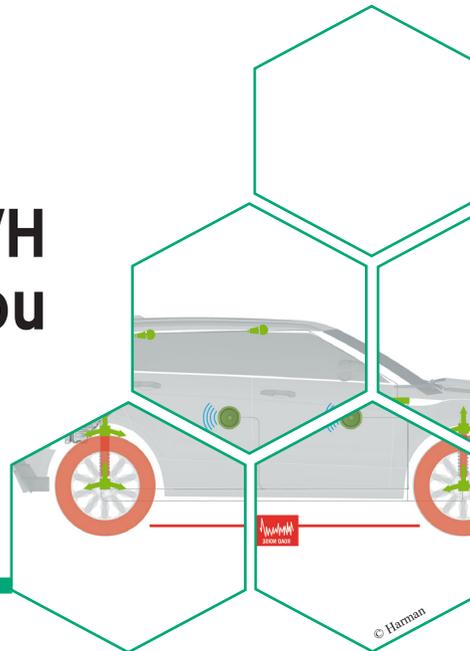


**The Engineering  
Integrity Society**

# Electric Vehicle NVH - not as quiet as you thought?

**Coventry University  
21 June 2018**



Most OEMs have an increasing range of electric and hybrid vehicles on the market with more in the pipeline. The common misconception is that these vehicles are highly refined from the outset by the very nature of the electric propulsion systems. In fact, this is not the case, and there are many challenges related to controlling the acoustic emissions of the new technology. This one-day event will enable all those interested in electric vehicle sound quality to be appraised of how these issues have been investigated and controlled, during recent research and development programmes within the automotive industry and academia.

## Programme

9.00am Registration, Tea and Coffee

9.20am Introduction to the EIS - John Wilkinson (EIS)

9.30am **Overview of NVH issues and their solutions regarding electric powertrain technology - Siemens**

The emitted sound from electromagnetic phenomena in electrified powertrains can contain high tonal components which are considered uncomfortable to vehicle occupants. This presentation will provide a concise overview of the NVH problematics of electric powertrains together with the explanation of the occurring phenomena with aim to better predict NVH performance and the result of potential design changes early in the design cycle through a combination of analytical and physics test methodologies.

10.00am **Noise Breakdown of an Electric Vehicle - Dennis de Klerk, Mueller BBM**

A noise breakdown of an Electric Vehicle into Powertrain, Tire and Wind Noise is discussed as well as a further study about the various noise source contributions of the electric motor and gearbox(es) in the vehicle interior.

10.30am Tea, Coffee and Exhibition

11.00am **Electromagnetically-excited Noise Mitigation Techniques of Electric Motors Used in EV/ HEV Traction Application - Jean Le Besnerais, Eomys**

This presentation reviews all mechanical and electrotechnical solutions to reduce acoustic noise and vibrations due to electromagnetic forces in electrified powertrains. Some of the electromagnetic noise reduction solutions are illustrated using MANATEE electromagnetic and vibroacoustic software on the example of a traction IPMSM.

11.30am **"Robot, Take me to the Pub!" Sound Design for Future Electric/Autonomous Vehicles - Mark Allman-Ward, Bruel & Kjaer**

The requirements, challenges & opportunities to engineer a different sound environment both internally and externally for fully electric and autonomous vehicles will be discussed. These vehicles exhibit sound characteristics that have a different subjective character to existing internal combustion engine vehicles, & a soundscape that does not lend itself to brand characterisation and market targeting. The opportunity to add sound styling to these vehicles is therefore of paramount importance but also presents a novel challenge. A process to approach the task of making these new sounds is presented.

12.00pm **Interior noise and electric vehicles - an experimental survey - Richard Cornish, Birmingham City University**

A small group investigated tyre noise inside electric and IC vehicles on inner city roads and some major A roads. The methodology focussed on comparing interior noise levels over road surfaces ranging from cobblestones to good and pitted tarmac. Vehicles were also compared qualitatively. In common with other workers we found that the noise levels varied strongly with the road type. Electric vehicles were about 50% heavier than the IC vehicles, with tyre pressures about 50% higher. Except for the most expensive battery electric vehicles, we found instances of much higher interior road noise. Our conclusion is that mainstream budget EVs risk becoming unpopular in cities due to poor levels of refinement.

12.30pm Lunch and Exhibition

13.30pm **Rotating Workshops**

The afternoon will consist of 4 rotating workshops.

**Introduction to the Coventry University Power Lab - Dr. Kostas Gyftakis, Coventry University**

**Use of the NVH Vehicle Simulator in the Development Process for New Vehicle Sounds - Mark Allman-Ward, Bruel & Kjaer**

This session will explore how sounds, internal and external, for electric vehicles can be developed and deployed.

**Addressing NVH Engineering Challenges for Hybrid & Electrical Vehicles Using Simulation Tools At Concept - Andrew McQueen, Gaurav Kumar & Emmanuel Domingues, Siemens**

**Laser scanning techniques for vibration assessment of electric motors - Matthew Archer, Polytec**

Using laser scanning technology this work shop demonstrates how the method can be applied to measuring and determining electric motor operating deflection shapes for both static and rotating parts

**Sound power noise source ranking using sound intensity probes in an array - Ian Macfarlane, Microflown**

An array of PU sound intensity probes can be used to obtain data on a DUT in one single capture. It enables the measurement of time-varying noise sources, such as motor run-ups, and can provide a quick insight into the contributions from (sub) components to the total sound power per order or order ranges, of the DUT. In this workshop you'll be guided through the workflow of the method, from measurement to presentation of noise ranking tables.

16.45pm Q&A Forum and Closing Comments

**BOOKING FORM**

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I enclose a cheque for £_____ made payable to the Engineering Integrity Society. Payment can also be made by BACS.		
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Any Special Dietary Requirements		
Please tick this box if you are happy to have future contact with the EIS. We limit the emails we send and will never pass your details to any other organisation. You are able to unsubscribe at any time. <input type="checkbox"/>		

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The annual subscription rates are £25 for UK residents and £30 for non-UK residents. Upon joining the Society you will also have the additional advantages of preferential attendance rates at EIS events, together with selected events held by some of the associated organisations. In addition you will have access to CDs containing archived copies of EIS presentations.

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