FORMING THE FUTURE

SCREW PRESSES WITH DIRECT DRIVE

SCHULER
Member of the ANDRITZ GROUP

VIRTUOSOS.
SCREW PRESSES WITH DIRECT DRIVE.

Systems for hot forging

Screw press type PAR265f for manufacturing aluminum forgings.

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 As far back as 1936, the conventional friction drive was superseded by the friction roller drive and, subsequently, direct drive.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:

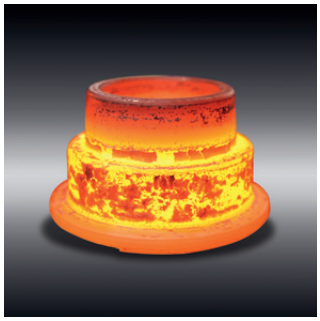
- Forgings for the automotive industry and commercial vehicles such as crankshafts, axles, connecting rods or transverse links
- Surgical instruments as well as turbine components
- Fittings
- Flanges
- Hand tools, cutlery

The advantages:

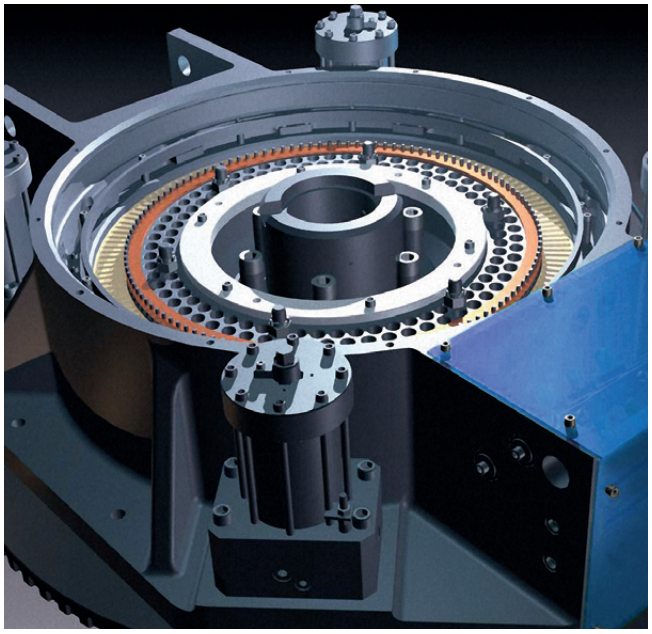
- Wide range of parts
- High repeat accuracy
- High reliability
- High flexibility
- Maximum efficiency

EXAMPLES OF COMPONENTS THAT ARE MANUFACTURED ON SCREW PRESSES

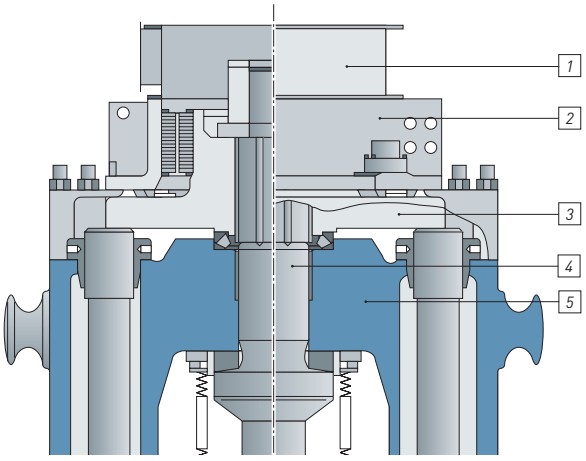


HIGH ENERGY EFFICIENCY AND PRECISION.
VARIABLE-SPEED DIRECT DRIVE.



Three-phase asynchronous motor.



1 Cooling motor
2 Main motor stator with motor housing
3 Rotor shrunk onto flywheel
4 Screw
5 Crown

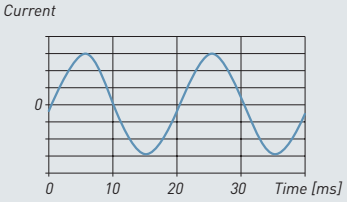
Drive system of a screw press.

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.

