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Sound level sample intervals  
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Celebrating the career of  
IOA Past President, Tony Jones

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# ACOUSTICS BULLETIN



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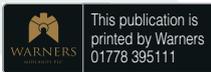
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# ACOUSTICS BULLETIN

Acoustics Bulletin Volume 49 No 1 January/February 2023

Cover image: A team of pupils from St Oscar Romero School in Worthing, Sussex have won the 2022 IOA Secondary Schools Competition. It is the second time that the school has achieved this remarkable result and Headmaster, Peter Byrne, said: "We are incredibly proud of what our students have achieved. The sheer complexity of the project and its real-life application is both inspiring and important for our school's development."

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Winning sound measurements by St Oscar Romero Catholic School, winners of the IOA Secondary Schools Competition 2022

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## Technical articles review procedure

All technical contributions are reviewed by an expert identified by publications committee. This review picks up key points that may need clarifying before publication, and is not an in-depth peer review.

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The Institute of Acoustics is the UK's professional body for those working in acoustics, noise and vibration. It was formed in 1974 from the amalgamation of the Acoustics Group of the Institute of Physics and the British Acoustical Society.

The Institute of Acoustics is a nominated body of the Engineering Council, offering registration at Chartered and Incorporated Engineer levels.

The Institute has over 3000 members working in a diverse range of research, educational, governmental and industrial organisations. This multidisciplinary culture provides a productive environment for cross-fertilisation of ideas and initiatives. The range of interests of members within the world of acoustics is equally wide, embracing such aspects as aerodynamics, architectural acoustics, building acoustics, electroacoustic, engineering dynamics, noise and vibration, hearing, speech, physical acoustics, underwater acoustics, together with a variety of environmental aspects. The Institute is a Registered Charity no. 267026



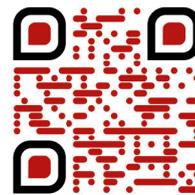
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# Dear Member

**W**hat a year it was last year – one of great Platinum Jubilee celebrations and then Queen Elizabeth II's reign ending after 70 years. We have a new King and we are now on our third Prime Minister in rapid succession! World events have caused significant global and domestic financial challenges and a cost of living crisis marked by high inflation and rising energy bills. In these uncertain times the article in this issue of *Acoustics Bulletin* on economic trends based on an interview with Dr John Lincoln for the latest IOA Bulletin video is particularly timely (see page 48).

## Reproduced Sound 2022

On a brighter note, I had the privilege of presenting the Peter Barnet Memorial award to Glenn Leembruggen of Acoustic Directions, Australia, at last year's 'Reproduced Sound' Conference in Bristol. This award was inaugurated in 2001 by the Electroacoustics Group, and it honours Peter Barnett who died the previous year and was a stalwart of the Reproduced Sound series of conferences. It is made annually to recognise advancements and technical excellence in the fields of electroacoustics, speech intelligibility, and education in acoustics and electroacoustics. Glenn presented an informative and enjoyable paper *Standing on the Shoulders of Giants*, in which he drew on his experiences in a huge variety of projects to pay tribute to early pioneers in the field of electroacoustics. Many thanks once again to the Electroacoustics Group for a thoroughly enjoyable conference with high quality papers and presentations.

## IOA business updates

In the November/December 2022 issue of *Acoustics Bulletin* I highlighted several areas which I wished to focus on and prioritise for development during my presidency, and these are now in the process of being embedded in our strategic business planning process.

Although we have already begun to make progress in many areas, I thought I would provide an update on the two below:

- improving our processes for managing governance meetings; and
- re-shaping our educational services delivery.



**Managing governance:** Through a selection process, we have identified a preferred online and offline software platform that provides a simple, secure and collaborative tool for planning and managing board/committee meetings via PCs, tablets and phones. This will be adopted for a trial period, after which a decision will be made on its future use.

**Educational services delivery:** The Education and Learning Working Group has been re-established and, working in collaboration with the Education Committee, Keith Attenborough and myself will develop a business plan and options for investing in reshaping our future educational services delivery programme. I am convinced that there are opportunities to expand our programmes offered, the flexibility of study options and the regions covered. The one thing I am somewhat relieved about is the failed Government plan in June last year to re-instate imperial measurements in the UK. Revising all our educational materials to reflect imperial measurement based acoustic units would have been a nightmare!

All that remains now is for me to wish you all the very best in your plans for 2023.

Alistair Somerville, IOA President

# Engineering Division



The IOA Engineering Division will support you through the process to help you become one of almost 229,000 registrants that hold international professional recognition.

*By Blane Judd BEng FCGI CEng FIET FCIBSE, Engineering Manager*

**A**ll professional engineering institutions who hold an Engineering Council license to offer professional registration, work to the same standards and are regulated by the Engineering Council to make sure the process is fair and equitable across all licensed bodies.

### Advice and guidance

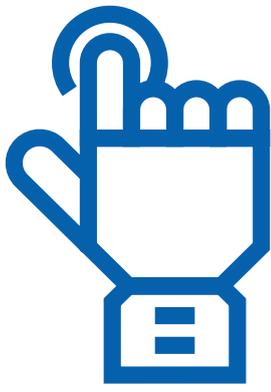
The process for registration starts with candidates being provided with guidance material when they first apply, and we are always ready to comment on the content of their professional review report prior to them submitting the final draft. Make sure that you write in the first person, it is strange for engineers to talk about what "I" have done, as we so often work in teams, but in this instance, it is important to show what your contribution was. For example, if you have selected a particular software to conduct modelling, explain why you chose it, what the shortfalls were, what results you were expecting and how you validated the outputs. Include equations if they are relevant and cite specific standards that you were working to. This is one occasion where you should not assume that the assessor will know you understand, you need to spell it out. These are all part of the A and B competencies and will save you having to do several rewrites. Also remember that communication is a key competence, so don't pad the report - make sure it is concise and to the point.



**The UK Standard for Professional Engineering Competence and Commitment (UK-SPEC)**

Fourth edition

Published August 2020





Apply the **STAR** principle:

- ..Explain the **Situation** your project relates to, describe the **Task** you needed to undertake, detail the **Action** you took to deliver the project and finally the **Result** you achieved.

### Support for all candidates

You can check for yourself if your qualifications meet the required specification by visiting the Engineering Council website <http://www.engc.org.uk/courses>. But please don't panic if your specific qualification is not listed, as we can still help you through the process using individual assessment.

We hold several interview events through the year, depending on the number of candidates we have coming forward for registration. So, if you are interested in taking the next step to becoming a professionally

registered engineer, contact us on [acousticsengineering@ioa.org.uk](mailto:acousticsengineering@ioa.org.uk) sending a copy of your CV and copies of certificates and transcripts of your qualifications. It is important that we have all of your further and higher education certificates, not just your highest attainment.

