



**核 心 价 值 观** 知行合一，为客户满意而奋斗

Core Value: Unity of knowledge and action, striving for customer satisfaction.

**企 业 愿 景** 成为高端机电行业核心组件最佳供应商

Our Vision: Become the best supplier of core components in high-end electromechanical sector.

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## 自粘结一体成型技术，打造电机超级铁芯

SELF-BONDING INTEGRATED FORMING: MAKING SUPER-EFFICIENT MOTOR CORES

## 让电机更高效·更冷静

MAKING MOTORS COOLER AND MORE EFFICIENT.

中国·深圳  
SHENZHEN, CHINA

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## 公司简介 | Company Profile

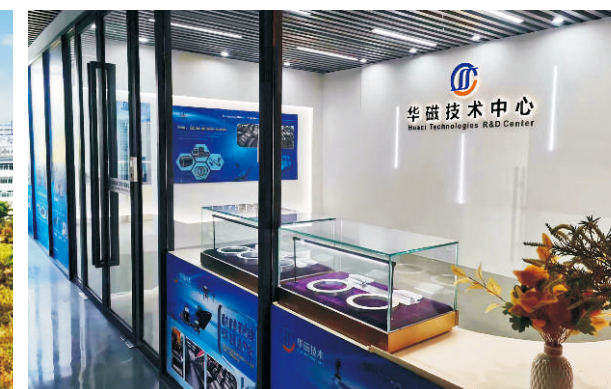
华磁技术（深圳）有限公司专业从事各类软磁材料及自粘结精密铁芯制造，为高性能电机、高速电机、特种电机提供先进解决方案。

自研的自粘结全表面贴合一体成型技术，成功解决了批量生产自粘结电机铁芯的行业难题，满足新能源车，航空航天，医疗及低空飞行器，人形机器人等新兴行业的产品性能要求。

公司坚持高端软磁材料在先进制造、新能源及其应用领域的创新发展方向，从市场反馈中持续进行技术升级，追求极致的产品性能和服务。公司全员恪守“知行合一，为客户满意而奋斗”的核心价值观，持续为客户创造价值。

Huaci Technologies (Shenzhen) Co., Ltd. was founded in 2020, with key members having over 10 years of experience in the application of soft magnetic materials. Huaci specializes in the manufacturing of various soft magnetic materials and self-bonding motor cores, offering advanced solutions for high-performance motors, high-speed motors, and special purpose motors.

Our independently developed self-bonding integrated forming production line, has overcome industry challenges in mass production. To date, we have provided core solutions to over 200 companies domestically and internationally, covering various application fields such as humanoid robots, aerospace, eVTOL air mobility, maglev air compressors, hydrogen fuel air compressors, medical devices and more.



## 企业资质 | Enterprise Qualification



高新企业 National High-tech Enterprise

品质体系 Quality Management Systems Certification



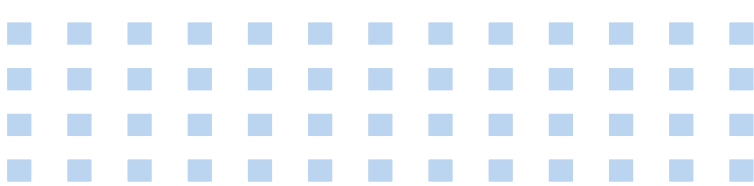
ISO9001:2015



IATF 16949:2016



专利证书 Patents

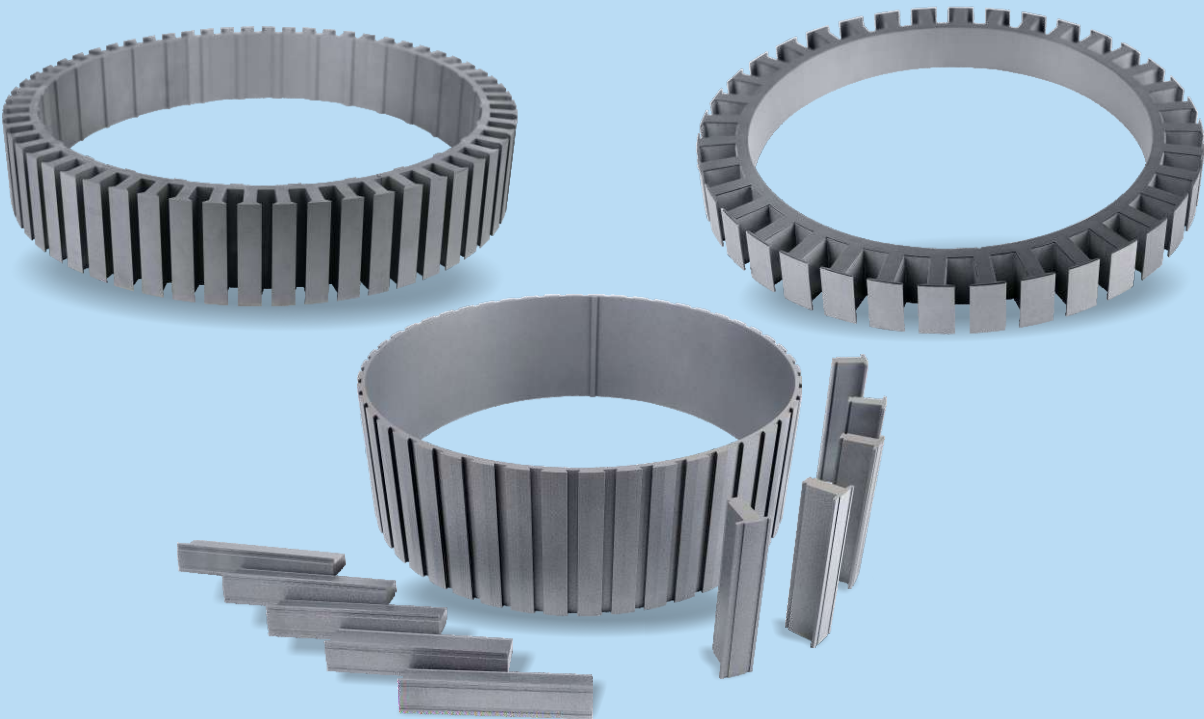


eVTOL Air Mobility

eVTOL低空飞行器 |

华磁自粘结铁芯因其损耗小、效率高、噪音低，设计灵活性高等优势，能满足低空飞行器电机小型化、高频化的趋势。

Our self-bonded motor cores, with advantages like low loss, high efficiency, low noise, and high design flexibility, meet the trends of miniaturization and high-frequency operation in air mobility motors.



产品优势

Key Benefits

- 高扭矩密度、高效率、低损耗、低噪音、高可靠性、高设计灵活性
- High torque density, High efficiency, Low loss, Low noise, High reliability, High design flexibility



主要参数

Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 励磁电流 Excitation current | 降低 (Reduce by) 10%–15%        |
| 噪音 Noise                | 降低 (Reduce by) 3–6dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.96               |
| 涂层厚度 Coating thickness  | 2–2.5 μm                      |

| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.02mm  |
| 垂直度 Perpendicularity     | 0.04mm  |
| 平面度 Flatness             | 0.02mm  |
| 圆跳动 Circular runout      | 0.02mm  |

