CASE STUDY HUBEI XIANGYANG DAAN AUTOMOBILE TESTING CENTER – XIANGYANG, HUBEI, CHINA

State-Of-The-Art Project for NAST National Automobile Quality Supervision and Inspection Center

With the goal of installing an internationally renowned drive motor EMC test facility, NAST partnered with ETS-Lindgren to design and install an EMC anechoic chamber with a dynamometer for real-world automotive testing of a wide range of vehicle components, including electric-motor (E-Motor) vehicles. ETS-Lindgren's E-Motor Chamber enables testing of power components for electric vehicles, including the single inverter and motor assembly, three-in-one electric drive assembly (including motor controller, reducer, and motor), vehicle charger, DC-DC converter, and electric heater, to name a few test scenarios. This optimally-configured EMC test environment enables testing of all automotive high-voltage components such as batteries, air conditioners, high-pressure power steering, high-pressure compressors, etc. ETS-Lindgren provided a turnkey project and was responsible for the project management, design and installation of the chamber, dynamometer system, hydrogen fuel cell facility, and site infrastructure construction. The customer was assured of all relevant hardware and software cooperation as well as support before, during, and after installation. As the world's largest manufacturer of EMC and Over-the-Air test systems, ETS-Lindgren has a diverse customer base in the field of global automotive testing. Together with AVL – the world's largest independent company dedicated to the development, simulation, and testing of powertrain systems for passenger cars and trucks, including hybrid, internal combustion engines, drivetrains, electric drives, batteries and software – the two companies combined their respective expertise to provide a state-of-the-art Automotive EMC Test Chamber.

Unique Technical Highlights of the Automotive Test Facility

- The powertrain bench meets NAST's high torque, high-speed test and configuration flexibility requirements.
- Single motor and assembly tests have short switching setup times, expediting overall test efficiency.
- The setting of each motor, the relative position of the motor to be tested, and the test table is static which improves the test stability and consistency per relevant standards.
- The on-board powertrain system for EMC testing uses two identical models of dynamometers, resulting in a perfectly symmetrical motor test bench that can more precisely control the parameters of the two shaft outputs.
- The feedthrough shaft through the anechoic chamber wall consists of a non-metallic fiber composite material, effectively reducing the generation of shaft-borne EMI.
- The AVL bench system can simulate grounding of the motor under test (with the car shell as the ground) or a floating ground (with the rubber tires as the floating ground).
- The EMC chamber features closed cell polystyrene based absorber material which is beneficial in this application to reduce the risk of hydrogen gas entering the interior of the absorbing material. At the same time, the installed hydrogen concentration detection device ensures testing is performed safely and reliably.
- The RF shielding effectiveness of the chamber, including shaft feed through and accessories, is > 100 dB.

- The EMC chamber meets the requirements of CISPR 25, ISO 11452-2, ISO 11452-4, ISO 7637, and other automotive EMC industry standards.

Drive Motor Anechoic Chamber Overview

- Constructed of ETS-Lindgren Model Series 101 RF shielded panels, the overall structure is fortified to meet Seismic Zone 7 level intensity per local requirements. Nominal interior chamber dimensions are 11.2 m L x 8. 2 m W x 6.1 m H (37 ft x 27 ft x 20 ft), includes 50 cm (20 in) raised floor.
- Fully Automatic Sliding RF Shielded Door, nominal dimensions are 3 m W x 2.6 m H (10 ft x 9 ft), equipped with automatic lift ramp up to 3 tons (6,000 lbs) capacity.
- Semi-Automatic RF Shielded Personnel Door, nominal dimensions are 1.2 m W x 2.1 m H (4 ft x 7 ft), equipped with automatic pneumatic latching mechanism.
- CISPR 25 compliant grounded test table, nominal dimensions are 4.5 m L × 1.5 m W × 0.9 m H (15 ft x 5 ft x 3 ft) wood test table, covered with 2 mm (.07 in) thick brass plate, load-bearing up to 700 kg (1,500 lbs).
- Accessories provided include waveguide air vents, LED lighting, connector panels, antennas with tower, fire alarm, surveillance (camera) system, and multiple power line filters with current ratings from 32 to 1200 amperes.

ETS-Lindgren Absorber Overview

- Model FS-300 30H composite absorbing material (FAA-300 absorber with ferrite tiles).
- Model DSH-600H composite absorbing material with ferrite tiles on all four chamber walls and ceiling.

Auxiliary Support Chambers

- Series 101 Control Room, nominal interior dimensions are 6.0 m L x 5.0 m W x 3.5 m H (20 ft x 16 ft x 11ft), includes 50 cm (20 in) raised floor.
- Series 101 Amplifier Room, nominal interior dimensions are 4.5 m L × 3.0 m W × 3.0 m H (15 ft x 10 ft x 10 ft), includes a 50 cm (20 in) raised floor.
- Dynamometer Sound Insulation Room 1, nominal interior dimensions are 6.0 m L x 5.0 m W x 3.5 m H (20 ft x 16 ft x 11 ft). Includes RF Shielded and Acoustic treated personnel sized soundproof doors, nominal dimensions are 1.2 m W x 2.1 m H (4 ft x 7 ft).
- Dynamometer Sound Insulation Room 2, nominal interior dimensions are 4.5 m L x 3.8 m W x 3.5 m H (15 ft x 12 ft x 12 ft).

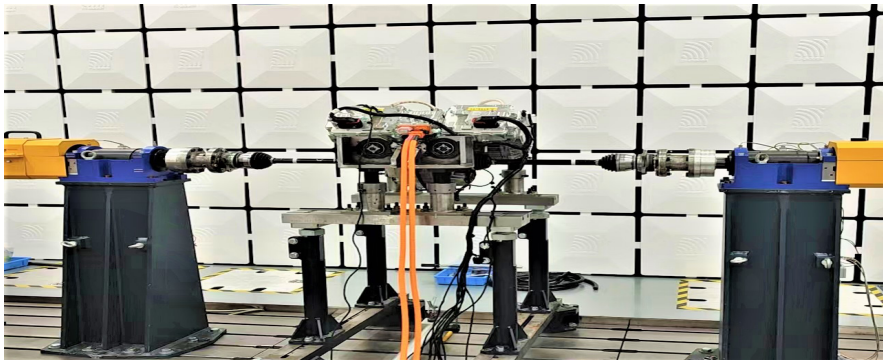
AVL Dynamometer System Features

- AVL E-Motor and E-Axle Test System, featuring PUMA 2 software.
- AVL Powertrain Motor Test System, three-phase asynchronous motor DYNOFORCE ASM 4600/0.75-3 400 T; rated torque 4,600 Nm from 0 up to 750 rpm; power rating 360 kW from 750 up to 1,970 rpm; rated speed 3,000 rpm.
- Distortion-resistant design.
- High-vibration dampening performance.
- Excellent static and dynamic stiffness.
- Quick mounting of dynamometer and mechanical components.
- Torsion resistant design.

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.



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