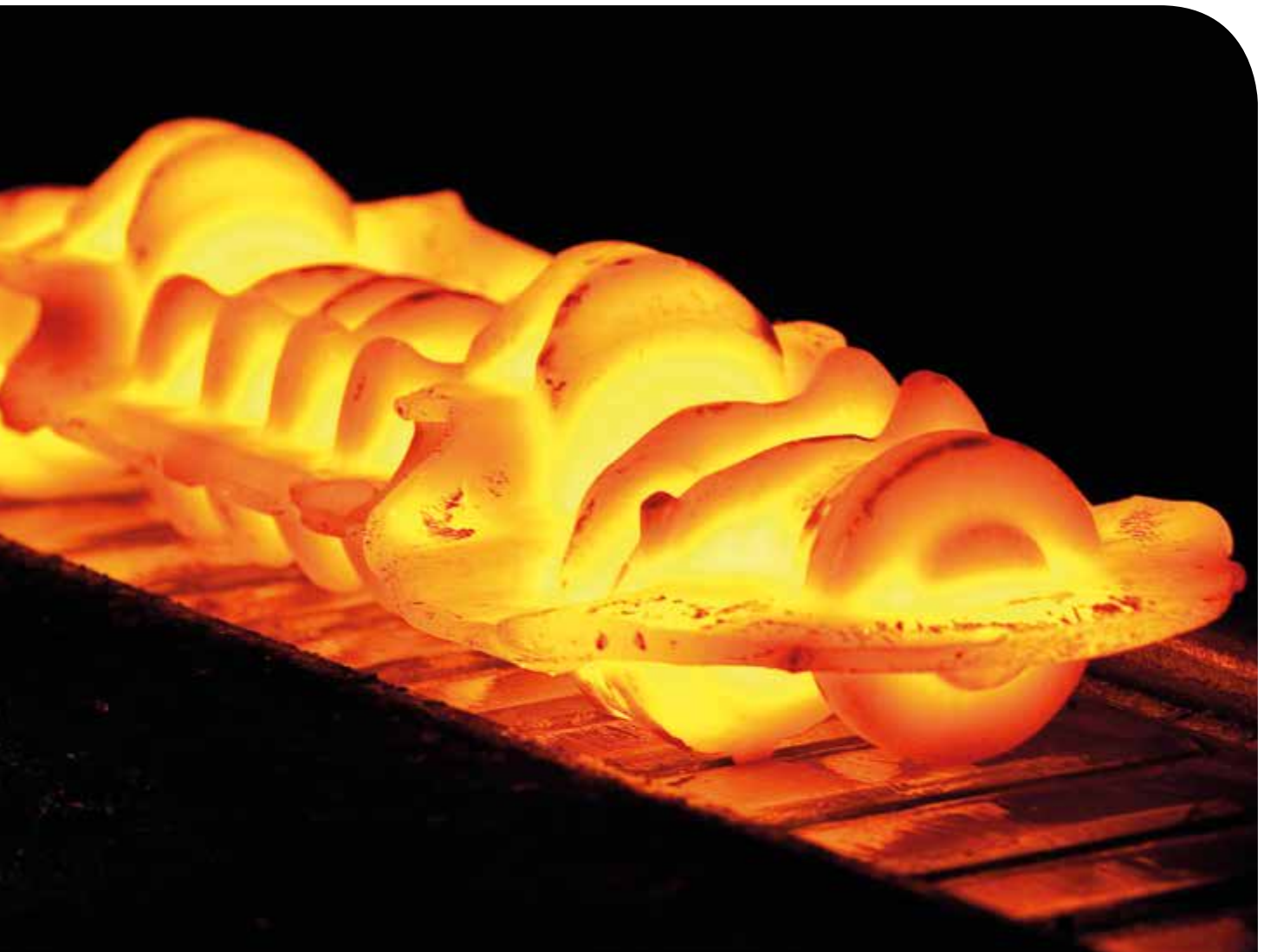


CLOSED-DIE FORGING

Productivity in its best form





THE SMS GROUP IS A GROUP OF GLOBALLY OPERATING COMPANIES IN PLANT AND MACHINERY CONSTRUCTION FOR STEEL AND NON-FERROUS METALS PROCESSING. WE COVER EVERYTHING FROM PIG IRON PRODUCTION TO METALLURGICAL PLANT, ROLLING MILLS TO STRIP PROCESSING LINES, TUBE MILLS AND FORGING PLANTS TO THERMAL TECHNOLOGY – COMPLETE WITH ELECTRICS AND AUTOMATION AS WELL AS SERVICE.



PRODUCT RANGE



IRON MAKING



TUBE AND PIPE PLANTS



LONG PRODUCTS PLANTS



ELECTRICAL AND AUTOMATION SYSTEMS



PRODUCTION



METALLURGY PLANTS AND ENVIRONMENTAL TECHNOLOGY



FLAT ROLLING PLANTS



STRIP PROCESSING LINES AND FURNACE TECHNOLOGY



FORGING PLANTS



TECHNICAL SERVICE

SMS  group

PORTFOLIO

Solutions to meet every need: From the single machine through to the automated forging line

Whether turbine blades for power stations and aircraft, con rods, stub axles or crankshafts for the car and commercial vehicle industry: SMS group's Product Unit Closed-Die Forging offers the right forging plant for every customer. More than 3,100 reference plants worldwide bear witness to the company's experience and competence.

SMS group plans, designs and manufactures machines and plants for closed-die forging that are in

operation worldwide. Whether new machine, overhaul or modernization – the machine and plant engineering company always caters to the individual wishes of the customer. The partners can thereby profit from the decades of experience and expertise with which SMS group sets international standards, because the experts from SMS group know the production processes in detail and can provide comprehensive advice: from preparation of the raw material through upline and downline forming to the finished

CONTROL AND

Integrated holistic solutions –



RAW MATERIALS

All common steel grades incl. high-alloy steel as well as titanium-based and nickel-based alloys



