

*Machines for
Powder Metallurgy*

Presses and Production Lines

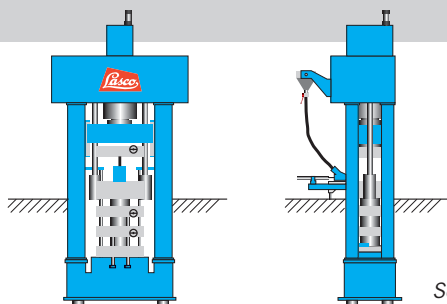


LASCO UMFORMTECHNIK
WERKZEUGMASCHINENFABRIK





MPP and KP series



Servo-hydraulic CNC multi-platen metal powder press.

MPP series		250	400	630	1000
Press force	[kN]	2.500	4.000	6.300	10.000
Upper ram stroke	[mm]	250	250	250	325
Filling height	[mm]	165	165	165	180
Stroke count	[1/min]	15	13	11	9
Platen 4					
Press force	[kN]	2.500	4.000	6.300	6.300
Stroke	[mm]	50	50	50	70
Upper auxiliary piston					
Press force	[kN]	2.500	4.000	6.300	10.000
Ejection force	[kN]	200	200	200	200
Stroke	[mm]	40	40	40	50
Platen 1 (die)					
Press force	[kN]	1.000	2.000	2.500	3.150
Stroke	[mm]	165	165	165	180
Platen 2					
Press force	[kN]	2.500	4.000	6.300	8.000
Stroke	[mm]	165	165	165	180
Platen 3					
Press force	[kN]	2.500	4.000	6.300	8.000
Stroke	[mm]	165	165	165	180
Core rod					
Press force	[kN]	1.750	1.500	2.300	2.500
Stroke	[mm]	165	165	165	180



■ Further press models and sizes available on request

KP hydraulic sizing press.

KP	Press force	Ram stroke	Max. distance Bottom platen/ram	Guide distance	Area Bottom platen (ram) Width x depth [mm] x [mm]	Ram speed (empty - upstroke) [mm/sec]	Press speed [mm/sec]	Prime mover [kW]
	[kN]	[mm]	[mm]	[mm]				
200	2.000	350	750	750	700 x 700	260	12	30
250	2.500	350	750	750	700 x 700	270	13	30
315	3.150	350	750	800	750 x 750	250	12	30
400	4.000	350	750	800	750 x 750	240	14	30
500	5.000	350	750	800	750 x 750	220	12	30
630	6.300	350	750	850	800 x 800	260	10	30
800	8.000	350	750	1.000	900 x 800	260	13	55
1.000	10.000	350	750	1.100	1.000 x 800	300	12	55

Economical solutions for powder metallurgy



Metal powder products are becoming indispensable in many fields of industry. Drive gears and rotor parts represent just a few of the many products manufactured.

LASCO has made available solutions for metal-forming tasks to users in industry and its related trades since its beginnings in 1863. In more than 140 years capability has grown to offer production technology specially adapted to the rugged working environments of the metal-forming industry. Today we can count over 1000 companies in our list of customers in 53 countries around the globe in working fields of all kinds.

Because of innovative engineering and efficiency, LASCO's hydraulic and screw presses used worldwide are also favoured for powder forging. In addition, our Company has years of experience in the manufacture of equipment for processes related to metal powder compaction, for example, in the production of industrial ceramics and sand-lime bricks.

This is why LASCO's machines and their automation have been setting standards for years, especially with regard to economy and precisely controlled double-action (double-sided) compaction of materials in powder form.

This expertise and our proven competence as a supplier of technology for cold and hot forming has given us the capability

to offer optimised machines and production equipment for the manufacture of metal powder components:



- **Series MPP servo-hydraulic CNC multi-platen metal powder presses**
- **Powder forging presses and automated powder forging production lines**
- **Series KP hydraulic sizing presses and automated sizing lines**

Comprehensively proven...



Layout of a press cylinder on a "LASCO" hydraulic press.