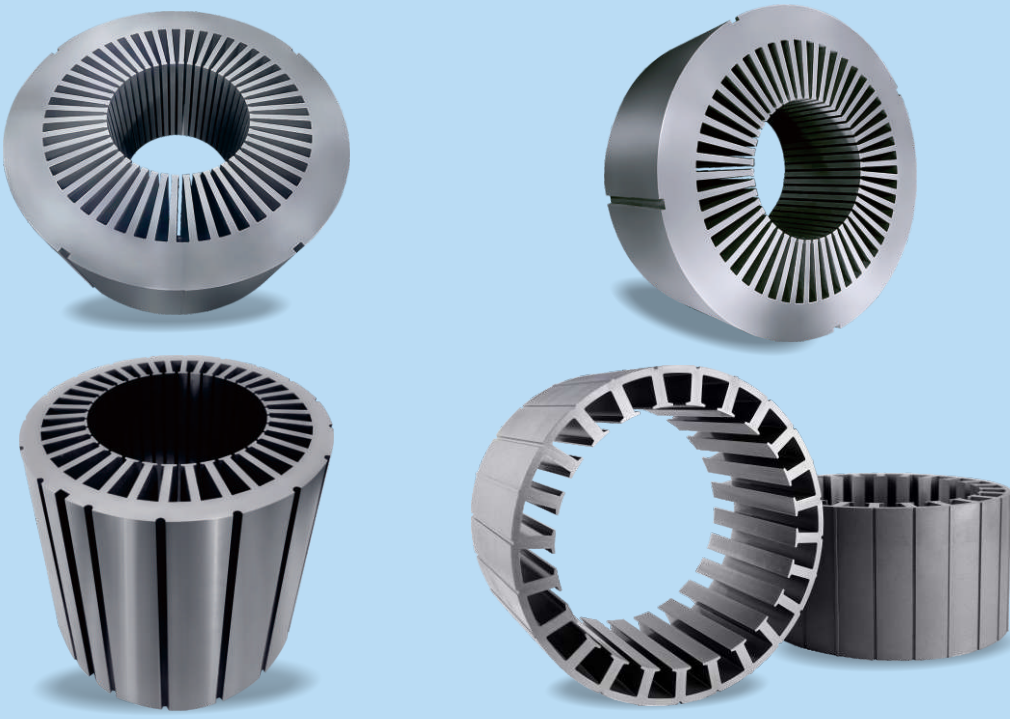


Aerospace

航空航天领域 |

华磁自粘结电机铁芯能满足航空领域严苛的技术要求，包括高可靠性、高结构强度、高效率、高环境适应性等。

Our self-bonded motor cores meet the stringent technical requirements of the aerospace industry, with high reliability, structural strength, efficiency, and environmental adaptability.



产品优势

Key Benefits

- 高效率、高精密、低噪音、低损耗、高结构强度、高可靠性
- High efficiency, High precision, Low noise, Low loss, High structural strength, High structural strength, High reliability

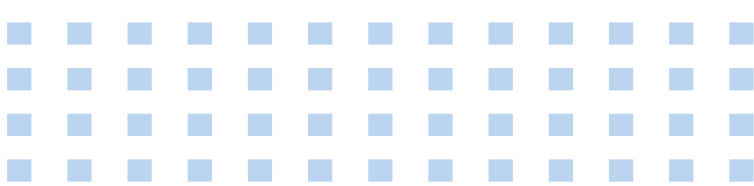


主要参数

Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 励磁电流 Excitation current | 降低 (Reduce by) 8%–12%         |
| 噪音 Noise                | 降低 (Reduce by) 3–6dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.95               |
| 涂层厚度 Coating thickness  | 2–2.5 μm                      |

| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.02mm  |
| 垂直度 Perpendicularity     | 0.06mm  |
| 平面度 Flatness             | 0.02mm  |
| 圆跳动 Circular runout      | 0.01mm  |

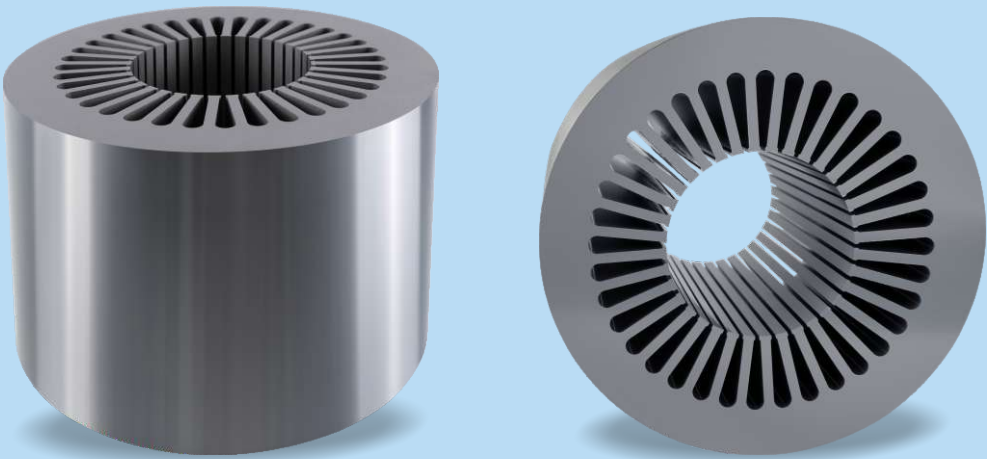


Maglev High-Speed Motors

磁悬浮高速电机 |

华磁自粘结电机铁芯显著减少了损耗和温升，提升转子刚性，提高了电机的运行效率和能源利用率。噪音低，提供了更为安静的运行环境。

Our self-bonded motor cores significantly reduce losses and temperature rise, enhance rotor rigidity, and improve motor efficiency and energy utilization. The low noise provides a quieter operating environment.



产品优势

Key Benefits

- 高效率、高可靠性、高功率密度、低损耗、低温升
- High efficiency, High reliability, High power density, Low loss, Low temperature rise



主要参数

Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 损耗 Core loss            | 小于 (Below) 12w/kg             |
| 励磁电流 Excitation current | 降低 (Reduce by) 8%–12%         |
| 噪音 Noise                | 降低 (Reduce by) 5–8dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.96               |
| 涂层厚度 Coating thickness  | 2–2.5 μ m                     |

| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.02mm  |
| 垂直度 Perpendicularity     | 0.05mm  |
| 平面度 Flatness             | 0.03mm  |
| 圆跳动 Circular runout      | 0.02mm  |

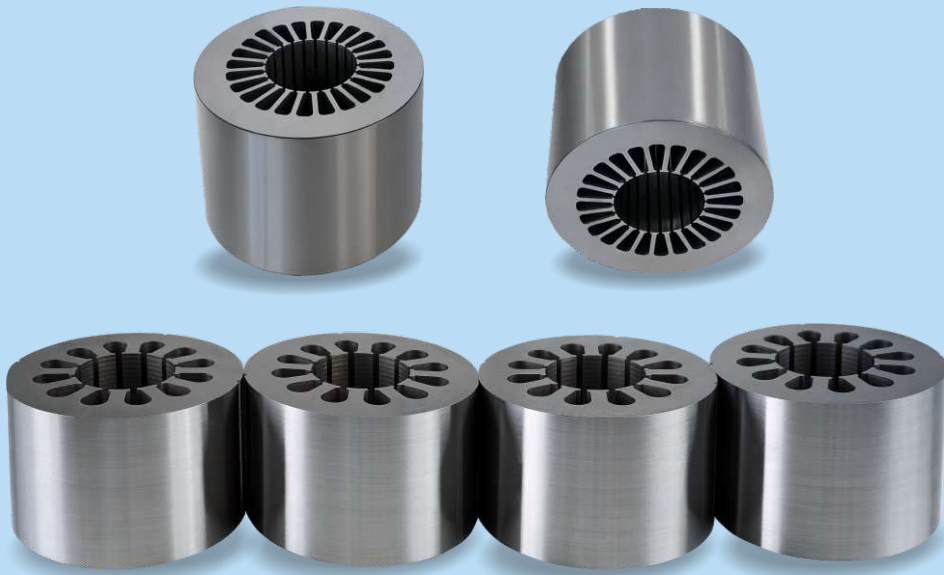


Hydrogen Fuel Cell Air Compressors

氢燃料电池空压机 |

华磁自粘结铁芯有效提高电机的效率和功率密度，同时减少能量损耗。铁芯性能直接影响到整个燃料电池系统的效率和稳定性。

Our self-bonded motor cores improve motor efficiency and power density while minimizing energy loss. The core's performance directly impacts the overall efficiency and stability of the fuel cell system.



