle and reliable way. As a result, the quality of the paint coat is improved.

Photo: Harter

Change to Water-based Paint

Those who want to switch from solvent-based to water-based paint need to deal with drying. A recent example is Sick AG of Waldkirch, Germany, a manufacturer of sensors and sensor solutions for industry. Preliminary drying tests of their items for gloss level, corrosion resistance and block resistance produced good results. So, Sick could switch to a water-based process. They installed a completely new facility for which Harter promptly built a dryer.

In either case. the water in the paint flashes off at low temperatures while superficial cross-linkage is prevented. Blistering, bubbling, or cratering are a thing of the past. Sick use in their line a combined dryer with a flashing-off zone and a curing zone. The heat pump module provides the dry process air for the flashing-off zone. The curing zone is heated conventionally. The items to be dried are placed on trolleys. They are dehumidified at about 40 °C for 20 minutes and subsequently cured at 80 °C for 40 minutes.

Reliable Pre-painting Drying

Painting is necessarily preceded by some preparatory processing and subsequent drying to remove adherent water. Every operator needs absolutely reliable and complete dehumidification to prevent deterioration of the paint coat. A renowned manufacturer of pumps chose low temperature drying for this purpose. Their major goal was to make the process more reliable in every aspect. Another benefit of this process is that the pump cases may be directly submitted to subsequent paint coating without the need for preceding cooling. The components are dried in a continuous dryer which is connected to the heat pump module through insulated piping. The pump cases are placed on a chain conveyor to be moved through the production area and to be processed at the relevant stations. They are processed in the continuous dryer at 50 °C to become completely dry. The conveyor belt speed is 1 m/min. The drying period is only 4.5 minutes. The dryer features an air recirculation system with three special fans to recirculate the air to provide the necessary air exchange.

Government Subsidy Available

According to the supplier, the heat pump technology integrated in the dryers is energy and carbon efficient enough to be classified future fit technology eligible for government subsidy. To overcome bureaucratic barriers Harter has partnered with an energy consulting firm who will see, upon customer request, that applications are processed smoothly.

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Jonas List ...

... has been responsible for paint drying with Harter GmbH as of 1 August 2023. The demand for energy efficient paint dryers has been rising again, the company says. So, they have started to pay more attention to this segment of industry. Jonas List has been a member of the Harter GmbH workforce since 2018. Being a trained tinsmith, he initially worked in the company's metalworking shop. He applied his skills in manufacturing stainless steel dryers for pharm, food and surface finishing applications. He changed to Sales in 2021. Today, he consults prospective customers from all over Europe about drying issues. His area of expertise has so far included adherent water drying in surface finishing applications and post-cleaning drying.

JONAS LIST
has been Harter's liaison for energy efficient drying of paint coated surfaces since August.

Photo: Harter