Regardless of whether they are metal powder presses, powder forging presses or sizing presses – LASCO's hydraulic presses are recognisable by their outstanding features.

Press cylinder

The press cylinder is forged steel with the bore honed. A pre-fill valve between the top of the cylinder and the oil tank ensures rapid filling and return of the oil. Split chevron packings with wiper rings provide a seal between cylinder and piston.

Press piston

The press piston is also forged. The contact surfaces are hardened, ground, and polished. A bronze bush ensures optimum sliding characteristics in the upper sealing and guiding area.

Ram

The ram may be either a steel casting or welded construction, fully stress-relieved. The press piston is accurately mated with the bore in the ram and clamped securely.

Guiding system

The guiding system is designed according to the specific application. For powder forging presses, a system maintaining constant clearance in spite of heat expansion has become standard. For sizing presses, a guiding system with eight slideways is preferred. The sliding surfaces are bronze running on nitrated steel. Tight clearances may be maintained and are adjustable by shims.

Combined with the long ram guiding system and the high press rigidity, production of high accuracy parts with excellent tool life is assured.

Press frame design

The choice of press frame design, either single piece or multiple element construction is determined by table area, installation height, ram stroke and application.

- Single piece welded construction, stress-relieving heat treated.
- Multiple element press frames, consisting of press table, uprights and cross head, pre-stressed with four tie rods.

Multiple element press frame

The press frame offers a whole lot of advantages, compared with single piece frames. Different materials of special suitability may be considered for the individual parts.

Potential notch stress concentrations at the connection between the table and the uprights and between the cross-head and the uprights on single piece frames are eliminated.

Transport of multiple element press frames may be easier and at lower cost, as the press is able to be disassembled into smaller units.

Above all, the press frame consisting of several parts is considerably more rigid as a result of the pre-stressing. For the same tensile stress, the elongation is only 20% of the value induced in a single piece frame.

As well as ensuring longevity of the frame, and forming of more accurate parts, the overall size and weight of the press may be reduced.

...in demanding environments

Ram support device

A pneumatically operated, electrically safe-guarded ram support device provides operational safety and prevents unintentional movements of the ram. The ram may be locked in its top position, when work is being carried out in the tool area. This safety feature is integrated into the press control system.



Sections of frames of LASCO presses - single piece (right top side) and pre-stressed multi piece (left).

Customised configuration



LASCO can design controller menu layouts and display masks to individual customer requirements.

Links to customer-specific software modules are possible. When needed, we can integrate phone or Internet-supported remote maintenance systems.

Efficient interfaces ensure real-time communication with automation systems, including those on an industrial robot basis. A data logger is always integrated, providing archiving of internal and external analog and binary signals.

Our controller concepts are local systems based on bus systems. As platforms, we only use hardware that satisfies international industrial standards. This provides our customers not only with the possibility of carrying out adjustments and maintenance themselves, but also cost-effective reprogramming and expansion when needs change. This is also a contribution to high investment security.

LASCO's process and machine controllers can offer all the features required by a modern production organisation, such as:

- Central, product-related setting and evaluation of all machine parameters
- Product data administration, optionally with data base link
- Production data acquisition
- Product tracing
- Integration in PPS
- Integrated maintenance program
- Integrated data logger

We also satisfy specific needs of users with the design of human interfaces and offer optional, individually customised display masks and graphics with menu layouts (in several languages).

Graphic colour displays in the local language are used for operator guidance. The acquisition, evaluation and recording of data can take place simultaneously during machine operation and interfaced to the company network.



LASCO UK 500 upstroking compact press for the manufacture of carrier plates.

Servo-hydraulic CNC multi-platen metal powder presses



MPP series multi-platen powder press under assembly.



Upper ram and die drives.



Adjustable mechanical press stops.

LASCO metal powder presses can offer the flexibility of hydraulic presses with the same robustness and performance known from mechanical presses.