产品优势

Key Benefits

- 高效率、低损耗、高稳定性、低噪音
- High efficiency, Low loss, High stability, Low noise

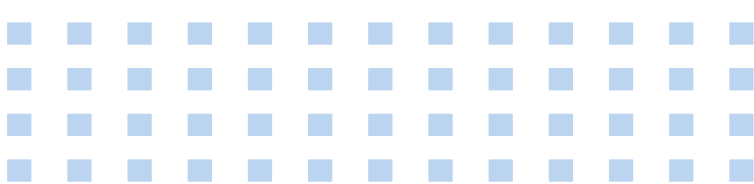


主要参数

Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 励磁电流 Excitation current | 降低 (Reduce by) 8%–12%         |
| 噪音 Noise                | 降低 (Reduce by) 3–6dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.95               |
| 涂层厚度 Coating thickness  | 1.5–2.0 μ m                   |

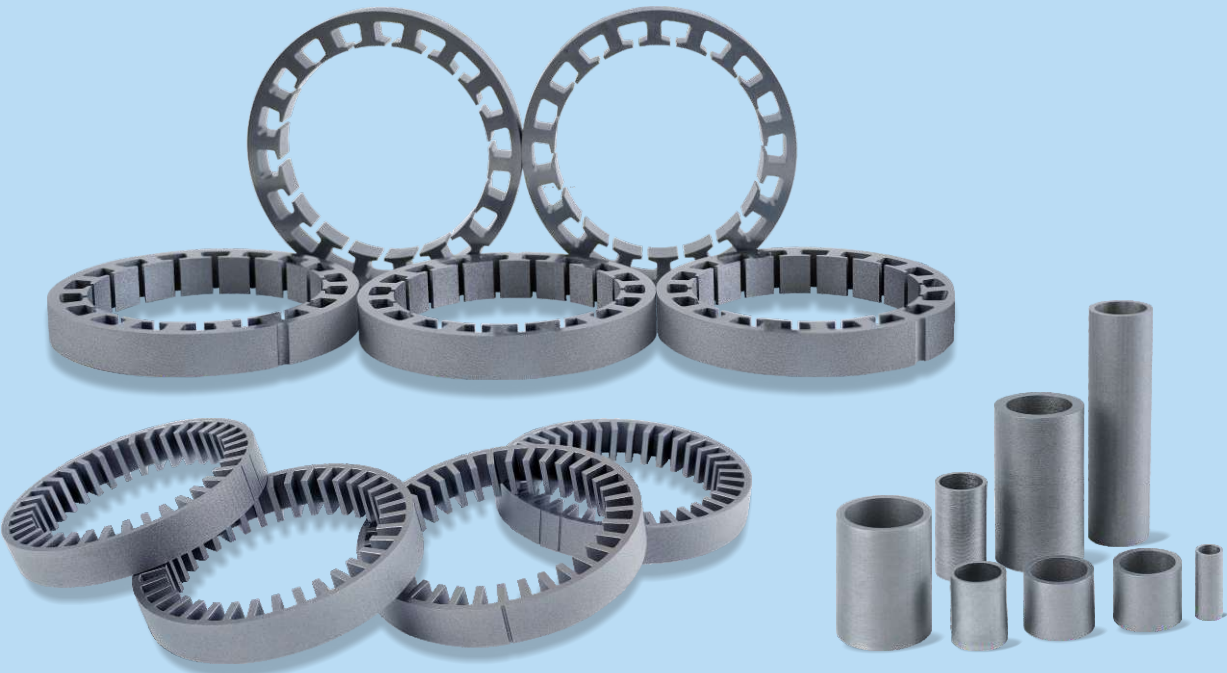
| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.02mm  |
| 垂直度 Perpendicularity     | 0.05mm  |
| 平面度 Flatness             | 0.03mm  |
| 圆跳动 Circular runout      | 0.02mm  |



Robot Motors  
机器人电机 |

华磁自粘结铁芯技术在机器人领域中提供了高效、稳定、静音和空间优化的电机解决方案，对于推动机器人技术的发展具有重要意义。

We use self-bonding technology which provides efficient, stable, quiet, and space-optimized motor solutions for robots. This technology plays a crucial role in advancing robotic technology.



产品优势  
Key Benefits

- 高结构强度、高效率、高可靠性、低损耗、低噪音、高设计灵活性
- High efficiency, High reliability, Low loss, Low noise, High design flexibility



主要参数  
Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 励磁电流 Excitation current | 降低 (Reduce by) 8%–12%         |
| 噪音 Noise                | 降低 (Reduce by) 3–6dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.96               |
| 涂层厚度 Coating thickness  | 2–2.5 μ m                     |

| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.02mm  |
| 垂直度 Perpendicularity     | 0.06mm  |
| 平面度 Flatness             | 0.02mm  |
| 圆跳动 Circular runout      | 0.02mm  |



Coreless Motors  
空心杯电机 |

华磁空心杯电机铁芯的优势在于其高效率、快速响应、高能量密度、低噪音和低振动、高可靠性、低齿槽效应、良好的散热性能、高峰值扭矩以及减少电磁干扰等方面。

Our iron core for coreless motor offer advantages such as high efficiency, rapid response, high energy density, low noise, low vibration, high reliability, low cogging torque, excellent heat dissipation, high peak torque, and reduced electromagnetic interference.



产品优势  
Key Benefits

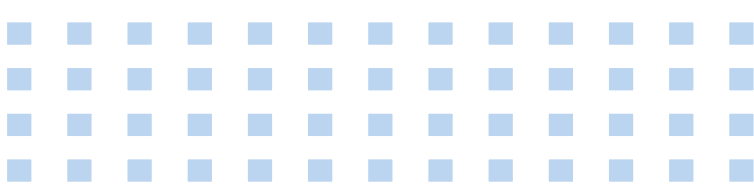
- 低损耗、高效率、高精密、高可靠性
- Low loss, High efficiency, High precision, High reliability



主要参数  
Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 励磁电流 Excitation current | 降低 (Reduce by) 8%–12%         |
| 噪音 Noise                | 降低 (Reduce by) 3–6dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.96               |
| 涂层厚度 Coating thickness  | 2–2.5 μ m                     |

| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.01mm  |
| 垂直度 Perpendicularity     | 0.02mm  |
| 平面度 Flatness             | 0.02mm  |
| 圆跳动 Circular runout      | 0.01mm  |



Special Purpose Motors

特种电机 |

华磁特种电机铁芯具备高温耐受性、高精度、高效率、低噪音、高可靠性等优势。能满足特种电机铁芯特定的性能要求。

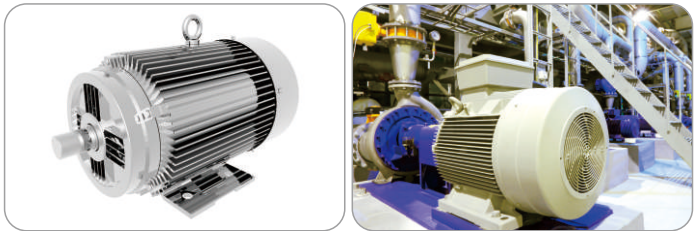
Our self-bonded motor cores exhibit high-temperature resistance, high precision, high efficiency, low noise, and high reliability, meeting the specific performance demands of special purpose motors.



产品优势

Key Benefits

- 高精度、高效率、低噪音、高可靠性
- High precision, High efficiency, Low noise, High reliability



主要参数

Key Properties

| 性能 Properties           | 数据 Data                       |
|-------------------------|-------------------------------|
| 粘接力强度 Bonding strength  | 大于 (Above) 2N/mm <sup>2</sup> |
| 励磁电流 Excitation current | 降低 (Reduce by) 10%–15%        |
| 噪音 Noise                | 降低 (Reduce by) 5–8dB          |
| 叠片系数 Stacking factor    | 大于 (Above) 0.94               |
| 涂层厚度 Coating thickness  | 2–2.5 μm                      |

| 形位公差 Geometric tolerance | 数据 Data |
|--------------------------|---------|
| 同心度 Concentricity        | 0.04mm  |
| 垂直度 Perpendicularity     | 0.06mm  |
| 平面度 Flatness             | 0.03mm  |
| 圆跳动 Circular runout      | 0.04mm  |



Key Equipments

核心设备 |

极薄材料—超精密涂覆 Ultra-Thin Materials–High Precision Coating

专业定制化精密涂覆设备，可涂厚度为0.05mm、0.1mm、0.15mm 极薄硅钢带，实现涂层厚度自动化控制。在提高生产效率、保证涂层质量方面具有显著优势。

Equipped with specialized coating machinery, it's capable of coating ultra-thin silicon steel strips with thicknesses of 0.05mm, 0.1mm, and 0.15mm. It ensures automated control of coating thickness, it has significant advantages in enhancing production efficiency and ensuring coating quality.

