

- Full metal surface, oil, and waterproof
- 35mm, super thin and solid construction
- 20% more magnetic force
- Extended lifespan by superior design

## **ELECTRO PERMANENT MAGNETIC QUICK CHANGE SYSTEM**

# COMPANY PROFILE

Zhuzhou HVR Magnetic Co., Ltd. is a leading company in electro permanent magnetic technology. We are a high-tech company focusing on the development and production of the following product lines: magnetic quick change systems for moulds and tools, magnetic clamping chucks for metalworking machines, industrial lifting magnets and customer-oriented magnetic applications.

Since its establishment in 2010, HVR has remained true to the vision that technology is the key to productivity and has acquired 5 innovative patents and 29 utility model patents. In September 2013, HVR was awarded as a “High Technology Enterprise” by the Department of Science and Technology of Hunan Province.

With continuous focus on R&D, our philosophy is to achieve win-win policies with our customers, create added value for employees, increase benefits for our customers, and make safe operation a priority.

The unique advantages of the HVR products are safety, energy saving, high efficiency, and environmental friendliness.

Our products are used in various sectors such as: steel construction, machine construction, shipbuilding, steel trade, railway and rolling stock, injection moulding, and various other industries.

HVR strictly adheres to the requirements of the quality certification standard ISO 9001: 2015.

In 2017, a European exclusivity agreement was concluded with the Belgian company MAGBAT-Europe which, from its location in Oudenaarde, takes care of the distribution, technical support, and after-sales service of the HVR products.

All these arguments make HVR the most reliable partner for electro permanent magnetic equipment for industrial applications.



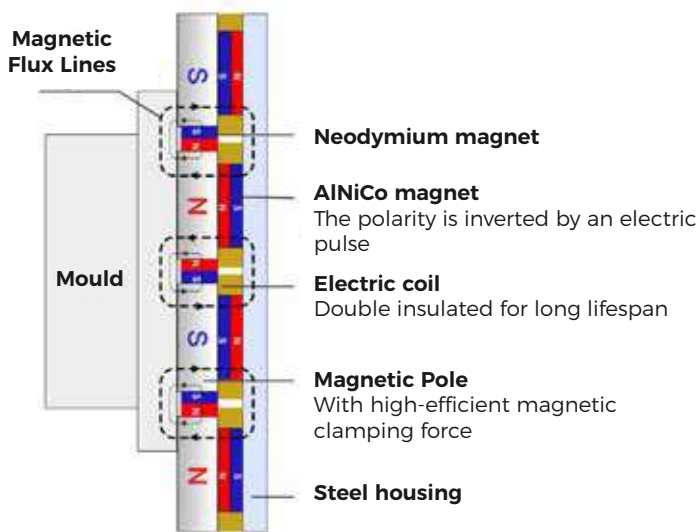
## CUSTOMERS & PARTNERS

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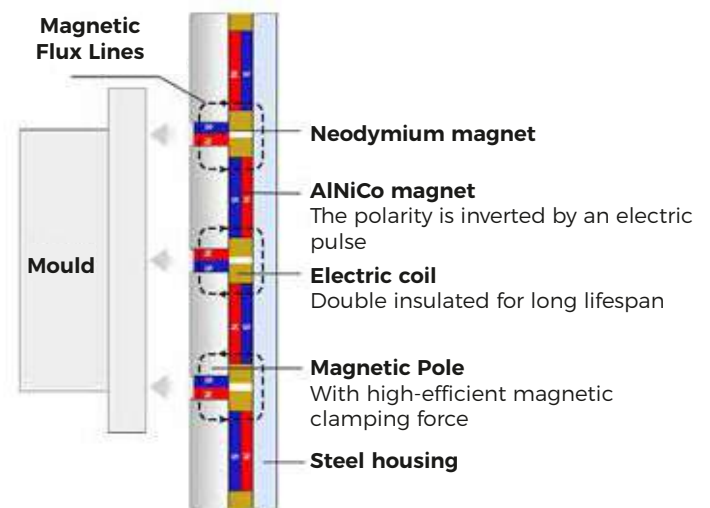
# WORKING PRINCIPLE

## CLAMP / MAGNETIZED



- 1 The electromagnetic coil is powered for 0.5 seconds.
- 2 The polarity of the AlNiCo magnet is inverted.
- 3 The Neodymium and AlNiCo magnet become unipolar.
- 4 The magnetic flux runs from the pole surface, across the mould backplate, clamping the mould.

