End-to-End Automation for a Highly Reliable Process

In the past, Scandinavian companies have often played a pioneering role in the automation of surface technology processes. A foundry in Denmark is continuing this tradition by fully automating both its electrocoating line and its new powder coating shop. The result is a highly efficient and cost-effective process.

Birn A/S, which was founded in 1896, is the largest foundry in northern Europe and is famous for its innovative, high-quality solutions. At its headquarters in Holstebro in Denmark, 500 employees manufacture around 45,000 tonnes of cast components every year. The company has a wide variety of customers from sectors that include the automotive, pump and hydraulic industries.

Birn offers its customers all the services that accompany a casting project, which range from planning and design to customised casting processes, machining, surface treatment and component assembly. As a result of its high degree of vertical integration, the foundry is in demand as a supplier of add-on parts for vehicles.

In addition to its comprehensive services, Birn is well-known in the industry for its high standards of quality and meticulous adherence to delivery deadlines. Automated workflows are the key factor behind its punctual deliveries. For quality assurance purposes, the company has its own comprehensively equipped laboratory where it can carry out every conceivable type of test relating to the casting process.

The foundry's most important customers include the Swedish truck manufacturers Scania and Volvo. In order to give their components greater corrosion protection in the medium term, in 2015 Birn hit on the idea of using a combination of electrocoating and powder coating processes.

Combination of electrocoating and powder coating improves corrosion protection

From the start of the project, Birn planned to install a fully automated, networked, monitored and centrally controlled electrocoating line. It also intended the powder coating shop to be as highly automated as possible. The aim was to be able to coat parts of all shapes and sizes in large volumes using a fully automatic process without manual adjustment of the spray guns.

In the past, only a robot coating system would have been able to fulfil these complex demands. But during the planning phase, Gema launched its new infeed axes and these proved to be the ideal solution to Birn's requirements.

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In the booth, 20 automatic spray guns follow the contours of the parts exactly.

Efficient system with dynamic contour detection and infeed axes

The powder booth has ten moveable horizontal infeed axes on each side. The spray gun layout on one side of the booth is a mirror image of the other so that the cast parts can be suspended in either direction without wasting time. The shape of the parts is detected by automated laser scanners at the entrance to the booth and the infeed axes automatically and precisely position each gun in accordance with the production specifications and the stored programs. The precision contour guidance function ensures that each gun follows the shape of the parts accurately and applies the powder at exactly the point where it is needed.

In addition to the positioning of the guns, the accurate dispensing and positioning of the jet of powder play a key role in the coating results. For this purpose, Birn relies on the OptiCenter OC03 powder centre and

OptiSpray application pumps, combined with OptiStar control modules with PCC (precise charge control) mode (which prevents the powder from being given an excessive electrostatic charge).

The OptiSpray pump system guarantees a highly regular and carefully controlled powder output. This remains reliable even when long hoses are used, which is a major benefit, in particular in connec-

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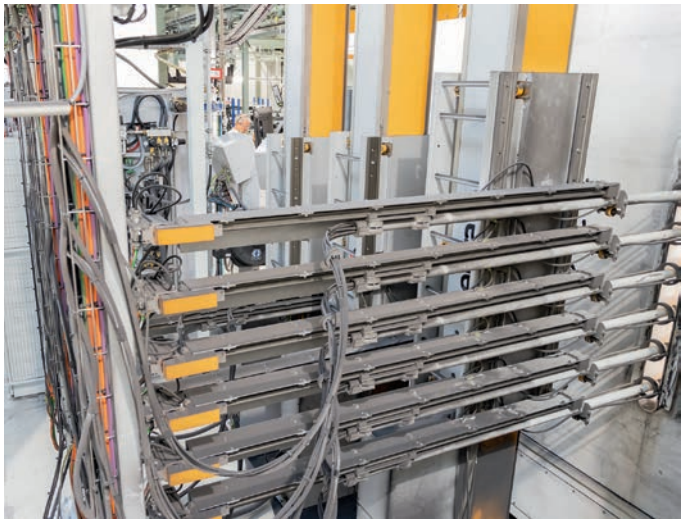
The powder centre with its application pumps supplies the automatic guns with powder.



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Each automatic gun is mounted on an infeed axis and can be individually positioned.

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The layout of the guns and the coating parameters are shown on large screens.

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The powder coating shop at Birn A/S is compact and flexible.

tion with the individually positioned axes, and results in consistent and reproducible coating finishes.

Only one member of staff is needed to mask the parts and to run and monitor the coating process. The manual coating function is only used in emergencies. Depending on the components being processed, the operators simply have to replace the flat jet nozzles with angled nozzles. The gun configuration is shown on a screen at the entrance to the booth, together with the process parameters. This means that almost anyone in the company can prepare for the coating process and monitor it to ensure that it is accurate and reproducible.

Networked system for high-quality coatings

The new Gema powder coating system provides the foundry with a high level of automation and extremely reliable processes. The networked control system connects all the production stations so that staff can intervene in the process at any time from wherever they are in the building.

The new Gema infeed axes with contour detection have taken the quality of the products to a new level and future-proofed the company's production capacity. Together with the careful regulation of the powder output by the control system and the powder pumps, this ensures that Birn's system can apply coatings cost-effectively and reproducibly without the need for manual application. The end result is a high degree of efficiency at a relatively low cost, which is in line with Birn's vision of constant innovation and technological leadership. //

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