Decades of experience in the construction of hydraulic forging and sizing presses are a guarantee of press and adapter design that can meet all applications:

- Generously sized press frames and central dissipation of press force ensures maximum rigidity and minimum deformation.
- System pressure is kept deliberately low at 250 bar to ensure minimum wear of the robust servo-hydraulics during operation.

with exchangeable adapters (MPP ... DS series).

Adjustable mechanical press stops – optionally servomotor-driven – ensure precise, reproducible press positions.

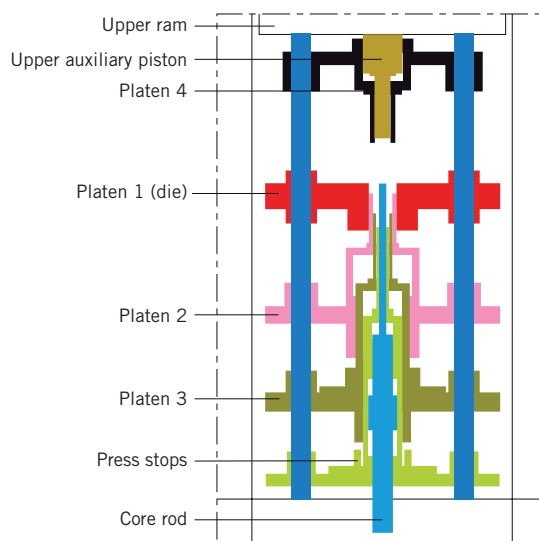
The press allows high variability in tool layout because almost all the lower levels can absorb the full press force.

The filling shoe is driven via a servo cylinder. The profile of motion is freely programmable, over-/under- and contour-filling is possible.

Electrical controllers

A Bosch-Rexroth multiple-axis controller and a Simatic S7 PLC working in parallel control the metal powder presses in the MPP series. Both controllers and the visualisation PC are interfaced via a Profibus DP for fast signal exchange

The axis controller allows synchronous control of all hydraulic axes including filling shoe drive with a reproducible accuracy of ± 0.01 mm - measuring accuracy ± 0.001 mm. In the basic version, up to 32 axes can be controlled in parallel. Axis control, linear interpolation and oscilloscope functions for visualisation of setpoint and actual values are among the standard functions available.



Schematic of the basic construction of a LASCO multi-platen metal powder press.

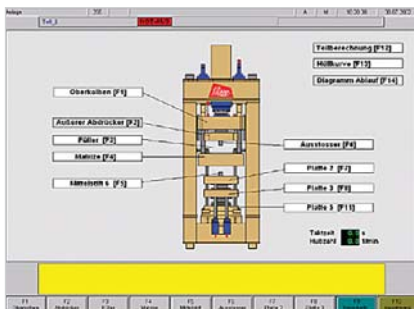
The LASCO pressing process

LASCO metal powder presses are servo-hydraulic multi-plate presses working in the range above 2500 kN.

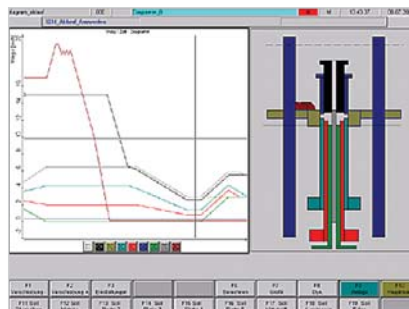
In the basic version they are fitted with four movable platens, an auxiliary piston in the upper ram and a core rod with press stop. If parts of higher complexity and with up to nine part levels are to be pressed then the basic version is extended by one platen each in the upper and lower adapter sections.

LASCO offers presses with the tool frame integrated in the press (MPP ... IR series) and presses

Process reliability and flexibility



Operator-guided data entry using the operator panel.



Call-up of status diagrams with the soft key.

Programming

Programming for individual press routines is in the form of a clearly designed menu technique. Warning limits can be set to avoid unintended settings outside process parameter values. Password protection or a key switch protects safety values.