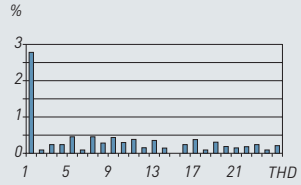
The advantages:

- 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

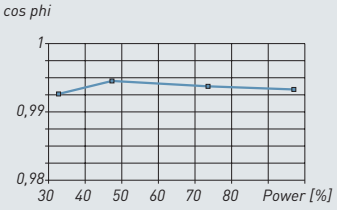
Sinusoidal power system load



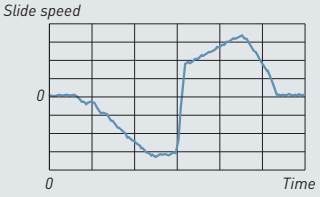
Few harmonics, so there are few feedback effects on the power system



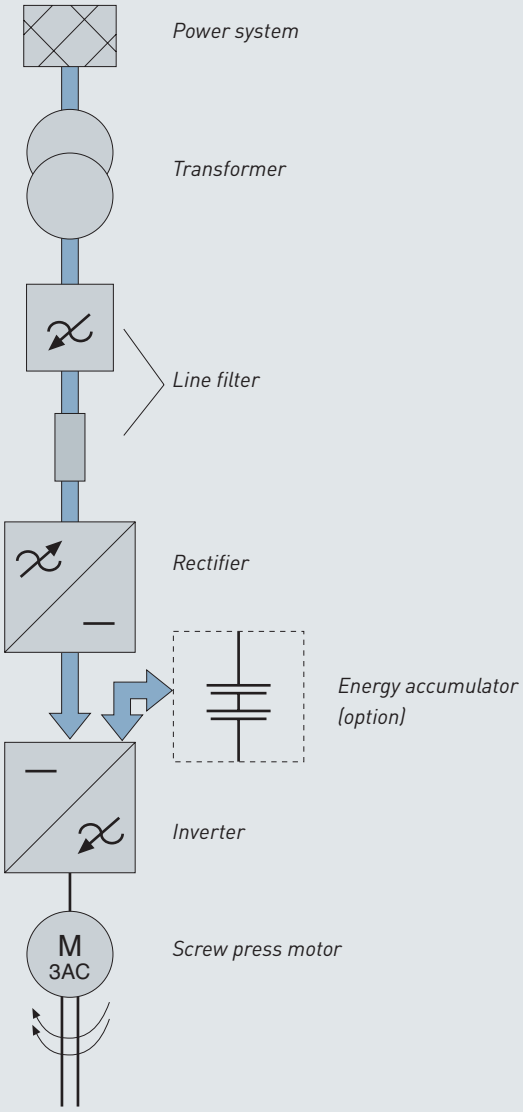
High efficiency



Highly dynamic press drive



Energy-efficient drive engineering.



Working principle.

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

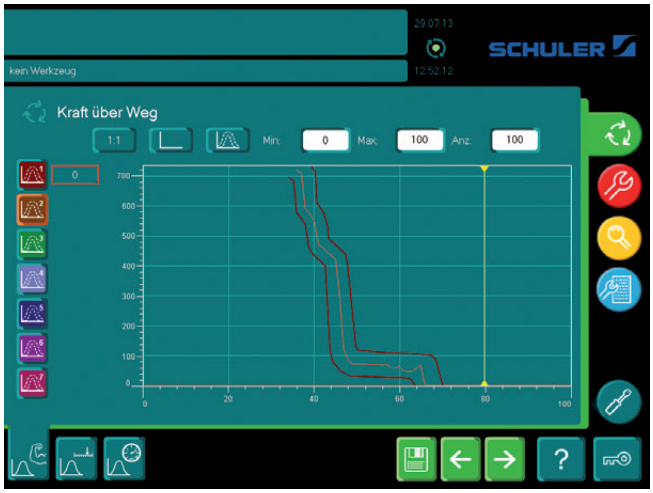
Straightforward operation with graphic user interface.

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.

