

Photo: EAS Europe B.V.

Fig. 1: EAS Pressmag HP magnetic system with “long pole magnets” offers the best precondition for clamping and holding large and heavy injection moulds even with round platens. No back platen with standardized dimensions is required.

图 1 EAS Pressmag HP 磁力夹具的长型磁极具有超强磁力，可夹持大型且沉重的注塑模，即使其模具背板为圆型。无需标准化模具背板。

System with unlimited adhesion:

无限制磁力换模夹具

EAS-magnetic clamping system in competitive comparison

EAS 磁力换模夹具的优势比较

As magnetic clamping systems offer a comprehensive package of application advantages, such as unrestricted utilisation of the full clamping area or evenly distributed clamp force over the full contact surface, an investment in magnetic clamping systems is a decision for higher production efficiency. But as there are substantial differences in the technical concepts

and the performance of the systems available from different manufacturers it is worthwhile for the investor to have a closer look at the individual technical parameters. The following presentation takes that closer look at the technical features of the magnetic clamping system by EAS Europe B.V. and compares it with the alternatives available.

由于磁力换模夹具在应用上具有综合的优势，例如，整个夹持区域的自由利用或整个接触面上平均分布的夹持力，投资磁力换模夹具必会大大提高您的生产效率。但是因为不同厂家在技术理念和产品性能上的很大差异，那么投资者就非常有必要对夹具产品的具体的技术参数多予注意。下文将详述 EAS Europe B.V.的磁力换模夹具的技术特点，并与同行产品做了比较。

The biggest advantage of magnetic clamping systems is that one does not have to standardize the mould/machine-interface by adding standard platens matching with clamps mounted on fixed positions. Round moulds can be clamped as well as block-shaped moulds or moulds with square platens. That grants for maximum flexibility and eases the job, especially for trade moulders.

But the different magnetic clamping systems available are not identical with respect to concept and performance: When comparing magnetic clamping technologies with each other one has to understand the concepts and the technologies for the specific field of application.

磁力换模夹具最大的优点就是，它不用通过加装标准化模具背板，以匹配装在固定位置的夹具，来标准化模具/机器的接触面。圆形模具、块状模具或带方形模具背板的模具都可以夹持。这样灵活性更大，也简便了工作，这对注塑厂家来说尤其如此。

但现有的不同的磁力换模夹具在设计理念和性能上是不同的。要比较这些磁力夹具的技术优劣，必须要了解具体应用领域所采用的设计理念和技术。

EAS Pressmag systems are specifically designed for the use on injection moulding machines and not just an adaptation of magnetic clamping systems known from workholding applications on machining centres.

The reason is that the specific working conditions on injection moulding machines such as static and cyclic force application, increased operating temperature, vertical contact surface between machine platen and injection mould require a

solution far beyond an adaptation of an existing system – especially considering the whole scope of injection moulding machines with their different basic conditions.

EAS Pressmag 磁力夹具专为注塑机上的应用而设计，而不仅仅是加工中心上的工件夹持应用磁力夹具的改进。

原因在于注塑机上的特定工作条件，尤其是整体考虑到注塑机及其各种基本条件，例如：静力和循环力的应用，更高的操作温度，机器模板和注塑模之间的垂直接触面，所要求的夹持方案大大有别于在已有夹持系统上所做的改进。

Different requirements – different solutions

要求不同 - 解决方案有差异

Although the fundamental requirement – the clamping and holding of an injection mould – is identical over the entire scope of injection moulding machines, at a closer look one important difference can be identified.

尽管从注塑机的整个范畴上讲，夹持与固定注塑模具的基本要求是一样的，但是细究之下就会发现一个重要的不同。

Small/mid size machines do offer other basic conditions than large machines with large and heavy moulds. The difference is caused by the differences in the physical size of the interacting components.

小/中型机器相比装有大且重模具的大型机而言，存在着其他的基本条件。这种不同在于相互作用的部件实际尺寸存在着差异。

Small/midsize moulds in general are constructed of relatively thin platens, back platens included. As the magnetic force between two metal components depends besides the correct material used on the sufficient thickness of the material for allowing the magnetic flux to develop a magnetic field it is obvious that small/mid size machines offer different preconditions than large machines with large moulds. It is for these reasons the optimum holding force on small/midsize machines can be achieved with small sized magnetic pole elements with a multitude of short range magnetic fields, whereas large magnetic pole better results can be achieved on large machines :

一般说来，小/中型模具由相对较薄的板块组成，包括背板。由于两个金属组件之间的磁力有赖于（除了要使用正确的材料）足够的材料厚度，以便磁通量形成磁场，因此很明显，相对于装有大型模具的大型机器，小/中型机器存在着不同的先决条件。由于这些原因，小/中型机器上的最佳夹持力可由大量具有短程磁场的小磁极实现。而大磁极的更佳效果可以在大型机器上实现。

EAS magnetic clamping system with unlimited
adhesion

EAS 无限制磁力换模夹具_第 页 Seite 4

Taking into account the above mentioned principles Messrs. EAS have developed two different systems:

考虑以上原因，Messrs. EAS 已经开发了两种不同的磁力换模夹具。

A) Pressmag SP with square pole technology for small/mid-range machines with a clamp force up to 400 tons

Pressmag SP 运用方型磁极技术，适用小/中型机器，夹持力可达 400 吨。

B) Pressmag HP with long pole technology for large machines.