- 涂材料厚度：0.05mm、0.1mm、0.15mm、0.2mm
- 涂层厚度：1.5–2 μm、2–2.5 μm
- 表面绝缘：> 1000 Ω · cm<sup>2</sup>/lam
- 材料宽度：250mm、310mm、285mm、450mm
- Material Thickness: 0.05mm, 0.1mm, 0.15mm, 0.2mm
- Coating Thickness: 1.5–2 μm, 2–2.5 μm
- Surface Insulation Resistance: > 1000 Ω · cm<sup>2</sup>/lam
- Material Width: 250mm, 310mm, 285mm, 450mm



特种软磁合金退火炉 Vacuum Annealing Furnace

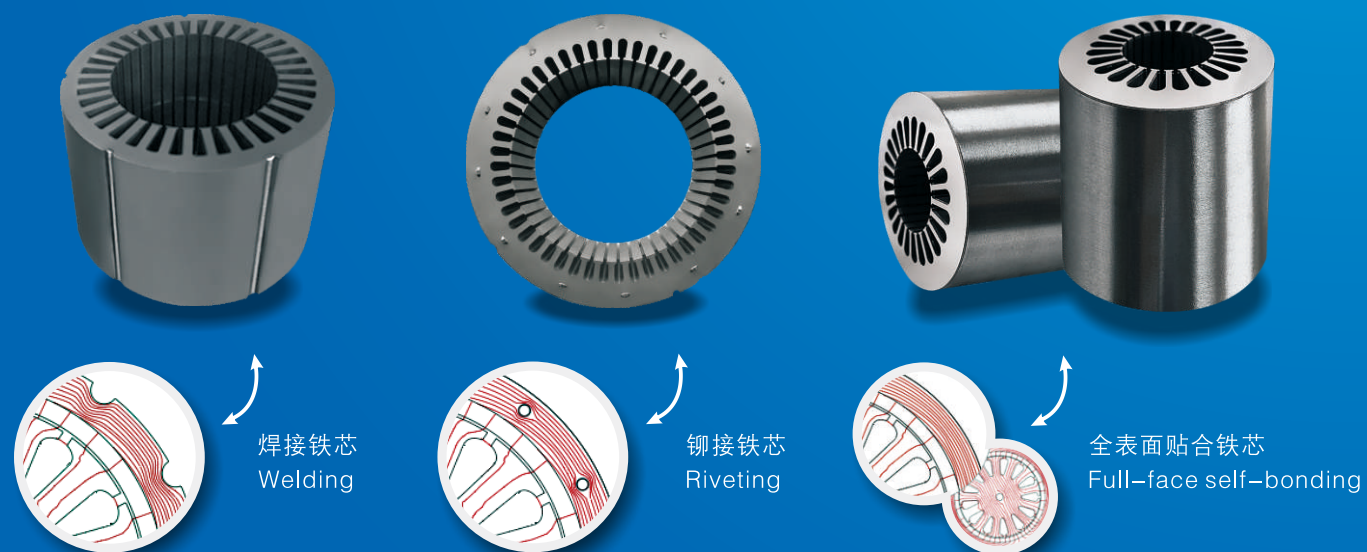
采用专业退火设备，在真空环境下对材料进行加热和保温，可以有效改善其磁性能和机械性能。该工艺对于制造高性能的电机至关重要。通过精确控制退火过程，可以获得具有优异性能的特种软磁合金材料，满足现代工业对高性能软磁材料的需求。

Using specialized annealing equipment, materials are heated and held under vacuum conditions to effectively improve their magnetic and mechanical properties. This process is critical for producing high-performance motors. By precisely controlling the annealing process, superior soft magnetic alloy materials with exceptional properties can be achieved, meeting modern industrial demands for high-performance soft magnetic materials.



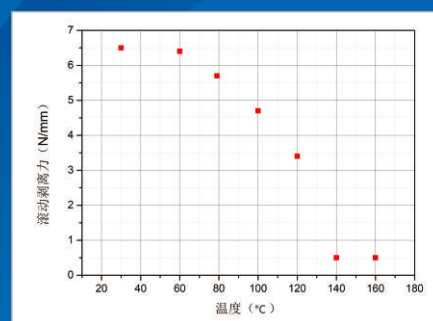
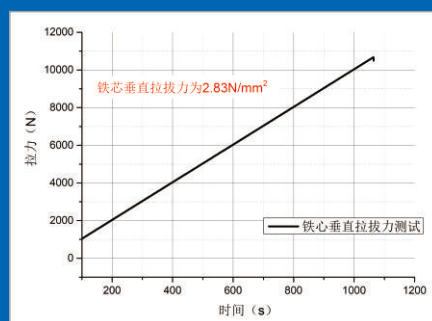
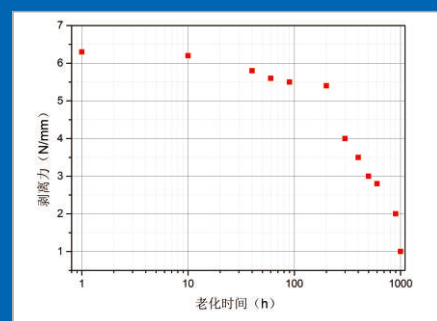
# Self-bonding · Integrated Forming Technology

## 自粘 · 一体成型技术 |



传统铁芯制程工艺采用的铆接、焊接方式，会劣化硅钢材料性能，部分对磁路还有破坏性影响，导致材料性能无法得到充分发挥。区别于传统铁芯制程工艺，我们采用的自粘结全表面贴合技术制造的铁芯，硅钢片面与面间没有任何空隙，完全贴合粘结成一个整体，且不会对磁路产生任何干扰。这种工艺制成的铁芯在整体结构强度，热平衡管理以及噪音控制等方面都远优于传统工艺制造的铁芯。

Conventional core lamination stacking methods, such as riveting and welding, can degrade the performance of silicon steel and even disrupt the magnetic circuit, preventing the material from reaching its full potential. In contrast, we use self-bonding full-surface lamination technology, which ensures that silicon steel laminations are completely gap-free and seamlessly bonded into a single unified structure, with no interference to the magnetic circuit. This innovative approach delivers cores with significantly better structural strength, thermal management, and noise reduction compared to those produced using conventional methods.



# Core Technologies

## 核心技术 |

自粘结全表面贴合技术铁芯，应用于不同场景的高速、高效电机，在热平衡管理、铁芯结构强度、耐温、噪音、抗震、自由设计等方面具有不可替代的优势。

Self-bonding technology in motor cores significantly improves efficiency, making them particularly suitable for high-speed, high-efficiency motors in diverse applications. It has irreplaceable advantages in thermal balance management, core structural strength, high-temperature resistance, noise reduction, vibration resistance, and design flexibility.



## Specialized Testing Equipment 专用检测设备 |

### 三坐标测量仪 Coordinate Measuring Machine

配备高精密三坐标测量仪，可以对产品的尺寸、形状和形位公差进行精密检测，进一步提升了产品的测量精度，为产品提供了更可靠的质量保障。

Equipped with a high-precision coordinate measuring machine, it allows precise inspection of product dimensions, shapes, and geometric tolerances. It further enhances measurement accuracy, providing more reliable quality assurance for products.



### 磁性能检测 Magnetic Performance Testing

专用磁性能检测设备，对磁性能进行全面分析，有利于促进品质及生产效率的提高。可在45Hz...10kHz的宽频范围内测量晶粒取向型或无取向型电工钢、电机铁芯的交流磁性能，支持电流法（M.C法）与磁场线圈法（H-Coil法）（选件）测量磁场强度。具有操作便捷、测量快速、重复性好、可靠性高等特点。

Specialized magnetic performance testing equipment enables comprehensive analysis of magnetic properties, promoting improved quality and production efficiency. It measures the AC magnetic properties of grain-oriented or non-oriented electrical steel and motor cores across a wide frequency range of 45Hz to 10kHz. It supports both the Current Method (M.C Method) and Magnetic Field Coil Method (H-Coil Method, optional) for magnetic field strength measurement. This equipment features easy operation, rapid measurement, excellent repeatability, and high reliability.



