Pascal
Press machine system
Clamping

Clamp the workpiece
Clamp the die
Clamp the tool

Changing

Change the workpiece
Change the die
Change the tool

Control

Control them
Pascal traveling clamp

A die clamping system which has changed considerably the stamping style in the world.
Pascal traveling clamp model TRA

- Sprocket
- Roller chain
- Hydraulic hose
- Air cylinder
- Base block

34,000kN(3,400tonf) Transfer press

23,000kN(2,300tonf) Transfer press

6,000kN(600tonf) Transfer press

- Backward end detection proximity switches
- Die detection proximity switch
- Clamp plate
- Hydraulic clamp
Stamping die clamping system

4,000kN (400 tonf) Press Pascal clamp TXA & TYA
**model TXA**
Manual slide, piston type of clamp. It is suitable for the die with a U-cut.

**model TXC**
Automatic slidable clamp with air cylinder. (TXA + Automatic slidable function)

**model TXE**
Automatic slidable clamp which utilizes the entire lower surface.

**model TYA**
Manual slide type of clamp with lever. It is suitable for the die without U-cut.

**model TYC**
Automatic slidable clamp with air cylinder. (TYA + Automatic slidable function)
Swing clamp THB

A specially designed swing clamp that is suitable for the application with a die changer.

2,000kN (200tonf) Press Swing clamp THB & Die-lifter (Clamp position)

(Unclamp position)
Clamp position

Unclamp position (at Die changing)

The rod is folded inside the bolster, and does not interfere with the die.

Rod

Hydraulic connection port

Cylinder

Die

Bolster
Pre-roller & Die-lifter

Pascal clamp TXA

Die-lifter

3,000kN(300tonf) Press Horizontally fold type Pre-roller PRS PRT & Die-lifter

Pre-roller PRT

Pre-roller PRS
**Pre-roller model PR (Extension arm rollers)**

**Removable & fold type**
- **Model PRA**
  - One-touch operation
  - Mounting block

**Vertically fold type**
- **Model PRF**
  - One-touch operation
  - Mounting block
  - Hook
  - Screw-lock pin

**Horizontally fold type**
- **ModelPRS / PRT**
  - Hinge
  - PRT

**Heavy load type**
- **ModelPRC**
  - Mounting block
  - Pillar
  - (Fixed in the floor with anchor bolts)

**Horizontally fold, heavy load type**
- **ModelPRU / PRV**
  - PRV
  - Pillar
  - The pillar is assembled with PRV/PRU and it is foldable with the pillar.

**Die-lifter model DLF**
With DLF series, heavy dies are lifted by hydraulic force. The rollers enable operator to move the die easily and smoothly.

**Die-roller model DRA**
A spring lifting roller that does not need hydraulic source. The compact design allows an easy installation just to slot it in the machine T-slots.
Pre-roller stand  PAT. P

model PRM

With excellent rigidity better than existing Pre-roller and less displacement against the load, smoother and safer die change is achievable.

6,000kN (600tonf) Press  Pre-roller stand

At installation

Pre-roller stand
model PRM

Bolster

Mounting block
model PRM-A

At removal

Pre-roller stand
model PRM

Bolster

Mounting block
model PRM-A

* Special designed model

12,000kN (1,200tonf) Press  Pre-roller stand
## Die Travel 1250mm

<table>
<thead>
<tr>
<th>Model</th>
<th>PRM1-1250</th>
<th>PRM2-1250</th>
<th>PRM3-1250</th>
<th>PRM4-1250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller frame distance (mm)</td>
<td>1000</td>
<td>1200</td>
<td>1400</td>
<td>1600</td>
</tr>
<tr>
<td>Overall length (mm)</td>
<td>1300</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>430</td>
<td>470</td>
<td>500</td>
<td>530</td>
</tr>
<tr>
<td>Allowable load (ton)</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Die Travel 1600mm

<table>
<thead>
<tr>
<th>Model</th>
<th>PRM1-1600</th>
<th>PRM2-1600</th>
<th>PRM3-1600</th>
<th>PRM4-1600</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller frame distance (mm)</td>
<td>1000</td>
<td>1200</td>
<td>1400</td>
<td>1600</td>
</tr>
<tr>
<td>Overall length (mm)</td>
<td></td>
<td>1650</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>520</td>
<td>550</td>
<td>590</td>
<td>630</td>
</tr>
<tr>
<td>Allowable load (ton)</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Die Travel 2000mm