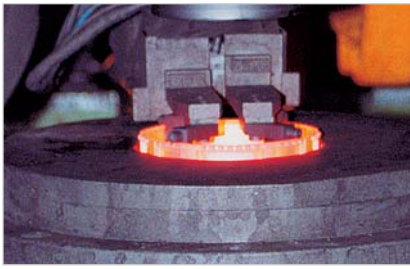
Programming of the press cycle is effected by entry of data for the

part to be pressed. After entry of die level sizes and the compaction ratio the control sequence is generated by the control system automatically and the operator can enter fine settings for any subsequent optimisation needed. All input data are shown both numerically and graphically in the form of a sequence diagram.



Basic configuration of the MPP series multi-platen metal powder press.

Maximum efficiency...



Powder forging of synchroniser rings.



Examples of powder-forged sintered parts.

The term **powder forging** describes a forming process that combines process sequences in sintering technology with subsequent hot forming. This process has been steadily gaining in importance for several years now. Near netshape component parts, with the same mechanical strength as pyrometallurgically produced components, are possible.

A preform produced powder-metallurgically by pressing and sintering shows to a large degree the contours of the final product. Subsequent hot-axial compaction is carried out on a forging press at a temperature of ca. 1100 °C. The powder-forged part is produced directly from the heat of sintering or by previous inductive heating in a closed die. In this “forging process”, densities of 96% to 99% of theoretical density are achieved.

LASCO counts among the pioneers of powder forging technology and is in the position, on account of

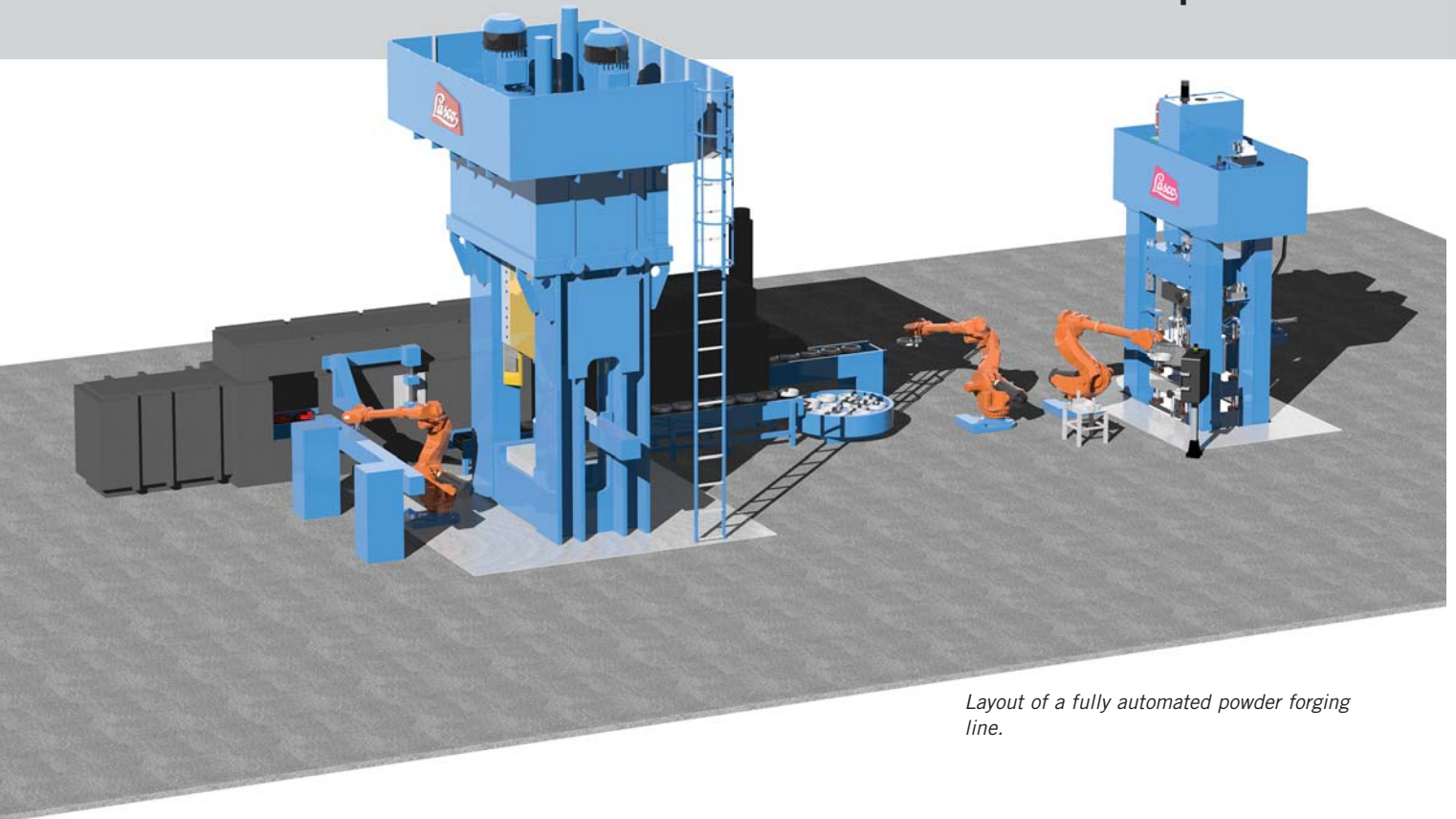
these decades of experience, to offer its customers complete **powder forging production lines** from a single source.

