

## 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 AND FUNCTIONAL PRINCIPLE

## **(1) Frame**

For the split tie-rod design, the SMS group attaches particular importance to a solid frame construction optimised using FEM computations.

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

The press ram is driven by two solid steel pitman shafts. These compact components with large bearing bushes transmit the press forces in a straight line, without any edge pressure, from the eccentric shaft via the wrist pin to the ram. Even eccentric forging forces occurring during the forging process can be transmitted.

## **(4) Ram guide system**

When designing the DIEFORMER, we pay particular attention to precise and long guidance of the ram in heat-resistant diagonal guides with nitrided guide ledges.

## **(5) Clutch / (6) brake system**

A fail-safe clutch/brake system ensures short response times. Clutch and brake are mounted directly on the eccentric shaft and thus protect the press directly against overloading. The wet clutch/brake system is controlled electro-hydraulically and designed for fully automatic operation for short cycle times. For ease of maintenance, clutch and brake are arranged separately on the flywheel side and on the opposite side of the press. The flywheel is braked by a variable-frequency drive motor.

## **(7) Weight balancing system**

For dynamic balancing, the weights of the press parts moving up and down, including bolster and dies, are compensated by two pneumatic cylinders. This minimises the bearing clearance of the components in the power train, thereby positively influencing the dynamic loading of the machine elements directly involved.

## **(8) Ram adjustment system**

The ram adjustment system allows the height of the die space to be adjusted in order to set up the forging dies and compensate temperature differences or die wear.

The stroke position of the ram is adjusted by means of a motor and worm gear and is held by separate clamps. The adjusting screw has been designed for self-locking.

The ram adjustment system can be actuated by pressing a button on the control desk of the machine without interrupting the automatic operating sequence.

## **Backgear / Herringbone gearing**

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

## **(9) Upper and lower (10) ejectors**

DIEFORMERS are equipped with hydraulically driven ejectors. These systems contribute significantly to the process stability, particularly on fully automatic forming presses.

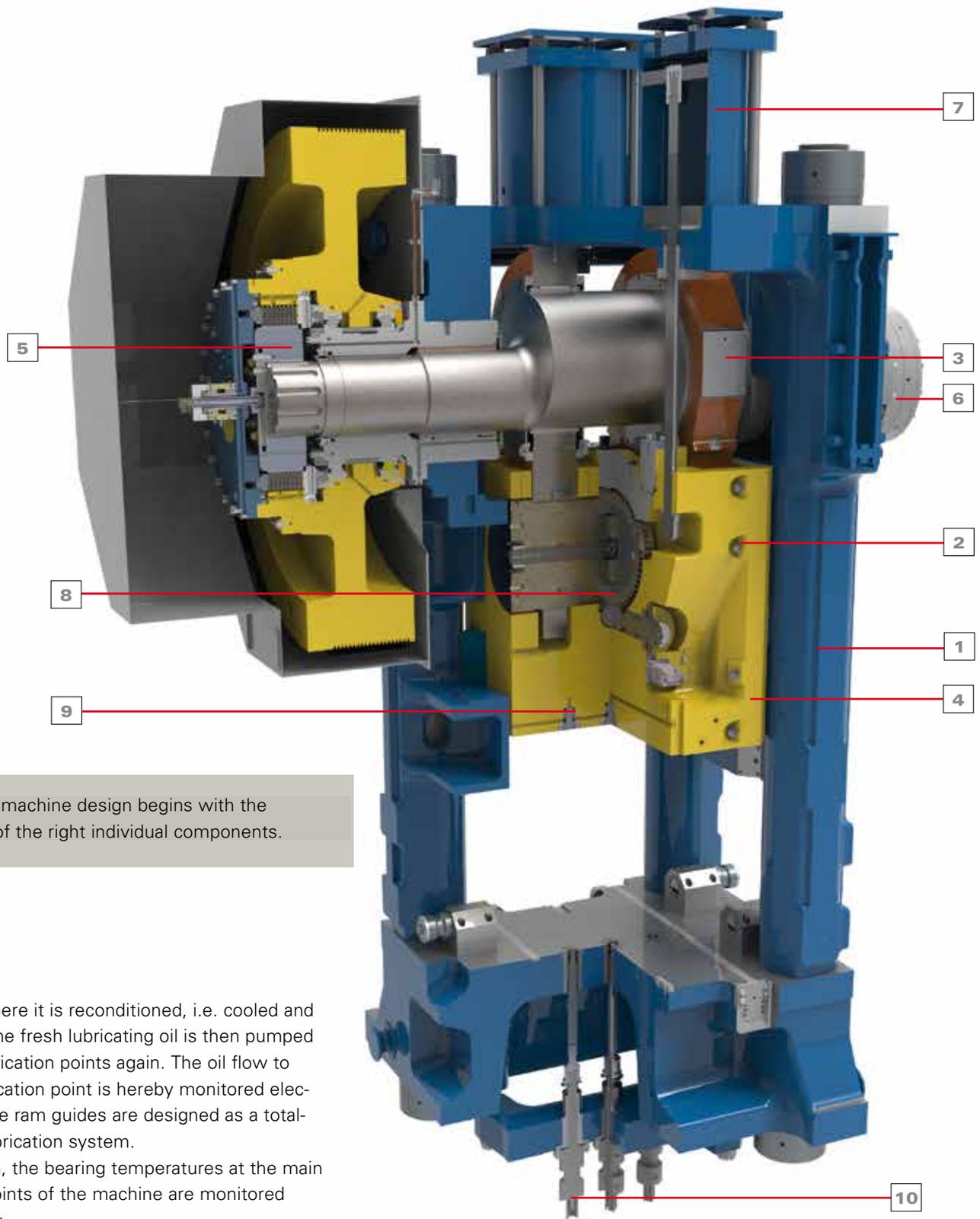
The ejectors have to transfer the workpiece to the monitored grippers of the automatic walking beam system in cycle and in the correct position.

