



宁波同创强磁材料有限公司

NINGBO TONGCHUANG STRONG MAGNET MATERIAL CO.,LTD.

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同创强磁
——您可靠的钕铁硼合作伙伴

TC MAGNET, Reliable name in NdFeB Magnet Manufacturing

创新
——驱动未来

Driving Innovation for a Better World



www.ndmagnets.com

宁波同创强磁材料有限公司

NINGBO TONGCHUANG STRONG MAGNET MATERIAL CO.,LTD.

Introduction

宁波同创强磁材料有限公司创立于2004年，专业从事稀土钕铁硼磁体、烧结钕铁硼辐射环及磁性组件的研究、生产、应用开发及销售，年产能超过5000吨。

同创位于中国东部重要港口城市—宁波市。作为国家高新技术企业，公司建有占地40,700平方米的现代化标准厂区，全面推行精益现场管理并通过IATF-16949:2016以及各种相关体系认证，公司的技术和管理团队成员都具有近30年的钕铁硼行业经验。2013年，同创通过省级高新技术企业研发中心资格认定，并与中科院宁波材料研究所共同成立“低镨高矫顽力烧结钕铁硼”研发中心。2017年，成立企业博士后工作站。2020年，通过浙江省企业研究院认定。

凭借“领先的工艺，精益的管理，合理的价格，及时的交货，出色的售后”，使得同创品牌被多家世界500强企业所认可，并成为其良好的合作伙伴。同创的产品被广泛地应用于永磁电机，电动电车，电梯曳引机，核磁共振成像，音圈电机，电声器件，传感器，风力发电机，磁选机，IT和电动工具等领域。

同创真诚希望加强与客户的紧密合作，实现共同发展。

TC, founded in 2004, is a leading manufacturer and supplier of rare earth magnet, specializing in sintered NdFeB magnet researching, manufacturing, application and marketing with annual output of 5,000 tons.

Located at Ningbo China, as a national high-tech enterprise, TC has an ISO-9001:2015, IATF-16949:2016 and ISO-14001:2016 certified manufacturing facility, occupied 40,700 square meters, and staffed with a management and technical team, all members have nearly 30 years experience in NdFeB industry manufacturing. In 2013, TC became the strategic partner of NIMTE (Chinese Academy of Sciences) engaged in the research of "High Coercivity Sintered NdFeB with Low Dysprosium". In 2017, our enterprise postdoctoral working station was founded. In 2020, TC won the title of "provincial enterprise research institute".

Our core advantages: Cutting-edge technic, Excellent lean production management, Reasonable price, On-time delivery and Customer-oriented service, qualified TC as recognized reliable partner of several world top 500 enterprises. Today, our magnets are widely used in Permanent magnetic motor, EVs, Elevator traction machine, MRI, VCM, Acoustic components, Sensor, Wind power generator, Magnetic separator, IT field and electricity-driven tools, and so on.

We sincerely hope to establish a win-win relationship and realize common development.

Certificate 认证证书



ISO9001:2015认证
ISO9001:2015 Certificate



IATF 16949:2016认证
IATF16949:2016 Certificate

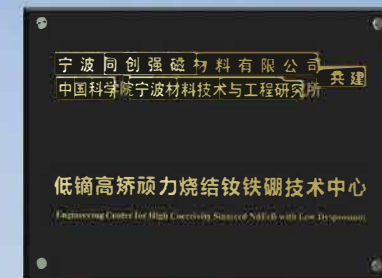


ISO14001:2016认证
ISO14001:2016 Certificate

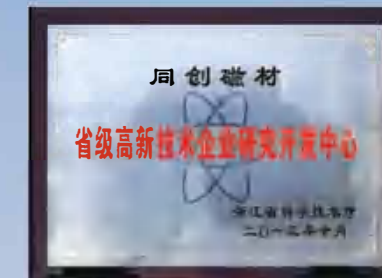
Honor 企业荣誉



国家高新技术企业
National High-Tech Enterprise



低镨高矫顽力烧结钕铁硼技术中心
Engineering Center for High Coercivity Sintered NdFeB with Low Dysprosium



省级高新企业研发中心
Provincial new high-tech enterprise R & D Center



2004-2021

不断超越，迈向新的征程



- Raw Material
配方
- Strip Casting
熔炼
- HDDR
氢破
- Milling
制粉
- Pressing
模压成型
- Sintering
烧结
- Performance Testing
性能测试
- Machining
机械加工
- Surface Treatment
表面处理
- Appearance Inspection
外观检验
- Magnetizing
充磁
- Magnetized Product Inspection
已充磁产品检验
- Packing
包装
- Delivery
出货





同创建有一个现代化、高标准的工程中心，成熟的检测体系以及全套先进的检测设备保证了同创产品的高品质，同时也是我司新产品和新工艺的验证基石，主要的测试仪器如下：

电感耦合等离子体发射光谱仪，扫描电镜，激光粒度分析仪，HAST低失重试验箱，投影仪，X射线镀层厚度测试仪，氢氧分析仪，碳硫分析仪，氧含量分析仪，变温磁测仪，盐雾试验箱，老热电化试验箱，磁偏转角测试仪、万能试验机、硬度测试仪、磁场分析仪。

TC has a modern high standard engineering center, advanced analytical methods and full set of sophisticated test apparatuses not only assured the top quality of TC product, but also the foundation of our research and technic improving. The main test apparatuses are as follow:

ICP Emission Spectrometer, Scanning Electron Microscope, Laser Particle Size Analyzer, HAST Tester, Projector, XRF Coating Thickness Spectrometer, Hydrogen-Oxygen Analyzer, Carbon-Sulfur Analyzer, Oxygen Analyzer, Hysteresigraph, Salt Spray Tester, Aging test box, Magnetic deviation angle tester, Universal testing machine, Hardness Tester, Magnetic field distribution tester

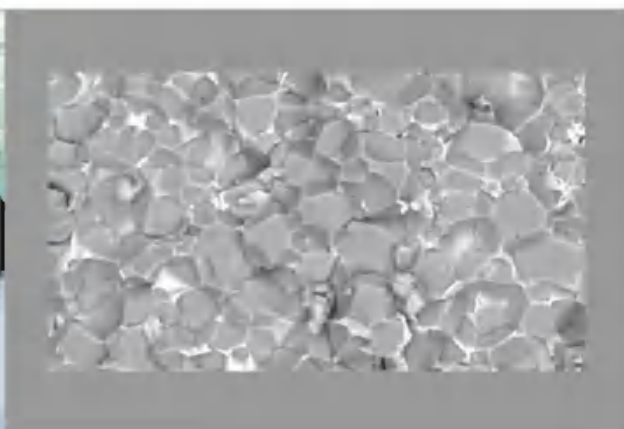
- 01 ICP元素分析仪
ICP Emission Spectrometer
- 02 氢氧分析仪
Hydrogen-Oxygen Analyzer
- 03 老化试验箱
Aging Test Box
- 04 X射线镀层厚度测试仪
XRF Coating Thickness Spectrometer
- 05 碳硫分析仪
Carbon-Sulfur Analyzer
- 06 投影仪
Image Dimension Measuring System



Engineering Center
工程中心



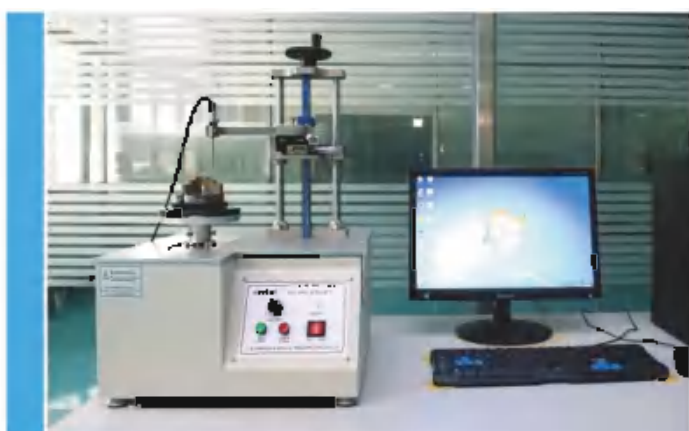
扫描电镜 Scanning Electron Microscope



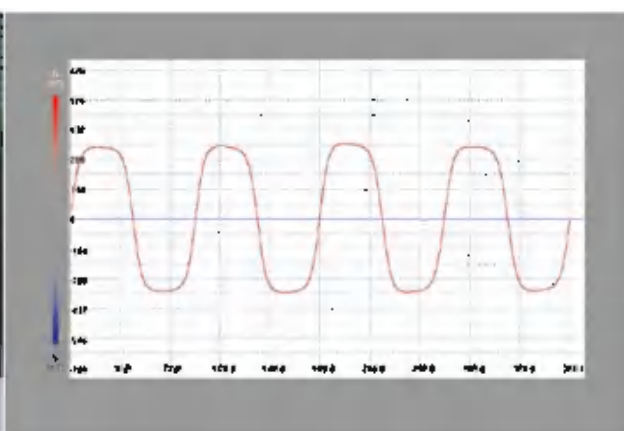
全自动外观尺寸检测仪
Full-automatic appearance and tolerance test equipment