### There are two routes to registration:

The **recognised qualification** route, if you have achieved the required learning outcomes through recognised qualifications in acoustics. Qualifications which provide the required level of knowledge and understanding are for IEng and accredited Bachelor's degree and for CEng an accredited integrated Master's degree or a combination of accredited Bachelor's and Master's degrees (see table top of page 7).

Incorporated Engineer (IEng) One of the following:	Chartered Engineer (CEng) One of the following:
An accredited Bachelor's or honours degree in engineering or technology	An accredited Bachelor's degree with honours in engineering or technology, plus either an appropriate Master's degree or engineering doctorate accredited by a licensee, or appropriate further learning to Master's level*
An accredited Higher National Certificate (HNC) or Higher National Diploma (HND) in engineering or technology	An accredited integrated MEng degree
An HNC or HND started after September 1999 (but before September 2010 in the case of the HNC) or a foundation degree in engineering or technology, plus appropriate further learning to degree level	An accredited Bachelor's degree with honours in engineering or technology started before September 1999
A National Vocational Qualification (NVQ) or Scottish Vocational Qualification (SVQ) at level 4 that has been approved by a licensee, plus appropriate further learning to degree level*	Equivalent qualifications or apprenticeships accredited or approved by a licensee, or at an equivalent level in a relevant national or international qualifications framework†
Equivalent qualifications or apprenticeships accredited or approved by a Licensee, or at an equivalent level in a relevant national or international qualifications framework†	

\* See: [www.engc.org.uk/ukspec4th](http://www.engc.org.uk/ukspec4th) for qualification levels and HE reference points.

† For example, UNESCO's International Standard Classification of Education (ISCED) framework.

The **individual assessment** route, for applicants who do not have the recognised qualifications and who will have an individual assessment of their qualifications and any other relevant learning such as: formal academic programmes, in-employment training and experiential learning self-directed learning. In many instances, it is likely to be a combination of some or all these options.

Remember we are here to help you get through the process and advice and support is offered to every candidate personally.

For **individual assessment**, the Institute accepts several courses from certain academic centres in relevant subjects, such as audio technology, as being equivalent to accredited courses for the purposes of EC registration, without the need for further assessment.

The Institute recognises the IOA Diploma course and the several Master's courses linked to it as providing evidence if you are looking to gain CEng registration. You could also offer a PhD qualification, depending upon the content of the associated taught element. We can also offer support for registration via a 'technical report' route, if you do not have the relevant qualifications to help you demonstrate you are working as a professional engineer in acoustics. If you need to follow the technical route, we will discuss this with you before you embark on that process.

### Election process

The election process is overseen by the Institute's Engineering Division Committee, which is made up of volunteers from the membership, to whom we are extremely grateful. They represent the ever-growing number of members holding

EC registration. They provide the essential peer review process that affirms that you are at the appropriate level for recognition as an Engineering Council Registered Professional Engineer.

### Recognising your professionalism

We have produced a video explaining how members can gain professional recognition and Engineering Council registration through the IOA.

In the video, we explain what members need to do in order to become either chartered or incorporated through the IOA.

There are 39 licenced bodies that offer chartered, incorporated or engineering technician level registration, all operating to UK-SPEC standard, currently at standard level 4 and there are five levels of competence associated with that standard. The IOA holds a licence for Chartered Engineer, and Incorporated Engineer but there are also Engineering Technician registrations and an ITC Technician registration (Information and Communication Technology).

The qualification that applicants can receive is internationally recognised and the advantage to individuals is that it allows them to move to overseas contracts and work all over the world. The recognition of this professional status is awarded by peers from within the sector, as evaluations of applicants' competence are undertaken by IOA members.

### Evidence of engineering credentials

These are all work-based and backed by a professional title, evidence of applicants' professional ethics is also demonstrated through

this and ethics is very important for us as engineers. Successful applicants become members of a relevant professional body, in this instance, obviously, the IOA.

All engineers must comply with a code of conduct and manage and apply safe systems of working. It is also important to undertake engineering activities applying security and sustainability that is consistent for all. It is vital that all registered engineers commit to continuing professional development, while becoming part of a wider acoustics and engineering community.

The difference between Incorporated Engineer status and Chartered Engineer status is quite nuanced;

An Incorporated Engineer maintains and manages applications of current and emerging technology and may undertake engineering design, development, manufacture, construction and operation, generally without high levels of financial responsibility. A Chartered Engineer, however, will be developing solutions to engineering problems using new (or existing) technologies, through innovation, creativity and change, being accountable for complex systems with significant levels of risk.

The IOA Engineering Department will be very happy to help point you in the right direction if you are unsure about the level of registration that is best for you, as well as those without recognised qualifications and we will carefully and thoroughly guide all applicants through the process towards registration. ©

Watch the video now at <https://www.ioa.org.uk/video/recognising-your-professionalism-0>

# Approved Membership Applications

The Membership Committee reviewed 70 application forms on 17 November 2022 at their meeting held at the IOA HQ as well as 10 through the fast-track route for non-corporate applications. 30 corporate applications have recently been approved by the Council following the recommendations of the Membership Committee. 33 new members have joined the IOA, the remaining are members who have upgraded.

## FIOA

James Talbot

## MIOA

James Abbass	Freya Malcher
Scott Boughton	June McClung
Laura Broadley	Michaela Moffatt
Martyn Broom	Andrew Niland
Ben Bryan	Ronny Ospina Orozco
Struan Carmichael	Robert Paton
Cheuk Kiu Chan	Chris Perry
Chin Chiu Chan	Glen Plunkett
Chris Conroy	Anna Rovigatti
Shannon Doherty	Charalampos Saitis
Matthew Elliott	Jonathan Seiffert
Ilaria Fichera	Daniel Taylor
Gareth Henderson	Ye Wilmshurst
Stephen Jay	Jamie Wilson
Ceri Jones	

## AMIOA

Ben Baddour	Adam Shaw
Hugo Bell	Kaljit Sroa
Valerie Cueto Erichsen	Tom Stephenson
Jenny King	Jake Telford
Conor O'Brien	Alexander Willsher
Joel Phillips	Robb Young
Matthew Ranger	

## TechIOA

Thomas Bunting	George Stephens
Henry Lo	Jodi Smith
Jamie Nelson	Robert Watson
Nial Ryan	

## Affiliate

Najwa Adnan-Smith	Sonny Soehardjanto
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# IOA 2023 Events for 2023

## IOA events 2023

Organised by the Underwater Acoustics Group  
 5th International Conference on Synthetic  
 Aperture in Sonar and Radar  
 6-8 September 2023  
 Villa Marigola, Italy  
<https://www.ioa.org.uk/civicrm/event/info?reset=1&id=718>

11th International Conference on Auditorium Acoustics  
 28-30 September 2023  
 SNFCC, Athens Greece  
<https://auditorium2023.org>

Acoustics 2023  
 Institute of Acoustics Annual Conference, Exhibition and Dinner  
 16-17 October 2023  
 The Guildhall, Winchester  
<https://www.ioa.org.uk/civicrm/event/info?reset=1&id=750>

## Other events 2023

NOVEM 2021 (Noise and Vibration: Emerging Methods)  
 Now 10-12 January 2023  
 Auckland, New Zealand  
[www.novem2021.ac.nz](http://www.novem2021.ac.nz)

Acoustics 2023  
 International Convention Centre Sydney (ICC Sydney)  
 4-8 December 2023  
<https://acoustics23sydney.org/>

For up-to-date information visit [www.ioa.org.uk](http://www.ioa.org.uk)



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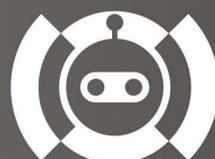


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# Adaptive laser induced phased arrays for *in situ* and in process remote ultrasonic inspection

Take a new look at what ultrasonic phased arrays can do!

