



- Schmid Technology Systems GmbH, Germany

Another String to the Bow

Gaspere Hilgner from Schmid (right) and Stefan Kreudler from Siemens (left) headed up the Layup Station project as a team. Siemens provided the automation and drive technology – from developing the hardware and software all the way to commissioning.

Mr. Hilgner, with the inauguration of the Layup Station at the start of the year, Schmid has successfully integrated a further major development in modular processes of its own into the portfolio. What is special about the system in your opinion?

Gaspare Hilgner: More important than my opinion is that of our customers', and from what they say it seems they are very satisfied with the module cycle time and the extremely compact system design. The print surface size, for example, is without parallel in the market. With our Layup Station we can apply approximately 50 MW and have also been able to prove that it arranges with very high precision. Everyone is very satisfied with the annual output we guarantee. Customers also appreciate the fact that our unit can be integrated modularly into existing lines, even in those from other manufacturers.

Mr. Kreudler, you and your colleagues at Siemens had very little time between November and January to answer the exacting requirements for the module's automation concept. What was important for Schmid?

Stefan Kreudler: Compared to our competitors for the contract, our comprehensive concept encompassing development, hardware, software, service and budget was what sealed the deal. Thanks to the cooperation with Mr. Hilgner, it was possible to implement the project on time and without problems.

Gaspare Hilgner: In particular, it was important to us that Siemens help us with choosing the hardware components, advise us on the control cabinet planning and provide technical assistance for calculating the theoretic braking distance of the linear motors in armature short-circuit braking – to name but three examples.

What makes Siemens the right partner for this in your eyes?

Gaspare Hilgner: The advantage with Siemens is that the group can provide all elements of automation, including all functionalities. Also, with their global presence they are always close to their customers. With 15 international locations, we too have a global presence and must therefore be able to deliver spare parts quickly when servicing is required. It is simply not an option to have a system down for two or three days.

Are there things that Siemens is able to offer you that other providers cannot?

Gaspare Hilgner: The issue of security is becoming more and more important. Siemens is in the position to integrate safety technology – an area where we have already had very positive experiences in other projects. The Siemens solution means no additional hardware components are needed to evaluate safety

sensors. The function Safety Limited Speed (SLS) was implemented with a single absolute encoder.

Stefan Kreudler: We're doing everything we can to make sure that the system can be used easily even when, for example, small corrections need to be carried out or a product changeover is due. With Safety Integrated, we have met Schmid's requirements for a safe reduced drive speed with motors from other parties. The solution is very easily serviceable and Schmid does not require service technicians from Siemens in the event of a disruption.



The project team, from left to right: Stefan Kreudler, Thomas Pflugfelder, both from Siemens; Uwe Keck, Gaspare Hilgner and Martin Tomaszewski, all from Schmid. Not shown is Reinhard Jacob, from Siemens

Gaspare Hilgner: That's right. Also the amount of wiring required in the control cabinet is significantly reduced with the safety function via Profisafe. For our customers this translates into reduced times for disassembly and reassembly of the Layup Station.

What challenges did you face during commissioning?

Gaspare Hilgner: Since it was the first time for us at Schmid to install a Siemens Motion Control System (Simotion D445), we were glad that Siemens representatives assisted with commissioning the system on site for our customers. We are focusing on acquiring the relevant know-how and want to be able to carry out programming and commissioning without extra assistance as soon as possible.

Stefan Kreudler: This is precisely what we mean by our motto "learning by doing." We provide support where necessary and then take a step back – in the positive sense.

Siemens will surely be called upon for advice on customer-specific engineering modifications for the next Layup Station contracts Schmid receives?

Stefan Kreudler: Not necessarily. We have already taken applications for both Schmid machine types into account in the development phase. A solution for both system types was developed for both single- ▶▶



A Schmid employee operates the Multi Panel 377 touch



Simotion/Sinamics drive units

► and double-sided string transferal. No additional engineering is required, nor any software adaptations. The system can therefore be started up quickly.

Gaspare Hilgner: This was a priority for us right from the start, since we hope to implement the application on a large scale for our customers. Only the teach points and formulation have to be adjusted for new situations.

We can tell from this interview that you're a well-practiced team. How would you describe your work together?