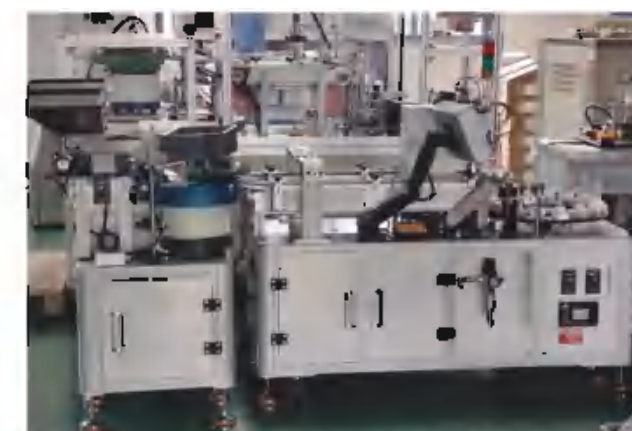
全自动划线标点仪
Full-automatic mark-making equipment



磁场分析仪 Magnetic Field Distribution Tester



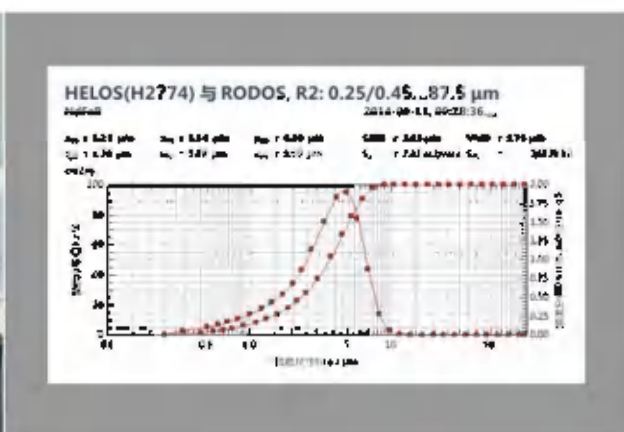
全自动磁偏角检测仪
Full-automatic magnetic deviation angle test equipment



全自动加垫片装管机
Full automatic plastic spacer-adding and tubulating machine



激光粒度分析仪 Laser Particle Size Analyzer



低失重产品 LOW WEIGHT LOSS PRODUCT

低失重产品 在高温高压和高温的条件下，表面未经处理的磁体的单位失重率可以定性的反映磁体的使用寿命，同创的低失重磁体可达到小于1mg/cm²的业内一流水平。

Under high temperature, high pressure, and high humidity, the weight loss level of uncoated magnets reflect the corrosion resistance ability of a bare magnet, it is highly related to the serving life of application products.

产品 Product	测试时间 Test Time	HAST 试验条件 HAST Test Condition	测试结果 Test Result
批量产品 Bulk Production	168小时 168 hours	132°C ±2°C, 3个大气压, 100% 湿度 132°C ±2°C, 3atm, 100% RH	≤1.0mg/cm ²



产品测试前后对比

Comparison photo after HAST test

低失重产品 Low weight loss product

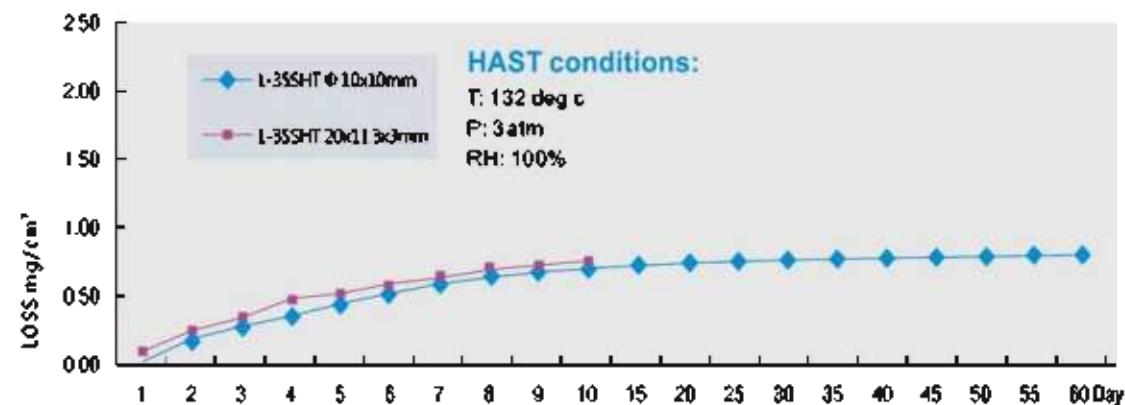


普通产品 Traditional Sample



L-35SH-T磁体HAST试验失重曲线图

WEIGHT LOSS CURVE OF UNCOATED L-35SH-T MAGNET WITH HAST



不同的牌号，不同的配方，失重水平有较大差异，我司根据客户要求可提供定制化服务，如您有特殊要求，欢迎联系我们专业的工程师。

Different grade and different formula will lead to different weight loss level, we can provide customized service according to customer requirements, please contact our professional engineer for more details.

低温系数产品

LOW TEMPERATURE COEFFICIENT PRODUCT

同创强磁通过优化的配方设计和改进的制程工艺，使得同等牌号的产品具有更高的耐热稳定性和更低的热退磁率。

TCMAG use own optimized formula and advanced production technics improved and enhanced the magnet temperature resistance ability, which get better thermo stabilization and less demagnetization in the same grade.

温度系数参考数据

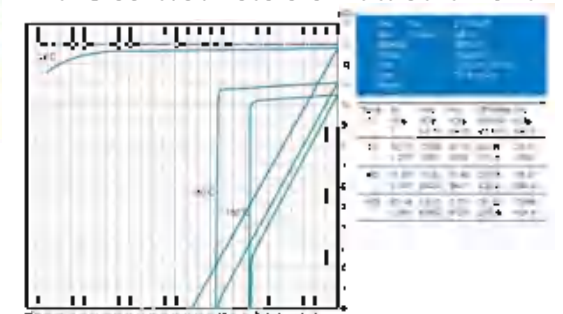
Reference data of temperature coefficient

剩磁温度系数 αBr	-0.1~-0.12% / °C
内禀矫顽力温度系数 βHcj	-0.38~-0.8% / °C



变温测磁仪 Hysteresigraph

NM-200C HYSTERESIGRAPH TEST REPORT



NdFeB 辐射环

RADIAL ORIENTED RING MAGNET

广泛应用于机器人、工业自动化生产线等领域
It was widely used in the application of robotics and industrial automatic production line etc.


什么是辐射环? What is Radial Ring Magnet?

辐射环(烧结钕铁硼)是指辐射取向的磁环,产品的取向从圆心向四周呈辐射状取向。它的充磁方式多样,有单极充和多极充,有直充和斜充等,常见的多极充有:2极、4极、8极、10极、12极等,充磁极数及斜充的角度由最终充磁夹具决定。

Ring magnet magnetized in Radial Direction is developed successfully which is using shaping method by new multipole radiation orientation, and meet different requirements of permanent motors. Fundamentally changed the past situation that radial ring magnet only relied on the magnetic tile assembly, greatly improve the performance of the motor

The popular poles include: 2 pole, 4 poles, 8 poles, 10 poles, 12 poles etc, the number of poles and the skew angle were decided by the magnetizing tooling.

