RAILWAY
Forging systems for the railway industry
FORGING SYSTEMS FOR THE RAILWAY INDUSTRY.
ON THE RIGHT TRACK.
All over the world, a high-capacity railway network brings people together. Once on the move, they rely upon technology to function properly. Whether wheels, rail ends, switches or chassis screw connections for high-speed trains, Schuler provides comprehensive technical expertise in forging technology to make sure that everything runs smoothly.

With 175 years of experience and approximately 5,500 employees working at international sites in Europe, the USA, Mexico, Brazil, Thailand, India, China and Russia, Schuler offers extensive know-how, competent expertise as well as customer-oriented services.

We offer you innovative and reliable solutions. Work with us to stay on track in the growing global transport technology market.

**Schuler system solutions for a wide range of parts**
- Railway wheels
- Axles
- Crankshafts
- Large and small connecting rods
- Disk brakes
- Chassis components
- Connection couplings
- Sleeper screws
HYDRAULIC TURNKEY SYSTEMS.
FORGING AND ROLLING RAILWAY WHEELS.
High speeds, extreme loads, powerful accelerations and sharp emergency braking – only forged railway wheels can meet these requirements. Railway wheels are forged in four working steps before they undergo mechanical machining. First of all, a disk-shaped preform is produced in two stages from a heated block. This preform is then rolled out into the final contour using a wheel roller. Finally, the rolled-out wheel is calibrated and the hub is offset axially and pierced. Hydraulic presses with a press force up to 100,000 kN are used for preforming of the wheels. Generally, press forces from 20,000 to 50,000 kN are required for flanging and piercing.

Advantages

- Precise preforming by high press forces, for high precision in the areas of the hub and running rim
- Weight saving by high accuracy in presses and wheel roller
- High productivity and availability
- Quick and easy retooling of the entire machine
- Standardized operating concept of the presses and wheel roller

Applications

- Railway wheels for freight cars
- Railway wheels for locomotives and cabooses
- Crane wheels
Automated turnkey machine for manufacturing railway wheels with rotary hearth furnace, three hydraulic forging presses and the Schuler wheel roller.

FORGING AND ROLLING RAILWAY WHEELS IN A COMPLETE SYSTEM
1. Loading robot
2. Rotary hearth furnace
3. Unloading robot
4. Descaling
5. Robot
6. Hydraulic forging press with 50,000 kN
7. Robot
8. Hydraulic forging press with 100,000 kN
9. Manipulators
10. Wheel roller
11. Manipulators
12. Hydraulic piercing and crimping press with 50,000 kN
13. Robot
14. Laser measuring system
15. Marking
16. Robot
17. Exit conveyors
The Schuler wheel roller MHRV-180/80.

THE SCHULER WHEEL ROLLER.

A central unit of the forging line is the wheel roller which reflects the full range of Schuler’s expertise in the areas of mechanical, hydraulic and electrical systems: Its extremely rigid configuration, large bearing dimensions and axes equipped with primary and secondary drives guarantee reliable operation and high availability.

The precise control hydraulics of the individual axes ensure that the rolled wheels satisfy the most exacting quality requirements. A comprehensive visualization concept for the press and wheel roller makes it easy to operate the machine. The control systems of the press and wheel roller have the same design, thus facilitating maintenance and diagnosis.

INCREMENTAL SET FOR FORGING AND ROLLING RAILWAYS WHEELS
In order to design the forging and rolling process, the machine control is supplemented by a simulation program: Job Engineering Software JES. The process plan and the die contour for the particular wheel are calculated starting from the wheel geometry. A link to the machine controller allows the corresponding machine parameters and the rolling strategy to be taken into account when calculating the process program.

Then, the parameters calculated in the JES (position, speeds and movements of all axes) for the wheel to be produced are sent to the machine control of the presses and the wheel roller.

An FEM analysis simulating the entire process for the product makes it possible to check the process via a direct connection to the JES. Insights gained from this are returned directly to the JES, thereby making it possible to optimize the entire process.

A technology partnership with Simufact enables Schuler to offer a full simulation of complete process sequences. Schuler provides the process expertise while Simufact contributes its many years of experience in the area of process simulation for complex forming processes.
OPEN DIE FORGING SYSTEMS.
MANUFACTURING RAILWAY AXLES.