The hydraulic **metal powder presses** in the MPP series are best suited for the production of the preform. The die and adapter technology is determined by the complexity of the component and the degree of closeness to the geometry of the finished part.

The heart of the powder forging line is the **forging press**. Depending on the technology and the required output, the forging machine is either a hydraulic press from the **KPS series** or a screw press from the **SPR/SPP series**. Both models possess typical features that suit them to the tough forging environment.

The forging presses are complemented by adapter systems and, if needed, they are fitted with quick-change devices and die cooling and lubricating apparatus.

...in series production



Layout of a fully automated powder forging line.

LASCO's automation and control technology combines metal powder presses, sinter furnaces and forging presses into a fully automated powder forging production line.

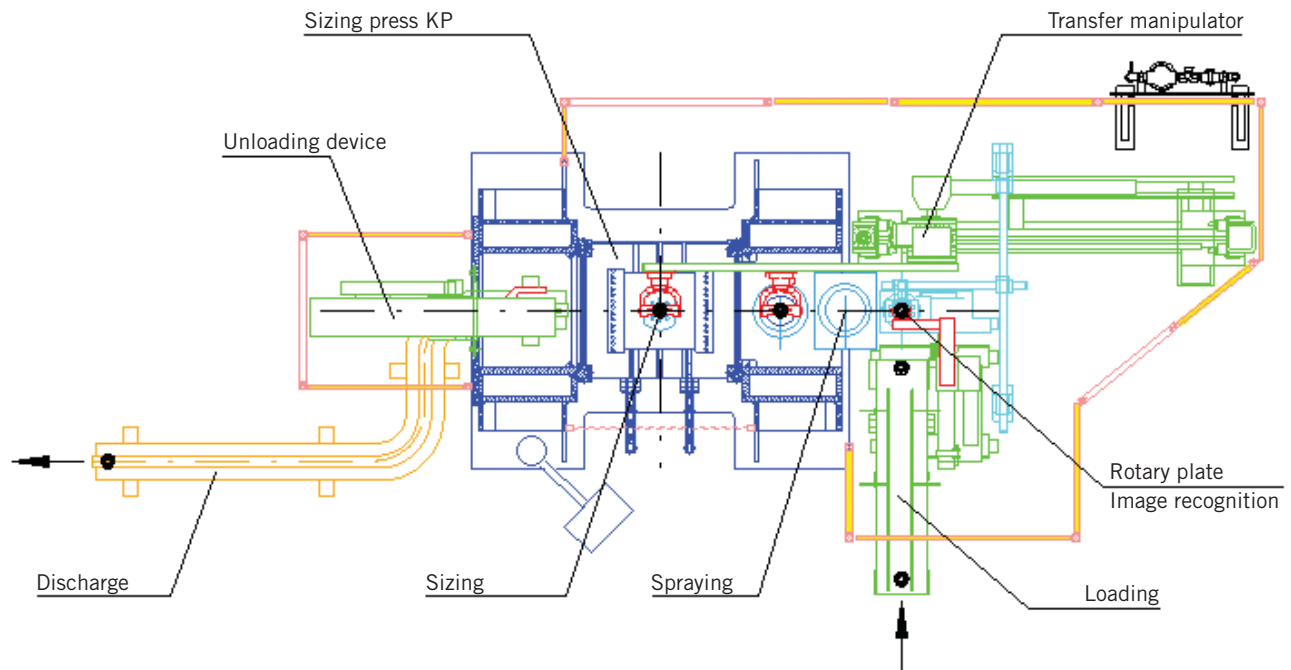
The automation technology is divided into automation between metal powder presses and sintering furnace and automation between the sintering furnace output and forging press, including press unloading. Specially adapted industrial robots are used for manipulation or, as in the case of sintering furnace discharge needs a special servomotor-driven linear axis with a water-cooled gripper is used.

