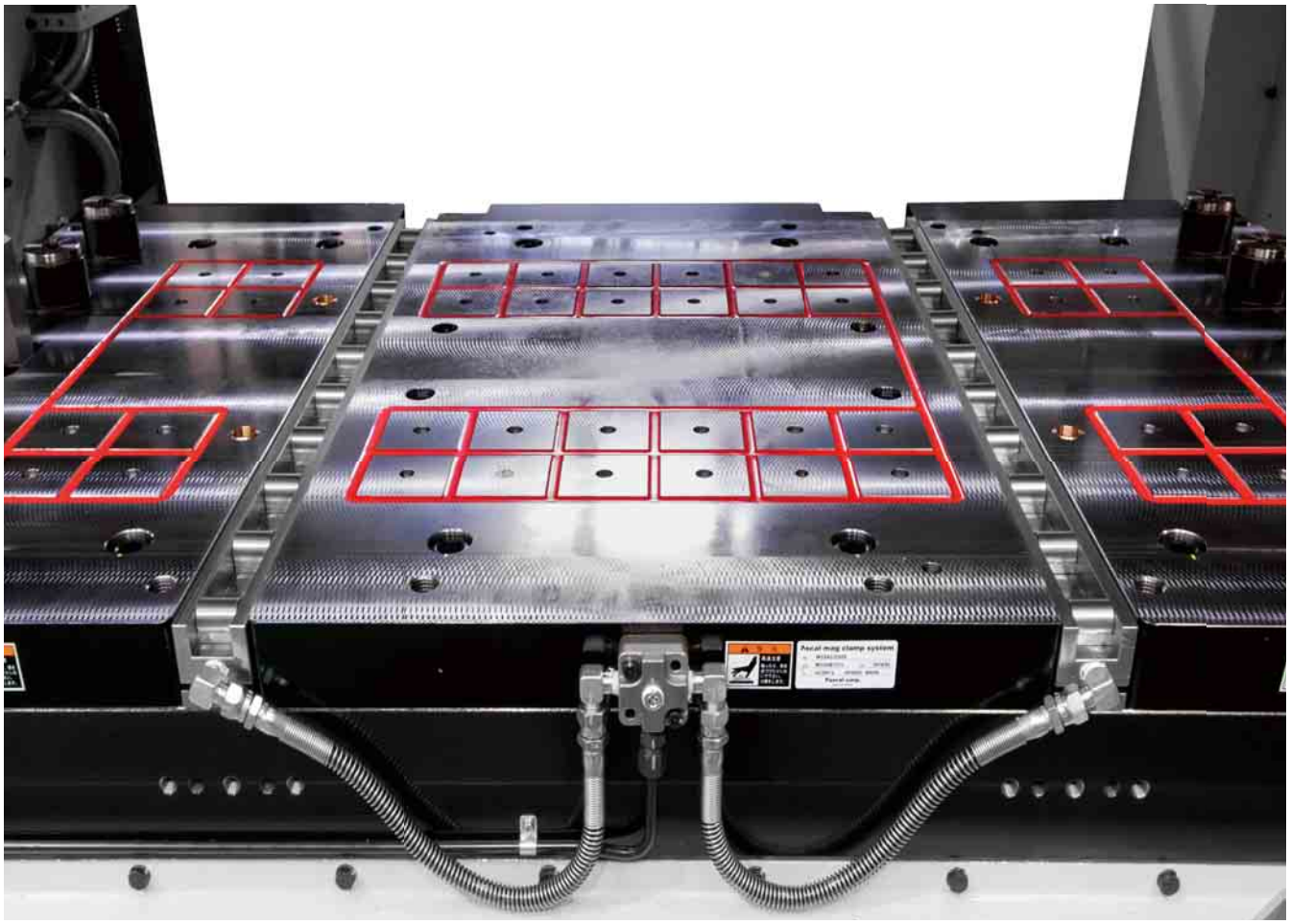
Suitable for a high speed press machine

Press mag clamp

model MGP



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

Pascal

www.pascaleng.co.jp

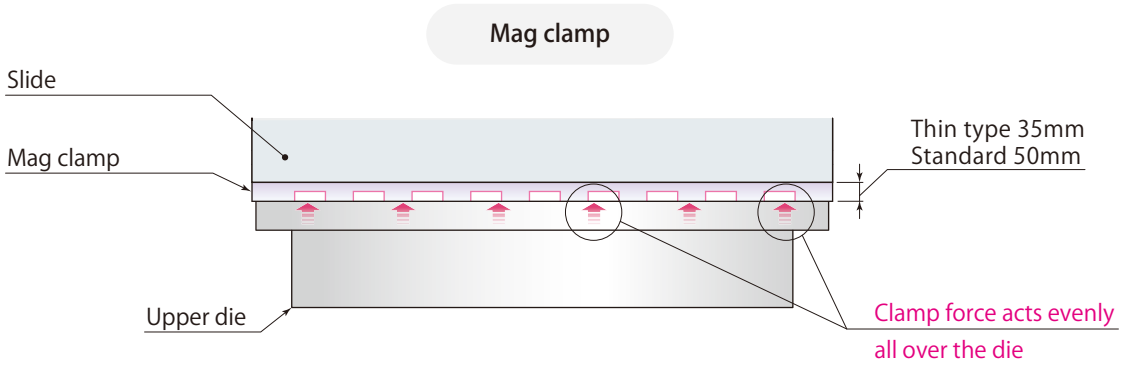
Suitable for a high speed press machine

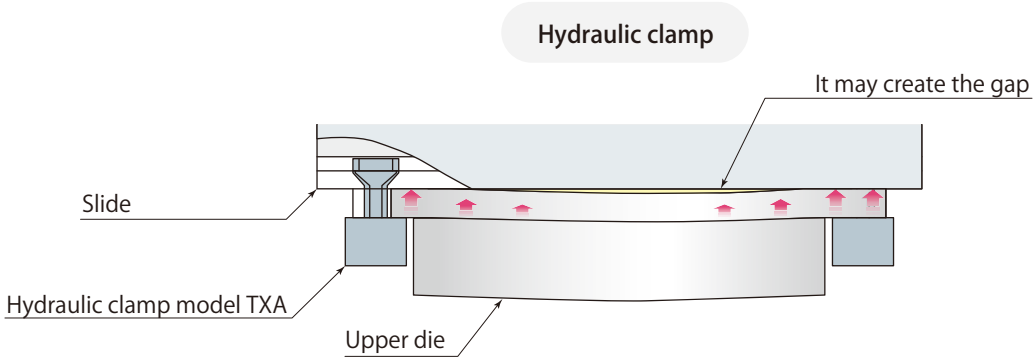
Press mag clamp

Practical example of 2,000kN High speed press

Clamping force can be evenly applied to all over the die plate

The die is stabley absorbed all over the face by the magnetic force and there is no force dispersion when clamping the die. It can restrain the gap between the machine and the die also enables the quality of the parts to improve.

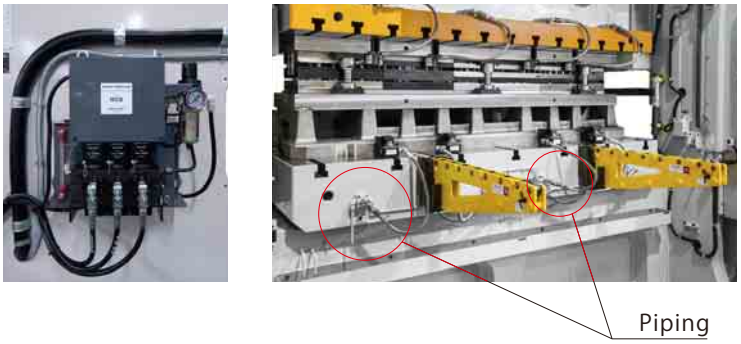




No hydraulic unit, no piping & Mainetance free

Mag clamp does not need hydraulic source also it has high durability since there is no driving mechanism. It can be used with maintenance-free.

Hydraulic source **Not required** Hydraulic piping **Not required**

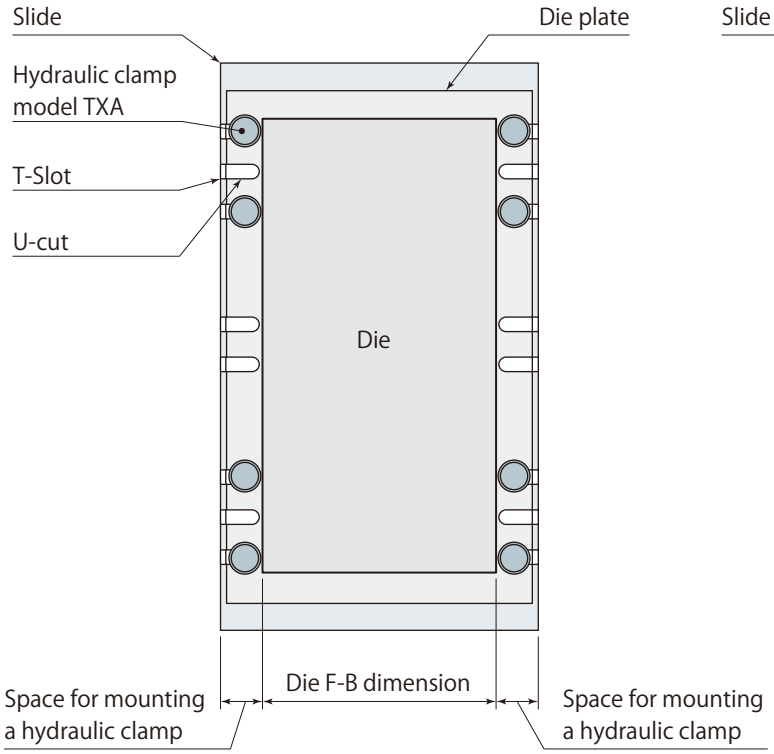


Suitable for the machine which cannot secure the space for a hydraulic clamp

The press mag clamp absorbes and fixes the mold by the magnetic force generated from the plate and there is no space required for mounting the clamp and therefore the slide or bolster surface can be used to the maximum. Also there is no need to standardize the mold size and no need for T-slots on the machine nor U-cuts for the die.