Pressmag HP 运用长磁极技术，适用大型机。

Up to 400 tons clamp force: Pressmag SP with 47 mm square poles

400 吨以下的机器：用 47mm 方型磁极的 Pressmag SP

> The determinant layout criteria for the magnetic clamping system for small/midrange machines is to achieve a maximum of clamping force on a small area and to distribute that force evenly. But what seems to be self-evident needs a closer consideration of the specifics of “small” injection moulds. **Especially the thin back platens with usually just 20-30 mm thickness and the in relation to the platen size bore rather high number of through holes are the determinant layout conditions.** The solution from EAS is a system with small 47x47 mm square poles, whereas the competitors go with a universal system with large 80x80 mm square poles for all applications. Thus they have to compromise on the technical performance with small moulds.

小/中型机器所用磁力换模夹具的决定性排布标准就是在小面积上取得最大的夹持力，并保持夹持力的均衡分布。但是很显然，必须要密切注意小型注塑模具的规格尺寸。尤其薄背板，通常只有 20-30mm 厚，而且背板的穿透孔比较多，是排布的决定性条件。EAS 的方案采用 47x47 mm 的方形小磁极，而其他厂家在所有的应用中都采用通用型夹具，用 80x80 mm 的方形大磁极。因此，对于小型模具，他们技术性能会降低。

The reason is – depending on the size of the magnet pole – different range of the magnetic fields (see fig 2 and 3). In accordance with using the large 80x80 mm square pole the full magnetic force can be achieved in co-operation with platens with an increased thickness only. Therefore the moulds would ask for a

replacement for the usually thin platens against “thick” executions. The disadvantage of the option is besides the higher costs the limitation of the shut height resp. the opening stroke of the injection moulding machine. The EAS solution for injection mould with usual back platens is an alternative layout with small 47x47 mm magnetic poles in higher numbers. That reduces the effective reach of the magnetic field thus offering the potential to fully develop the magnetic flux within the given platen thickness - without any losses caused by stray flux. Thus the full holding force can be achieved in the practical operation.

原因在于 - 取决于磁极的大小 - 磁场范围的不同（参看图 2 及图 3）。与使用 80x80 mm 的大磁极一致，全部磁力只能通过增加背板厚度来实现。因此，就厚度而言，模具需要替换通常比较薄的背板。这种办法的缺点除了增加成本外，也相应减少了注塑机模厚和开模行程。对于模具背板是普通型的注塑模具，EAS 的解决方案是另一种排布，采用大量 47x47 mm 的小磁极。这会减小磁场的有效到达范围，使磁通量在规定的背板厚度内充分发挥成为可能，避免了散乱磁通量引起的损耗。因而在实际操作中可取得全部夹持力。

One more innovation by EAS is the application of multidirectional magnetic elements. These are magnetic elements with cubic base, but a round “head” in the contact surface (see fig 4a + b). **With the round head a circular magnetic field is achieved allowing for an evenly distributed magnetic field independent on the geometrical size and shape of the counterparts.**

EAS 另一个创新是采用多向磁极单元。这些磁极单元具有立方体基座，但其接触面却是圆头的（参看图 4a+b）。**圆头设计形成圆形磁场，使磁场均衡分布，尽管每对磁极的几何尺寸和形状不同。**

> With 47 mm square poles not just the an optimum result regarding the force build-up can be achieved but also the thickness of the magnetic clamping platens can be reduced to 38 mm only. That in combination with standard (thin) back plates helps to keep the machines specification within the standard execution, not requiring the machine equipment option of a longer frame resp. longer tie bars.

Other magnetic systems on the market work with 55 mm thick platens.

采用 47 mm 方形磁极不仅可以取得效果更佳的夹持力，而且磁板厚度可减少到只有 38 mm。加上标准（薄）背板后，机器仍在标准规格内，机器不必选配更长的框架和更长的拉杆。而市场上其他磁力夹具的磁板厚 55mm。

> Small 47 mm square poles allow for more design flexibility in distributing the clamping force on the platen. The higher number of magnetic poles on a given area allows for a more flexible arranging the poles around ejector holes and the opening for the centre location ring (see fig. 2), resulting in a higher overall holding force.

