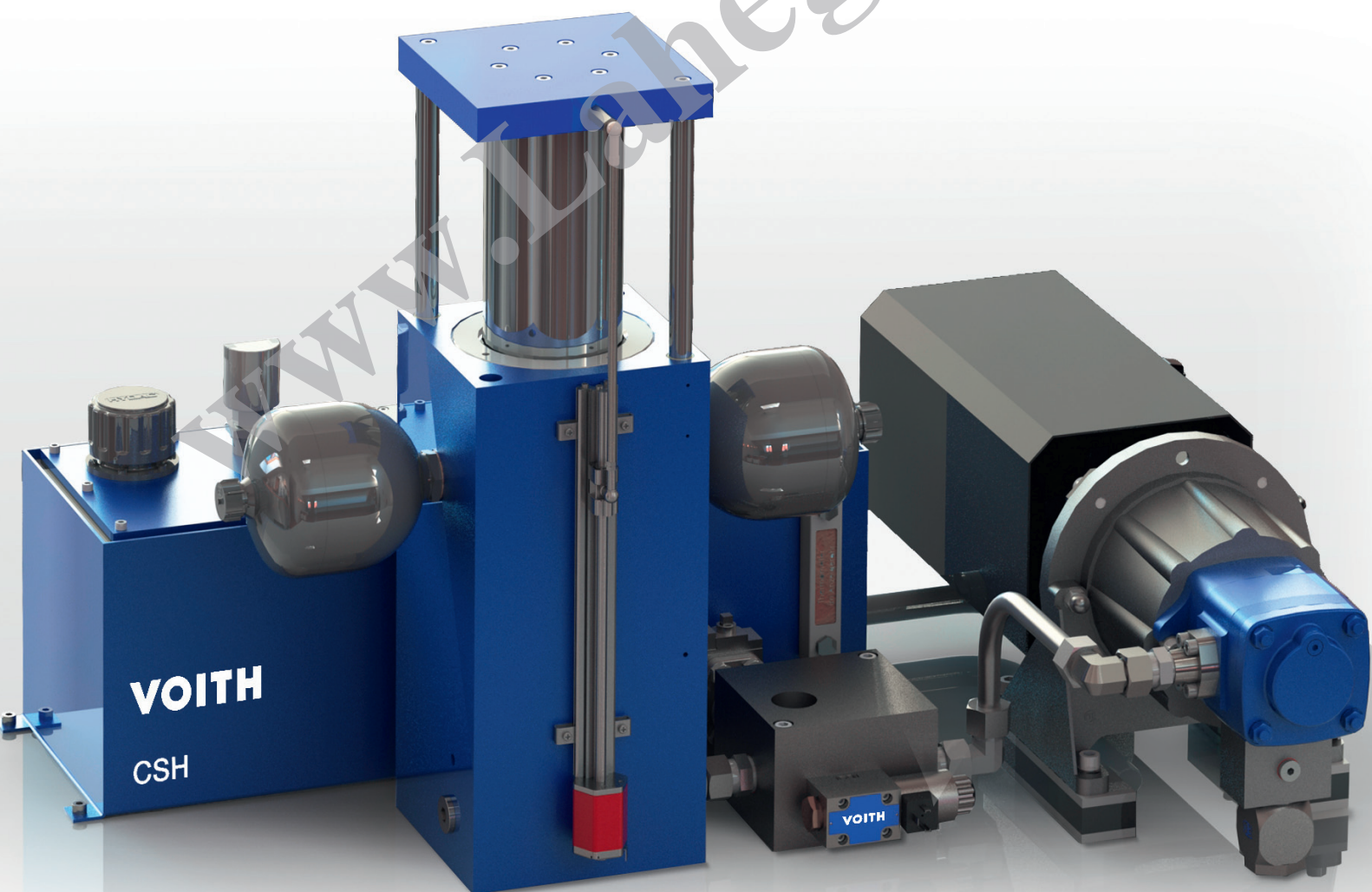


**VOITH**

Saving Energy while  
Increasing Productivity.  
Servo-Hydraulic Drive CSH  
for Die Cushion



