

Double the performance

Servo-pumps: A project recently carried out on a hydraulic press by Exner Pressentechnologie together with Siemens shows that changing over from conventional servo-valve technology to servo-pumps is worth the effort.

In innovative servo-pump systems, pressure and flow rate are no longer controlled by the choking effect of valves, but rather by a servomotor's torque and speed. This means that energy is supplied only when it is actually needed at the hydraulic cylinder. The result? A considerable increase in energy efficiency – as is confirmed by the real-world example presented here.

More than 50 years of experience

Exner Pressentechnologie GmbH was founded in Witten-Herdecke, Germany, by Ludwig Exner more than 50 years ago. A manufacturer of hydraulic presses with forces of between 200 and 30,000 kN, the company is active in both national and international markets. "Our business is focused on Germany and neighboring European countries, however," says technical manager Michael Lange. Well-known firms from the automotive, electronics, medical technology, household appliance, minting, jewelry, eye-wear, and watch industries are among the Westphalia-based firm's customers. Exner was acquired by the present-day Schubert Group in Ennepetal around seven years ago, and business operations were shifted to this site. The Schubert Group now has a total of 90 employees – 35 of whom work for Exner. Describing the Exner presses, Lange says that they are "extremely robust and durable, with a wide product range, and highly customizable."

Failsafe automation

Exner uses only Siemens products when designing press control systems – the two firms work closely together. The favored control system is the Simatic S7-300 PLC series. A Simatic S7-315F controller is being used in a new hydraulic press. This choice enables the design of a failsafe automation system for plants with increased safety requirements.

The integrated interface can also be used to connect fail-safe I/O devices. The entire system meets safety requirements up to SIL 3, in accordance with IEC 61508, and PLe, in accordance with ISO 13849.1.

High energy efficiency

The backbone of the press automation set-up is a Siemens application for servo-pumps, which offers a solution for energy-saving hydraulic applications. Unlike with a conventional hydraulic solution, and thanks to dynamic direct pressure and volume regulation by means of a variable-speed servomotor, complicated control systems are not required, thus reducing energy consumption by more than half. "The oil pressure in the plant is regulated directly via the connected Sinamics S120 drive system," explains Bernhard Kreutzer from Siemens in Essen, who looks after Exner. Using the Siemens solution has considerably reduced the energy consumption of the press. The transfer of heat into the structure has also been reduced, meaning that less heat needs to be dissipated, once again saving energy.

A custom-fit solution

The flexibility of the system means that it can be configured to meet customer requirements. Kreutzer confirms: "If we know the key details for the press, we can offer a solution that perfectly meets the customer's needs." In terms of control, the solution was implemented in such a way that the positioning of the ram is left to Exner's control system, and a speed interface with the servo-pump is created from there. The main control system, and not a proportional valve, now controls the servo-pump's set-point value for speed. "That was the best way to integrate the servo-pump," says Kreutzer, as it allowed Exner's standardized control system to



Wolfgang Geyer

A view of the inner workings of a gear pump whose operation is controlled by a servomotor

be maintained. "Once Siemens had delivered the servo-pump we did the rest – organizing the entire control cabinet, building the HMI, and performing the overall integration. Commissioning was done in three days," says Lange.

A considerable increase in performance

The servo-pump application brings the company other benefits in addition to significant energy savings. For example, control accuracy has improved considerably. "Compared with our standard presses, which had an overshoot of 10% to 15% during adjustment, we are at around 1% with the new solution – all within a very acceptable period of time," emphasizes Lange. Above all, however, it is the machine's increase in performance that Exner is particularly happy with: the press used to achieve 20 strokes per minute, and now it achieves 40. That is an unexpected 100% increase. One thing is very clear: the engineers involved have been very pleasantly surprised. ■

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Benefits of the servo-pump application:

50%
energy savings

Compared with standard presses, which had an overshoot of 10% to 15% during adjustment,

we are at around 1%
with the new solution

Increase in performance:
from 20 strokes per minute to

40