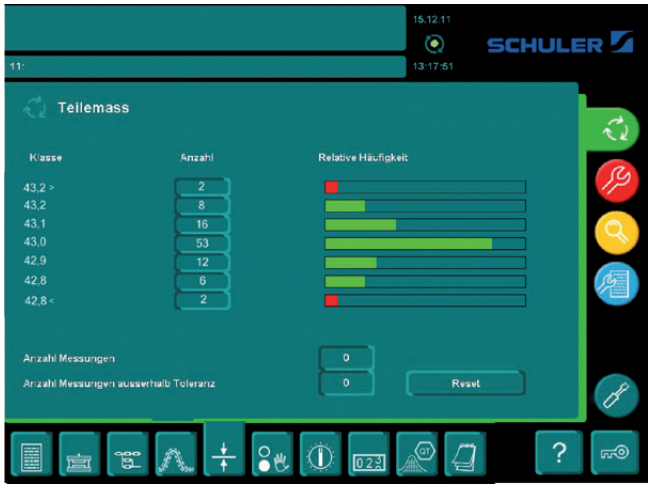
Depending on the machine and application, the standard functions include a wide range of stroke control options or impact program specifications, energy and part thickness measurement, control loops for energy and TDC position, as well as documentation functions for die and production data.

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

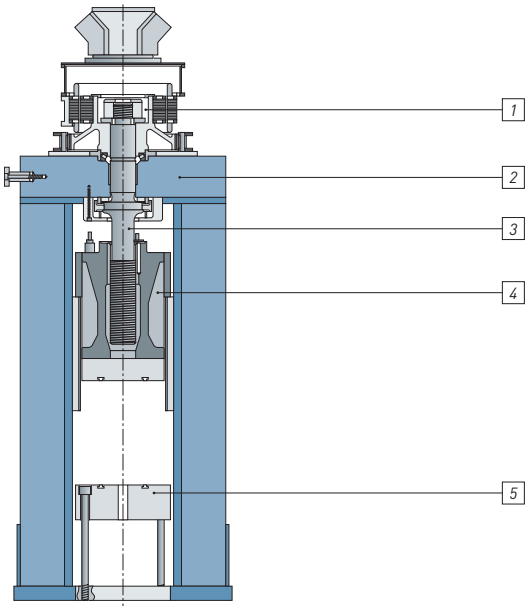
- MDA-Machine data acquisition
- Barcode scanner
- Pyrometer for part temperature
- Central control for forging cells with central data storage and data management
- Interlinking interfaces and, if required, control functions to customer's forging peripherals
- Heating with control loops for top and bottom
- Customer-specific special functions

THE LIGHTWEIGHTS.
SCREW PRESSES IN THE PA / PAR SERIES.

Type PAR 265f screw press for manufacturing aluminum forgings.

A type PA spindle press can also be used for producing components from non-ferrous metals.

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.



1 *Drive*
2 *Frame*
3 *Screw*
4 *Slide*
5 *Bolster plate*

OVERVIEW OF SERIES PA / PAR SCREW PRESS MODELS

Model	PA 125	PA 140	PA 160	PA 180 PAR 180	PA 200 PAR 200	PA 225 PAR 225	PA 265 PAR 265	PA 300 PAR 300	PA 325 PAR 325	PA 360 PAR 360
Screw diameter [mm]	125	140	160	180	200	225	265	300	325	360
Continuously permitted press [kN]	2,500	3,200	4,000	5,000	6,400	8,000	11,000	14,000	16,000	21,000
Die-to-die blow force [kN]	3,200	4,000	5,000	6,300	8,000	10,000	14,000	18,000	20,000	26,000
Gross working capacity PA [kJ]	4.5	6.5	10	14	19	27	42	60	75	100
Gross working capacity PAR [kJ]	–	–	–	24	32,5	45	72	105	130	170
Stroke rate max. [min^{-1}]	33	32	29	24	23	21	20	19	18	17
Distance bed – slide max. [mm]	620	670	730	790	850	940	1,050	1,150	1,250	1,350
Bolster width [mm]	460	500	540	580	620	680	750	800	850	900
Bolster depth [mm]	500	530	570	610	650	710	800	850	920	1,000