# Drive Your Die Cushion with Innovation

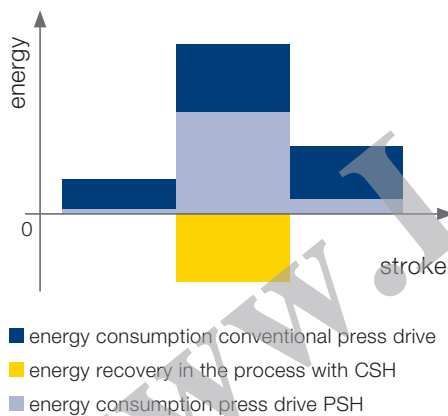
In deep drawing presses, two subsystems play the decisive role for productivity and workpiece quality: the press drive and the die cushion. A precisely defined blank holder force ensures controlled flow of the material into the drawing die and is the basis for a stable forming process. The innovative Voith CSH Die Cushion Drive provides you with a highly flexible servo-hydraulic drive system. With this drive, you actively and precisely set the curves for position, force and speed – and you can do this over the entire deep drawing process. Your die cushion becomes a servo cushion!

Conventional die cushion drives and control systems usually incur losses. Often, these drives require cooling systems that consume additional energy. Even the energy that the motion of the ram introduces into the die cushion is almost always lost in the form of thermal energy (heat).

With the Voith CSH Die Cushion Drive, this is completely different: The servo technology is inherently economical in energy consumption. In addition, it is possible to recover virtually all of the energy of the ram motion in the form of electrical energy. As a result, you considerably increase the energy efficiency of your press. You save up to 80% of the energy costs compared to a conventional hydraulic die cushion drive without servo technology.

The CSH Die Cushion Drive represents a unique solution both for the modernization of existing presses and for new systems. Customarily, productivity can be increased by 50% and more. You can fabricate complicated deep-drawn parts economically with a reliable process. The press produces at a remarkably lower cost/piece. You enhance your position over that of your competitors.

## Comparison of Energy Consumption



## Technical Data (standard versions)

Die cushion force	200 to 10,000 kN
Rated power	up to 2 MW
Position-control accuracy	up to 0.01 mm
Force-control accuracy	up to $\pm 1\%$
15.4-inch TFT LCD control panel with intuitive touchscreen operator interface	
Communication: PROFIBUS/PROFIsafe, PROFINET, Ethernet, USB	

# CSH Components

## Scope of delivery

- Servo motor pump group
- Cylinder
- Power Pack (optimum filtering circuit, cooling,...)
- Accumulator
- Cabinet
  - Converter
  - Control Simatic S7
  - Software package
  - Control buttons
- Sensors
- Cable with a defined length for:
  - Sensors
  - Motor
  - Valves of scope of delivery

- Performance Fluid PF-400 (For the press drive PSH, exclusive use of PF-400 is mandatory.)
- Software package
- Retrofit package
- Automatisation