<table>
<thead>
<tr>
<th>Model</th>
<th>PRM1-2000</th>
<th>PRM2-2000</th>
<th>PRM3-2000</th>
<th>PRM4-2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller frame distance (mm)</td>
<td>1000</td>
<td>1200</td>
<td>1400</td>
<td>1600</td>
</tr>
<tr>
<td>Overall length (mm)</td>
<td></td>
<td>2050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>680</td>
<td>730</td>
<td>780</td>
<td>820</td>
</tr>
<tr>
<td>Allowable load (ton)</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The value in Weight does not include the mounting block and base.
Pascal pump X63

New series of Pascal pump model X63 which pursues more reliability.
Air-driven, Compact, High performance hydraulic pump

High cycle, reliable reciprocation of air and hydraulic piston ensures a repetitive suction and discharge oil process. As discharge pressure hikes up to the circuit set pressure, reciprocation goes slow eventually. Pascal pump stops at the time the discharge pressure reaches the set pressure then keeps balancing air and oil discharge pressure. At the balanced condition, Pascal pump never consumes air and there is no power loss or oil temperature rise unlike an ordinary electric motor pump. In the event of pressure drop (oil leakage) in the circuit, the pump immediately reacts to start pumping for recovering the pressure loss. When leaking oil, the pump restarts pumping and the sound of pumping is like an alarm for leakage to call operator for servicing.
Pascal control unit HCS

A new, easy-to-maintain hydraulic control unit

Returning oil to the tank at air bleeding
Adopting transparent pipe to return the oil from air bleeding valve to the tank, air bleeding can be done without draining the oil.

Adoption of steel tank which is strong against impact and heat

Visible oil level gauge with red ball

1 block-type valve unit
Independent circuit valves have been configured as a block valve, improving maintainability.

Equipped with filter regulator as standard

Only one piping from the pump to the valve for easier servicing of the pump.
The pipe can be installed or removed easily when exchanging the pump and valve.

The check valve inside the oil tank.
The valve can block the oil flow out of the tank even if the valve unit is demounted when servicing.
Example of hydraulic circuit **DDF Circuits** (Solenoid operated)

- **Press machine**
  - Operation panel
  - Control box

- **Control unit** HCS□-H2DDF

- **Hydraulic 24.5MPa**

- **Air 0.47MPa**

- **Slide**
  - Upper die
  - Lower die
  - Bolster

- **Pascal clamp TXA**
- **Pascal clamp TYA**
- **Die-lifter**
Pascal control system

Power unit **HUT** & Non-leak valve unit **VHA**

**Example of hydraulic circuit**

**AC Circuits (Manual operated)**

- Pascal clamp TXA
- Pascal clamp TYA
- Die-lifter
- Slide
- Upper die
- Lower die
- Bolster
- Hydraulic 24.5MPa
- Return pipe
- Air 0.47MPa
- Power unit HUT-2
- Non-leak valve unit VHA-AC
- Operation panel
- Control box

Press machine
Pascal control system

Power unit **HUT** & Non-leak valve unit **VSB**

Example of hydraulic circuit

**DDF Circuits** (Solenoid operated)

- Pascal clamp TXA
- Pascal clamp TYA
- Die-lifter
- Slide
  - Upper die
- Lower die
  - Bolster
- Operation panel
- Control box
- Non-leak valve unit VSB-H2DDF
- Power unit HUT-2
- Return pipe
- Air 0.47MPa
- Hydraulic 24.5MPa
Press mag clamp MGP

The magnet clamp enables the die change in one minute.

Pascal mag clamp is a die clamping system which absorbs and fixes the die with strong everlasting magnets (Neodymium magnet and Alnico magnet).

