



Quality powder coating on a massive scale

Steel rafters production

Grædstrup Stål A/S, Brædstrup, Denmark

Performance by design

 **Nordson**

Advanced XXL-Powder Coating for production of steel profiles

Unique powder coating system doubles the productivity, reduces the color change time, and saves powder. All on an extra-large scale.



7.2 m tall booth with the Spectrum® HD powder feed center is color changed in 15 minutes.

The Company

The Danish company Grædstrup Stål is at the forefront of innovative manufacturing with a continuous focus on quality, efficiency, and environmental friendliness.

Each year the company converts over 400 tons of steel into custom-designed rafters and structures for a wide range of agricultural, commercial, sports and industrial constructions projects.

Grædstrup Stål follows a zero-fault approach to manufacturing – from the first cut or weld to quality powder coated, finished products. Most of the production, in the 14,000 m² facility, is fully automated.

While others in their industry paint with liquid, Grædstrup Stål believes powder coating delivers superior corrosion protection and finish quality with minimal environmental impact. „Coating our steel beams and rafters with powder offers numerous advantages,” says production manager Allan Kåstrup Kristensen. „It makes our products much more durable and superior to conventional liquid-coated steel rafters under any conditions“.

The Challenge

Since 2000, Grædstrup Stål operated one of the largest powder coating systems in Denmark handling products up to 5 m in height and 23 m in length. Although over the years the system had upgrades, by early 2018 the company realized the old booth was a hindrance. It took several hours to change colors which reduced operating flexibility and low conveyor speed which forced them to a 3-shift operation.

In early 2018, company management started to look for a better solution to:

- Increase productivity
- Save time on color change
- Reduce powder consumption and waste
- Improve coating coverage of challenging welds and corners
- Minimize the environmental impact

Peter Johansen from Lakteknik, an experienced Nordson representative in Scandinavia, was very familiar with Grædstrup Stål and their system. Using his experience in the industry, Peter helped to fine-tune the new system specifications and worked closely with the customer and the Nordson engineering team to design and deliver the perfect system.

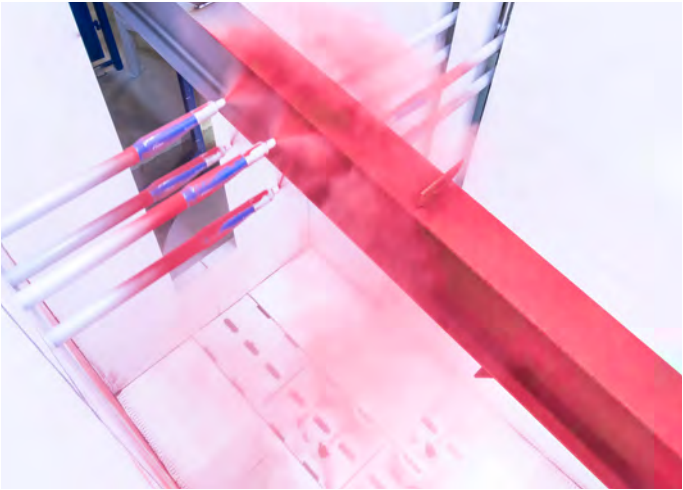
The Solution

The new ColorMax® E booth measures 4.3 m long and 7.2 m tall. Yet, it can color change in 15 minutes – a major improvement from the old system. The booth delivers reliable powder containment through its 5.2 m tall product openings while also ensuring soft airflow in the spray area. The automatic floor cleaning system keeps powder in the booth to an absolute minimum. The system is complemented by two 6.5 m tall, variable-stroke reciprocators each carrying four Encore® HD automatic spray systems. Automatic purge-cleaning of the pumps, spray systems, and feed hopper in the Spectrum® HD powder feed center simplifies the color change.

This extra-large booth installation and commissioning took only 16 days, and in April 2019, the new powder coating system started operation.

One of the unique features of the system, is the ability to vary the conveyor speed depending on the size of the product passing through the spray area. Products are scanned prior to entering the booth. The PowderPilot™ HD system controller monitors the rate of change in the product height to determine at which line speed a particular section of the product is to be conveyed through the coating area. If a product hangs vertically, requiring a long stroke of the reciprocators, the conveyor speed can be reduced to 1 m/min. When some sections of the rafters are only 400 mm in height over the length of 20 m, the conveyor speed can increase up to 6 m/min delivering the maximum productivity while maintaining the coating uniformity. The reciprocators stroke and the powder output of the spray systems are automatically adjusted to match the production rate and to minimize the overspray.

The eight Encore HD automatic spray systems deliver the highest powder application efficiency and improve the coverage even in the



Gentle downdraft airflow assists the powder deposition. The automatic floor cleaning simplifies the color change.

most challenging welds and corners due to the minimum spray velocity produced by the HDLV® (High Density Low Velocity) pumps.

The Results

Since the start of the operation in April 2019, the new system performance has exceeded the Grædstrup Stal expectations. “The gains in our productivity are most impressive,” confirms Allan Kåstrup Kristensen, “What used to take us 20 hours is now powder coated in a single, 8-hour shift. Just imagine the energy savings from not having to heat our huge oven for 3 shifts.” The average line speed increased from 1 to 3.5 m/min. Additionally, color changes are now finished in 15 minutes.



The product sections of different heights are coated at different conveyor speed to maximize the overall production rate.

The coating coverage is also improved. “We mainly coat for corrosion protection classes 1 to 3. Thus, the target coating thicknesses can range from no less than 70 µ and up to 200 µ. The new system delivers the needed coating consistently, with good uniformity, using only eight instead of ten guns in our old system,” says Mr. Kristensen. The increased powder application efficiency combines with the variable and programmable powder output to deliver 40% annual powder savings.

“Since the start of the production, we spent hardly any time on the system maintenance. It just runs. The dense-phase pumps are as good today as on the first day of production – we haven’t touched them. Additionally, the support we receive from Lakteknik is very responsive. We are well taken care off.” testifies Mr. Kristensen.

“The Nordson system allows us to fine-tune and program many operating parameters making it easy for us to gain a deeper understanding of the powder coating process,” Allan Kåstrup Kristensen continues, “We are closely monitoring the coating and are experimenting with programs to further optimize our operation and reduce costs. This investment has already paid for itself. All goals achieved.”



The PowderPilot HD controller optimizes the coating parameters for products of various heights processed at different conveyor speed.

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 15 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
- Unmatched 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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PWR-19-6129 • 09/2020