二次元坐标仪  
2D Coordinate  
Measuring Machine



高度计  
Height Gauge



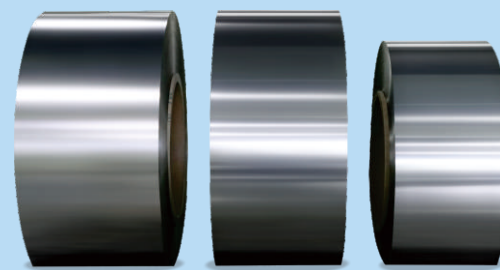
偏摆仪  
Runout Tester

## Ultra-thin Silicon Steel 极薄硅钢 |

### 材料介绍 Material Introduction

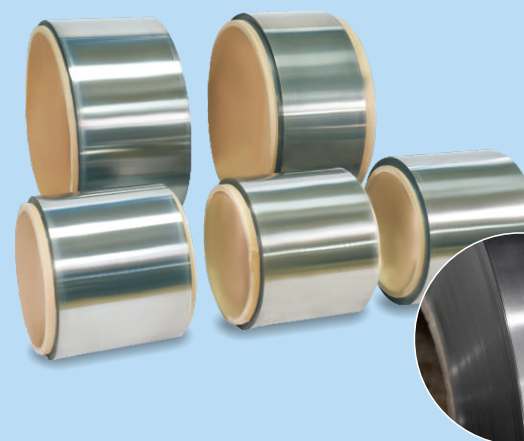
采用二十辊森吉米尔轧机，进行多道次轧制。结合薄硅钢晶体再结晶特殊要求，进行高温退火和板型矫正。对材料涂层进行定制化生产，最大程度发挥极薄硅钢磁性能，并满足高速电机、飞轮储能、阳极饱和电抗器等领域的特殊要求，进行定制化生产。

We use 20-high Sendzimir rolling mill, for multiple-pass rolling. Considering the specific requirements for recrystallization of thin silicon steel, we apply high-temperature annealing and flatness correction to customized production for material coatings, maximizing the magnetic performance of ultra-thin silicon steel. The process is tailored to meet the specialized requirements of applications such as high-speed motors, flywheel energy storage, and anode-saturated reactors.

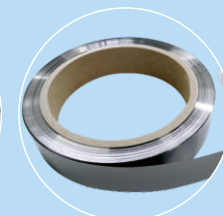
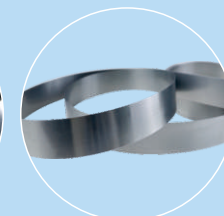
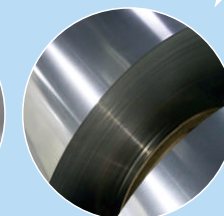
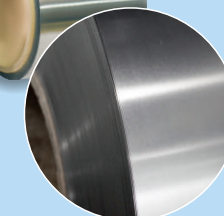


- HWA系列：自粘结无取向硅钢材料
- H 系 列：极薄可退火取向硅钢
- HWA Series: Self-bonding non-oriented silicon steel
- H Series: Ultra-thin annealable oriented silicon steel

## Self-bonding Non Grain Oriented Electrical Steel 自粘结无取向硅钢材料 |



材料厚度：0.05mm-0.2mm Material Thickness: 0.05mm-0.2mm  
材料宽度：350mm Material Width: 350mm  
单卷重量：300kg-500kg Coil Weight: 300kg-500kg



Material Properties

硅钢材料性能

1.硅钢材料机械性能 Mechanical Properties

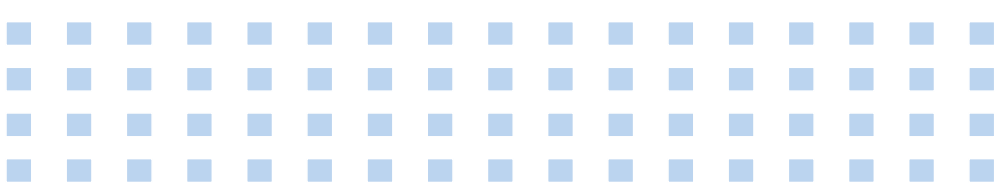
| 型号 Type                                      | 10HWA900 | 15HWA1050 | 20HWA1200 | H-100 |
|----------------------------------------------|----------|-----------|-----------|-------|
| 厚度 Thickness(mm)                             | 0.1      | 0.15      | 0.2       | 0.1   |
| 叠片系数 Stacking Factor(%)                      | 0.95     | 0.96      | 0.97      | 0.95  |
| 层间绝缘电阻 Interlaminar Insulation Resistance(Ω) | > 30     | > 30      | > 30      | > 30  |
| 硬度 Hardness(HV)                              | 205      | 212       | 230       | 203   |
| 密度 Density(g/cm³)                            | 7.6      | 7.6       | 7.6       | 7.6   |
| 抗拉强度 Tensile Strength(N/mm²)                 | 550      | 565       | 586       | 450   |
| 屈服强度 Yield Strength(N/mm²)                   | 480      | 475       | 465       | 420   |
| 延伸率 Elongation(%)                            | 5.14     | 7.24      | 10.6      | 6.5   |

2.硅钢材料尺寸公差 Dimensional Tolerances

| 型号 Type   | 厚度标准<br>Thickness Standard |                     | 横向厚度公差<br>Cross-Sectional Thickness Tolerance(mm) | 宽度标准<br>Width Standard |                     | 收卷内径<br>Inner Diameter (mm) |
|-----------|----------------------------|---------------------|---------------------------------------------------|------------------------|---------------------|-----------------------------|
|           | 厚度<br>Thickness(mm)        | 公差<br>Tolerance(mm) |                                                   | 宽度<br>Width(mm)        | 公差<br>Tolerance(mm) |                             |
| 10HWA900  | 0.1                        | ± 0.008             | 0.01                                              | 350                    | ± 1                 | 300                         |
| 15HWA1050 | 0.15                       | ± 0.01              | 0.015                                             | 350                    | ± 1                 | 300                         |
| 20HWA1200 | 0.2                        | ± 0.01              | 0.02                                              | 350                    | ± 1                 | 300                         |
| H-100     | 0.1                        | ± 0.008             | 0.01                                              | 260                    | ± 1                 | 300                         |

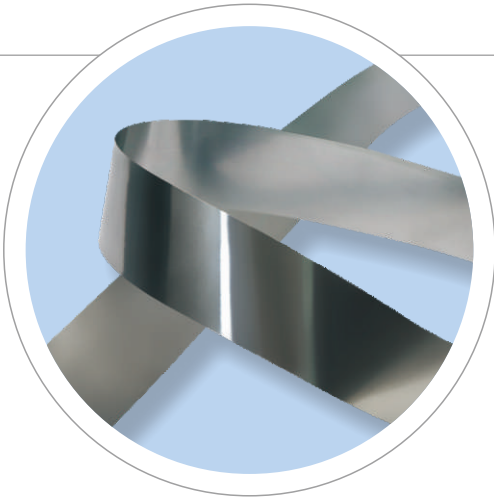
3.材料典型铁损指标 Iron Loss

| 型号 Type   | 铁损 Iron Loss |           |            |           |           |            |
|-----------|--------------|-----------|------------|-----------|-----------|------------|
|           | P(15/400)    | P(10/400) | P(10/1000) | P(5/2000) | P(2/5000) | P(1/10000) |
| 10HWA900  | 23.02        | 8.91      | 30.35      | 22.21     | 15.43     | 12.65      |
| 15HWA1050 | 25.74        | 10.39     | 35.58      | 28.53     | 21.29     | 17.44      |
| 20HWA1200 | 26.77        | 11.21     | 40.71      | 32.86     | 24.92     | 20.79      |
| H-100     | 12.2         | 7.02      | 21.31      | 18.13     | 15.22     | 10.10      |



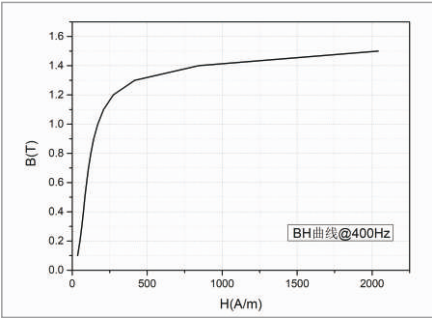
Self-bonding Non Grain Oriented Electrical Steel

