CASE STUDY A NOVEL DUAL-USE EMC TEST CHAMBER– EUROFINS ELECTRICAL & ELECTRONICS, UK

ETS-Lindgren, in partnership with Eurofins Electrical & Electronics UK, Grangemouth, Scotland, successfully designed and built an advanced EMC test facility. The collaboration between ETS-Lindgren and Eurofins was instrumental in delivering a highly versatile and efficient EMC testing solution. ETS-Lindgren's expertise in RF shielding and chamber construction complemented Eurofins' industry-leading testing capabilities, resulting in a flexible test chamber system that serves a wide range of applications, including aerospace, automotive, and general EMC testing.

The 3m chamber's distinguishing feature is its ability to function either as a Semi-Anechoic Chamber (SAC) with a reflective ground plane or as a Fully Anechoic Room (FAR) by incorporating full-floor ferrite tiles and hybrid absorbers. Additionally, its dual-axis configuration allows for two antenna mast positions — one for vertical and one for horizontal polarization — facilitating rapid and efficient measurements when using two receivers. This chamber fully complies with MIL-STD-461 and CISPR 25 standards, making it a highly versatile and valuable tool for EMC testing.

Chamber Overview

The chamber's shielding system is constructed using modular metal elements composed of 2mm hot-galvanized steel panels, each coated with a 275 g/m² zinc layer. This design provides an impressive RF attenuation of 120 dB up to 40 GHz, ensuring a controlled testing environment. The chamber's external shield-to-shield dimensions measure 8.48 m L x 6.72 m W x 6.0 m H (27.8 ft x 22.0 ft x 19.7 ft). The core design features a permanently installed ground plane over a raised floor, which can be modified by adding ferrite floor panels and absorbers to transition from the SAC to FAR mode. This flexibility enables full compliance testing in both configurations with a 4m (13.1 ft) height scan when required.

Proprietary Simulation Tools

ETS-Lindgren's proprietary RF simulation tools played a crucial role in modeling and optimizing chamber performance, ensuring that the absorber layout and enclosure size were designed with maximum efficiency, particularly important for this custom project's requirements. These tools enabled engineers to validate performance goals with a high degree of confidence before physical construction began. To further mitigate project risks, Building Information Modeling (BIM) software was utilized during the design phase. BIM facilitated:

- Enhanced visualization and communication
- Improved understanding of the complex chamber design
- Better integration with the building infrastructure
- Reduced likelihood of budget overruns and schedule delays

Chamber Performance

The chamber meets all MIL-STD-461 compliance requirements, including configurations with a removable test bench positioned at the turntable edge. Additionally, it satisfies and exceeds the validation standards of CISPR 25 when employing the Long Wire Method (LWM). The chamber also aligns with future Normalized Site Insertion Loss (NSIL) standards outlined in CISPR 16, covering frequencies from 9kHz to 30MHz. Quiet Zone (QZ) performance is shown below, suitable for both SAC and FAR configurations.

- 1.5m (4.9 ft) diameter QZ in FAR mode
- 2.0m (6.5 ft) diameter QZ in SAC mode

Increased Throughput

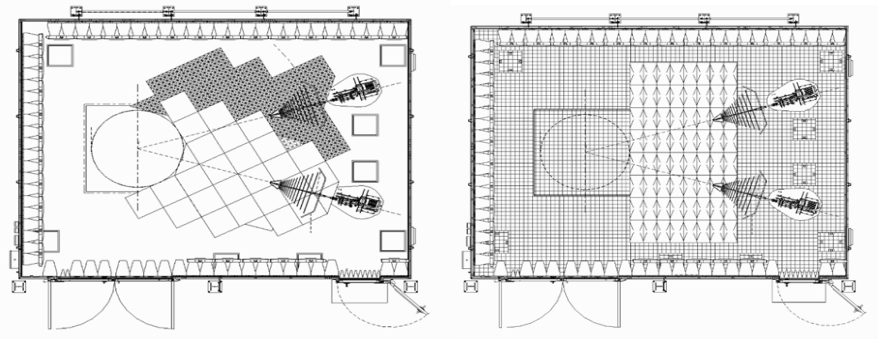
The partnership between ETS-Lindgren and Eurofins resulted in an EMC test chamber that enhances testing efficiency while providing unmatched flexibility. This dual-range EMC test chamber significantly reduces test times for full compliance radiated emissions and immunity measurements.

Laboratory management maximized their service offerings within a minimal spatial footprint, thanks to the chamber's multi-purpose, "two-for-one" design. This innovation not only streamlines testing processes, but also provides an adaptable and cost-effective solution for EMC compliance testing.

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.
Additional 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.

(Floor layout for dual range 3m hybrid chamber showing sVSWR layout in SAC mode (left) and NSA in FAR mode (right)).



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