By Dr Theodosia Stratoudaki, University of Strathclyde

**M**any current challenges in Non-Destructive Evaluation (NDE) stem from the increased use of advanced materials and manufacturing processes that push the limits of materials' performance. NDE techniques need to cope with extreme environments (high temperature/radioactive), restricted access and complex geometries.

In order to address these, a new ultrasonic capability is being developed for real-time,

**Below:** Figure 1: Remote ultrasonic inspection of an as-built Ti-alloy component, made using Additive Manufacturing. The photo shows the Adaptive Laser Induced Phased Array (Adaptive LIPA) experimental setup during scanning. The beam paths of the two lasers that excite (red beam) and detect (green beam) ultrasound have been marked on the photo

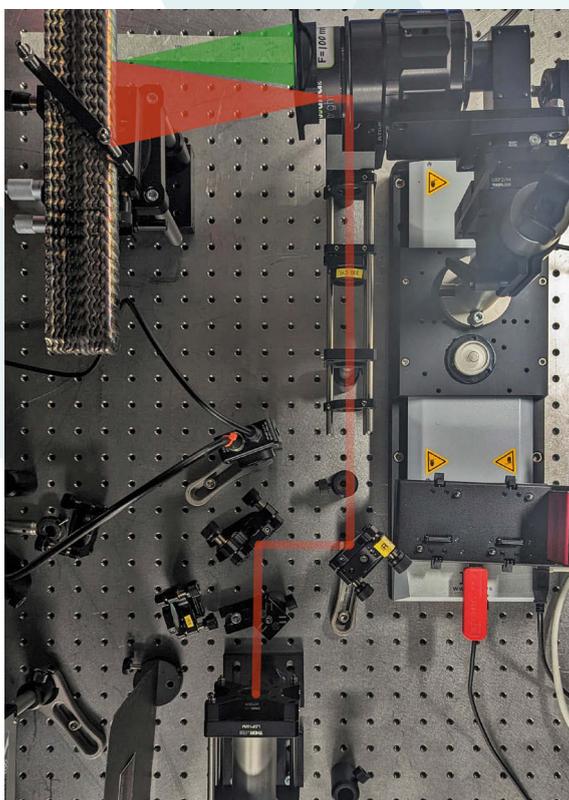
remote ultrasonic imaging. This new capability will be achieved by introducing a conceptual change to phased array ultrasonics by adapting the array to the demands of the inspected structure, on the fly.

The long-term vision behind this project goes beyond inspection, to develop a method for monitoring and control of in-process parameters, in places of extreme environments such as fusion reactors or turbine engines. The means to achieve such adaptive ultrasonic array is laser ultrasonics. A consortium of three universities was formed in 2021 to address

this challenge. The research is led by Dr Theodosia Stratoudaki (author of this article) at the University of Strathclyde and is supported by Professor Paul Wilcox (University of Bristol) and Professor Matt Clark (University of Nottingham).

## Limitations of existing instrumentation

Transducer based ultrasonic phased arrays have transformed how ultrasonic imaging is perceived and have had an enormous impact in science, medicine and society, being at the heart of all P12



**Above:** Figure 2 A close up of the Ti-alloy sample being scanned by the two lasers of the Adaptive LIPA system, during the adaptive data acquisition

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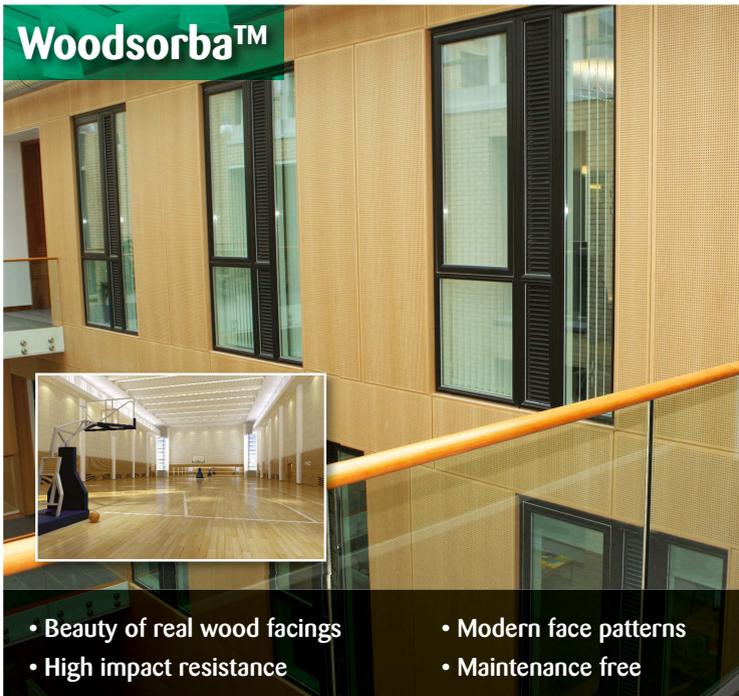
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medical ultrasonic imaging and sonars. They have also defined what we have come to consider as an ultrasonic phased array: an instrument with fixed geometry of instrumentation, fixed number of elements and pitch, fixed operational ultrasonic frequency, which requires contact and/or an ultrasonic coupling medium to operate.

However, these instrumentation specifications and requirements are setting a limitation on the data acquisition process, with respect to data acquisition time and data volume. We introduce the concept of the Adaptive Laser Induced Phased Array (Adaptive LIPAs) which can adapt, dynamically, to the geometry, material and demands of the inspected structure in order to achieve efficient, real-time, remote ultrasonic imaging. In Adaptive LIPAs, a laser is used for ultrasonic generation and another one is used for ultrasonic detection. The two beams are scanned on the surface of the inspected component and the data are collected remotely and without couplant. The phased array is then synthesised in post-processing, by applying a variety of ultrasonic imaging algorithms.

### Flexibility of Adaptive LIPAs

We have previously shown successful ultrasonic imaging using LIPAs by capturing the Full Matrix (Full Matrix Capture, FMC) and applying the Total Focusing Method (TFM).

