

MRI 屏蔽设备

MRI shielding enclosures

保证图像质量，与世界领先的屏蔽技术齐头并进

Protecting Image Quality with the World's Leading Shielding Technology

一个 MRI 设备的建成，必须具备专业的知识，实际的经验，并有先进的设计理念支持，从而才能满足客户需求。

A great MRI facility is built with proven expertise, practical experience, and progressive design ideas which support customer needs.

与世界上其他的 MRI 屏蔽设备生产厂家相比，CNEMC 自 2003 年成立以来已经成为此行业的领头人。我们的屏蔽系统既有标准型，也可根据顾客需求以及 MRI 屏蔽技术的发展特别制造。

As the manufacturer of more MRI shielded enclosures than any other shielding supplier worldwide, CNEMC has been at the cornerstone of the MRI industry since 1984. Our modular copper RF and custombuilt RF/magnetic shielding systems have set the standard for shielded MRI enclosure technology and accessory development.

根据我们的经验，并提供给您可靠的屏蔽解决方案，优秀的施工质量，以及热情的服务，通过我们专业的销售专家和项目经理给您的保证与信心，让您的影像诊断设备得以正确的运行，不受电磁干扰/射频干扰。

Our experience in delivering reliable shielding solutions, quality construction, and courteous service through our knowledgeable

sales specialists and project managers gives you the assurance and confidence that your diagnostic imaging facility will be properly executed and protected from EMI/RFI interference sources.

我们的安装团队可提供 15 年的使用证明和无与伦比的 300 万小时有效和可靠的服务
Our installed base collectively represents approximately 15,000 plus years of proven use and an unparalleled 30 million plus hours of effective and reliable service.



运用建屏蔽材料与工程学专业知 识，并辅之以一个高度专业的工作人 员和安装队伍，CNEMC 的屏蔽 设备能为您提供超过二十年的可靠性能。劣质屏蔽产品可能会影响屏蔽的完整性和可用性，但 CNEMC 一直在提供最高质量的产品和无与伦比的服务口碑上保持其领导地位。

Constructed of superior shielding materials with indepth engineering know-how, supported by a highly professional staff and installation team, CNEMC's shielded enclosures have provided reliable performance for more than two decades. While inferior shielded enclosures will suffer loss of shielding integrity and serviceability, CNEMC has maintained its leadership by providing the highest quality product and an unequalled service reputation.

了解市场

Understanding the Market

CNEMC 同所有 MRI 设备制造商和各医疗机构密切合作，以满足 MRI 设备和特殊建筑要求的客户需要。屏蔽设备不应妨碍 MRI 成像设施的性能，并能达到外观、公开性、病人安放和美学相结合的理想水平。同时，外壳设计必须具有弹性，在保证质量的同时，也要使其具备性能可靠，操作方便的特点。

CNEMC has worked closely with all MRI equipment manufacturers and the various medical organizations to satisfy the imaging equipment needs and the special architectural requirements of our customers. A shielded enclosure should not hinder one's ability to achieve the appearance, openness and patient setting or aesthetics desired by the imaging facility. Rather, the enclosure design must be flexible while providing performance, reliability, operational ease, and assured quality.

为保证屏蔽的完整性，改善操作，并减轻病人的顾虑，CNEMC 引入了许多创新。其中很多来自工程主管、技术员、建筑师、及影像设备供应商的灵感和审美观念，都在 CNEMC 屏蔽设备中有直接体现。CNEMC has introduced many innovations for assuring shielding integrity, improving operator use, and easing patient apprehension. Many of these inspired and aesthetic ideas have been a direct result of input from facility directors, technicians, architects, and imaging equipment providers.



设计和技术支持

Design and Technical Assistance

在规划 MRI 设备阶段，CNEMC 提供一个专一的工程学、制造业和测试/服务队伍来评估你的屏蔽需要，建立设计规范，为您解决独特的电磁/射频干扰问题。

During the planning phases of an MRI facility, CNEMC provides a single source engineering, manufacturing, and

testing/service team to evaluate your shielding needs, establish design specifications, and solve unique EMI/RFI problems.