> 47 mm 的方形小磁极使磁板夹持力的分布设计更加灵活。在既定面积上磁极数量更多，使顶出孔和中心定位孔周围的磁极排布更加灵活（参看图 2），产生更高的总夹持力。

> Each 47 mm pole creates a holding force of 2,2 kN per pole when fully covered by the mould. In every project the layout of an EAS magnetic clamping system includes such a number of poles in order to cover or exceed the theoretical opening force and in addition the holding force for the maximum weight of an injection mould. EAS is not compromising on the system safety and reducing the number of poles to be cheaper!

> 当被模具完全覆盖时，每个 47 mm 的磁极产生 2.2 kN 的夹持力。在每个项目中，EAS 磁力换模夹具的设计包括的磁极数量达到或超过理论开模力，以及注塑模具最大重量要求的夹持力。EAS 绝不会在产品的安全性能上打折扣，不会为降低价格而减少磁极的数量！

> The flexibility of arranging the “small poles” allows for a platen layout with a sufficient number of screw connections preventing the bending of the platens during the opening stroke of the machine. With only a few connections the magnetic

clamping system would bend and thus create an air gap between the clamping system and the mould, resulting in a reduction of holding force.

小磁极排布的灵活性使磁板上可设计足够多的安装螺栓，防止磁板在机器开模过程中弯曲变形。如果安装螺栓过少，磁力换模夹具会变形，进而在夹具与模具之间形成空隙，减少了夹持力。

> The EAS SP-systems are designed for an application temperature up of 150 C, while other suppliers offer just standard versions with 100 to 120°C application temperature.

> EAS 的 SP 夹具设计的使用温度达到 150°C。而其他厂家供应的只有标准产品，使用温度在 100 到 120°C。

Summarizing all the technical features the EAS Pressmag SP square pole-systems offer an outstanding performance at an economic investment.

综观所有的技术特点，EAS 的 Pressmag SP 方形磁极换模夹具性能优越，价格经济。

For large machines with more than 400 tons clamp force:

Pressmag HP with long pole modules

用于锁模力超过 400 吨的大型机器:

长型磁极的 Pressmag HP

The comparatively more spacious layout of large injection moulding machines and the corresponding moulds directs the focus rather on holding force and operational safety than on space aspects. With that in mind EAS developed the Pressmag HP-system with long pole magnets.

由于大型注塑机及相应模具的布局相对宽敞，因此，相对于空间布局，其夹持力和操作安全的要求更为重要。出于这一考虑，EAS 开发了长型磁极的 Pressmag HP 磁力换模夹具。

> Long pole elements feature compared to the square pole systems a specific difference in function. It is the ability to concentrate a high proportion of the magnetic flux even in a partially covered element. Thus almost the full holding force is provided even when a mould does not cover the full area of the magnetic platen. Compared to a magnetic system with square poles and the identical platen size the long pole layout provides a higher holding force. Practical tests on machines with 720, 1500 and 1600 tons clamping force show a remarkable difference between the two competing systems with clear advantages for the long pole system (Fig. 8 + 9)

与方形磁极相比，长磁极在功能上有明确的不同。即便只有部分被覆盖，长磁极也能够聚集绝大部分的磁通量。因此，即便模具没有完全覆盖磁力模板，也可产生几乎全部的夹持力。相对于磁板尺寸相同的方形磁极磁力夹具，长磁极的设计产生更大的夹持力。在锁模力是 720T、1500T 和 1600T 机器上的实际测试，显示了两种竞争夹具的显著差异，而长磁极夹具有着明显优势（图 8+9）。

> Using the long pole system and the mono-directional technology, where the single magnetic inserts are the north pole and the frame the south pole, the contact surfaces of both poles result in a neutral condition with no stray flux.

EAS magnetic clamping system with unlimited adhesion

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>用了长磁极夹具及单向技术，单个磁体是北极，基板是南极，那么两个磁极的接触面达到中性，无散乱磁通量。

> The mechanical construction of the magnetic platen system with the long poles inserted into machined pockets of the carrier platen provides for maximum rigidity and stability with less bending or breathing of the platen. This in combination with sufficient mounting screws results in no air gaps and thus no loss of holding force.

> 长磁极插入承载基板加工好的位置，这样的磁力模板机械构造具有更大的刚性和稳定性，不容易变形或磁板间隙小。加上足够多的安装螺栓，无空隙产生，因此无夹持力损耗。

Top safety with EAS Pressmag systems

EAS Pressmag 夹具的绝佳安全性

The EAS Pressmag systems are designed and rated to hold the maximum weight of a potential injection mould and in addition the rated opening force of the injection moulding machines and includes sufficient safety.

EAS Pressmag 夹具依据注塑模的潜在最大重量和注塑机的开模力而设计，具有充分的安全性。

In addition to the generous layout of the magnetic system the function is monitored by sensors. A new “4 in 1”-sensor monitors if a mould is in contact with the system, the temperature, if the magnetic flux level is within the set tolerances (in case a non-magnetic material is for the mould platens) and the change of magnetic flux during the production (in case an air cap occurs). The sensor is interfaced with the machine control and stops the machine in case of the detection of a related problem.