10HWA900 自粘结无取向硅钢

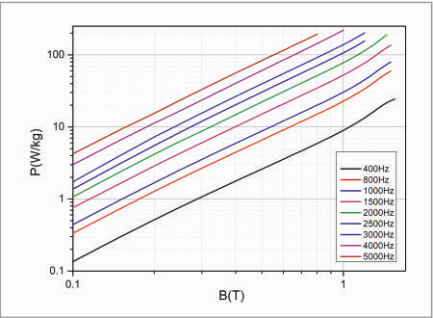


10HWA900 磁性能数据 Magnetic Performance

| 磁感<br>Magnetic Flux Density(T) | 铁损 Iron Loss (W/kg) |       |        |        |        |        |        |        |
|--------------------------------|---------------------|-------|--------|--------|--------|--------|--------|--------|
|                                | 400Hz               | 800Hz | 1000Hz | 1500Hz | 2000Hz | 2500Hz | 3000Hz | 4000Hz |
| 0.1 T                          | 0.14                | 0.33  | 0.44   | 0.76   | 1.07   | 1.37   | 1.73   | 3.01   |
| 0.2 T                          | 0.52                | 1.27  | 1.68   | 2.87   | 4.18   | 5.51   | 7.24   | 11.31  |
| 0.3 T                          | 1.07                | 2.68  | 3.55   | 6.03   | 8.74   | 11.97  | 15.60  | 23.67  |
| 0.4 T                          | 1.77                | 4.46  | 5.93   | 10.13  | 14.83  | 20.33  | 26.50  | 40.32  |
| 0.5 T                          | 2.60                | 6.59  | 8.79   | 15.06  | 22.21  | 30.43  | 39.62  | 60.65  |
| 0.6 T                          | 3.57                | 9.06  | 12.09  | 20.78  | 30.81  | 42.19  | 54.84  | 84.58  |
| 0.7 T                          | 4.65                | 11.86 | 15.85  | 27.31  | 40.56  | 55.54  | 72.24  | 112.12 |
| 0.8 T                          | 5.90                | 15.07 | 20.11  | 34.46  | 51.55  | 70.61  | 91.68  | 143.51 |
| 0.9 T                          | 7.29                | 18.56 | 24.80  | 42.80  | 63.82  | 87.47  | 113.82 | 179.07 |
| 1.0 T                          | 8.95                | 22.73 | 30.35  | 52.30  | 77.81  | 106.52 | 138.63 | 219.44 |
| 1.1 T                          | 10.92               | 27.68 | 36.90  | 63.36  | 94.08  | 128.83 | 167.43 | ---    |
| 1.2 T                          | 13.37               | 33.77 | 44.96  | 76.91  | 114.04 | 155.55 | 202.38 | ---    |
| 1.3 T                          | 16.48               | 41.60 | 55.33  | 94.40  | 139.82 | ---    | ---    | ---    |
| 1.4 T                          | 20.05               | 50.93 | 67.81  | 115.58 | 172.34 | ---    | ---    | ---    |
| 1.5 T                          | 23.09               | 59.67 | 79.39  | 136.08 | ---    | ---    | ---    | ---    |
| 1.55 T                         | 24.33               | ---   | ---    | ---    | ---    | ---    | ---    | ---    |



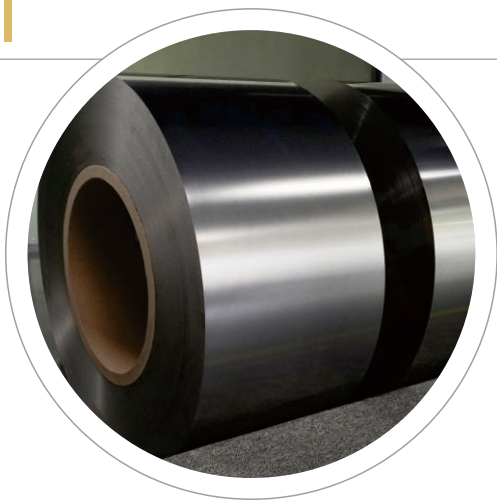
磁化曲线 Magnetization Curve



损耗曲线 Core Loss Curve

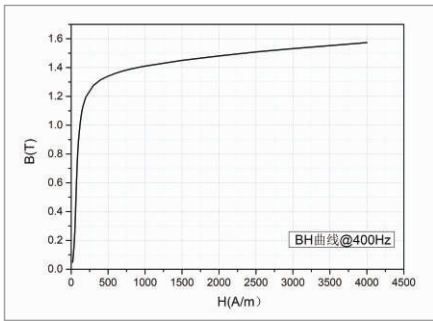
# Self-bonding Non Grain Oriented Electrical Steel

## 15HWA1050 自粘结无取向硅钢

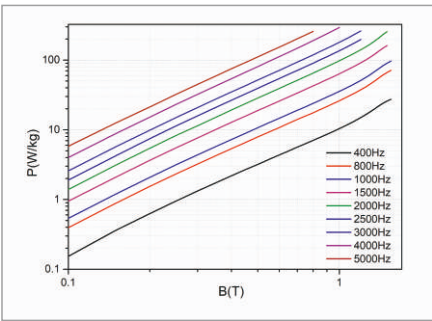


15HWA1050 磁性能数据 Magnetic Performance

| 磁感<br>Magnetic Flux<br>Density(T) | 铁损 Iron Loss (W/kg) |       |        |        |        |        |        |        |
|-----------------------------------|---------------------|-------|--------|--------|--------|--------|--------|--------|
|                                   | 400Hz               | 800Hz | 1000Hz | 1500Hz | 2000Hz | 2500Hz | 3000Hz | 4000Hz |
| 0.1 T                             | 0.15                | 0.39  | 0.54   | 0.94   | 1.39   | 1.90   | 2.57   | 3.99   |
| 0.2 T                             | 0.63                | 1.54  | 2.08   | 3.65   | 5.45   | 7.47   | 9.88   | 15.20  |
| 0.3 T                             | 1.33                | 3.23  | 4.37   | 7.66   | 11.44  | 15.88  | 20.89  | 32.17  |
| 0.4 T                             | 2.19                | 5.37  | 7.26   | 12.78  | 19.21  | 26.59  | 34.93  | 54.11  |
| 0.5 T                             | 3.19                | 7.89  | 10.69  | 18.85  | 28.54  | 39.38  | 51.65  | 80.50  |
| 0.6 T                             | 4.35                | 10.77 | 14.63  | 25.83  | 39.18  | 54.24  | 71.13  | 111.83 |
| 0.7 T                             | 5.64                | 14.05 | 19.09  | 33.63  | 51.30  | 71.14  | 93.39  | 148.09 |
| 0.8 T                             | 7.06                | 17.53 | 23.88  | 42.51  | 65.00  | 90.20  | 118.69 | 189.80 |
| 0.9 T                             | 8.60                | 21.57 | 29.40  | 52.40  | 80.25  | 111.56 | 147.23 | 237.77 |
| 1.0 T                             | 10.39               | 26.10 | 35.59  | 63.47  | 97.45  | 135.92 | 179.81 | 292.96 |
| 1.1 T                             | 12.46               | 31.27 | 42.64  | 76.15  | 117.25 | 163.83 | 217.19 | ---    |
| 1.2 T                             | 14.95               | 37.46 | 51.03  | 91.09  | 140.36 | 196.57 | 261.24 | ---    |
| 1.3 T                             | 18.10               | 45.30 | 61.67  | 109.87 | 169.26 | ---    | ---    | ---    |
| 1.4 T                             | 22.06               | 55.47 | 75.54  | 134.50 | 208.35 | ---    | ---    | ---    |
| 1.5 T                             | 25.75               | 66.05 | 90.15  | 161.30 | 255.44 | ---    | ---    | ---    |
| 1.55 T                            | 27.37               | 71.18 | 96.83  | ---    | ---    | ---    | ---    | ---    |



磁化曲线 Magnetization Curve

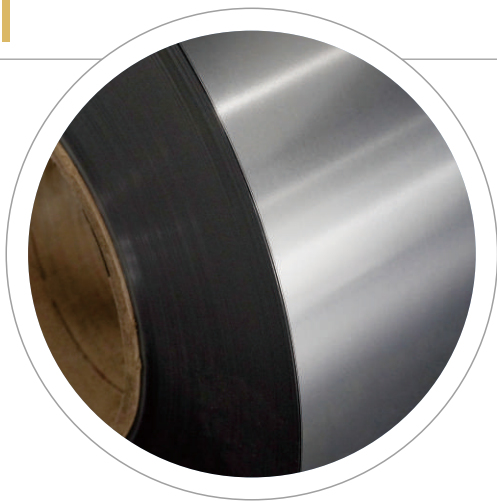


损耗曲线 Core Loss Curve



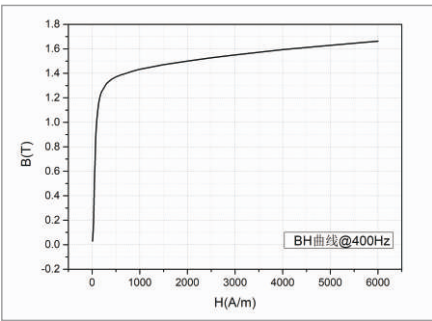
# Self-bonding Non Grain Oriented Electrical Steel