The ram ejectors are hydraulically driven single ejectors.

The table ejectors are designed as hydraulic position-controlled single ejectors.

## **Lubrication system**

The main bearings of the machine are continuously lubricated with oil. After leaving the lubrication gap, the oil is collected and directed to the recirculating



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

oil unit where it is reconditioned, i.e. cooled and filtered. The fresh lubricating oil is then pumped to the lubrication points again. The oil flow to each lubrication point is hereby monitored electrically. The ram guides are designed as a total-loss oil lubrication system.

In addition, the bearing temperatures at the main bearing points of the machine are monitored electrically.

# INDIVIDUAL COMPONENTS



## ECCENTRIC SHAFT

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



## FRAME

- Of split design with tie rods and solid press table and head section.
- Broad, high windows in all uprights for the inward transfer of the forging blanks and outward transfer of the finished part or flash
- Ram guide system of thermally neutral, diagonal design

## PITMAN/RAM

- Double pitman with very wide distance between supports that corresponds almost to the ram width to minimise ram tilting
- Minimum wear of the ram guide thanks to balanced ratio of pitman length to ram stroke



# COMPONENTS

## AUTOMATIC ELECTRIC WALKING BEAM SYSTEM

- Designed for an operating speed of up to 30 strokes per minute
- Comprising four individual housings with drive, attached to the press frame
- With two replaceable walking beams with their own drive units which are independent of the press
- 3 axes of movement: "Transport step", "Lift/Lower" and "Open/Close", each driven by separate servo motors