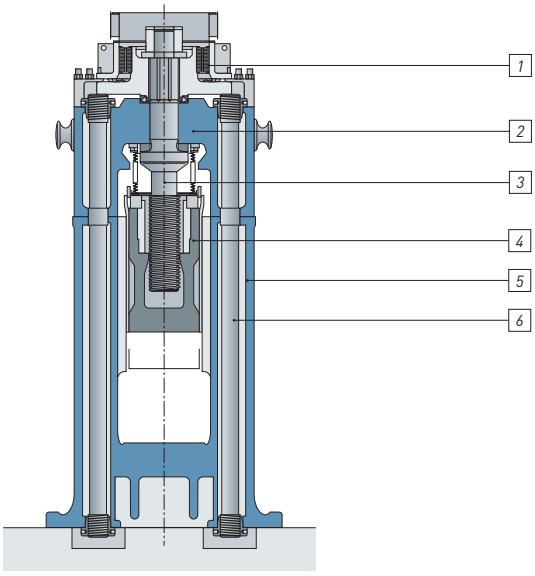
Subject to technical modifications.

THE STRONG ONES.
SCREW PRESSES IN THE PSM / PSH SERIES.

Screw press type PSH 4.630f for manufacturing parts for light trucks.

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.



1 *Drive*
2 *Crown*
3 *Screw*
4 *Ram*
5 *Frame*
6 *Tie rod*

OVERVIEW OF SERIES PSM / PSH SCREW PRESS MODELS

Model	PSM 265 PSH 265	PSM 300 PSH 300	PSM 325 PSH 325	PSM 360 PSH 360	PSM 400 PSH 400	PSM 450 PSH 450	PSM 500 PSH 500	PSM 560 PSH 560	PSM 630 PSH 630
Screw diameter [mm]	265	300	325	360	400	450	500	560	630
Continuously permitted press [kN]	11,000	14,000	16,000	21,000	26,000	32,000	40,000	50,000	64,000
Die-to-die blow force [kN]	14,000	18,000	20,000	26,000	32,000	40,000	50,000	63,000	80,000
Gross working capacity PSM [kJ]	65	100	120	160	210	315	400	500	700
Gross working capacity PSH [kJ]	90	140	170	225	300	420	560	700	1,000
Stroke rate max. [min^{-1}]	20	19	18	18	17	16	16	15	14
Distance bed – slide max. [mm]	780	860	920	1,000	1,080	1,200	1,300	1,450	1,460
Bolster width [mm]	750	820	860	930	1,000	1,100	1,200	1,320	1,600
Bolster depth [mm]	860	870	920	1,000	1,080	1,180	1,280	1,400	1,990

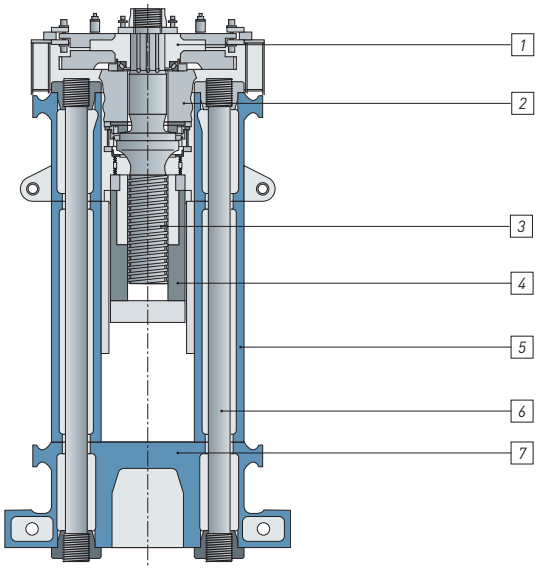
Subject to technical modifications.

THE HEAVY TEAM.
SCREW PRESSES IN THE PZS SERIES.

PZS 900f for manufacturing heavy forgings.

A Schuler Group employee machining the profile for the screw of a screw press.

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.



