

# Efficiency increase and cost reduction

Dense phase technology combined with robot precision

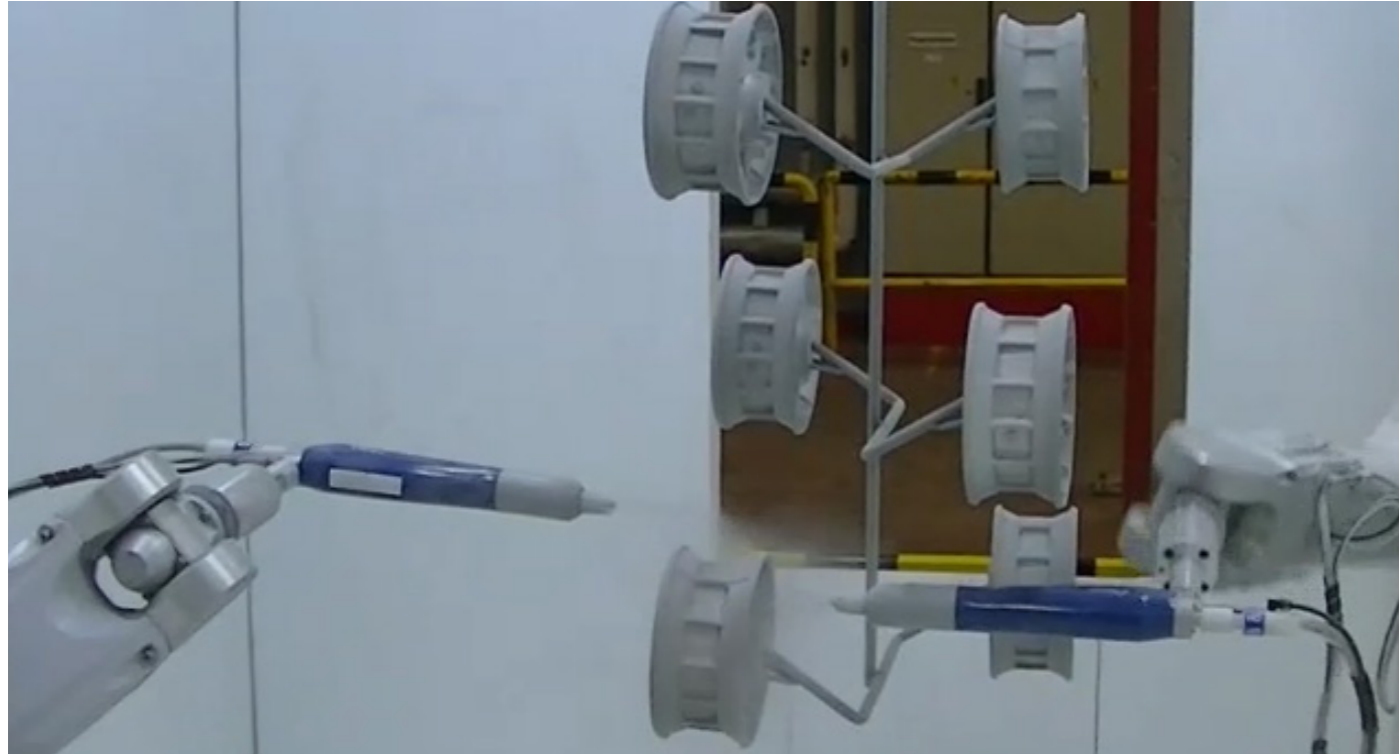
Welco GmbH & Co. KG | Germany

*Performance by design*

 **Nordson**

# From Manual to Robotic Powder Coating Processes

Automotive and motorcycle exteriors are exposed to extreme conditions over a long period of time due to heat, cold, moisture, stone chipping, road salt, UV radiation and much more. At the same time, no other industry makes such high demands on the appearance and feel of surfaces as the automobile and motorcycle manufacturers. The visually attractive sheet metal and plastic parts of those conceal complex shapes. Since 2016 after many years of manual powder coating, the surface finisher WELCO, Germany, has been relying on the innovative combination of robot coating with dense phase technology.



## Finishing in design quality

Anodizing, cathodic dip coating or powder coating, since its foundation in 2006, WELCO GmbH & Co. KG in Germany has dedicated itself entirely to "surface finishing in design quality". Well-known German automobile and motorcycle manufacturers are among its satisfied customers. The demands of these customers are high, not only in terms of the quality and appearance of the finished surface, but also with regard to "soft factors" such as delivery performance, reliability, flexibility and economy.

