



RF & ELECTROMAGNETIC SHIELDING EXPERTS



EMI, EMP, & HEMP SOLUTIONS FOR CRITICAL INFRASTRUCTURE

Shielding products and services to maintain a resilient critical infrastructure.

1.724.352.8100



gavenindustries.com



THREATS TO CRITICAL INFRASTRUCTURE

Whether caused by man or nature, electromagnetic pulse (EMP), geomagnetic disturbance (GMD), and other electromagnetic interference (EMI / IEMI) events have the potential to disrupt and permanently damage electrical components and entire systems within most critical infrastructure sectors and impact large-scale infrastructure. While EMP hardening standards exist for military applications, they are often too case-specific, expensive, and impractical for the private sector to implement, leading to very little action being taken to address this threat, despite it having the potential to affect the nation at large.”
Department of Homeland Security, Office of Science and Technology.

ABOUT US

For nearly 40 years Gaven has established itself as the leader and expert in complex shielding; specializing in HEMP, EMP, RF, and IEMI protection. We offer a wide range of standard structure and shelter solutions as well as enclosure products. Additionally, our expertise cuts the guesswork out of complex shielding needs whether large or small.

Gaven has wide-spanning expertise throughout the 16 critical infrastructure sectors, including public and private entities. Gaven's HEMP structures are used to help maintain a resilient critical infrastructure. We have partnered with energy companies, telecom providers, data centers, water & wastewater, transportation, and more.



DESIGN & CONSULTATION

- In-house drafting and modeling
- Products designed to meet and exceed test standards
- Lifecycle survivability analysis
- A/E & prime contractor partnership
- Complete BIM coordination



TESTED & VERIFIED STANDARD PRODUCTS

- Acceptance & Verification test capabilities
- Lifecycle Capabilities such as preventative maintenance services and Hardness Surveillance



INSTALLATION, INTEGRATION, & CONSTRUCTION

- Project management
- Construction management
- Trade-partner coordination
- Onsite installation specialists and quality management

HEMP/EMP VULNERABILITIES



SCADA CONTROL & OPERATIONS CENTERS

While no utility infrastructure system or process is a true single point of failure, the ability to meet service delivery needs starts within the SCADA or operations center. These facilities greatly benefit from strategic planning and tactical implementation of an EMP and EMI protection plan.

BACKUP POWER GENERATORS

The ability to operate through an electromagnetic event such as EMP, HEMP, or IEMI depends on the availability of power. To power your critical systems and processes through a power interruption, a generator can only guarantee continuity if the processor-controlled systems are adequately shielded and filtered.

LEGACY SUBSTATIONS & UTILITY DELIVERY SYSTEMS

No critical infrastructure mechanism or operation is at greater risk from EMP, IEMI, GMD, or even physical destruction than our nation's substation and utility delivery systems. These crucial sites can be protected by even basic risk-mitigation steps.

CRITICAL EQUIPMENT FACILITIES

Critical assets such as equipment and sub-systems are those that, if damaged, can significantly impair an organization's ability to safely meet production requirements or negatively impact delivery and quality level. Shielding and protecting these sites offer a comprehensive E-threat risk mitigation strategy.

DATA CENTERS & CRITICAL COMPUTING

Outside of the energy sector, the key infrastructure mechanisms in our daily lives are data centers and critical computing. These crucial components manage the second-to-second viability of mission-critical interconnected systems – regardless of the sector.

DISASTER RECOVERY OPERATIONS & EMERGENCY SERVICES

In the event of an EMI/EMP, maintaining public safety and the ability to recover relies on the availability of survivable equipment. Whether hardened or stored as spares, these critical components and electronics are needed to preserve human life and repair critical systems.





MODULAR SHIELDED STRUCTURES

Gaven's HEMP-shielded Modular Enclosure System is designed to rapidly deploy a HEMP-shielded structure or enclosure that is proven to meet or exceed stringent EMI and RFI shielding requirements such as those within MIL-STD 188-125-1/-1A/-2 and NSA 94-106. The system is designed to be as large or small as required while maintaining transportability. The fast installation and mobility of the system make it more cost-effective and agile in many cases than a traditional stick-built or mechanically fastened solution. The entire system can be optioned to include features that account for CBRN applications.