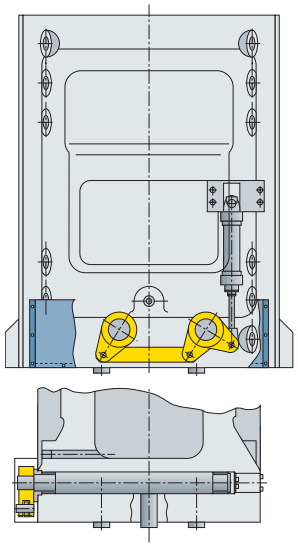
1 *Drive*
2 *Crown*
3 *Screw*
4 *Slide*
5 *Upright*
6 *Tie rod*

OVERVIEW OF SCREW PRESS SERIES PZS

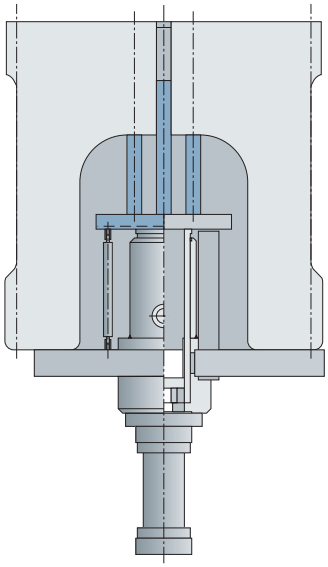
Model	PZS 710	PZS 800	PZS 900	PZS 1000	PZS 1120	PZS 1200	PZS 1325
Screw diameter [mm]	710	800	900	1,000	1,120	1,200	1,325
Continuously permitted press [kN]	80,000	100,000	128,000	160,000	200,000	230,000	280,000
Die-to-die blow force [kN]	100,000	126,000	160,000	200,000	250,000	290,000	360,000
Gross working capacity PSM [kJ]	1,150	1,650	2,250	3,150	4,000	5,000	7,000
Gross working capacity PSH [kJ]	2,200	3,000	4,000	6,000	6,800	8,500	10,000
Stroke rate max. [min^{-1}]	10	9	9	8	8	7	4
Distance bed – slide max. [mm]	1,200	1,700	1,800	2,000	2,000	2,200	2,300
Bolster width [mm]	1,600	2,050	2,100	2,400	2,400	2,600	3,100
Bolster depth [mm]	2,000	2,000	2,200	3,000	3,000	3,000	3,700

Subject to technical modifications.

IN-DEPTH TECHNOLOGY.
EJECTOR.



Hydraulic ejector in the slide.

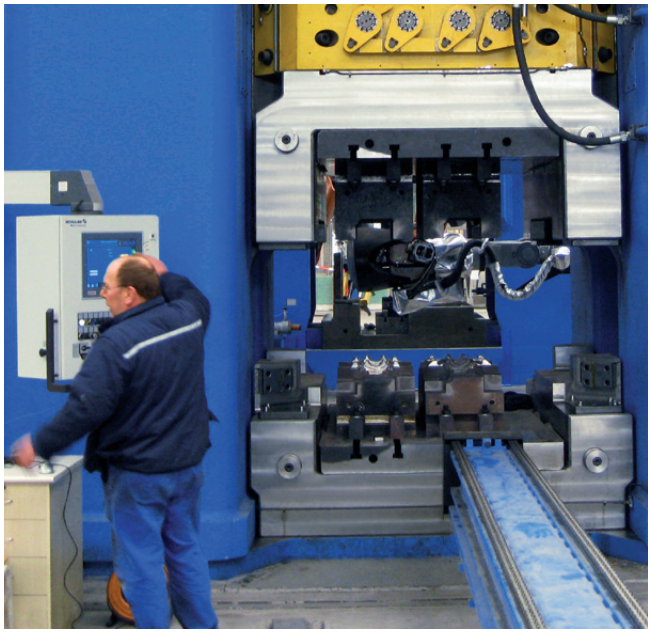


Hydraulic ejector in the bolster.

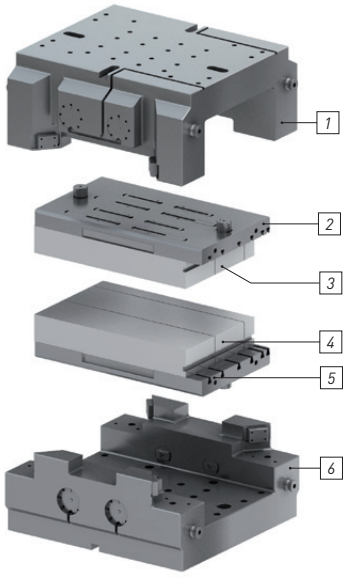
Hydraulic ejector in the bolster and slide. Ejectors are essential for automatic operation as well as difficult ejection processes. The drive comes from a separate hydraulic unit. The control system is integrated into the press controller. Several ejection positions can be provided for off-center ejection 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.

