Ever-higher demands are being placed on the specific properties of biaxially stretched film. Films used in monitors must meet especially high quality standards. With MESIM (mechanical simultaneous stretching system), ANDRITZ Biax offers customers a flexible solution that not only satisfies these high quality standards but also accommodates a wide range of stretch ratios in the machine direction (MD) and the transverse direction (TD). The machine is built for speeds and widths almost unheard of up to now. Each machine features customized drive and automation technology to ensure that the complex processes can be performed at maximum precision and efficiency. “Siemens is our strategic partner when it comes to control systems, drive technology, and automation solutions,” says Robert Litzlhammer, project manager electrical engineering and automation at ANDRITZ Biax. “Siemens specialists also provide us with application, engineering, and service support.”

Sensors monitor motor synchronization

In contrast to other simultaneous stretching machines, the MESIM system is primarily mechanical in operation. The tenter frame is made up of a continuously adjustable monorail track system equipped with clips that are optimized for each specific product. Whereas the inner track controls the stretching in the transverse direction, the divergence between the two tracks determines the clip spacing and hence the longitudinal stretching in machine direction. “At line speeds of up to 250 m/min, it is crucial that the drives used to adjust the transverse and
machine directions of the clips work absolutely synchronously,” explains Julian Leingartner, director of technology and R&D at ANDRITZ Biax.

The clip chain is driven on each side by two air-cooled Simotics M-1PH7 inlet and outlet motors and four Sinamics S120 frequency converters. In addition, 26 Simotics S-1FT7 motors control the transverse stretch ratio and 12 Simotics S-1FT6 motors control longitudinal stretching. To ensure the synchronization and hence the quality of the film, the clearance between the clip chain and the articulated arms determined by the mechanical design is continuously monitored by 38 heat-resistant inductive sensors and controlled in real time by the automation system.

Almost maintenance-free automation components

These simultaneous stretching machines can manufacture products not possible to be produced on any other machine until now: “For one thing, materials such as polyamide, PET, PTFE, polyimide, acrylic polymers, polypropylene, EVOH (barrier resin), PLA (polylactic acid), and PC, among others, which either could not be processed or could be processed only with great difficulty on sequential machines, can be stretched biaxially. Secondly, the machines enable exact stretching of films at predefined angles. This allows very precise optical and mechanical properties to be obtained and reduces wastage because the entire final product can be processed further without requiring any preparation,” Leingartner adds. Automation of machine operations from extrusion to orientation and film handling is accomplished by three networked fail-safe Simatic S7-300 PLCs. Simatic Step 7 and a standard visualization system are used for programming. The machine components are fabricated and preassembled centrally at ANDRITZ Biax and installed as a complete machine at the customer’s location after shipment. Siemens technicians can assist customers in commissioning and servicing. However, the automation components require little servicing. An ANDRITZ machine that has been running in Argentina for eight years without requiring servicing is proof of this. This example also illustrates the high reliability of the Simatic – true to the motto “It runs and runs and runs ...”

Energy-intensive motor cooling eliminated

MESIM technology requires much less energy than electromagnetic systems and sequential machines do. The mechanical stretching process and the omission of heating and stretching rollers – except for the chill roll and the unwind module – lower the required drive power and reduce stress of the film material. Only two main drives and drives for controlling the longitudinal stretching are used. The motors are positioned outside of the hot zone and are equipped with drive shafts. This eliminates the need for energy-intensive cooling. The simultaneous stretching machine design also results in lower heating requirements. The material is heated only once, unlike in sequential stretching, in which the material is often heated several times. Additionally, simultaneous stretching with MESIM is done without roller contact, enabling top-quality film surfaces and minimal contamination of the material web. This in turn satisfies customers’ demands for high quality. The latest generation of MESIM machines is currently in operation at ANDRITZ customer sites in Japan and France. ANDRITZ Biax offers customers the possibility to test the benefits of MESIM as well as film formulations on a lab line, and to experience firsthand just what MESIM is capable of.

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Robert Litzlhammer, project manager electrical engineering and automation at ANDRITZ Biax

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