But on top EAS offers an additional safety feature (optional). It is a patented mechanical safety device consisting of one or two pins attached to the back platens of the mould and a key slot opening on the magnetic clamping system. The pins will stop the moulds from dropping off in very unlikely case of a complete system break down (Fig.12 a+b)

除了磁力夹具的灵活设计外，其功能由传感器监控。新的“四合一”传感器监控模具是否与磁板接触、温度变化、磁通量水平是否在设定范围内（假设模具背板用了非磁性材料），以及生产过程中磁通量的变化（假设有间隙产生）。传感器与机器控制单元相连，如果检测到有关问题，停止机器运转。在磁板上部，EAS 提供额外的安全选配。这是一项具有专利的机械安全装置，由一个或两个插在模具背板上的插销以及磁

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力夹具上的键槽组成。在非常罕见的整个夹具系统失灵的情况下，插销会阻止模具掉
落（图 12a+b）。

EAS is more than just magnetic clamping

EAS 不仅仅有磁力换模夹具

EAS offers an unique product portfolio for a quick mould and die change.

The comprehensive scope of supply ranges from manual operated devices to fully automatic systems for clamping and connection of medias. EAS offers both hydraulic and magnetic clamping systems. No matter whether the job is retrofitting on existing machines or designing new equipment the EAS technicians are in the position to provide a solution. But the EAS program is not limited just to clamping systems: Systems for the internal mould transportation or storing and supporting the manipulating for maintenance complete the offer, as well as a full scope of magnetic lifters for metal components.

EAS 提供快速换模的整套独特方案。

产品供应范围广泛：从手动装置到全自动系统，用于模具夹持和回路连接。EAS 提供液压和磁力两种换模夹具系统。不管是对现有机器进行改装还是设计新的设备，EAS 技术人员随时恭候，为您提供解决方案。但 EAS 的项目绝不仅限于换模夹具系统。

EAS 还提供模具厂内运输或存储系统和维护支持系统，以及金属件用的全套磁力吊具。

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Factbox EAS: EAS 资料:

EAS Europe B.V.

EAS is one of the leading manufacturers in the world for automation components and systems for a quick mould and die change in the plastic injection moulding industry as well as in the metal stamping industry.

EAS 是注塑与金属冲压业快速换模自动化装置与系统的世界领先厂商之一。

In the main factory in Renswoude / Holland 30 employees are designing and producing hydraulic and mechanical clamping systems, a large program of mono and multi couplers as well as complete solutions and automatic mould & die change systems.

在荷兰 Renswoude 总厂，有 30 名人员设计生产液压、机械夹具系统、单项/组合快速接头以及自动化换模系统的全套方案。

Since the acquisition of the magnetic clamping know how of Walker Braillon in 2005, EAS designs and manufactures magnetic clamping systems, also in their recently opened new factory in China. Next to the Dutch headquarters EAS has sales and marketing companies in Europe (Germany France and Italy) North America and Asia.

自 2005 年获得 Walker Braillon 的磁力换模夹具的专有技术，EAS 包括其最近在中国新开的工厂，开始了磁力换模夹具的设计与生产。除了荷兰总部外，EAS 在欧洲（德国、法国及意大利）、北美和亚洲均有营销公司。

Illustrations:插图

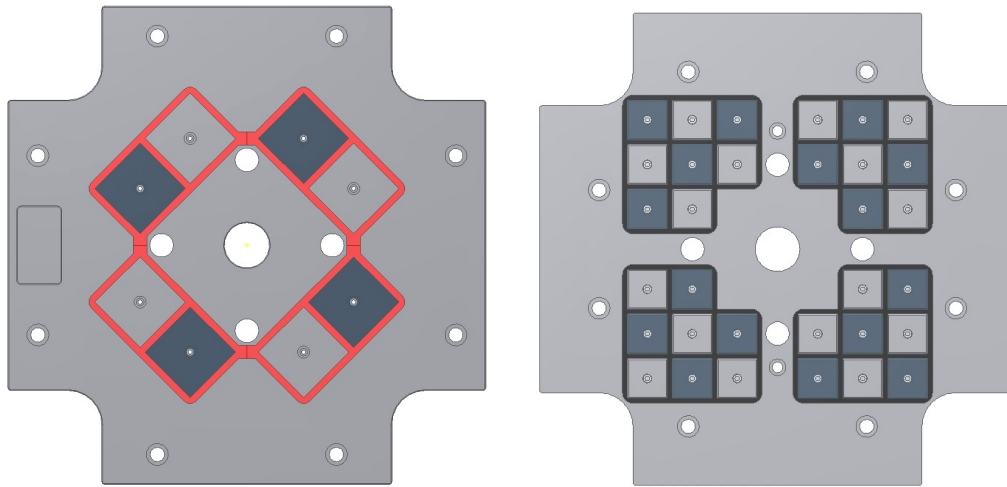


Fig.2: Magnetic clamping systems with square poles: Version with 80 mm poles compared with the EAS Pressmag System with 47 mm poles (right)
The dark squares visualize the north poles, the grey squares the south poles.
图 2: 方形磁极的磁力换模夹具: 80 mm 磁极的夹具与 EAS 47 mm 磁极的 Pressmag 夹具 (右图) 相比。 黑色方块为北极, 灰色方块为南极。