The Modular Enclosure System uses three main components to assemble a facility system that is scalable to mission or operational needs such as workspaces, communications facilities, command facilities such as C2 or C4ISR / C5ISR, data and computing centers, and operations centers such as SCADA rooms.



MODULAR STRUCTURE COMPONENTS

1



ENCLOSURES

Gaven's Modular Enclosure System offers a lower cost and faster installation than more complex fixed-site builds. Deployable in a substation or at TOCC to provide an EMI, RFI, or HEMP-shielded enclosure that exceeds MIL-STD 188-125 standards without complex design or time associated with installation.

- ISO transportable design
- Available in 20' or 40' options
- Designed with airflow waveguide options
- Includes power filters, shielded door, and emergency exit hatch

2

VESTIBULES

Gaven's Personnel Entry Vestibule provides a clean entry option allowing interlock of doors to other enclosures. It also serves as a passageway for traffic between enclosures.

- Includes power and wiring infrastructure
- Includes shielded door for clean entry during daily use
- ISO transportable
- Shown with included shipping covers



3



FLEXIBLE CONNECTING LINKS

Gaven's patented Flexible Connect Link allows for system components to be easily interconnected. Additionally, the flexible connection allows shielding integrity to survive slight seismic shifts and settling.

- Flexible design mitigates small movement and shifting foundation and non-level placement
- Field deployable to both permanent and temporary locations
- Includes floor plate for a sturdy and flat interior surface
- Shown with included shipping covers

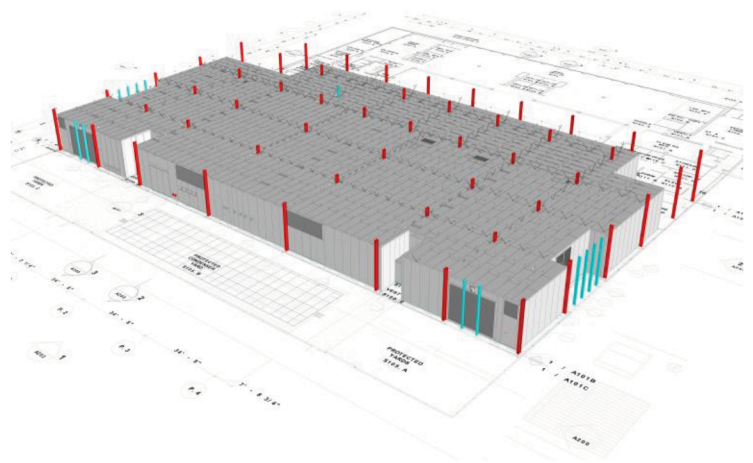


PREFABRICATED FIXED-SITE STRUCTURES

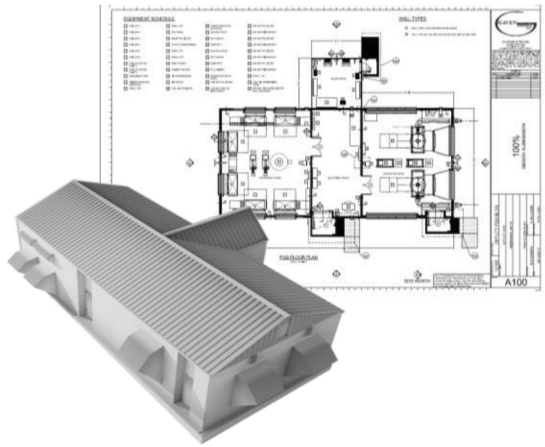
The installation of shielding for an entire facility after the envelope is complete can take significant time. The traditional stick-build method is both costly and time-consuming on-site. Gaven's approach is a prefabricated system that can integrate the shielding directly into the envelope itself, so when the facility envelope is complete, the shielding is also complete. This approach, using steel-form tilt-up panels utilizes methods that are familiar to many general contractors and adds a welding step for seams of the tilt-up panels to integrate the shielding with adjacent walls, floors, and ceiling panels.