RAW MATERIAL PREPARATION

- Cold shears and hot shears
- Induction heating plants



PREFORMING

- Electric upsetting machines
- Horizontal forging machines
- Forging rolls
- Cross rolls
- Upline forming presses

SUPPORT AND SERVICE –

product – the experts at SMS group offer solid expertise whatever the task.

TRADITIONAL BRAND NAMES – THE LATEST KNOW-HOW

The machines with the traditional names Schloemann, Eumuco and Hasenclever have been standing for the highest technical performance worldwide for over 50 years. These brands formed the basis for SMS Eumuco GmbH. In 2002, SMS Eumuco's press and forging activities were united in the SMS group Product Unit Closed-Die Forging. The SMS group portfolio contains all the main presses for closed-die forging with all the necessary upline and downline forming equipment. With automation systems and transport facilities, such as walking-beam systems and spraying equipment or programmable robots, SMS group links the individual machines into fully automated lines.

DEPENDABLE PARTNER – BEFORE AND AFTER THE START OF PRODUCTION

SMS group follows through a project from the initial idea up to the choice of the economically most viable forging process. Services tailor-made for closed-die forging, such as the optimization of existing spraying systems or safety testing in accordance with accident prevention regulations, coupled with expert knowledge in design and development make the specialists at SMS group the ideal partner when it comes to plant operation. The staff develop new technical solutions together with the customer, accompany the start of production and train the operating personnel. Even after commissioning, the customer can rely on the SMS group after-sale support. Through modernization projects, SMS group brings even older plants and machines back to the state-of-the-art – so that they can meet today's higher market and product demands.

