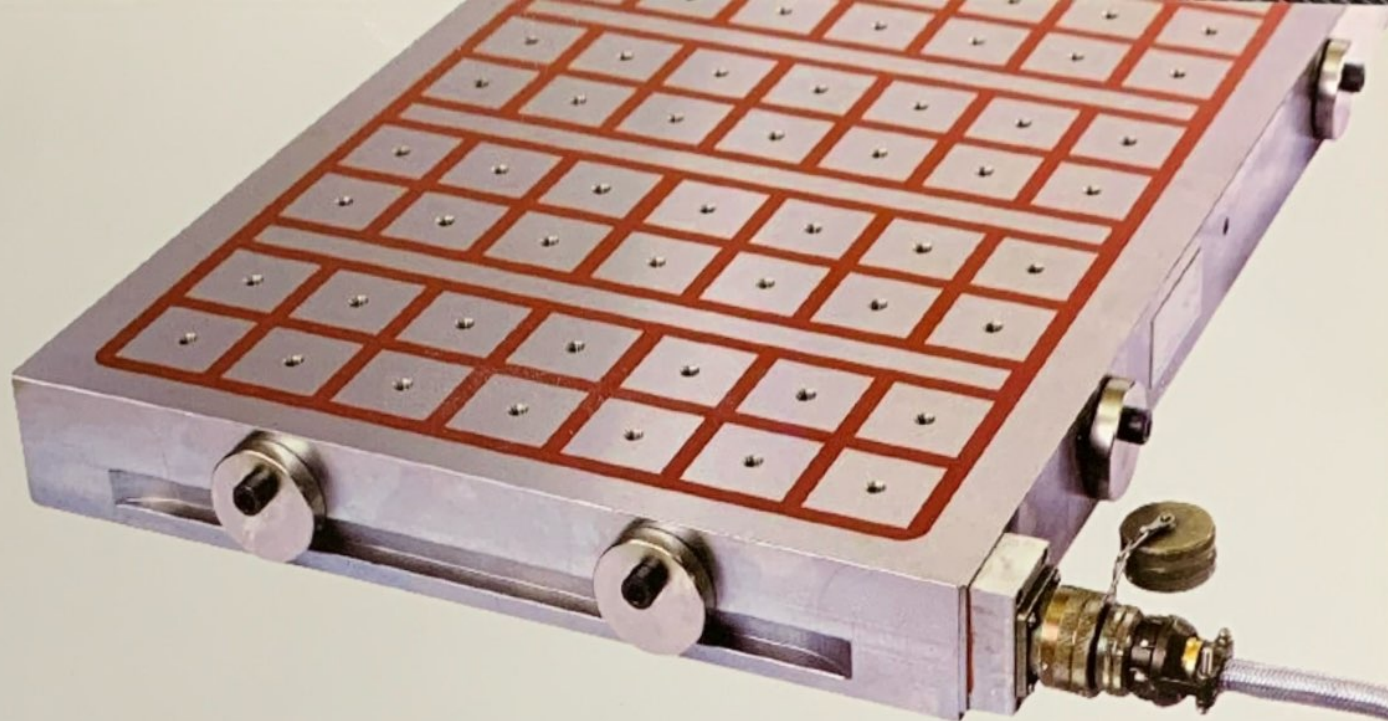




SUPER-CLAMP

• 强力 • 安全 • 高效 • 操作简单 • 环保节能

Electro-Permanent Magnetic Chuck

电控永磁吸盘



• 集成自动化 FMC/FMS

• 非标定制专用永磁吸盘



森达五金有限公司

Sam Tat Hardware Company Ltd

简介

SUPER-CLAMP 电永磁吸盘是最佳的磁夹持工具，它是利用电脉冲来开启和关闭。当工件在加工过程中由磁夹持时，它是非常安全可靠的。工件经磁性夹紧后，永磁吸盘始终保持磁性。MAG（上磁）和DEMAG（退磁）的时间只是几秒钟，电脉冲消耗较少的能量，因此磁吸盘不会热变形。

Brief

SUPER-CLAMP Electro-permanent magnetic chuck is the best magnetic clamping tool, which use electric pulse to open and close. It is very safe and reliable when workpiece is held by the magnetic chuck in machining process. After workpiece clamping by magnetism, the magnetic chuck holds the magnetism permanently. MAG and DEMAG time is just few seconds, electric pulse consume few energy, the magnetic chuck won't be thermally deformed.



