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Drive as development driver

Highest degree of flexibility, efficiency and quality when coating and laminating

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Max Kroenert from Hamburg counts on drive integrated closed-loop control using drive control blocks to develop a foil coating machine for lithium batteries.

High-capacity and long-life energy storage devices are a basic requirement for the general acceptance of electric cars, which are increasingly being seen as playing a decisive role in reducing CO₂ emissions.

This is the reason that innovative energy-storage technology has absolute top priority for the large automobile companies and leading suppliers.

The machine construction factory Max Kroenert GmbH & Co. KG from Hamburg is indirectly involved in this development process. This company is the global market leader for special machines to coat and laminate materials, and is therefore a sought-after partner when it comes to developing high quality substrate foils for lithium batteries from roll to roll.

Can be used with a high degree of flexibility

Kroenert's latest development to coat and laminate in the laboratory, research & development environment and production is the "LabCo" laboratory coater; this is a very flexible system that can be used in a wide variety of ways for material web widths ranging from 200 to 500 mm – and web velocities of between 0.1 and 100 m/min.

Equipped with a universal coating station, LabCo can be quickly and simply equipped to handle all of the usual coating techniques. The range of coating media and the type of coating is just as varied: whether direct or indirect, forward or reverse – this can also be adapted to the particular application.

This degree of flexibility is achieved with a modular design of the laboratory machine with the core components comprising unwinder, coating station, dryer and rewinder. This is based on the drying technology of Drytec Trocknungs- und Befeuchtungstechnik GmbH & Co. KG and its many years of experience – a daughter company of the Kroenert-group.

World class coating and laminating

More efficient with the latest automation and drive technology from Siemens

A high degree of variability in the design and application requires appropriately flexible and scalable automation technology. This supports the machine modularity and can also be quickly customized to suit various situations. This Hamburg-based company depends on well-proven equipment in the form of individual electronic drives at the most important axes, which can be freely programmed and linked with one another. Just the same as on their high-performance lines for mass production, they also use seamless and integrated solutions from Siemens for their laboratory machines.

This comprises a fail-safe SIMATIC S7 300F (CPU 315F 2 DP) control, drives from the current SINAMICS S120 generation and a PC-based visualization system developed by Kroenert.

The specified drive system has a modular design. It comprises a separate infeed, and where relevant, a regenerative feedback unit, the second generation of SINAMICS CU320-2 Control Units as well as the power units.

Positive summary from Jürgen Blum:

“Without having to rely on support from Siemens, we got our laboratory machine ready for the market in the shortest period of time, and now we can quickly offer customized solutions for practically all applications.”

Closed-loop control functionality directly in the drive

“The modular design was an argument to change over to the current SINAMICS S120 family of drives”, explained Dipl.-Ing. Jürgen Blum, head of electrical engineering with Kroenert. “An additional reason was the high degree of closed-loop control functionality of the system directly integrated in the Control Units.”

This shortens the signal paths, and as a consequence results in extremely short cycle times of just a few milliseconds and therefore the highest control quality. Put another way: The coating constancy/quality, especially in intermittent operation can be kept within tight tolerances. As a consequence, the coating result is not so much defined by the drive technology as was previously the case, but predominantly by the coating station – the actual core competence of Kroenert. When coating the substrate foils for Lithium batteries, with the new drive system, the specified dimension precision at the coating edges of ± 0.5 mm for a material web velocity of 10 m/min was achieved in the shortest time.

The drive system was connected to the control via the PROFIBUS DP and the PROFIsafe profile. As a consequence, sequence and safety-relevant signals can be transferred using one and the same Profibus cable, which reduces wiring costs.

User-friendly graphic drive engineering

For the user-friendly graphic engineering of SINAMICS solutions, Siemens has developed the Drive Control Chart (DCC) engineering tool.

DCC reduces drive engineering to graphically interconnecting multi-instance-capable blocks selected from a comprehensive block library. “This means that the dancer roll controls – which are also absolutely indispensable for laboratory coaters – can be implemented in a very user-friendly way for the winders and unwinders”, explained Jürgen Blum. “The same applies to the electronic coupling between the drive acting as master at the coating station and all of the other driven axes.” All of the sequences can be tested in a user-friendly fashion and optimized using the trace test and diagnostics tool and the control panel.

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