辐射环尺寸 Dimensions

图示及充磁方式 Sketch	参数 Dimension	范围 Dimension	尺寸公差 Tolerance	同轴度 Coaxiality	圆柱度 Cylindricity
 多极直充	外径 OD	20-75mm	± 0.05mm	0.1	0.04
	内径 ID	15-68mm			
 多极斜充	壁厚 T	2-7mm			
	高度 H	5-50mm			
我司能生产的性能 / Grade	具体咨询我司专业工程师 Please contact our sales engineer for the details				
常用镀层 / Coating	镍铜镍, 环氧树脂 NiCuNi, Epoxy etc.				
应用领域 / Applications	机器人、工业自动化生产线等, 比如液晶面板生产线 Robotics and Industrial Automatic Production Line etc.				

以上数据为目前我司的工艺水平, 产品的尺寸、性能和公差随着以后工艺的改进也会有变化, 具体请联系我司专业工程师。
Above data only represents our current technology, the dimensions, performance and tolerance will be changed when the technology improves in future, please contact our professional engineer for the details.

辐射环的应用优势 The advantages of Radial Ring Magnet

生产工艺: Assembly technique	减少电机部件数量, 简化组装工艺, 提高装配效率。 Less parts, simplify assembly process, easily realize automatic assembly.
产品精度: Product Precision	更好的同轴度, 垂直度, 转子外径尺寸精度高。 Outer Diameter Higher precision, Better Coaxiality and Verticality.
充磁方式: Magnetization way	灵活可选的充磁方式(充磁极数及直充角度, 斜充角度), 大大减小电机的齿槽力矩。 Very flexible to choose different ways of magnetizing, include magnetizing poles and skew angles.
安全性: Safety	可靠性高, 不会有脱落风险。 Highly reliable, no risk of magnet peel off.
电机性能: Motor performance	气隙小, 电机运转更加平稳, 低噪音, 运转速度高。 Very small air gap, motor has smoother operating performance with less noise and vibration.

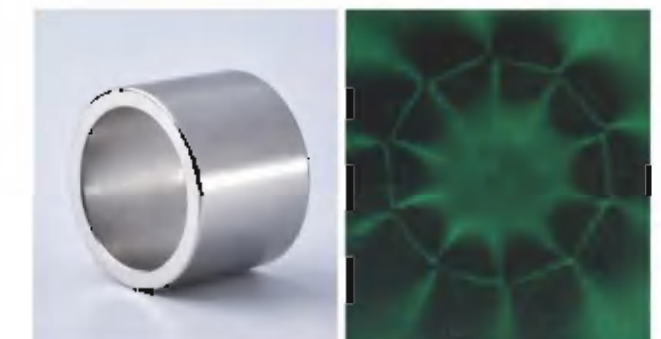
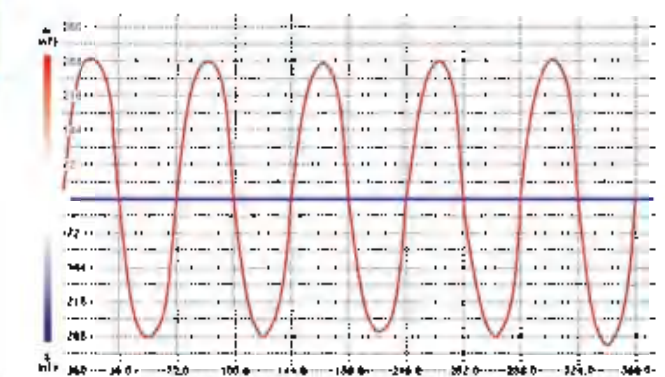
辐射环的优点

Advantages of a radiation ring

瓦形磁石 Arc Magnet	辐射环 Radial Ring Magnet
	 易组装 Easy Assembly
	 尺寸精度高 Higher Precision
	 充磁方向灵活 Flexible Magnetizing

10极辐射环表磁波形图

10 poles Radial Ring Magnet Surface Flux Density Distribution Chart



低磁偏角产品
LOW DEVIATION ANGLE PRODUCT

一般来说, 传感器应用领域对NdFeB磁偏角有更高要求, 我司专业的团队、精良的测试设备以及良好的QC生产控制体系, 使得我司一次成品合格率达到业内领先水平 (具体看产品尺寸及要求)。

Generally speaking, Sensors have higher standard for magnetic angle deviation. Our professional team, advanced equipment and well-trained QC staff, makes TC the leading company who has very high qualified rate of low deviation angle product. (it depends on dimensions and requirements).

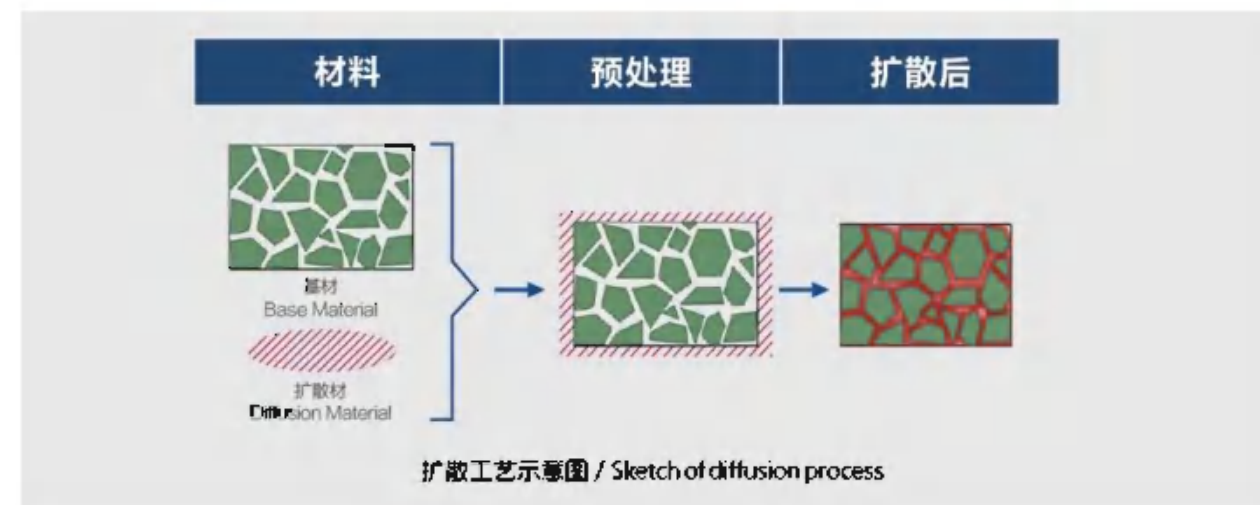


专业高精度磁偏角测试仪
Magnetic deviation angle tester

重稀土晶界扩散工艺
Grain Boundary Diffusion (GBD)

运用经典扩散理论, 通过重稀土在晶间相的扩散, 达到使用少量重稀土来实现高矫顽力和高工作温度磁体的制备。

Based on the classical diffusion theory, by diffusion of a small amount of heavy rare earth into the intergranular phase, we achieved the goal of obvious increase of coercive force and higher working temperature for magnets.



晶界扩散工艺特点 / Features of GBD:

- 制作传统工艺无法生产的超高性能磁钢 / GBD can produce super-high grade magnets that traditional tech can't.
- 显著降低重稀土用量, 节省宝贵资源 / Greatly reduce the usage of Heavy Rare earth
- 在几乎不降低Br的情况下, 大幅提高Hcj / Increase Hcj sharply without much influence to Br
- 相比于传统工艺, 对生产SH-AH高Hcj磁体有显著成本优势 / Compare with traditional tech, it can greatly reduce dosage of Heavy rare earth, and the cost of high Hcj magnets (SH-AH grade) will be changed accordingly
- 对产品尺寸及渗透方向有尺寸限制 / It has limit to the dimensions of magnet