## 20HWA1200 自粘结无取向硅钢

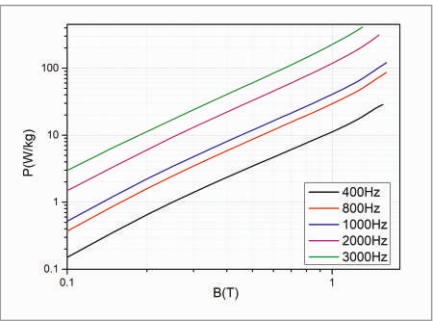


20HWA1200 磁性能数据 Magnetic Performance

| 磁感<br>Magnetic Flux<br>Density(T) | 铁损 Iron Loss (W/kg) |       |       |       |        |        |        |
|-----------------------------------|---------------------|-------|-------|-------|--------|--------|--------|
|                                   | 50Hz                | 200Hz | 400Hz | 800Hz | 1000Hz | 2000Hz | 3000Hz |
| 0.10                              | 0.01                | 0.06  | 0.15  | 0.37  | 0.52   | 1.48   | 2.97   |
| 0.20                              | 0.06                | 0.27  | 0.65  | 1.59  | 2.22   | 6.02   | 11.33  |
| 0.30                              | 0.12                | 0.59  | 1.40  | 3.46  | 4.78   | 13.08  | 24.00  |
| 0.40                              | 0.20                | 0.98  | 2.34  | 5.84  | 8.03   | 22.07  | 40.47  |
| 0.50                              | 0.29                | 1.44  | 3.44  | 8.68  | 11.90  | 32.86  | 60.39  |
| 0.60                              | 0.39                | 1.95  | 4.69  | 11.95 | 16.37  | 45.46  | 84.11  |
| 0.70                              | 0.50                | 2.51  | 6.10  | 15.65 | 21.35  | 60.06  | 111.82 |
| 0.80                              | 0.63                | 3.14  | 7.65  | 19.66 | 27.07  | 76.76  | 144.09 |
| 0.90                              | 0.76                | 3.83  | 9.38  | 24.26 | 33.48  | 95.88  | 181.64 |
| 1.00                              | 0.91                | 4.59  | 11.21 | 29.42 | 40.71  | 117.88 | 225.24 |
| 1.10                              | 1.08                | 5.46  | 13.36 | 35.23 | 48.90  | 143.30 | 276.29 |
| 1.20                              | 1.28                | 6.48  | 15.85 | 41.97 | 58.37  | 172.98 | 336.44 |
| 1.30                              | 1.53                | 7.71  | 18.89 | 50.11 | 69.82  | 208.57 | 408.69 |
| 1.40                              | 1.83                | 9.28  | 22.73 | 60.66 | 84.51  | 253.98 | ---    |
| 1.50                              | 2.12                | 10.86 | 26.77 | 72.98 | 102.01 | 312.21 | ---    |
| 1.60                              | 2.32                | ---   | ---   | 85.96 | 120.09 | ---    | ---    |
| 1.70                              | 2.44                | ---   | ---   | ---   | ---    | ---    | ---    |



磁化曲线 Magnetization Curve

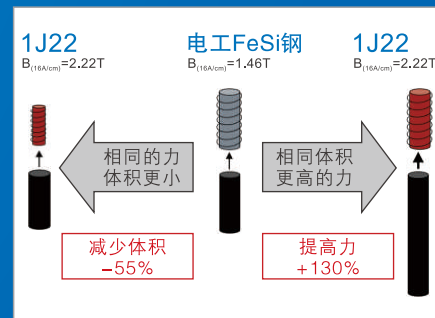
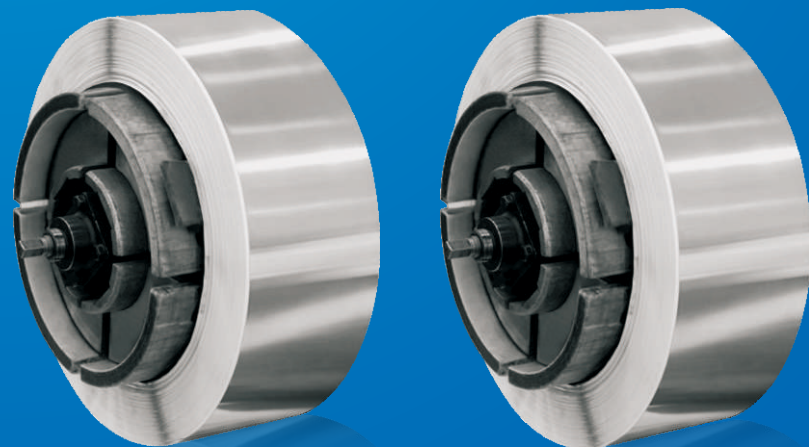


损耗曲线 Core Loss Curve

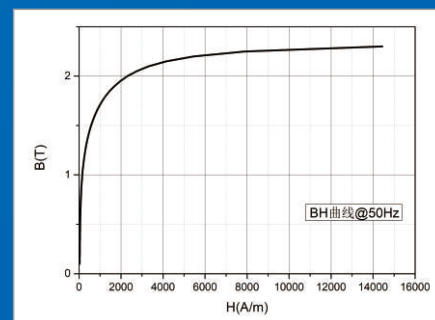
# Soft Magnetic Alloy

## 软磁合金材料

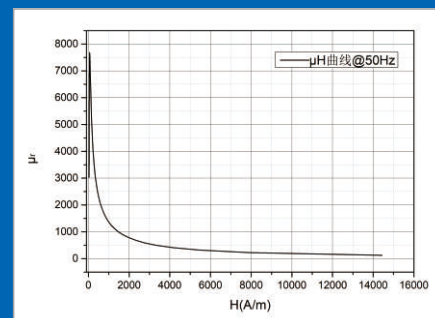
材料种类：1J22 / 1J27 / 1J50 / 1J85  
Material Types: 1J22 / 1J27 / 1J50 / 1J85



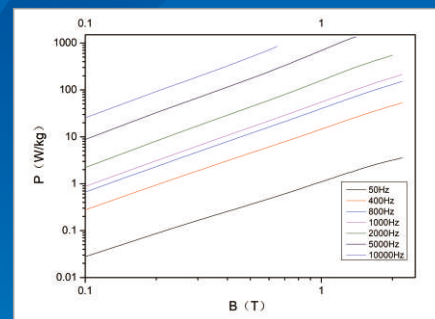
1J22磁感优势



B-H曲线 B-H Curve



μ-H曲线 μ-H Curve



损耗曲线 Core Loss Curve

### 1J22

- 合金的饱和磁感应强度最高 (2.4T)
- 高居里温度 (980℃)
- 饱和磁致伸缩系数最大 (60~100×10<sup>-6</sup>)
- 合金电阻率低 (0.27 μΩ·m)，不宜在高频下使用

### 1J22

- High saturation magnetization, up to 2.4T.
- High curie temperature, reaching 980℃.
- Saturation magnetostriction ranging from (60~100×10<sup>-6</sup>)
- Low resistivity (0.27 μΩ·m), unsuitable for high-frequency applications but ideal for high power density and high torque applications.

### 1J27

- 合金具有高磁感应强度 (2.36T)
- 高居里温度
- 良好的机械韧性，良好的延展性
- 透气性更好，不呈现的1j22 (Hiperco50) 合金的脆性

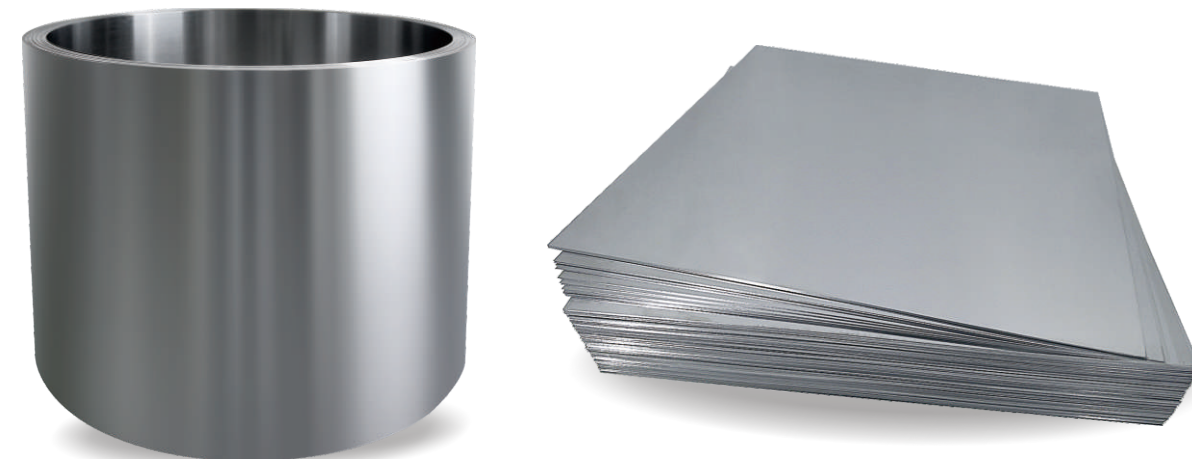
### 1J27

- High magnetic flux density, reaching up to 2.36T.
- High curie temperature ensures stable operation in high-temperature environments.
- Exhibits excellent mechanical toughness and ductility.
- Better permeability and does not exhibit the brittleness of Hiperco 50.