It is unnecessary to unify the die size and it can clamp instantly at one touch operation. Applying current is only when switching on and off. The electric power is not consumed during clamping and the die will not be fall down due to the power blackout. The clamping force works against the entire die surface, so it prevents the deflection and improves the quality of machined parts.
### Clamp (Magnetized)

- **Neodymium magnet**
  - Super strong permanent magnet
- **Alnico magnet**
  - Polarity is inverted by electromagnetic coil
- **Electromagnetic coil**
  - Inverts the polarity of alnico magnet
- **Magnet core**
  - Powerfully adheres mold

#### Diagram:
- Clamp plate
- Effective height of magnetic flux: Approx 20mm
- Mold

#### Steps:
1. Electromagnetic coil is energized for 0.5 sec.
2. Polarity of alnico magnet is inverted.
3. Neodymium magnet and alnico magnet become homopolar.
4. Magnet core becomes a strong magnet to adhere the mold.

---

### Unclamp (Demagnetize)

1. Electromagnetic coil is energized for 0.5 sec.
2. Polarity of alnico magnet is inverted.
3. Magnetic flux of neodymium magnet and alnico magnet is not emitted from the surface of the magnet core so that the mold can be unclamped.

---

2,000kN (200tonf) High velocity press machine
Press mag clamp

800kN (80tonf) Press Press mag clamp

4,000kN (400tonf) Transfer press
Press mag clamp & TXA
The Proposal instead of moving bolster

Stamping Die changer
3,000kN press 5 ton × 2 dies
Roller table with swing arm, independent pusher

- Roller arm
- Roller table
- Guide
- Stopper pin
- Cableveyor
- Pusher head
- Die stopper
- Pusher stand
Stamping Die changer
3,000kN press  4 ton × 2 dies
With roller table and independent pusher

Die stage
6,300kN press  10 ton × 1 dies
With pusher and swing roller arm
### Pascal coupling system

Pascal coupling system for the hot press and hydroforming press

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Hydraulic, Water, Air / Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piping size</td>
<td>3/8&quot;  1/2&quot;  3/4&quot;  1&quot;  1 1/4&quot;  1 1/2&quot;  2&quot;</td>
</tr>
</tbody>
</table>

12,000kN (1,200 tonf) Hot press Coupling System
12,000kN (1,200 tonf) Hot press Coupling System
12,000kN (1,200 tonf) Hot press coupling system example

Air cylinder
Non-contact connector thermocouple
Aligning part
Lock guide socket
Proximity switch
Non-contact connector Thermocouple

① Slide

Water 1 1/2"

② Bolster operation side

Air cylinder
Proximity switch
Aligning part
Lock guide socket
Lock guide pin

Die side

Water 1 1/2"

Die side
**Pascal hydraulic die cushion**

Pascal die cushion system follows with a high response to the press force which is pressurized at a high speed and can get a stable cushion force of very small surge pressure. It can perform the high-value added fine blanking machine with excellent productivity, without depending on fine blanking machines.
Delivery record 400 Systems

Sprocket prototype (addendum processed on both sides) produced by 4,000kN press

Sprocket prototype with no burr on teeth produced by 4,000kN press

Engine parts produced by 4,000kN press

Seat belt parts produced by 5,000kN, 2,000kN, 1,500kN press

Automotive parts produced by 3,000kN press

Parking lock pawl produced by 5,000kN, 2,000kN, 1,500kN press
mini N2 gas springs

Compact and durable N2 mini gas spring

4,000kN (400tonf) Progressive press upper
Mini N2 gas spring adopted example

4,000kN (400tonf) Progressive press lower
Mini N2 gas spring adopted example
**New proposal of N2 gas spring in place of coil springs**

Pascal N2 gas spring contains a stronger force rather than an ordinary coil spring and exhibits excellent characteristics and durability on the application that requires a large load and stroke.

<table>
<thead>
<tr>
<th></th>
<th>Initial deflection</th>
<th>Initial force</th>
<th>Stroke</th>
<th>Durability</th>
<th>Maintenance</th>
<th>Space-saving</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas springs</td>
<td>○ (Not required)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○ (Easy)</td>
<td>○</td>
</tr>
<tr>
<td>Coil springs</td>
<td>× (Required)</td>
<td>×</td>
<td>×</td>
<td>×</td>
<td>× (It takes effort)</td>
<td>×</td>
</tr>
</tbody>
</table>