我们在设计屏蔽设备时，将为建筑师和最终用户提供颇有价值的协助，以适应 MRI 设备的规格，同时满足 MRI 设备的所有功能和审美需求。为推动这项工作，我们提供一个全面的建筑用地规划指南，其中概述了实用的设计考量、兴建详情及屏蔽设备规格说明。

We provide valuable assistance to both the architects and end users in designing a shielded enclosure that accommodates MRI system specifications while meeting all of the functional and aesthetic requirements of the facility. To facilitate this, we offer a comprehensive Architectural Site Planning Guide, which outlines practical design considerations, details of construction, and specifications for the planning of a shielded enclosure for a diagnostic imaging facility.

工程建设和安装

Project Engineering and Installation

CNEMC 的服务包括提供事先提供一个符合实际的详细而实用的施工图，以保证安装的准确性，减少现场安装时间。

Services available from CNEMC include providing generated shop drawings for architectural approval prior to fabrication, along with interface details to ensure installation accuracy and minimize the installation time on-site.

CNEMC 的一个项目经理与我们的客户负责协调所有工程和安装活动，以妥善处理项目的各个方面和工程进度时间表。每个屏蔽装置的安装，都由 CNEMC 技术训练有素的、并在测试设备和射频学上说有丰富经验的，以及熟悉施工环境和工程的细节的主管监督完成。

An CNEMC project manager coordinates all engineering and installation activities with our customers to properly phase all aspects of the project and meet critical schedule dates. Each shielding installation is managed on-site by an CNEMC technically trained installation supervisor who has experience in a broad range of test equipment and RF theory, as well as a familiarity with the construction environment and project details.

CNEMC 的客户将受益于我们细致周到的服务，并能定制屏蔽设备及零件，以满足各种现场条件。CNEMC customers benefit from our painstaking attention to detail and ability to customize our shielded enclosures and components to meet a variety of field conditions.

我们的总部设在石家庄，并在全国各地设有制造和销售办事处。CNEMC 的优越地理位置，保证了其产品在各地市场的供应。我们 MRI 系统供应商保持联络，以确保我们在所有的国内市场的全方位服务能力。

With headquarters in Shijiazhuang, and manufacturing and sales offices throughout the world, CNEMC is ideally positioned to support its offerings in mark CNEMC throughout the China. We also maintain relationships with all overseas MRI system providers to ensure that our full service capabilities are available in internal mark CNEMC.

引领技术走向更高层次

Moving the Technology to the Next Level

MRI 的技术和应用，在临床和科研的上，都在不断演变。我们的研究和开发团队正在不断探索屏蔽技术，材料和应用的新发展。

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The application and technology of MRI, in both clinical and research settings, are constantly evolving. Our research and development group are continually exploring new developments in shielding techniques, materials, and applications.



保护图像质量与正确构建屏蔽系统

Retaining Image Quality with a Properly Constructed Shielding System

MRI 的屏蔽，正确的设计和围护施工对于长期确保图像质量至关重要。
In MRI shielding, proper design and enclosure construction is critical for ensuring long term image quality.

在确定 MRI 屏蔽的时候有几个因素需要考虑:使用材料类型、施工方法、焊缝质量、屏蔽渗透，并结合屏蔽系统和组件与周边环境。上述任何一个因素应用不当，都可造成 RF 干扰，造成的图像缺陷。此外，磁场泄漏也可能对周围的人员和设备的安全和操作构成威胁。

There are several factors to consider when specifying an MRI shielded enclosure: the type of materials used, method of construction, seam quality, penetrations of the shield, and the integration of the shielding systems and components with the surrounding environment. Improper application in any of these areas can cause RF interference, resulting in flawed images. Additionally, magnetic field leakage can represent a safety or operational concern for the surrounding personnel and equipment.

