With two heavy-duty torque motors, ebu Umformtechnik achieves a press force of 1,000 t on servo-presses and applies this force optimally to the tool in every operating mode. In the new special pendulum mode, the output can be increased by up to 50%.

In the near future, yet another user will be cost-effectively producing sophisticated formed parts and deep-drawn parts using multistage tools and progressive dies on a 1,000-t servo-press from ebu Umformtechnik GmbH based in Bayreuth, Germany.

The centerpiece of the press is the DS 1000 double-servo drive, consisting of two torque motors from the new Simotics T-1FW4 Heavy Duty series from Siemens. The water-cooled permanent-magnet synchronous motors (shaft height 400 mm) have a compact design have a high power density and a peak torque of around 30,000 Nm. Using a planetary gear, this results in a torque on the eccentric shaft of around 1 million Nm. It was thus possible to also build this press – currently the manufacturer’s largest of its kind – with only two motors.

The driving power required for any new servo-press, and consequently the configuration of the drive assembly, is determined by the press manufacturer using a newly developed design program for dimensioning. For the 1,000-t machine, two 800-kW single-axis motor modules were specified for each torque motor.

Motion control with added value

A Simotion D445 precisely controls the high forces, and the parameters are set locally via the established curve generator, which ebu has supplemented with additional operating modes. The operator enters important basic data for the metalforming process, including tool opening and closing angles, position, and stroke before and after BDC, as well as the target stroke rate, and whether it should oscillate or not. The system checks the plausibility and quickly calculates individual energy, process, and quality-optimized ram kinematics for every tool or form part. It automatically takes into consideration all machine-specific maximum values and the optimum forming speed.
Individual operation for flexible production

Depending on the tool, molded part, and automation, the user can choose between operating the press in normal servo circulation mode, in conventional pendulum mode, or in a special pendulum mode developed together with drive specialists from Siemens. For large stroke dimensions, where a transfer system with relatively slow forming speed is used, the special pendulum mode is particularly beneficial. Here, the entire available rotational speed range of the torque motor, including the field weakening range, is utilized (up to 700 min⁻¹). The stroke necessary to achieve tool impact can be moved through even more quickly and then be formed slowly and carefully. Subsequently, maximum acceleration provides the required clearance for transfer. “In practice, this means we achieve stroke rates even 30% to 50% higher than in normal pendulum mode. This is not possible with any other motors we are familiar with due to their less pronounced field weakening range,” says Dr. Michael Altgott, engineer and head of mechanical construction at ebu Umformtechnik.

Additionally, the motion profile can be changed for special production tasks by using the multipoint operating mode. This also works for the pendulum mode. For this purpose, the user determines the ram speed at various points on the line of movement, for example, to define longer hold times or different acceleration ramps.

Energy efficiency built in

Larger ebu presses feature energy storage as standard, which recovers and delivers braking energy exactly when and as needed via the DC link. With this energy storage, excessive power and torque peaks can be avoided, thus limiting the driving power to be installed to an average load. This means a total peak output of 3.2 MW is safely covered with a connected load of 300 kW, for example, and the energy efficiency is thereby increased significantly.

The company’s experience with the construction and design as well as the flexible application of the 1,000-t servo-press has been good – so good, in fact, that the press manufacturer has taken on the next challenge and is planning a 1,250-t servo-press. Altgott concludes: “The means and methods mentioned, as well as the control and drive technology from Siemens, offer us maximum safety and reliability, meaning that we can now deliver our presses, install them, and put them into operation at the customer’s site without any prior construction here at our plant. This saves us a lot of time and money.”

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