Servo presses for use in forging operations are considered a new technology, and many manufacturers are still considering or are only beginning to explore the capabilities. Not inconsequentially, servo presses also represent a significant investment. One might then ask: Why should a profitable midsized forging company specialized in the hot or warm forging of high-precision automotive components, delivering the required results with conventional mechanical presses, acquire a servo press?

Nicolas Daulon is the director of Setforge Gauvin, which is one of the forging subsidiaries of Setforge and part of French manufacturing company Farinia Group. According to Daulon, “In warm forging we struggle for versatility and competitiveness. We always want to deliver more components produced in shorter cycle times. This is what a servo press does for us. It combines the flexibility of a hydraulic press with the high production speed of a conventional mechanical press.”

Thanks to this investment, Setforge Gauvin’s team hopes to increase its product production rates and improve the quality of their warm-forged non-axisymmetric automotive components. Before purchasing the servo press, the company carefully researched all the available technologies to find the one that best fits the requirements and standards of warm forging.

Vertical-Crankshaft Servo Press for Warm Forging

Setforge Gauvin chose the vertical-crankshaft Schuler press with link drive instead of a rod-crank system. Flywheel, clutch and brake are replaced by two high-capacity torque motors, directly engaged with the crankshaft. The power is transmitted from the motors to the driveshaft.

Since this is a free-motion press, the stroke, slide motion, slide position and speed are programmable and thus highly adaptable to specific production needs. Thanks to Schuler’s servo-direct technology (SDT), the kinematics of the press can be adjusted to the requirements of every single forming cycle.

This is not the case with a conventional forging press, in which the forging cycle can only run at the speed of the slowest requirement in the entire process. With the servo-driven press, however, the motor can accelerate or reduce the speed within a single cycle of the press stroke. Thus, every forging operation...
happens in reduced cycle time at the required speed to deliver optimal results.

Taken together, the new servo press covers all general benefits of conventional multistage mechanical presses for automated warm forging. Additionally, the servo press operates faster, is more versatile and delivers components of better quality.

How does warm forging benefit from a servo-driven press?
Warm forging is more cost-efficient for some applications. The process has been used in manufacturing since the 1970s. Since then, it has proven beneficial to the production of precision rotationally symmetric components. These are generally made of high-alloy materials and require intermediate annealing. They are mostly components of critical importance to the automotive industry that can be manufactured neither by cold nor hot forging due to the following reasons:
- The steel grades for cold forging are of relatively high carbon content.
- Hot forging would require horizontal production with flash because of the significant machining allowances.

Warm forging is a demanding process that requires sound engineering skills and knowledge and high-quality presses.

The warm-forging manufacturing process occurs within the temperature range of 650-1000°C (1200-1830°F), depending on the material used and the component being processed. This is usually above the work-hardening temperature of the workpiece and below the temperature at which scale forms.

If the forging temperature is below the transformation point of 740-770°C (1364-1420°F), the material should undergo a preliminary heat treatment. This temperature range is used for parts of moderate complexity that don’t require heat treatment after forging. For parts of greater complexity, the forging temperature needs to be higher than the transformation point.

Warm forging falls between cold- and hot-forging techniques and combines the benefits of both. More specifically, it provides a wider range of shaping options compared to cold forging and greater precision compared to hot forging. Warm forging generally requires higher engineering skills (e.g., for tooling design, cooling and lubrication), however, and a dedicated forging press.

Warm forging is an important milestone at Setforge. Performed as a single production technique (or as an extension to cold and/or hot forging), our warm-forging manufacturing process delivers mechanical components of premium quality.

Benefits of Warm Forging on a Servo Press
The bottom line regarding warm forging on a servo press is about decreasing the length of the forging cycle and increasing productivity. Here are some other benefits to the process and the dedicated equipment.
- **High Precision** – The high accuracy for each point of the vertical-crankshaft servo press guarantees the high precision of the entire warm-forging process, yielding superior component quality and long die life. Furthermore, this accuracy is not dependent on the press size.
- **Increased Productivity** – Thanks to the adjustability of the press stroke length, cycle time can be significantly reduced. The stroke of the 630-metric-ton press is decreased from 800 mm to less than 600 mm. Schuler SDT systems increase productivity from 30% to more than 150% compared to conventional mechanical presses. Servo-driven presses are smaller than conventional ones, but they possess far more

### ABOUT SETFORGE

Setforge is the forging subsidiary of Farinia Group – a leading French company specialized in material transformation. The other activities of the company include a casting division (FMGC), an additive-manufacturing division (Spartacus3D) and an IT division (Safir).

Setforge, which accounts for 74% of Farinia’s annual revenue, is a leading supplier of high-quality forged components to a range of industries. The company owns state-of-the-art forges equipped with cutting-edge technologies for cold, warm and hot forging. Farinia believes in diversity and innovation and keeps on investing in new machines for optimized manufacturing and improved quality.

For additional information, please visit www.farinia.com
capacity to accelerate production cycles.

- **Flexibility** – The slide motion of the vertical-crankshaft servo press is freely programmable and thus adaptable to various movements. The speed of the slide can be decreased during transfer to allow the die to cool prior to the next forming operation, which requires higher speed for reduced pressure and contact time. The result is longer die life and improved component quality.

- **Economic Efficiency** – Schuler presses with SDT come with a blank loader, crossbar feeder and end-of-line system that determine increased output rates as short, fully automatic die and tooling change times. This leads to a significant reduction in per-unit part costs.

- **Energy Savings** – The power-save mode (braking energy-recovery system) of the vertical-crankshaft servo press for warm forging optimizes energy consumption by using the electricity generated when reducing the speed of the motor.

**Outlook**

Demanding customers and unstable markets are only some of the challenges facing the forging industry today. The sector has undergone significant changes in recent years because of global competition. This is mainly initiated from cheaper Chinese production costs, competing manufacturing processes and various environmental and economic factors. Although the importance of forging in a wide range of current and future industries cannot be denied, the sector should improve its ability to deliver highly competitive products as soon as possible.

The slowdown in the automotive sector had a significant impact on the warm-forging industry. Only companies ready to adopt new technologies to optimize the forging process can survive industry downsizing and become even stronger. Setforge realizes the importance of cost-effectiveness, precision, greater flexibility and reduced energy consumption. The investment in a vertical-crankshaft press with link drive for warm forging is absolutely worth it, and it will fully optimize the entire manufacturing process.

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