无镝及重稀土扩散工艺
DY FREE AND GBD PROCESS

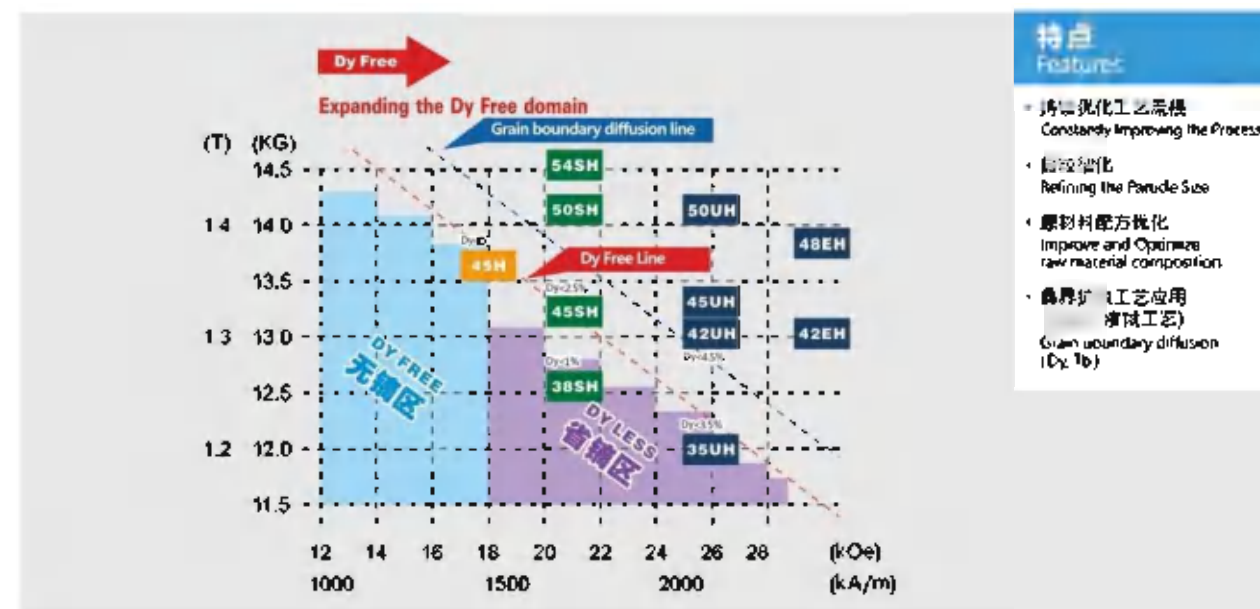
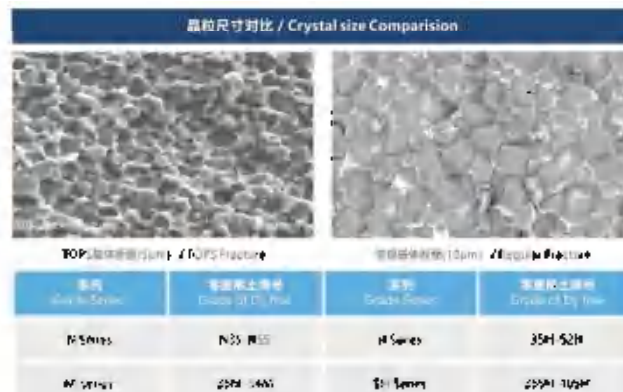
作为中科院宁波材料研究所战略研发伙伴, 同创一直致力于“低镝高矫顽力烧结钕铁硼”产品的研发, 经过多年的研发与试验, 效果显著, 具体介绍如下:

As the strategic partner of NMTE (Chinese Academy of Sciences) engaged in the research of "High Coercivity Sintered NdFeB with Low Dysprosium", after years of R&D, TC achieved obvious progress in GBD technology showed as below:

重稀土减少工艺(微晶工艺)
Tech Of Optimizing Particle Size

同创通过细化晶粒尺寸, 减少磁体内部缺陷等措施实现重稀土减少甚至零重稀土化。

By refining the particle size, improving of impurity control as well as optimization of technics, TC realized the achievement of HEAVY RARE EARTH less and even heavy rare earth zero.



- 特点 Features:
- 持续优化工艺流程
Constantly Improving the Process
 - 晶粒细化
Refining the Particle Size
 - 原料配方优化
Improve and Optimize raw material composition
 - 晶界扩散工艺应用
(微晶工艺)
Grain boundary diffusion (Dy free)

烧结钕铁硼性能等级表 Sintered NdFeB Magnetic Properties

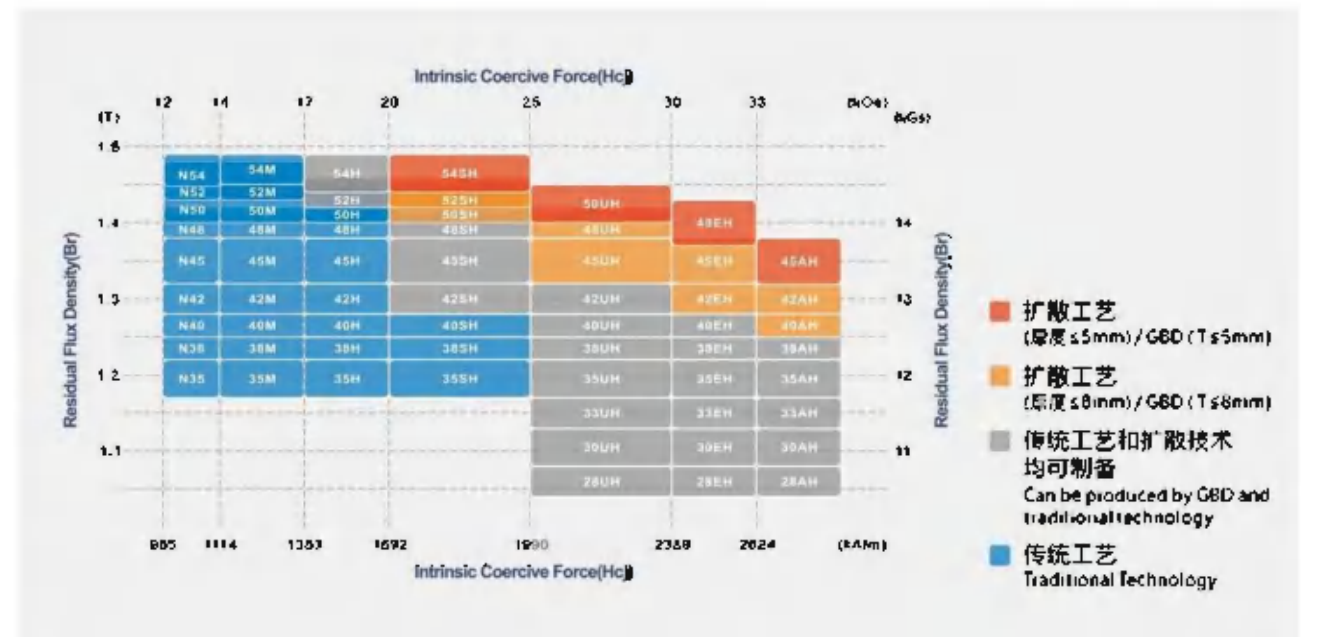
类别 Item	牌号 Grade	剩磁 Remanence(Br)		剩磁矫顽力 (Hcb)		内禀矫顽力 (Hc)		最大磁能积 (BH) max		工作温度 Working Temperature LiD≥0.7(°C)	温度系数%/°C Temp Coefficient	
		kGs	T	kOe	kA/m	kOe	kA/m	MGOe	KJ/m ²		α(Br)	β(Hc)
N	N35	11.7-12.2	1.17-1.22	≥10.9	≥868	≥12	≥955	33-36	263-287	≤80	-0.12	-0.8
	N38	12.2-12.5	1.22-1.25	≥11.3	≥899	≥12	≥955	36-39	287-310	≤80		
	N40	12.5-12.8	1.25-1.28	≥11.4	≥907	≥12	≥955	38-41	302-326	≤80		
	N42	12.8-13.2	1.28-1.32	≥11.5	≥915	≥12	≥955	40-43	318-342	≤80		
	N45	13.2-13.8	1.32-1.38	≥11.6	≥923	≥12	≥955	43-46	342-366	≤80		
	N48	13.8-14.2	1.38-1.42	≥11.6	≥923	≥12	≥955	45-49	358-390	≤80		
	N50	14.0-14.5	1.40-1.45	≥12.0	≥955	≥12	≥955	47-51	374-406	≤80		
	N52	14.2-14.6	1.42-1.46	≥10.5	≥836	≥12	≥955	49-53	390-422	≤80		
	N54	14.5-14.9	1.45-1.49	≥10.5	≥836	≥11	≥876	51-55	406-438	≤80		
M	35M	11.7-12.2	1.17-1.22	≥10.9	≥868	≥14	≥1114	33-36	263-287	≤100	-0.12	-0.7
	38M	12.2-12.5	1.22-1.25	≥11.3	≥899	≥14	≥1114	36-39	287-310	≤100		
	40M	12.5-12.8	1.25-1.28	≥11.6	≥923	≥14	≥1114	38-41	302-326	≤100		
	42M	12.8-13.2	1.28-1.32	≥12.0	≥955	≥14	≥1114	40-43	318-342	≤100		
	45M	13.2-13.8	1.32-1.38	≥12.5	≥995	≥14	≥1114	43-46	342-366	≤100		
	48M	13.7-14.3	1.37-1.43	≥12.9	≥1027	≥14	≥1114	45-49	358-390	≤100		
	50M	14.0-14.5	1.40-1.45	≥13.0	≥1033	≥14	≥1114	47-51	374-406	≤100		
	52M	14.2-14.6	1.42-1.46	≥13.1	≥1043	≥14	≥1114	50-53	390-422	≤100		
	54M	14.5-14.9	1.45-1.49	≥13.2	≥1051	≥14	≥1114	51-55	406-438	≤100		
H	35H	11.7-12.2	1.17-1.22	≥10.9	≥868	≥17	≥1353	33-36	263-287	≤120	-0.12	-0.65
	38H	12.2-12.5	1.22-1.25	≥11.3	≥899	≥17	≥1353	36-39	287-310	≤120		
	40H	12.5-12.8	1.25-1.28	≥11.6	≥923	≥17	≥1353	38-41	302-326	≤120		
	42H	12.8-13.2	1.28-1.32	≥12.0	≥955	≥17	≥1353	40-43	318-342	≤120		
	45H	13.2-13.7	1.32-1.37	≥12.3	≥973	≥17	≥1353	43-46	342-366	≤120		
	48H	13.7-14.2	1.37-1.42	≥12.5	≥995	≥17	≥1353	45-49	358-390	≤120		
	50H	14.0-14.5	1.40-1.45	≥12.6	≥1003	≥17	≥1353	47-51	374-406	≤120		
	52H	14.2-14.6	1.42-1.46	≥13.1	≥1043	≥17	≥1353	49-53	390-422	≤120		
	54H	14.4-14.9	1.44-1.49	≥13.1	≥1043	≥17	≥1353	50-55	396-438	≤120		
SH	35SH	11.7-12.2	1.17-1.22	≥11.0	≥876	≥20	≥1592	33-36	263-287	≤150	-0.11	-0.55
	38SH	12.2-12.5	1.22-1.25	≥11.4	≥907	≥20	≥1592	36-39	287-310	≤150		
	40SH	12.5-12.8	1.25-1.28	≥11.8	≥939	≥20	≥1592	38-41	302-326	≤150		
	42SH	12.8-13.2	1.28-1.32	≥12.1	≥963	≥20	≥1592	40-43	318-342	≤150		
	45SH	13.2-13.8	1.32-1.38	≥12.3	≥979	≥20	≥1592	43-46	342-366	≤150		
	48SH	13.7-14.3	1.37-1.43	≥12.7	≥1011	≥20	≥1592	45-49	358-390	≤150		
	50SH	14.0-14.5	1.40-1.45	≥12.6	≥1003	≥20	≥1592	47-51	374-406	≤150		
	52SH	14.2-14.6	1.42-1.46	≥12.6	≥1003	≥20	≥1592	49-53	390-422	≤150		
	54SH	14.4-14.9	1.44-1.49	≥12.6	≥1003	≥20	≥1592	50-54	396-430	≤150		
UH	28UH	10.4-10.8	1.04-1.08	≥9.6	≥764	≥25	≥1990	26-29	207-231	≤180	-0.11	-0.5
	30UH	10.8-11.3	1.08-1.13	≥10.2	≥812	≥25	≥1990	28-31	223-247	≤180		
	33UH	11.3-11.7	1.13-1.17	≥10.7	≥852	≥25	≥1990	31-34	247-271	≤180		
	35UH	11.7-12.2	1.17-1.22	≥10.8	≥860	≥25	≥1990	33-36	263-287	≤180		
	38UH	12.2-12.5	1.22-1.25	≥11.3	≥899	≥25	≥1990	36-39	287-310	≤180		
	40UH	12.5-12.8	1.25-1.28	≥11.8	≥939	≥25	≥1990	38-41	302-326	≤180		
	42UH	12.8-13.2	1.28-1.32	≥12.1	≥963	≥25	≥1990	40-43	318-342	≤180		
	45UH	13.2-13.8	1.32-1.38	≥12.3	≥979	≥25	≥1990	43-46	342-366	≤180		
	48UH	13.7-14.3	1.37-1.43	≥12.7	≥1011	≥25	≥1990	45-49	358-390	≤180		
	50UH	14.0-14.5	1.40-1.45	≥13.0	≥1035	≥25	≥1990	47-51	374-406	≤180		