Automation technology used for powder forging:

- Press-loading and -unloading robots with special grippers
- Palettising robots for loading the sintering furnace
- Weighing and control systems
- Image processing systems for part recognition and orientation
- Sintering-furnace unloading systems with special water-cooled grippers

All machine parts are linked for control purposes by a master controller that communicates with the individual machine components via a fast bus system.

Hydraulic sizing presses



With the aid of sintering techniques, precision parts can be produced with optimal use of material. Subsequent **sizing** after the sintering process often allows the production of near netshape parts.

Because of their flexible mode of operation, hydraulic presses are eminently suited to such a sizing process. In contrast to mechanical presses with their fixed operational sequence, they have the advantage that all operational sequences can be freely programmed.

Depending on press size and task definition, LASCO's sizing presses are designed with single piece press frames in stress-relieved welded or in multipiece pre-stressed construction. The high guideway precision required is achieved with a long ram in conjunction with compound bronze/steel guideway pairs with adjustable clearance.

The design of the hydraulic drive and the control system is dependent on the complexity of

the parts to be sized and the adapter technology used.

The upper and lower rams have high-resolution measuring systems. Optionally, the hydraulic axes can be freely positioned by a positioning control system to an accuracy of ± 0.01 mm.

In addition to upper and lower rams, supplementary hydraulic axes can be integrated in the bottom plate and/or in the press slide. Additional hydraulic lines can control auxiliary functions in the sizing adapter.

Quick-change systems for fast adapter exchange are available. Adapter clamping in the press and insertion or removal from the press are hydraulically assisted using rollers.

In connection with the LASCO automation and control technique the calibrating presses of the KP series turn to **automatic sizing lines**.

For this purpose, the parts to be sized are – in a first step – fed to

an orientating station either manually or e. g. via pallet storage automatically. Orientation of the parts is carried out with a rotary table or an x-y-table, supported by an image recognition system. A freely programmable transfer manipulator charges the press incrementally.

Besides the sizing station itself lubricating and/or chamfering stations can be integrated.

The **LASCO automation technique for sizing presses** comprises:

- Press loading and unloading systems
- Part orientating stations
- Lubricating systems
- Chamfering stations
- Master control for the press line
- Palletising and storage systems

Sintered parts of highest accuracy



LASCO's added value



Experts in sales, design, production, assembly and service make it possible for LASCO to react flexibly and comprehensively to the needs of its customers.

Perfectly harmonized solutions from a single source

Our experienced experts design all the components of a production line that have a decisive effect on product quality in-house. Because of the flexibility and fast decision-making capabilities of a medium-sized company it is possible to react comprehensively to customers' needs and to offer

perfectly harmonised solutions from a single source.

Complemented by our personal presence around the globe, LASCO can offer its customers services that have set standards in the world market.



LASCO's workforce, working together in interdisciplinary teams, will find the optimal solution to your forming requirements.

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