Components such as Titanium alloys and aluminium, made by additive manufacturing, have been imaged in this way. However, the flexibility of LIPAs with respect to synthesising any number of array elements and positioning them at any configuration or pitch opens up new horizons for ultrasonic phased array designs that were previously impossible to make with transducer

## Adaptive Laser Induced Phased Arrays can adapt, dynamically, to the geometry, material and demands of the inspected structure in order to achieve efficient, real-time, remote ultrasonic imaging

probes, such as overlapping array elements or reconfiguring the array during inspection. It is this flexibility of Adaptive LIPAs that is currently being exploited for automated inspection.

### Detection and characterisation

Additive manufacturing is an excellent example to demonstrate the strengths of the Adaptive LIPAs as it provides an opportunity to inspect complex geometries in an environment that reaches high temperatures, without contact and without couplant. In this case the aim is to detect possible defects during the metal deposition process. If the location of these defects were known, then Adaptive LIPAs would give us the opportunity to synthesise the 'perfect' ultrasonic array for that defect at that particular location.

This 'perfect array' would have the optimum number and positioning of elements to avoid capturing unnecessary signals that contain only noise and avoiding the creation of grating lobes. However, the location of the defects in the majority of NDE inspection situations is unknown. This is why the Adaptive LIPA process is split into two stages: detection and characterisation.

An initial array is synthesised with elements progressively added and information from captured data continuously analysed until a decision can be made on whether there is no defect, and the process is

stopped or a region where a defect presence has been detected in which case the array is automatically reconfigured to the optimum design for this location, on the fly.

The process finishes when a high-resolution ultrasonic image of this area has been produced and the defect can be characterised. At the moment, this adaptive data acquisition process has allowed us to image defects on additively manufactured components from Titanium alloy in three minutes, compared to 30 minutes for FMC, while retaining the same imaging quality with respect to signal-to-noise ratio. There has also been a significant reduction in data volume (from 255MB for FMC to 84MB for the Adaptive LIPAs) which further aids post processing. Our aim is to develop the instrumentation and software to further push the concept to address the demands of *in situ* and in process inspection.

### Funding and partners

The Adaptive LIPA project has acquired its major funding from the Engineering and Physical Sciences Research Council (EPSRC). EPSRC is the main funding body for engineering and physical sciences research in the UK and is part of UK Research and Innovation. The project includes partners from the manufacturing, nuclear and power generation sectors. This project is a Targeted Research Project of the UK Research Centre in Non Destructive Evaluation (RCNDE). ©

### To find out more

Visit Dr Stratoudaki's publications page at: <https://pureportal.strath.ac.uk/en/persons/theodosia-stratoudaki/publications/>

# Environmental Monitoring

The **SV 307A** is designed for long-term and short-term noise monitoring applications such as road and rail traffic, industrial plants or construction sites.

The station firmware has the functionality of advanced triggers that supports unattended measurements. A unique feature of the SV 307A Class 1 sound level meter is it can be calibrated remotely on site saving you time. The SV 307A is based on patented MEMS microphone technology covered by a lifetime warranty.

SV 307A



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30 years of service, product development and work in standards committees speaks for itself.

# Women in engineering

As Chair of the EDI (Equality, Diversity and Inclusion) Working Group, and a woman working in the field of acoustics, I want to share examples of brilliant women who work in this diverse and dynamic profession to the attention of our members. So, in this article, Josie Nixon tells us about how she joined the profession and how she is thriving. – Angela Lamacraft.



Above:  
Josie Nixon

**I didn't follow a traditional route into acoustic consultancy. Instead, I side-stepped into the industry, following a 'quarter-life-crisis'! I originally studied geography at Leicester University before going on to get my Masters from Bristol University in human geography: contemporary space and society.**

After travelling, I gained experience working for a local environmental consultancy, whose services included noise impact assessments. I really enjoyed this work, for the variety of clients, the investigative nature of the role and the balance of being on site, and being in the office processing data, determining suitable remedial measures and compiling technical reports.

Having decided acoustics was the industry for me, and with the lure of living (and socialising) in the capital, I moved to a London consultancy solely specialising in acoustics. Here, I learnt a lot about mechanical plant noise and the importance of accurately following procedures; such as those used for accredited sound insulation testing.

The job enabled me to study the IOA Diploma in Acoustics at London South Bank University.

After a couple of years, (and all partied out) I moved back home to my rural village in Essex, and joined HA Acoustics, based in Hertfordshire. My first role was as an acoustic consultant, progressing after a couple of years, to senior acoustic consultant. My role enables me to continue to expand my knowledge and undertake a wide variety of projects; in particular, larger commercial schemes, sporting facilities, agricultural and residential planning applications, acoustic design reviews, noise modelling, and noise and vibration at work assessments for helicopter pilots and airport personnel.

## Additional study

I undertook a second Masters, the MSc in Acoustics at LSBU. The combination of work and study has given me an outlet to further investigate my own interests on noise emissions, specifically tonality from drone blades. This has led to having two papers co-published while presenting virtually at Inter-noise 2020 and 2021. Thankfully, I was able to attend Inter-noise 2022 in person where I sat on a panel and crucially met women working in acoustics (WWAs!). It was lovely physically meeting and putting names to faces, where beforehand I'd only had the

chance to speak on social media/at IOA events!

The projects I work on are rarely the same and I enjoy the challenge this brings. As my projects have expanded, I find that the knowledge I gained in my geography related degrees strongly interlink into my acoustic projects. In August 2022, I became Chair of the IOA Early Careers Group (ECG) and I am pushing the ECG Committee to help support new acousticians and encourage women into an otherwise male dominated industry.

## Industry reform

The diverse world of acoustics occasionally involves visiting sites from industries that can be sexist, particularly on construction sites, ports and agricultural sites where there have been odd instances where, as a female, I have not been taken seriously, considered junior to my junior colleagues, or even considered to be on work experience or a day out from the administrative desk! However, I do believe that both mine and those traditional male industries are changing and I'm thankful for the many women who have gone before me. Acoustic consultancy and engineering still have a way to go to become an inclusive and diverse industry, and welcoming individuals from a wider socio-economic background. The industry is improving and I am proud to be part of the push for this much needed reform. ☺

“Acoustic consultancy and engineering still has a way to go to become an inclusive and diverse industry.”

# Sound Masking

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Open plan offices benefit from Sound Masking



Cellular offices achieve better speech privacy with Sound Masking

Sound Masking is a cost effective solution to the problem of improving speech privacy in today's modern office environment. Best installed during office fit out but often installed as retrofit, Sound Masking from AET has improved the office environment for many international companies throughout Europe over the last 20 years.

In today's office speech privacy becomes a key aim and open plan offices can suffer from two speech problems:

- Other people's conversations can be an irritating distraction
- Confidential conversations can be almost impossible to conduct

Similar problems also exist in cellular offices. Apart from noise breakthrough via partitions, flanking over, under and around them, other problem areas include light fixtures, air conditioning systems and services trunking. Sound masking compensates for these problems.

