Future-proof powder coating

With the right recipe to keep pace with the times

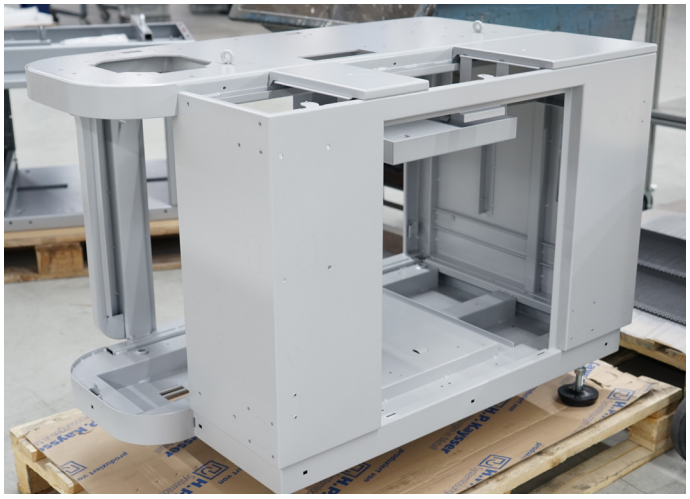
H.P. Kaysser GmbH + Co. KG

Performance by design

Nordson

The right recipe for sustainability and growth

H.P. Kaysser is growing and planning for the future. Their new powder coating plant provides the flexibility to economically coat small and large workpieces in series production or batch size one.



H.P. Kaysser GmbH + Co. KG in Nellmersbach, Germany is one of the leading companies in the area of sheet metal machining and processing. In order to raise the technical and performance capabilities of their surface finishing facilities, H.P. Kaysser invested in a new powder coating system, using dense phase technology with state-of-the-art application engineering from Nordson.

With more than 70 years of experience providing development and strategy support to customers from practically every business sector, today H.P. Kaysser offers intelligent, economical solutions that range from engineering services and the full sheet metal processing chain right through to logistics. With some 30,000 m² of facilities, the company's fully automated operations fabricate and process products made of steel, cast iron, stainless steel and non-ferrous metals – as individual units or in small, medium or large batch sizes. Customers take advantage of their high quality, low prices and rapid lead time, with the company experiencing steady growth.

H.P. Kaysser have always excelled in surface finishing and even in their early history they focused on alternatives to liquid coating systems. When H.P. Kaysser installed their first powder coating plant in 1969, this new technology had only just been launched on the market, and their plant was one of the first and biggest in Germany. The vintage system was still fully functional and in daily service until recently, working alongside a second unit, installed in 1989 to automatically process larger workpieces.

Over the past 30 years, coating operations and associated processes such as color change and system cleaning have achieved such a high level of automation that modern powder coating lines are essentially when it comes to meeting the demands of "smart factory": maximum flexibility for the economical production of even small and extremely small series right down to "batch size 1"!

Sustaining growth, enhancing flexibility

The modernization and improvement of powder coating capabilities to meet current and future requirements were nothing new to Thomas Kaysser, CEO of H.P. Kaysser and son of the company's founder. He had already been focusing efforts in this area for some time when, in the spring of 2015, he asked his son Timm to be responsible for the planning and construction of a new coating system. "We were looking for the right combination of the highest quality coating, in an optimal process," recalls Timm Kaysser. "Firstly, we needed the best ingredients for the identification and coding of workpieces throughout the transport, pretreatment, masking and coating operations. But we also needed an intelligent control system to link everything together."

Accordingly, the plant specifications stated the following requirements:

- Secure investment in long-term, future-proof technology
- Extremely high flexibility in production
- Minimized environmental impact and maximized sustainability
- Creation of capacity to coat all in-house production in the company's own coating system, irrespective of the size and weight of the components.
- Creation of additional capacity to cover subcontract work as a job coater.

Booth, powder guns and powder feed center form an integrated color change system that enable eight extensively automated, extremely rapid and contamination-free color changes.

The size of the components to be coated and the resulting dimensional requirements for the powder coating system soon made it clear that this project would require significant investment and the construction of two brand new production halls.

For the planning and configuration of the coating technology, Kaysser drew on the extensive experience of CS Oberflächentechnik, a company that had already participated in the creation of several major powder coating lines.

Timm Kaysser, Project Leader H.P. Kaysser and
Jörg Zimmerhackel, CS Oberflächentechnik

The first new production hall was completed at the end of 2018 in the first phase of the project. A second construction phase slated for completion by the end of 2020 is still underway. With 2,800 m² of floorspace, the first hall houses a powder coating line that handles components up to 2.5 x 1.0 x 1.5 m (h x w x b) in size and 350 kg per carrier, in series and with eight scheduled color changes per day. Workpieces first pass through a pretreatment area comprising of up to six zones and incorporating numerous buffer and sorting storage options for maximum flexibility on their way to the heart of the powder coating plant: a state-of-the-art coating booth from Nordson, designed for both maximum color change speed and extreme cleanliness.

Based on a ColorMax³ booth, a variant was adapted to the existing space constraints, which is why the 2.6-meter-long foreshortened booth with a lower roof as installed at H.P. Kaysser is designated as a ColorMax^{E} (“Engineered”). The high-strength, exceptionally smooth surfaces of the booth components ensure minimal powder-in-process at all times and perfect illumination in the booth, facilitating easy visual quality inspections.