AUTOMATION

intelligently networked



FINAL FORMING

- Eccentric forging presses
- Wedge presses
- Hydraulic presses
- Screw presses
- Hammers
- Downline forming presses

PERIPHERY

- Spraying technology
- Plant visualization
- Diagnostic tools
- Transport facilities
- Special machines
- High-speed automation

FORGED PRODUCTS

Safety-relevant components for motor vehicles, aircraft, ships and machines, e.g. crankshafts, con rods, gear wheels or tie rod ends, steering parts, transmission parts, turbine discs and turbine blades

A WHOLE PLANT LIFE LONG

ECCENTRIC FORGING PRESSES – TYPE MP

Fast set-up for maximum productivity

SMS group offers the most modern stroke-bound eccentric forging presses with the dieformer series. Thanks to the automation system developed by SMS group and die quick-changing facilities, the dieformers can be employed for practically any forging application: for hot and warm forming, and for forging with and without flash.

PRECISION PLUS PRODUCTIVITY

Eccentric forging presses from SMS group impress with their very high precision in combination with high productivity. The rigidity of the press in longitudinal and transverse directions create the ideal preconditions for precision forgings. The press achieves its high output thanks to the high useful stroke rate.

FASTER SET-UP

The short non-productive times also contribute to high productivity: The ram quick-adjustment system allows bolster and dies to be set up in a minimum of time. The wide rams are suitable for all forming applications. Quick correction of the ram position is possible during production without interrupting the process.



STROKE-BOUND MACHINES DIEFORMER TYPE MP

Nominal force: 6.3 to 160 MN

THE BENEFITS AT A GLANCE

- High precision thanks to minimized ram tilting
- Ratio of ram width to pressure rod width approx. 1:1
- High stroke rate guarantees high productivity

REFERENCES (EXCERPT)

More than 330 eccentric forging presses, of which

- 2 AMP 2000 at Gohsyu, Japan
- 2 AMP 3150 at Neumayer, Germany
- 7 MP/AMP 3150 at Hirschvogel, Germany and USA

ECCENTRIC FORGING PRESSES – TYPE EP

High standard for economic production

With the Ecopress EP Series, SMS group has created a particularly cost-effective modular concept for stroke-bound eccentric forging presses. The standardization of components has significantly reduced design, production and erection costs. The benefits for the customer: They profit from shorter delivery times and reduced investment costs. Furthermore, they boost their competitiveness by reducing the production costs of the forgings.

FUTURE-PROOF CONCEPT

The die space of the Ecopress EP meets the present-day demands on working in multiple operations. All important components of the press are easily accessible, so that the press offers the maximum in ease of maintenance and availability. And thanks to the newly designed self-supporting machine housing, all the currently applicable noise regulations are not just satisfied, but far surpassed.

STROKE-BOUND MACHINES ECOPRESS TYPE EP

Nominal force: 6.3 to 31.5 MN

THE BENEFITS AT A GLANCE

- Modular concept for reduced investment and production costs
- High ease of maintenance and availability
- Low noise level thanks to innovative machine housing

REFERENCES (EXCERPT)

More than 330 eccentric forging presses, of which

- 7 presses at Hirschvogel, Germany and China
- 1 press at WHB, Brazil



WEDGE PRESSES

Precision in every dimension

The KP wedge presses from SMS group are characterized by their extremely high forging precision. Added to that is the high productivity, as the full nominal force can be applied to several dies alongside one another.

LENGTHS AHEAD OF THE COMPETITION

Wedge presses from SMS group are particularly recommended for the forging of long parts where close thickness and offset tolerances have to be maintained over the whole length. Typical fields of application for this machine are in the production of twin con rods, front axles for trucks, crankshafts, balancing shafts, camshafts and other precision forgings.