## UNCLAMP / DEMAGNETIZED



- 1 The electromagnetic coil is powered for 0.5 seconds.
- 2 The polarity of the AlNiCo magnet is inverted.
- 3 The magnetic flux no longer flows along the surface of the magnetic plate, so the mould is unclamped.



**SAFETY**

The magnetic force is independent of the electric current and remains permanently present after magnetization.



**ENERGY SAVING**

95% less energy consumption.



**QUICK**

More than 90% efficient when changing a mould.



**LONGER LIFE SPAN**

Full metal clamping surface, IP67 waterproof.



**HIGHER QUALITY**

Uniform clamping of the entire surface, resulting in no deformation of the mould.



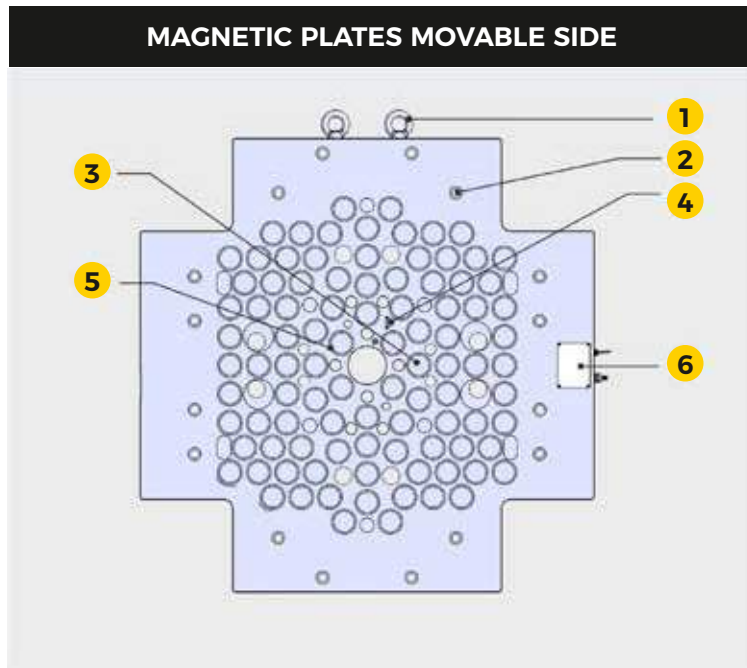
**MAINTENANCE FREE**

No moving parts, no wear parts.

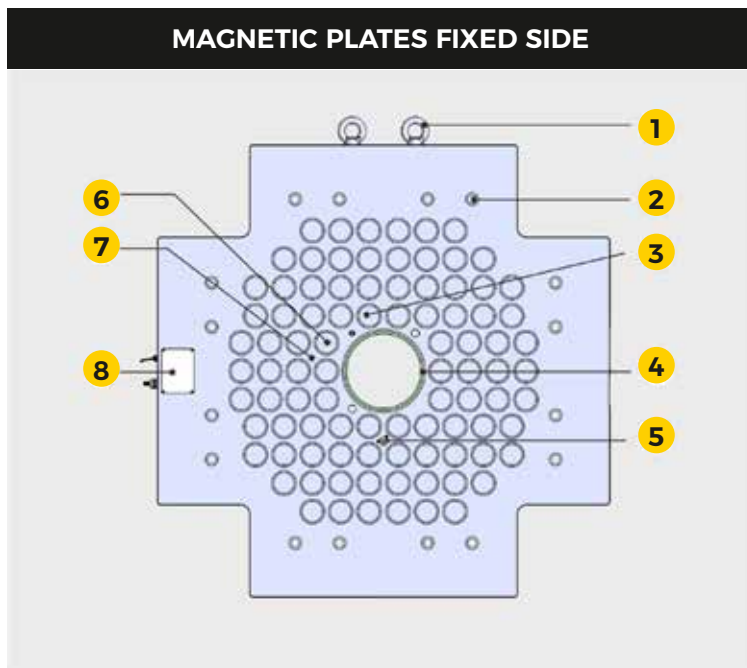
- The HQMC electro permanent magnetic quick change system is specially designed for injection moulding machines from 50-4000 tons. Due to the innovative design of the magnetic circuit, 20% more magnetic force is developed in comparison with conventional magnet system.
- HQMC electro permanent magnetic clamping systems provide higher efficiency in mould changes. Smaller moulds are changed in less than 3 minutes, while the mould change time for larger moulds is reduced from 2 hours to 20 minutes or less.
- Only one operator is needed to change the mould in just 3 minutes, without additional tools and at a safe distance outside the machine. The HQMC system significantly reduces labour costs and labour intensity. The 8 Safety functions provide a “real-time” protection and warning system.  
**Safety is our priority.**



