



SAE 2009 Noise and Vibration Conference and Exhibition

May 19-21, 2009

Pheasant Run Resort, St. Charles, Illinois, USA

Engine / Powertrain / Driveline Track

Structural Analysis

The focus of the Structural Analysis session is to share experiences on analyzing, testing, and developing solutions to structural noise and vibration problems from powertrain sources. Analytical modeling, experimental testing and predictive correlation are just a few of the tools used in this endeavor.

Intake / Exhaust

This session covers experimental, computational, and analytical efforts related to the basic mechanisms and control techniques of noise and vibration in the breathing system (induction, combustion chamber, and exhaust) of engines. Noise sources include airborne, flow, flow-acoustic and flow-structure coupling.

Components / Accessories

This session is focused on base engine, mounts, accessories, fuel injection system, combustion system, related design or development noise and vibration topics. The papers of this session will have both experimental and analytical approaches to problem solving.

Driveline

This session deals with analytical, computational and experimental studies of the dynamic response including noise and vibration of automotive driveline system and components. Typical topics of interests include, but not limited to, torque converters, gear noise, axle noise driveline system dynamics, transmission noise and vibrations, powertrain dynamics, transient dynamic response and propshaft balancing.

Diesel

The diesel NVH session is focused on issues related to making diesel engines achieve better NVH characteristics. Topics include both analytical and experimental techniques for developing low noise diesel engines and components. Related topics covered in this session include linear and torsional vibration of diesel engines, as well as features intended to reduce diesel specific intake and exhaust noise problems, such as turbocharger whine.

Hybrid and Alternative Propulsion Systems

This session focus on issues related to the unique NVH characteristics of hybrid and other alternative propulsion systems. The paper topics will include experimental and analytical work dealing with noise generation and control. The acoustic and vibration environment and resulting issues with such propulsion systems will be a primary topic of focus.

Vehicle Subsystem Track

Body Structure / Chassis

This session covers static and dynamic issues in the body and chassis that contribute to noise and vibration problems in vehicles. Included in this session are modal studies, measurement and analysis methods, transfer path analysis, design guidelines, and recommended practices for noise and vibration control of the body and chassis.

Brakes

This session provides a good overview of current issues and problem-solving activities in vehicle braking system noise. Braking noise is one of the highest dollars cost warranty issues for the automakers, and therefore, gets considerable attention. The papers of this session will describe both experimental and analytical programs of investigations related to this issue.

Tires

This session includes papers regarding vehicle exterior or interior tire/pavement noise.

Airbag Deployment

This session covers noise sources, measurement and analysis techniques, noise attenuation strategies, case studies, design practices, prediction and modeling methods, and human response related to air bag deployment noise.

Buzz, Squeak and Rattle

This session is focused on the vehicle body interior noise issues caused by friction and/or impact due to the vibration of interfacing components. The papers in this session will investigate those issues through the best practice of analytical and experimental applications.

Interior Noise and Vibration Sources

This session covers noise and vibration sources and paths within a vehicle (automobiles, trucks and recreational vehicles). Typical noise sources include, but are not limited to, the HVAC system, electric motors, seat adjusters, electric windows, and door locks. Vibration inputs include, but are not limited to, the road and the engine. Included in this session are all aspects of Whole Body and Hand Arm Vibration experienced by professional drivers. This session also covers the acoustical design and performance of audio, infotainment, and hands free phone systems.

Mounts and Shock Absorbers

This session is dedicated to contributed papers in the areas of static, dynamic, and fatigue characterization of elastomers, bushings, mounts and shock absorbers used in the mobility industry. Particular emphasis is given to new and innovative analysis and testing methodologies to quantify the non-linear properties of these systems in addition to the effects of temperature, frequency, and aging. Papers dealing with specific applications and case studies of existing methodologies are also welcome.



Passive and Active NVH Control Track

Materials

This session will cover materials used to solve noise and vibration problems in vehicles. Topics covered will include new and traditional NVH materials, materials with unique or special NVH properties, case studies covering applications of NVH materials to solve specific vehicle problems, modeling of materials, manufacturing or processing of NVH materials, and engineering and design principles for the use of NVH materials.

Materials Production and Part Fabrication

The papers in this session describe various processes for the manufacture of acoustical materials and the fabrication of parts from those materials. The session addresses the question: "How is that made?"

Active Noise and Vibration

This session addresses the strategies and methods for implementing active noise and vibration control in a vehicle. It will cover sensors and transducers, feedback systems, control algorithms, software for active control, noise and vibration cancellation devices, noise and vibration measurement systems, and case studies.

