■ ebu Burkhardt GmbH, Germany

New Approaches in Metal Forming

A servo-electric drive and control unit expands the possibilities of cutting-edge automatic punching machines. The machine manufacturer is delighted with the flexibility gained as a result.

The core competence of ebu Burkhardt GmbH in Bayreuth, Germany, lies in the punching and metal-forming segment, with a focus on the manufacture of automatic punching machines. The product is the same as always, but the technology has evolved over time. While in the past an appropriately large flywheel mass ensured that the force required during the punching process was available, the Bavarian company now uses a servo-electric drive and control unit for this purpose.

Creation of individual motion profiles
At the metal-forming specialist’s premises in Bayreuth, this task is carried out in part by two
Simotics T-1FW4 heavy-duty torque motors, because with the help of this cutting-edge technology, the required energy can also be supplied by means of an electric flywheel mass. The mechanical flywheel mass is thus rendered obsolete. The major advantage is that the servo-electric drive solution makes it easy to transfer individual motion profiles to the plunger and thus to the tool. The use of servo technology will enable the company to pursue completely new possibilities in metal forming. Jörg Berger, managing director of ebu Burkhardt GmbH, explains the decision in favor of servo technology: “Servo technology holds massive potential. It’s very flexible in use. What’s more, it can be used to achieve superior parts quality.”

**Intelligent temporary storage of electrical energy**

Berger continues, “Regardless of new technology, at the end of the day the energy balance must be right.” To ensure this, the excess electrical energy from the punching process is stored temporarily in other systems. This storage takes place with the help of the Sinamics S120 frequency converter, which determines the torque motor’s speed. Thanks to the integrated energy-regeneration capability of the water-cooled power sections, the unit is able to induce the recovered electricity from the braking processes into the DC link. The electricity is then available again for the next punching process. There is also another option for storing excess energy. For this purpose, an additional asynchronous motor is brought up to speed in the automatic punching machine and thus serves as a kinetic energy accumulator. At the moment of punching, it acts as a generator and delivers the additionally required electricity when needed.

**Servo technology enables maximum flexibility**

All processes are controlled by a Simotion 435D. But the motion control unit can handle more than just motion control. Because of its efficiency, it also offers the option of controlling the whole machine – meaning that no additional controller is required. Berger sums up: “The servo-electric drive technology combined with Simotion allows us to get considerably closer to the technological limits than was previously possible.”

The greatest advantage of the servo-electric drive technology, however, is the ability to adjust flexibly to production processes and different workpieces. Berger reports, “We can map around 80 percent of the standard machines with this new solution.” The motion control unit can store different motion profiles, which the servodrive then transfers to the workpiece. Berger says, “No one yet has a curve changeover of this type that boasts such speed.” These variable motion profiles also make incremental metal-forming processes possible, which, in turn, allow not only the achievement of superior parts quality but also the realization of process improvements.

**Leading position thanks to system partner**

According to Berger, “We have gained this technological advantage in tandem with our system partner Siemens.” The servo technology described was developed and brought to market readiness thanks to the additional support provided during configuration, design, and commissioning. The machine manufacturer focuses specifically on integration, following the Totally Integrated Automation model offered by Siemens. Berger stresses, “We benefit hugely from the fact that our system partner has a large number of tried-and-tested solutions in its portfolio that are all coordinated with each other. Due to this ongoing close collaboration, we also know at an early stage what innovations we can expect in the field of open-loop, closed-loop, and switching technology. This helps us meet our goal of building innovative machines.” Berger comments happily, “After all, we want to become a technological leader – and with the new servo technology we are doing just that.”

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