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- Mobil Exxon HQ
- Elizabeth Arden
- Barclays Bank
- Freshfields
- KPMG
- PWC
- BP



Sound Masking is now available with a host of extras including:

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- Fault reporting
- Automated amplifier changeover



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Sound Masking is also known as sound conditioning or white noise systems



Certificate Number 130222

# The Institute of Acoustics Diploma results 2021

*By Professor K Attenborough, HonFIOA (IOA Education Manager)*

**C**andidates for the IOA Diploma in Acoustics and Noise Control in 2021/2022 were based at three accredited centres (KP Acoustics Research Labs, London South Bank University and the University of Derby), and at four centres for tutored Distance Learning (Bristol, Edinburgh Napier University, Milton Keynes and Trinity College Dublin).

Relaxation of the COVID-19 pandemic restrictions made it possible to hold written examinations at centres rather than online on 9 and 10 June 2022. There were 96 candidates (including two resits) for the General Principles of Acoustics (GPA) Module examination, 13 (no resits) for Regulation and Assessment of Noise (RAN), 47 (including two resits) for Noise and Vibration Control Engineering (NVCE), 76 (including two resits) for Building Acoustics (BA) and 52 (including six resits) for Environmental Noise Measurement, Prediction and Control (EN). 110 candidates registered for the project module. Although 28 are listed as having failed the project in the table of results, 25 of these 28 have deferred their project to 2023.

As in previous years, a merit threshold of 70% was applied to the written GPA paper and the conflated GPA mark. The examination scripts of candidates satisfying the conflated mark threshold but gaining between 68% and 72% on the written paper were examined at moderation, re-marked where appropriate and judged individually as 'pass' or 'merit'. However, even if these criteria were satisfied, a merit was not awarded if a coursework assignment mark was carried over from a previous year.

Criteria based on the means and standard deviations from the previous 10 years were used to decide whether to moderate examination marks for the specialist modules. To obtain a merit grade on the specialist modules, candidates were required to have a conflated mark of at least 70% and a written examination mark of at least 70%. No merit was awarded if it depended on a deferred score.

The first GPA coursework assignment was about noise effects on hearing and noise rating and resulted in a mean mark of 77%. The second GPA assignment was on MRI scanner noise and resulted in a mean mark of 73%.

The specialist module coursework topics this year included sustainable acoustic materials (NVCE), concert hall design (BA), mineral extraction noise (EN) and air source heat pumps (RAN). For the second time candidates were required to produce and record a video presentation for the NVCE coursework. The mean mark gained this year for the video presentation was lower than last year. A voluntary presentation was included as part of the Project for the first time this year. While it could be made at any stage of the project in 2022, for future years it will be associated with the project proposal. As a result of the experience in 2022, advice on creating such presentations is being added to the handbook, the project guide and issued when needed.

The numbers of candidates who gained merits (M), passes (P) or fails (F) in each module are shown for each centre in the following table of results. The 'fails' include those who were absent from the written examinations.

10 exceptional candidates have obtained five merits. The prize for best overall Diploma performance, based on not only gaining **P18**

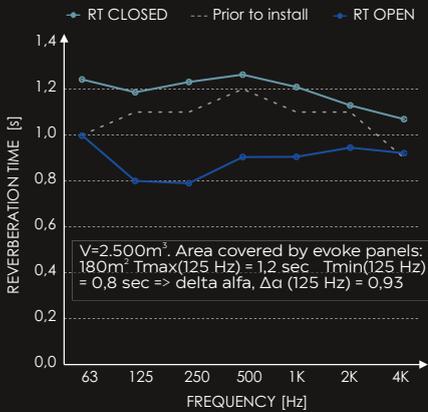
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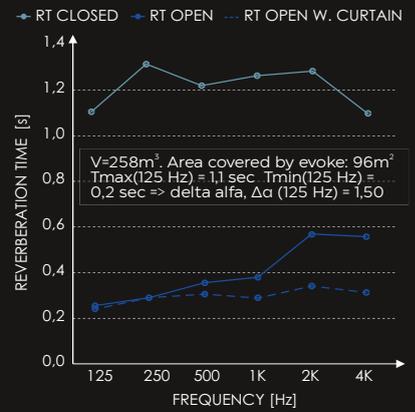


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five merits but also achieving the highest aggregate marks on three of the modules (GPA, BA and EN), is to be awarded to Daniel Robinson (DL Edinburgh).

The other candidates who are to be congratulated on achieving five merits are Fraser Roskilly (KP Acoustics Research Labs); Leonardo Enrique Fernandez Rodriguez (London South Bank University); Aileen Rahilly (University of Derby); Joshua Hale (DL Bristol); Luke Coffey (DL Dublin); Daniel Robinson (DL Edinburgh); Kira Marshall (DL Edinburgh); Jack White (DL Milton Keynes); Ben Hunt (DL Milton Keynes) and Warren Meyer (DL Milton Keynes).

Candidates to be commended on achieving four merits are Milo Fox (London South Bank University); Benjamin Gray (London South Bank University); Roderick Pugh (University of Derby);

Joseph Oxenham (University of Derby); Seán Mansfield (DL Dublin); Paul Couper (DL Edinburgh); Michael Fearman (DL Edinburgh); Emma Howard (DL Milton Keynes); Tom Gregory (DL Milton Keynes); Vincent Mooney (DL Milton Keynes).

Luke Coffey will be receiving the prize for the best overall Diploma performance by an Irish student.

Seena Sajeev (DL Edinburgh) has been awarded the 2020-21 ANC Prize for the project *Soundscape Approach to Residential Noise Impact Assessment: Potential to Deliver Improved Outcomes*.

I am grateful to all examiners and tutors for their cooperation and contributions in this second difficult year. Thanks again to Helen Davies and Caitlin Jesney (who, sadly, left her employment with the IOA during 2022) for their administrative contributions during the 2021/2022 presentation year of the Diploma. **P20**