STROKE-BOUND MACHINES TYPE KP

Nominal force: 20 to 160 MN

THE BENEFITS AT A GLANCE

- Large wedge surface area creates broad connection between ram and press frame
- The flat wedge surfaces permit a wide die space with minimum ram tilting
- High productivity thanks to high stroke rate

REFERENCES (EXCERPT)

More than 60 wedge presses, of which

- 2 KP 12500 lines at ThyssenKrupp Gerlach, Germany and USA
- 1 KP 12500 line at Kamaz, Russia
- 4 AKP 3150 lines at automotive industry suppliers in Germany
- 2 AKP 2500 lines at Nissan, Japan
- 1 KP 12500 line at CNHTC, China



HYDRAULIC PRESSES

Fully automatic for complex applications

Thanks to their characteristic forming behaviour, hydraulic presses from SMS group are outstandingly suitable, for example, for the forming of aluminium. They are force-bound and have a long stroke with variable stroke length adjustment. The forming rate can be individually adapted to the workpieces. High energy is available over the whole stroke length. Press speeds of up to 50 mm/s can be achieved.

PROCESS UNDERSTANDING FOR OPTIMIZED MACHINES

In order to take full advantage of the benefits offered by hydraulic forging, SMS group develops, designs and produces machines and plants for fully automatic forging. SMS group's customers thereby profit from the technical know-how, the vast experience for every detail of machine and process and the broad expertise of the SMS group employees with complex production processes.

FORCE-BOUND MACHINES TYPE HVP, HSP, HFP

Nominal force: 3.15 to 20 MN

THE BENEFITS AT A GLANCE

- Forming speed can be individually adapted to the workpieces
- Press speeds up to 50 mm/s
- High level of automation

REFERENCES (EXCERPT)

More than 140 hydraulic presses, of which

- HFP 2000 at Hirschvogel, Germany
- HFP 1600 at Isuzu, Japan
- HVP 1600 at Thecla, Switzerland
- HVP 630 at Mazda, Japan



SCREW PRESSES – TYPE SPE

Direct forging force application
with energy recovery



The energy-bound high-performance screw presses with direct drive from SMS group have universal applications. They combine high forming force with a simultaneous high forging precision. Screw presses with direct electric drive differ from flywheel-driven screw presses in that the driven spindle is connected directly to the drive motor without intermediate gearboxes or other mechanisms.

INTELLIGENT HIGH-AVAILABILITY MACHINE CONCEPT

The forging sequences on a workpiece can be programmed. The bottom dead centre position is variable. No adjustment of the die height is necessary. Thanks to the SMS group technology, no adjustment of the ram is necessary as the machine heats up. The drive comes from a synchronous motor with the stator forming part of the machine frame and the rotor part of the flywheel. The machines also have an impressive energy concept thanks to the feedback of the braking energy.

The synchronous motors of the presses have a simple design with larger packing density. The permanent magnets generate no heat at the rotor, i.e. no rotor cooling is necessary and the stator winding is cooled with water. Contaminated cooling air flows in the motor area are eliminated and thus reliability is increased.

ENERGY-BOUND MACHINES – TYPE SPE

Nominal force: 6.3 to 125 MN

THE BENEFITS AT A GLANCE

- High forming forces with high precision
- Automated process thanks to programming of the forging sequences on a workpiece
- Energy-saving operation thanks to feedback of the braking energy
- Great ease of operation

REFERENCES (EXCERPT)

More than 1,000 screw presses, of which

- SPE 16 and SPE 20 at Warmpresswerk Schachmann, Germany
- SPPE 6.3 in Shandong, China

SCREW PRESSES – TYPE SPKA

With full momentum into the future

Screw presses with continuously revolving flywheel and integral clutch are a further form of the energy-bound machines from SMS group. This opens up possibilities offered by no other press type. These presses are used to forge turbine blades and turbine discs of titanium for the aircraft industry and for power station components.

FLEXIBLE PROCESS SEQUENCES

High forming energy is available even at reduced ram speed. This is made possible by the special clutch disengagement technology. Furthermore, minimum workpiece contact times are achieved. Clutch disengagement can be force or stroke-controlled. All functions are controlled electronically.

THE DESIGN BENEFITS

Special features on the mechanical side are the pneumatic weight balancing, the spindle brake and the hydraulic flywheel bearings. Low accelerated masses, short acceleration distance and stroke rate preselection are further benefits of this machine type. Maximum forging power is available at 50% of the nominal stroke rate. The machine has variable-frequency drive.