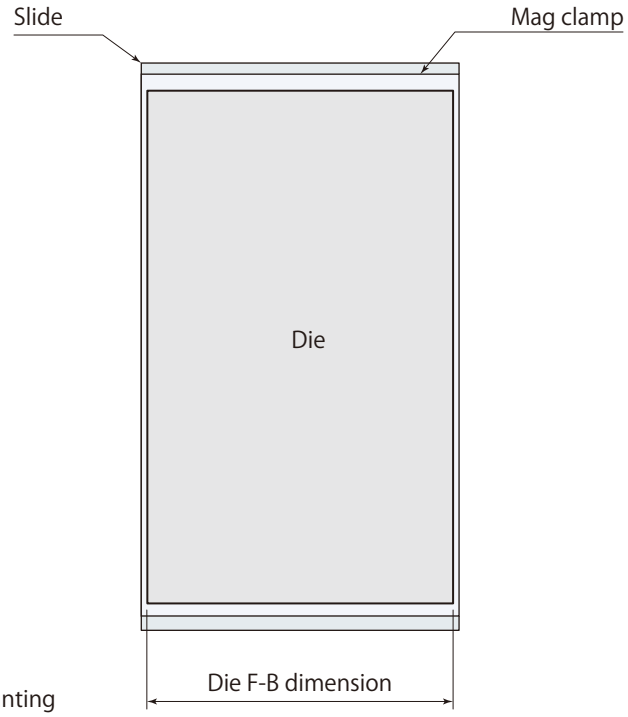
Hydraulic clamp

Needs T slot and U-cut



Mag clamp

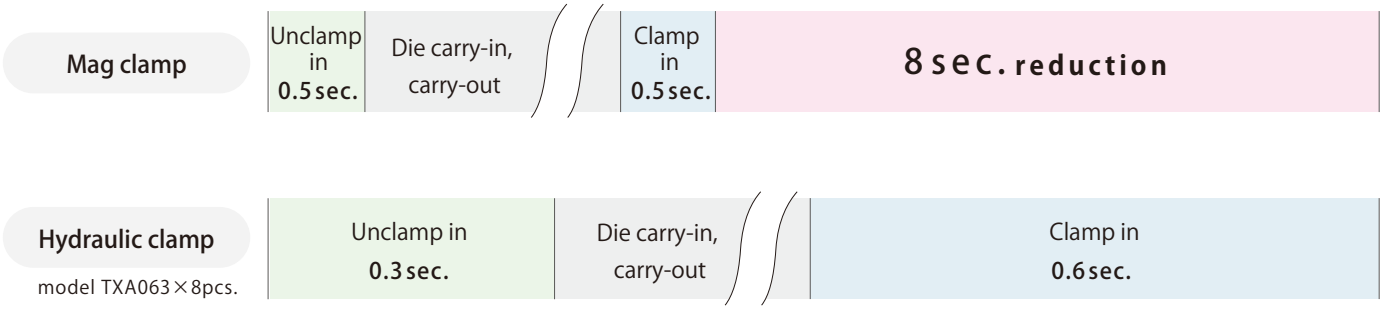
No T-slot nor U -cut



Slide area can be maximized
to clamp a large size of the die.

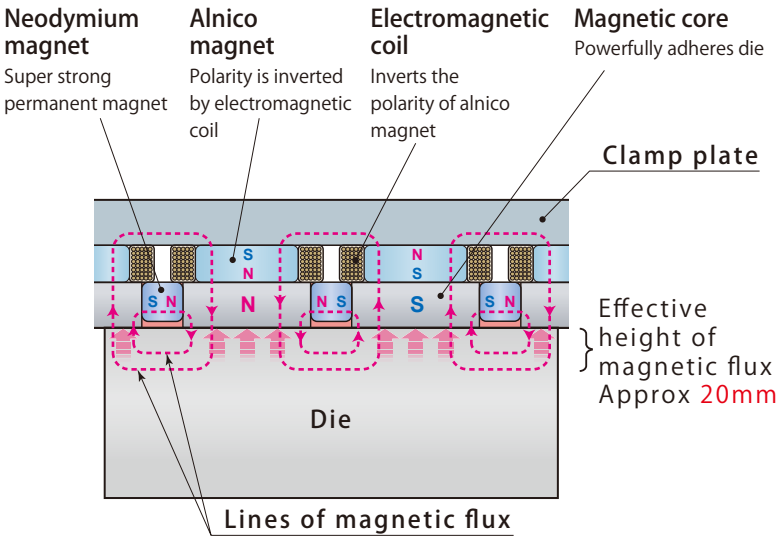
Clamp in 0.5 sec.

Clamp/Unclamp instantly by simply depressing the button



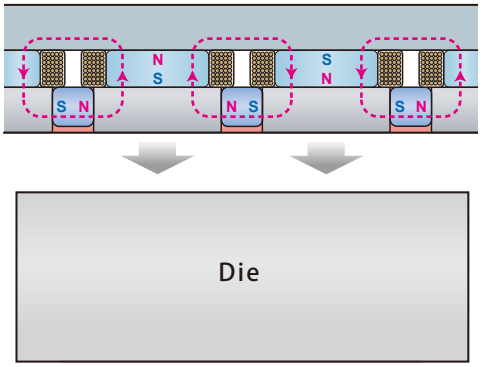
Pascal mag clamp is a die clamping system which absorbs and fixes the die with strong permanent magnets (Neodymiummagnet and Alnico magnet).
Energization required only when switching on and off. The electric power is not consumed during clamping the die and there is no risk of die fall due tothe power outage.

Clamp（Magnetized）



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 clamp the die.

Unclamp（Demagnetized）



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 die can be unclamped.

- Die can be adhered and detached instantly (0.5-4.5 seconds)
- Energization required only when switching on and off. No energization required during clamped condition. No electricity consumed, thus no heat generation.
- Once the die is clamped, unclampin (demagnetization) will not occur even when a power failure or power cable breakage occur.
- Magnetic force of permanent magnet will not decrease through aging. Clamping force is maintained for long-term use.
- Clamp force is evenly applied on all faces of the magnet core . No gaps are created between the machine's platen surface and center part of the die which helps improve accuracy.
- Clamp plate has no moving parts, thus assuring high durability . Plate interior is maintenance-free.
- No need to unify the die sizes. (Note that clamping force is dependent on the size of die plate .)
- The effective height of magnetic flux is about 20 mm above clamp plate surface. Magnetic field does not cause significant effect inside the die.
- No magnetic field is generated from the sides or back of the clamp plate.

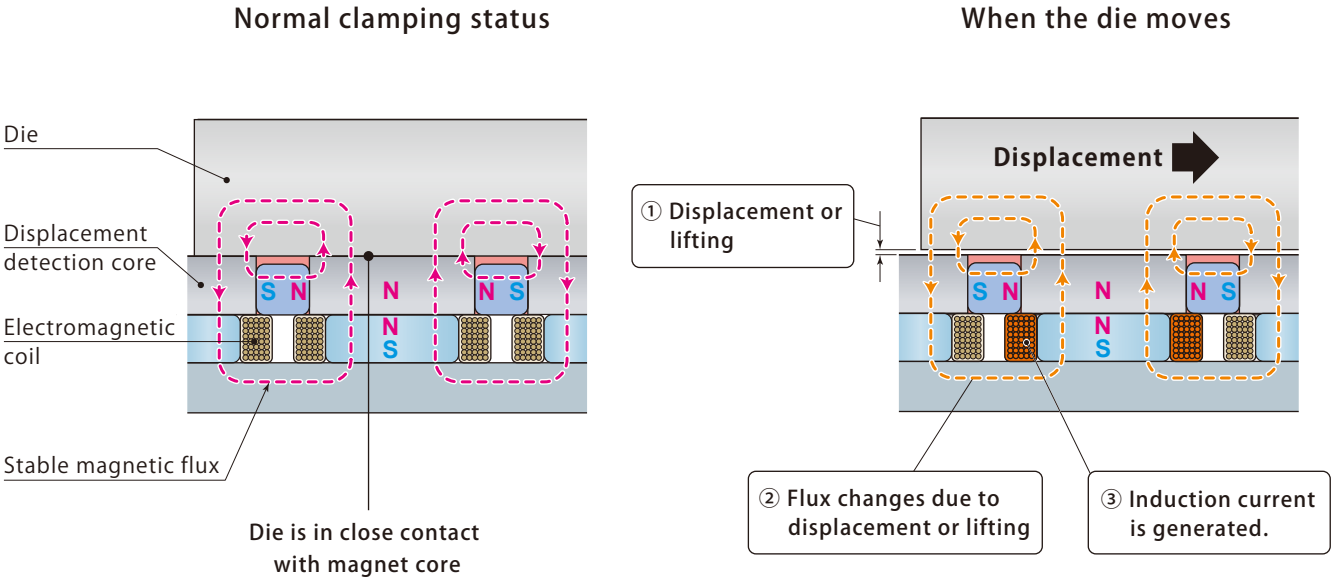
Plate thickness	Clamping force (per magnet core)	Model
		MGP
Thin type 35mm	32×100 mm	3.43kN
	50×50 mm	2.45kN
	100×100 mm	7.84kN
Standard 50mm	70×70 mm	7.35kN
	75×75 mm	7.84kN
	115×115 mm	15.68kN
Operating temperature ℃		0 ～ 80 (0 ～ 150 or 0 ～ 180 for heat proof type)
Magnetic flux height mm		20 (die plate material SS400)
Primary power voltage		AC200 / 220V ±5% (50/60Hz)
Applicable machine		For general press machine
Displacement detection system		Include

● Operating temperature indicates the temperature on the surface of the clamp plate.

Accessories	Operation panel model ESMD-P	
	Control box model EMGD	
	Control cables	
	Interlock	
Option	Non standard voltage arrangement (50/60Hz)	AC380V ±5%
		AC440V ±5%
		AC480V ±5%
	High temperature	0 ～ 150℃
		0 ～ 180℃
	Rust proof, polish arrangement for clamp plate	
	DD mag clamp	

Displacement detec tion system (standard) PAT.

Displacement or lifting of the die can be detected by the electromagnetic coils being built into the magnet core near the center of the clamp plates.
When the die moves, these electromagnetic coils detect an induction current signal.



