

## DIEFORMER Type MP



# A TRADITION OF PROGRESS

The Closed-Die Forging Division of SMS group with the traditional name Eumuco Hasenclever is able to look back on a long tradition of press manufacture in which important developments have led from the classic closed-die forging press to today's automatic forming system.

Our modern DIEFORMER stands out through its versatility in handling the most varied forgings with

and without flash, made from very diversely alloyed aluminium or steel grades, as well as forming processes ranging from hot to warm.

The automated DIEFORMER can be operated both in intermittent and continuous mode, depending on the requirements in hand or the part to be produced.





# STRUCTURAL DESIGN

## Functional principle

### **(1) Frame**

SMS group attaches particular importance to solid frame construction which offers significant advantages over split tie-rod designs in regard to longitudinal rigidity and also rigidity against tilting. We realise machine frames of monobloc design in weights up to 185 t.

### **(2) Ram / (3) Pitman**

The press ram is driven by a broad, solidly connected double pitman made of cast steel. This compact component with large pressure cups conducts the pressing forces linearly, without any edge pressure, from the eccentric shaft via the wrist pin to the ram.

This thereby transmits also eccentrically occurring forging forces linearly to the eccentric shaft. The high rigidity against tilting ensures uniform forging thicknesses.

### **(4) RAM GUIDE SYSTEM**

We have, in designing the DIEFORMER, paid particular attention to precise and extensive guidance of the ram. Depending on the type of frame, the ram slides either in adjustable, rigid box-type guides, or in thermally insensitive diagonal guides that also are adjustable.

### **(5) CLUTCH / BRAKE SYSTEM**

A fail-safe clutch/brake system ensures short response times. The clutch and brake are arranged directly on the eccentric shaft and thus safeguard the press from overloading.

The clutch/brake system can be controlled either electro-pneumatically or electro-hydraulically. In case of the electro-pneumatic clutch/brake system, the clutch and brake disks are connected to the eccentric shaft and have easy-to-replace, asbestos-free friction pads.

The patented electro-hydraulic clutch/brake system is preferred particularly for higher cycle times in com-

bination with fully automatic operation. With this disk-type design, the clutch and brake are arranged together on the right-hand side of the press, and the clutch interplays with the brake. Both elements are comprised in one integral unit and arranged on the eccentric shaft.

### **(6) Weight counterbalancing system**

Two pneumatic cylinders dynamically counterbalance the weights of the up- and downward moving press parts, including bolster and dies. This minimises the bearing clearance of the components within the power train, thereby positively influencing the dynamic loading of the machine elements directly involved. The rear counterbalancing cylinder is additionally used to clamp the eccentric wrist pin for the ram adjustment.