ENERGY-BOUND MACHINES – TYPE SPKA

Nominal force: 8 to 224 MN

THE BENEFITS AT A GLANCE

- High forming forces with short workpiece contact times
- Variable contact speed of the dies
- Maximum power even at 50% of the nominal stroke rate

REFERENCES (EXCERPT)

More than 1,000 screw presses, of which

- SPK 2000 at Warmpresswerk Schachmann, Germany
- SPK 11200 at Wuxi, China
- SPKA 22400 at Böhler, Austria
- SPKA 22400 at Wuxi, China





MORE THAN JUST ON TIME

In cooperation with the Chinese company Wuxi Turbine Blade (WTB), the employees from SMS group erected the world's most powerful clutch-operated screw press three months faster than planned. The plant impresses with a press force of 35,500 tonnes, a spindle diameter of 1,320 mm and an exceptional energy efficiency. Wuxi can now forge significantly more sophisti-

cated parts for its customers from the aircraft and power station industries than to date. "For us the plant has the advantage of being able to meet the growing demands of our customers from the aircraft and power station industries," says Yan Qi, Managing Director of WTB. "We have been working together successfully with SMS group since 1976."



**SMS
MEER**
SMS group
EISMÜCK WASENCKLEVER
044-22400



FORGING ROLLS

Save material, reduce forming force

The forging rolls from SMS group impress with their clear design and high reliability. The machines are particularly suited to the preforming of forgings where the mass distribution of the preform is already close to that of the blank to be forged. For the plant owners this means material cost savings thanks to reduced flash, higher surface qualities thanks to the descaling during the rolling process and an improved grain orientation in the workpieces. Plus the increase in die life thanks to the optimum material distribution and descaling.

The size of the forging roll depends on the dimensions of the starting material. In general material with an edge length of up to 160 mm with a square form or a diameter of roughly 170 mm with round form can be employed.

SEAMLESS INTEGRATION

The automatic forging rolls can be easily integrated into forging lines and require no additional operating personnel. The high productivity allows the capacity of a downline closed-die forging press to be fully utilized. Furthermore, quick-change systems and the well-conceived operating concept offer short set-up and tooling times.



TYPE RW, ARWS

Sizes: RW manually operated /
ARWS 1 to RWW 3 automatic

THE BENEFITS AT A GLANCE

- Cost and quality advantages, as the preform is already very close to the form of the blank to be forged
- Simple integration into forging lines
- Short set-up and tooling times thanks to well-conceived operating concept

REFERENCES (EXCERPT)

More than 640 forging rolls, of which automatic forging rolls at

- Forges de Courselles, France
- Nissan, Japan
- Modern Drop Forge, USA
- Bharat Forge, Germany and India

CROSS ROLLS

Save time and machining costs

The machines for cross rolling from SMS group are characterized by flexibility, high yield and quick tool changing. The design of the adjacent rolls prevents scale deposits and asymmetric heating of the rolling dies. The drive principle with torque motor and permanently connected shafts combines maximum variability with the highest precision. Further options available include heating and cooling systems for the tools.

PRECISION BLANKS

Our cross-rolling machines are outstandingly suitable for volume distribution during forging of mass products, such as twin con rods or stub axles for the automotive industry. They contribute significantly to the optimization of the whole process. With the best possible blank forms within close dimensional and weight tolerances and with reduced flash and die wear. The cross roll is used for final and precision rolling of rotationally symmetrical parts such as transmission and drive shafts. The result: Subsequent machining is frequently made completely superfluous or is significantly reduced.