# MAGNETIC PLATES DESCRIPTION



- 1 Lifting eye
- 2 Fixing holes
- 3 Displacement detection
- 4 Distance detection
- 5 Magnetic flux detection
- 6 Junction box



- 1 Lifting eye
- 2 Fixing holes
- 3 Displacement detection
- 4 Locating ring
- 5 Distance detection
- 6 Magnetic flux detection
- 7 Temperature detection
- 8 Junction box

# CONTROL PANEL AND INSTALLATION

## CONTROL PANEL



**Model: HQMC-11A**

Length: 159 mm Width: 122 mm Height: 39 mm

- 1 Full metal surface. High mechanical strength. High level of protection.
- 2 Full metal push buttons, easy operation, high level of protection, safe and stable, very suitable for industrial environments.
- 3 Safety key that allows the operator to switch easily and clearly between production and mould change mode.
- 4 Step-by-step help pages with detailed explanations of each action.
- 5 Indication of the different alarm types, which will result in an immediate stop of the machine.



**Model: HQMC-12A**

Length: 275 mm Width: 255 mm Height: 51 mm

- 1 Full metal surface. High mechanical strength. High level of protection.
- 2 Full metal push buttons, easy operation, high level of protection, safe and stable, very suitable for industrial environments.
- 3 Different access profiles: machine operator / supervisor / maintenance.
- 4 Graphic representation of production time / mould changes / operator activities.
- 5 The buttons below the touchscreen have a separate I / O signal. Also if the touchscreen is faulty, the system can still be operated and work normally.

## INSTALLATION LAYOUT



- 1 Magnetic plate movable side
- 2 Magnetic plate fixed side
- 3 Control panel
- 4 Control Unit

# THE HIGHEST SAFETY STANDARD

1

## CLOSED MOULD DETECTION

The MAG cycle can only be performed when a build-up of pressure is detected. This ensures that both mould halves fit 100% against the respective magnet plates when the MAG cycle is performed.

2

## MAGNETIC FLUX DETECTION

Release for production is only obtained if the measured magnetic flux, after magnetization, reaches the standard minimum safety value. If this is not the case, an error is indicated. If during the injection process the magnetic flux value decreases minimally, the machine stops immediately.

3

## TEMPERATURE DETECTION

To prevent the magnetic plates becoming too hot, which reduces the total magnetic force, the magnetic plates are equipped with a temperature sensor. When the temperature gets higher than the pre-set value, the automatic production process stops.

4

## CURRENT DETECTION SYSTEM

During the MAG and DEMAG cycle, the current pulse is monitored by the current detection sensor. Only when the set value is reached, a successful release is allowed.

5

## MOULD DISLOCATION DETECTION

The position of the mould is monitored during production. If due to circumstances a small shift of the mould occurs, the machine stops immediately.

6

## DISTANCE DETECTION

The proximity switch ensures that the DEMAG cycle can only be performed if the distance between the die and the magnetic plate is less than 0.2 mm. In addition, the automatic production process stops immediately when a distance > 0.2 mm is detected between mould and magnetic plate.

7

## INTERFACE CONTROL SYSTEM

Only when all detection sensors are in normal operation, the fixed and movable side have been successfully magnetized, and the safety key has been placed in the injection position, the automatic production process can be started. Any other condition will result in ALARM, stopping automatic operation of the machine.

8

## SAFETY KEY SWITCH

The safety key is used to select setup- or production mode. To demagnetise, the LOCK and DEMAG button must be pressed simultaneously. Demagnetising is not possible during the automatic production process.