### **(7) Ram adjustment system**

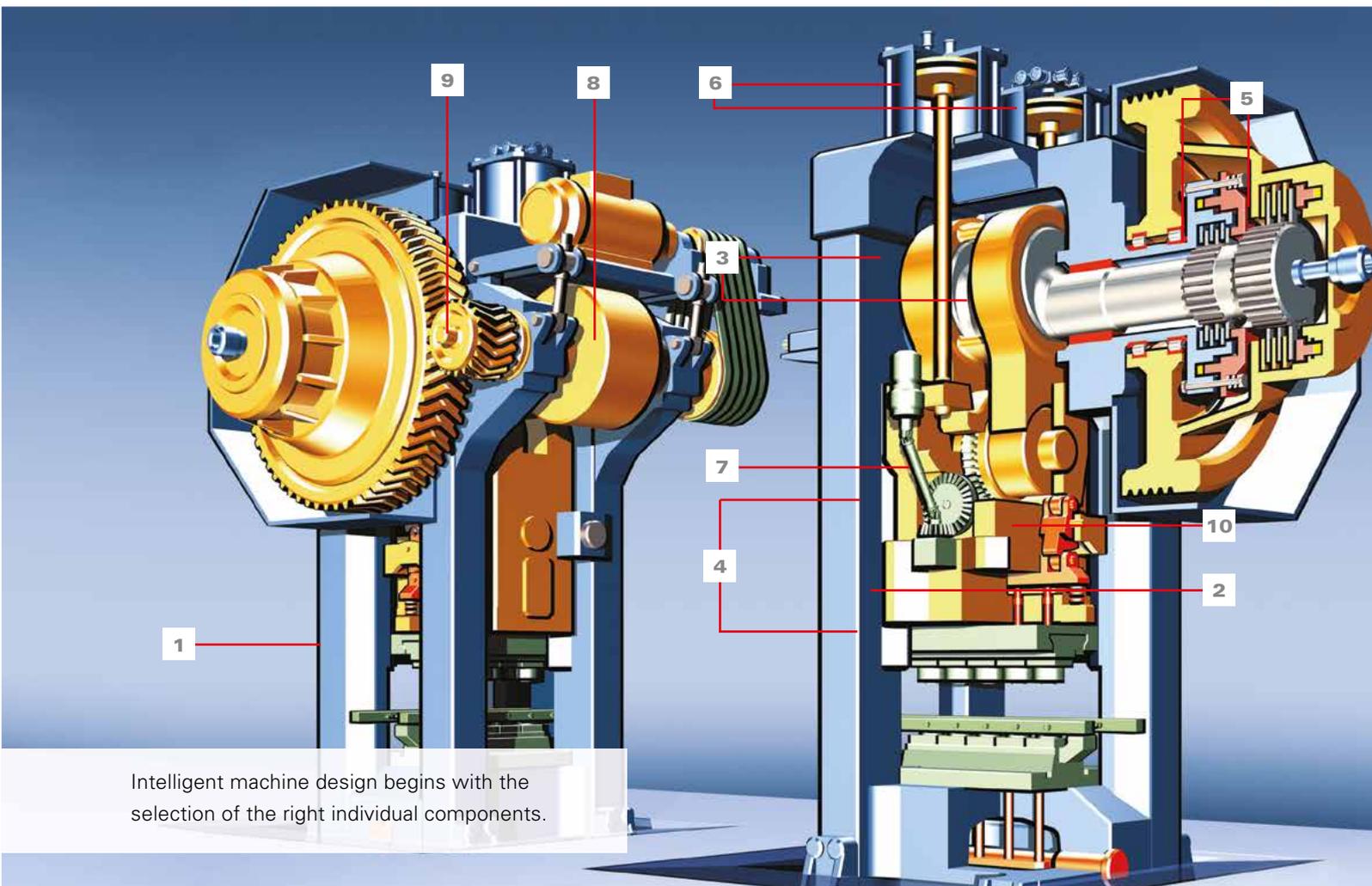
The ram adjustment system makes it possible to adjust the height of the die space, in order to set up the forging dies and compensate for temperature differences or for die wear. The ram stroke position is adjusted by means of a motor, which turns the eccentric wrist pin via a cardan shaft and worm gear drive. The wrist pin is supported over its entire width. Specially designed automatic presses with a rapid adjustment system enable adjustments through the push of a button on the press control desk, without interrupting the automatic sequence of operations.

### **(8) Backgear / (9) Herringbone gearing**

DIEFORMERS can be supplied with or without backgear, depending on the forming energy requirements. The drive torque is transmitted from the backgear to the flywheel by means of compact herringbone gearing on the pair of gears. This type of gearing ensures smooth running.

### **(10) Table / Ram ejectors**

DIEFORMERS are fitted with controlled table and ram ejectors. These systems help considerably to



Intelligent machine design begins with the selection of the right individual components.

stabilise the process, especially for fully automatic forming presses. The workpiece has to be made available by the ejectors at the right time and in the correct position to the monitored tongs of the automatic walking-beam transfer system. The ram ejector serves in this respect to ensure that the formed workpiece remains in the bottom die when the upstroke of the press ram takes place. The ram ejector system is kinematically designed in such a way that the workpieces are held down in the bottom die during the ejection process. The ejectors move in synchrony with the ram. Individual ejectors of the mechanic-hydraulically or, alternatively, servo-hydraulically controlled type are used in the press table for the main forming stages in the bottom bolster. Which ejector strokes are realised depends on the type of part and different forming operations involved. They are adjustable through the push of a button on the press control desk. Different ejector systems optimally customised to the requirements and application in hand can be fitted.

### Lubrication system

Lubrication is geared to the needs of each machine type, with flexible programming of the lubricant input being possible. The central lubrication system is sub-divided into functional groups, each of which is monitored electrically. There are consequently different lubrication cycles and varying lubrication intervals for the eccentric shaft and pitman bearings, ram guides and gears, for example. Also, temperature sensors are fixed at important bearing positions of the machine to display any overheating. Equipping the machine with a closed-circuit oil lubrication system for the backgear is possible as an option.