TYPE QW

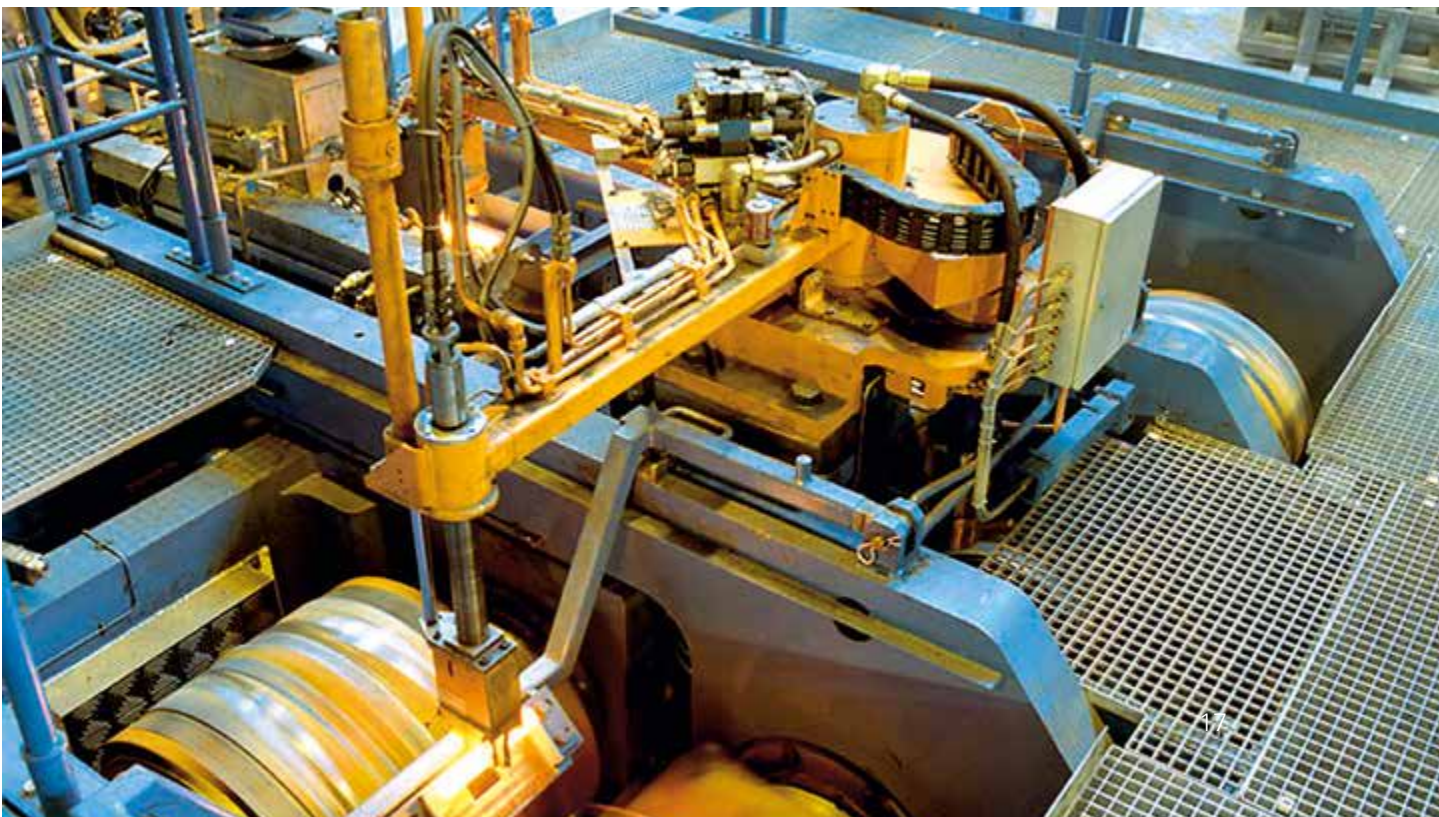
THE BENEFITS AT A GLANCE

- Optimum heating and cooling systems for the tools
- Quick tool changing with tool adapters
- Inexpensive tools (half rings)

REFERENCES (EXCERPT)

More than 640 forging rolls, of which cross rolls at

- Mahle Brockhaus, Germany
- ThyssenKrupp, Brazil
- WHB, Brazil



FURTHER PRESSES AND SPECIAL MACHINES

Complete range of machines for all demands

SMS group offers the right machine solution for every forging application. Whether small batches or large series production – the right concept is developed together with the plant operator.