**Mini N2 gas spring**  
*DSD38-20 × 1 unit*

**Coil springs**  
*ø40 × 150 × 10 units*

Load comparison between model DSD and coil spring
### Table: Cylinder Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>DSD</th>
<th>DSA</th>
<th>DSC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder diameter mm</td>
<td>Ø32 Ø38 Ø50</td>
<td>Ø19 Ø25 Ø32 Ø38 Ø50</td>
<td>Ø32 Ø38 Ø50</td>
</tr>
<tr>
<td>Initial force kN</td>
<td>6.6 10.3 20.2</td>
<td>1.06 2.38 5.34 7.98 16.9</td>
<td>3.82 7.98 14.8</td>
</tr>
<tr>
<td>Stroke mm</td>
<td>10 ~ 50</td>
<td>10 ~ 50</td>
<td>10 ~ 50</td>
</tr>
</tbody>
</table>

- **Model DSD**
  - Large diameter rod
  - High initial force
  - Rod seal, sleeve-less construction

- **Model DSA**
  - High durability against side-load
  - Rod seal, sleeve-less construction

- **Model DSC**
  - Compact body
  - Rod seal, sleeve-less construction
  *Model DSC is weaker against the side-load compared with model DSA due to the guide-less structure.

### Initial Force

- **Model DSD38-25**: 10.3 kN (1051 kgf)
- **Model DSA38-25**: 7.98 kN (814 kgf)
- **Model DSC38-25**: 7.98 kN (814 kgf)

### Max. Side-load

- **Model DSD38-25**: 0.52/100 mm (Allowable eccentric angle 0.3°)
- **Model DSA38-25**: 0.52/100 mm (Allowable eccentric angle 0.3°)
- **Model DSC38-25**: —
**Slide lock**  

The electric slide-fall protection system which eliminates the risk of physical injury accident or damages on the dies.
mold rotator

Roller gear driven type  \text{model SMR}

Model SMR rotates the table with high rigidity roller gear and large sized sprocket, which enables excellent in durability and safety by introducing roller gear driven type (PAT.).

<table>
<thead>
<tr>
<th>Max. rotation weight</th>
<th>ton</th>
<th>1, 3, 5, 10, 15, 20, 30, 50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roller gear driven (electric motor) type</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Flat type *model SMF*

Model SMF is embrrddable and flatable.
The table is rigid enough to be passed over by a forklift or a truck.

<table>
<thead>
<tr>
<th></th>
<th>Roller gear driven (electric motor) type</th>
<th>Hydraulic cylinder driven type</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Max. rotation weight</strong></td>
<td>ton</td>
<td>1, 3, 5</td>
</tr>
</tbody>
</table>
180° die rotator for upper die

model SMP PAT. P

To avoid fatal accidents caused by a damage or removal of sling wire.

* The photo shows a prototype. The protection covers are removed for a photo.

<table>
<thead>
<tr>
<th>Model</th>
<th>SMP10</th>
<th>SMP16</th>
<th>SMP20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frame diameter mm</td>
<td>Ø1200</td>
<td>Ø1800</td>
<td>Ø2200</td>
</tr>
<tr>
<td>Die size (F-B) mm</td>
<td>1000</td>
<td>1600</td>
<td>2000</td>
</tr>
<tr>
<td>Die size (L-R) mm</td>
<td>1600, 2000</td>
<td>2000, 2500</td>
<td>4000</td>
</tr>
<tr>
<td>Upper die weight ton</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>

* Max rotateable die weight is determined by the drive motor capacity.
robot tool changer

Max payload 5 10 20 40 60 100 150 200 kg

In the welding line

For sheetmetal stamping
DOMESTIC LOCATIONS

JAPAN

Head office / R & D center
- Itami, Hyogo

Sales office
- Osaka, Hyogo
- Kumagaya, Saitama
- Atsugi, Kanagawa
- Nagoya, Aichi

Plant
- Oita
- Yamagata

Oita plant

Yamagata plant
Pascal products are supporting

For sheetmetal stamping
- Traveling clamp
- Stamping die clamp

For plastic molding
- Mag clamp
- Mold die clamping system
- Auto coupler
- N2 gas springs

For die and mold
- Press machine: Body, Roof, Door etc...
- Molding machine: Bumper, Instrument panel etc...
automotive production lines in the world.