Clamp force calculation

The clamp force of Mag clamp is determined by the contact area of magnetic core (number of magnet core) with a die. The force decrease when contact area is decreased by a cutout or holes provided to the die. In addition to it, operating temperature over 80℃ and material of die are also definite factors to have the clamp force decrease.
(Refer to for calculation of rated clamping force. **page→15**)

DD Mag clamp (optional)

The clamp with DD sensor which can numerically check the die. It can detect the clamp force decrease caused by heat, die base material and a clearance between the die and magnet core face.
page→12

Operation panel

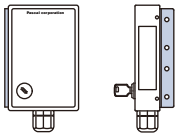
model **ESMD-P**

Model		ESMD-P
Mass	kg	0.6

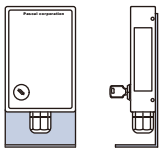
Compact and user-friendly operation panel exclusively designed for magnetic clamp. It can be installed to press machine or wall utilizing the rear tap hole. (M4 bolts x 4 accessories)

Mounting bracket

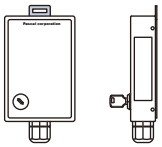
L type



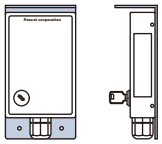
Self-standing type



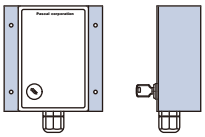
Wall mount type



Hang down type



Embedded type



Control box

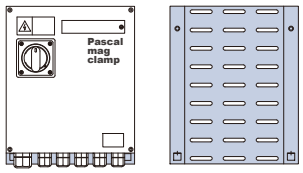
model **EMGD**

H400× W350 × D200 (mm)
＊ Size for model EMGD-A2J2.

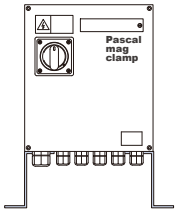
Model		EMGD
Mass	kg	25 ～ 80

Mounting bracket

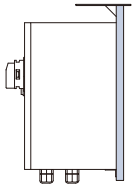
Wall mount type

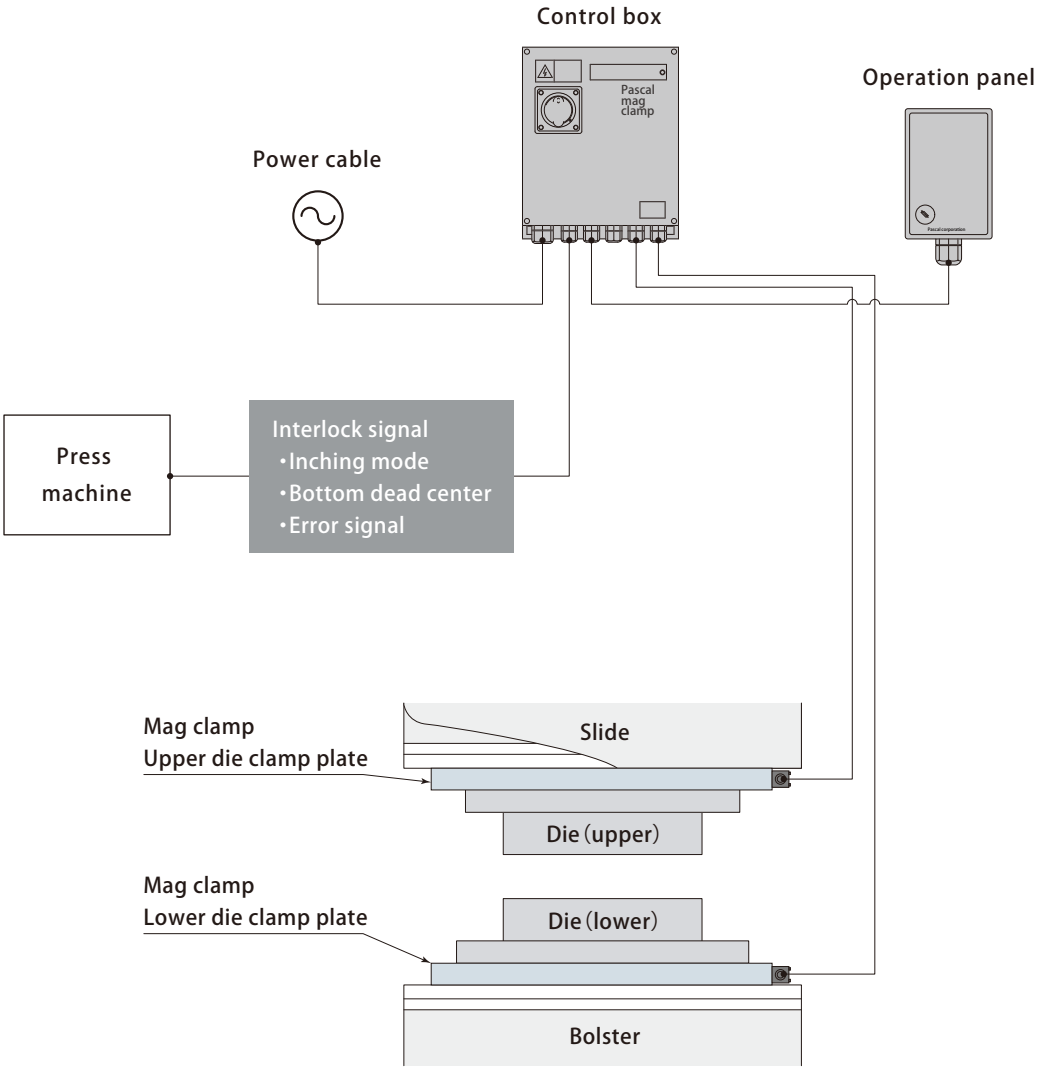


Self-standing type



Hang down type





Interlock

Safety interlocks listed below are built in the electric control circuit for die change operation.

Operational conditions			
When die change operation begins	①	Magnetic clamp	Die change ON
	②	Press machine	Inching mode
	③	Press machine	Machine slide at BDC(bottom dead center)

- Magnetic clamp operation is feasible only when the above #1 to# 3 are all prepared.
- Conditions on press machine can be checked by LED on the operation panel.

Emergency stop	
During machine is running for production	Die displacement detection system works when the die being clamped by magnetic clamp shifts or detaches from the plate.

page→8

Die Detecting

Smart sensor checks the die DD mag clamp

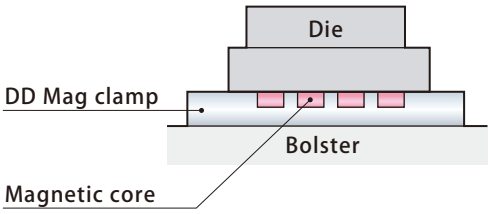
The clamp with DD sensor which can numerically check the die. It can detect the clamp force decrease caused by heat, die base material and a clearance between the die and magnet core face.

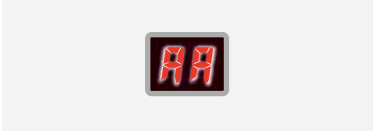
As for DD mag clamp, the status indicator is added to the control box.

＊Die displacement detection system Refer to **page→8**

Normal clamping status

The sensor indicates A A which means the die has adequate size, material and temperature are appropriate to clamp and there is no gap between the magnetic surface and die.

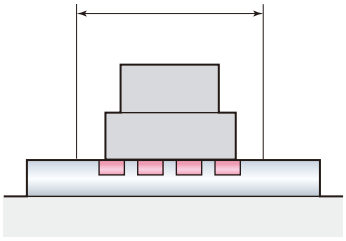




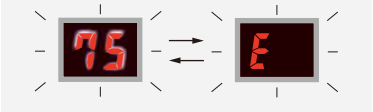
Size detection

Detect too small die

Minimum die size required to clamp

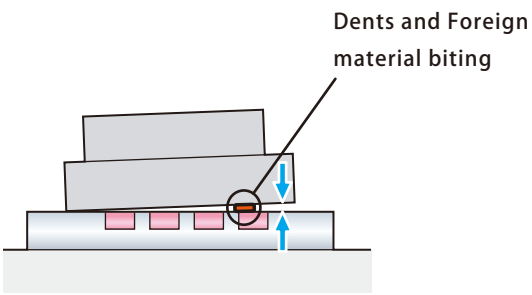


Indication example

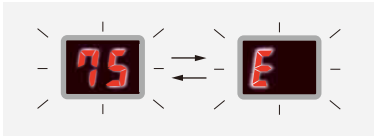


Gap detection

Clamp force decrease due to the gap

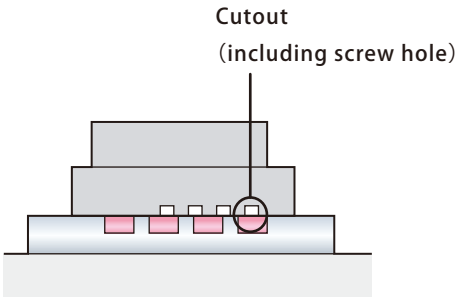


Indication example

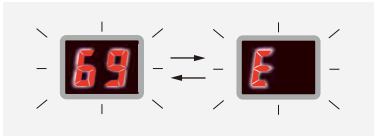


Clearance detection

Clamp force decrease due to a clearance



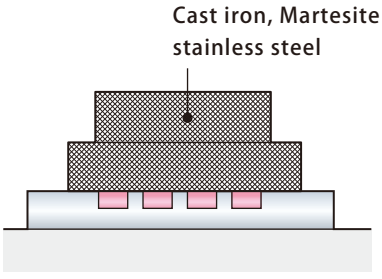
Indication example



The sensor output abnormal signal when clamp force decreases more than 20% due to gap or clearance.

Material detection

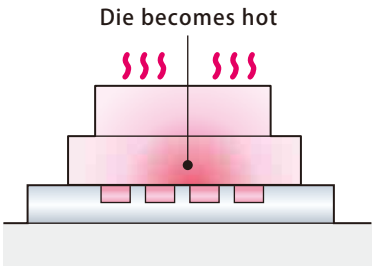
Clamp force decrease due to
the material that are not easily magnetized.



