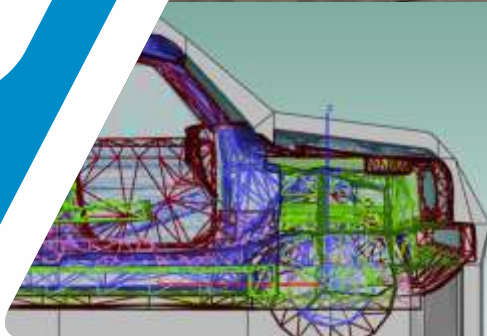


NOISE, VIBRATION & HARSHNESS

Transforming Noise to Sound



YOUR PREFERRED PARTNER FOR RELIABLE NVH SOLUTIONS

Why ARAI

- Pioneer in NVH Development, providing end to end solutions for an Indian Automotive industry with 25 years of experience
- Expert manpower and state of the art test and simulation facilities
- Advanced test rigs and methodology for component and vehicle level NVH assessments
- Database of 300+ Powertrains, 500+ Vehicles, 500+ Automotive sub systems, 1000+ Acoustic Materials

Major Facilities

- Hemi-anechoic chamber with Chassis and Engine dynamometers
- Large Coupled Reverberation Chambers with Impact Isolation Testing
- Reverberation suite, Modal room, Alpha cabin, Tyre test rig
- BSR Test Rig
- 200+Channels Data Acquisition system and instrumentation

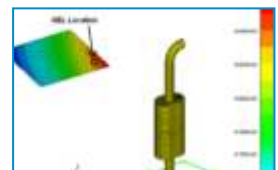
Vehicle NVH

- Incab and Exterior NVH Refinement for Electric and ICE vehicles
- Design Validation and Verification Planning (DVVP) Testing
- Pass-by Noise Compliance for UN R-51, UN R-41, ISO-362, IS 3028
- NVH Benchmarking at Component Level, Aggregate & Vehicle Level
- AVAS Development for EV vehicles as per UN R-138/AIS173
- Transfer Path Analysis (TPA)
- Bus Interior Vibration & Harshness Evaluation as per AIS 153



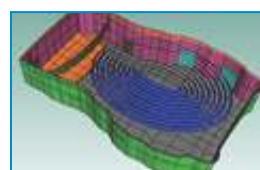
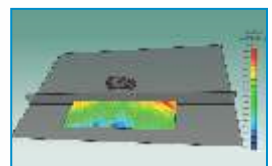
Powertrain NVH

- Powertrain NVH Development for Gasoline, Diesel, CNG and LPG
- Noise Source Identification & Benchmarking
- Engine Combustion Noise Improvement Through Calibration Optimization
- Design & Development of Intake & Exhaust System



NVH Simulation & Design Solutions

- Vehicle Interior Sound Package Optimization using SEA
- Genset Acoustic Enclosure Design Solution
- Noise Barrier Acoustic Design
- Industrial Noise Control
- Room Acoustic/ Auditorium Sound Design



Acoustic Material

- Evaluation of Sound Absorption, Transmission & Insertion Loss (NABL Accredited)
- Biot's Parameter Evaluation— Flow Resistivity, Porosity, Tortuosity, VCL, TCL & Mechanical Properties.
- Sound Absorption Evaluation of Automotive Trims in Alpha Cabin
- Cavity Filler & Grommets Acoustic Performance Evaluation
- Damping Loss Factor Test using Oberst Bar/ RTC-III
- Road Noise Barrier Lab & In-Situ Testing
- Coupled reverberation chambers along with impact isolation tests as per ISO 10140-2
- Acoustic Design & development of large size floor panels of Buses, Trucks, Metro, railways and aerospace application
- Airport acoustic roofing system for aircraft noise reduction



Buzz, Squeak and Rattle (BSR)

- Dedicated Facility For BSR Evaluation of Components, Sub-systems & Vehicle Level
- 5 DOF System To Simulate Vertical, Fore Aft, Lateral, Roll And Pitch Motions
- Simulation of Sine, PSD, Random & Acceleration Time History Excitation Profiles



Tyre Noise

- Tyre Noise Evaluation Using Close Proximity Method (CPX)
- Tyre Benchmarking - Quantification of Tyre Source Strength by Acoustic Transfer Functions
- Tyre Cavity Noise Evaluation
- Sound Power Evaluation as per SAE & ANSI standards



Sound Quality (SQ)

- Vehicle Interior SQ Development for EV
- Objective SQ Matrices to Subjective (Jury Rating) Correlation
- Brand Sound Development



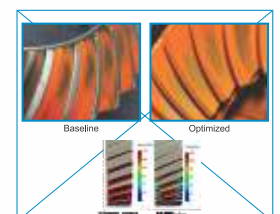
Modal Analysis

- BIW, Engine & Component Modal Testing
- Rigid Body Modes, CG & MI Estimation
- Operational Deflection Shape Analysis
- Acoustic Cavity Modal Analysis



Axle and Transmission Whine Reduction

- Design Optimization of Gear Micro Geometry for Whine reduction
- Benchmarking of Axle/ Transmission for Whine Quantification on Transient Dynos
- Contact Pattern Optimization



Component NVH

- Timing Chain, Fan Noise, Siren Horn Evaluation
- Alternator, Electric Motor Noise Evaluation
- Air Brake Compressor Noise
- Vehicle HVAC Noise Evaluation



Genset Industry

- NVH Development for CPCB IV Genset
- Design Solution for Enclosure, Silencer, Intake And Cooling Fan
- Super Silent, Containerized Genset Development
- Genset Performance Development



Off Road Vehicles & Mining machinery

- NVH Benchmarking & Reduction
- Sound Power Level Evaluation as per ISO 6393/6395
- Machine Mounted Alarm & Horn Test
- Evaluation of Human Exposure to Machine Vibration As Per ISO 2631
- In-cab & Exterior Noise Reduction Solutions



Agriculture Machinery NVH

- NVH Reduction for Tractors, Harvesters & Other Equipment
- Tractor PTO Performance Testing as per IS 12207
- Torsional Vibration & Linear Vibration Reduction



Home Appliances, Surgical & Industrial Equipment

- Sound Power Evaluation of Air Conditioners, Chimney, Coolers, Refrigerators, Washing Machines, Mixer-Grinders, etc. (NABL Accredited)
- Noise Assessment of Surgical Tools, Industrial Equipment
- Turnkey Projects for NVH Refinement for Industrial & White Goods



Other Mobility NVH Solutions

- Defense Industry
- Aviation Industry
- Railways
- Marine Industry