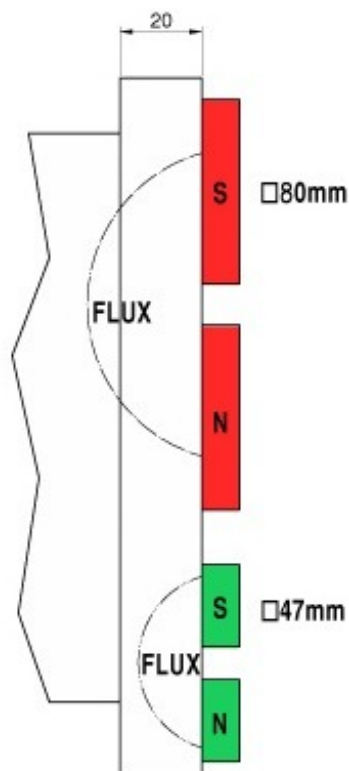
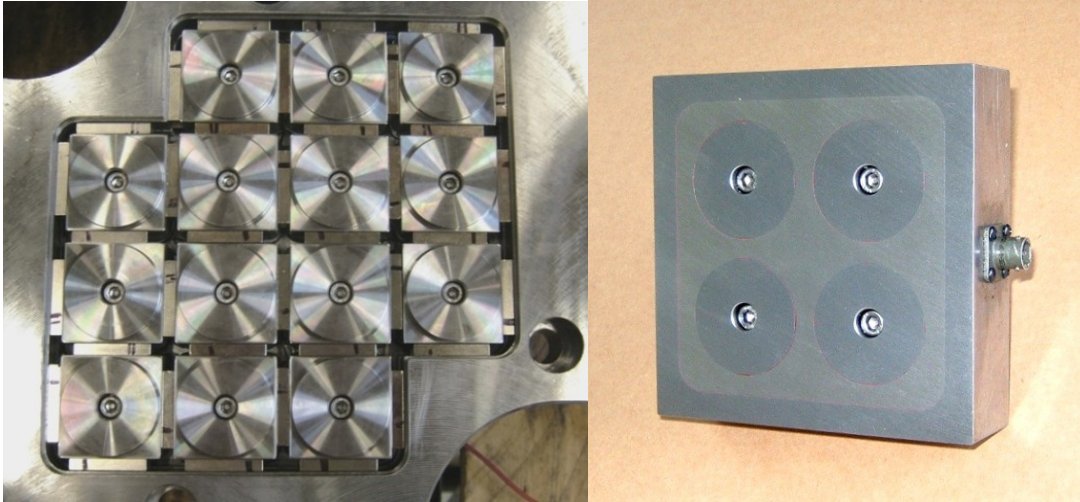


Fig. 3: The comparison of the “80 mm pole system” with the “47 mm pole system by EAS” shows the difference in the distribution of the magnetic flux. With the 47 mm poles the magnetic flux is distributed more evenly and concentrated within the back plate of the mould.

EAS magnetic clamping system with unlimited adhesion

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图 3: 80mm 磁极的夹具与 EAS 47mm 磁极的夹具相比较, 在磁通量分布上存在着差异。47mm 磁极的磁通量在模具背板内的分布更加均衡和集中。



Photos: EAS Europe B.V.

Fig. 4a+b: EAS Pressmag SP system for small/midrange machines: Detail view on the 47 mm square pole assembly (left photo) and in operating condition with round tops (right photo)