## HYDRAULIC CLUTCH/BRAKE SYSTEM

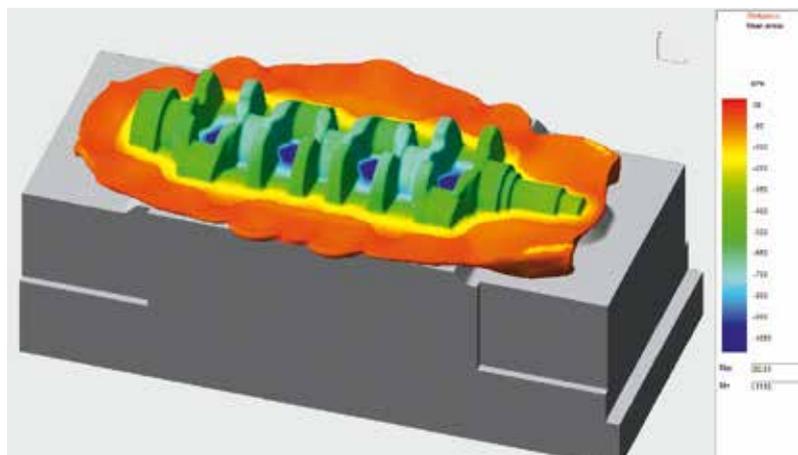
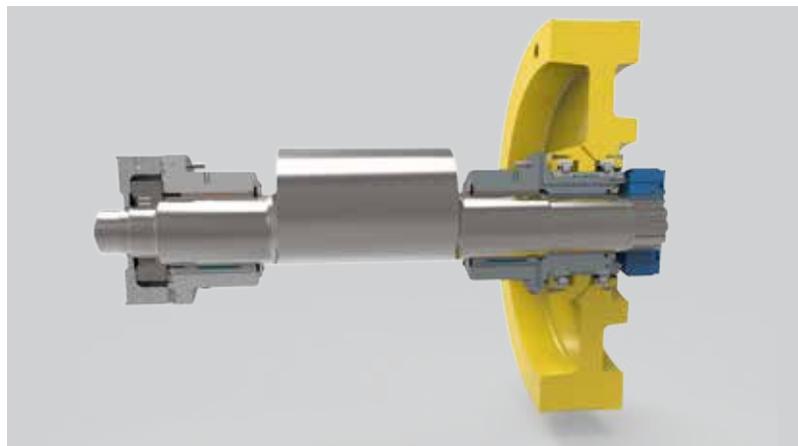
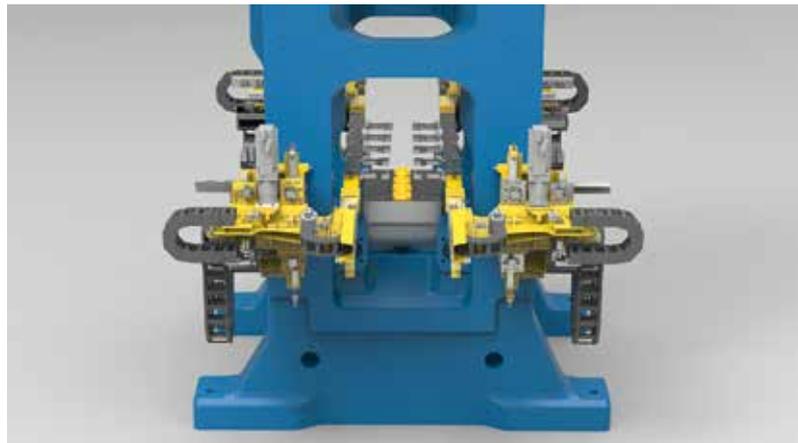
- Oil-bath-mounted
- Short response times
- Good heat exchange
- Low noise level
- Almost no wear

## ROBOT HANDLING SYSTEMS

- Integration of industrial robots

## HOLISTIC CONCEPTS FOR MACHINES AND PROCESSES THROUGH

- Assurance and optimisation of the operational sequences on the basis of trial configurations, e.g. spray stand
- Practical trials



# CONTROL SYSTEM

## GENERAL

The Siemens S7-1500 control system with failsafe CPU and certified press safety software has complete functional control and monitors the machine and its auxiliary units.

## OPERATION

The machine and the installed automation system is monitored and operated via a control panel near the machine for set-up, single stroke and automatic mode. In conjunction with the integrated visualisation system, all machine functions can be selected and executed very easily and efficiently. Depending on the requirements, the control panel can be expanded to include an additional operator panel with enabling push-button for local operation directly at the machine.