烧结钕铁硼性能等级表 Sintered NdFeB Magnetic Properties

类别 Item	牌号 Grade	剩磁 Remanence(Br)		剩磁矫顽力 (Hcb)		内禀矫顽力 (Hc)		最大磁能积 (BH) max		工作温度 Working Temperature LiD≥0.7(°C)	温度系数%/°C Temp Coefficient	
		kGs	T	kOe	kA/m	kOe	kA/m	MGOe	KJ/m ²		α(Br)	β(Hc)
EH	28EH	10.4-10.8	1.04-1.08	≥9.8	≥780	≥30	≥2368	26-29	207-231	≤200	-0.11	-0.45
	30EH	10.8-11.3	1.08-1.13	≥10.2	≥812	≥30	≥2368	28-31	223-247	≤200		
	33EH	11.3-11.7	1.13-1.17	≥10.5	≥836	≥30	≥2368	31-34	247-271	≤200		
	35EH	11.7-12.2	1.17-1.22	≥11.0	≥876	≥30	≥2368	33-36	263-287	≤200		
	38EH	12.2-12.5	1.22-1.25	≥11.3	≥899	≥30	≥2368	36-39	287-310	≤200		
	40EH	12.5-12.8	1.25-1.28	≥11.6	≥923	≥30	≥2368	38-41	302-326	≤200		
	42EH	12.8-13.2	1.28-1.32	≥11.7	≥931	≥30	≥2368	40-43	318-342	≤200		
	45EH	13.2-13.8	1.32-1.38	≥12.3	≥979	≥30	≥2368	43-46	342-366	≤200		
	48EH	13.7-14.3	1.37-1.43	≥12.3	≥979	≥30	≥2368	45-49	358-390	≤200		
AH	28AH	10.4-10.8	1.04-1.08	≥9.9	≥787	≥33	≥2624	26-29	207-231	≤230	-0.1	-0.38
	30AH	10.8-11.3	1.08-1.13	≥10.3	≥819	≥33	≥2624	28-31	223-247	≤230		
	33AH	11.3-11.7	1.13-1.17	≥10.6	≥843	≥33	≥2624	31-34	247-271	≤230		
	35AH	11.7-12.2	1.17-1.22	≥11.0	≥876	≥33	≥2624	33-36	263-287	≤230		
	38AH	12.2-12.5	1.22-1.25	≥11.3	≥899	≥33	≥2624	36-39	287-310	≤230		
	40AH	12.5-12.8	1.25-1.28	≥11.6	≥923	≥33	≥2624	38-41	302-326	≤230		
	42AH	12.8-13.2	1.28-1.32	≥11.7	≥931	≥33	≥2624	40-43	318-342	≤230		
	45AH	13.2-13.8	1.32-1.38	≥11.7	≥932	≥33	≥2624	43-46	342-366	≤230		

备注 NOTE: 以上磁性能参数和物理特性均为室温下的数据
 The above magnetic parameters and physical properties are given at room temperature.
 最大工作温度依赖于磁体的长径比、厚度和环境因素
 The maximum working temperature of magnets is dependent on length-diameter ratio, thickness and environment factors

产品磁性能分布 Magnetic Property distribution chart



一般物理性能 Typical physical properties

参数	Parameter	单位 Unit	指标 Standard
居里温度	Curie Temperature	°C	310-380
Br可逆温度系数	α_{Br}	%/°C	-0.1~-0.12
Hcj可逆温度系数	β_{Hcj}	%/°C	-0.38~-0.8
最高工作温度	Maximum Operating Temperature	°C	80-250
密度	Density	G/cm ³	7.40~7.80
维氏硬度	Vickers Hardness	HV	550-650
抗弯强度	Bending strength	Mpa	250
抗拉强度	Tensile strength	Mpa	80
抗压强度	Compressive strength	Mpa	1000-1200
电阻率	Electrical resistance	$\mu\Omega \cdot cm$	130-160
热导率	Thermal conductivity	W/(m·K)	6-8
杨氏模量	Young's Modulus	GPa	150
膨胀系数	Coefficient of Thermal expansion	10 ⁻⁶ /°C	11.5-15.5 11.5-15.5