我们的经验、施工记录和透彻的屏蔽原则知识，引领 MRI 工业屏蔽设备开发最符合成本效益的施工方法。

Our experience, track record and thorough knowledge of shielding principles have led to the
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development of the most cost-effective methods of construction for shielded enclosures for the MRI industry.

铜制 RF 屏蔽结构

Copper RF Shielded Construction

我们的医用等级铜制 RF 屏蔽外壳采用了最高等级的纯铜。由于其优越的柔韧性，导电性和耐腐蚀性，铜远远超过其他材料，如极易氧化和化学腐蚀的镀锌钢或铝。我们预制的墙和天花板都是拼装在一起，而在里面形成一个完全独立的屏蔽室，并尽量减少现场安装时间。这个富有弹性的系统使其能够弥补中等地震活动造成的地基平整和膨胀。

Our medical grade copper RF shielded enclosure uses the highest grade of pure copper. Because of its superior pliability, conductivity and corrosion resistance, copper far excels over other materials such as galvanized steel or aluminum, which are vulnerable to oxidation and chemical attack. Our prefabricated wall and ceiling panels are bolted together from the inside to form a completely freestanding shielded room, and to minimize on-site installation time. The resilient framing system of the shield permits it to compensate for foundation leveling and expansion as well as moderate seismic activity.



集成 RF 和电磁屏蔽的屏蔽结构

Integrated RF/Magnetic Shielded Construction

CNEMC的集成RF和电磁屏蔽的屏蔽设备，是最符合成本效益，最可靠的系统/解决方案，能够同时满足RF和电磁屏蔽的要求。策略性地运用磁场屏蔽材料，以减少和遏制磁场作用，同时保护成像设备免受外部RF干扰。CNEMC安装的磁屏蔽罩，在某些情况下，重量超过250吨，符合AISC、ASTM、OSHPOD钢结构规格要求，满足四级地震的需求。

CNEMC's integrated RF/magnetic shielded enclosure is the most cost-effective and reliable system/solution for satisfying both RF and magnetic shielding requirements. CNEMC utilizes strategically placed magnetic shielding materials to minimize and contain the effects of the magnetic field, while protecting the imaging equipment from outside RF interference. CNEMC has installed magnetic shielded enclosures, in some cases with weights in excess of 250 tons, which conform to AISC and ASTM steel construction specifications along with meeting OSHPOD and Seismic Zone 4 requirements.

RF门的常规建筑类型

Conventional Architecturally Styled RF Doors

为了加强建筑风格与临床 MRI 套房的协调与美感，CNEMC 的常规 MRI RF 门提供了一个完美的解决方案，以满足轻量级、机械操作但拥有较高性能的屏蔽门需要。配有一个近似平坦的门槛，使运送病人出入 MRI 套房平稳而省力。



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Designed to enhance the architectural style and beauty of the clinical MRI suite, CNEMC's conventional MRI RF door offers a perfect solution to the need for a lightweight, mechanically operated, yet high performance shielded door. With a near-flat threshold, patient transport into and out of the MRI suite is smooth and effortless.

品质卓越的透明 RF 窗户

Excellent RF Window Clarity

CNEMC RF 窗户，提供业界最佳屏蔽性能的同时保证其清晰度。此窗的设计如同观察窗一样清晰透明，它包含双层谨慎导向的 RF 筛网，尽量减少莫尔图的失真，并防止灰尘和颗粒的积聚。CNEMC



的 RF 窗户同样可用作天窗、通风窗或者观察窗。CNEMC RF windows offer the industry's best combination of shielding performance and clarity. The patented window design contains a double layer of carefully oriented RF mesh screens to provide transparent like views, minimize moire pattern distortion, and prevent dust and particle buildup. CNEMC's RF window can also be used as a skylight, clearstory window, or observation window.

RF 滤波器和通风波导附件

RF Filters and Waveguide Accessories



CNEMC 拥有一个经 UL 认证的完整产品生产线，包括电源/信号滤波器、波导通气孔、所有电气流入接口、机械及穿透屏蔽外壳管道。

CNEMC manufactures a complete line of UL certified power/signal line filters along with waveguide air vents and feedthrus to interface with all electrical, mechanical, and plumbing penetrations of the shielded enclosure.

