

PRESS RELEASE

First overhead paint shop system for 20-ton components

Yellow giants painted overhead

Liebherr breaks new ground with a new large-scale paint shop for hydraulic excavators: The components, weighing up to twenty tons, are conveyed through the system on a guided track while freely suspended. A special drive solution ensures optimal protection against explosion in the painting and drying booths.

It is impressive: An excavator undercarriage glides through the production hall in the Swabian town of Kirchdorf, accompanied by a flashing warning light and regular warning signals to protect employees. Behind that, some booms and revolving platforms are followed by several more. The undercarriage weighs around eleven tons - the other components push the total weight up to more than 15 tons. "We were looking for a solution that would enable faster material flow and better cost-effectiveness in the coating and drying of parts," explains Thomas Fischer, responsible project manager at Liebherr. "Our previous suspended coating line was only designed for loads up to four tons, heavier parts had to be transported manually. These parts had to be conveyed by floor, which makes painting difficult. A ceiling-mounted system of up to 20 tons did not seem feasible for us at first - until then nobody has built such a system."

As early as 1949 Liebherr manufactures, have been assembling and coating hydraulic excavators at its Baden-Württemberg headquarters. The field of application of the typical yellow giant includes civil engineering and tunneling, industrial transshipment technology, demolition and recycling companies as well as water management. The product range includes machines with application weights between ten and 672 tons. Excavators up to 77 tonnes are currently being manufactured at the Kirchdorf plant - and the trend is rising. As part of restructuring the production process, the coating process for heavy parts was automated and converted to use environmentally friendly, water-soluble 2-component hydro coatings. A machine shop that was previously used to weld parts was already available. A completely new facility was then created in an area of 3,500 square meters.

New idea from the building materials industry

Vollert Anlagenbau from Weinsberg provided the solution. In addition to intralogistics systems for the metal and automotive industries, the heavy loads specialist also develops conveyor systems for the building materials industry, including precast concrete plants. The

principle of the new continuous single-girder suspension track for parts weighing up to 20 tonnes originated here. "We were able to call on our experience in the building materials industry for the new plant. We had already designed similar systems for this industry. However, the high load capacity of a ceiling-mounted system has so far been unique," explains Dieter Schnell, Project Manager at Vollert. "The challenge, moreover, was to develop a system that, for reasons of explosion protection, would be able to do without an individual electric drive for the transport units in the paint shops. And that is exactly what we did."

Perfect explosion protection: no motor, no power supply

The solution is as simple as it is ingenious: The transport units specially developed by Vollert, consist of a hanger on which the units are suspended individually or in groups, depending on their size and weight. The height can vary by two meters. The hangers travel on a ceiling-mounted track through the entire system. Stationary friction wheel drives are installed at regular intervals, which provide the necessary feed. Three distribution manipulators at central points, with a span of 15.5 meters weighing 14 tons each, transport the units to the priming, painting, evaporation and drying booths. This shows the actual advantages of the drive system: Shunting and retrieval of the suspenders into the booths is done using friction-wheel technology and a rack-and-pinion drive mounted on the distribution manipulator. This means no motors or live plant components are required inside the booths - a decisive point for explosion protection. "Although explosion-proof drives are possible, they are much more expensive," says Dieter Schnell. "In addition, this would expose the engineering components to contamination by, for example, paint fog, which requires constant maintenance." However, with the friction wheel drive, the Vollert engineers have found a cost-effective, durable and virtually maintenance-free solution with high accessibility: The new plant operates 24 hours a day.

Complete planning from a single source

As a general contractor, Vollert, not only oversaw the planning, conveyor technology and steel construction, but also the coordination for the other parts of the system engineering. The entire system comprises 17 workstations, including five dryers and evaporators, as well as one cleaning, priming, painting and cooling booths. At the end of the system, there is also a return buffer with four places. On the one hand, this serves as a free cooling section after the topcoat drying, on the other hand to compensate for production fluctuations. Loading and unloading are handled by a fourth manipulator with a span of 16 meters and a

height of 10.5 meters. This is designed as a self-propelled half-port solution, so that no disrupting elevated track restricts the radius of action in the delivery of parts that are up to 12.5 meters in length, 4.5 meters high and 2.8 meters wide. After delivery, the parts are suspended on the transport unit, located in the loading manipulator, and transported to the cleaning booth. At the end of the transit, the first of three distribution manipulators transport the carrier units along with the parts and bring them to the drip-off and then to a free preparation area. Here the surfaces that must not be painted, such as the slewing ring of the excavators, are masked and holes are sealed before priming. In addition, the transport unit is assigned a corresponding dataset, which provides information about the type of paint, RAL color, temperature and drying time. The RAL number can be retrieved from the priming and painting station on displays. The dryer control also uses this dataset. After the acknowledgment, access, removal and further transport are done completely automatically. A total of 19 hangers, each carrying up to 20 tons are constantly moving around. Thanks to the parallel arrangement of the preparation stations and paint booths, it is also possible to cross over the parts and in doing so pass, select, remove or return parts. A passage buffer passes parallel to the workstations and over to the paint booths. This gives Vollert's single-girder suspension track much greater flexibility than others. Even in the run-up to the planning, the process flows were virtually simulated and the optimal number of transport units was determined to ensure a smooth process. This solution guarantees the fastest cycle times.

Environmentally friendly painting technology

Heimer Lackieranlagen and Industrielufttechnik from Bielefeld specialize in paint and dry booth equipment. Two booths are used for priming and coating the excavator parts. Fully automatic roller doors prevent paint mist from escaping and contaminating the surfaces. Modern filter systems suck out and clean the air, and using the water-soluble 2-component, hydro-lacquer hardly any solvents left in the paint. Liebherr also uses an environmentally friendly solution for cooling, evaporation and drying booths: The dryers work with 90 percent recirculated air and only ten percent fresh air. A heat exchanger in the evaporation unit also preheats the fresh air and returns valuable energy. When finished, the suspenders are driven onto the return line, at the end of which the parts are removed and transferred to final assembly. For transport safety reasons transport speeds are limited to 0.2 m/s in areas with factory traffic, but in the closed painting area and on the return line the system reaches speeds of up to 0.5 m/s.

Project Manager Thomas Fischer is very satisfied with this result: "Although this is the first plant of its kind, we are absolutely convinced of the solution. Compared to before, we now achieve shorter cycle times at much higher loads, while being much more flexible in the throughput. This gives us a modern, environmentally friendly and more economical plant." And the project time is also impressive: The engineers at Vollert only needed 15 months from planning to final acceptance.

About Vollert Anlagenbau GmbH

As a specialist in heavy loads and large components, Vollert Anlagenbau GmbH develops turnkey intralogistics concepts for the aluminum and metal industry. As a general contractor and full-service provider, the range of services includes state-of-the-art material flow, storage and packaging technology as stand-alone solutions or integrated into a larger logistics environment.

Whether it's for mega-high-bay warehouse systems for aluminum coils, intelligent material handling systems for the leading aluminum extrusion manufacturers, the most highly productive storage-retrieval systems in the world for sheet metal blanks, automatic crane systems for 50 tons and more or the most modern surface treatment plants - Vollert has more to offer all-round than you would expect.

Vollert plant and machine solutions are in use in more than 80 countries worldwide, and in Asia and South America, subsidiaries are increasing their sales activities. Vollert employs 250 people at its headquarters in Weinsberg. www.vollert.de

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Image 1



Image 2



Image 3



Image 4