Indication example

High temperature detection

Clamp force decrease
due to the die heat-up



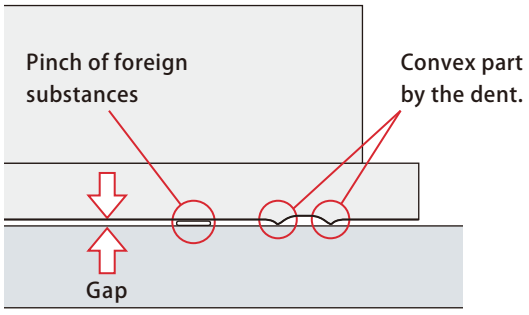
Indication example

Simply type of material or die temperature does not make the clamping force decrease lower than 80% however the value goes down due to the force decrease.

- The die height is decreased by the thickness of the magnetic plate.
- The weight of machine slide increases after mounting the magnetic plate. Check the balancing capacity of the machine.
- Do not use a die with the plate that is deformed or warped. Clamp force decreases due to the gap between the die plate and clamp plate. Make the clamp plate and the die contact totally when clamping/ unclamping.
- Be sure to use the mag clamp by keeping the contact surfaces of die and clamp plate always clean. Water or oil on the mag clamp may not cause a decrease of clamp force however dusts or foreign substances being absorbed by a magnet may create a gap between the die plate and clamp plate.
- In case that there are some dents on the contact surfaces of die and clamp plate, remove the convex part using the oilstone.

Check the below to improve the safety

- Mag clamp generates a powerful magnetism. The person who is wearing a cardiac pacemaker is strictly prohibited to approach. Projecting height of magnetic flux above the clamp plate towards forward（to die side）is just around 20 mm. However , be sure not to bring mobile phone, magnetic card or compact disc, etc. that are susceptible to magnetism close to the clamp plate to avoid a damage.
- Do not bring any magnetic substance such as ferrous metal close to the adherence surface when mag clamp is at clamping（magnetized）. Due to the power of magnet, it may be adhered to the clamp surface, which may cause injury of fingers or hands.



- The projecting height of strong magnetic flux is around 20mm, however weak magnetic flux generates even outside the range exceeding 20mm, so the following cautions should be considered when a die plate is thinner than 25mm.

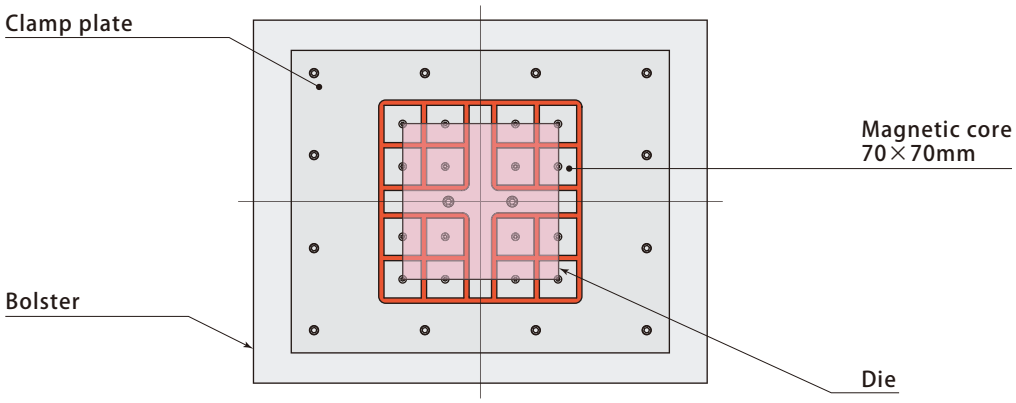
① The clamping force may become decreased.

② The sensor which is easy to be influenced by magnetism has a possibility of malfunction.

③ In case a moving parts is located within 25 mm above the die displacement detection core, it may cause a malfunction of the die displacement detection sensor .

Calculation of rated clamping force

The clamping force of Mag clamp（the adhering force of magnetic clamp ）varies according to the area size（number of magnet core ）where the die plate and clamp plate contact. When loading a small die of which die plate does not contact all the magnet cores, the rated clam ping force is obtainable by the calculation formula shown below. Refer to the following calculation example.



Example

1. Magnet cores that the die contacts with its entire area ＝ 4 pcs
2. Magnet cores that the die contacts with 1/2 of its area ＝ 8 pcs
3. Magnet cores that the die contacts with 1/4 of its area ＝ 4 pcs
4. Total magnet cores that the die contacts

   ＝ 4 pcs + 8 pcs × 1/2 + 4 pcs × 1/4 ＝ 9 pcs

5. Clamping force per magnet core ＝ 7.35 kN/pcs
6. Rated clamping force ＝ 7.35 kN/pcs × 9 pcs ＝ 66.15 kN

- If there is a hole or notch at the bottom of die, deduct the respective area from the total contact area（number of magnet core ）
- The actual clamping force may be less than the rated force acc ording to the conditions of die.

（ Regarding to the decline of clamping force refer to **page→16** ）

Decline of clamping force

According to the conditions of die, the actual clamping force may become less than the rating. Before using mag clamp, be certain to calculate and acknowledge the decline of clamping force referring to the below tables and charts. And be sure to use in the strict condition that the actual clamping force is larger than the die opening force of press machine.

(Actual clamping force) = (Rated clamping force - Reduced force) ≧ (Die opening force of press machine[*1] + die weight[*2])

If the actual clamping force is not sufficient , replace the die plate to a larger one to increase the contact area on the clamp plate.

＊1 Refer to the table shown below for the die opening force of press machine.
Crank press ：10% more than the press pressurizing force
High speed press ：20% more than the press pressurizing force
Hydraulic press ：more than the die opening force of press machine.

＊2 Contact Pascal for the details in case that knock-out force generates.

Material of die plate

Material	Clamping force
SS400 S55C S45C-H ※	100% (rated)
S45C	95%
SK3 SUJ ※	85%
SUS430 FC250 FCD600 ※	80%
SKH51 SKD11	70%

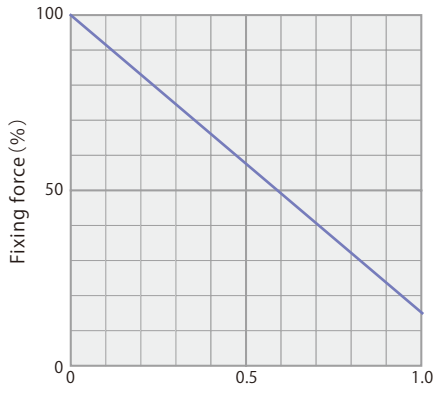
The clamping force declines according to the materials of die. S45C-H, SUJ, and FCD600 tends to be hard to come off at unclamping because the residual magnetic flux on the die affects this however it should be improved once the clearance is created between the adaptor plate and clamp plate.

Surface of die plate

Surface roughness (Max. height and surface roughness Rz)	Clamping force
Rz1.6～3.8	100% (rated)
Rz7.5～15.5	approx.100%
Rz85～150	approx.90%

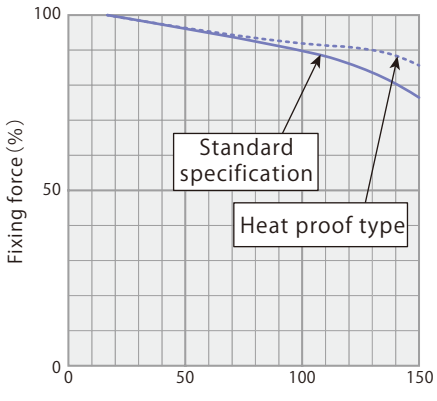
The clamping force declines according to the grade of surface roughness in contact with the adaptor plate and clamp plate.

Distance between two plates



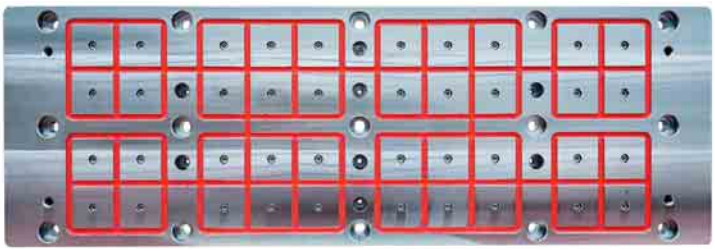
A dent or deformation of die creates a distance to the clamp plate, which will decrease the clamping capacity significantly.

Temperature of die



If the temperature of die becomes high, the clamping force significantly decreases. Keep the die temperature below 80℃ while it is clamped.

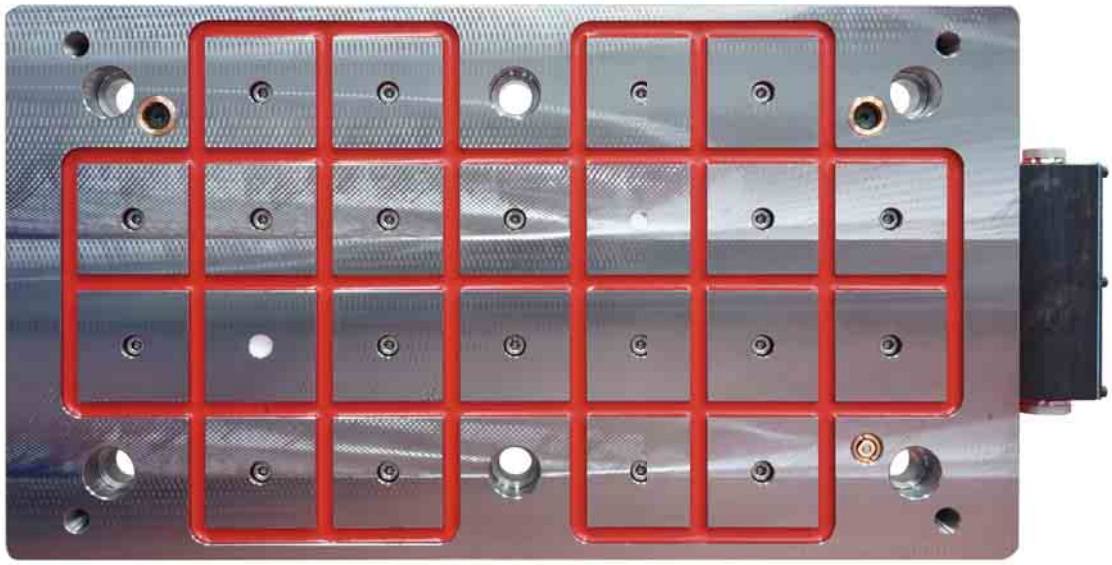
Press mag clamp (upper die)