Gaspare Hilgner: At all times I had the feeling that we were all working with a common goal. A good relationship on a personal level is a great advantage in working together and it benefits the outcome. This good relationship was important as we continually had to make adjustments during the project, which required a great deal of flexibility from Siemens. Those who imagine that a large group is impossible to work with are wrong. In reality, we enjoy a successful cooperation everyday with Siemens employees

and not with some faceless corporate body. This human interaction works perfectly. The Layup Station is in fact only one of many areas in which we work together with Siemens.

Stefan Kreudler: That's absolutely right. For our part we also really appreciate that Schmid is considering us with regard to new innovations, which is a great show of confidence. This is really exciting for us, as Schmid is a leading company in terms of technology, and one that continually develops its systems rigorously in line with the process. Schmid sells technology and overall processes, which is what makes the company so strong. Furthermore, there are already clear signs that the process stages will become even further consolidated in the future, and we look forward to presenting our own ideas in this innovative environment. ■

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Layup Station with the Tabber Stringer

The Layup Station from Schmid

The Layup Station's portal-axis system allows exact arrangement of cell strings in a uniform matrix on the glass with EVA foil. The strings are transferred automatically by the Tabber Stringer's stringer unit to the Layup Station, where they are taken on by a gripper system. Camera systems check the strings for breakages, orientation and performance, and defect strings are separated. Two combined cutting-bending units shorten the bus bars to the required length and bend them to exactly the desired angle before they are positioned on the glass plate with EVA foil.

Drive technology from Siemens

Development

- ▶ Support and consultancy for choosing hardware components used in the system
- ▶ Use of an absolute encoder with SinCos signal tracks on the drive shaft of the double gantry systems
 - ▶ no reference run required
 - ▶ only one encoder system per motor
 - ▶ reliable actual value detection for safely reduced speed
- ▶ Safely reduced drive speed for where motors from other parties are used
- ▶ System operation inside the system via a Mobile Panel 277
- ▶ Controlled stopping of the drives in the event of power failure
- ▶ Buffering of the control voltage by integration of a UPS
- ▶ Calculation/dimensioning of the armature short-circuit function for stopping the axles, even in the event of drive disruption (independent stopping for the gantry system)
- ▶ Control-cabinet planning
- ▶ Considerable space was saved in the control cabinet by using an FCPU, and amount of wiring required for the safety technology was minimized
- ▶ Installation of only one control system for automation and safety technology



A Schmid employee at the Mobile Panel for teaching positions during active SLS inside the machine

Drive hardware

- ▶ Short cycle times thanks to the use of multi-axle path interpolation in the Simotion control
- ▶ Safety functions integrated into the drive
- ▶ Control of the safety functions via PROFIsafe
- ▶ Use of an Active Line Module to compensate for fluctuations in mains voltage
- ▶ Controlled stopping of the drives in the event of power failure without extra drive components



Simatic ET200eco for connecting the distributed peripherals, rotary grippers for the strings

Drive software

- ▶ All positions/stations in the machine are recorded via various teach routines and archived in Simotion
- ▶ Jog mode, positioning of individual axles and teaching with a Mobile Panel MP277 in setup mode with safely reduced speed. Special feature: System operator inside the machine
- ▶ Material protected by rotation via automatically generated cam profile interpolation
- ▶ Programming according to Siemens Application Styleguide
- ▶ Use of standard components from the Simotion Easy Basics library (e.g., OMAC operating mode manager, FBCreateCam for generating cam profiles)
- ▶ Use of Simotion Handlings Toolbox for carrying out multi-axle path interpolation
- ▶ Extensive monitoring of the gantry system integrated into the Simotion
 - ▶ incline-angle monitoring of the parallel axles
 - ▶ fully automated collision monitoring of the gantry system for double-sided string application via definition of areas (kinematic zone, working area, product zone, restricted area)
- ▶ Coordinated error handling (mirroring of error response by one parallel axle of the other)
- ▶ Error monitoring of the parallel axles (identical drive behavior to avoid mechanical damage)
- ▶ Software development appropriate to Layup Stations with single- or double-sided string application
- ▶ Teaching and alignment routines/alignment calculations for alignment/orientation at right angles to the depositing surface/glass, developed individually for the Layup Station