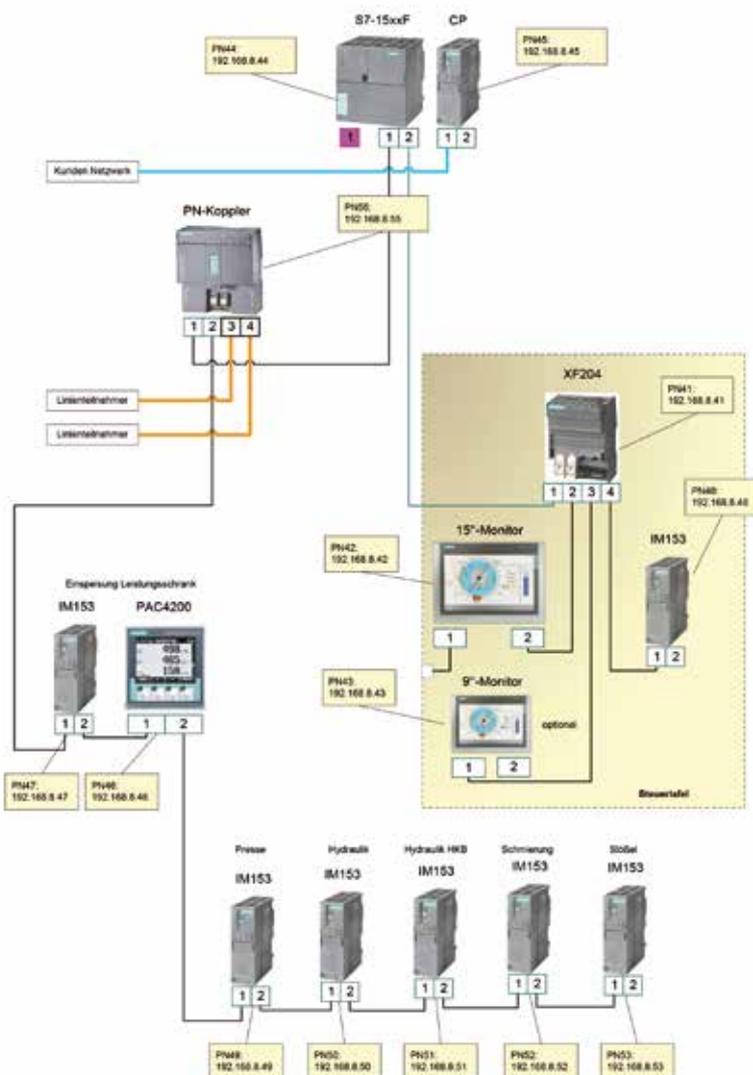
## VISUALISATION SYSTEM

The visualisation system employs a 15" touch panel that also forms an integral part of the control system. All necessary machine parameters, measured values and error messages are displayed to the machine operator in an intuitive and easily understood form. Troubleshooting is simplified by an extensive description, while the integrated initial fault function focuses the analysis on the crucial aspects. The complete machine documentation and further technical documents can be displayed at the machine.

## LEVEL 2 / MES

Process data are transmitted via interfaces to superordinate systems, such as the PC-based SMS Level2 System. The following MES function modules have already been implemented:

- MIDIS (order management),
- BDE (process data acquisition),
- FIS (error message management),
- ISS (maintenance management),
- MPT/CM (condition monitoring).



Also with a view to Industry 4.0, these MES function modules are subject to ongoing further development to the special needs of the respective operating environment and are therefore individually tailored.

### **TIA PORTAL**

The programs of the whole control system consisting of PLC, the visualisation system and possibly the automation system are integrated into the TIA portal which thus forms the ideal basis for programming with common variable ranges and troubleshooting to support maintenance work.

### **CONTROL SYSTEM ARCHITECTURE**

The architecture of the control system is decentralised, with the power packs of the table ejector and clutch/brake having dedicated I/O stations in the terminal boxes so that they form self-contained units. Profinet with Profisafe features is predominantly used as bus system so that e.g. decentralised emergency stop buttons or safety valves are also implemented in the decentralised structure.

### **INTEGRATION**

Interfacing with existing forging lines, both in conjunction with a line controller and as direct interfaces to the line components, presents no problems. Here again, Profinet with Profisafe is predominantly used so that safety-related signals can also be exchanged.

### **PRESS FORCE MEASUREMENT**

A 4-channel press force measuring system which measures the forces on each side and in each frame for protection of the machine and for monitoring of the process by the operator is also lined to the machine controller via Profinet. The measured value masks of the visualisation system display both the individual and total measurements as a bar chart and measured value, as well as the off-centre loading of the table in a chart.