Railway axles are components exposed to significant loads that place specific requirements on the forging process. They are manufactured in one step from square or round-profile blanks, referred to as ingots, and are transported to the forging manipulator using an ingot cart running on tracks. The manipulator takes them from the cart and places them into the hydraulic open-die forging press for the forging process. The movements of the press and manipulator are synchronized by the press control.

The forging cell is equipped with a high-performance, robust direct drive for high stroke rates and reliable operation. If a second manipulator is used as well, there is no need to turn the forgings. This results in much shorter cycle times. Also, two axles can be forged from one blank, further boosting productivity.

Advantages
- High repeat accuracy
- High reliability
- Automatic forging die change
- Maximum efficiency even with small batches
- High flexibility

Applications
- Railway axle

A STRONG PARTNERSHIP IN THE AREA OF OPEN DIE FORGING

Schuler has built on its capabilities in open die forging by forming a strategic partnership with Pahnke. Together, we provide our customers a broad range of products and services, even for large scale and complex projects.
FORGING LINE FOR MANUFACTURING RAILWAY AXLES

1 Open-die forging press
2 Manipulator 1
3 Manipulator 2
4 Operator station
5 Hydraulic drive

TECHNICAL DATA OF OPEN-DIE FORGING PRESSES

<table>
<thead>
<tr>
<th>Types</th>
<th>MHFT</th>
<th>MHFU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Pushdown</td>
<td>Pulldown</td>
</tr>
<tr>
<td>Press force [kN]</td>
<td>800–1,500</td>
<td>800–1,500</td>
</tr>
<tr>
<td>Die change</td>
<td>Lateral shifting device for automatic change of the forging dies</td>
<td>Lateral shifting device for automatic change of the forging dies</td>
</tr>
<tr>
<td>Drive</td>
<td>Energy-efficient direct drive with servo-controlled hydraulic pumps</td>
<td>Energy-efficient direct drive with servo-controlled hydraulic pumps</td>
</tr>
<tr>
<td>Material feed</td>
<td>Ingot cart with integrated turntable</td>
<td>Ingot cart with integrated turntable</td>
</tr>
<tr>
<td>Material handling</td>
<td>Forging manipulators</td>
<td>Forging manipulators</td>
</tr>
</tbody>
</table>
COMPLETE SYSTEMS WITH ECCENTRIC PRESS AND THREAD ROLLING. MANUFACTURING SLEEPER SCREWS.

Sleeper screws are manufactured in three production steps, in large quantities from wire coils. These screws have a variety of unique head and thread designs. During production, the wire section is first cut into sections with a precisely defined length. In the next production step, part of this cut wire is inductively heated and the screw head is forged in the eccentric press. The third machine rolls the thread, which also involves heating part of the blank using an induction system.

Applications
- Sleeper screws with a wide range of shapes

Advantages
- Wide range of head and thread shapes
- High output
- Flexible production cells
- Maximum efficiency
COMPLETE SYSTEM FOR MANUFACTURING SLEEPER SCREWS WITH SCHULER ECCENTRIC PRESS

1. Wire feed
2. Straightening machine
3. Shear
4. Feed to eccentric press
5. Induction furnace
6. Eccentric press
7. Feed to thread rolling machine
8. Induction furnace
9. Thread rolling machine
10. Finished part conveyor belt

TECHNICAL DATA OF ECCENTRIC PRESSES

<table>
<thead>
<tr>
<th>Types</th>
<th>MME1-250</th>
<th>MME1-315</th>
<th>MME1-400</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press force [kN]</td>
<td>2,500</td>
<td>3,150</td>
<td>4,000</td>
</tr>
<tr>
<td>Drive</td>
<td>Mechanical drive</td>
<td>Mechanical drive</td>
<td>Mechanical drive</td>
</tr>
<tr>
<td>Material feed</td>
<td>Automatic</td>
<td>Automatic</td>
<td>Automatic</td>
</tr>
<tr>
<td>Component transfer</td>
<td>Tri-axis transfer</td>
<td>Tri-axis transfer</td>
<td>Tri-axis transfer</td>
</tr>
<tr>
<td>Output</td>
<td>approx. 30 parts / minute</td>
<td>approx. 30 parts / minute</td>
<td>approx. 30 parts / minute</td>
</tr>
<tr>
<td>Forming stations</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
COMPLETE SYSTEMS WITH SCREW PRESS.
FORGING BRAKE DISKS, CRANKSHAFTS, CONRODS OR LARGE CONRODS.

