Sheet metal is used in mechanical engineering, for car bodies, and in electrical engineering. In these fields, uniform material strength and smooth surfaces are generally critical. To achieve these characteristics and optimize material properties, the rolled sheet metal is stretched and leveled in what are referred to as stretch-bend-leveling lines. Burghardt + Schmidt GmbH, based in Remchingen, Germany, is a worldwide leader in the manufacture of stretch-bend-leveling lines. Its automation partner is DAA Delta Technik GmbH, a long-time Siemens Automation Solution Partner.

The challenge of retrofitting key plants

“In addition to new systems, the number of retrofitting jobs is increasing as well,” says Jan van den Broek, managing director of DAA Delta Technik. Machines built in the 1980s are quite solid from a mechanical point of view, but replacement parts are no longer available, plant documentation is often incomplete, and source codes are unavailable as well. “Since those machines are key machines, there is an acute need for action to maintain and optimize production,” explains van den Broek. In cooperation with Burghardt + Schmidt, DAA Delta Technik has successfully realized many retrofitting projects all over the world – and recently in the United States. A prominent sheet copper manufacturer wanted to have its plant completely retrofitted over Christmas. The client urgently needed more flexibility for the implementation of customer demands and wished for improved plant usability. “We accepted the challenge – also because we knew that Siemens would be able to help us out on-site if needed,” says Peter Voß, sales engineer at DAA Delta Technik.

Centralized intelligence

The plant in the United States is powered by direct current drives. Existing converters were replaced by the new Sinamics DCM converters. Two Simatic S5-135 U units and the Simadyn D drive control system were previously used for control purposes. Special proportional valve control cards from the hydraulic supplier, integrated into Simatic S5, actuated the roller leveling supports.

The new concept is based on Simatic S7-400 with an integrated FM 458-1 DP. This freely programmable application component carries out the complex control of the eleven main drives linked to the system via Profibus DP. The proportional valves were connected to the control system via the Simatic ET 200S distributed I/O system. Thus, control and automation are combined in one central S7-400 rack. “We prefer concentrating intelligence in a single place to
be able to identify possible errors quickly and to transfer the memory card with the program onto a new module. An important advantage of the FM 458-1 DP is the possibility of intellectual property protection. The modules are interconnected via CFC and can be locked, which protects our know-how and offers the operator security that no undesired changes will be made to the program,” explains Voß.

Optimum usability and design

The plant is now visualized with Simatic WinCC, and the new operator panels are Simatic push-button panels. The openness of this solution increases flexibility and improves the usability of the plant. Helmut Mau, the project engineer at DAA Delta Technik who planned and also managed the retrofit, recalls the customer’s acceptance with pleasure: “The customer could no longer remember the exact capabilities of the machine. To be on the safe side, they had not run the machine at maximum speed for a long time. Now, the machine reaches 200 m/min again – at a higher quality.” The machine can now be quickly, easily, and precisely set for each job. The leveling results have been considerably improved. As a result, customer requirements were more than met – without any delays.

For van den Broek, what is unique about this solution is the integrated engineering: “Not only control and visualization go perfectly together, the Sinamics converters are also integrated so closely that we are parameterizing and diagnosing with Step 7 – also by means of remote diagnosis from anywhere in Germany, if necessary.”

Drive solutions with energy savings potential

DAA Delta Technik is also equipping new plants from Burghardt + Schmidt with the same automation and drive components, but with three-phase alternating current systems. “We are making use of energy recovery and the application of brake energy in the intermediate circuit of the drive line-up,” explains Voß. “The recovered energy can be used directly in the plant. As half of the drives are running in generator mode, the required power input is virtually halved. With Sinamics S120 and DCM we are flexible, as we can both modify new plants with alternating current systems and plants with the proven direct current technology and make them reliable in operation for many years to come.”