Over the long term, the considerably enhanced coating quality will be accompanied by major material savings. For the H.P. Kaysser plant, the target savings were estimated to be about 30 %. Actual signs of significantly reduced powder consumption are already apparent and its exact extent will be closely monitored and documented.

During operation, the intelligent airflow management system provides regular compressed air pulses to convey excess powder to the central channel extraction system, which effortlessly transports it back to the powder feed center. Following the same principle, the system cleans itself during each color change – almost fully automatically. Inside the booth, the powder is applied by eight Nordson Encore HD automatic powder guns, which are designed both for coating with dense phase technology and for use in highly automated production and cleaning systems.

The Nordson ColorMax® Booth, Encore® HD Powder Guns and Spectrum® HD Powder Feed Center form an integrated color change system that enable eight extensively automated, extremely rapid and contamination-free color changes. All manually cleaned powder system components are easily accessible, thereby also helping to keep color changes short. To ensure that the required color is always available at exactly the right time, a Nordson Spectrum HD powder feed center supplies virgin/recycled powder. Due to the high transfer efficiency of the Nordson application equipment, only very little overspray is generated. This overspray is drawn to the twin cyclone where the still usable powder is collected in the surge hopper and pumped back to the powder feed center via a HDLV transfer pump. This reclaim powder is then sieved by an ultra-sonic sieve before it passes through to the main hopper where it is mixed with virgin powder-ready to be used again.

For economical reasons as well as cleanliness, the planning of the H.P. Kaysser coating system emphasized the importance of efficient powder recovery. Only a minimal percentage of unusable powder fines end up in the final filter, making this a highly efficient application system.

Intuitive operation

The powder coating system is controlled by a PowderPilot HD control system from Nordson. An icon-based touch screen user interface provides the operator with relevant information about the status of individual system modules as well as step-by-step instructions when – during a color change, for example – operator intervention is required. For the most part language-independent, the control system makes operation very intuitive and largely eliminates operator error and training needs.

For individual workpieces and for workpieces with highly complex geometries that cannot be coated in the powder coating booth system, a manual coating booth was installed. The manual glass booth supplied by the system integrator Rippert Anlagentechnik GmbH & Co. KG was equipped with a Nordson Color-on-demand® System, which was supplied by iOS Industrieofen-Service GmbH together with their powder management system. This system is designed for ten colors and up to 15 color changes per day.

Minimizing environmental impact and maximizing energy efficiency

Investment in a new production plant is inextricably linked with the expectation of decades-long utilization. “Decision-makers of my generation can no longer focus almost exclusively on technical and commercial aspects. Today, we also give environmental, sustainability and energy-related questions the same priority, right from the start,” says Timm Kaysser.

Having opted for a fully solvent-free, eco-friendly powder coating system with sophisticated cleaning and conveying systems that essentially eliminate powder waste, he has no doubt whatsoever that he’s on the right path to long-term sustainability. Moreover, the new automatic coating line is configured for exceptional energy-saving operation due to the Nordson “Going Green Package”, whereby devices operate in combination with an intelligent control system, to continuously adapt to the actual energy requirements of the moment. For example, when the light barriers detect significant gaps in the supply of products to the booth, all powder guns are switched to standby, and the booth airflow is reduced to the minimum required extraction rate, using a frequency inverter to reduce the electrical power required.

Initial results: it was worth it!

After 30 months of planning and construction, the project’s first phase comprising the new production hall with the powder coating line inside started up for the first time in November 2018 – with impressive results from day one.

What strikes the eye immediately is the tremendous improvement in surface quality. While coating thicknesses with the old coating system line generally varied between 150 and 200 µ, the use of the new system was able to lower the coating thickness by approx. 80 µ down to 120 µ. A high level of process control, due to Nordson’s Dense-Phase Technology, will allow the customer to achieve further powder savings and higher quality as he can precisely control his powder application in further optimizations.

Welcome side effect: Over the long term, the considerably enhanced coating consistency will be accompanied by major material savings. For the H.P. Kaysser plant, the target savings were estimated to be around 30%. Actual signs of significantly reduced powder consumption are already apparent and its exact extent will be closely monitored and documented. Another value testifies to the exceptionally economical and sustainable operation of the system: although the automatic booth’s 96% cyclone efficiency requirement represented an ambitious target, it was achieved already during the start-up phase.

With their choice of efficient dense phase technology, highly automated components, an integrated plant control system with barcode identification of carriers and, not least, a 50% increase in production capacity, the “Surface Finishing” business at H.P. Kaysser is perfectly prepared for continued long-term growth.

Timm Kaysser’s interim assessment is positive. “By all appearances, I’d say that together with our industrial partners and tradesmen we’ve put something together here that works really well.” And with a grin, he adds: “The best ingredients and not too many cooks – all of whom agree on the recipe: As in so many other cases, this was the key to success here.”

Performance by design

H.P. Kaysser
Systemlösungen in Metall

H.P. Kaysser GmbH + Co. KG
Hans-Paul-Kaysser-Straße 4 | 71397 Leutenbach | Germany
+49 (0)7195 188-0
info@kaysser.de | www.kaysser.de

Nordson Deutschland GmbH
Heinrich-Hertz-Straße 42 | 40699 Erkrath | Germany
+49.211.9205.141
ics.eu@nordson.com | www.nordson.com/ics

/Nordson_Coating /NordsonICS
/company/nordson-industrial-coating-systems

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