# SPECIFICATIONS AND CONFIGURATIONS

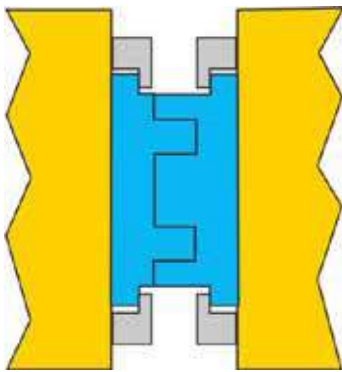
Dimensions (mm)	ø44	ø66
Magnetic force / pole (kg)	360	900
Magnetic plate thickness (mm)	35	46
Max. temperature (° C)	120 / 150 / 180	
Magnetic flux depth (mm)	20	
Proximity switch range (mm)	0.2	
Standard voltage (V)	AC230V / 400V / 415V / 440V,50 / 60Hz	
Closing force machine (KN)	500-40000	

N°	ITEM	CONFIGURATION	QTY
1.	Magnetic plates fixed side	☑	1
2.	Magnetic plates movable side	☑	1
3.	Locating ring	☑	1
4.	Control unit	☑	1
5.	Operating panel HQMC-11A	☑	1
6.	Operating panel HQMC-12A (Interactive power control and touchscreen)	○	1
7.	Proximity switch for distance detection	☑	1 pc. installed on both fixed and movable side
8.	Magnetic Flux Detection System	☑	1 pc. installed on both fixed and movable side
9.	Displacement Sensor	☑	1 pc. installed on both fixed and movable side
10.	Temperature Sensor	☑	1 pc. installed on fixed side
11.	Mounting Bolts	☑	1 set
12.	Connection cables	☑	1 set
13.	Operation and Maintenance Manual	☑	1

☑ Standard configuration    ○ Optional configuration

# STRENGTH OF MAGNETIC CLAMPING

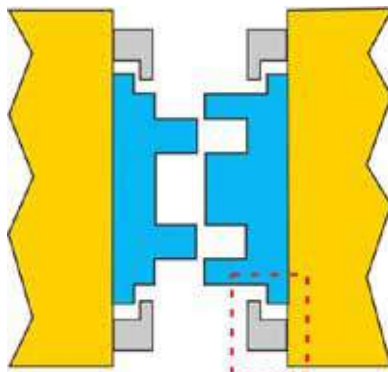
## DISADVANTAGES OF CONVENTIONAL CLAMPING / 1 2 3



1

### Limitations and no flexibility

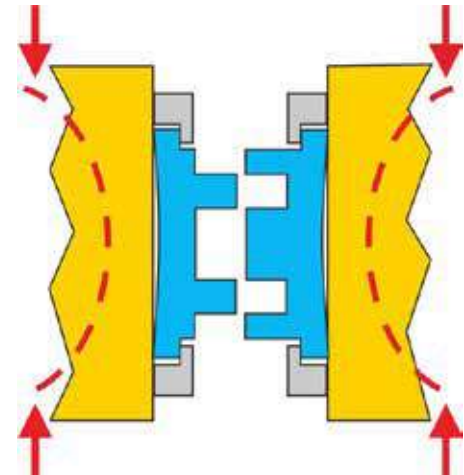
The maximum size of the mould is limited because of the clamps.



2

### Time consuming and ineffective

Due to the thin base plate, many clamping tools are required.

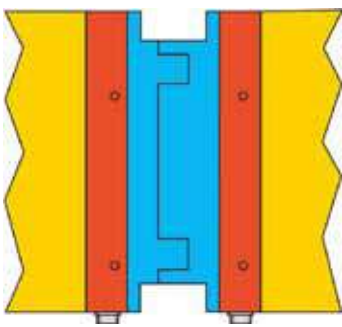


3

### No uniform clamping

The mould is not clamped where most forces occur (moulding part), resulting in mould deformation = wear of the mould + lower quality of the injected parts.