IN-DEPTH TECHNOLOGY.
DIE HOLDERS.



Die holder with cassette system for rapid die change.



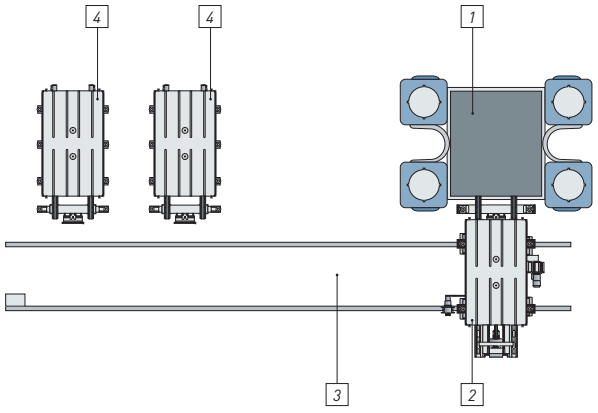
1 *Die holder top piece*
2 *Intermediate plate*
3 *Upper die*
4 *Lower die*
5 *Intermediate plate*
6 *Die holder bottom piece*

Die holder with cassette system.

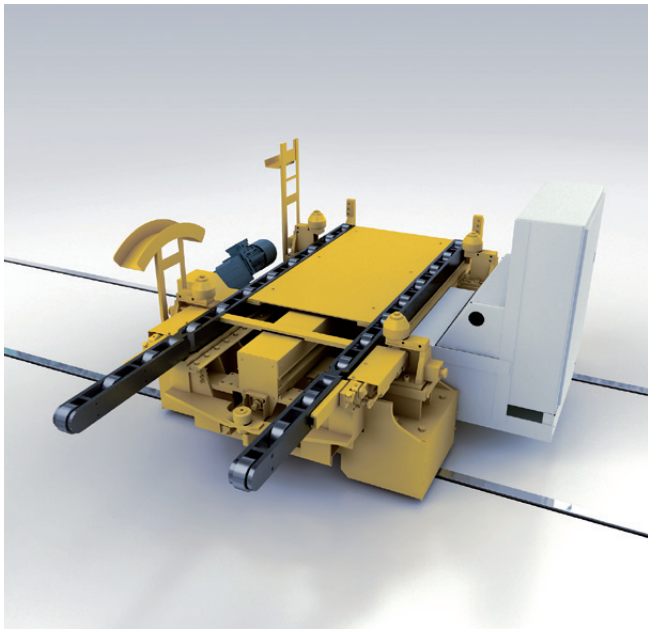
Die holder with cassette system. With its own guide system, this die holder improves the accuracy of forged parts. Furthermore, the cassette system is hydraulically clamped in the base holder, which means it is prepared for a semiautomatic, fast quick die change.

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.



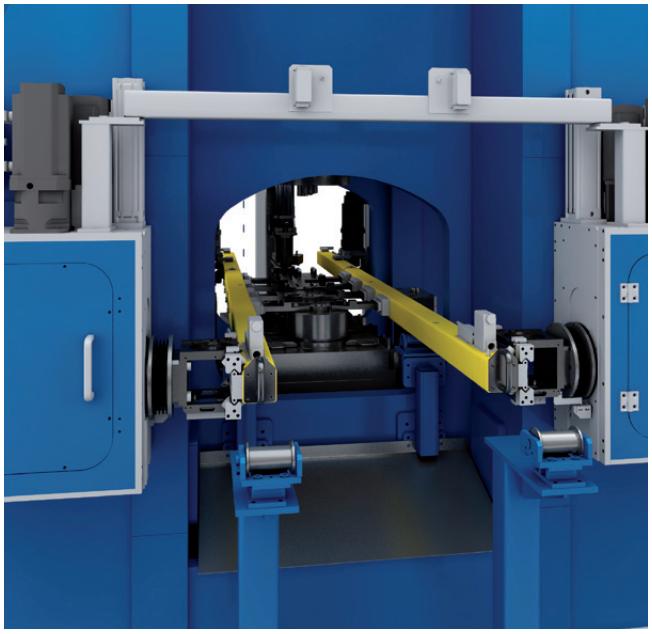
1 Screw press
2 Die change cart
3 Rail system
4 Storage tables



Die change cart for transporting a die set.