"We are much more than an extended workbench for our customers", is how WELCO Managing Director Richard Nuber describes the relationship with his clients. "We are regularly involved in production planning at an early stage, develop individual solutions and then implement them. The focus is not so much on groundbreaking innovations, but rather on targeted optimization steps along the process chain, which result in both technical and economic improvements to the components and their manufacturing methods."

The success of such efforts can then also be verified in the company's own plant. The versatile supplier is QM-certified according to the highest European performance class ISO/TS 16949:2016 and offers mechanical, chemical and climate change tests, which are important for international vehicle construction.

## Future proof investment

For powder coating, WELCO relied on manual work and Venturi technology until 2015. "To achieve a decent coating quality was high in every aspect," recalls Mr. Nuber. "We sprayed to waste and needed two minutes or more to coat complex workpieces. Around 13% of the parts still had to go to post touch up." Even after that, the film thicknesses fluctuated greatly from coater to coater. There were high costs for system maintenance, wear parts, repairs and downtime. "It was clear that only an automated powder coating process could optimize quality and reduce the effort to an acceptable level. Three goals were important to us: a high quality of powder coating, automatic handling of wear and spare parts and the economic efficiency," Mr. Nuber continues.

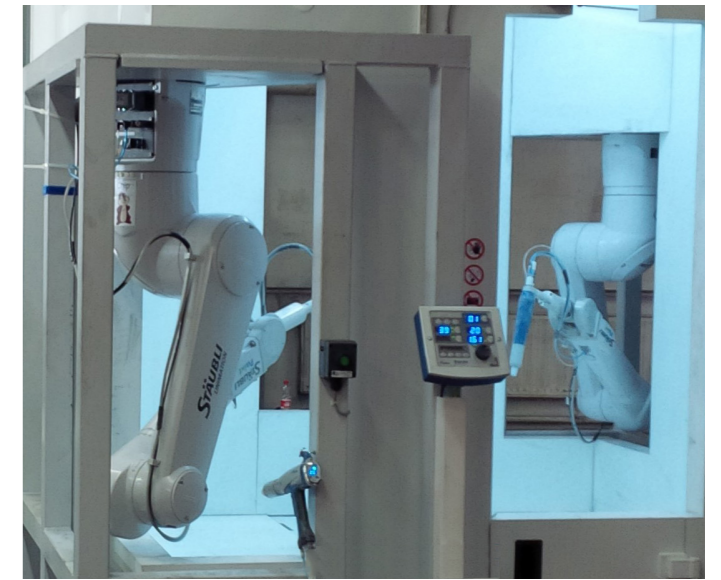
After researching Mr. Nuber became aware of the Nordson dense phase technology. In order to test this technology for its own application, the WELCO team gladly accepted the offer from dense phase pioneer Nordson to carry out initial tests in their test lab in Erkrath. "We tested our parts with the Encore® HD manual coating powder guns and the application itself immediately convinced us that a process that could be controlled completely and safely with hardly any overspray at a high penetration depth of the powder. However, the conventional reciprocators were not flexible enough for our complex parts. For a high degree of automation, we had to think of robots."

"This was also an exciting new task for us," says Jörg Zimmerhackel, Project Manager of the WELCO plant (Managing Director of CS Oberflächentechnik and southern German representative of Nordson). "We agreed to develop a completely individual solution for WELCO and were awarded the contract."

Even the configuration of the ColorMax® fast color change booth proved to be a difficult task. "The available area for the booth was only 20 sqm. There had to be enough space for the two robots and their movements. The height of 2.50 m without substructure was not allowed to be exceeded," as Mr. Zimmerhackel describes the challenges of the planning and construction phase. "In addition, further openings in the booth had to be provided for the accessibility of the robots. This made it difficult to create a gentle, uniform air flow in the booth, but we were able to successfully build a solution."

The booth was designed according to the customer's specifications and the dimensions were transmitted to the robot manufacturer, who extensively simulated the mobility of the two compact, staggered 7-axis robots. Only thereafter did the construction of the powder coating booth begin. "ColorMax booths that are modified in this way to meet customer specific requirements are given the suffix "E" for Engineered," explains Mr. Zimmerhackel. "This one is designed for parts up to 1,200 x 600 x 600 mm in size and is equipped with standard components from the ColorMax³ booth".