可根据客户需要特别设计定制

Customized Capabilities to Fit Your Design Needs

CNEMC 先进的施工技术和特色，提供无与伦比的设计自由度和灵活性，以满足扩大功能和适合您的设备的要求。

CNEMC's advanced construction techniques and features provide unparalleled design freedom and

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versatility, allowing you to expand the functionality and appeal of your facility.



CNEMC 擅长设计、建造和测试，在各种不同的配置情况下，满足高、中和低场磁体的应用需求。我们广泛的制造技术和产品生产能力，反映了我们在这方面的经验；而我们取得的经验也让我们在解决独特的屏蔽问题上不断进步。我们的工程师拥有所有 MRI 系统及其应用的第一手的经验。我们将会对工作环境的保持、建筑结构问题、周围电磁/射频干扰情况、工程预算、未来需求，以及 MRI 设备寿命等诸多方面进行考虑，以便为不同的磁场强度提供最佳的材料和设计方案。结合这些因素，CNEMC 与其他其他声称充分延长产品寿命的屏蔽供应商相比，将提供具有高度可靠的屏蔽性能的产品。

CNEMC specializes in designing, building, and testing facilities for high, mid and low field magnet application needs in a variety of configurations. Our wide array of technical manufacturing and product capabilities reflects the experience we have gained in solving unique shielding problems. Our engineers have firsthand experience with all MRI systems and their applications. We offer the optimum design and materials for various field strengths, maintaining consideration for the working environment, structural issues, ambient EMI/RFI conditions, budget, future requirements, and MRI equipment life expectancy. By combining these factors, CNEMC delivers a highly reliable product with shielding performance designed to substantially outlast products offered by other shielding enclosure suppliers.

超导磁体系统

Superconducting Magnet Systems

超导 MRI 系统，包括中场和高场磁体，范围通常从 0.5 特斯拉到几个特斯拉。由于信噪比例的增加，3.0 特斯拉和更高单位的新型永磁技术(全身扫描)变得越来越流行。一些活跃的屏蔽磁铁对靠近的有色金

属反应敏感，可能会引起某些例如镀锌 RF 地板等组件制造不稳定问题。而 CNEMC 的 RF 屏蔽系统，是由有色纯铜制成，从而使 RF 屏蔽不会影响到磁铁。

Superconducting MRI systems include mid and high field magn CNEMC, typically ranging from 0.5 tesla to several tesla. Newer magnet technology has 3.0 Tesla and higher (whole body scanners), which are becoming more prevalent due to greater signal-to-noise ratios. Some actively shielded magnCNEMC are sensitive to having ferrous metal too close, caused by such components as a galvanized RF floor, which can create instability problems. CNEMC's RF shielding system, made of non-ferrous pure copper, provides RF shielding which will not affect the magnet.



CNEMC 不仅考虑到保护环境，使其不受磁铁本身和外界磁铁干扰，更考虑到图象质量均匀性、磁力反应线圈、磁体锚固要求、磁体性能要求等方面，在设计 MRI 设备时，从真正意义上为您提供最全面的协助。

Cognizant not only of the need to shield the environment from the magnet and shield the magnet from the environment, but also of the implications to image volume homogeneity, coil reaction to magnetic forces, magnet anchoring requirements, and service needs of the magnet, CNEMC truly provides the most comprehensive assistance in planning your MRI facility.

开放的磁体系统

Open Magnet Systems

开放系统是为了降低磁场强度单位，需要的空间较小，设计也应更合理。他们对周围由于汽车、电梯、火车、变压器和开关设备的移动造成的直流或交流磁场波动也更敏感。

Open systems are lower field strength units, requiring less space and designed to be more affordable. They are also more sensitive to ambient magnetic AC and DC field fluctuations created by moving cars, elevators, trains, and electrical transformers and switchgear.

