SCREW PRESSES
WITH DIRECT DRIVE
Screw press type PAR265f for manufacturing aluminum forgings.

VIRTUOSOS.
SCREW PRESSES WITH DIRECT DRIVE.

Systems for hot forging
Schuler forging. System solutions from Schuler offer customers all over the world a decisive quality advantage in all temperature ranges:

- Systems for hot forging
- Systems for warm forging
- Systems for cold forging

Schuler screw presses are primarily used in hot forging.

High flexibility. Thanks to almost 120 years of experience in building screw presses, with continuous developments, there is practically no drop forging that cannot be manufactured using a screw press. As far back as 1936, the conventional friction drive was superseded by the friction roller drive and, subsequently, direct drive. From 1963 onward, once reliable three-phase synchronous motors with rapid permitted switching frequencies were available; the door was open to a new and ideal drive system for screw presses. In this direct drive, the torque from the drive motor is transmitted to the screw without intermediate drive components, wear parts or energy losses. This drive concept represents the optimum design solution for a screw press drive – in terms of robustness, reliability, maintenance and efficiency.

The applications:
- Forgings for the automotive industry and commercial vehicles such as crankshafts, axles, connecting rods or transverse links
- Surgical instruments as well as turbine components
- Fittings
- Flanges
- Hand tools, cutlery

The advantages:
- Wide range of parts
- High repeat accuracy
- High reliability
- High flexibility
- Maximum efficiency

EXAMPLES OF COMPONENTS THAT ARE MANUFACTURED ON SCREW PRESSES
HIGH ENERGY EFFICIENCY AND PRECISION.

VARIABLE-SPEED DIRECT DRIVE.

The screw press drive. The drive motor is a robust, multi-pole three-phase asynchronous motor designed for high switching frequencies and operation in both directions of rotation.

The advantages:

- Optimum controllability of the forging process
- Variable setting of forging energy between 5% and 100%
- No mains load due to current peaks when forging
- Reduced energy consumption
- Better overall efficiency of the press
- Reduced load on the mechanical brake due to regenerative braking with the main motor
- Energy-saving due to recovery of the braking energy
- Extended service life of the brake linings
- Lower thermal loading on the main motor
- Increased available stroke rate
- Reduction in connected load due to optional energy accumulator
SUCCESS FACTORS / SCREW PRESSES WITH DIRECT DRIVE

Energy-efficient drive engineering.

Working principle.
CONTROLLING AND MONITORING PROCESSES.
FORGE CONTROL SYSTEM (FCS).

Straightforward operation. The Schuler-FCS control system represents the latest development in control systems for screw presses and forging hammers. It has been developed especially for forging machines, and combines the latest features for high flexibility and high accuracy in controlling machine parameters.

Depending on the machine and application, the standard functions include a wide range of stroke control options or impact program specifications, energy and part thickness measurement, control loops for energy and TDC position, as well as documentation functions for die and production data.

THE ADVANTAGES

- Ease of operation because of uniform graphical user interface with touch screen
- Monitoring functions for parameters affecting quality, such as impact energy, part thickness, impact force, part temperature
- Required impact energy can be applied precisely
- Visualization in almost every customer’s language
- Access to machine documentation, circuit diagrams and fluid diagrams
- Remote maintenance and diagnosis
- Interfaces for external data storage as well as print function, including integration in a customer’s network
- Control loops to ensure that process parameters are observed, especially for screw presses
Monitoring of the force/weight profile with envelope curve.

Thickness measurement including Gaussian standard distribution curve.

**ADDITIONAL EQUIPMENT**

- MDA-Machine data acquisition
- Barcode scanner
- Pyrometer for part temperature
- Central control for forging cells with central data storage and data management
- Interlinking interfaces and, if required, control functions to customer’s forging peripherals
- Heating with control loops for top and bottom
- Customer-specific special functions
THE LIGHTWEIGHTS.
SCREW PRESSES IN THE PA / PAR SERIES.

Monoblock design. The body of the press in the PA series is a monoblock design. An additional torque limiting clutch is used for overload protection in the PAR series. This system makes it possible to implement a higher working energy on the press, which is necessary for large forming distances. In particular, small components made from non-ferrous metals and requiring high precision can be forged efficiently on type PA and PAR screw presses.
OVERVIEW OF SERIES PA / PAR SCREW PRESS MODELS

<table>
<thead>
<tr>
<th>Model</th>
<th>PA 125</th>
<th>PA 140</th>
<th>PA 160</th>
<th>PA 180</th>
<th>PA 180</th>
<th>PA 200</th>
<th>PA 200</th>
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<th>PA 300</th>
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<th>PA 360</th>
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<tr>
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<td>140</td>
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<td>180</td>
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<td>265</td>
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<tr>
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<td>2,500</td>
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<td>11,000</td>
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<tr>
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<td>6,300</td>
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<td>Distance bed – slide max. [mm]</td>
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<td>670</td>
<td>730</td>
<td>790</td>
<td>850</td>
<td>940</td>
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<td>1,150</td>
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<tr>
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<td>460</td>
<td>500</td>
<td>540</td>
<td>580</td>
<td>620</td>
<td>680</td>
<td>750</td>
<td>800</td>
<td>850</td>
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<tr>
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<td>570</td>
<td>610</td>
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<td>850</td>
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Subject to technical modifications.
THE STRONG ONES.
SCREW PRESSES IN THE PSM / PSH SERIES.

Two-piece casting held. The medium PSM / PSH series are produced as a two-piece casting held together by four tie rods. In the PSM series, the tie rods absorb surplus energy once a defined forging force has been reached, protecting the press against overload.