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.

IN-DEPTH TECHNOLOGY.
TRANSFER.



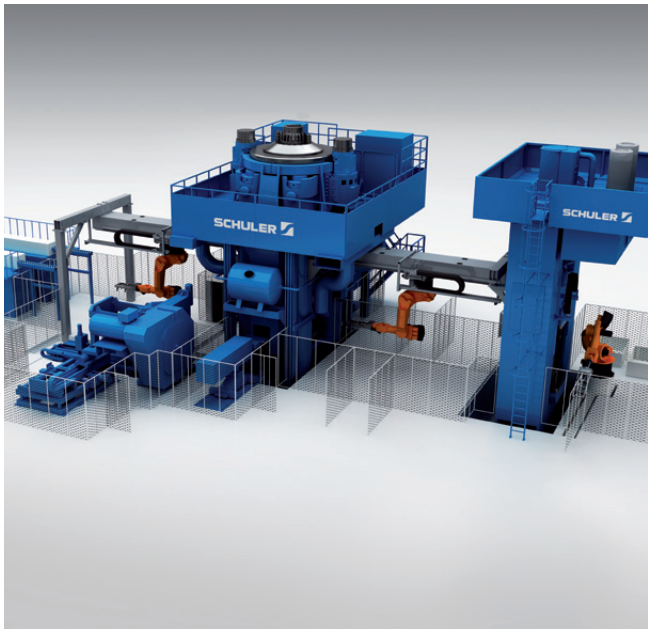
Transfer system for rapid parts transport.

Installation of the transfer in a screw press.

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 custum system solutions, Schuler supplies turnkey systems, including integration of all necessary peripheral devices.



Turnkey system for manufacturing crankshafts.

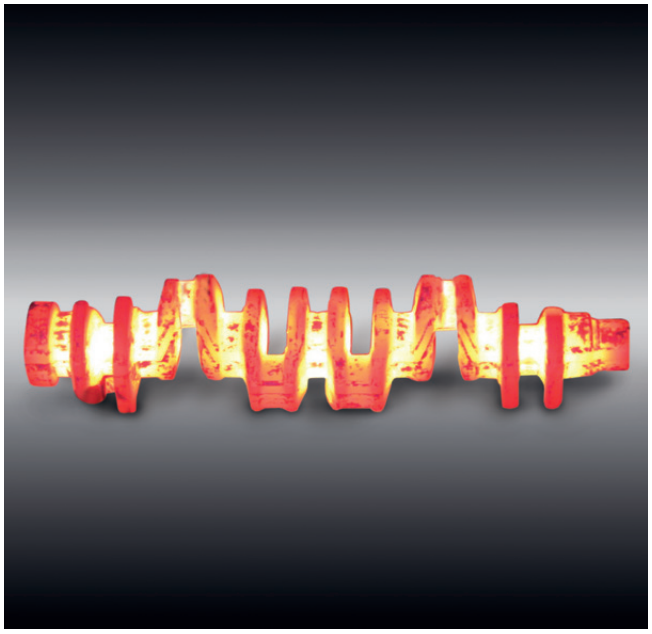
Optimum accessibility and flexibility due to innovative automation with suspended robots.

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.



Manufacture of crankshafts for heavy trucks.

Forge Control System for monitoring the complete forging line.

SCHULER SERVICE – OPTIMUM SERVICE FOR MORE PERFORMANCE

EXPERTISE
PARTNERSHIP
PRODUCTIVITY
SAFETY
FUTURE

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**

www.schulergroup.com/forging
For more information, simply scan the QR code
with the camera of your smartphone or tablet.

Schuler Pressen GmbH
Werk Weingarten
Schussenstraße 11
88250 Weingarten
Germany
Phone +49 751 401-2211
Fax +49 751 401-952211
Schuler Service Phone +49 751 401-2244
Schuler Service Fax +49 751 401-2670

forging@schulergroup.com
www.schulergroup.com/forging