Upper die clamp plate		
Capacity of press machine		2000 kN (200 tonf)
Plate size	mm	Depth: 400 × Width: 1200 × Thickness: 54
Mass	kg	175
Magnet core (Size × quantity)		70 × 70 mm × 40 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	294
Primary power voltage		AC 380 V 50 / 60 Hz 30 kVA 50 A

Upper die clamp plate		
Capacity of press machine		2500 kN (200 tonf)
Plate size	mm	Depth: 550 × Width: 2100 × Thickness: 65
Mass	kg	252 × 2plates
Magnet core (Size × quantity)		70 × 70 mm × 48 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	352
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A

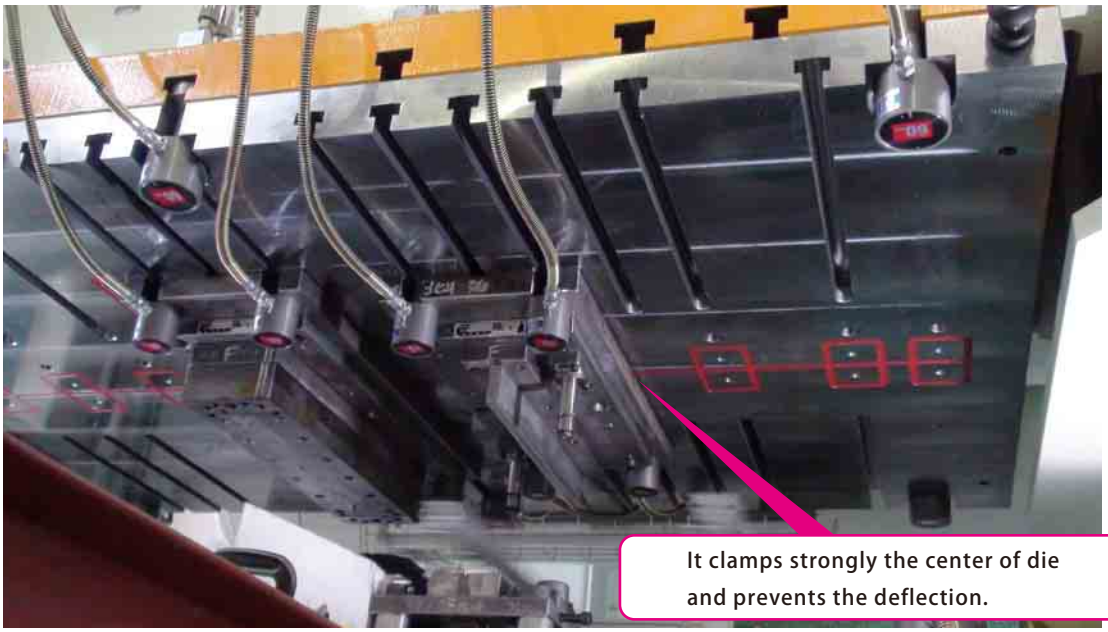
Lower die clamp plate (Embedded type)		
Capacity of press machine		25000 kN (2500 tonf)
Plate size	mm	Depth: 2150 × Width: 4600 × Thickness: 100
Mass	kg	6620(Entire plate including magnet cores) Magnet plate 290 kg × 4 plates
Magnet core (Size × quantity)		70 × 70 mm × 240 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	1764
Primary power voltage		AC 200 V 50 / 60Hz 50 kVA 100 A



Upper die clamp plate		
Capacity of press machine		10000 kN (1000 tonf)
Plate size	mm	Depth: 350 × Width: 640 × Thickness: 55
Mass	kg	86
Magnet core (Size × quantity)		70 × 70 mm × 22 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	162
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 30 kVA 50 A

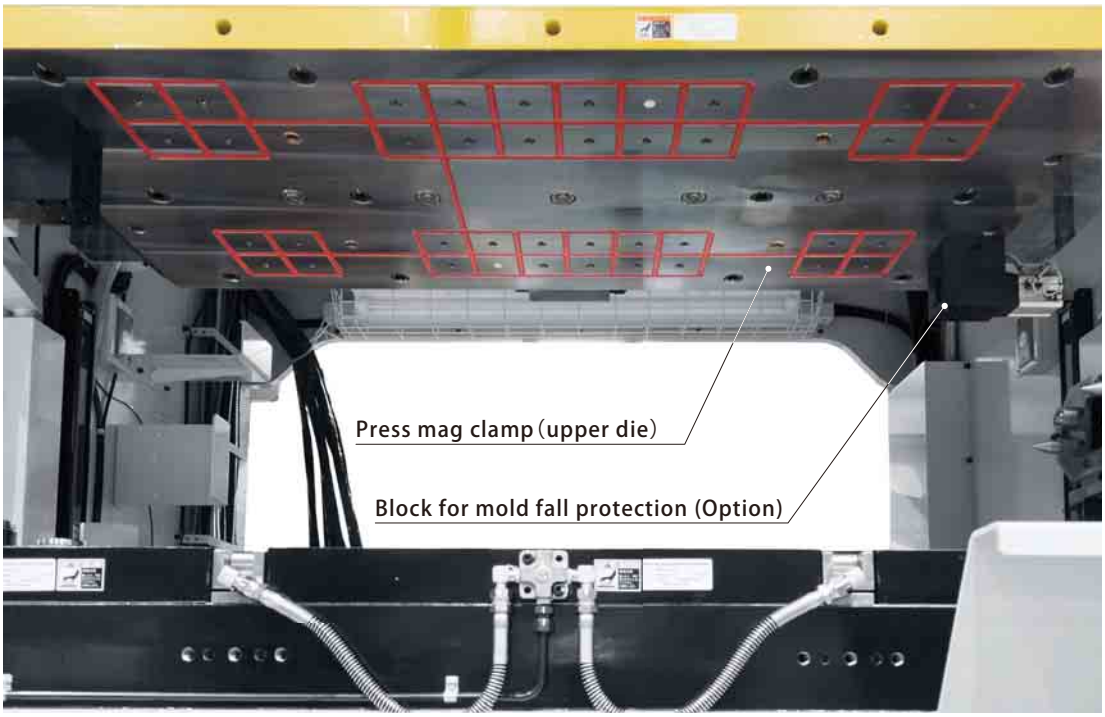
Press mag clamp (upper die)

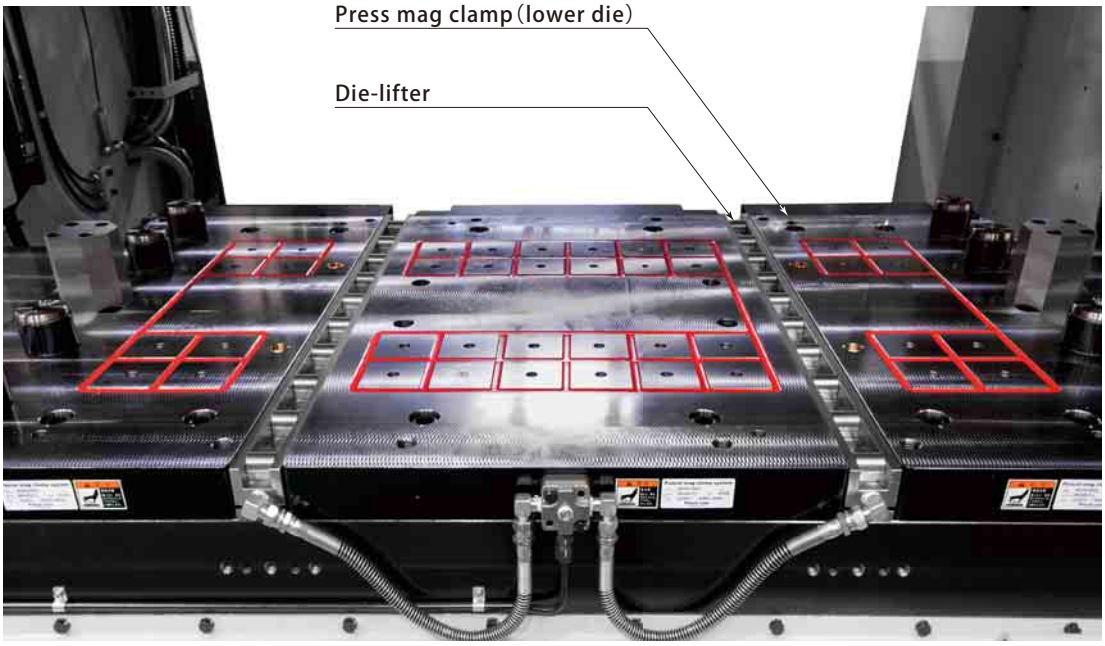
Clamp TXA



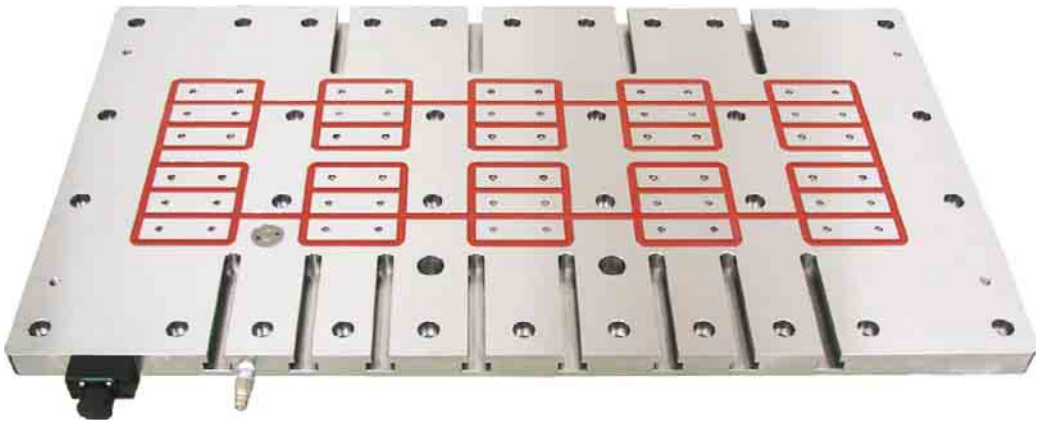
It clamps strongly the center of die and prevents the deflection.