电永磁吸盘

SUPER-CLAMP 电控永磁吸盘

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传统夹具的弊端

由于传统的夹紧系统的约束，即使是最先进的机床往往无法发挥极致。事实上使用虎钳和夹板，加工过程中工件总是被约束，因此需要进行多次装拆和定位才能完成所有加工，影响生产效率。此外，传统的机械夹紧方式经常产生结构应力，导致工件变形，最终难以达到公差要求。

Disadvantages of traditional clamping tools

Even the most sophisticated machine tools are frequently unable to realize their full potential due to restraints represented by traditional clamping systems.

In fact, the workpieces are never completely free to execute all the machining anticipated when operating with vices and clamps and it is therefore necessary to proceed with successive positioning to carry out the cycle completely, with all the inevitable drawbacks in terms of productivity. Moreover, the use of traditional mechanical systems frequently induce structural stresses, creating deformations that generate problems when processing and consequently achieving the required tolerances.

traditional clamping induces stresses on workpiece



传统夹具

自由加工，夹紧力均匀

工件被定位在磁性吸盘表面上，可作为一个机械基准面，也是一个夹紧区域。磁力均匀分布在整個接觸面，工件没有被压缩或变形。一次性的装夹，工件可完全自由地进行加工。由于没有障碍或限制，机器的能力可以得到最好的利用。无振动的情况下允许更高的切削余量，延长刀具寿命，更卓越的加工精度和表面质量。

equal & predicted clamping force over the entire surface



Free workpiece and uniform clamping

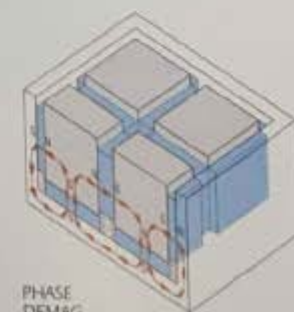
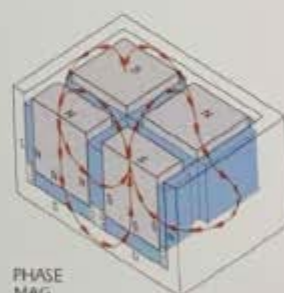
The use of a magnetic system enables the workpiece to be positioned on a magnetic surface that acts both as a mechanical reference and as a clamping area. The force is distributed uniformly over the entire contact surface without compressing or deforming the workpiece, which remains completely free for all the machining operations with a single set-up. Because there are no obstacles or constraints, the machine's capacities can be best exploited. The absence of vibration allows higher stock removal, longer-life for the tools, better finishing and superior accuracy.

The winning technology

Electro-permanent magnetic systems ensure great strength, totally safe, and long-term reliability, improving all the typical limitations of the obsolete electro-magnetic systems.

The invertible double magnetic system comprises a series of independent square poles in a chess board arrangement and alternating N/S, capable of generating a high concentrated force through a mesh of multiple magnetic seams that permit the magnetic flux to circulate in a horizontal and flat field. The clamping force generated enables the workpiece to be held irrespective of the direction of the cutting force, even in the case of limited thicknesses, thanks to the limited depth of field.

The "neutral crown" enables the magnetic flux to be directed completely over the active surface ensuring optimum efficiency and total insulation of the module. Electric power is only used for a few seconds in the MAG (activation) and DEMAG (de-activation) phases: during processing the workpiece is held exclusively by the force of the high-energy permanent magnets that surround each of the square generator poles on 5 faces. The system is insensitive to possible current failures and is therefore "intrinsically" safe. The absence of consumption enables energy to be saved and the clamping surface to be maintained in a "cold" condition with no deformations or expansions. The force of the magnets remains constant indefinitely.



决胜的技术

电永磁系统改善了老式磁夹紧系统的不安全，不稳定，过热和经常需要维修等缺陷。电永磁系统确保强大的吸力，绝对安全，和长期的可靠性。

双磁路转换系统包含一系列独立的，以棋盘方式布置的，能转换N/S的方形磁极，通过众多磁体缝隙网络，使得磁力线在水平平面区域内流动而产生高聚集力。

产生的夹紧力使工件固定，与切削方向无关，也不受工件厚度限制。

磁力线完全作用在活性表面，确保最佳效能并与其它模块完全绝缘。电能只是在充磁（MAG）和退磁（DEMAG）阶段被使用数秒：在加工过程中，工件由高能永久磁体产生的力量来固定。这一磁力环绕于每个方形刺激的五面。