图 4a+b: EAS 的 Pressmag SP 夹具适用小/中型机器: 47mm 方形磁极的装配 (左图) 及实际操作时的圆头接触面 (右图) 详图。

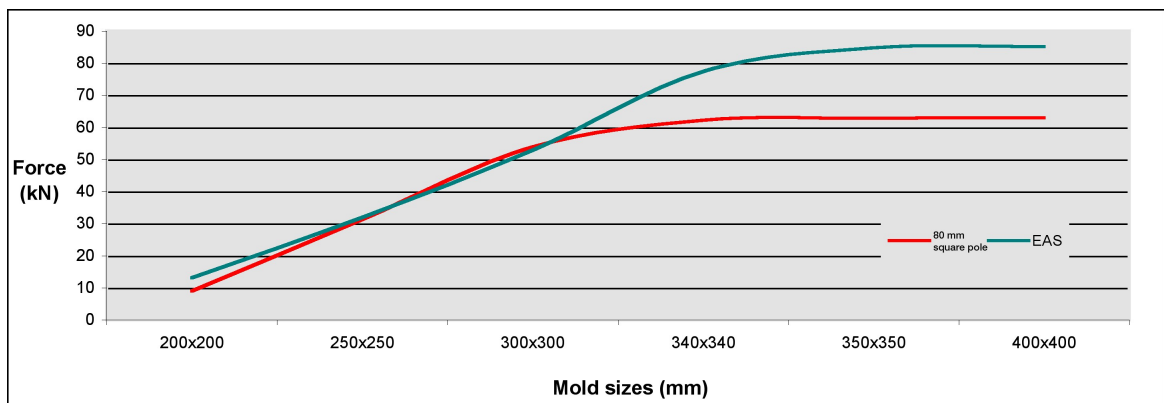


Fig.5: Comparison of holding forces: EAS Pressmag SP system (green graph) compared with 80 mm square pole system from a competitor

图 5: 夹持力比较: EAS 的 Pressmag SP 磁力夹具 (绿线) 与竞争对手的 80mm 方形磁极夹具的比较。

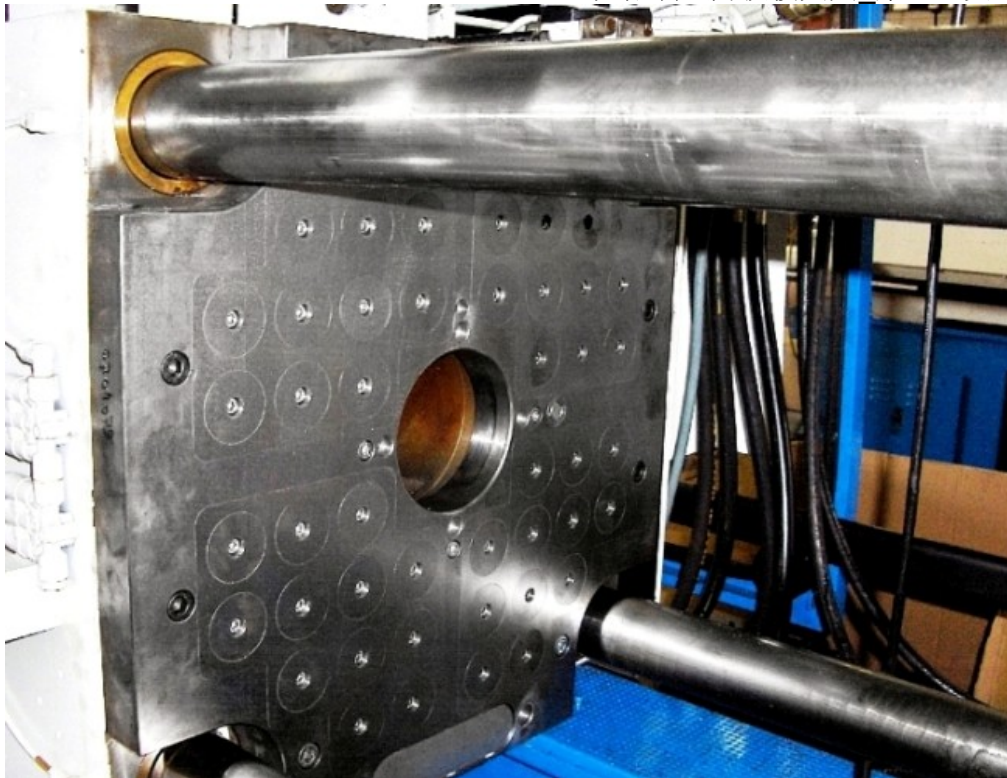


Photo: EAS Europe B.V.

Fig 6: EAS Pressmag SP magnetic clamping system on a 100 ton injection moulding machine