Upper die clamp plate		
Capacity of press machine		4000 kN (400 tonf)
Plate size	mm	Depth: 1400× Width: 2100 × Thickness: 75
Mass	kg	1609
Magnet core (Size × quantity)		70 × 70mm × 22 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	162
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 20 kVA 40 A





Upper die & Lower die clamp plate		
Capacity of press machine		2000 kN (200 tonf)
Plate size	mm	Depth: 850 × Width: 1450 × Thickness: 55
Mass	kg	Upper die: 360 Lower dei: 471(140,191,140)
Magnet core (Size × quantity)		70 × 70 mm × 40 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	294
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A



Upper die clamp plate		
Capacity of press machine		1250 kN (125 tonf)
Plate size	mm	Depth: 600 × Width: 1080 × Thickness: 35
Mass	kg	153
Magnet core (Size × quantity)		32 × 100 mm × 30 pcs
Clamping force per magnet core	kN	3.43
Total clamping force	kN	103
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A

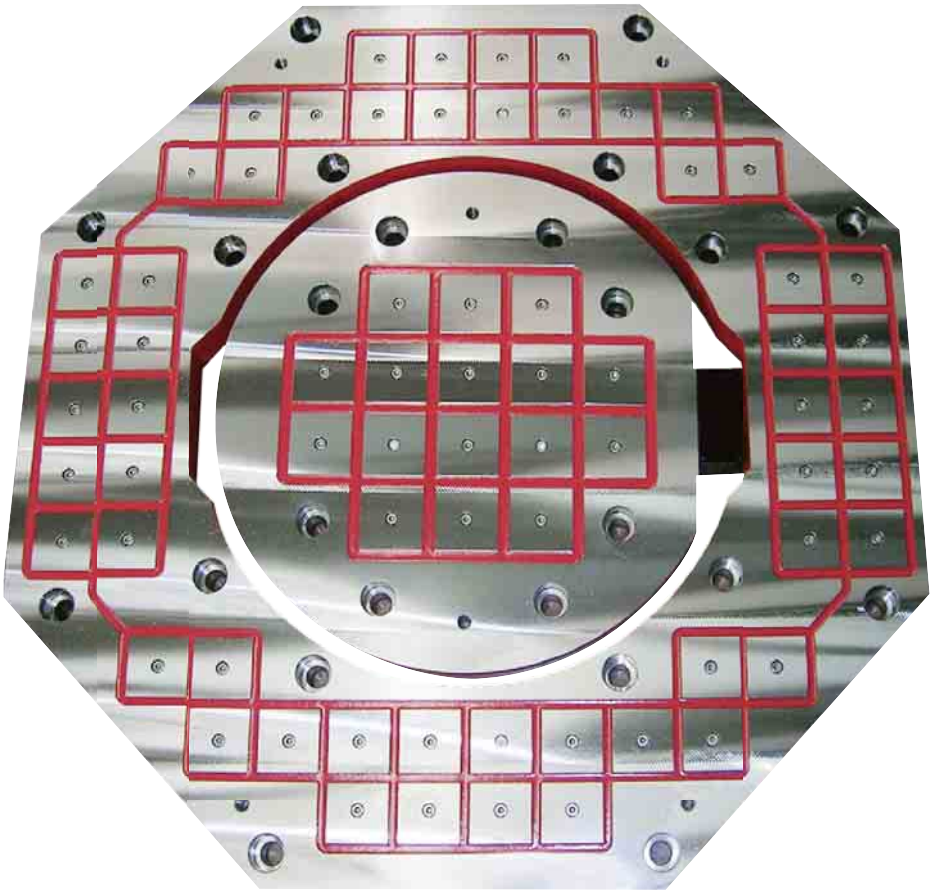
Lower die clamp plate		
Capacity of press machine		1250 kN (125 tonf)
Plate size	mm	Depth: 900 × Width: 1200 × Thickness: 50
Mass	kg	350
Magnet core (Size × quantity)		70 × 70 mm × 22 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	162
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A

Upper die & Lower die clamp plate		
Capacity of press machine		4000 kN (400 tonf)
Plate size	mm	Depth: 1200 × Width: 2400 × Thickness: 70
Mass	kg	Upper die: 2269 Lower dei: 2090
Magnet core (Size × quantity)		70 × 70 mm × 56 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	412
Primary power voltage		AC 200 V 50 / 60 Hz 40 kVA 60 A

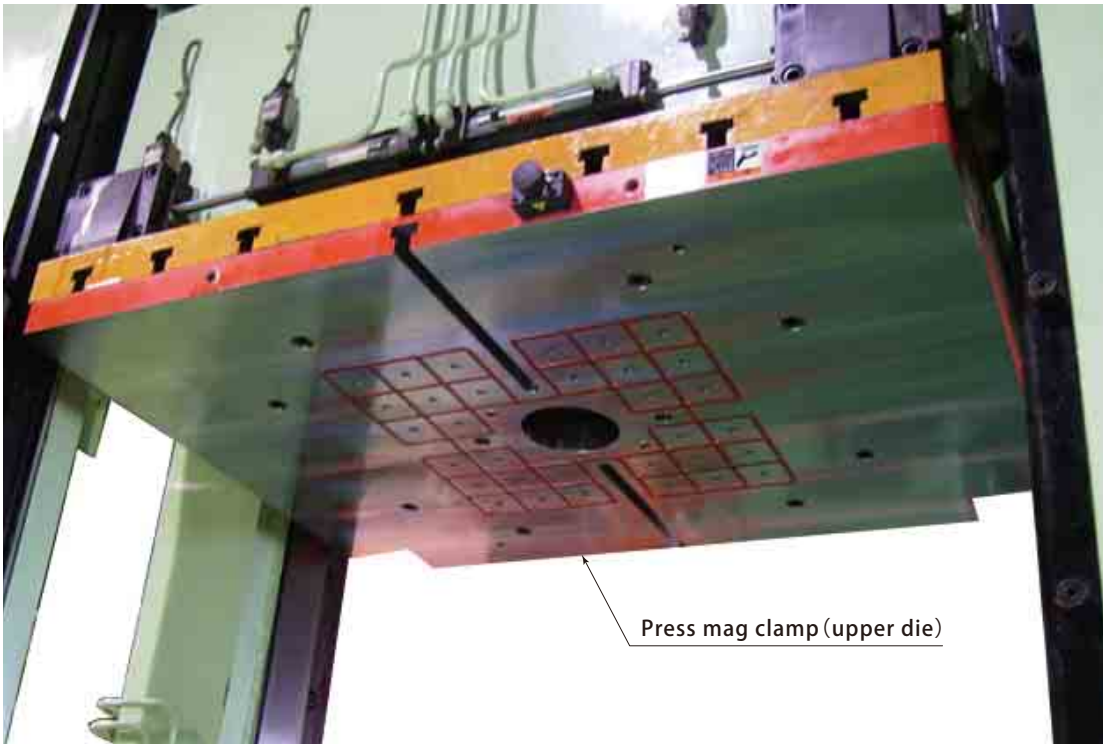
Lower die clamp plate		
Capacity of press machine		450 kN (45.9 tonf)
Plate size	mm	Depth: 450 × Width: 800 × Thickness: 50
Mass	kg	131
Magnet core (Size × quantity)		70 × 70 mm × 8 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	58.8
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 15 kVA 40 A

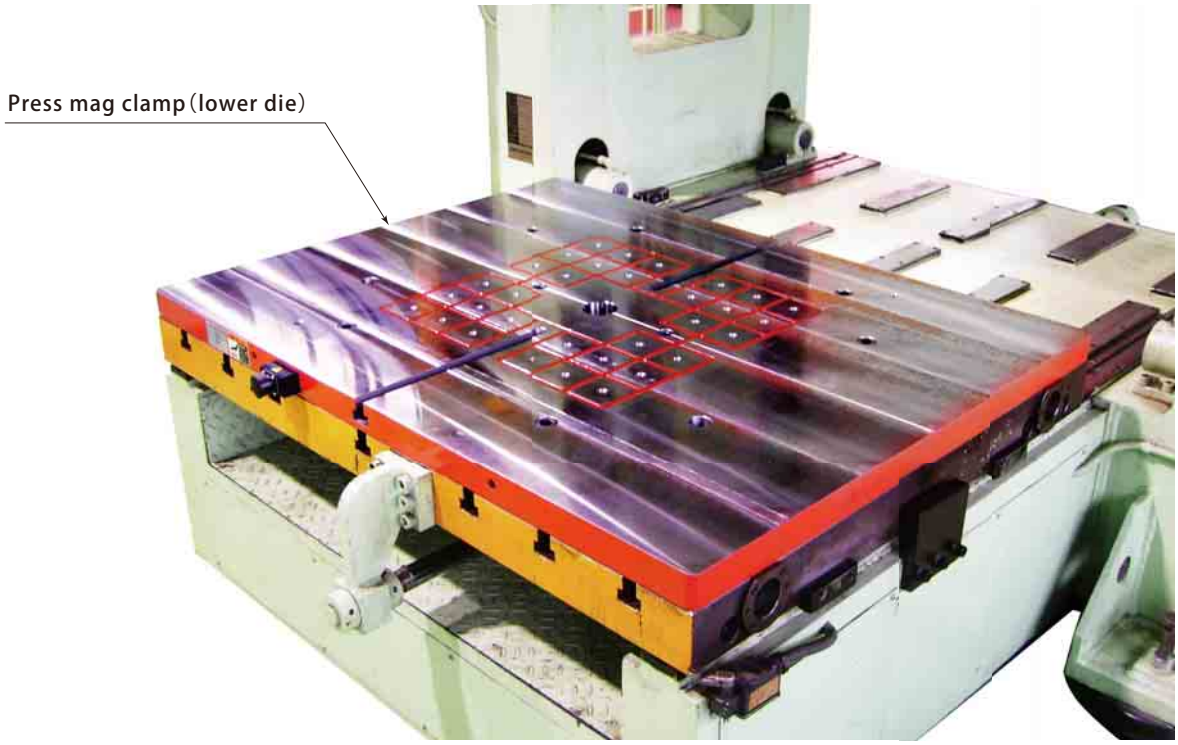
Lower die clamp plate		
Capacity of press machine		250 kN (25.5 tonf)
Plate size	mm	Depth: 300 × Width: 550 × Thickness: 50
Mass	kg	57
Magnet core (Size × quantity)		70 × 70 mm × 8 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	58.8
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 15 kVA 40 A