由于这一系统不受电源故障的影响，因此，从根本上保证了工件装夹的安全性。由于工件加工时没有能耗，因此节省能源，装夹面保持“冷”状态，无变形和膨胀，磁力夹紧力保持永久恒定。

Features 特点

■ 强大吸附力，不附着铁屑

在高速铣削加工中，切削力并非集中在一个方向。因此吸盘需要强大和均匀的吸附力。磁极可产生780kg强大吸附力，且均匀分布在工件上，防止工件在加工过程中移动。

磁场穿透约10mm，工件表面不会导磁，不会磁化刀具及机床主轴，不影响排屑和加工的表面质量。

■ 安全可靠，无发热

SUPER-CLAMP电控永磁吸盘夹紧工件过程中不需要使用电力，不会因断电而失去夹紧力，避免了老式电磁吸盘因断电和电线损坏时磁力失效而出现工件脱落的危险。

夹紧工件过程中吸盘保持固定温度，无发热变形，不会影响加工精度。

■ 提高作业效率

电控永磁夹具对五面加工没有任何干涉，一次装夹完全实现五面加工。节省多次装夹时间，生产效能大大提高。另外，不需要为传统夹具留空间，工件尺寸可以等于或大于机床工作台面，充分利用机床的可用范围。

■ 简易操作

退磁OFF与上磁ON的转换过程只需要1-2秒，操作简单，无需要任何压板，螺栓等元件；退磁OFF彻底，夹具剩磁量小，易于工件卸除。

■ 环保节能

加工过程中夹紧系统不需电能，且吸力恒久保持，比老式的电磁吸盘节能95%。使用SUPER-CLAMP电控永磁吸盘既节能又环保。



电子控制单元

电永磁夹具系统可配置一系列先进的控制单元；以便供单个通道或多个通道使用；控制单元可快速完成充、退磁循环。根据不同磁力面只需要1-2秒；每个控制单元都装有饱和电流检测系统；控制箱电压可选220V或380V。

电子控制器特点：

- 控制器在待机或充退磁后电源与主回路隔断。
- 具备过流保护功能，磁盘电流过大时自动切断输出，面板解锁键报警指示灯长亮。
- 欠电流指示功能。
- 动作间隔时间调节功能。
- 集成化设计，性能稳定可靠。
- 充退磁动作均上升沿启动。
- PLC接口，实现远程控制。
- 充退磁电压强度，电流强度，充退磁时间设置。

Electronic control units

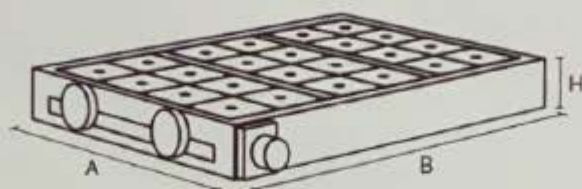
A series of modern electronic control units are available to single magnets or to banks of multiple magnets.

The control units allow extremely fast activation (MAG) and deactivation (DEMAC) cycles to be achieved, equal to 1-2 sec., based on the size of the magnetic area. The commands are given using digital push-button integrated in the units or by using a digital remote control unit connected by wire (TC) that is available on request.

Saturation current (UCS) detection, the multi-channel units are complete with a machine safety connector and PLC interface.



Electro-Permanent Magnetic Chuck 电控永磁吸盘



FC50密集型

Model No. 型号	Dimensions AxB (mm)	Number of Poles 磁极数	Weight 重量KG
FC50-203	240x340	12	42
FC50-205	240x490	18	60
FC50-206	240x640	24	78
FC50-208	240x790	30	97
FC50-209	240x940	36	115
FC50-210	240x1090	42	133
FC50-303	300x340	16	52
FC50-305	300x490	24	75
FC50-306	300x640	32	98
FC50-308	300x790	40	121
FC50-309	300x940	48	144
FC50-310	300x1090	56	166
FC50-403	420x340	24	73
FC50-405	420x490	36	105
FC50-406	420x640	48	137
FC50-408	420x790	60	169
FC50-409	420x940	72	201
FC50-410	420x1090	84	233
FC50-503	480x340	28	83
FC50-505	480x490	42	120
FC50-506	480x640	56	156
FC50-508	480x790	70	193
FC50-509	480x940	84	230
FC50-510	480x1090	98	266
FC50-603	600x340	36	104
FC50-605	600x490	54	150
FC50-606	600x640	72	196
FC50-608	600x790	90	241
FC50-609	600x940	108	287
FC50-610	600x1090	126	333

