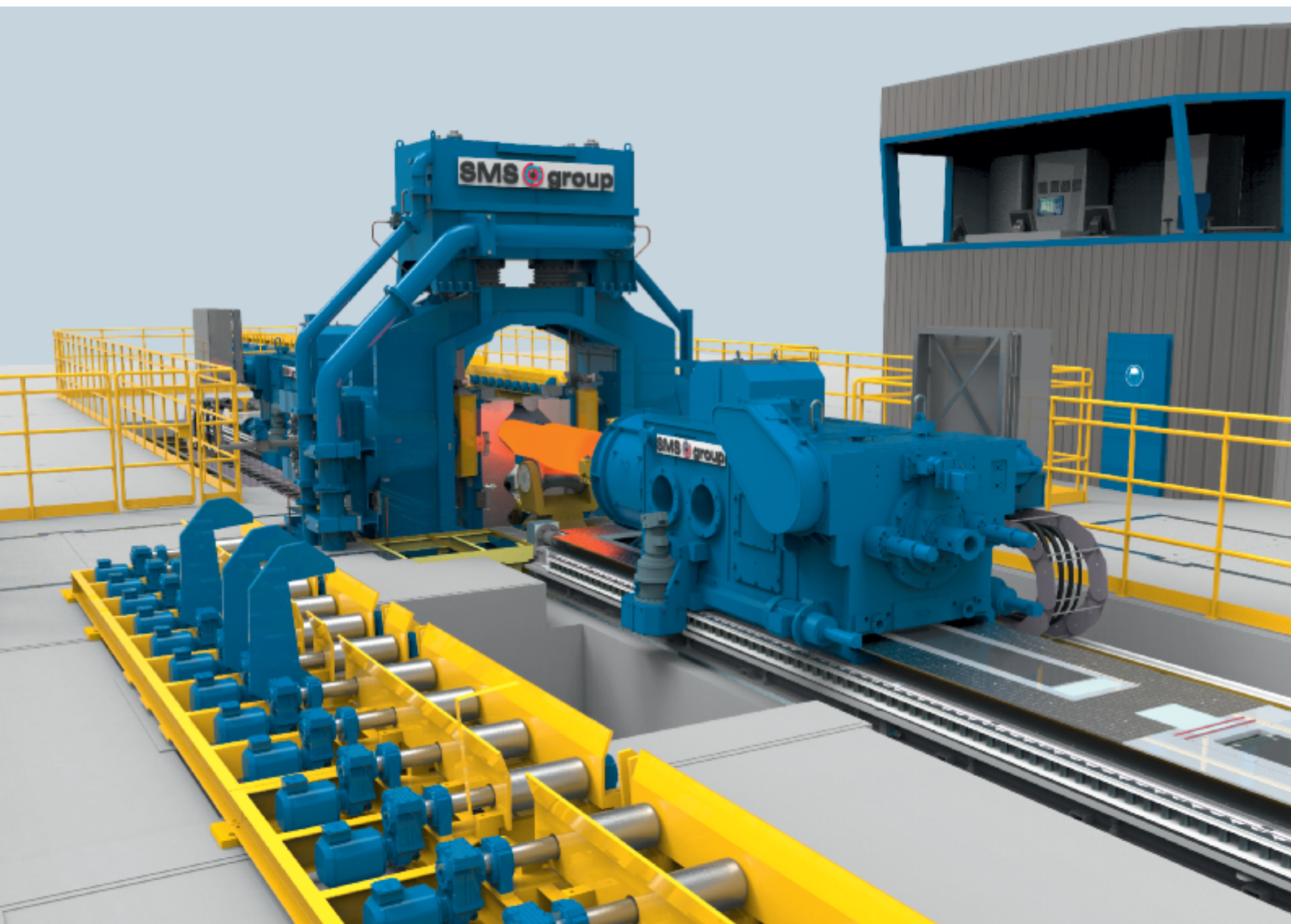
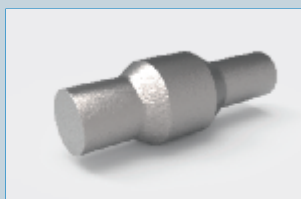


## SMI Hydraulic Radial Forging Machine Customized forging technology



Forgeable Geometries



# SMI – Faster forging ... Lower cost

## What is SMI?

SMI is an automatically controlled and hydraulically driven 2-ram forging machine with integrated manipulators and centering devices for automatic operation, and is suitable for forging step shafts, axles, bars and intermediate parts for mass distribution.

SMI is a state-of-the-art system and is ideal for the mass distribution of hot forgings used for the closed-die forging of, among other things, titanium and nickel alloys, special steels, tool steels, construction steels, stainless and corrosion-resistant steels as well as heat-resistant steels. It is capable of forging all materials that are normally forged using open-die forging equipment. High levels of productivity and quality are achieved through high penetration depths and large manipulator working steps per stroke.

SMI is based on the proven SMX design but features just two horizontal rams.

## Forging Unit

The forging unit consists of one cast frame and two identical horizontal cylinders that each comprise a press ram which is driven hydraulically and controlled using a programmable servo unit. The synchronization of the two press rams is achieved by means of the servo control unit. The high stroke frequency of up to 240 strokes per minute is possible thanks to the specially-developed hydraulic drive and control system.

Each of the two press rams is controlled by only one valve, which is integrated in each ram cylinder.