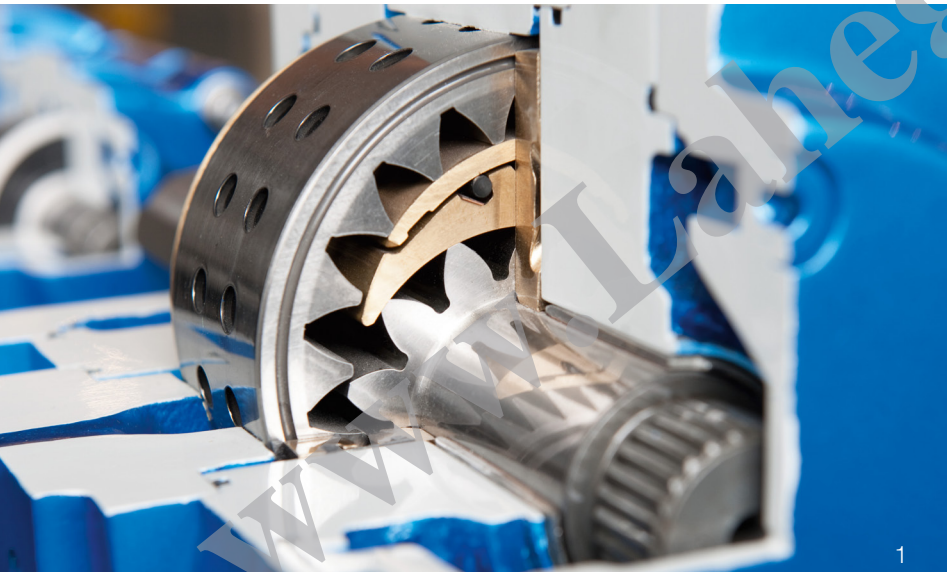
## Option

- Safety technology

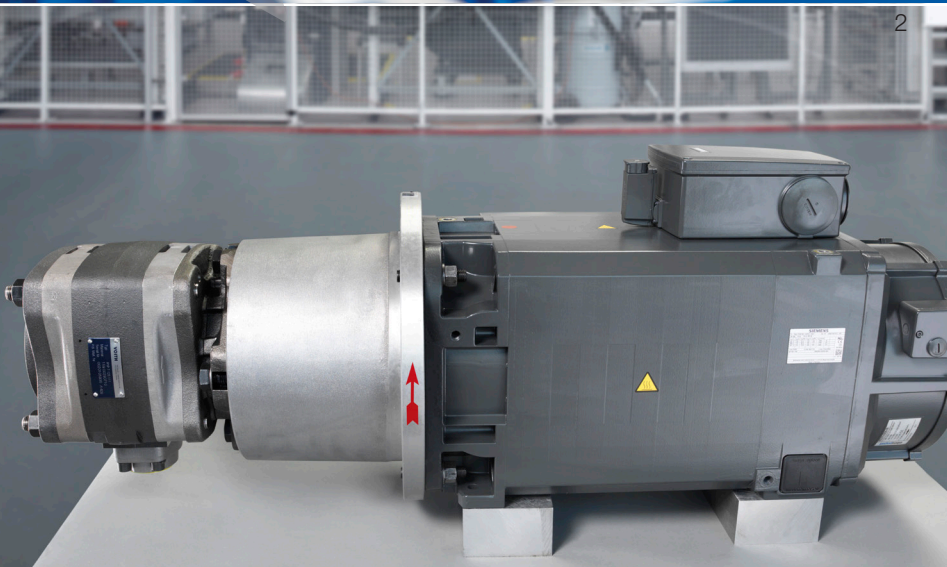
## Advanced scope of delivery

- Advanced safety features in Simatic S7 CPU

- 1 Cutaway of internal gear pump model IPVP
- 2 Servo pump