The floor and sides of the booth were made of powder-repellent coated panels, and the slight overspray at the floor is directly removed by the AirWash system. Each of the two robots are equipped with an Encore HD automatic gun for the powder application itself. The robots are programmed quickly and easily in a point-to-point process.



The components of the system are supplied with fresh powder from the Spectrum® HD powder center. The self-cleaning HDLV® pumps and transfer pumps are used for powder delivery. These pumps carry the powder from the hopper to the guns and gently return the reclaimed powder to the Spectrum HD powder center. A Nordson self-cleaning twin-cyclone is used for gentle powder recovery, with an hourly output of 12,000 cubic meters. Impurities and micro particles are retained by the after filter.

To initiate one of the five daily color changes in a three-shift operation, the operator must click on the touch screen of the PowderPilot® HD control system and the color change starts automatically. The intuitive system also guides the operator easily through the process.

Also the rest of the installation is operated by the PowderPilot HD control system. "The handling is very intuitive. What the operator needs to know or do is displayed almost seamlessly in easy understandable icons," says Zimmerhackel, addressing the issue of the lack of skilled workers. "Good language skills and extensive training are not necessary for safe operation of the system. Even the control of the robots were placed on the Windows-based PowderPilot HD".

## Better, faster and more economical

For almost four years now, the fully automatic system has been coating aluminum, steel and magnesium components with great precision and reliability in three shifts at WELCO. "The interplay of robot technology and dense phase technology has been proven with a 100% process control."

"The expected quality improvement has been achieved in all aspects." The coating specialist attributes this to the uniform and consistent powder coverage on oddly shaped parts. This is achieved by the soft powder cloud that emerges from the powder gun at a low speed and from a short distance. Less overspray produces a high penetration depth of the powder which is exactly how Nordson engineered its dense phase technology with HDLV pumps in the Encore HD spray system.

"In fact, the extremely precise application of the dense phase technology is further enhanced by the precisely controllable robots and with maximum repeatability. The basis for this is the



wide range of data recorded both by the coating system and the robots, which are stored in the recipes. This makes the entire production process both very reliable and flexible and it results in uniform coatings and visible quality advantages." Mr. Zimmerhackel added.

The effectiveness and efficiency of the coating process has also increased significantly and can be expressed in concrete figures, "Instead of over two minutes with the old technology, we now coat our workpieces in about one minute on average. At the same time the rework rate has fallen to 5%. We save around 25% to 35% of the powder through consistent recovery, with a consumption of around 40 tons per year, that is about 10 tons," Richard Nuber continues. "This has enabled us to double our production output and achieve a significant increase in sales!"

The time required for a color change has settled down to well under 15 minutes. Since the complex color change process is now largely automated, one operator can be saved in each shift. "But it was never our goal to rationalize jobs with the new technology. We advised our workers very early on in the planning phase and involved them in the change process. This caused the workers to be highly motivated and concentrate on their new tasks," says Nuber.

In conclusion, Richard Nuber mentions with a smile: "In addition to the cost savings and because of the absolute process control, the Nordson dense phase technology, with its very uniform coating quality, gives me great pleasure right from the start. Recently, I received another request for a sample coating from a very well-known and high quality automotive group. I just couldn't help myself. I was looking forward to coating this sample myself again with our Nordson Encore® HD manual system and being able to present an excellent, very consistent result to the customer, who was also very enthusiastic about the quality".

View also the video of the WELCO powder coating system  
[www.nordsoncoating.com/robot](http://www.nordsoncoating.com/robot)

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## Nordson Dense Phase Technology

Nordson's patented HDLV® pumps use dense-phase technology with high-density powder, low-velocity air to pump more powder to the spray gun with a minimum of air, and maximum process control.

This results in superior efficiency, unmatched coverage, and reliable self-clean color change, boosting productivity and reducing operating costs.

With more than 10 years of field-proven experience, Nordson remains at the cutting edge of dense phase pump technology in the powder coating industry.

- Powder output stability and process control, for precise applied coating thickness and significant powder savings
- Highest application efficiency with soft spray pattern
- Superior coverage of recessed areas through optimised spray velocities
- Longtime wear life of the internal pump components significantly reduces maintenance downtime for maximum productivity
- Contamination free color change of the entire spray system due to an automated purge clean system

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WELDING & COATING SOLUTIONS

### Nordson Industrial Coating Systems

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