# INDIVIDUAL COMPONENTS



## ECCENTRIC SHAFT

- Made of high-alloy quenched and tempered steel, with extra-wide eccentric cams
- High rigidity – low deflection
- Increased fatigue limit through generous eccentric-to-pinion transition radii

## FRAME

- Of solid, monobloc cast steel design in transport weights up to 185 t
- Broad, high side windows in all uprights for the inward transfer of the forging blanks and outward transfer of the finished part or flash
- Ram guidance system in thermally neutral, diagonal design



## PITMAN/RAM

- Broad, solidly connected double pitman made of cast steel
- Ratio of double pitman width to ram width approximately 1:1 to minimise ram tilting
- Low ram guide wear through balanced ratio of double pitman length to ram stroke



# ASSEMBLIES

## AUTOMATIC ELECTRIC WALKING-BEAM TRANSFER SYSTEM

- Designed for an operating speed of up to 30 strokes per minute
- Comprising four individual housings with drive, attached to the press frame
- Including two replaceable walking beams with their own press-independent drives
- 3 axes of movement: "Transfer Step", "Lift/Lower", "Open/Close", in each case driven by separate servo-motors

## HYDRAULIC CLUTCH/BRAKE SYSTEM

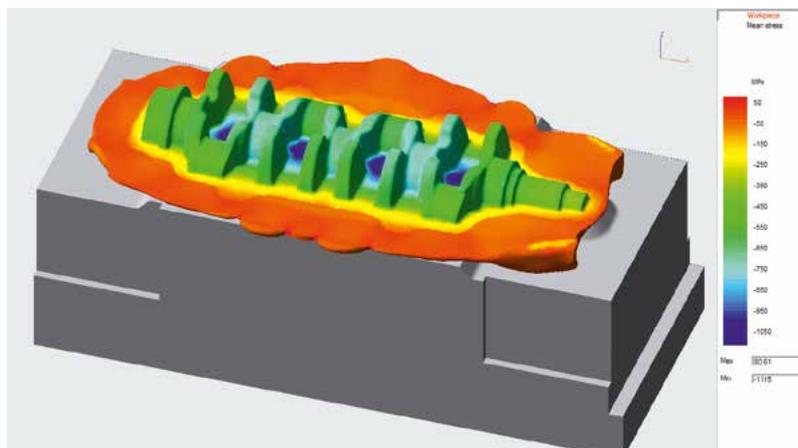
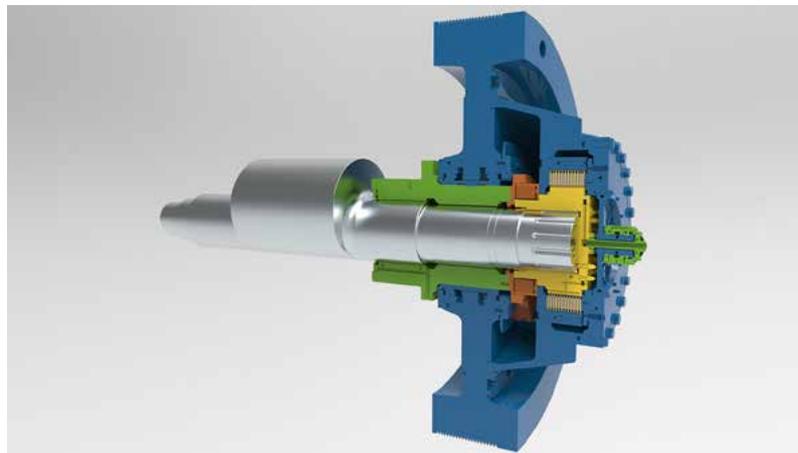
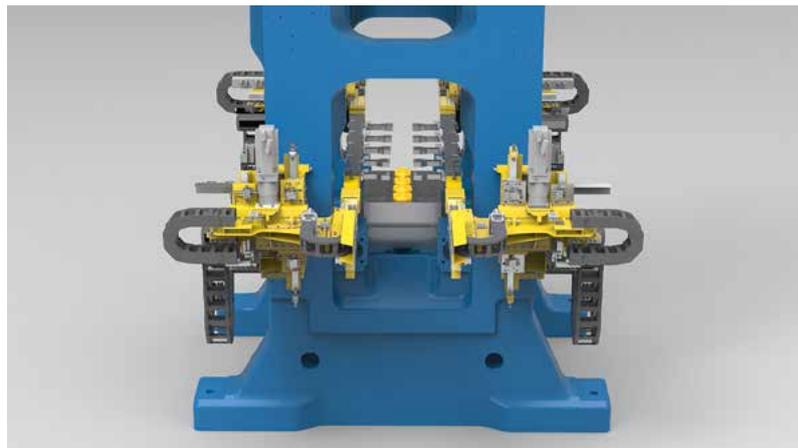
- Oil-bath-mounted
- Short response times
- Good heat exchange
- Low noise level
- Almost no wear

## ROBOT HANDLING SYSTEMS

- Integration of industrial robots

## INTEGRATED CONCEPTS FOR MACHINERY AND PROCESSES THROUGH

- Assurance and optimisation of the operational sequence (of expected die loads)
- Practical testing with experimental arrangements such as, e.g. spray stands



# CONTROL SYSTEM

A programmable logic controller has complete functional control and monitors the machinery and additional units.