磁性能参数及换算表 Magnetic Parameter and Conversion Table

参数及表示	Unit and Symbol	国际单位 SI-units	单位换算 Conversion Table
磁感应强度 B	Flux density B	T(Tesla)	1T=10kGs
磁极化强度 J	Polarization J	T(Tesla)	1T=10kGs
磁场强度 H	Magnetic field intensity H	KA/M	1KA/m=12.57Oe
磁能积(BH)m	Energy density(BH)m		1KJ/m ³ =0.126MGOe
磁通 Φ	Magnetic flux Φ	Wb(Weber)	1Wb=10 ⁸ MX

充磁方向 Directions of Magnetization

常规充磁产品 Conventional Product

辐射环 Radial Oriented Ring

烧结NdFeB钕铁硼磁钢镀层说明 Available Coatings Of Sintered NdFeB Magnets

镀层类型 Coating	镀层厚度 Thickness	颜色 Color	结合强度 Bond Strength	绝缘性 Insulation	盐雾时间 SST	特点 Characteristic
蓝白锌 Zn	4-8 μ m	蓝白色 Bright Blue	良 Good	差 Bad	>24H~48H	一般防护, 适用于大多数产品 Regular Protection Applicable to most products
彩锌 Colored Zn	4-8 μ m	彩色 Shining Color	良 Good	差 Bad	>48H~72H	耐盐雾 Excellent salt spray resistance
镀锌镍 Ni-Cu	10-20 μ m	银白色 Bright Silver	良 Good	差 Bad	>24H~72H	耐盐雾, 耐潮湿, 耐高温 Excellent humidity, heat & salt spray resistance, High temperature resistance
双金属 Ni-Zn	10-20 μ m	银白色 Bright Silver	良 Good	差 Bad	>48H~72H	耐盐雾, 耐潮湿, 耐高温 Excellent humidity, heat & salt spray resistance, High temperature resistance
化学镍 Electroless Nickel	4-8 μ m	银白色 Bright Silver	好 Okay	差 Bad	>96H	耐盐雾, 耐潮湿, 耐高温 Excellent humidity, heat & salt spray resistance, High temperature resistance
磷化加环氧 Phosphating + Epoxy	10-20 μ m	黑色或灰色 Black or Grey	好 Okay	优 Excellent	>168H	超耐盐雾, 耐潮湿, 结合力好, 绝缘性好 Excellent humidity, heat & salt spray resistance, excellent adhesion, Excellent insulation
镍钨加环氧 Ni-W + Epoxy	10-20 μ m	黑色或灰色 Black or Grey	良 Good	优 Excellent	>168H	超耐盐雾, 耐潮湿, 结合力好, 绝缘性好 Excellent humidity, heat & salt spray resistance, excellent adhesion, Excellent insulation
喷涂环氧 Sprayed Epoxy	10-30 μ m	黑色或灰色 Black or Grey	一般 General	优 Excellent	>72H	超耐盐雾, 耐潮湿, 结合力好, 绝缘性好 Excellent humidity, heat & salt spray resistance, excellent adhesion, Excellent insulation
磷化/钝化 Phosphating/Passivation	1-3 μ m	深灰色 Dark Grey	非常好 Excellent	较差 Poor	$\leq 2.5H$ Emergency 25-400 hours	临时性保护 Temporary Protection
浸弗洛 Everlub	8-20 μ m	黄色 Yellow	好 Okay	优 Excellent	>24H	耐盐雾 Excellent salt spray resistance
特氟龙 Teflon	>10 μ m	黑灰色 Black	好 Okay	优 Excellent	>16H	耐摩擦, 耐高温, 低温, 耐腐蚀 Excellent friction resistance, high/low temp resistance
镀镍+金 Au	10-15 μ m	金色 Golden	良 Good	差 Bad	>12H	美观 Good looking
派瑞林 Parlyne	6-12 μ m	透明 Transparent	好 Okay	优 Excellent	>24H	具有良好的绝缘性, 防潮, 防腐, 防盐雾侵蚀 With good electrical insulation, moisture proof anti corrosion and anti salt spray etc excellent
铝 Al	8-20 μ m	银白色 Silver white	非常好 Excellent	差 Bad	>48H	防腐性能好, 结合力佳, 耐高温 Excellent anti-corrosive property and adhesive force, High temperature resistance

注: 对不同产品的盐雾试验, PCT试验时间, 视实际形状而定 Notes for different products, the salt spray test and PCT time varies with the shape and size of the product.



磁学常识
Magnetic Knowledge

剩磁(Br): 将一个磁体在闭路环境下被外磁场充磁到饱和后撤消外磁场, 此时磁体表现的磁感应强度, 我们称之为剩磁, 单位为特斯拉(T)或高斯(Gs).

Br, Residual Induction (or Flux density) is the magnetic induction corresponding to zero magnetizing force in a magnetic material after saturation magnetizing in a closed circuit. Measured in Gauss or Tesla.

磁感矫顽力(Hcb): 饱和磁化后的磁体在被反向退磁时, 使磁感应强度降为零所需反向磁场强度的值称之为磁感矫顽力(Hcb), 单位是安/米(A/m)或奥斯特(Oe). 但此时磁体的磁化强度并不为零, 只是所加的反向磁场与磁体的磁化强度作用相互抵消, 对外磁感应强度表现为零, 此时若撤消外磁场, 磁体仍具有一定的磁性.

Hc, also known as Hcb or Hc1. Coercive force is equal to the demagnetizing force required to reduce induction field, B, to zero after the magnet has previously been saturation magnetized, measured in Oersteds(Oe) or Amperes per meter(A/m). In this case, the magnet's magnetization strength is not zero. If the external magnetic field is revoked at this moment, the magnet can still show some magnetism.

内禀矫顽力(Hcj): 使磁体的磁化强度降为零所需施加的反向磁场强度, 称之为内禀矫顽力, 单位是安/米(A/m)或奥斯特(Oe). 内禀矫顽力是衡量磁体抗退磁能力的一个物理量.

Hcj, Intrinsic coercive force: is equal to the demagnetizing force required to reduce magnetization strength of the magnet to zero after the magnet has previously been saturation magnetized, measured in Oersteds(Oe) or Amperes per meter(A/m).

磁能积(BH)和最大磁能积(BHmax): 退磁曲线上任何一点B和H的乘积, 即B×H, 称之为磁能积; 而B×H的最大值称之为最大磁能积(BH)max, 单位为焦/米³(J/m³)或高·奥(GOe). 最大磁能积是衡量磁体所储存能量大小的重要参数之一. (BH)max越大说明磁体适合的磁能量越大.

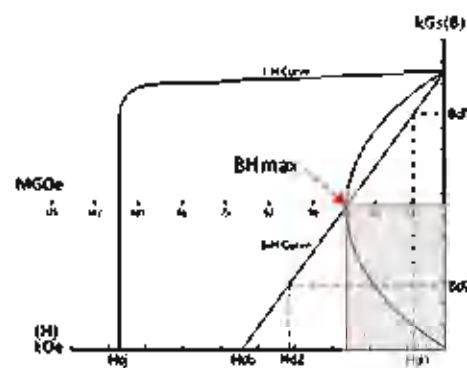
Energy product: the product of B and H corresponding to any point in the demagnetization curve. It indicates the energy that a magnetic material can supply to an external magnetic circuit when operating at any point on its demagnetization curve; measured in J/m³ or GOe. (BH)max, or Maximum energy product: is the maximum value of product(B×H) which can be obtained on the demagnetization curve.

剩磁温度系数(αBr): 温度在某范围内变化时剩磁磁感应强度可逆变化的百分数与温度变化度数的比值, 称为剩磁温度系数.

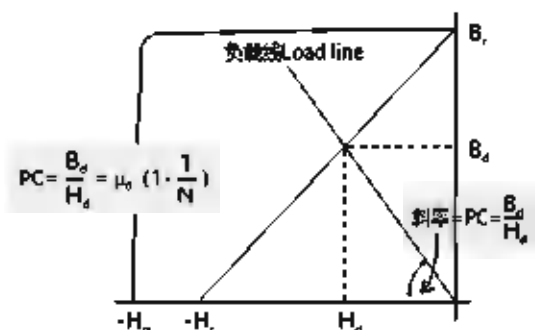
Br temperature coefficient(αBr) is a factor which describes the reversible change in residual magnetic flux intensity with a change in temperature.