CNEMC 的专业磁屏蔽和纠正补偿体系的技术，保护 MRI 系统不受以上磁场波动影响。我们能够提供精密的测试仪器，以评估磁场波动水平，并提供力所能及的屏蔽设计和解决方案。

CNEMC has developed extensive expertise in specialized magnetic shielding and corrective compensation systems to protect MRI systems from these field fluctuations. We can offer assistance with highly sophisticated testing equipment for evaluating the level of magnetic field fluctuations, along with providing possible shielding designs and solutions.



MRI的介入申请系统

MRI Guided Interventional Applications

MRI 的介入申请系统，是 MRI 设备应用中最新和最有前途的发展领域代表之一。依靠 MRI 设备提供的成像诊断功能，外科医生可以随时真切的观察和查看诊断结果。CNEMC 在屏蔽设备上的先进技术，帮您保护医疗设备，保证您在手术时设备的高可靠性能。

MRI guided interventional applications represent one of the newest and most promising areas of growth in MRI uses. With the assistance of the diagnostic imaging capabilities provided by MRI, surgeons can visually investigate and view the results of their actions in real time. CNEMC can help you safeguard your investment in this advanced technology by providing an enclosure that will perform with the highest available reliability during surgical procedures.

如同任何手术一样，维持一个高度无菌环境的关键是要预防感染源的介入。我们的自动密封 RF 门，在让大多数消过毒的病人进入 RF 屏蔽外科手术室时，发挥了关键作用。

As in any surgical setting, the need for maintaining a highly sterile environment is critical to the prevention of infection in interventional applications. Our AutoSeal RF door is playing a key role by offering the most sterile patient accessway into RF shielded surgical suites.

MRI 屏蔽设备的升级和服务

MRI Shielded Enclosure Upgrades and Services

除了设计和安装 MRI 系统之外，CNEMC 为现有屏蔽室提供升级服务，以适应新的磁体系统。这些升级，往往需要改变磁体界面，并进行测试，以诊断是否初期及后期的修改工作影响了设备性能。如有必要，我们将负责维修或更换关键 RF 元件、包括门窗、RF 滤波器和波导。我们经验丰富的服务人员在诊断并修复 RF 泄漏上拥有高超的技术，除此之外还能检查和现场维修破旧的门窗等。

In addition to designing and installing MRI shielding systems, CNEMC provides services for upgrading existing shielded rooms to accommodate new magnet systems. These upgrades often require the magnet interface to be changed, and call for testing to diagnose whether initial and post modification work has adversely affected performance. If needed, we will repair or replace critical RF components, including doors, windows, RF filters, and waveguides. Our experienced service personnel are highly skilled in their ability to diagnose and repair RF leakage, in addition to providing inspection and field maintenance of worn door components.

我们拥有自己的试验设备和能力，使 CNEMC 更有效率的诊断 RF 与地面绝缘的问题。此外，在交流/直流磁场测试时，采用三轴高斯计和磁门磁力仪与计算机数据采集系统，使我们能够以更有效的服务于我们的客户和 MRI 供应商。

Having our own in-house test capabilities and equipment has enabled CNEMC to diagnose RF and ground isolation problems more efficiently. Additionally, AC/DC magnetic field testing, using 3-axis gaussmeters and fluxgate magnetometers with a computerized data collection system, enables us to more effectively service not only our customers but the MRI suppliers as well.

其他医学屏蔽应用系统

Other Medical Shielding Applications

我们广泛的经验使我们能够为更多的其他医疗屏蔽服务，如：

Our breadth of experience enables us to service such additional medical shielding applications as

- 磁源成像 MSL
- 正电子放射摄影仪 PET
- 心电图仪 ECG
- 脑电图仪 EMG
- 经尿道微波热疗 TUMT
- 苍白球切开术 Pallidotomy
- 热疗 Hyperthermia
- 生理和睡眠障碍实验室 Physiological and sleep disorder labs