Technical characteristics

Model	Force Pole (kgf)	A (mm)	B (mm)	H (mm)
FC50	350	240-600	340-1090	69
FC70	780	240-600	400-1000	70 (B<1000)
				80 (B≥1000)

FC70强力型

Model No. 型号	Dimensions AxB (mm)	Number of Poles 磁极数	Weight 重量KG
FC70-204	240x400	8	55
FC70-206	240x600	12	80
FC70-208	240x800	16	100
FC70-210	240x1000	20	125
FC70-304	300x400	12	75
FC70-306	300x600	18	100
FC70-308	300x800	24	130
FC70-310	300x1000	30	160
FC70-404	400x400	16	84
FC70-406	400x600	24	127
FC70-408	400x800	32	170
FC70-410	400x1000	40	244
FC70-502	500x200	10	65
FC70-504	500x400	20	110
FC70-506	500x600	30	159
FC70-508	500x800	40	213
FC70-510	500x1000	54	290
FC70-602	600x200	12	75
FC70-604	600x400	24	130
FC70-606	600x600	36	185
FC70-608	600x800	48	246
FC70-610	600x1000	66	354



固定垫块

浮动磁垫是一种创新和独特的技术解决方案，应用在不规则或弯曲表面的夹紧。

受惠于强大的磁路，即使使用较高的磁垫，磁路也能对工件产生强大的吸附力。浮动磁垫可调节适应工件的装夹表面，夹紧力稳定不会导致工件变形。标准的方案是使用三个固定磁垫和适量的浮动磁垫，紧固于磁极上，以使形成于工件最好的接触面。一旦充磁夹紧，磁垫将全部支撑于工件底部，强劲的磁流使磁垫涨紧，与工件形成一个坚如磐石的整体。

自动调整磁垫的上半部可在斜面上移动，两部分彼此咬合安装，避免夹紧过程中轴向或径向移动。

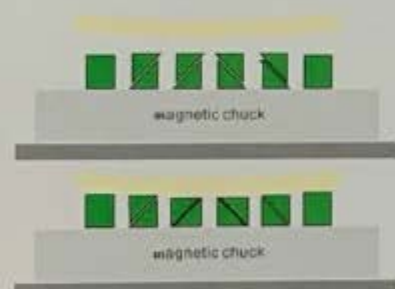
Fixed pole extensions

The mobile pole extensions are an innovative and unique technical solution, originating from the need to clamp workpieces with irregular or warped surfaces.

Using the power of Super-Clamp circuit, which can generate a high force concentration even with pole extensions of considerable height, a flexible magnetic bed has been developed capable of adjusting itself to the workpiece to be clamped and to lock it firmly with no deformation.

The standard solution foresees the use of 3 fixed extensions plus a suitable number of moving ones, bolted to the generator poles, in order to achieve the best contact surface with the workpiece. Once locked they provide full support to the workpiece and the high potential magnetic flux circulation stiffens the extensions/piece contact making it monolithic.

The self-adjusting pole extensions operate with the upper part moving on a slant surface and being them mounted opposite one another this will prevent any axial or radial movement during the clamping phase.



SUPER-CLAMP 电控永磁吸盘

注意事项

磁通密度

工件中通过的磁通量是决定吸附力的条件，为实现最佳的夹持状态，工件中通过的磁通量应尽可能地多。

一般夹紧时，只要正确放置在永磁吸盘的N极和S极上，即可通过最多的磁通量。

clamping force vs magnetic flux density



Single covering
1 north pole, 1 south pole



Double covering
2 north poles, 2 south poles



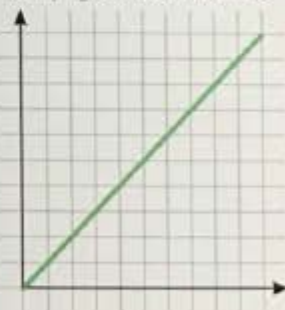
Triple covering
3 north poles, 3 south poles

