

Efficient Drying of Exterior Truck Parts

Drying and flashing off water-based paints is a time and energy consuming job to do. The Swedish commercial vehicle manufacturer Scania gives an example of how much a change in the drying process may improve the situation. They retrofitted der Meppel, Netherland, facility implementing efficient technology at reasonable cost and without extensive rebuilding.

The Swedish truck manufacturer Scania's requirements for the drying process are perfectly clear – efficient, low temperature drying shall enhance adhesion of water-based paints on external truck surfaces. The Scania Group company based at the Dutch city of Meppel was established in 2005. It produces paint coated exterior parts for Scania's European truck assembly facilities at Zwolle (the Netherlands), Angers (France) and Södertälje (Sweden). A total of 30 robots, in four lines, apply paint to plastic parts for the cab and chassis in the primer and colours desired by the customers. Scania offers colours in more than 500 hues. They use a water

based 1K metallic basecoat for their exterior truck parts. This paint requires optimum drying conditions. "The goal was to improve adhesion by implementing an efficient drying process", says Anton van Steeg, Scania Meppel Senior Paint Specialist and Project Manager co-responsible for the painting process. In December 2015 they decided to make additional investments in hardware to improve the painting process. Their headquarters in Sweden recommended to further reduce the residual moisture content of the base paint coat prior to applying the clear topcoat. Initial tests had revealed residual moisture contents of between 10 and 12 percent.

Space-saving Solution without Rebuilding

Scania had initially considered investing in a new oven. The idea was finally dismissed for various reasons including a reluctance to make larger investments or to rebuild the facility. Also, space restrictions precluded extension of the facility so that any modification had to fit in the existing area. Anton van Steeg conducted an online search to find Harter, a manufacturer of heat pump based condensation drying systems with a record of successful paint coating applications – exactly what van Steeg was looking for.

Following successful drying tests in the Harter pilot plant station at Stiefenhofen, Germany, two systems were acquired and commissioned. Scania invested in two smaller (Airgenex type 9500) rather than in one big condensation drying system. The systems are sized 2400 mm long, 1100 mm wide and 1800 mm high, and have a power rating of 10.95 kWh each. "If we had bought a single system it would have been too bulky to be taken to the upper level at all" explains van Steeg their choice in retrospect. Also, doors, hallways and corridors are narrow enough to preclude the installation of a single, big system. "This was a smart way of conveniently achieving a good result."



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Scania paint exterior truck parts at their Meppel (the Netherlands) site for assembly at their three European assembly facilities located at Zwolle (the Netherlands), Angers (France) and Södertälje (Sweden)



Two heat pump modules condition the process air to provide the correct environmental conditions for the drying process. Extremely dry air is passed over the items to be dried to remove humidity – at low temperatures.

Processing 900 Skids a Day

The parts are first mounted on skids. The Meppel site processes almost 900 skids a day. The product portfolio includes plastic body attachments such as fender fairings, side skirts, headlamp housings or wheel arch liners. And cab, deflector, and grill parts from SCM composite materials. All such parts must be delivered by the facility either painted or unpainted in accordance with internal production control requirements. These parts undergo processing at three levels from drying systems at the top level, through painting lines at the medium level to cleaning, picking & packing, and shipping at the bottom level.

Prior to paint application, the parts are cleaned. Scania's painting is a fully automated process in which 30 robots apply paint to the parts. On the P1, the painting line for structured chassis parts, all parts have a primer coat plus a subsequent solvent-based topcoat applied at the T1. The two other lines, T2 and T3, are used to finish coat all cab and reflector parts which are primer coated in Scania's new factory with the P2 and P3 line. On the T2 line, parts have a waterborne basecoat and subsequent clear coat applied. The basecoat may be omitted so that a coloured topcoat is applied. The T3 line is used to apply solvent based paints. Once topcoat painted, the skids are passed through the drying systems and a cooling zone. In the "Inspection and Repair" area, the painted parts are thoroughly inspected and any non-conformance with the desired surface quality touched up.

Drying at Low Temperatures

The Airgenex heat pump based condensation drying systems are vital for Scania's

processing. The basic design of the system was developed by Harter back in 1991. It has since been employed in various industrial applications. The system enables drying at low temperatures which makes it ideally suited for drying paint coats. Paint coated surfaces dry from the inside out in a uniform way. Dry and, thus, unsaturated air is passed to the flash-off zone where it absorbs moisture. The moist air is then routed to the dehumidification module where it is stripped of the moisture it carries. Excess water together with the solvent is condensed and collected in a separate container. This way, the relative humidity in the flash-off zone may be reduced from 65 to 23 percent.

Drying times are very short due to the underlying physics of the process, i.e., water is absorbed from the paint. Chemical curing may begin once the water is flashed off the paint. Condensation drying is effected in a closed system with no exhaust air. Constant drying parameters independent from the elements ensure constant drying quality.

The project was executed in accordance with a tight schedule. After initial go-ahead in December of 2015, the system was due for implementation as early as in August of 2016. Scania's requirements were met, again. "Harter could undertake to realize the project in such short order" says van Steeg. The moisture in the flash-off zone was reduced from 65 to 23 percent. "This helped to further improve paint adhesion. Now that moisture is effectively removed the curing oven works much better. We obtain better results using the same temperature", says van Steeg to sum it up. Also, the targets specified by Scania of Sweden are fully met.

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„The paint drying system has been operating to our full satisfaction since 2016.“
Anton van Steeg, 2023

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