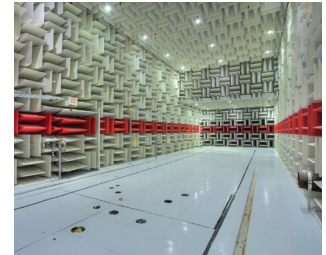


Acoustic & Vibration Services for Engine & Vehicle Test

ACS provides acoustics and vibration solutions for developmental and production test facilities for engine, vehicle, and component manufacturers. These services allow manufacturers to obtain quality data for new product development, emissions regulations and requirements, and end of line production testing.

ACS services include acceptance criteria preparation and review, independent witness testing, and owner's representation. ACS also provides design services and construction oversight for acoustically sensitive spaces within a facility, with consideration given to acoustic and vibration flanking paths, ambient sound and vibration levels, facility contributions, and sound or vibration level expectations.

ACS provides advanced testing and analysis for vibration diagnostics, design enhancement, and structural dynamic behavior as well as validation of system dynamic performance to verify and confirm design specifications.



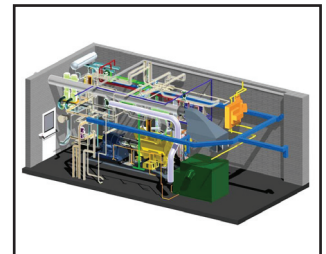
Anechoic room for open exhaust emission measurement and genset testing

Engineering Design • Engineering Review • Validation

We apply our understanding of acoustic and vibration standards to ensure your objectives are met. Key acoustic test standards routinely designed for include: ISO 3744, ISO 3745, ISO 354, ASTM423.

ACS expertise includes:

- Identification of transmission paths of noise between adjacent spaces
- Acoustic walls and doors, HVAC silencing, duct lagging, and fan noise
- Assessment of the potential for noise emitted from a building to the site boundary where local governing regulations have sound limits
- Evaluation of vibration characteristics to validate system dynamic performance
- Evaluation of vibration characteristics of rotating machinery by ODS, Modal Analysis, Order tracking, Order Analysis

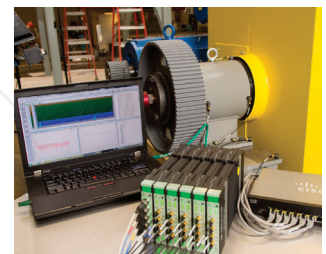


Test cell model for system integration

Product Specification • Supplier Selection • Procurement

ACS works with your team to size and specify requirements for acoustic products, treatments and sound rooms (reverberation, semi-anechoic, and anechoic.) In addition to the purchasing and delivery requirements, acoustic product details specified include but are not limited to:

- **Sound Door Specification** – size, STC rating, door swing, fire rating, hardware type
- **Acoustic Window** – size, STC rating, fire and blast protection rating
- **Anechoic and Hemi-anechoic Room Specification** – room dimensions, cut-off frequency, background noise level, construction type, HVAC interface, cable pass location identification, vibration isolation requirements
- **Reverberation Room Specification** – room dimensions, background noise level, surface finish, construction type, HVAC interface, cable pass location identification, vibration isolation requirements
- **Silencer Specification** – Dynamic Insertion Loss requirements for HVAC and engine silencers, allowable self-generated noise level, pressure drop limits
- **Transmission Loss Opening Specification** – clear opening dimension, removable filler panel requirements



Advanced testing and analysis for vibration diagnostics



NVH Laboratory for Class 4 – 8 heavy-duty trucks

System Integration

By understanding the clients' products and testing techniques, ACS integrates the facility and test equipment to insure a quality measurement environment. Integration services are delivered by a specialized ACS team with backgrounds in product development and testing, data acquisition, mechanical applications, NVH applications, and instrumentation and controls.

Integration Services

Process & Facility Systems Integration

- Articulate & document test equipment requirements & acceptance criteria
- Facility design requirements
- Test equipment layout development
- Facility & equipment construction requirements

Test Equipment Integration

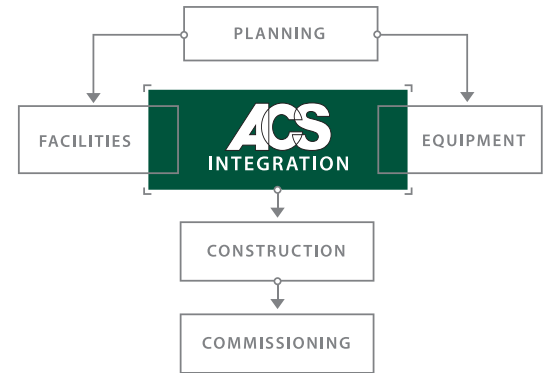
- Application communication
- Equipment cabling and interconnect development
- Test systems support equipment design & fabrication & installation
- Test equipment installation
- Data acquisition systems specific requirements
- Instrumentation specific requirements
- Systems performance testing & commissioning
- Systems certification testing
- Develop/deliver electronic O&M manuals
- Preventative maintenance & spare parts management

Vendor Management

- Specification development
- Vendor contact & bidding
- Quote analysis & revision
- Test equipment receipt
- Vendor progress management
- Drawing & specification review
- Checkout & troubleshooting
- Vendor data reporting & management

Acoustics and Vibration Analysis

- Ambient Vibration
- Onsite Sound Surveys
- Modal Analysis
- Structural Vibration
- Acoustic Room Qualifications



ACS is a single-source provider of fully integrated facility and equipment solutions, serving the international engine- and vehicle-testing markets. The Company specializes in the comprehensive design, construction, integration, and commissioning of development and production test facilities for engine, vehicle, and components manufacturers.

ACS Services

- Single source integrated delivery
- Facility design
- Construction management
- Systems integration
- Equipment specification, selection & procurement
- Specialized test equipment design & fabrication
- Instrumentation and controls
- Facility & equipment commissioning
- Data management
- Preventative maintenance