图 6: 100 吨注塑机上使用的 EAS Pressmag SP 磁力换模夹具。

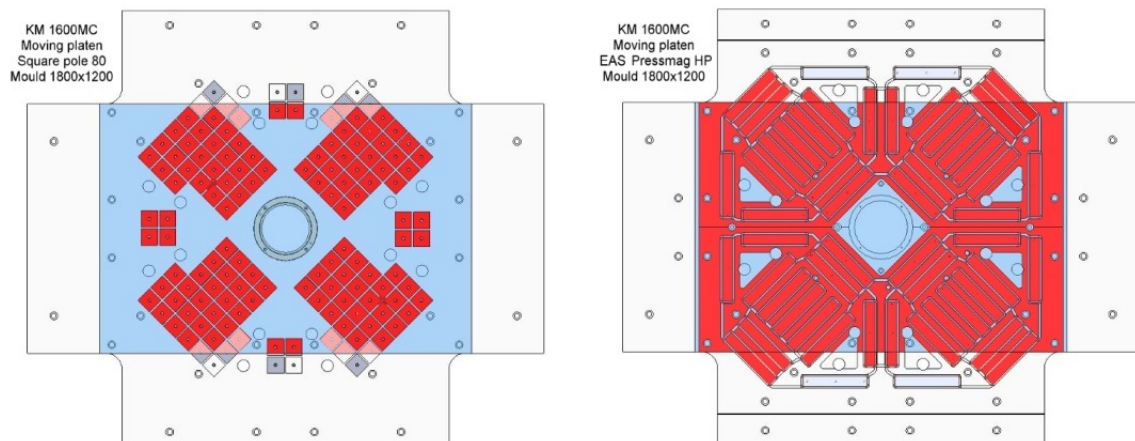


Fig. 7: Comparison of magnetic clamping systems for large machines: The 80 mm square pole system compared with the EAS Pressmag HP “Long Pole-System”

图 7: 大型机器用磁力换模夹具的比较: 80mm 方形磁极夹具与 EAS 的 Pressmag HP 长磁极换模夹具的比较。

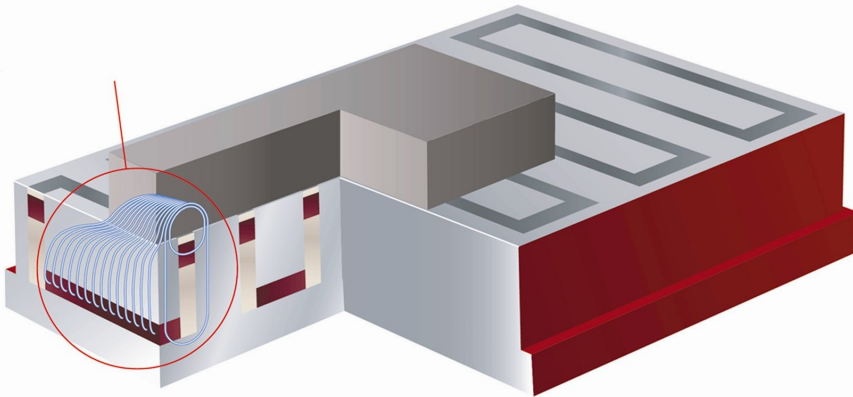


Fig. 8: The function of a “Long Pole System”: The Platen is the south pole, and the block-shaped inserts the north poles. The advantage of that system is that the full magnetic flux of the total pole is still working even when the pole is not fully covered. With the square pole system the magnetic flux is only active when both square poles are covered.

图 8: 长磁极换模夹具的功能: 基板为南极, 块状磁体为北极。这样的优点在于即便磁极未被完全覆盖, 整个磁极的全部磁通量仍然起作用。只有当一对方形磁极都被覆盖时, 方形磁极夹具的磁通量才会起作用。

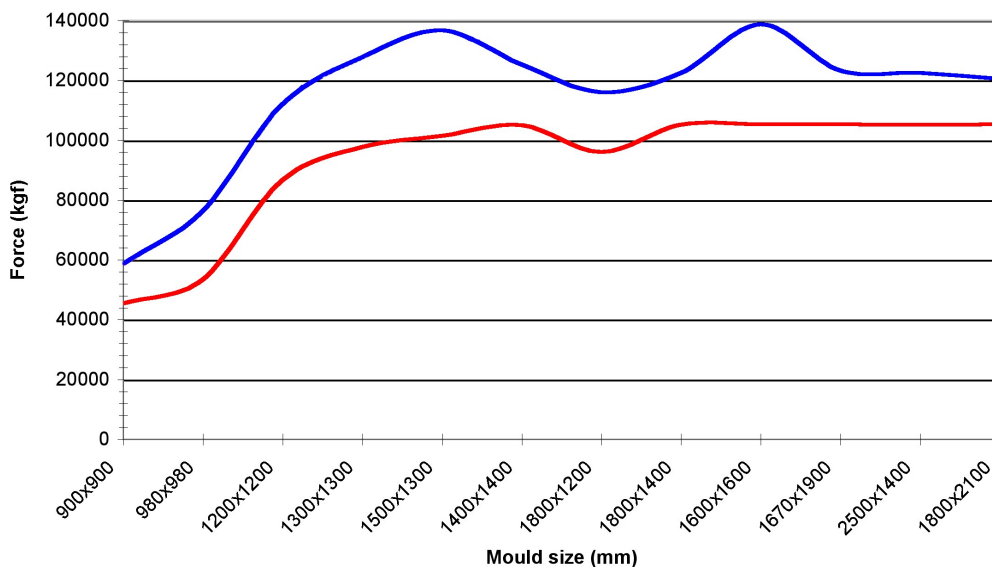


Fig. 9: Comparison of holding forces: EAS Pressmag HP “Long Pole System”