ELECTRIC UPSETTING MACHINES

Electric upsetting machines from SMS group are gentle on the material and ensure optimum grain orientation inside the workpieces. The machines require no forging furnace and the forming process

is clean. Numerous workpieces can be preformed or even completely formed by electric upsetting. The horizontal or vertical upsetting machines with heating powers from 12 to 630 kVA are suitable for forming steels, titanium and most other forgeable materials, for round and polygonal cross-sections. The range of applications is broad: From upsetting of workpiece ends and centre sections through to cylindrical and stepped upsetting.

HORIZONTAL FORGING MACHINES

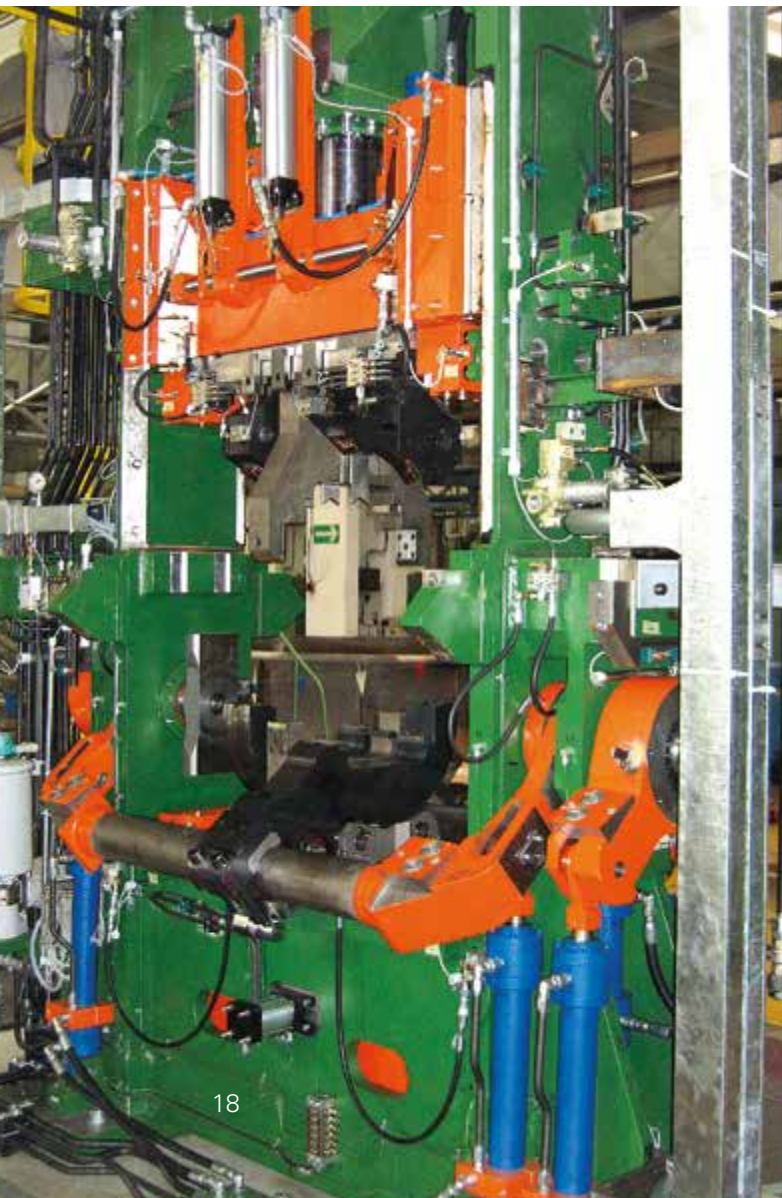
Horizontal forging machines from SMS group are employed to pre-forged or finish-forged forms on predominantly long, shaft-like workpieces in several operations. A wide range of complex workpiece geometries can be produced cost-effectively in this way.