Upper die & Lower die clamp plate		
Capacity of press machine		800 kN (80 tonf)
Plate size	mm	Depth: 402 × Width: 450 × Thickness: 50
Mass	kg	Upper die: 65　Lower dei: 65
Magnet core (Size × quantity)		70 × 70 mm × 8 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	59
Primary power voltage		AC 200 / 220 V　50 / 60 Hz　15 kVA　40 A



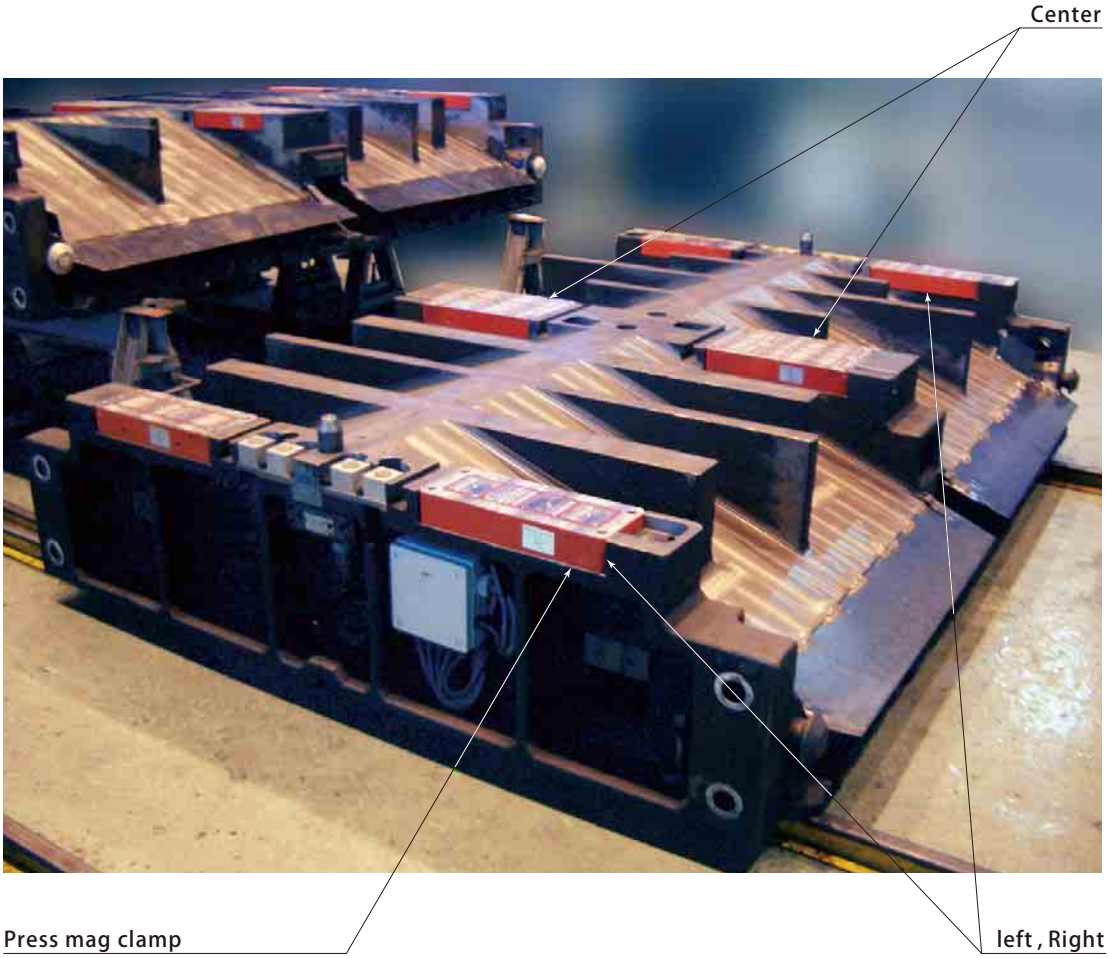
Outer slide & Inner slide clamp plate			
Outer ／ Inner		Outer	Inner
Plate size	mm	Depth: 1100× Width: 1100 × Thickness: 60	ø620 × Thickness: 60
Mass	kg	310	136
Magnet core (Size × quantity)		70× 70 mm × 52 pcs	75× 75 mm × 16 pcs
Clamping force per magnet core	kN	7.35	7.84
Total clamping force	kN	382	125
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A	





Upper die & Lower die clamp plate		
Capacity of press machine		500 kN (50 tonf)
Plate size	mm	Depth: 1300 × Width: 1000 × Thickness: 50
Mass	Kg	Upper die: 462 Lower dei: 480
Magnet core (Size × quantity)		70 × 70 mm × 32 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	235
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 30 kVA 50 A

Upper die & Lower die clamp plate		
Capacity of press machine		1000 kN (100 tonf)
Plate size	mm	Depth: 1300 × Width: 1000 × Thickness: 50
Mass	Kg	Upper die: 459 Lower dei: 477
Magnet core (Size × quantity)		70 × 70 mm × 32 pcs
Clamping force per magnet core	kN	7.35
Total clamping force	kN	206
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A



- Speed up the set-up operation with mag clamp (boltless)
- Reduction of worker's load for die change operation
  Improvement for worker's safety

Sub bolster clamp plate		
Capacity of press machine		27000 kN (2700 tonf)
Plate size	mm	Depth: 280× Width: 430 × Thickness: 70 ／ Depth: 160× Width: 430 × Thickness: 70
Mass	kg	Center: 64 Left,Right: 37
Magnet core (Size × quantity)		75 × 75 mm × 32 pcs
Clamping force per magnet core	kN	7.84
Total clamping force	kN	251
Primary power voltage		AC 200 / 220 V 50 / 60 Hz 40 kVA 60 A

Pascal is the only manufacturer of magnetic clamp in Japan and has over 5,000 unit of track record in delivery not only for press machine but also machining center, diecasting and plastic molding machine.

Press machine

2,000kN (200ton) High speed press

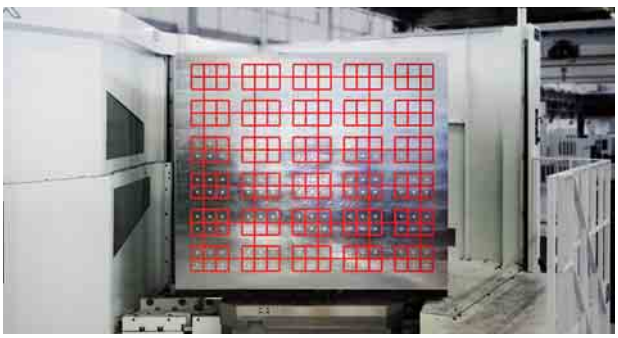
2,000kN (200ton) Press magnetic clamp

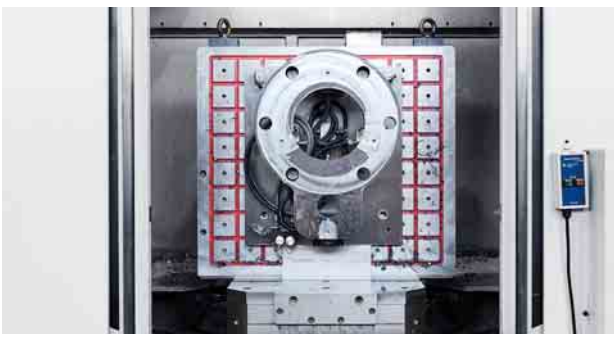
5-face machining center

Die machining with double mag clamp
(dual side magnetc)