## IOA Diploma Results Chart for 2021/22

Centre Name		GPA	Labs	BA	NVCE	RAN	EN	Project
Distance Learning (Bristol)	Merit	1	1	1	0	1	1	1
	Pass	3	5	1	1	0	4	3
	Fail	1	1	1	0	0	2	3
Distance Learning (Dublin)	Merit	3	3	1	0	0	2	3
	Pass	3	3	2	2	0	1	2
	Fail	0	0	3	1	0	2	1
Distance Learning (Edinburgh)	Merit	5	6	2	0	1	4	3
	Pass	3	3	2	2	2	5	5
	Fail	1	0	0	0	1	1	2
Distance Learning (Milton Keynes)	Merit	10	11	10	6	2	1	8
	Pass	15	18	10	9	2	5	18
	Fail	11	5	9	6	3	8	17
KP Acoustics Research Labs	Merit	2	2	1	1	0	0	3
	Pass	2	2	1	1	1	4	3
	Fail	0	0	0	0	1	0	0
London South Bank University	Merit	4	7	8	5	0	0	5
	Pass	11	10	10	11	0	0	12
	Fail	2	0	0	2	0	0	1
University of Derby	Merit	6	8	7	0	0	3	6
	Pass	10	10	12	2	0	12	10
	Fail	3	0	0	0	0	2	4
<b>Totals</b>	<b>Merit</b>	<b>31</b>	<b>38</b>	<b>30</b>	<b>12</b>	<b>4</b>	<b>11</b>	<b>29</b>
	<b>Pass</b>	<b>47</b>	<b>51</b>	<b>38</b>	<b>28</b>	<b>5</b>	<b>31</b>	<b>53</b>
	<b>Fail</b>	<b>18</b>	<b>6</b>	<b>13</b>	<b>9</b>	<b>5</b>	<b>15</b>	<b>28</b>



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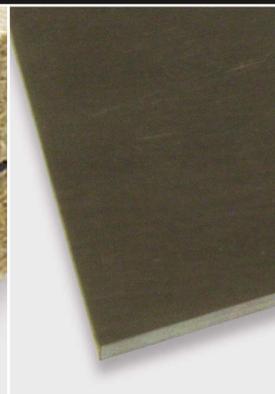
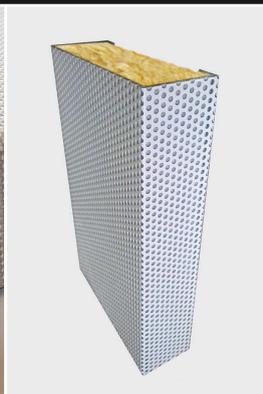
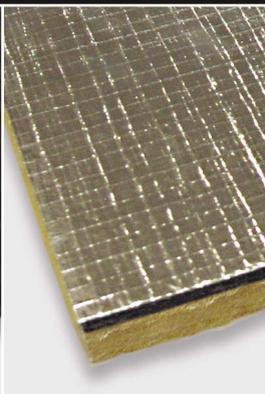
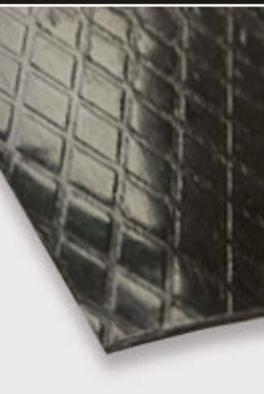
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### Project titles 2022

#### Distance Learning (Bristol)

- Can a change in perceived loudness of road traffic noise be measured by psychoacoustics descriptors?
- An investigation into the accuracy of predicted noise levels using methodologies in BS5228-1 in comparison to measured equivalents
- Evaluation of the effectiveness of 'Noise Council, code of practice on environmental noise control at concerts, 1995' for mitigation of unreasonable noise pollution and disturbance from live music events in the Cardiff and County of Cardiff
- Autophonic noise – a study into internal voice loudness and perception

#### Distance Learning (Dublin)

- A noise management and compliance study for an outdoor music event
- An exploration of the tranquillity of Fairview Park using the Tranquillity Rating Prediction Tool (TRAPT)
- The impact of diffusion and absorption distribution on the acoustic parameters of a home recording studio
- The use of advanced reverberation time formulae in an ordinary and non-ordinary room
- Assessment of room acoustics in shared use space

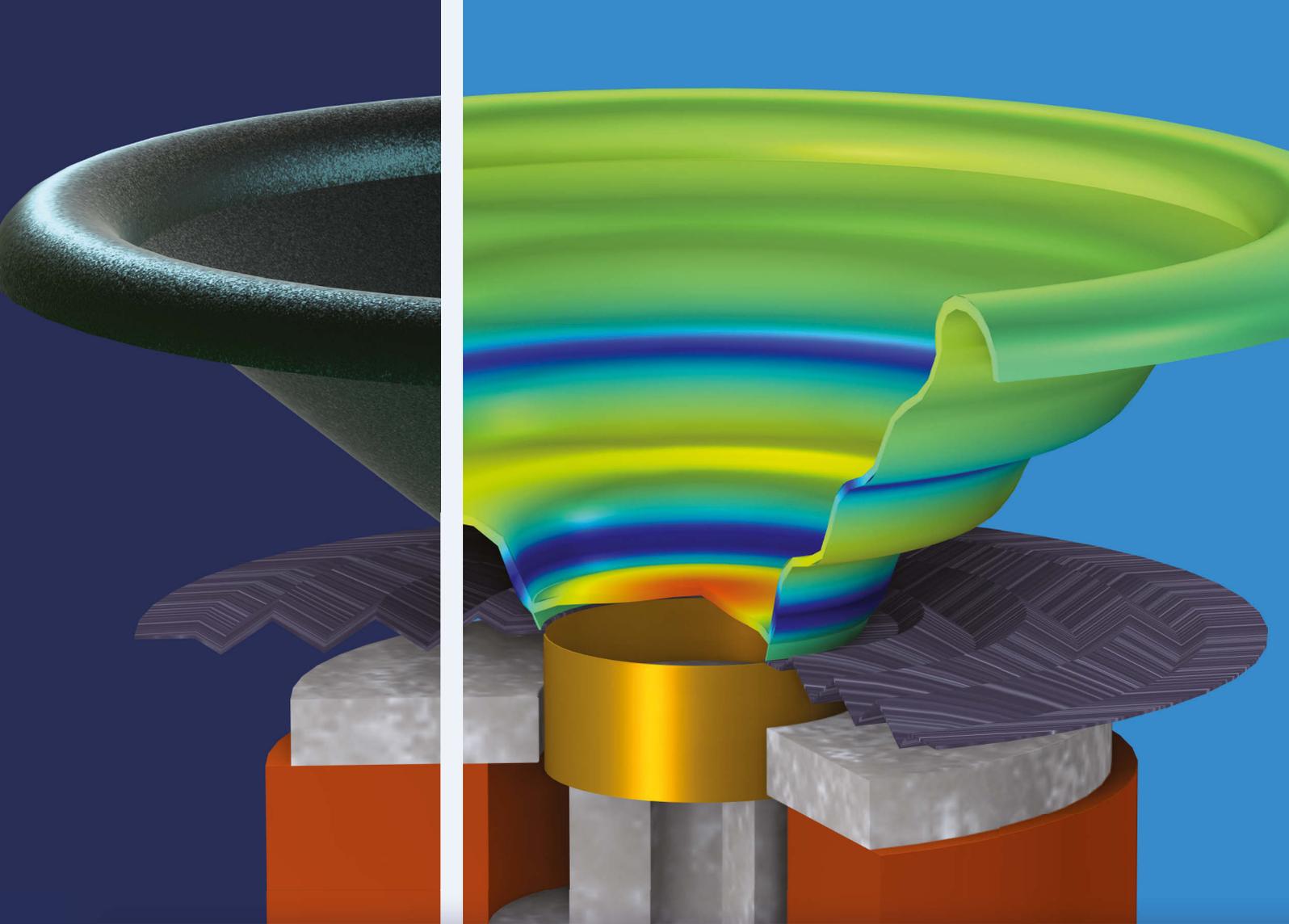
#### Distance Learning (Edinburgh)