矫顽力温度系数(βHcj): 温度在某范围内变化时, 内禀矫顽力可逆变化的百分数与温度变化度数的比值.

Hcj temperature coefficient(βHcj) is a factor which describes the reversible change in intrinsic coercive force with a change in temperature.



BHmax解释 | BHmax explanation

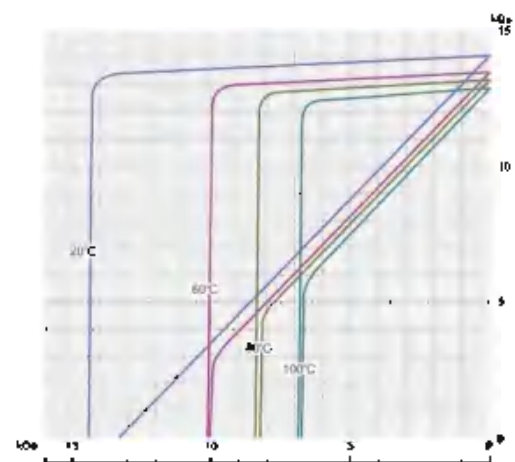


工作点和负载线 | Working point, Load Line or Operating line

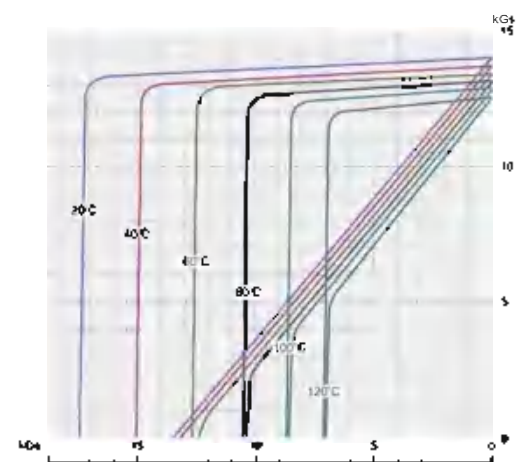
工作点和负载线: 永磁体是在开路状态下工作的, 由于开路状态的磁体是在退磁场的作用下, 所以工作状态下的永磁体的磁感应强度不是在闭路状态的Br点上, 而是在比Br低的退磁曲线上的某一点, 这一点称为永磁体的工作点, 如图中的O点. 而连接工作点D与原点O的直线称为负载线, 其斜率是Pc, N为磁体的平均退磁因子.

Working point, Load Line or Operating line: when the magnet is working under open circuit condition, since the effect of demagnetization field, the induction strength of the magnet in working condition is not the Br under closed circuit condition, actually, it's some point in the B-H curve which is lower than Br. This point is defined as working point, O, as shown in the above picture. The straight line drawn between the working point and the origin is called load line, which is also known as operating line. The slope of this line is defined as Pc, Pc=Bd/Hd=μ0²(1-1/N). N is called the average demagnetization factor.

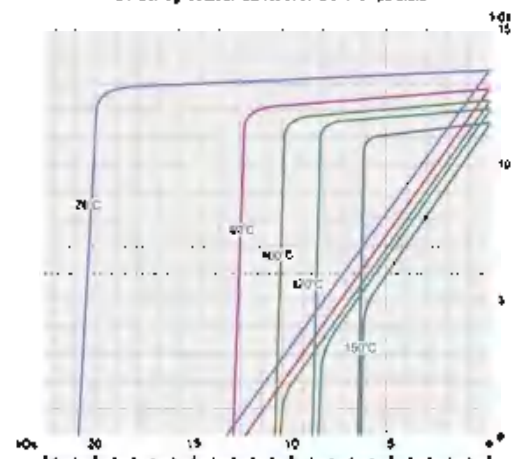
在不同温度下的退磁曲线
BH Curve At Different Temperature



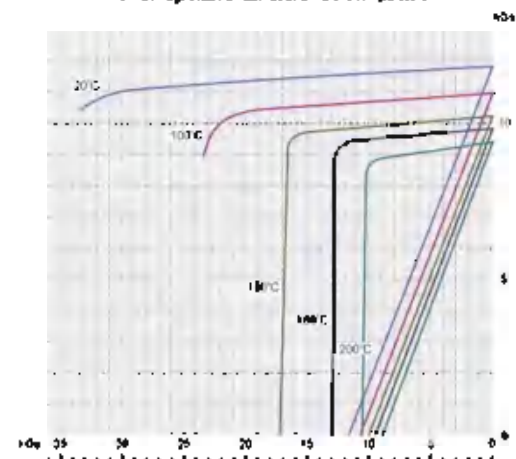
48M 在不同温度下的退磁曲线
48M Demagnetization Curves at Different Temperature



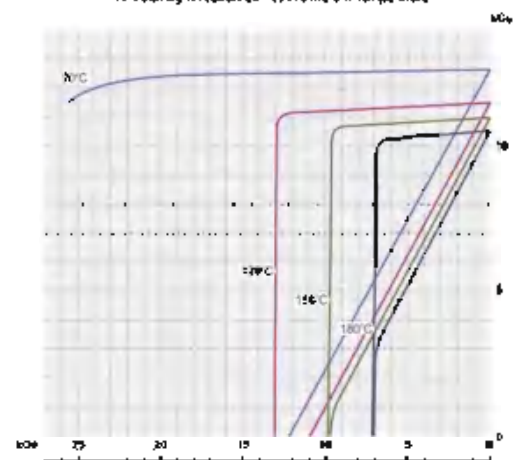
48H 在不同温度下的退磁曲线
48H Demagnetization Curves at Different Temperature



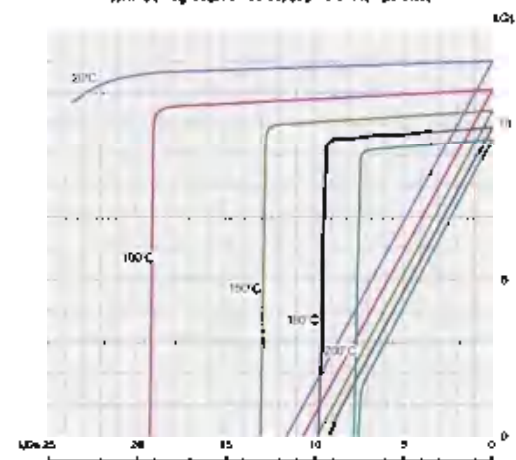
45SH 在不同温度下的退磁曲线
45SH Demagnetization Curves at Different Temperature



35AH 在不同温度下的退磁曲线
35AH Demagnetization Curves at Different Temperature



38UH 在不同温度下的退磁曲线
38UH Demagnetization Curves at Different Temperature



35EH 在不同温度下的退磁曲线
35EH Demagnetization Curves at Different Temperature



我们能生产具有良好一致性、均匀性的高、中、低各档性能烧结钕铁硼，并按客户要求生产加工方块、圆片、球体、瓦形等各种形状永磁体及磁性组件，欢迎咨询洽谈。

We provide different grades (from high to low performance) sintered magnets with perfect uniformity and consistency and manufacture varieties of permanent magnets in block, disc, ring, arc, sphere etc and magnetic assemblies according to customers' requirements, please contact us to get details.

直线电机 Linear Motor



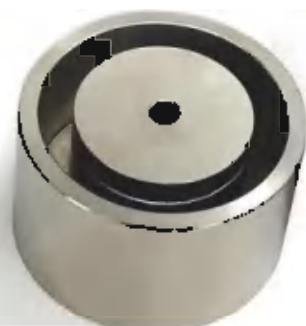
U型直线电机 U shape Linear Motor

平板直线电机 Flat Linear Motor

直线电机是将电能直接转化为直线机械运动的装置。由于无中间机械转化机构，因此它的结构简单，元器件少，对机械加工的要求低，实现了无摩擦、零间隙转动。在计算机和功率元件的控制下，能够轻易实现高速和高加速直线运动，从而提高工业设备的速度和效率。

Direct drive linear motors have high force density, high stiffness, enable extremely smooth velocity control and require minimal maintenance. It typically consists of magnet track and magnets, with very good acceleration capabilities and short settling times, which make them ideal for precise, rapid movements.

