Machines for solid metal forming

Hydraulic deep drawing presses
TZP series

Technical specification

TZP

<table>
<thead>
<tr>
<th>Press force</th>
<th>Return force</th>
<th>Ram stroke</th>
<th>Maximum安装 height</th>
<th>Maximum table width</th>
<th>Table depth</th>
<th>Lateral throughway</th>
<th>Table height above the floor</th>
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<tbody>
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Options

<table>
<thead>
<tr>
<th>TZP</th>
<th>Drawing cushion force</th>
<th>Drawing cushion stroke</th>
<th>Drawing cushion width</th>
<th>Drawing cushion depth</th>
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- Additional press series (e.g. TSP) and sizes on request
- Hydraulic ejectors in the table and/or in the ram on customer’s demand
- Ejector force, -stroke, -speed according to customer’s specifications

Schematic of a TZP press

A = Ram stroke
B = Maximum installation height
C = Table width
D = Table depth
E = Daylight between guides
F = Lateral throughway
G = Table height above floor
Since its foundation in 1863, LASCO has been engaged in harnessing fluid power for forming applications. At an early stage we became aware of the advantages of oil-hydraulic systems and applied them to the construction of efficient forming machines. With more than 100 years of experience, LASCO offers forming systems worldwide that are designed to withstand the demanding working environments which exist in the forming industry and are capable of performing their tasks with efficiency and reliability.

LASCO presses, with oil-hydraulic drive, combine "state of the art" hydraulic, mechanical, and electronic control technology in a functional entity, ensuring optimum productivity in a cost-effective manner, for the long term.

The requirements of our customers are the benchmark for our actions, resulting in the production of machines designed specifically for each application. Whilst the basic concepts of LASCO hydraulic deep drawing presses are outlined in this brochure, we would be delighted to discuss with you, the exact performance you would expect from "your" hydraulic deep drawing press.
Because of their versatility, hydraulic deep drawing presses have firmly established themselves in the field of sheet metal forming. As press force, ram stroke and forming velocities are variable and precisely controllable, hydraulic drives are particularly suitable for the successful forming of difficult materials. In addition, efficiency is significantly improved by the dimensioning of the drive and the use of modern control systems.

LASCO, recognized worldwide as a specialist for hydraulic forming machines, designs and manufactures deep drawing presses that embody high demands on press technology and are tailored to the customer’s requirements. The spectrum of formed parts covers many branches of industry such as the automotive supply and electrical industries, household utensil industry or medicine technology. Depending on the tasks involved, single, double or multiple acting presses are employed that are designed with state-of-the-art press ram and drawing cushion technology, permitting economical forming of difficult parts made of superalloy materials with repeatable quality.

In the worldwide machine market, features such as ruggedness, clear design, operational reliability, ease of operation and serviceability increase the attractiveness of LASCO’s answers to customers’ forming tasks.

Our hydraulic presses are marked by:

- high forming speeds
- rapid pressure attainment
- quick reversal of stroke

Our **TZP** series is combined with numerous options, a comprehensive range of accessories and the latest automation systems so that we can provide efficient concepts tailored to the needs of every area of application.

LASCO’s services are not only limited to construction, production and installation of standardized components, but cover the job of satisfying the customer as a whole. Our in-house depth of production has not only resulted in certified quality but also in flexibility allowing a fast, uncomplicated response to the customer’s needs and requirements.
Forming solutions

Convincingly economical

LASCO T2P 1000 with walking beam.
Fundamental characteristics

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

- **Single piece** weld fabrication, stress-relieving heat treated
- **Multi-piece** press frame, consisting of press table, uprights and cross head, prestressed with four tie rods

During design, we take into account structural conditions on the customer’s site. Depending on the height of the production hall, for example, we can locate the hydraulic drive either directly on the press head, separately next to the press or in the press cellar.

Bolster plate on the table
To protect the press table from wear, LASCO presses are provided with a protection plate that is pinned and screwed to the press table and quickly removed or replaced if remachining is necessary. They are supplied as standard with T-slots for fixing the dies with option of custom designed hydraulic clamping systems.

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 for high-speed down- and upwards movement of the ram. Split chevron packings with wiper rings provide a seal between cylinder and piston.

Press piston
The press piston is forged. Its contact surface is hardened, ground and polished. In the upper...
sealing and guiding area, a build up bronze welding ensures optimum running characteristics.