UPLINE AND DOWNLINE FORMING PRESSES

With a comprehensive range of hydraulic and mechanical upline and downline forming presses, SMS group is able to meet the individual demands of forging shops in this segment, taking both the current workpiece spectrum and the plant operator's future plans into consideration.

HAMMERS

High flexibility and low investment costs make the closed-die forging hammers from SMS group attractive forming solutions in many areas of forging. Characteristic of our machines is their reliability and permanent availability under the tough day-to-day operating conditions.



FORGING LINES

Integrated process chains from a single source

In order to meet the present-day demands for an optimum production flow and just-in-time production, forging lines have to be linked using the latest electronics to form high-performance systems.

HARMONIZED INTERFACES

All components from SMS group are carefully matched to form an integrated unit. The results: Gentle material handling, low maintenance, high availability and reliability. Those are the factors for optimum productivity and high quality.

FLEXIBLE PRODUCTION CONCEPTS

Thanks to the use of tool quick-changing systems and the extensive programming possibilities of all machine and transport functions, complete plants from SMS group operate cost-effectively even with small lot sizes, as they can be changed over from one forging series to another within a very short time.



FROM THE CUSTOMER'S VIEWPOINT

"We produce sophisticated forgings primarily for the automotive industry. A lot of our manufacturing equipment comes from SMS group and we are very satisfied with it. In SMS group we also have competent experts at our side offering us dedicated support in many areas."

Dr.-Ing. Franz Eckl, Managing Director Technology, ThyssenKrupp Gerlach GmbH

AUTOMATION SYSTEMS

Everything runs by itself



SMS group has comprehensive know-how in all aspects of flexible production automation. The experienced staff develop solutions for the plant operators tailored exactly to their requirements – even for their existing plants.

EXACT POSITIONING

The automation systems developed specifically for the hot section set new standards in forging force and positioning accuracy: Gripper arm and walking beam systems with hydraulic or servo-electric drive.

UNINTERRUPTED PRODUCTION FLOW

Furthermore, SMS group offers transport and handling systems and facilities perfectly matched

to the intended application. Typical examples are insertion and removal devices, manipulators for forging rolls, charging devices and intermediate transport facilities.

CONSISTENTLY HIGHEST QUALITY

In addition to improving the productivity, the automation of the forging processes makes an important contribution also to quality assurance. SMS group develops the solutions. Continuous, thermally stable forging processes result in higher precision, improved tolerances and reproducible forgings.

SPRAY TECHNOLOGY

The cleanest technology lead

SMS group offers spray systems that are optimally integrated into the sequence of functions of the forging plant. They ensure that modern forging presses develop their full performance and achieve the highest forging quality. The spray technology from SMS group cleans, cools and dries the dies and applies the necessary process lubrication.

AS MUCH AS NECESSARY, AS LITTLE AS POSSIBLE

The control of the spray systems permits in-cycle maintenance of the dies with exactly programmable spraying times and spray quantities. SMS group's product range allows practically all spray requirements to be satisfied. High-speed presses have mechanically linked spray arms that swing in and out in cycle with the forging process. Flexible manipulators or robot-mounted spray systems permit manual or other individual solutions.

ENVIRONMENTAL PROTECTION INCLUSIVE

SMS group installs extractor hoods and filter systems on the press and spray system to extract the process vapours. The integrated design facilitates maintenance and increases cleanliness in the press area.



NOTES

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

SMS GROUP GMBH

Business Unit Forging Plants
Closed-Die Forging

Ohlerkirchweg 66
41069 Mönchengladbach
Germany

Phone: +49 2161 350-1450
closeddieforging@sms-group.com
www.sms-group.com

The information provided in this brochure contains a general description of the performance characteristics of the products concerned. The actual products may not always have these characteristics as described and, in particular, these may change as a result of further developments of the products. The provision of this information is not intended to have and will not have legal effect. An obligation to deliver products having particular characteristics shall only exist if expressly agreed in the terms of the contract.