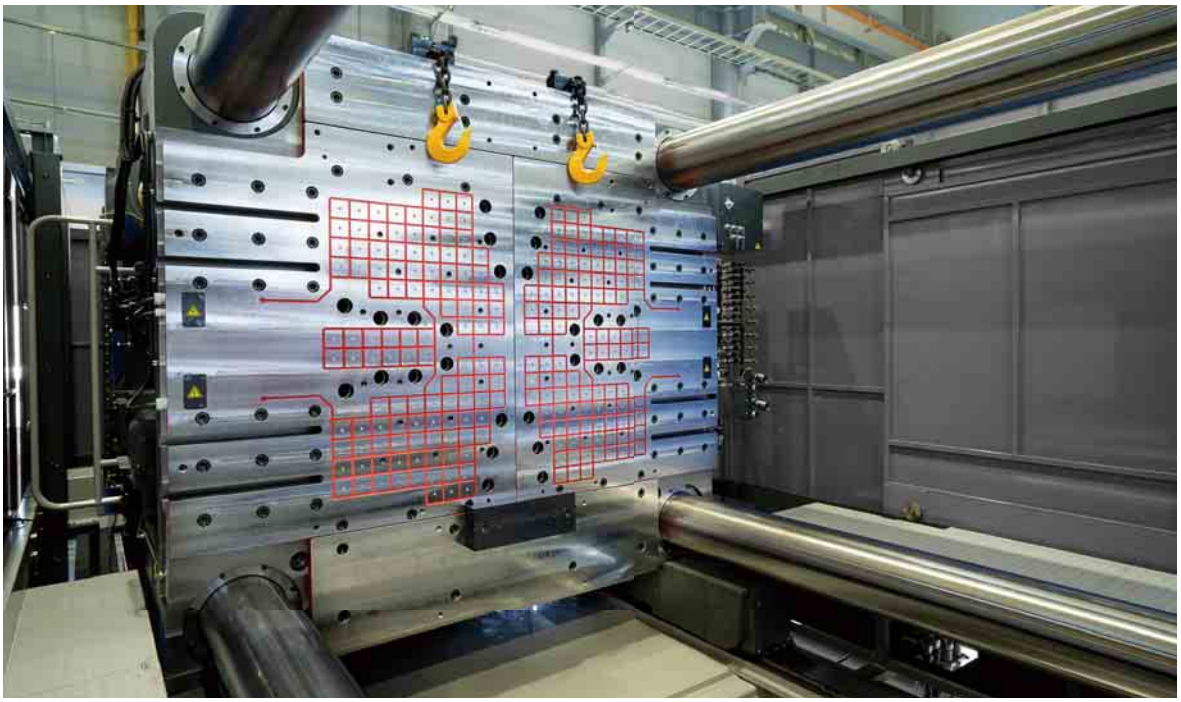
Long size workpiece machining

Horizontal machining center

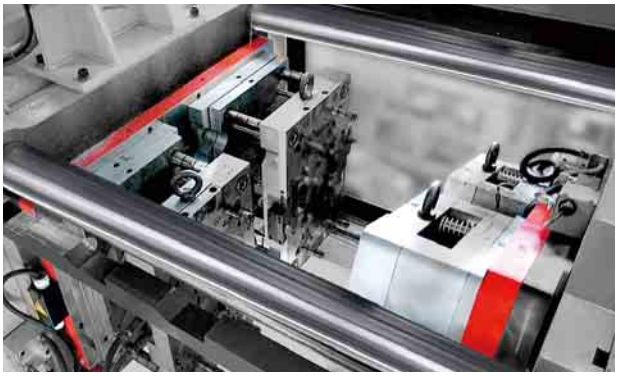




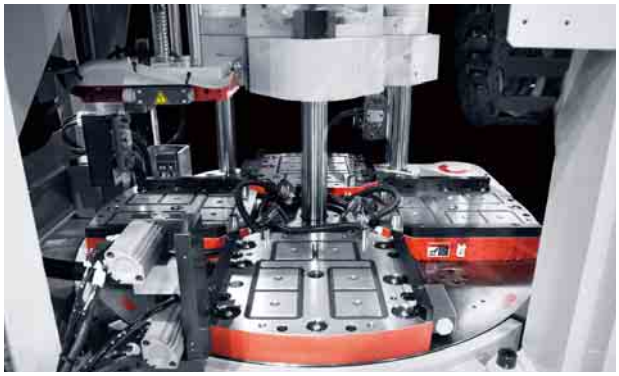
Injection molding machine



25,000kN(2,500ton) IMM Magnet clamp



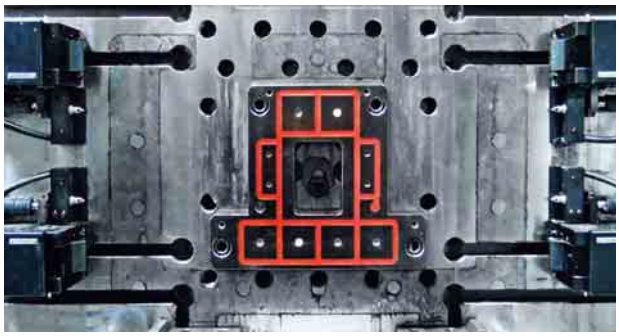
2,300kN（230ton）Two-color IMM Magnet clamp



400kN（40ton）Vertical Rotary IMM Magnet clamp

Die casting machine

3,500kN（350ton） Magnetic clamp for diecasting machine

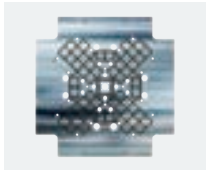


8,500kN（850ton）C-plate magnetic clamp

Pascal all products

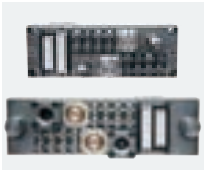
Bumper | Connector | Instrument panel | Door | Wheel | Body

For plastic molding



Mag clamp

Mold die clamping system



Auto coupler

For sheetmetal stamping

Traveling clamp

Stamping die clamp

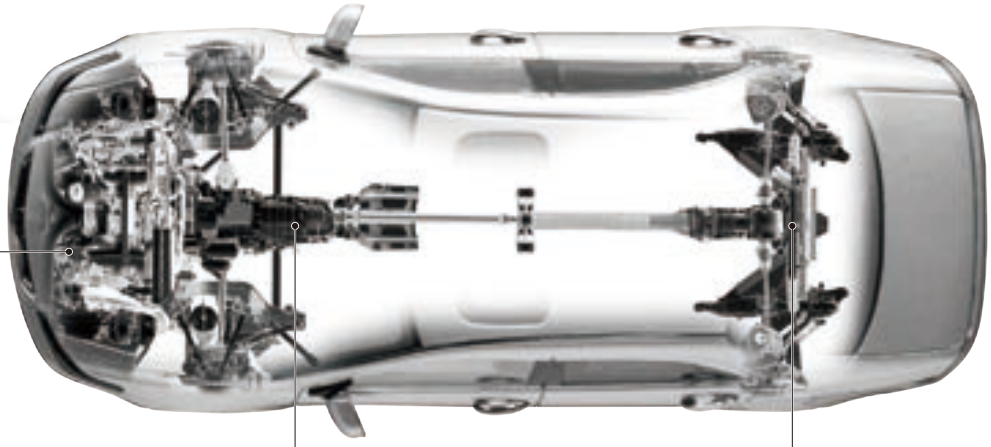
For automotive parts die & mold

N_2 gas springs

Press machine : Body , Roof , Door etc...

Molding machine : Bumper , Instrument panel etc...

Pascal products support
automotive production lines globally.



Engine

Transmission

Axle

For die cast machine

Die-clamping system

C-plate mag clamp

For metal cutting work

Work clamp

Pallet clamp

Index table

N_2 gas balancer

DOMESTIC LOCATIONS

JAPAN

Head office / R & D center ····· ◉ Itami, Hyogo

Sales office ····· ● Osaka, Hyogo
● Kumagaya, Saitama,
● Atsugi, Kanagawa
● Nagoya, Aichi
● Yamagata

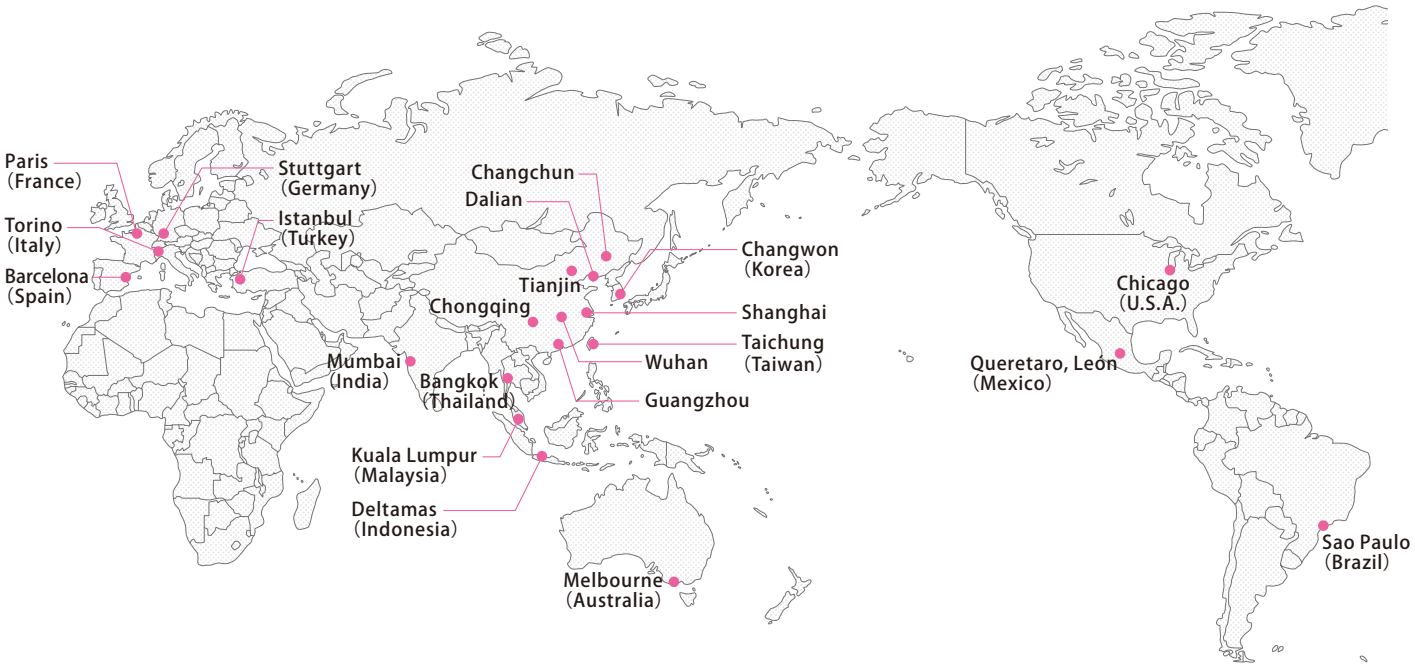
Plant ····· ● Oita
● Yamagata

Head office / R & D center

Oita plant

Yamagata plant

GLOBAL NETWORK



ASIA

- Dalian [China] ● ●
- Shanghai [China] ●
- Changchun [China] ●
- Tianjin [China] ●
- Wuhan [China] ●
- Chongqing [China] ●
- Guangzhou [China] ●
- Taichung [Taiwan] ●
- Bangkok [Thailand] ●
- Changwon [Korea] ●
- Deltamas [Indonesia] ○
- Kuala Lumpur [Malaysia] ○
- Mumbai [India] ○
- Melbourne [Australia] ○

AMERICA

- Chicago [U.S.A.] ●
- Queretaro , León [Mexico] ○
- Sao Paulo [Brazil] ○

EUROPE

- Stuttgart [Germany] ●
- Torino [Italy] ○
- Paris [France] ○
- Barcelona [Spain] ○
- Istanbul [Turkey] ○

● Plant ● Subsidiary ● Sales office ● Liaison office ○ Agent

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