Coil feeding systems, machines, and accessories for sheet metal fabrication are one particular focus in the range of products offered by Dimeco Alipresse, based in the Besançon region of France. Another core element is flexible, automatic systems for punching, forming, and assembling. The most recent development for the company, which is part of the globally active Dimeco group, is the very first “fully electric” punching machine, the Linapunch® MC-E. Innovative control and drive technology from Siemens, the preferred choice for many years, forms the backbone of this new machine.

Servo-dynamic instead of hydraulic
The main difference compared with the former design: instead of rows of hydraulic stamps, the synchronous operation of two 1FK7 servomotors controls the stroke movement of a central slide plate using toggle lever kinematics. This process achieves up to 200 strokes per minute when punching and punching forces of $2 \times 200$ kilonewtons. The top and bottom dead centers of the toggle lever system are adjustable and can be configured freely, resulting in optimized power ratios with extremely short cycle times.

However, a newly developed component of the Linapunch® MC-E is crucial for ensuring the optimum number of strokes: punching is performed by two strikers (hammers) located between the slide plate and up to 52 tools in the machine. These strikers are operated independently of one another in the X and Y directions via servomotors and toothed belts, located above each punching tool pre-positioned in a transverse direction above the sheet metal in order to then perform punching. This positioning of the strikers starts with the slide plate moving upward; as a result, the full return stroke is used, saving valuable cycle time. As before, the stamping tools are mounted in pairs on the sides of the assembled cassettes, which are also operated independently of one another in a transverse direction via ball bearing spindles and servomotors. This enables the tools to reach almost any point on the sheet metal as it is being transported lengthways through the machine by the coil.

Motion controller for optimum dynamics
Movement is calculated and coordinated by Dimeco’s Simostar control system, which features the drive-based motion control system Simotion and a Simatic MP 377 Multi Panel with a 12-inch touch display. The centerpiece is the Simotion D435 control module, which in this design is integrated into the Sinamics S120 drive system. This drive system comprises a common supply and multiple power modules, which coordinate the positioning of a total of 13 axes. In addition to the nine servo-axes in the feeder and basic machine, four additional servo-axes are located in the customized stacking table. The motion control system also monitors the working areas of both punch heads to eliminate collisions and ensuing damage. In addition, there are various auxiliary and conjugate axes, some of which are operated by frequency converters from the Micromaster 440 series and some by motor starters in the Simatic ET 200S distributed station. A scalance switch compatible with Profinet connects the system to the user’s company network and enables maintenance and diagnostics to be performed on the system remotely right up to the drives.
With the mobile Simatic MP 377 Multi Panel connected to the main machine – used for programming, operating, and monitoring the Linapunch® and managing tool, parts, and job lists – a thin client of the same design and with an identical user interface is connected via Industrial Ethernet. This allows the decoiler and straightener to be installed in a user-friendly position at the infeed.

**Twice the number of strokes, half the power consumption**

“Almost doubling the number of strokes and halving energy consumption compared to similar hydraulic machines are clear advantages for operators of our Linapunch® MC-E,” says Jean-Louis Nou, head of electrical engineering at Dimeco Alipresse. Moreover, the MC-E is now much more compact. It also offers a high degree of flexibility, as the operator can create new programs or edit existing programs while production is running, and transfer them to the control system at the push of a button. This means that even the smallest of batch sizes can be processed flexibly. In addition, a broad range of sheet metal lengths can be processed directly from the coil, adding to the high degree of flexibility.

The French company has always implemented complex automation solutions such as these without any outside assistance. Dimeco was one of the first manufacturers of punching machines to introduce Simotion as soon as it came onto the market. So today you can build on the experience gained from more than 250 systems in the field. The next stage in development will be an even better, dynamically regulated method of coordinating the decoiler, straightening machine and punching machine, to eliminate the loop that is currently commonly seen. “We rely on Siemens, because as a global company we are happy to benefit from the presence of a prestigious provider in all our markets,” says managing director Laurent Deschamps. “By doing this, we have quick access to all of the components and expertise it offers. And that is something our customers value too.”

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Laurent Deschamps, Geschäftsführer

With 1FK7 servomotors, the Linapunch® MC-E punching machine achieves the optimum number of strokes and high punching forces

Photos: Dimeco