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**Noise, Vibration and Harshness 2018 | Birmingham**

Macdonald Burlington Hotel | Institution of Mechanical Engineers

Measurement, Analysis and Design for Complex Systems

10 – 20 May 2018

Conference Grant

£1200

May 2018 was obviously a busy month for our Institution. In addition to the annual meetings and historic special meeting, the IMechE continued its series of seminars throughout the UK. Two seminars taking place in tandem were of particular interest to me: Noise, Vibration and Harshness 2018 and High-Performance Powertrains. As an international member interested in working in the automotive NVH field, the prospect of learning from industry leaders in this niche field was an appealing one. The IMechE Prizes and Awards committee allowed me this chance by accepting my application for an Educational Conference Grant. This opportunity to travel from Texas to the UK was a tremendously powerful and enlightening experience for me; one that would not have been at all possible without the help of the IMechE.

The conference itself was in Birmingham at the Macdonald Burlington Hotel in the city center. Two seminars shared a common meeting space so although I registered for Noise, Vibration and Harshness there was ample opportunity to speak with the attendees, delegates, speakers, and vendors from High-Performance Powertrains. In retrospect there would have been no issue with attending some of the presentations at the sister seminar; some of which sounded incredibly fascinating.

I spent the whole day in the NVH seminar and was able to hear from a number of industry leading experts. Many of the speakers and organizers seemed to know one another from a similar conference years prior. The first two presentations were not from the automotive industry at all but the military and marine industries. The first, given by Marcus Potter of BAE, covered NVH considerations for tanks and other military vehicles. The intense shock reduction needed for the soldiers inside those machines makes passenger vehicle noise reduction seem like a sheer luxury. The second, given by Kian Banisoleiman of Lloyds Register, covered a case study of a large propeller shaft experiencing torsional fatigue failure at a journal bearing due to a blocked oil passage in a viscous vibration damper. The situation on this massive ship is very similar to problem I see all day on small CC motorcycle engines involving fatigue failures due to inadequate lubrication.

A Q&A panel followed introducing Sean Biggs of Jaguar Land Rover among others. After a quick presentation on power generation NVH requirements by Robin Wareing of Cummins Generator Technologies, Sean would go on to give his presentation on effective Computer-Aided Engineering strategies in NVH and was one of the more engaging speakers throughout the day. He emphasized the need for effective communication and collaboration between people in different departments, regardless of what specific tools are being used. I have certainly found that to be true in any organization and seems to be a systemic problem well beyond the realm of automotive noise control. I found myself identifying with quite a few points Sean emphasized.

Following was an interesting research project on the subjective analysis of exhaust tuning by Mudassir Farooq, a Senior Engineer at Horiba MIRA. He is using dynamic loading to better correlate test results with CAE models in NVH simulations. He explained the inherent difficulties in establishing an approach to a useful subjective analysis of the sound quality for different

exhaust geometries. Next Simon Tate, manager of the NVH department at Ricardo, gave a fascinating talk on experimentally determining the damping properties of various materials.

A number of highly interesting presentations were given throughout the day, but perhaps one of the most memorable highlights took place towards the end of the agenda. Lawrence Bergman of the University of Illinois explained his teams' research on two applications of Non-Linear Energy Sinks (NES): transonic flutter and blast suppression. His presentation was followed by one from Martin O'Mahony of Ford Motors who, in addition to two research assistants, explained their Targeted Energy Transfer approach to drivetrain design. A round table discussion rounded out the day. I was fortunate enough to be seated with many of the speakers and researchers, which was particularly enlightening.

The conference seemed well attended, as the common areas during the breaks was very full. Not knowing the exact number of attendees, there seemed to be well over one hundred people present including speakers, delegates, vendors, and attendees. The vendors had plenty of equipment to check out and discuss. Many of the exhibitors were very knowledgeable and interesting to talk to, as many of them had come from all over the British Isles and Europe. In addition to the subject matter experts, I find the ability to meet colleagues from different parts of the world particularly rewarding. United States culture seems to have a way of undervaluing the perspectives of other cultures, which I find to be essential not only for my personal and professional development, but for any well-rounded engineer working internationally.

Overall the conference was well-curated with an agenda that effectively held the attention of the attendees. The chair and host of the conference, Stephanos Theodossiades, was very knowledgeable and did a fantastic job of keeping the program on track.

After travelling across the Atlantic Ocean for a one day conference, it naturally seemed like it was over too soon. One lesson I have learned in my volunteer role with the Institution is that the best way to take advantage of any travel opportunities that I (or any other volunteer or delegate) am awarded is to extend the trip at my personal expense in order to see as much as possible. While constraints at home prevented me from staying in the UK for much longer than a week, I made time to experience things that were not only enjoyable to me personally, but relevant to me professionally.

The same industry-leading automotive heritage that brought about the conferences that took me over to the United Kingdom in the first place, also gave way to a countless other automotive and powersport attractions. The conference speaker and Jaguar Land Rover Principal Technical Specialist Sean Biggs insisted that I visit the National Motorcycle Museum while I was in Birmingham. So, before heading back to London the following day for the IMechE Annual general Meeting I made sure to visit the museum on my way out of Birmingham. In the days following I made my way to the Isle of Man to witness the Time Trials that have been taking place on the island since 1907. Between the pair of conferences and the rich motorsports legacy in the United Kingdom, this trip gave international context to my current job role, near-future job prospects, and my ongoing volunteer efforts.