NVH Measurement Track

Facilities

This session is focused on the development and application of facilities to conduct noise and vibration measurements. The intent is to provide practical information on the engineering challenges to consider in the construction and/or adaptation of a facility to the specialized noise and vibration requirements.

Instrumentation Systems, Sensors, and Methods

This session covers instrumentation sensors, systems and methods used in the measurement and analysis of noise and vibration. Analysis of methods internal to instrumentation will also be covered.

Sound Source Identification

This session covers sound source identification and localization, acoustical holography, sound generation mechanisms, measurement techniques related to the sound source and noise propagation, and visualization techniques for sound pressure levels, sound radiation patterns, frequency content, and intensity. Also included are prediction and modeling methods related to the sound source.

Standards, Processes and Perspectives Track

Standards and Regulations

This session is intended to provide a forum for review of the engineering standards being developed and their interaction with regulation that may exist on the product or systems.



Product Development Process

This session focuses on the development process used to achieve NVH goals and includes topics such as benchmarking, target setting, target cascading, the role and timing of simulation methods and test methods and cross functional coordination and optimization. Papers in this session will also explore the relevance and timing of component, subsystem and full system analysis and testing.

Business Management Topics

This session focuses on the business side of NVH, including topics such as planning, organizing, staffing and managing NVH activities to optimize profitability and performance. Contributions from corporate management, small business owners, and project managers are a key part of the session. Topics to be highlighted include technology costs, facilities investment and payback, and future trends in the global NVH market.

Subjective Response

This session covers subjective testing and analysis related to automotive noise and vibration, usually referred to as sound quality and vibration quality. The focus is on both subjective and objective tools and methods that can be used either to design sound or vibration quality into the automotive product, or to characterize and eliminate undesired sounds or vibrations.

Historical Perspectives

This session addresses a variety of subjects covering the historical development and evolution of NVH practices, unlike the other sessions which focus on specific areas of noise and vibration technology. These papers are from the more experienced practitioners of vehicle noise and vibration who will share with attendees their thoughts, concerns, and hopefully their wisdom, gained through many years of engineering practice.

Numerical Methods Track

Structural Analysis

This session focuses on the development and application of analytical methods for characterizing the dynamic behavior of structural systems. Analysis methods for all structural components, subsystems and complete systems found in automotive vehicles will be considered, except for powertrain and driveline which are covered in Powertrain Structural Analysis session. Examples include (but are not limited to) body structure, chassis structure, seats and interior structures.

SEA Design

This session provides a good overview of recent innovations to SEA (Statistical Energy Analysis) modeling techniques. SEA models can be used alone or together with hybrid analytical or experimental techniques to establish good comparative NVH predictions at the earliest stage of the vehicle design process. The papers of this session will describe recent advances and / or validations of SEA theory, applications, or use in conjunction with hybrid techniques for high- and mid-frequency NVH predictions.



Vibro Acoustic Analysis

This session covers the relationships between vibration and noise that can be generated throughout the vehicle. Included in this session are modal vibration studies related to noise, vibration transfer paths throughout the vehicle, and coupling of vibration and acoustical modes. Both experimental and analytical approaches are included in this session.

Vehicle Exterior Track

Drive-By Noise

This session covers noise sources, measurement techniques, noise attenuation strategies, case studies, prediction and modeling methods, and community regulations related to drive-by noise.

Windnoise and Aeroacoustics

This session is to present numerical and experimental work pertaining to noise due to flow around the vehicle body, such as flow-induced interior noise, flow over protrusions, sunroofs, windows, noise from ventilation systems, or flow noise in exhaust system. Papers on aerodynamics alone without sound are excluded. Numerical studies may include new models or models based on existing theory as long as they are adequately supported by experimental or theoretical verifications.

Commercial and Specialty Vehicles Track

Heavy Duty Truck/Off-Highway

This session covers noise and vibration in heavy trucks and buses and all other off-road vehicles. Special attention will be focused on the noise and vibration problems found in these vehicles, as opposed to passenger cars and light trucks, and to the engineering solutions required to solve these problems. Included in the session are discussions of special measurement methods, modeling specifically directed to these vehicles, and NVH materials with special properties to address unique problems.

Power Sport Vehicles

This session covers noise and vibration including test, analysis, treatment and validation techniques for power sport vehicles including motorcycles, snowmobiles, ATVs, jet skis, pleasure craft, and ultralight or microlight aircraft.

Aerospace

This session is devoted to NVH issues arising within the aeronautical and aerospace industries, such as community noise, aircraft interior noise, aerospace vibro-acoustics, noise prediction, modeling and modal analysis.