The press is monitored and operated from control panels which are appropriately assigned according to function. Integrated in this system, besides the power section, are the control section and the operator communication level. The press is monitored and controlled via a press safety control system, and the automation functions and higher-level systems via a user-programmable controller. Where necessary, the interface with the peripheral elements, such as heating system or operator communication level, is realised via a bus system (Profibus DP).

All the components are standard parts that are obtainable internationally. Generally speaking, the highest quality is used, in order to cope with temperatures over an extended range from around  $-20^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$ . Any faults are displayed in plain language on the control panel, which has graphics capabilities. The control panel also serves as a source of information for the operator, giving operating instructions, for example, or figures on the peak pressing forces, bearing temperature levels, lubrication functions and lubricant levels, crank position, ram position for the ram adjustment, or number of press strokes over a given period. As an option, data on forging temperatures, or flywheel speeds, etc. can also be called up.





**“A PICTURE SAYS MORE THAN A THOUSAND WORDS”**

Effective support becomes available within a very short time, because experts can be called upon directly and faults quickly rectified.

Our PC-based service and information systems, such as the PICOS++ (Process Information and Control System) used for visualisation and diagnostics, offer an extra advantage. This modern EDP tool can be utilised for diverse applications thanks to its user-friendly handling. Pre-defined values are input intuitively under password protection. Machine settings are stored in “recipes”, with it being possible both to print out the recipes and to export them as files. Critical measurement data can simply be read off in the form of a colour display, for instance, or all the important data summarised on screen. The status of all the machinery operating together in a forging line is thus visible at a glance. Supplementary information, if required, can also be retrieved. The operator is guided by means of handling instructions and machine illustrations, for example, so that faults can be rectified more quickly.

It is possible not only to monitor running-time-dependent maintenance intervals, but also to programme and thus realise them more selectively.

In the event of a machine standstill the outage time can be drastically shortened with the aid of ViTeSy, a Video conferencing and Teleservice System. This system is a combination of video conferencing and data communication and can be installed on any PC. A parity of information is achieved between two partners by means of image transfer, with the possibility of:

- Observing and evaluating dynamic machine processes
- Parallel transmission of video images and process data
- Selective remote diagnosis of machine controls
- Digitalisation of video images and documentation.

# FORGING EXAMPLES



Whether connecting rods, journals, transmission shafts or other closed-die forgings: SMS group's die-former unites traditional forging handicraft with automated industrial manufacture – precisely, productively and cost-effectively. Here are just a few examples from the die-former's extensive spectrum of forging capabilities.



# INTERESTING FACTS

## about the Dieformer

### STANDARD BASIC DESIGN

- Monobloc frames in transport weights up to 185 t, also split tie-rod design
- Adjustable ram guides with bronze strips
- Motor-operated ram adjustment system
- Pneumatic block-type clutch and brake, or electro-hydraulic clutch/brake system
- Pneumatic counterbalancing system
- Flywheel brake
- Mechanical top ejector for 3 operations
- Hydro-mechanical bottom ejector with thumb shaft, for 3 operations
- Soundproofing hoods
- Grease or oil lubrication
- Complete installation
- Electrical controls
- Hydraulic power pack (for mineral oil)

### OPTIONS

- Low-wear table coat welding
- Ram locking device
- Adjustable ram guides with nitrided strips
- Rapid ram adjustment system
- Ram dejamming device
- Electro-hydraulic clutch/brake system
- Top ejector assembly, mechanical or hydraulic
- Bottom ejector assembly, motorised stroke adjustment
- Bottom ejectors, individually actuated and motor-operated adjustment
- Bearing temperature monitoring system
- Tonnage monitors
- Fume extraction hood
- Grease replenishing system
- Hydraulic power pack (for non-flammable HFC fluid)
- Frequency-controlled drive
- Closed-circuit oil circulation lubrication system

### OPTIONAL EXTRAS

- Dies
- Bolsters
- Die and/or bolster quick-clamping system
- Bolster changing carriage
- Turnover equipment
- Workpiece transfer equipment
- Spraying device
- Customised electronic control system

### SPECIFICATION

SMS group: Your partner with ideas and profile to match

SMS group dieformer for closed-die forging operations are precisely geared to your requirements. You can choose from an extensive range of performance parameters to make all components match perfectly, both technically and economically.



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