### **MEASURED VALUE ANALYSER**

In addition, the machine is equipped with an IBA measured value and data acquisition system that is ideally suited for both simple and individual troubleshooting and for detecting less frequent fault patterns, e.g. for calibration of the hydraulic clutch. This system uses signals from existing sensors, and at the same time records also the signals from the control program in one measuring cycle so that a time-critical monitoring of process, sensors and control system becomes possible.

### **REMOTE SERVICE**

The comprehensive remote service function has been made possible by linking the IBA system with the TIA portal. Analysis and diagnosis by recording and evaluating the relevant signals through to program changes are possible here by agreement with the machine owner. Provided that the security-relevant measures are observed, the machine can be linked to the SMS group remote service via VPN (Virtual Private Network) in order to support machine maintenance.

# FORGING EXAMPLES



Whether connecting rods, journals, transmission shafts or other closed-die forgings: SMS Meer'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.



# THINGS TO KNOW

## about the MP

### STANDARD VERSION AS BASIS

- Press frame of split design with tie rods and solid press table and head section
- Ram guide with nitrided ledges
- Ram locking device
- Motorised ram adjustment system
- Wet electro-hydraulic clutch/brake system
- Electric flywheel brake
- Hydraulic individual top ejectors for 3 operations
- Hydraulic individually controlled table ejectors for 3 operations
- Pneumatic weight balancing
- Circulating oil lubrication for the main bearings
- Protective hoods
- Temperature monitors for the main bearings
- Press force monitor
- Complete installation
- Electrical control system
- Hydraulic power pack (for mineral oil)

### OPTIONS

- Low-wear table coat welding
- Adjustable ram guides with bronze ledges
- Ram dejamming device
- Top and bottom ejectors for up to 5 operations
- Die space gates
- Fume extraction hood
- Hydraulic power pack (for non-flammable HFC fluid)
- Variable-frequency drive of 4Q design

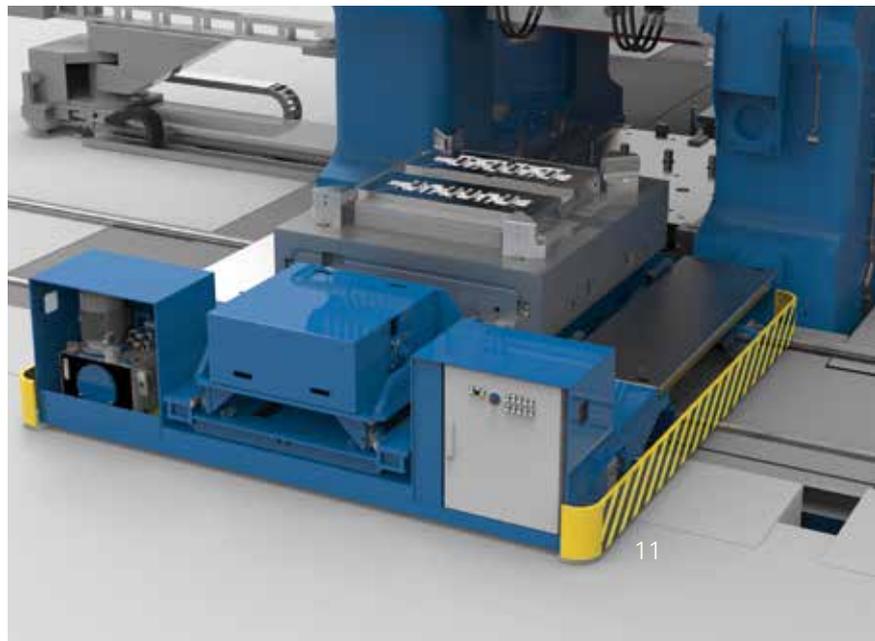
### EXTENDED OPTIONS

- Die and die design
- Bolster concepts
- Die and/or bolster quick-clamping system
- Die maintenance and spraying unit
- Automation systems such as workpiece transfer equipment, robots and loaders
- Die holder changing systems with change arm or carriage
- Turnover equipment
- Interface incorporated into the controller of the press periphery

### 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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