# CASE STUDY MOUNT SINAI UNION SQUARE, NEW YORK CITY, NEW YORK

ETS-Lindgren recently upgraded its Magnetic Active Compensation System (MACS™) to the latest generation, the MACS/D™, at the Mount Sinai Union Square New York, New York location. Mount Sinai, which is comprised of several medical campuses throughout the New York City area, is renowned for their premier facilities delivering the highest level of patient care. As with other major metropolitan areas, New York City presents environmental challenges to medical institutions attempting to deliver premier healthcare. To address these challenges, Mount Sinai Union Square, in collaboration with ETS-Lindgren, incorporated Magnetic Active Compensation Systems on the facility's Magnetic Resonance Imaging (MRI) systems several years ago, which ensured Mount Sinai Union Square was able to utilize all imaging options available on the MRIs. As a result, Mount Sinai Union Square was able to provide its renowned high quality care to all patients.

As an industry leader with over 100 high performance MACS MRI installations worldwide, introduction of the latest generation MACS/D system advances ETS-Lindgren to the preeminent status of sourcing the world's foremost active compensation system, specifically tailored for MRI sites.

## Environmental Effects on Imaging

Mount Sinai's Union Square location is an example of a facility with a challenging environment that affects the ability of a facility to deliver the desired patient care. Several subway lines converge at Union Square generating a high level of electromagnetic interference (EMI) that may adversely impact some imaging modalities, including MRIs. EMI most commonly results in artifacts that obscure the images produced by the MRI facility. Clear images are essential for proper patient diagnoses and treatments. Subways, elevators, moving vehicles, magnetic navigation systems, and electrical distribution equipment, all of which are present at the Mount Sinai Union Square location, may cause fluctuations in magnetic fields. Rather than accept that the environment could limit the functionality of its MRIs and patient services, Mount Sinai Union Square explored solutions. ETS-Lindgren's MACS/D was the ideal solution for high power compensation to correct the magnetic EMI found in the extreme environment of Mount Sinai Union Square.

## Magnetic Active Compensation System – The Latest Generation

ETS-Lindgren's wideband digital Magnetic Active Compensation System (MACS/D™) is a tri-axial magnetic field compensator designed to attenuate environmental magnetic fields adversely affecting the image quality of MRIs and other imaging modalities. Incorporating patented ACR technology, the MACS/D provides higher compensation at the magnet's isocenter than other active compensation systems, with effective shielding factors at isocenter of up to 350. Custom high-power coil drivers provide constant attenuation over a wide dynamic range that can extend to ±45 μTesla (±450 mGauss) with standard coil sets in each of the three axes. Additionally, the MACS/D high-efficiency, low-dissipation, coil-driver amplifier ensures long-term system reliability at sites with frequent high-level interfering field levels.

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## Implementation at Mount Sinai Union Square

In March 2020, ETS-Lindgren provided an upgrade of one of the MACS systems at Mount Sinai Union Square to the latest MACS version, the MACS/D. The new MACS/D is on a digital platform enabling superior imaging as well as flexibility for future product enhancements. In the case of Mount Sinai Union Square, the MACS/D provided a higher level of performance, providing incremental improvements to the electromagnetic environment and ensuring the continued high quality of MRI images. In addition, the upgraded software of the MACS/D utilizes networking capabilities to monitor system performance as well as provides the capability for remote diagnostics, troubleshooting, and repair. The upgrade to the MACS/D places Mount Sinai Union Square on the latest platform contributing to its superior patient care. The MACS/D is compatible with all magnets, from 0.2T to 3T and higher, superconducting or resistive.

Mount Sinai Union Square staff appreciated the password-protected access to MACS/D standard and advanced operational parameters, DSP coefficients and system configuration. VPN client support ensured secure remote data logging and diagnostics as well as convenient downloading of future software upgrades, maximizing long-term utility.

## Summary

ETS-Lindgren performed on site surveys at Mount Sinai Union Square to quantify the magnitude of environmental interference at the MRI facility. The OEM verified there was a significant impact to the 1.5T magnet from the electromagnetic interference created by the subway station located below the MRI facility. The MACS/D approach was a cost-effective and practical solution to address high performance attenuation of dynamic environmental magnetic fields. Following the MACS/D installation, ETS-Lindgren met with Mount Sinai Union Square staff to confirm performance improvement and functionality of the 1.5T magnet. Working in partnership with Mount Sinai Union Square and the 1.5T magnet provider resulted in the desired outcome of images free from RF artifacts. Mount Sinai Union Square personnel benefited from the high quality clear images now produced by the magnet; they are diagnosing patients with confidence and providing the high quality care for which they are well-known.

## About ETS-Lindgren

ETS-Lindgren is an international manufacturer of components and systems that measure, shield, and control electromagnetic and acoustic energy. The company's products are used for electromagnetic compatibility (EMC), microwave and wireless testing, electromagnetic field (EMF) measurement, radio frequency (RF) personal safety monitoring, magnetic resonance imaging (MRI), and control of acoustic environments.

Headquartered in Cedar Park, Texas, ETS-Lindgren has manufacturing facilities in North America, Europe, and Asia. More information about ETS-Lindgren is available at www.ets-lindgren.com. Additional information about ETS-Lindgren's parent company ESCO and its subsidiaries is available at www.escotechnologies.com.

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