**Ram**
The ram is in a welded design, stress-relieving heat treated, with multiple guidings attached.

**Guiding system**
The guiding system is designed as multiple guiding according to the specific application. The sliding surfaces are for example bronze running on nitrated steel. Tight clearances may be maintained and are adjustable by shims. Combined with the long ram guiding system and high press rigidity, eccentric loads can be safely applied.

**Ram locking bolt**
A pneumatically operated, electrically safe-guarded bolt provides operational safety when working in the die space and prevents unintentional ram movement. The ram may be locked in its top position. This safety feature is integrated into the press control system.

Schematic sections of LASCO deep drawing press frames. Single piece frame (left), pre-stressed multi piece frame (right).
Hydraulic drawing cushions are used for the manufacture of deep parts and difficult shapes in single-acting presses. Cushion forces range from 400 kN to 8000 kN, the cushion stroke from 160 to 300 mm.

Depending on the application, single-point, two-point, four-point and six-point cushions are used.

The hydraulic drawing cushions exclusively supplied by LASCO have the following advantages compared with other drawing cushions:

- High compression, which means that large forces can be transferred in small spaces.
- High cushion force precision realized with active control of pressure and force during the deep drawing process.
- Variation of preset force values depending on the position of the drawing cushion.
- Properly positioned ejection ensures exact location at the transfer points.
- Selective influence on material flow by the drawing cushion because of unequal distribution of force at the power feeding points (multiple-point drawing cushions).
- Optional acceleration of the drawing cushion, so that the overshoot of the counter pressure at drawing start is reduced, which lessens the dynamic loading of cushion and press.

Customized modular design

In close cooperation with the Fraunhofer Institute for Machine Tools and Metal Forming Technology, Chemnitz, LASCO has designed hydraulic drawing cushion modules that are tailor-made for LASCO hydraulic deep drawing presses. This permits to determine an optimal cushion structure and the necessary hydraulic equipment from the defined press parameters.
**Achievable hydraulic drawing cushions**

Hydraulic single-point drawing cushion  
Hydraulic four-point drawing cushion  
Hydraulic six-point drawing cushion

**Customized drawing cushions**

<table>
<thead>
<tr>
<th>Cushion force (kN)</th>
<th>Press force (kN)</th>
<th>Execution</th>
<th>Areas of application</th>
<th>Schematic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-point drawing cushion</td>
<td>400 - 2500</td>
<td>1000 - 12500</td>
<td>Combined cushion and ejector axis 1 x differential cylinder</td>
<td>Small cushion plate dimensions divided cushion plates</td>
</tr>
<tr>
<td>2-point drawing cushion</td>
<td>400 - 5000</td>
<td>1000 - 20000</td>
<td>2 Combined cushion and ejector axis 2 x differential cylinder dead stops, if required</td>
<td>Use of transfer tools</td>
</tr>
<tr>
<td>4-point drawing cushion</td>
<td>1250 - 8000</td>
<td>3150 - 20000</td>
<td>4 Combined cushion and ejector axis 4 x differential cylinder dead stops, if required</td>
<td>Use of transfer tools</td>
</tr>
<tr>
<td>4-point drawing cushion</td>
<td>1250 - 8000</td>
<td>3150 - 20000</td>
<td>Divided cushion and ejector axes 4 x plunger cylinder 1 x differential cylinder dead stops</td>
<td>Large cushion plate dimensions high cushion forces</td>
</tr>
<tr>
<td>6-point drawing cushion</td>
<td>5000 - 8000</td>
<td>12500 - 20000</td>
<td>Divided cushion and ejector axes 6 x plunger cylinder 1 x differential cylinder dead stops</td>
<td>Large cushion plate dimensions high cushion forces</td>
</tr>
</tbody>
</table>

Design of the cushion bed in accordance with DIN 55181

Partition in the table box when cushion plate is split
The "heart" of the press

Hydraulic drives...

In the case of a direct drive, the movements of the hydraulic press are dependent on the delivery of pressurised oil provided by the pumps. This solution is preferred when a particular performance is required over a relatively long stroke, with a high stoking rate.

Press drive
The press drive determines the efficiency of a press by its performance and quality. A good reason for LASCO to design and manufacture the system in house according to the customer's requirements.

