

Davis-Standard, Germany

The right turn

Davis-Standard has developed a high-performance cast line that produces stretch films of even thickness without tearing. For process and line control, the market leader relies on integrated control, regulation, and drive technology from a single source.



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Thanks to their extreme stretchability, stretch films can be used in many different areas. The cast line for producing these films achieves speeds of up to 1,000 m/min at the winder inlet

Davis-Standard is a leading global manufacturer of extrusion systems, screw conveyors, cylinders, and process control systems for the finishing industry and for plastics and rubber processing. In the development of a cast line for stretch film, the company aimed to achieve new standards for speed, throughput time, and precision. The machine

manufacturer chose Siemens as its project partner to develop an automation concept with seamless control, regulation, and drive technology. Because Davis-Standard operates internationally, the global availability of products and services for the automation system was an important factor in the decision to work with Siemens.

From four extruders, the new DS x Stretch cast line produces a five-layer film with a net width of 2,000 mm, which it can stretch cold inline to four times its original length and to a thickness of 8 µm. The cast line achieves a production speed of 1,000 m/min at the winder inlet. When the line is producing short hand rolls, this speed means a fail-safe alternating cycle of on average 20–30 seconds for four rolls. The machine direction orientation (MDO) cold stretching unit can also be bypassed and the stretch film fed directly to the winder unstretched. In this case the machine achieves production speeds of 700 m/min.

Software provides for constant process

The machine builder's German subsidiary was in charge of designing the automation solution for the new cast line. It developed an automation concept distributed to several controllers, based on Siemens components. "Siemens gave us a lot of support in selecting and designing the components as well as in preparing the concept," reports Klaus Speith, development manager at Davis-Standard Germany.

A fail-safe Simatic S7-400F controls the line. Via Profinet, it coordinates the drive axes in the main part of the plant and provides for a constant, controlled lead tension in the MDO stretcher. There is an additional Simatic S7-400 CPU in the rack with the line control system to regulate the heating and profile at the sheet die. Davis-Standard software ensures constant processing and consistent high quality. The third key component in the control system is a compact Simatic Microbox PC with a real-time-capable WinAC RTX software PLC. It is designed as an autonomous system so that the machine builder can also offer its gravimetric feeding system as a stand-alone solution.

Relieving the line control

The winding unit is also autonomous from a control point of view and can process either short hand rolls with a film length of up to 300 m or machine rolls up to a diameter of 250 mm for unstretched film. A drive-based Simotion D motion controller ensures coordinated tension during the winding of sensitive film material. This highly dynamic system synchronizes approximately 40 drive axes, with a dancer and pulling station at the inlet acting as compensating buffer.

The set points are dynamically processed in several CU 320-2 PN control units of the Sinamics S120 modular drive system. The drive controllers also perform safety functions such as Safe Torque Off (STO) and Safe Stop (SS1). In hazard situations, Profinet and the Profisafe profile, in association with the higher-level F-CPU, bring the drives into a safe state to protect man, machine, and materials.

Prevention of input and wiring errors

Signals bundled by the hub are transmitted on the Drive-Cliq digital system bus to the winder control via Sinamics control units. The Drive-Cliq system used throughout the cast line links all the drive components via plug-in connections. The control unit reads the electronic type plates, and the correct parameters for motors and transmitters are automatically set. The last link in the fully integrated drive train com-

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prises customized Simotics S-1FK7 servo motors or Simotics M-1PH8 main motors. To allow the quickest possible data exchange, all the controllers communicate with each other via Industrial Ethernet and with the higher-level automation system, which connects the distributed components to the control system. The HMI devices, which are all Simatic Multi Panels, are also connected via Industrial Ethernet. Drives and distributed I/O-modules are linked to the corresponding controllers by Profinet, and Profinet-capable Scalance switches provide segmentation.

“Obtaining all the main components from one manufacturer eliminates interface problems and significantly simplifies engineering because it requires only one tool. PLC, drives, and also HMI devices are designed and programmed together, simplifying diagnostics as well as program maintenance,” explains Speith. ■

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