音圈电机 Voice coil motor



圆柱型音圈电机的工作原理：利用线圈中的电流与永磁体相互作用产生推力，实现直线运动，具有范围广、低移动负载、快速响应、高加速度的特点；通常应用于高频运动；当与高分辨率的编码器配合应用时，精度可达到亚微米级。

The working principle of cylindrical voice coil motor is that the current in the coil interacts with the permanent magnet to generate thrust and realize linear motion, which has the characteristics of wide range, low moving mass, fast response and high acceleration; It is usually used in high frequency motion; When worked with high resolution linear encoders, the precision can reach sub-micron level in positional control.

产品特点:

- 直接驱动
- 零齿槽、零齿隙和零滞后
- 高峰力和持续力
- 多种直径尺寸和力选项
- 快速响应，低移动质量
- 磁芯与线圈运动不接触
- 卓越的可靠性

Product Features:

- Direct drive
- Zero Cogging, zero backlash and zero hysteresis
- High Peak force and Continuous force
- Multiple Diameter sizes and force options
- Fast response, low moving mass
- Non contact between core and coil movement
- Excellent reliability

磁性联轴器 Magnetic Couplings

工作原理:

永磁联轴器是通过永磁体的磁力将原动机与工作机联接起来的一种新型联轴器。它无需重叠的机械联接，而是利用稀土永磁体之间的相互作用，利用磁场可穿透一定的空间距离和物质材料的特性，进行机械能量的传递。永磁联轴器的出现，彻底解决了某些机械装置中动密封存在的泄漏问题。

Magnetic coupling is a new generation of coupling, which by using the power generated by permanent magnets to transmit drive torque. It consists of external rotor, internal rotor and isolating cover.

Magnetic coupling was widely used in pump and agitator systems to isolate the electric motor drive from highly toxic and/or aggressive liquids. This has the advantage of removing dynamic seals which have a finite lifetime and are prone to leakage. They replace mechanical seals with a complete and air-tight static permanent seal. Magnetic couplings can also be used as a torque limiter to protect system drive components.



消费电子无线充电器 Consumer Electronics Wireless



无线充电由发射器和接收器组成，这种结构类似于变压器。

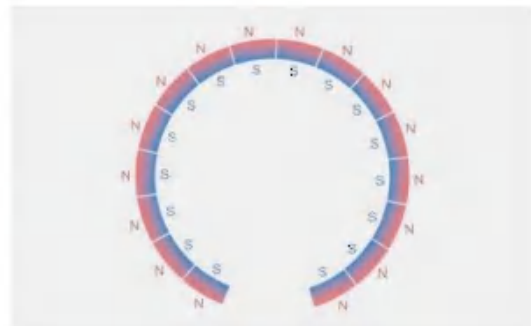
无线接收线圈的外围集成了一圈磁铁阵列，实现了与其他磁性附件的自动对准和吸附，从而提高了无线充电器的无线接收效率，充电效率大大提高。

Wireless charging consists of a transmitter and a receiver. The structure is similar to a transformer.

A dense array of magnets is integrated on the periphery of the wireless receiving coil to achieve automatic alignment and adsorption with other magnetic accessories, thereby improving the wireless receiving efficiency of wireless charger, which gave much higher charging efficiency.

产品特点/Product Features:

- 小巧轻便 Small and light
- 自动对齐 Automatically aligning
- 吸附牢固 Attaching firmly



海尔贝克阵列 Halbach Array



海尔贝克阵列是一种特殊的永磁体排列，它会显著增强阵列一侧的磁场，而在另一侧产生接近零的磁场，这是通过阵列中相邻磁铁的磁化方向的旋转变化来实现的。

海尔贝克阵列在一定区域内会产生较高而均匀的磁场，其产生的磁场强度会超过磁性材料本身的剩磁。

A Halbach Array is a special arrangement of permanent magnets that augments the magnetic field on one side of the array while reducing the field to near zero on the other side. This was achieved by having a spatially rotating of magnetization

High and uniform magnetic field will be produced by Halbach array in a certain area, and its magnetic field can also exceed the Remanence of the magnetic material itself.

应用领域:

线性海尔贝克阵列:

如无刷交流电机、声控线圈、磁性药物靶向等高技术应用，如用于粒子加速器和自由电子激光器的摆动磁铁。

圆形海尔贝克阵列:

如无刷交流电机、磁力联轴器、高磁场缸等。

Application:

Linear Halbach Arrays:

Such as the brushless AC motor, voice coils, magnetic drug targeting to high-tech applications, such as wiggler magnets which are used in Particle accelerators and Free-electron lasers.

Cylinder Halbach Arrays:

Such as brushless AC motors, magnetic couplings and high field cylinders.

磁力棒 Magnetic Rod

磁棒主要应用于磁力架构成的磁性分离器中，其由高性能磁铁和不锈钢管通过组装、焊接和抛光加工而成，也被称为磁棒，磁性过滤棒等。其可以有效的吸除松散的或者流动的原料中的铁杂质和金属小颗粒。

最高表磁/Surface Gauss: 8000-13000 Gs

Magnetic rod, the main part of different magnetic grate separators, are made from high power magnets and stainless tube by well welding and polishing, they are also named magnetic rod, magnetic bar, magnetic filter bar etc. they can effectively remove ferrous chips and metal particles from loosely packed, free flowing materials.



定制化磁性组件产品 Custom-made magnetic system product

从2009年开始，同创已批量供货磁性器件给国内外客户，根据客户不同的尺寸和要求，我可提供全流程服务，从咨询，设计，打样到批量生产；如您有任何疑问，请联系我们销售工程师。

TC start to supply magnetic system products since 2009, we can provide a complete service from consult, design, sampling to bulk production, and we are happy to answer any your questions about our products, Should you have any questions, please contact our professional sales engineer.



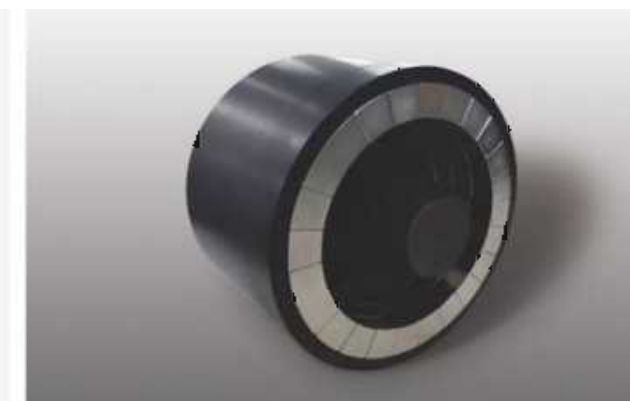
吸盘 Pot Magnet



方形沉孔吸盘 Rectangular Pot Magnet



磁性转子 Magnetic Rotor



平板电脑磁组件 Tablet computer magnetic assembly



作为中科院宁波材料所的战略研发伙伴，同创持续投入资金致力于新产品新工艺的研发，可根据用户的特殊要求而提供特制的磁体产品，包括磁体组件的设计和技术支持，从磁体的耐腐蚀性、耐高温性能、亲水性、粘接性到批次间一致性都可以得到稳妥的解决。

同创开发的高性能磁体，以性能优异、价格合理而得到客户的广泛认可，并成为众多世界500强企业的主要供应商。

As the strategic partner of NIMTE (Branch of Chinese Academy of Sciences, which engage in the R&D of NdFeB magnet), TC invests lot of money on the researching and developing new technics and new products, and can supply not only customized magnets as per particular requirements, but also magnetic assembly consult service and technical support.

Our high-performance products were famous for excellent performance and reasonable cost, which were highly praised by our top 500 enterprise clients.



家用电器 Home Appliances



工业电机 Industrial Motor



风力发电机 Wind Power Generator



电梯 Elevator



消费电子 Consumer Electronics



核磁共振 MRI (Magnetic Resonance Imaging)

点火线圈
Ignition coil

轮毂电机
In-Wheel Motor

电动汽车驱动电机
EV Motor

天窗电机
Roof motor

启动电机
Starting motor

变速箱
Transmission case

后门电机
Motor of the back door

动力方向盘电机
EPS

座位电动调整电机
Electrical regulated machine of the seat

雨刷电机
Wiper motor

窗户开关电机
Power window motor

汽车领域 Automobile