- Road traffic noise and the 'new normal': an investigation into road traffic noise levels in Scotland following the COVID-19 pandemic
- An investigation into the effect on road traffic noise caused by precipitation on road surfaces in urban areas
- Exploring alternative measurement set-up in the context of IEC 61400-11
- Bird scarer gas guns and the use of the National Farming Union code of practice to attenuate noise levels
- Air source heat pumps, a review of proactive regulatory controls to prevent noise disturbance from residential installations in the Eden district.
- Comparison of acoustic performance of a home music room before and after remediation
- What makes a standard office acoustically suitable to be utilised as a noise laboratory for environmental health
- The effect of vegetation density on road noise mitigation

#### Distance Learning (Milton Keynes)

- The physical and perceived impact of acoustic treatments in the workplace
- Investigation into attenuation of conveyor belt noise from a British Gypsum mine and how to achieve reasonable success
- Comparison of reverberation times in four rooms: experimental measured value and predicted using Sabine's, Eyring's equations and EASE modelling
- Comparison of sound insulation constructions for high intensity fitness studios under different types of amplified music in various conditions
- Assessing the comparability of different instruments when calculating Peak Particle Velocity (PPV)
- Investigating the comparison of air source heat pump noise emissions and the effectiveness of reduction of noise by acoustic enclosure at residential households
- Understanding the relationship between air tightness (from unplanned ventilation) and façade sound insulation in masonry construction houses
- Prediction of building services plant noise relative to operating conditions
- Comparison of noise attenuation achieved by different types and shapes of noise barriers and attenuation predicted [P22](#)





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- An assessment for the suitability of different noise sources for use in the measurement of reverberation time
- An investigation into the acoustic properties of local screening in a controlled environment and open plan office
- Two proposed methods for measurement of the façade shape level difference during the overheating condition
- Understanding the impact of stiffness in drywall partitions
- An evaluation of EASE AURA prediction software in the prediction of reverberation time
- Generator room acoustics
- An acoustic design of the auditorium at Al Lesaily School
- A critical review of draft guidance for the assessment of noise impacts from kennelling and boarding establishments in Northern Ireland
- The impact of Coronavirus on road traffic noise levels and residential amenity
- Investigation of noise complaints on an intensive care unit
- Measurement, analysis and assessment of the acoustic parameters of a multipurpose church auditorium
- An experimental investigation of the application of splitter silencers shading system for the attenuation of noise on office building façade
- Acoustic design of audio control room
- Prediction of nighttime levels from road traffic
- Sound insulation and reverberation time comparison
- Comparison of RT prediction accuracy

#### **KP Acoustics Research Labs**

- Moored vessel noise and its contribution to the surrounding noise environment at The Camber in Portsmouth
- Air-source heat pumps: their practicality and acoustic environmental impact
- Do final floor finishes affect  $\Delta L_w$  performance?
- Air source heat pumps, permitted development and statutory nuisance
- Investigation to determine the extent to which high speed trains generate a sonic boom when travelling through tunnels in the south east on the HS1 railway line

- A study on the acoustic conditions required to convert a domestic room to a high-quality listening environment with regards to professional music engineers during the COVID-19 lockdowns

#### **London South Bank University**

- An investigation into impact noise induced by playing darts
- Investigation of flanking noise between timber construction residential flats, and ways to identify and minimise their effects
- Investigating the noise level relationship between the pandemic and motorway road traffic on the M4
- Promoting low frequency diffusivity in a reverberation chamber using a quadratic residue type diffuser QRD
- Vocal booth enclosure design and analysis for the home studio
- Evaluating the acoustics of a small open plan office using in-situ measurements and a computer prediction model
- An investigation into noise creep
- Noise mapping and environmental acoustic impact of airports in Pointe Noire – Congo
- An acoustic analysis of Edith Borthwick School: does a functioning school still adhere to current acoustic guidance and is said guidance fit for purpose?
- An investigation into building vibration caused by music festival activity in London, UK
- A soundscape investigation of the LSBU campus: A holistic approach to environmental noise surveys
- A critical investigation into the BS4142:2014+A1:2019 reflection correction
- A passenger noise exposure assessment of Wiltshire bus routes
- Impact sound transmission test methodologies for specialist dance floors
- Assessing methods of attenuation of vibration and low-frequency noise from a subwoofer
- The repeatability and validity of airborne sound insulation testing using different methods and the validity of testing regime used in the evolving construction methods
- Traffic noise exposure of cyclists

#### **University of Derby**

- Investigation of low frequency noise from an unknown source and the difficulty of assessment for local authorities
- Comparing assessment and prediction methods for road traffic noise
- Smartphone applications: their accuracy for screening occupational noise exposure
- An investigation into a potential methodology for drone noise assessment
- An Investigation into the noise exposure levels on public transport
- An investigation into the potential noise impacts of air source heat pumps
- Comparison of staff and customer noise exposure in a nightclub environment
- Comparative analysis of anechoic chamber wedge material and factors affecting the absorptive performance
- Predicting the sound reduction index of a natural ventilation unit using finite element analysis
- Investigation and assessment of hand-arm vibration in drummers
- Acoustic room correction for home cinema
- Assessment of the pop code and its relevancy at forestry commission events
- Noise impact assessment for dog boarding kennels
- Pilot study: assessing acoustic tranquility indoors – exploring established and novel methods to inform design
- Critical analysis of low-cost class 1 Mems Data Logger and its suitability for noise surveys in a typical urban suburban and rural environments and as a long-term monitoring equipment around construction sites
- The classification of excessively noisy vehicles [P24](#)