EAS magnetic clamping system with unlimited
adhesion

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(blue graph) compared with 80 mm square pole system from competitor

图 9: 夹持力的比较: EAS 的 Pressmag HP 长磁极夹具 (蓝线) 与竞争对手的 80mm 方形磁极夹具的比较。

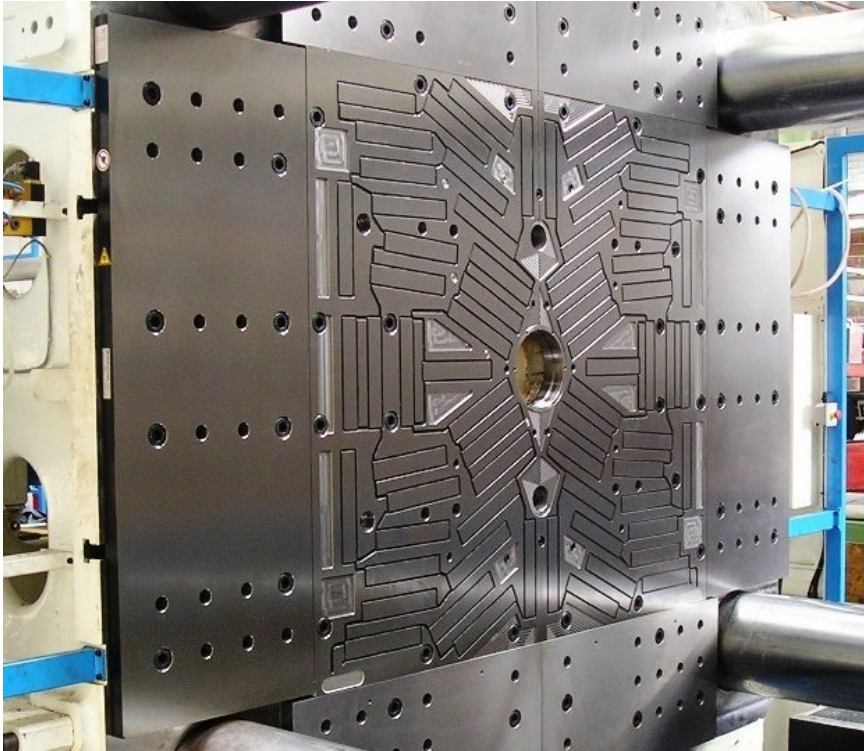


Photo: EAS Europe B.V.

Fig. 10: EAS Pressmag HP magnetic system in an injection moulding machine with 1.600 tons clamping force

图 10: 锁模力 1600 吨的注塑机上使用的 EAS Pressmag HP 磁力换模夹具。



Photo: EAS Europe B.V.

Fig. 11: EAS magnetic clamping system as part of a fully automatic mould change system (side entry of injection moulds) on an injection moulding machine with 3200 tons clamping force.

图 11: 锁模力 3200T 注塑机上用了全自动换模系统（水平换模），EAS 磁力夹具是其中的一部分。

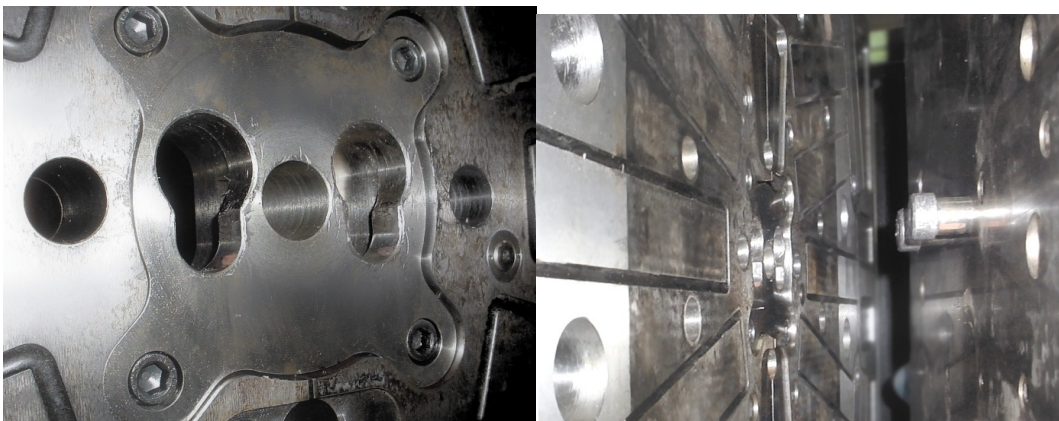


Fig. 12 a+b: Optional mechanical safety features for non automated mould change systems : Holding pins on the injection mould and bayonet locks in the magnetic clamping platen.

图 12a+b: 机械安全装置选配，用于非自动化换模系统：注塑模上的支撑销和磁板上的卡口。