The products are optimally lubricated as they exit the system, irrespective of their geometry. That is assured by the spray nozzles, which move freely in all directions and seamlessly adapt to the swivel angle and required amount of oil. Images: Eckardt Systems

Corrosion protection – a report from the factory floor

Protective coating per nozzle

by Stefan Müller-Ivok Abrasive blast-cleaning following hot forming is certainly efficient; however, it also activates the surface of the cleaned parts. Consequently, measures must be taken immediately to counteract the threat of corrosion. Specializing in bodywork components Strahlcenter Venetis deploys corrosion protection systems that are able to offer several special features.

Roof frames, A and B-pillars, floor profiles and other important car body components are given very special treatment in the Strahlcenter Venetis located in the town of Schwäbisch Gmünd, Germany. The layer of oxide scale that remains on the parts following the hot forming process is removed by means of so-called wheel shot blasting. This process sees abrasive media in the form of hardened, round steel shot blasted onto the surface of the workpiece via the blades of the wheel. This allows parts with larger surface areas and less complex shapes to be quickly and thoroughly de-scaled. Any failure to remove the layer of oxide scale would significantly complicate further processing (welding, applying paint coatings and so on). Millions of parts are put through this procedure every year in the Strahlcenter Venetis.

Fit for storage and transport

As equally important is the step that directly follows. The de-scaled surfaces of the parts are now completely exposed – and must be protected against corrosion immediately. “That must happen straight away, because our customers require that we produce the parts a couple of days in advance”, explains the Plant Manager Jürgen May. “Moreover,

Daniel Assmann, Sales Manager at Eckardt Systems and Venetis Plant Manager Jürgen May.

> **Jürgen May**
> »Applying the oil uniformly is the be all and end all. Even the slightest deviations can mean it is not possible to reliably weld or bond the components.«

blast cleaned parts are particularly prone to corrosion, for example when water condensate is present and they come into contact with salt air when shipped overseas via sea freight."

To ensure corrosion does not become an annoying topic, a special mixture of oil is used to coat the parts after they have been blasted clean. This process is an extremely finely balanced matter. "When it comes to protecting our products against corrosion applying the oil uniformly is the be all and end all", Jürgen May summarizes. "Even the slightest deviations can mean the components cannot be reliably welded or bonded in subsequent processing procedures. The customer specifications are correspondingly precise with regard to how thick the film of corrosion protection oil is allowed to be. Our challenge is to implement these parameters in our application processes in a manner that ensures the required quality is guaranteed for each and every individual part of every type of part."

No alternative to spraying

Against this backdrop the only process that makes any practical sense is to apply the oil by spraying. "It is also conceivable to draw the parts through an oil dip bath, but residuals of oil are unavoidable; what is more, we could never achieve and reproduce the required very fine

Overall view of the system at Venetis as seen from the output end.

film thickness", the Plant Manager explains the reasons why this approach is unsuitable.
The company chose to bring the Bretten based company Eckardt Systems on board as their lubrication partner. Eckardt specializes in the construction of highly precise, high performance lubrication systems, which are based on different processes such as roller, squeeze-on and spray lubrication. These systems are in service around the globe, with focus on the automotive industry as the most important branch; consequently, Eckardt offers precisely the level of expertise that the Strahlcenter Venetis also demands with a view to the requirements and production processes of the end customers. Eckardt also uses the fundamental technology behind spray lubrication for corrosion protection purposes; worthy of note is that the second generation of this family-led company designs and produces the integrated systems consisting of spray chamber and transport system (endless conveyor or material carriers) wholly in-house according to customer specifications.
"Our requirements for Eckardt to fulfil were, so to speak, based on two pillars: in addition to the uniform application of oil, the topic 'clean air' was also very important from our perspective. The system should prevent the generated oil mist spreading through the production hall to the best-possible degree", Jürgen May sketches the starting position.

Movement in the nozzle chamber

The utilized spray nozzles form the heart of the Eckardt spray system. "How efficient the lubricant is applied depends on different factors, but above all the most important factor is the number and swivel manoeuvrability of the nozzles", explains Daniel Assmann, Sales Manager at Eckardt Systems. "Our spray chamber is significantly bigger than those of comparable systems, so we are able to distribute more nozzles across the whole width and – as a consequence – reach all of the surface areas even of different sized parts.
The spray nozzles can move freely in all directions and they seamlessly adapt to the swivel angle and required amount of oil. That makes it possible to align the lubrication process perfectly to suit different surface geometries and set up individual lubrication patterns down to the finest detail. The patterns can be reproduced at any time and called up by the system controls at the press of a button." And Jürgen May adds: "Generally speaking, it is unavoidable that we go through a lot of trials and testing until we are able to define the optimum spray process to meet individual product requirements. The design of the movable spray nozzle is an enormous help in this regard. If the nozzles in the system were rigid, the amount of time and effort would be many times greater – and we would not have the respectively required spray pattern so quickly and conveniently at our finger tips."

Filter stages for clean air

The corrosion protection system from Eckardt fulfils the second specification with regard to air quality by means of a sophisticated filter system. "This solution sees several filter stages connected in series, which increases the overall separating efficiency and, in particular, reduces the load on the final filter stage and by doing so increases its

Side view of the system with the discernible filter system on top.

service life", says Daniel Assmann. In this manner the remaining solid particles in the oil mist are reliably removed, which makes extraction simpler and more efficient. All in all official measurements confirm that the prevailing air quality in the production hall is such that a company specializing in shot blast cleaning could not necessarily expect, adds the "top man" Jürgen May.

Soft as wax thanks to heating

Another feature makes a significant contribution to the long service life of the filter systems mentioned above: They can be heated. "The corrosion protection oil contains a proportion of wax, which cools down when flowing through the filters and becomes hard – with the result that the filter becomes more or less clogged up", according to Mr May. "That is not a risk in our system, because each of the installed filters can be heated so the wax is kept liquid and the oil can drain well. As a consequence, not only do we need to change the filters less often but we are also able to collect, recycle and re-use more oil; a point that with regard to cost effectiveness is extremely noticeable."

Expansion planned

There are presently three corrosion protection systems in use at the Strahlcenter Venetis. As far as the team around Jürgen May are concerned it is already certain that the new shot blasting system to be installed as part of the envisaged expansion will also be coupled with corrosion protection technology from Eckardt. ■

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Hot forming on the increase

An assessment by Daniel Assmann, Sales Manager at Eckardt Systems:

"Enormous efforts are being made in particular in the automotive and its supplier industries to improve the process of hot forming, for instance to be better able to control the setup and temperature of the parts to be formed across the entire process and to reduce precipitation times. We assume that as the methodology is increasingly refined the process will become far more common and will also be implemented across other branches of industry.

After all, using this process it is quite possible to realize extremely thin, lightweight parts and complex geometries. That in turn increases the demands placed on the flexibility, repeat accuracy and cost effectiveness of corrosion protection. Against this backdrop we see a great deal of potential for our spray-based system concept in all fields of industry."