

Efficient Hydraulic Forming

# Forming energy consumption



The largest forging press currently installed in Switzerland is at Imbach & Cie AG Solutions in Metal. It is equipped with EHF technology and works multifunctionally with a pressing force of up to 3,000 t

How can energy be used optimally? Where can energy be saved in the workflow? Does it make sense to switch off during brief downtimes? Schuler provides answers to these questions and develops energy-saving solutions applicable to all performance classes of metal forming. One of these solutions is Efficient Hydraulic Forming (EHF). Schuler uses this technology to minimize the energy requirements of hydraulic presses.

Thanks to their flexibility, hydraulic presses are used in a variety of applications. With their high pressing forces, large share of full-load operation, and enormous drive power, however, their energy consumption is a major cost factor. Jürgen Woll, head of electrical design for solid forming and leader of the energy efficiency project team in the Schuler Group's Hydraulic Division, saw a need for action here: "It's important for our customers today to operate in an energy-efficient manner. We took the opportunity to tackle the issue at the right moment: with Efficient Hydraulic Forming – or EHF for

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short.” One of the most modern multi-functional forging presses in the world is now equipped with EHF. The Swiss company Imbach & Cie AG Solutions in Metal uses 3,000 t of pressing force to work all kinds of steels, as well as aluminum alloys, titanium, and copper. The metalworking takes place using an automatic EHF mode, which is defined via a programmable step sequence – and a total of four modules.

### Switch off during breaks with EHF Standby

At full load, asynchronous motors have a high level of efficiency – but the efficiency decreases significantly in no-load condition. EHF Standby reduces energy consumption by avoiding the usual starting characteristics of drives. Even the shortest break can therefore be used to save energy. During a standstill, all the main drives are switched off. When the operator activates the master switch, the electric motors are hydraulically accelerated to the required speed and switched on electrically. The process is completed in a split of a second – that is 20 times faster

than in a conventional run-up, and also highly efficient. It reduces energy consumption by 80% compared to a star-delta start sequence.

### Avoid energy loss with speed-controlled auxiliary drives

The second module provides an innovative solution to an old problem. Depending on the condition of the system, the auxiliary functions are powered acyclically. Usually the auxiliary units run at a constant speed. However, the intelligent speed-controlled drive of the EHF only supplies the auxiliary units with energy when it is needed – thus minimizing the no-load losses. This is achieved through the use of Sinamics G120 frequency inverters in conjunction with Simotics servomotors.

### Save energy with efficiency-optimized hydraulics

The third module optimizes the efficiency of the hydraulics by means of flow-optimized components. Control valves in the main circuit have been eliminated, with servo-pumps taking

over their function. The advantage of this approach is that standard hydraulic oils can be used and oil wastage, pressure peaks, and cooling power are reduced. Furthermore, the number of components in the main circuits is also reduced, which keeps the system easy to maintain.

### Feeding energy back into the production process

With the fourth module, energy stored in the system is fed back into the production process – such as the potential energy of the ram during fast approach or the energy from the compressed oil when releasing. With the aid of the pumps, the draining oil drives the Siemens electric motors, which in turn generate electricity – free from harmonics and circuit feedback.

### Plans for the future

Significant energy savings can be achieved in hydraulic presses with EHF. However, Schuler already has other items on the agenda – such as the display of the power and energy consumption under various operating conditions and the use of energy-efficient components in all Schuler presses. Woll says, “Together with Siemens, we want to introduce energy analysis too.” After all, Schuler’s slogan is “Forming the Future,” and that now needs to be accomplished with significantly reduced power consumption. ■

### EHF – the advantages at a glance

- 20% – 60% energy savings
- Short amortization period and low maintenance costs
- Very easy maintenance
- Automatic functioning, without operator intervention
- Energy savings and optimization in all operational phases
- Ability to retrofit existing presses
- Modular implementation

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