The machine can be operated in manual mode (for tool changing only) and in fully automatic mode (automatic forging).

## Two fully synchronised manipulators

The SMI is equipped with two tried-and-tested manipulators which are guided and driven by rack and pinion or by hydraulic cylinder on slide beds. The manipulators are used to support, guide, advance and rotate the workpiece centrally during forging. Hydraulic and electrical power is provided by a powertrack for each manipulator.

Support rollers: each manipulator side has support rollers with an automatic function to guide the materials and prevent bending.

## Centering Device

A centering device each is arranged on either side of the forging unit. The centering rolls are operated hydraulically and serve to guide the workpiece on the correct axis into the forging dies and support it before and after the forging dies.

## Hydraulic Equipment

The hydraulic equipment consists of main drive pumps for the press ram movement, additional pumps for the auxiliary equipment, and a central oil reservoir with filter and cooling units. An oil-water cooler is used to keep the hydraulic oil at a temperature level suitable for the relevant operation. The worldwide from SMS group patented hydraulic system is designed such that the oil in the cylinder unit flows in one direction only. This ensures smooth actuation of every single stroke and thus guarantees a long service life for all hydraulic components.

## Electrics & Automation

The electronic control system for the SMI comprises a computer control system for process performance and process visualization, logic control unit and a control system for all forging machine and manipulator axes. The pass schedules for the forging process are provided by the ComForge® technology package developed by the SMS group with its comprehensive material databases. The pass schedule can be optimised and saved by the plant owner so that all the data on the forging process are immediately available for repeat orders.



An industrial computer has been incorporated in the control desk for operating the SMI. What's more, machine faults are registered and displayed on the screen with supplementary texts to assist with quick fault detection and maintenance.

### Training

An in-depth training course specifically designed for maintenance and operating personnel is offered by SMS during the installation of the machine on site, and is divided into both theoretical and practical training.

### The forging process

#### 1. Standard loading version:

A swiveling gripper station on the loading side transports the ingot from the roller conveyor to the infeed manipulator. A second gripper station integrated at the unloading side takes the forged part from the output manipulator back to the roller conveyor. The machine design boosts productivity by allowing simultaneous loading and unloading of the machine: While the finished forged part is removed on the unloading side, a new ingot can already be clamped on the loading side.

#### 2. Robot loading version:

The heated blank is delivered onto the loading table by the charging manipulator, then picked up by the gripper of a robot and fed into the loading manipulator. The manipulator moves the workpiece into the forging areas between the dies. The two forging dies move uniformly from both sides to the forging axis and penetrate the workpiece. The workpiece, therefore, remains in the center of the forging axis throughout the entire forging process.

The workpiece is enveloped by the two forging dies, each of which has two or three tool positions (angle dies); consequently, the workpiece is mostly elongated with only a minimum of spread, depending on the tool design. Alternatively, flat, round or special profiled dies can be used.

### SMI benefits

- Material savings thanks to mass distribution
- High productivity
- Product flexibility
- Time-efficient due to fast tool-changing with tool changing device
- Energy-efficient due to forging in just one heat
- Reproducible high product quality
- Forming through to the core due to hydraulic drive concept with long stroke
- Automatic forging mode
- Low-maintenance design

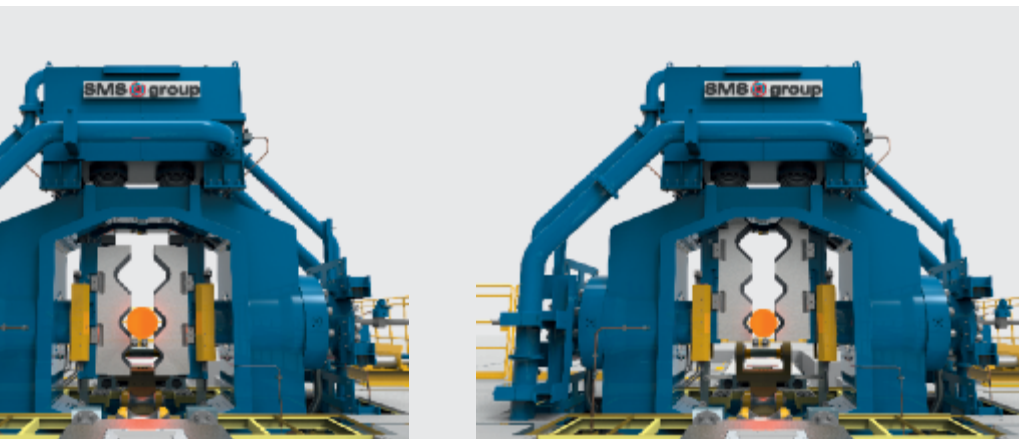
### Manipulator benefits

- Continuous drive
- Continuous rotation
- Perfect synchronization with tool movement
- No up or down tong movement for the manipulator working step
- No vertical tong movement during the press stroke

### Available series

Press size*	Max. press force (MN)	Max. tool opening (mm)
SMI 200	4	200
SMI 430	8	430
SMI 600	10	600

\* Smaller or larger machine sizes on request. Changes during the course of further development reserved.



### Quick Tool Shifting

With the tool movement/shifting device, tool positions can be changed directly during the forging process. Therefore with fast tool changing, forging can be performed in just one heat. This saves time and energy as the forgeable part needs to be heated only once.

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