Direct drive, combination of direct and accumulator drive
Depending on the size and the characteristics of the press, LASCO considers two basic concepts of hydraulic drives: the direct drive and a combination of direct and accumulator drive.

Preferably, the drive is installed on the head of the press with the advantages such as good accessibility to all hydraulic elements and shortest possible pipe connection between pumps, accumulator and cylinder. However, option of floor mounting of the drive system is available in situations where the overall height is restricted.

The constant temperature of the hydraulic oil is maintained by a heating system installed in the oil tank. A separate cooling/filtering system driven by a pump prevents the maximum temperature from being exceeded and continuously cleans the oil. Status of the filters is indicated on the screen of the control system.

Lubrication
The lubrication of the slideways is by oil. Adjustment of the amount and frequency is through the electronic control which also prevents the oil level from dropping below the minimum.
Hydraulic servo direct drive

In the servo drive technology servo motors are directly coupled with hydraulic pumps. The positioning of the hydraulic pistons, the adjustment of the pressing speed as well as the setting of force values are done without control or proportional valves.

This drive technology shows its strength especially in positioning tasks. The value of the actual position of the moving press ram is transferred to the position controller of the axis control. Then the servo drive moves the hydraulic piston to its desired position by feeding the required quantity of hydraulic oil into the cylinder. In addition compressibility and leakages are compensated automatically. For machines with several press cylinders a simple and highly efficient synchronization control can be realised by this technology, even with changing loads.

Special features:
- Hydraulic presses with servo pump drives have an efficiency of > 90%.
- During a standstill of the line, the drive motors also stop.
- The operation of the hydraulic system is almost pulsation-free.
- Multi-axial lines – especially with tight functional connections of the axes – can be controlled reliably.
- All setting data allow digitalized storage and documentation.
- Simplified diagnosis even of complex lines due to the clear drive design.
- Coefficient of efficiency cos phi = 1.
Different methods of operating the cushion are available to the user in various modes of operation. In “Jogging mode“, every position can be approached manually. In “Controlled mode“, the cushion remains in its position after decompression. Afterwards, the cushion travels under control behind the ram. An intermediate stop in a pick-up position is possible for the automated process. In “Uncontrolled mode“ the cushion travels back to the cushion upper dead-point with the ram.

**Decentralised process control**

If the hydraulic system is the “heart“, then the “brain“ of a modern hydraulic press is the decentralised process control. As LASCO is totally customer focused, all configuration and programming is performed in house.

**Continuous control concept**

The architecture of the electronic control for the different types of cushions was developed or adapted based on standardized industrial hard- and software. In this way, user-specific cushion process controls can be implemented into the overall control concept with all the necessary control algorithms. This solution ensures a complete, continuous control concept (PLC functionality, motion functionality) in all the function components in the press.

LASCO’s competence in software programming and in the design and installation of electronic, electrical, and mechatronic components allows the consideration of all customer requests that are technically feasible, including the provision of interfaces for integration of existing processes and interlinked operations.

LASCO press and process controls offer all the performance characteristics of a modern product organisation, such as:

- centralised, product-related setting and evaluation of all machine parameters
- product data administration with connection to a database
- operating data registration
- product follow-up
- integration in MRP
- integrated maintenance program
- integrated data logger

Architectural control principle of a drawing cushion.
Operator guidance on customer’s demand

LASCO designs the operator menus and screen forms of a control system individually according to the customer’s demand, in this case located in China.

The requests of the customer are also considered, when designing man-to-machine interfaces, as well as specific screen menus and charts (available in several languages).

The operator is guided by a graphic colour display, which is in the same language as the messages displayed at the terminal. The registration, evaluation, and listing of data can be input during operation and the data can be transferred into the company network via interfaces. Software modules specific to the customer can be linked.

Options of integrated phone- or internet-aided on-line maintenance systems are offered.

Efficient interfaces ensure the real time communication with automation systems and industrial robots. In principle, a data logger is integrated and offers the possibility of archiving internal and external analogous and binary signals. LASCO control concepts are decentralised on the basis of bus systems. Only hardware of international industrial standards is selected. This permits customersthe possibility of making adjustments and performing maintenance work on their own as well as reprogramming and enhancing at a reasonable price. Not least this means a high security of investment.
The capacities and characteristics of the TZP and TSP series of metal forming hydraulic presses are optimally designed for their different purposes.