PREFABRICATED SHIELD SYSTEM

- Designed to achieve up to 100 dB of shielding effectiveness by integrating continuously welded seams
- Fastest construction time solution with simple tilt and weld on-site design
- Available in multiple panel sizes for height and width
- Used in current project sites with over 30,000 square feet of shield volume
- Can be installed at new facility sites as well as into existing structures



PREFABRICATED FIXED-SITE CAPABILITIES

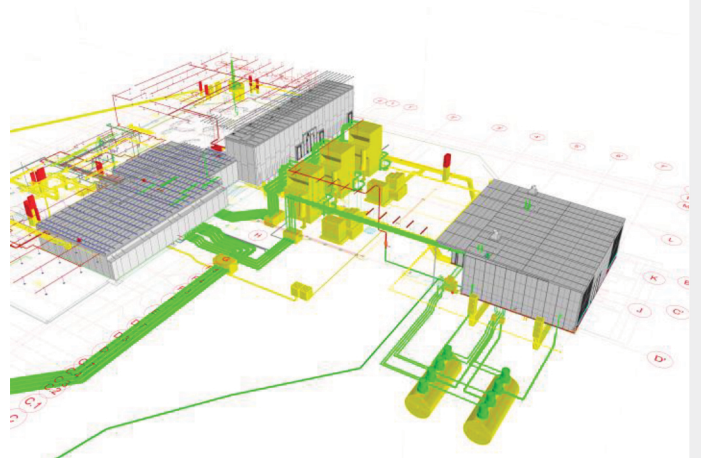


CONSULTATION, DESIGN, & DRAFTING

- In-house drafting & modeling
- Broad functional expertise
- Focused on life cycle survivability (i.e. future recertification and maintenance)
- Gaven regularly partners with major A/E firms
- Gaven and its partners also offer heat load, fluid flow, environmental, structural, seismic, vibration, transportation, and other analyses

INTEGRATION & SITING

- Full integration capabilities including mechanical, electrical, data, and other systems
- Includes both in-house integration and site installation and integration into site infrastructure
- Ability to build and store on-site for later integration



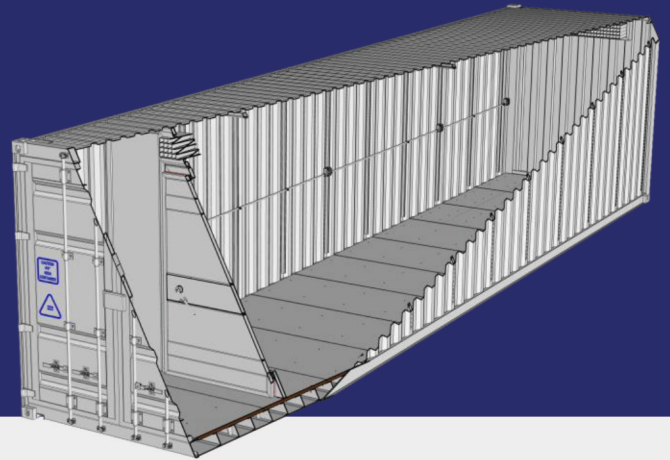
INSTALLATION & CONSTRUCTION

- Ability to pre-build and stage components until the site is prepared for construction and installation
- Executes both small- and large-scale construction work in all environments
- Staffed with trained and experienced project managers, superintendents, installation specialists, welders/erectors



SHIELDED TRANSPORTABLE CONTAINERS

In the wake of an IEMI, EMP, HEMP, or large-scale GMD event, portable electronics, power tools, communication equipment, and life-saving medical devices will cease to operate. Protecting these critical items is essential to minimizing impact post-event. Gaven's HEMP-Shielded Transportable Containers are tested to meet both military and ISO standards – mitigating threat and risk concerns and ensuring the resiliency of microgrids, as well as small-unit and community operations.



KEY FEATURES:

- Meets MIL-STD 188-125-1A/2 standards
- Meets ISO 668:2013 standards for transportability including ISO lift and skid points
- Weatherproof shipping doors & vestibule design
- Installed Unistrut for aftermarket fittings
- Additional options include filtered power, lighting, and generator connections

FINISHING:

- Durable interior finishing
- Pre-mounted finishings upon request

STANDARD SIZING:

- Available in 10ft, 20ft, and 40ft configurations
 - 8' W x 8'6" H x 10' D
 - 8' W x 8'6" H x 20' D
 - 8' W x 8'6" H x 40' D
 - 9'6" H available upon request

INGRESS/EGRESS:

- Weatherproof double swing doors
- HEMP-shielded inner door 4ft x 7ft clear opening
 - Includes standard pressure seal door
 - Optional pneumatic air-seal door



CRITICAL BACKUP POWER GENERATION

A simple generator to power your critical systems and processes is not enough in case of power interruption resulting from an EMP event. Gaven offers multiple power generator options that are HEMP protected with filtered power. Gaven's standard offering of both transportable and semi-permanent fixed-site Tier 4 Final generators are available from 60 kW to 600 kW. We also offer custom solutions for even smaller generators and have routinely shielded 1 MW generators. Gaven has deep experience in deploying large format generators and generator structures in many different verticals including utilities such as energy, water, oil & gas, and more.





HEMP/EMP SERVICES

E-THREAT VULNERABILITY AUDIT

Gaven's experts will conduct an on-site vulnerability audit of existing facilities – reviewing power feed systems, data infrastructure, critical components, and more. After the audit, Gaven provides an overall vulnerability assessment and risk mitigation recommendation.

PERIODIC TESTING & INSPECTION

Regular evaluation of shielding effectiveness should be inspected and maintained annually. Inspections should include evaluating the door leaf, frames, parts and components, and RFI/EMI entry points to maintain optimal performance and safety.

PREVENTATIVE MAINTENANCE

Due to the constant normal usage of a room or facility, shielding effectiveness degrades over time. Preventative maintenance such as cleaning, lubrication, adjustments, and part replacement helps maintain the optimal functionality of your systems.

REPAIR & RESTORATION SERVICES

Our skilled staff has experience repairing and restoring a vast array of shielded products and facilities – ensuring your equipment's effectiveness, performance, and compliance.

MAINTENANCE SERVICE & HM/HS CONTRACTS

Inspection, preventative maintenance, testing, and repairs will extend the operational life cycle and efficacy of systems and equipment while ensuring sufficient protection of critical infrastructure during time-sensitive operations. Gaven Industries will lead the charge in the identification of all hardness critical items, and hardness critical processes, as well as physically conducting the suggested maintenance and surveillance practices.



TESTING & INSPECTION

- Door leaf, frames, and seams
- Parts and components
- RFI/EMI points of entry
- Power filter operations



PREVENTATIVE MAINTENANCE

- Cleaning
- Lubrication
- Adjustments



RECERTIFICATION TESTING

- Welded seams
- Point of entry vulnerability
- Sensitive equipment vulnerability



PRIORITY PARTS & SERVICE

- Reduced site visit fees
- Fast response on-site technician
- Replacement parts

TESTING SERVICES

LIFECYCLE & PERIODIC TESTING

Throughout the lifecycle of shielded enclosures, protection failures or degradation may go unnoticed until critical operations must be performed. Gaven Industries will take the lead on the identification of all critical items and processes, as well as physically conducting the suggested maintenance practices.

SHIELD EFFECTIVENESS (SE) TESTING

Shielding effectiveness testing assesses the shielded enclosure's ability to block harmful electromagnetic and radio frequency signals. During Gaven's decades of experience, efficiencies have been identified through the development of test methodologies and practices, allowing us to accelerate the testing process without sacrificing quality.

PULSE CURRENT INJECTION (PCI) TESTING

Externally generated threat energies can couple onto lines and may enter HEMP-protected facilities/shields. PCI is a test method intended to measure the performance of an electrical point-of-entry (POE) protective device's ability to suppress energy that couples on conductors during an EMP. Gaven has designed and manufactured pulse generators capable of outputting MIL-STD-188-125-compliant double-exponential waveforms and we routinely test power filters, audio filters, data filters, control/signal filters, as well as RF POEs.