- 3 Cabinet



1



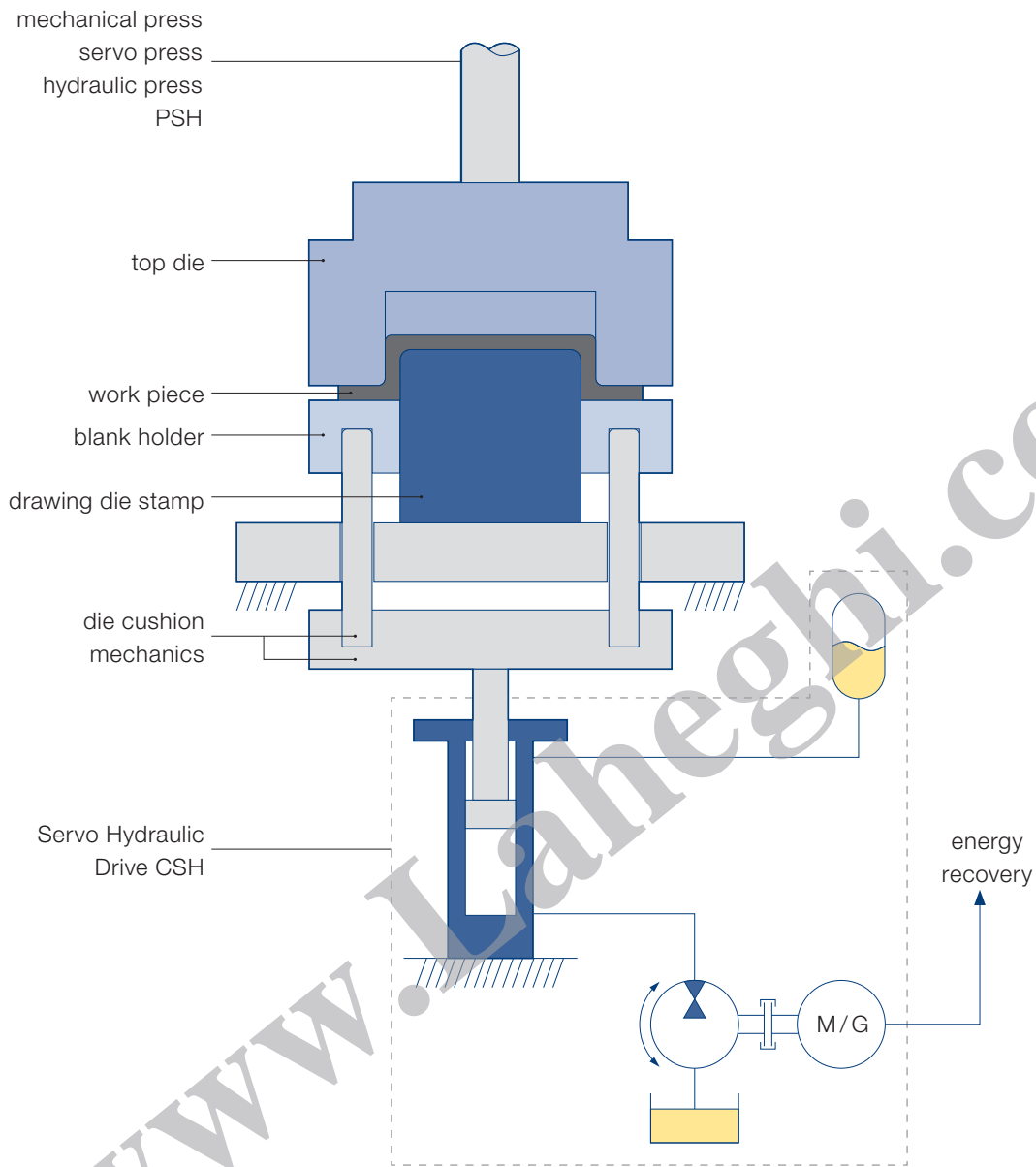
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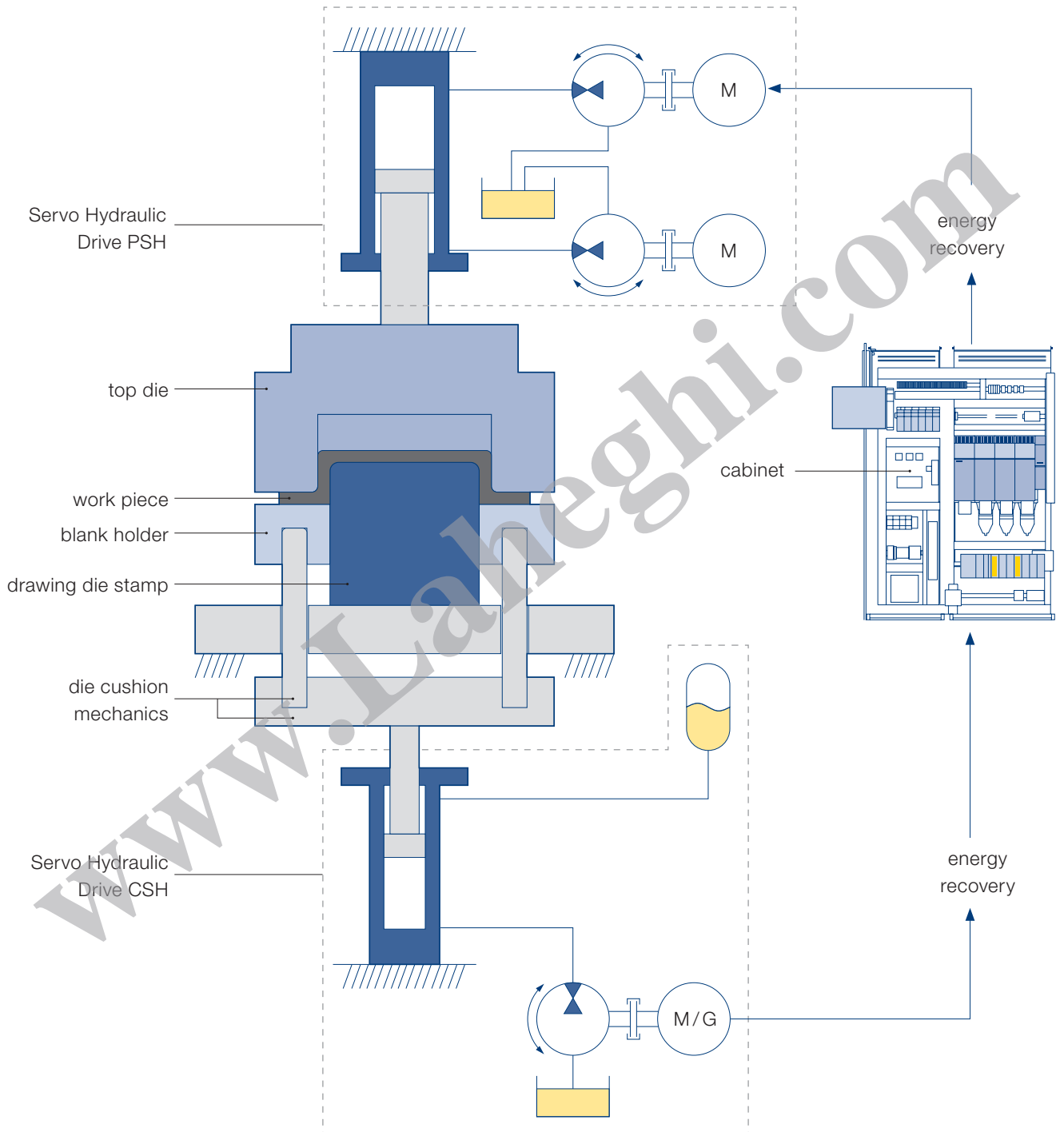
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# CSH Operating Principle