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. 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.

Applications
• Crankshafts
• Conrod / large conrod
• Brake disks

Advantages
• Wide range of parts
• High repeat accuracy
• High reliability
• High flexibility
• Maximum efficiency
• Frequency Drive
• Suitable for automation and line integration
### TECHNICAL DATA OF SCREW PRESSES

<table>
<thead>
<tr>
<th>Types</th>
<th>PA</th>
<th>PAR</th>
<th>PSM</th>
<th>PSH</th>
<th>PZS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw diameter [mm]</td>
<td>125 – 360</td>
<td>180 – 360</td>
<td>265 – 630</td>
<td>265 – 630</td>
<td>710 – 1,325</td>
</tr>
<tr>
<td>Gross working capacity [kJ]</td>
<td>4.5 – 100</td>
<td>24 – 170</td>
<td>65 – 700</td>
<td>90 – 1,000</td>
<td>1,150 – 10,000</td>
</tr>
<tr>
<td>Continuously permitted press force [kN]</td>
<td>2,500 – 21,000</td>
<td>5,000 – 21,000</td>
<td>11,000 – 64,000</td>
<td>11,000 – 64,000</td>
<td>80,000 – 280,000</td>
</tr>
<tr>
<td>Die-to-die blow force [kN]</td>
<td>3,200 – 26,000</td>
<td>6,300 – 26,000</td>
<td>14,000 – 80,000</td>
<td>14,000 – 80,000</td>
<td>100,000 – 360,000</td>
</tr>
</tbody>
</table>
FORGING SYSTEMS WITH COUNTERBLOW HAMMERS. FORGING BRAKE DISKS, CRANKSHAFTS, CONRODS OR LARGE CONRODS.

Counterblow hammers are predominantly used for manufacturing large and ultra-large forgings. The high impact energy and tonnage of the hammer dies, moving in opposite directions, permits precision forming of large forgings.

Applications
- Crankshafts
- Large connecting rod
- Chassis components
- Connection couplings

Advantages
- Extremely high impact energy and tonnage
- High reliability and availability
- High stability of the overall structure
- High precision with large forgings
- Hydraulic tup coupling
- Long stroke for accessibility

Counterblow hammer with 800 kJ working capacity.

Large crankshaft forged on a counterblow hammer.
TECHNICAL DATA OF COUNTERBLOW HAMMERS

<table>
<thead>
<tr>
<th>Types</th>
<th>HG</th>
<th>DG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working capacity [kJ]</td>
<td>160 – 400</td>
<td>160 – 1,400</td>
</tr>
<tr>
<td>Drive</td>
<td>Hydraulic drive</td>
<td>Pneumatic drive</td>
</tr>
<tr>
<td>Coupling of the tups</td>
<td>Hydraulic slide coupling</td>
<td>Hydraulic slide coupling</td>
</tr>
<tr>
<td>Material feed /material handling</td>
<td>Forging manipulators</td>
<td>Forging manipulators</td>
</tr>
</tbody>
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Over 900 service employees worldwide provide expert support 24/7 in close cooperation with you – our partners. Our main priority is always to ensure the maximum productivity and safety of your production equipment in order to secure your company’s continued success.

With over 175 years of experience and expertise, we can guarantee the best possible support for the operation of your machines – and not only those supplied by Schuler, but by all other manufacturers. Whatever the situation, Schuler Service has the right solution for your specific needs.

Our services for you.

Technical customer support:
- Machine inspections
- Safety inspections
- Preventive maintenance
- Repair
- Repair welding
- Production support

Components and Accessories:
- Spare parts and spare part packages
- Maintenance kits
- Repair parts
- Replacement parts

Project Business:
- Modernization
- Retrofits
- Refurbishment
- Machine relocations

Special services:
- Service contracts
- Hotline and remote service
- Training
- Tailored customer training
- Optimizing plant & processes
- Consulting

Used Machinery:
- Purchase and sale
- Evaluation

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www.schulergroup.com/service_en
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