CONTINUOUS-WAVE IMMERSION (CWI) TESTING

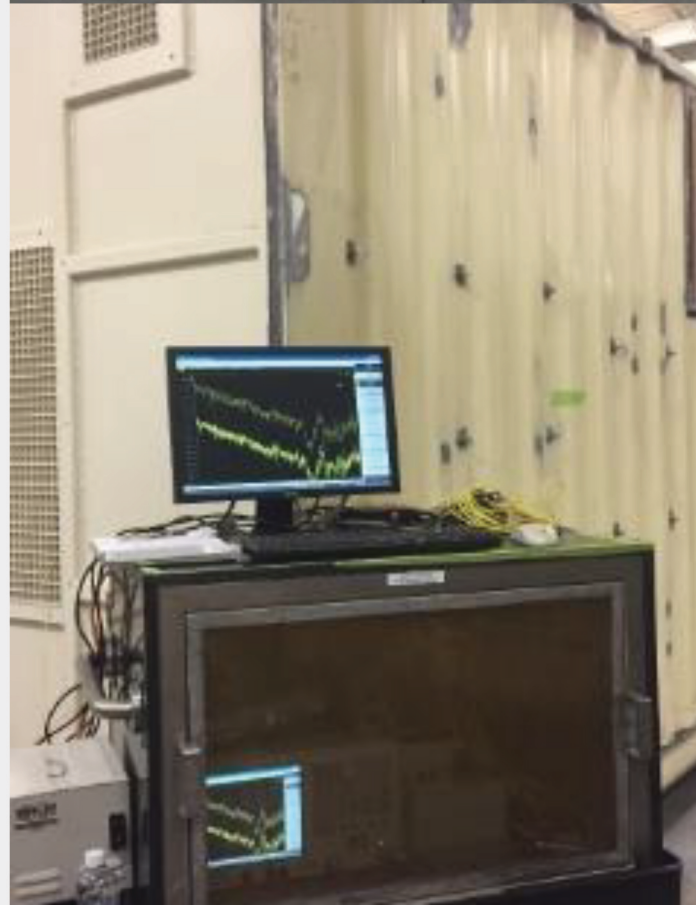
A test method for measuring the electromagnetic responses induced on an electromagnetic barrier and other items of interest (e.g., cables or conduits) illuminated by a CW electric or magnetic field.