# PSH-CSH Combination, 80% Energy Saving



# Advantages Using CSH

Features	Advantages	Benefits
<ul style="list-style-type: none"> <li>Actively controlled servo pump with a servo motor that operates as a motor or generator.</li> <li>No classic valve and control technology.</li> </ul>	<ul style="list-style-type: none"> <li>Even the energy that the motion of the ram introduces into the die cushion can be recovered in the form of electrical energy.</li> <li>The energy efficiency of the die cushion drive is exceptionally high.</li> </ul>	<ul style="list-style-type: none"> <li>+ You save up to 80% of the energy costs compared to a conventional hydraulic die cushion drive.</li> <li>+ The press produces with a low cost/piece; you enhance your position over that of your competitors.</li> </ul>
<ul style="list-style-type: none"> <li>Control modes provided by the servo pump:               <ul style="list-style-type: none"> <li>– Position (freely selectable)</li> <li>– Speed over stroke</li> <li>– Force over stroke</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Design freedom for the entire deep drawing process with regard to the curves for position, speed and force (servo cushion!).</li> <li>The adjustable blank holder force allows arbitrary characteristics of surface pressure – even decreasing or oscillating ones.</li> <li>Deep drawn parts can be fabricated with a reliable process.</li> </ul>	<ul style="list-style-type: none"> <li>+ With a reliable, repeatable deep drawing process, you increase the productivity of the press by up to 50% – even more in individual cases.</li> <li>+ A controlled, reproducible die cushion force characteristics results in a defined material flow and avoids significant creases and cracks in the workpiece.</li> <li>+ Complicated deep drawn parts can be fabricated economically and with the fewest rejects.</li> <li>+ The forming depth of workpieces can be expanded considerably.</li> </ul>
	<ul style="list-style-type: none"> <li>Pre-acceleration of the die cushion can be selected as desired (synchronization).</li> </ul>	<ul style="list-style-type: none"> <li>+ The impact caused by the top die contacting the workpiece is minimal. The quality of the parts produced improves due to the reduced damage to the surface.</li> <li>+ The dies and the press itself experience a reduced load and have longer service lives. This reduces your operating costs significantly.</li> <li>+ Noise emissions lowered by up to 6 – 8 dB(A) reduce the effort and the costs for noise abatement.</li> </ul>
	<ul style="list-style-type: none"> <li>Decoupling the motion of the die cushion from the ram motion is easily possible after reaching bottom dead center.</li> </ul>	<ul style="list-style-type: none"> <li>+ The die cushion with the workpiece can be moved independent of the ram.</li> <li>+ Following the draw process, no counter forces from the die cushion act on the ram. Reduced loading increases the lifetime of the die and the press.</li> </ul>
	<ul style="list-style-type: none"> <li>A part ejection function can be programmed.</li> </ul>	<ul style="list-style-type: none"> <li>+ Your deep drawing press produces large and complicated workpieces without damage.</li> </ul>