吸附面积

若吸附面积加倍，工件中通过的磁通量和保持力也将会加倍。

另外，连续的吸合面越大，吸附力也越强。

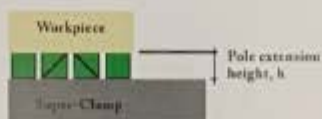
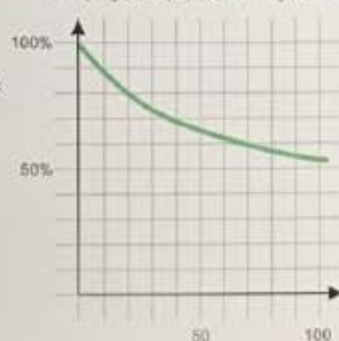
clamping force vs contact area



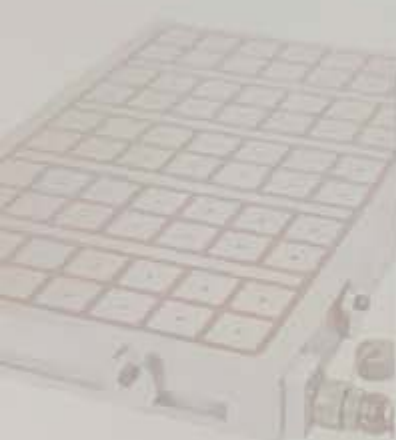
垫块高度

垫高块越高，工件中通过的磁通量越少，请参考曲线图表的衰减率。

clamping force (%) vs pole height (mm)



SUPER-CLAMP 电控永磁吸盘

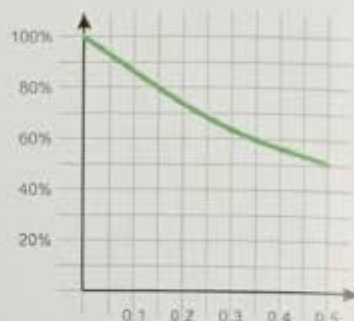


接触面状态

单位面积的吸附力随工件接触面的状态而变化，请参考适当的值计算吸附力。



clamping force (%) VS air gap(mm)



最小尺寸

工件中的磁通从电极吸盘一个极的中心向另一个极的中心以半圆状流动。若工件厚度低于半圆，磁通就会超过工件，无法充分利用夹紧力。

另外，为了最大限度利用吸附力，工件尺寸最好是覆盖四个磁极以上。

参考工件最少尺寸：

FC 50: 120x120x20mm以上

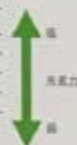
FC 70: 180x180x30mm以上

工件材质

请根据加工工件的材质确认衰减率。

Clamping force deceleration against Materials

Deceleration Rate	Materials
100%	S5400, S**C
85%	SK3, SUJ
80%	FC***, FCD***, SU3430
78%	SKH51, SKD11
0%	黄铜、铝、SUS200, SUS300系列、铁



夹紧力计算

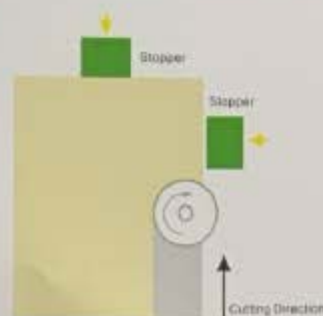
$$\text{Clamping force, N} = \text{Contact area, mm}^2 \times \text{Distance deceleration, \%} \times \text{Material coefficient, \%} \times \text{Air gap coefficient} \times \text{Safety coefficient}$$

夹紧力, N 接触面积 距离衰减率, % 材料系数, % 空气系数 安全系数

切削力的方向

切削力的方向平行于吸附面的时候，所需的吸附力为切削力的3~10倍。（摩擦系数0.1~0.3）

所需的夹持力不足时，可在切削力方向设置工件挡块，以降低所需的吸附力。



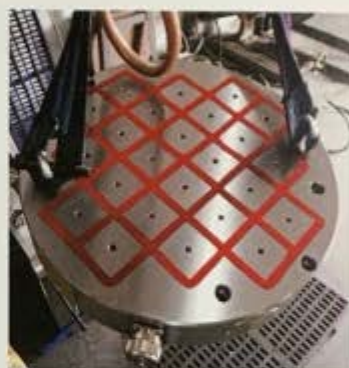
SUPER-CLAMP 电控永磁吸盘

非标定制

根据不同应用及机床的需求，特殊尺寸及规格可以按要求和来图定制 SUPER-CLAMP 电永磁吸盘。详情请与我们的技术人员联系。



① 鞋模具定制磁盘



② 大型五轴机定制磁盘



③ 冲压机床定制磁盘



④ 冲压机床定制磁盘



⑤ 数控激光打标机定制磁盘



⑥ 非标尺寸定制磁盘