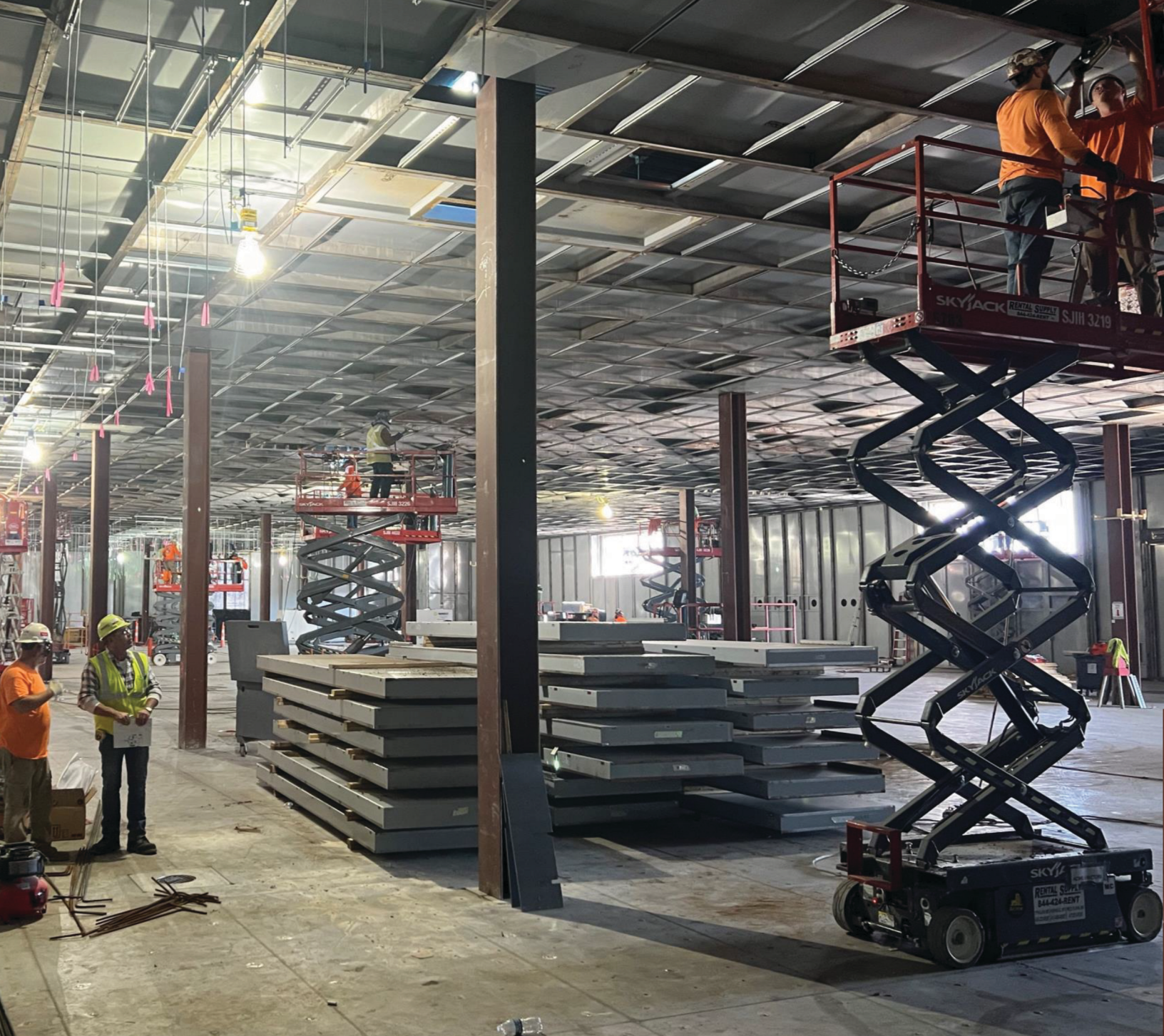
RECERTIFICATION TESTING

Recertification of HEMP-shielded enclosures is necessary to maintain compliance with regulatory standards and to ensure that the enclosure's integrity can withstand an EMP occurrence.

DESIGN VALIDATION / MODELING

Gaven has the capability to evaluate and certify how a shield and its components will perform during the preliminary design process to ensure consistency and quality of the shields. We conduct this through our elite computer modeling and virtual test environments system.





PROJECT: PREFABRICATED STRUCTURE

One of the largest power producers in the United States approached Gaven for EMP consultation regarding EMP protection for their new build Transmission Operations Control Center in the Midwest. This large site included a 60,000 sqft facility. As the EMP consultant, Gaven was a day 1 participant in virtual design coordination (VDC), identified the project's HEMP specifications, and assisted the evaluation of critical systems and the determination of shield extent. Gaven also provided guidance on layout and configuration of building with respect to shield integration.

Gaven was also selected for design and shield construction. Gaven's design and project management experts provided a phased design submission, allowing for on time procurement of long lead items as well as coordination with trades for sequencing of the build.

PROJECT NOTABLES

- Provided complete consultation, design, shield installation, and testing for a large power Transmission Operations Control Center (TOCC) in the Midwest.
 - Day 1 participant for virtual design coordination (VDC).
 - Identified project's HEMP specifications.
 - Assisted in the evaluation of critical systems and determination of shield extent.
 - Provided guidance on the layout and configuration of the building with respect to shielding integration.
 - Phased design submission, allowing for on-time procurement of long-lead items such as electric filters.
- Designed and installed 30,000 sqft of HEMP shielding as part of a new build that is a 60,000 sqft facility.
- Calculated and provided pressure loss calculations and designed waveguides for air and fluid transfer to meet MIL-STD 188-125 requirements.
- Furnished and performed acceptance testing (MIL-STD 188-125-1, Appendix B) on facility electrical filters.
- Fabricated and installed all shielding components (i.e., floor plate, wall/roof panels, vestibules, waveguides/pipe penetrations, shielded doors, and door control systems).
- Leveraged a network of both regional and nationwide vendors and fabricators to increase schedule control.
- Identified means for incorporating Special Protective Measures (SPMs) at exterior, vulnerable, mechanical yard equipment.





RF & ELECTROMAGNETIC SHIELDING EXPERTS

CONTACT US

As leaders in the RFI, EMI, EMP, and HEMP shielding industry, we pride ourselves on our expertise in shielding and knowledge of protection against complex risks and vulnerabilities. Gaven Industries offers complete end-to-end turnkey solutions that include consultation, design, manufacturing, installation, testing, and maintenance. Let us help with your next project.



1-724-352-8100



sales@gavenindustries.com



6655 N Noah Drive,
Saxonburg, PA, 16056, USA

Our Clients



Homeland
Security



FEMA



U.S. AIR FORCE



1.724.352.8100



gavenindustries.com

05-2023