In addition, the PSH series features a hydraulic overload protection system. This system allows the press to be equipped with a higher working energy, which is necessary when large forgings are involved.
### OVERVIEW OF SERIES PSM / PSH SCREW PRESS MODELS

<table>
<thead>
<tr>
<th>Model</th>
<th>PSM 265</th>
<th>PSM 300</th>
<th>PSM 325</th>
<th>PSM 360</th>
<th>PSM 400</th>
<th>PSM 450</th>
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<th>PSM 560</th>
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<td>80,000</td>
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<td>400</td>
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<td>18</td>
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<td>Distance bed – slide max. [mm]</td>
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<td>920</td>
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<td>1,080</td>
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<td>1,300</td>
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<tr>
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<td>870</td>
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<td>1,080</td>
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<td>1,280</td>
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</tbody>
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Subject to technical modifications.

1. Drive
2. Crown
3. Screw
4. Ram
5. Frame
6. Tie rod
THE HEAVY TEAM.
SCREW PRESSES IN THE PZS SERIES.

Four-piece casting held. The frame of PZS presses in this series is a four-piece casting held together by four tie rods. The drive comes from several motors linked via a bull gear to the external diameter of the flywheel. The press force is limited by a slipping clutch in the flywheel.
### OVERVIEW OF SCREW PRESS SERIES PZS

<table>
<thead>
<tr>
<th>Model</th>
<th>PZS 710</th>
<th>PZS 800</th>
<th>PZS 900</th>
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<th>PZS 1120</th>
<th>PZS 1200</th>
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<tbody>
<tr>
<td>Screw diameter [mm]</td>
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<td>800</td>
<td>900</td>
<td>1,000</td>
<td>1,120</td>
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<td>1,325</td>
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<tr>
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<td>128,000</td>
<td>160,000</td>
<td>200,000</td>
<td>230,000</td>
<td>280,000</td>
</tr>
<tr>
<td>Die-to-die blow force [kN]</td>
<td>100,000</td>
<td>126,000</td>
<td>160,000</td>
<td>200,000</td>
<td>250,000</td>
<td>290,000</td>
<td>360,000</td>
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<tr>
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<td>3,150</td>
<td>4,000</td>
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<td>7,000</td>
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<tr>
<td>Gross working capacity PSH [kJ]</td>
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<td>6,800</td>
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<td>7</td>
<td>4</td>
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<tr>
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<td>1,800</td>
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<td>2,000</td>
<td>2,200</td>
<td>2,300</td>
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<td>2,100</td>
<td>2,400</td>
<td>2,400</td>
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<td>3,100</td>
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<tr>
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<td>2,000</td>
<td>2,200</td>
<td>3,000</td>
<td>3,000</td>
<td>3,000</td>
<td>3,700</td>
</tr>
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</table>

Subject to technical modifications.
IN-DEPTH TECHNOLOGY.
EJECTOR.

Hydraulic ejector in the slide.

Hydraulic ejector in the bolster.

Hydraulic ejector in the bolster and slide. Ejectors are essential for automatic operation as well as difficult ejection processes. The drive comes from a separate hydraulic unit. The control system is integrated into the press controller. Several ejection positions can be provided for off-center ejection during work in several operations or manufacturing long parts, such as crankshafts or front axles. Both the arrangement of ejectors and the control system can be configured and built individually for the application.

Several ejection positions can be provided for off-center ejection during work in several operations or manufacturing long parts, such as crankshafts or front axles. In addition, the ejection force, ejection stroke, ejection speed and time of ejection can be continuously varied, for example delayed ejection when forging non-ferrous metals.
**Die holder with cassette system.** With its own guide system, this die holder improves the accuracy of forged parts. Furthermore, the cassette system is hydraulically clamped in the base holder, which means it is prepared for a semiautomatic, fast quick die change.

**For special applications.** In addition, die holders are available for special applications such as forging turbine blades. All die holders can be supplied with an electric heating system.
**IN-DEPTH TECHNOLOGY.**

**DIE CHANGE SYSTEM.**

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Fast, semi-automated die change. A die change cart takes the die set installed in the screw press with a cassette system and places it on a storage table. Then, the new die set waiting on another storage table is installed in the press with the die change cart. A die change system of this type reduces the press downtime involved in a die change to a minimum.
Automation with transfer system for increasing parts output. The electronic drive system ensures an optimum movement sequence in all three axes and optimum flexibility for adapting to different applications. Combined with an insertion feeder and a spraying system, this delivers a highly efficient forging cell.
TAILOR-MADE SYSTEMS.
EVERYTHING FROM A SINGLE SOURCE.

As a supplier of custom system solutions, Schuler supplies turnkey systems, including integration of all necessary peripheral devices.

THE CUSTOMER: MANUFACTURER OF CRANKSHAFTS FOR HEAVY TRUCKS

The requirements:
Machine for fully-automated production of truck crankshafts.

The solution:
Schuler supplied a complete, fully-automated forging line. A type PZS 750f screw press is used as the main forging machine. The trimming press and automation system are also supplied by Schuler.

All necessary process steps such as heating, rolling, pre-forging, finish forging, trimming and calibrating are carried out in the line. The complete automation, die change, interlinking with subsequent heat treatment, etc. are also integrated.
Manufaeture of crankshafts for heavy trucks.

Forge Control System for monitoring the complete forging line.

SCHULER SERVICE – OPTIMUM SERVICE FOR MORE PERFORMANCE

Schuler Service offers a tailored portfolio of services covering the entire life cycle of your equipment. Over 900 service employees worldwide provide expert support around the clock in close cooperation with you – our partners. Our main priority is always to ensure the ultimate productivity and safety of your production equipment in order to secure your company’s continued success.

Find out more. www.schulergroup.com/service