# Advantages Using CSH

Features	Advantages	Benefits
<ul style="list-style-type: none"> <li>• (Servo) hydraulic solution.</li> </ul>	<ul style="list-style-type: none"> <li>• The drive has safe, fast-acting overload protection.</li> </ul>	<ul style="list-style-type: none"> <li>+ You avoid significant damage to the press in the event of incorrect operation or a malfunction.</li> <li>+ Restarting is quick.</li> </ul>
	<ul style="list-style-type: none"> <li>• The number of wear parts is low; they have a long lifetime, are inexpensive and easy to replace.</li> </ul>	<ul style="list-style-type: none"> <li>+ The die cushion drive has long maintenance intervals and short maintenance times.</li> <li>+ The availability of the press increases.</li> </ul>
<ul style="list-style-type: none"> <li>• Modular, simple design.</li> <li>• Few components.</li> <li>• Small oil tank.</li> </ul>	<ul style="list-style-type: none"> <li>• This keeps the planning effort associated with system integration low.</li> <li>• The drive can be scaled for virtually all deep drawing presses.</li> </ul>	<ul style="list-style-type: none"> <li>+ Short development times save you planning costs.</li> <li>+ The drive is ideal both for new presses and for modernizing or retrofitting.</li> </ul>
	<ul style="list-style-type: none"> <li>• The die cushion drive has a simple design.</li> </ul>	<ul style="list-style-type: none"> <li>+ The drive is operationally reliable and has high availability.</li> <li>+ Low maintenance and repair costs.</li> </ul>
	<ul style="list-style-type: none"> <li>• The oil volume in the system is up to 80% less than for a conventional hydraulic die cushion drive.</li> </ul>	<ul style="list-style-type: none"> <li>+ The small effort for oil management has a positive effect on operating costs.</li> </ul>
<ul style="list-style-type: none"> <li>• The drive can be programmed via a 15.4-inch TFT LCD control panel with an intuitive touchscreen operator interface.</li> </ul>	<ul style="list-style-type: none"> <li>• The drive has a high degree of flexibility and is suitable for all die cushion applications.</li> <li>• The control system is pre-engineered with standard software.</li> </ul>	<ul style="list-style-type: none"> <li>+ Integrating the drive into the press is fast, easy and economical.</li> <li>+ This keeps your startup effort and costs low.</li> </ul>
	<ul style="list-style-type: none"> <li>• The HMI interface is convenient and modern.</li> <li>• All relevant parameters can be programmed and visualized on site.</li> </ul>	<ul style="list-style-type: none"> <li>+ The initial training of your operating personnel is short.</li> <li>+ Fast, informative process visualization and monitoring is possible on site.</li> </ul>
	<ul style="list-style-type: none"> <li>• The drive system has its own diagnostics and is Industry 4.0 ready.</li> </ul>	<ul style="list-style-type: none"> <li>+ Maintenance needs can be detected early and extremely quickly.</li> <li>+ Downtime of the press is considerably less.</li> <li>+ On-site service calls can be reduced by up to 70%.</li> </ul>
<ul style="list-style-type: none"> <li>• Integrated process monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• The drive system has its own diagnostics and is Industry 4.0 ready.</li> </ul>	<ul style="list-style-type: none"> <li>+ Maintenance needs can be detected early and extremely quickly.</li> <li>+ Downtime of the press is considerably less.</li> <li>+ On-site service calls can be reduced by up to 70%.</li> </ul>
<ul style="list-style-type: none"> <li>• Control algorithms are perfectly adapted to the hydraulics and electronics.</li> </ul>	<ul style="list-style-type: none"> <li>• The die cushion drive is a complete, single-source solution.</li> <li>• Simple and very fast startup.</li> </ul>	<ul style="list-style-type: none"> <li>+ Shorter development and startup times save you money.</li> </ul>

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Engineered Reliability