**TZP: deep drawing at optimal speed**
In principle, all working characteristics can be realized on TZP presses because of their controller’s flexibility and the design of the hydraulic drive.

LASCO TZP presses are particularly suitable for drawn parts of difficult materials, from a metal forming aspect. Precisely determined pump capacities, short switching times and pre-settable strokes result in high output.

Press force, forming speed of the ram and the counter-holding force of the drawing cushion are programmable. In conjunction with height-adjustable hydraulic cutting-shock dampers, cutting and piercing processes of equal quality such as are known, for example, on punch presses, can be carried out.

**TSP: Deep drawing with subsequent blow**
Supplementary to its deep drawing series, LASCO also supplies deep drawing presses with subsequent blow. These machines coin contours precisely with the help of a subsequent blow. Using this method, the size of the press can be significantly reduced.

The subsequent blow can be triggered on most workpieces without changeover. When the drawing stroke has ended, the cushion remains in the drawing position and the raised ram falls from a preset height onto the cushion.

The final force achieved with this method exceeds the nominal press force by many times. Because of this calibrating operation, high dimensional accuracy is achieved and springback is prevented.

**Coining on a hydraulic press**
Coining allows the production of many workpieces with the use of simple positive and negative tools. The short contact (impact) time prevents breakdown of the lubricating film.
Optionally available as a deep drawing blow press

Typical parts produced on a LASCO hydraulic TZP press.
High tensile sheet metal combines low weight with maximum strength. These properties are the answer to lightweight solutions looked for in the products of many branches of industry, especially the automotive industry. In traditional cold metal forming, these higher strength sheet metals cause problems because extreme press forces are required and the tools are subsequently liable to heavy wear.

A far more economical solution to this problem is hot sheet metal forming. As a recognized hot sheet metal forming specialist, LASCO offers mature solutions with its deep drawing presses of special design supplied with full automation and handling devices.

The sheet steel leaving the furnace at a temperature of over 900 °C is transferred to a special tool, then formed and cooled down in the tool. This process is precisely controlled in a narrow time and temperature window to achieve the desired strength. The automation technology is designed to take the high thermal expansion of the material inherent in the method used into account and ensures exact pick-up and drop-off points. Control of the individual components of the hot metal forming machine is linked via a bus system to a master controller.

Tryout presses: machines for all characteristics

Because of their exact controllability of forming forces and speeds, coupled with the ease of operation provided by the control system, LASCO hydraulic drawing presses are particularly suited for use as so-called tryout presses. Such machines are used in large batch series production to prepare the tools used on the production lines for series work, i.e. setting up, running in and, if necessary, subsequent bedding in and polishing. The use of a separate machine instead of the machine intended for series production is significantly more economical – especially if tools are to be made fit for a series that is already in production.

To be able to function as “simulating machines”, the characteristics of the machines in the series production line have to be tracked exactly, regardless of whether the presses used are hydraulically or mechanically driven. To be able to cover the large spectrum of forming forces and speeds, tryout presses need highly dynamic control, an excellent, flexible control system and rapid resettability for a multiplicity of tools.
Of course LASCO offers also a wide range of peripheral equipment to augment the production process of the main unit.

This option permits consideration of almost any automation for our presses, but also their successful integration into inter-linked processes.

Optional components

- automatic loading and unloading devices
- quick-changing systems for tools, tool holders or cassettes
- hydraulic ejectors in the table and in the ram (multiple operations)
- hydraulic parallelizing system
- master control
- transfer units
- robots
- protection devices
- cutting shock dampers
- electronic on-line maintenance

Schematic of an automated LASCO TZP 800 for hot forming of structural automotive parts.
Comprehensive service

The LASCO benefit

Your single source for engineered solutions

All components of a forming system that are essential for it to perform consistently are sourced from leading international suppliers or made in-house by LASCO’s highly experienced and motivated experts. This fact, combined with the flexibility and the concise management of a medium-sized company, enable LASCO to react in a comprehensive manner to requests and to offer perfect solutions from one source.

Complemented by personal service all around the globe, LASCO guarantees its customers a level of performance that has set the industry standard for decades.

LASCO employees co-operate in interdisciplinary project teams to find the optimum solution for your forming requirements.
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