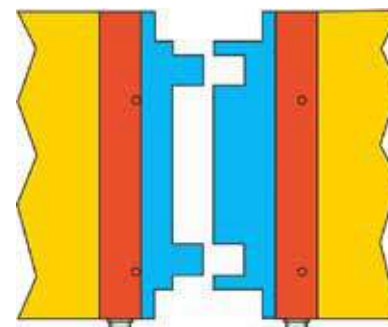
## BENEFITS OF MAGNETIC CLAMPING / 4 5 6



4

### Bigger moulds on smaller machines

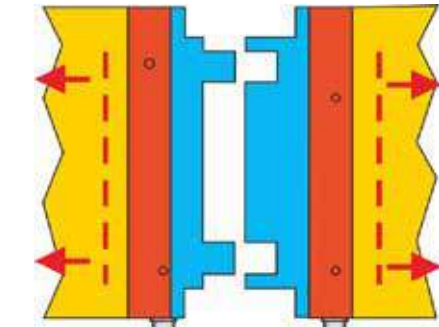
The complete area of the machine plate can be used by eliminating clamps.



5

### Flexibility

All moulds, regardless of shape and size of the mould base plate, can be clamped without adjustment.



6

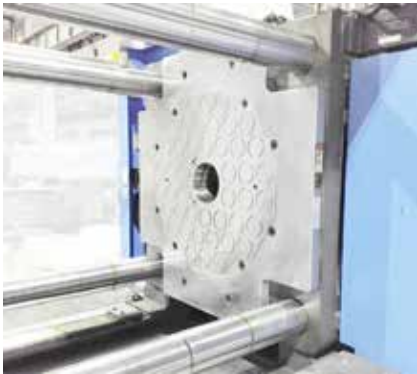
### Uniform clamping

The mould is clamped over the entire surface, resulting in no mould deformation and better quality of the injected pieces.

# MAGNETIC CLAMPING VS CONVENTIONAL CLAMPING

CONTEXT	TRADITIONAL CLAMPING		HQMC MAGNETIC CLAMPING
	MECHANICAL CLAMPING	HYDRAULIC CLAMPING	
<b>RELIABILITY</b>	Serious safety risk caused by mechanical point clamping.	The effective clamping force is based on point clamping and cannot be accurately determined. In addition, hydraulic components require continuous inspection and maintenance.	The magnetic force is permanent, independent of the electric current, and in real time displayed. No moving parts, no wear, and no maintenance. 100% Safe because of interface with the machine.
<b>MOULD CHANGE EFFICIENCY</b>	Changing the mould is time consuming.	The thickness of the mould backplate is limited, and therefor causes a much less efficient mould change time.	The mould change time can be shortened to a few minutes, resulting in over 90% time reduction. Only one operator is required.
<b>CLAMPING POINTS</b>	Only clamping force on the circumference of the back plate of the mould. No clamping force at the moulding part, which makes the mould easily deformed.	Only clamping force at a few points of the back plate of the mould. No clamping force at the moulding part, which causes deformation of the mould during production.	Uniform clamping over the entire area, especially in the middle zone (mould part), where the greatest forces occur. Full mould support, no deformation of the mould.
<b>QUALITY INJECTED PARTS</b>	No clamping force on the moulding part position leads to mould deformation, making the product inconsistent and less qualitative.	No clamping force on the moulding part position leads to mould deformation, making the product inconsistent and less qualitative.	The uniform clamping force over the entire surface gives the plastic product a high consistency and better quality.
<b>FLEXIBILITY</b>	Several factors limit flexibility. Mechanical clamps take up a certain amount of space, which limits the dimensions of the moulds.	Because of the fixed clamping position, all moulds must be equipped with the same back plate. This requires many adjustments and causes many unnecessary costs.	All moulds, regardless their shape and/or dimensions, can be clamped without any adjustment. No periphery that obstructs with the mould. Larger moulds on smaller machines.
<b>MAINTENANCE COST</b>	Bolts and threaded holes must be renewed regularly. This results in a high maintenance cost.	The hydraulic pump works for a long time, resulting in a high energy cost. Chance of oil leaks. Regular maintenance required. Not a clean working environment. The wear parts must be replaced regularly.	No energy consumption during the production process. No leakage, clean environment, no maintenance.