# 1J22 Material Properties

## 1J22 材料性能



### 1J22 国外相同牌号对照表 1J22 Similar Products Reference

| 俄罗斯 Russia | 英国 UK     | 法国 France | 日本 Japan | 合金类型 Alloy Type | 1J22     |
|------------|-----------|-----------|----------|-----------------|----------|
| 50KΦ       | Permendur | AFK502    | SME SMEV | 产品形状 Shape      | 带材 Strip |

|                                  |         |
|----------------------------------|---------|
| 产品尺寸 Thickness                   | 0.35 mm |
| 热处理温度 Heat-Treatment Temperature | 845℃    |

|                                       |                                   |
|---------------------------------------|-----------------------------------|
| 磁场强度 A/m(Oe) Magnetic Field Intensity | 磁通密度 T (KG) Magnetic Flux Density |
|---------------------------------------|-----------------------------------|

|            |             |
|------------|-------------|
| 160 (2)    | 1.35 (13.5) |
| 400 (5)    | 1.95 (19.5) |
| 800 (10)   | 2.10 (21.0) |
| 1600 (50)  | 2.20 (22.0) |
| 4000 (50)  | 2.23 (22.3) |
| 6000 (75)  | 2.25 (22.5) |
| 8000 (100) | 2.30 (23.0) |

### 化学成分 Chemical Composition

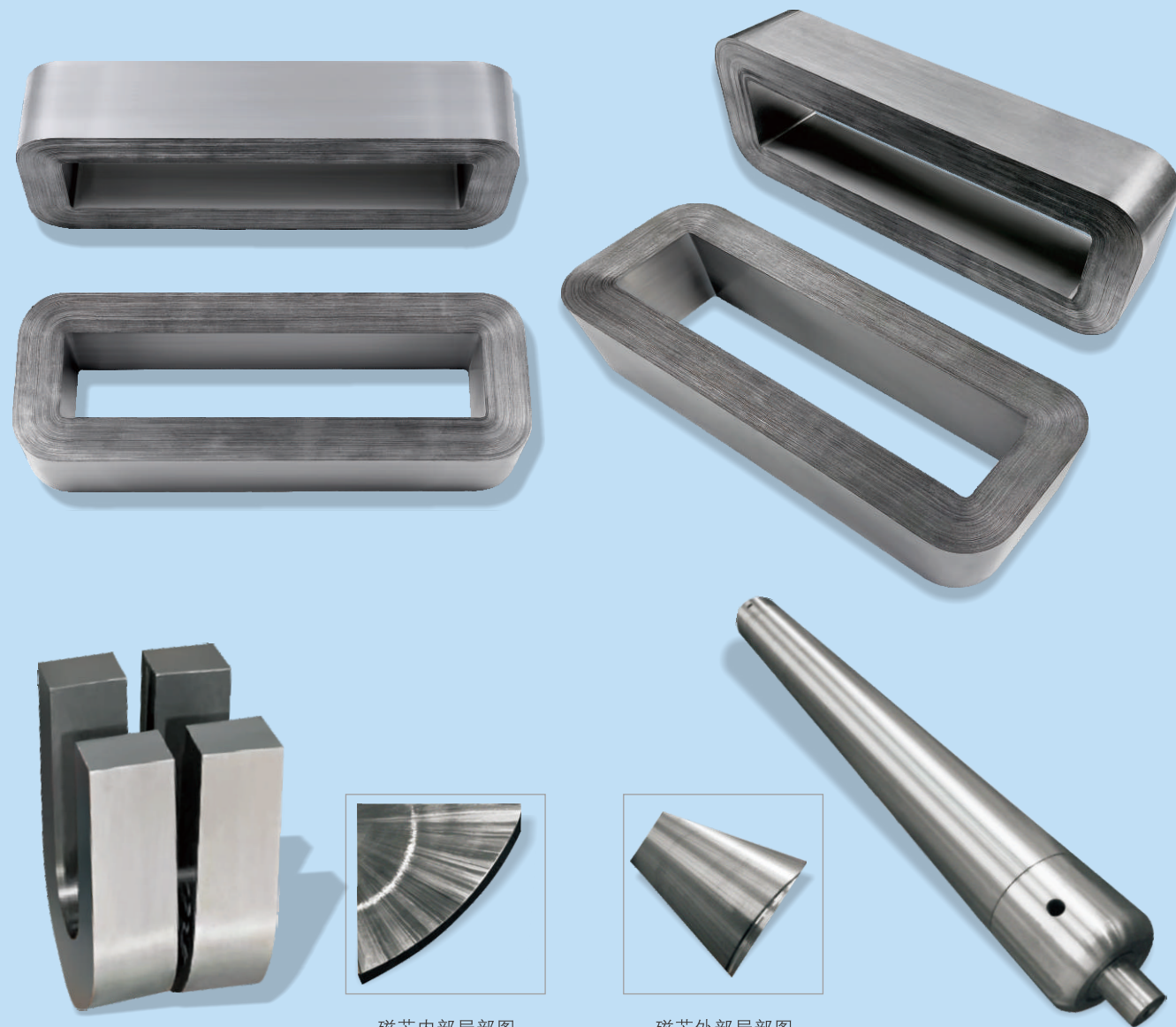
| C     | Mn   | Si   | P     | S    | Cu   | Ni   | Co        | V         | Fe           |
|-------|------|------|-------|------|------|------|-----------|-----------|--------------|
| 0.025 | 0.15 | 0.15 | 0.015 | 0.01 | 0.15 | 0.25 | 47.5-49.5 | 1.75-2.10 | 余量 Remainder |

### 物理性能 Physical Properties

| 密度 Density (Kg/m <sup>3</sup> ) (g/cm <sup>3</sup> ) | 电阻率 Resisitivity (μΩ·mm) (μΩ·cm) | 居里点 Curie Point (℃) | 饱和磁致伸缩 Saturated magnetostriction coefficient (λ θ/10 <sup>-6</sup> ) | 饱和磁通密度 Saturation Magnetic Flux Density(T)(KG) | 弹性模量 Elastic Modulus (Gpa/psi) | 热导率 Thermal Conductivity (W/m·K)/cm·s℃ |
|------------------------------------------------------|----------------------------------|---------------------|-----------------------------------------------------------------------|------------------------------------------------|--------------------------------|----------------------------------------|
| 8120 (8.12)                                          | 400 (40)                         | 940                 | 60                                                                    | 2.38 (23.8)                                    | 207 (x103)                     | 29.8 (0.0712)                          |

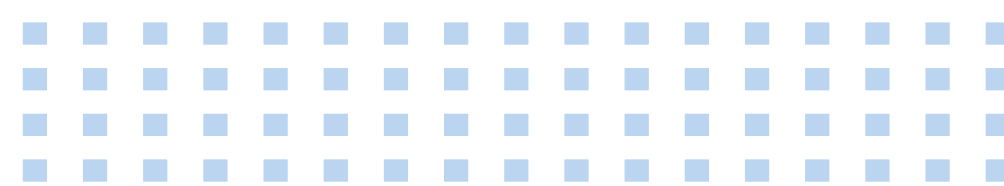
## Ultra-Thin Oriented Silicon Steel Core 极薄取向硅钢铁芯

- 公司提供极薄取向硅钢铁芯的特殊加工工艺和制造。
- Offering specialized processing methods and manufacturing to ultra-thin oriented silicon steel cores.



磁芯内部局部图  
Internal Side

磁芯外部局部图  
Outer Side



## Business Partners 合作伙伴