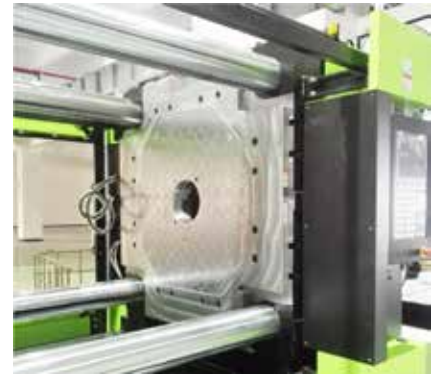
# APPLICATION CASES



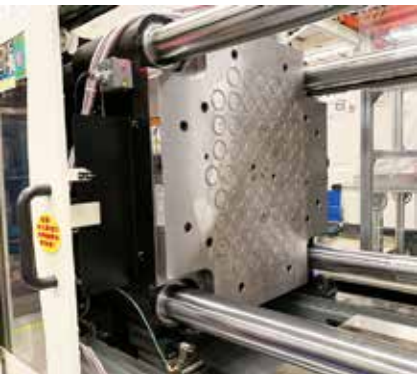
1 Haitian 200T



2 Nissei 200T



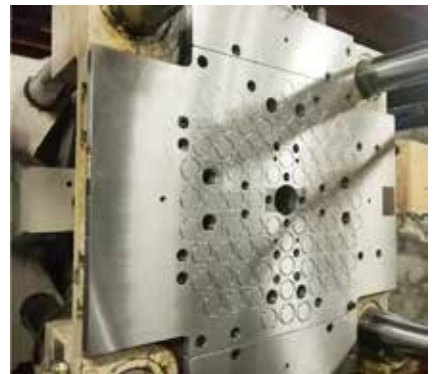
3 Izumi 360T



4 Haitian 650T



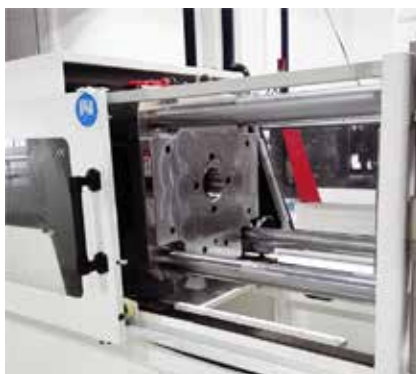
5 Arburg 180T



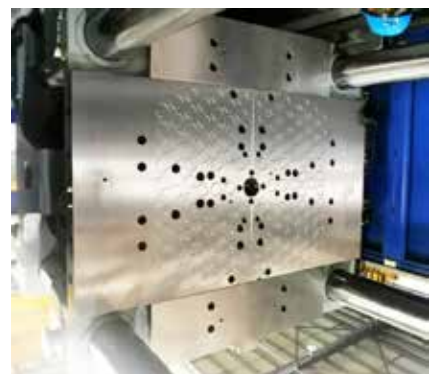
6 Tederic 800T



7 Haitian 650T



8 Milacron 110T



9 Nissei 180T



# ELECTRICAL PERMANENT MAGNETIC QUICK CHANGE SYSTEM FOR PUNCHING PRESSES

## EFFICIENCY

Changing dies on punching machines is a time-consuming activity. This increases production costs and decreases efficiency.

By using the HVR magnet quick-change systems, set-up time is minimized, overall production costs are reduced, and competitiveness is enhanced.

## STABILITY

With the HVR magnet system, any mould can be clamped, regardless of its size and shape. This reduces the design and production costs of the tool.

A uniform clamping ensures a longer lifespan of the punch / cutting plate and guarantees a better quality of the final product.

The punch waste is easily disposed via customized drop slots in the magnetic plate.

## EASY TO INSTALL

The design of the magnetic system is adapted to the technical specifications of the press and is fixed by screws. Due to the innovative design, the thickness of the magnetic plate is very limited, allowing maximum use of the opening stroke of the press.

## EASY TO OPERATE

No additional tools are required to clamp the mould. The user can operate the system easily and from a safe distance, without getting under the press, which benefits the user's safety.

The mould changing process is very simple and effective and includes the following steps:

- Position the mould on the machine table
- Close the press
- Magnetize the top and bottom magnetic plates.
- DONE!

## SAFETY

Thanks to the electro permanent magnetic technology, the magnetic force remains continuously and unabated, even in the event of a power failure or cable break.

An interface with the press guarantees 100% security.





# **FAQ** **(FREQUENTLY ASKED QUESTIONS)**

## **Q Which parameters are considered in the design of an electro permanent magnet plate?**

- A** This product is used to overcome the friction force that occurs in the ejection process, cumulated with the weight of the mould, by magnetically clamping the backplate of the mould, which prevents the mould from falling out of the machine. The parameters that are considered are:
- (1) The weight of the mould.
  - (2) The maximum opening force of the machine.
  - (3) The clamping force of the movable side is greater than the clamping force of the fixed side because of the acceleration.

## **Q Can the mould fall out of the machine in the event of a power failure?**

- A** No, this system is an electro permanent magnetic system and independent from the electric current. It only uses the electric power for a very short period (0.5 sec) to run the MAG and DEMAG cycle. Then the power drops down. The effective force is generated by powerful permanent Rare-Earth magnets.

## **Q Is magnetic radiation harmful to humans?**

- A** No, this is harmless. After magnetization, the magnetic system forms a closed magnetic field on the surface of the magnetic plate. The effective distance range of the magnetic field lines is 20 mm. Once above 20 mm, the magnetic field becomes very thin and comparable to the magnetic field strength in the air. People with pacemakers, bank cards, watches, cell phones and other items should not get close to the magnetic field (20 mm)

## **Q Is the magnetic plate water, oil, and corrosion resistant?**

- A** Yes, by using a multi-layer, waterproof, oilproof, and corrosion-resistant structure, it is even possible to work in a water, oil, and gas environment.

## **Q Can the magnetic system withstand high temperature?**

- A** Depending on the version, the maximum temperature is: T1: 120 ° C, T2: 150 ° C, T3: 180 ° C. At temperatures exceeding 180 ° C, we do not recommend the use of magnetic clamping plates.

## **Q Does an electro permanent magnetic system interfere with the press / injection machine?**

- A** The electro permanent magnetic system only uses current during the mould change. The magnetic field is only 20 mm high from the clamping surface of the magnetic plate. All other zones are non-magnetic. There are no interferences with the machine.

**Q The back plate of the mould is not 100% flat. What should be done about this?**

**A** The magnetic plate must fit completely against the clamping surface of the mould. Remove any interferences, clean the back plate, tighten additional screws...

**Q Which data must be confirmed when applying for an electro permanent magnetic quick change system?**

**A** A. Brand and model of the machine  
B. Closing force (TON)  
C. Drawings of the machine plates, dimensions of the location ring (Only QMC for Moulds)  
D. Minimum mould size  
E. Maximum mould weight (fixed and movable side)  
F. Maximum mould contact temperature.  
G. Position and dimension of the scrap removal holes (Only QMC for Dies)

**Q Is it possible to clamp moulds fitted with an insulation plate?**

**A** Moulds with the insulation plate on the backplate cannot be used. It is possible if the insulation plate is placed between the backplate and the moulding plate.

**Q What happens if the injection nozzle is not properly adjusted?**

**A** Due to the impact, it is possible that the mould is pushed off the magnetic plate. In any case, avoid that the injection nozzle goes too deep. Use a safety chain during the start-up phase.

**Q What if there are recesses and holes in the back plate of the mould?**

**A** The magnetic system has been developed with a safety margin of 30%. For example, if the back plate of the mould consists of 20% holes, the system is still intrinsically safe. Keep in mind that other conditions, such as the flatness of the back plate of the mould, also influence the total attraction force of the magnetic plate.

**Q What happens if the mould temperature is getting too high?**

**A** If the temperature of the backplate of the mould exceeds the allowed temperature, an alarm is generated, and the automatic production process stops immediately. The solution is to place an insulation plate between the backplate of the mould and the moulding plate.

**Q Should the opening speed of the machine be within certain limits?**

**A** Yes, when the machine opens too quickly, especially in the first phase, there is a vacuum effect in the mould that can pull it off the magnet plate.

**Q What to do if the mould does not open?**

**A** If, due to circumstances, the mould does not open, the opening force should be increased. The moment that the opening force exceeds the clamping force of the magnetic plate, the mould will release from the magnet plate, and the proximity switch will generate an alarm. The machine will immediately stop. When such a situation arises, every precaution must be taken to prevent the mould from falling. For example: the use of a safety chain.

# PRODUCT OVERVIEW



Electro permanent lifting magnets for heavy applications



Electro permanent magnetic quick change systems for injection moulding machines and punch presses



Electro permanent magnetic chucks for workholding



Customer-oriented solutions for automation projects

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