# Isocheck Isoblock & Isobar system - raising the performance bar -

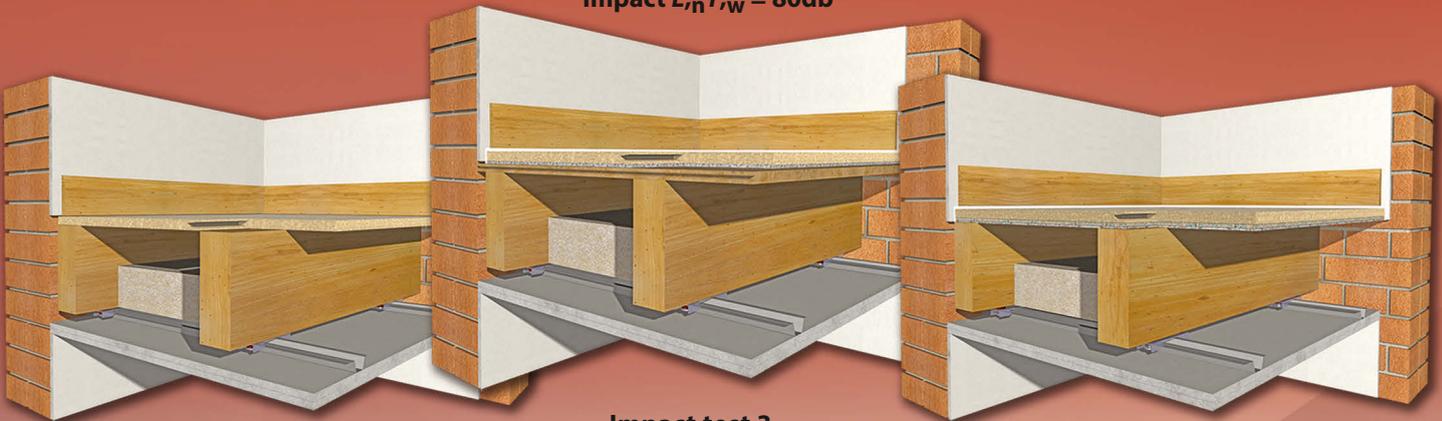
Copies of this laboratory test data and additional test data are available via email to [technical@isomass.co.uk](mailto:technical@isomass.co.uk)

## - in floors -

### - Base floor - impact test 1 -

22mm chipboard, 225 x 47mm timber joists @ 400mm centres, 15mm plasterboard

**Impact  $L_n T_w = 80db$**



### - Impact test 2 -

22mm chipboard, 100mm insulation, 225 x 47mm timber joists @ 400mm centres, *Isoblock & Isobar*, 20kg/m<sup>2</sup> plasterboard

**Impact  $L_n T_w = 56db$**

### - Impact test 3 -

*Isocheck 24T*, floorboards, 100mm insulation, 225 x 47mm timber joists @ 400mm centres, *Isoblock & Isobar*, 20kg/m<sup>2</sup> plasterboard

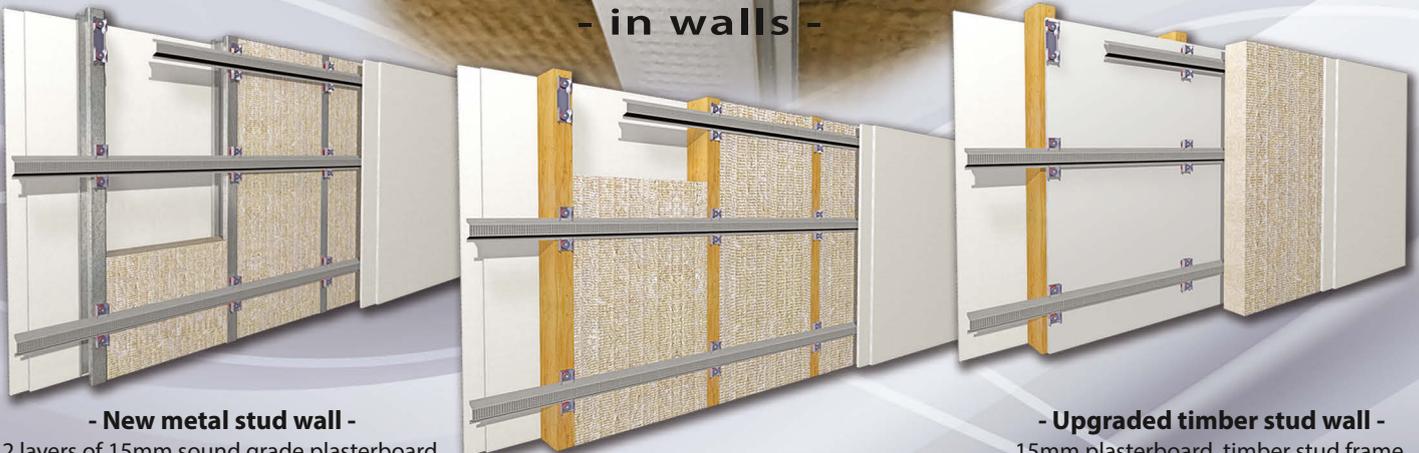
**Impact  $L_n T_w = 53db$**

### - Impact test 4 -

*Isocheck 32T* direct to joists, 100mm insulation, 225 x 47mm timber joists @ 400mm centres, *Isoblock & Isobar*, 20kg/m<sup>2</sup> plasterboard

**Impact  $L_n T_w = 49db$**

## - in walls -



### - New metal stud wall -

2 layers of 15mm sound grade plasterboard, 70mm metal stud frame, 50mm insulation, *Isoblock & Isobar*, 2 layers of 15mm sound grade plasterboard

**Airborne  $D_n T_w + C_{tr} = 57db$**

### - New timber stud wall -

2 layers of 15mm sound grade plasterboard, 50 x 100mm timber stud frame, 100mm insulation, *Isoblock & Isobar*, 2 layers of 15mm sound grade plasterboard

**Airborne  $D_n T_w + C_{tr} = 60db$**

### - Upgraded timber stud wall -

15mm plasterboard, timber stud frame, no insulation, 15mm plasterboard, *Isoblock & Isobar*, insulation, 2 layers of 15mm sound grade plasterboard

**Airborne  $D_n T_w + C_{tr} = 60db$**



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### Diploma awarded 2022

#### Distance Learning Bristol

Archer J  
Baker G  
Hale J  
Jenkins T

#### Distance Learning Dublin

Coffey L  
Mansfield S  
Yurek A

#### Distance Learning Edinburgh

Boyjonauth N  
Cain R  
Couper P  
Evans B  
Fearman M  
Marshall K  
Platts O  
Robinson D

#### Distance Learning Milton Keynes

Abdalla S  
Balasubramanian S K  
Beverley A  
Bontoft D  
Dippi D  
Forsdyke N  
Freeman A  
Gregory T  
Howard E  
Hunt B  
Mahay J  
Melothe C S  
Meyer W  
Mooney V  
Ng E  
Ospina Orozco R  
Panneer Selvam S  
Rajan A  
Shafeeque V M  
Tan I  
Thompson F  
Valente V  
White J

#### KP Acoustics Research Labs

Hayes A  
McKay K  
Parker T  
Roskilly F  
Shaw R  
Wright D

#### London South Bank University

Agyare Y  
Ahmadi S  
Babariya N  
Chaplin M  
Egbuonu E  
Fernandez Rodriguez L E  
Fox M  
Gray B  
Hagan D  
Hales G  
Hayes M  
Lewis W  
Long R  
Pilotti A  
Smith M

#### University of Derby

Fitzmaurice B  
Hanson A  
Hill J  
Hobbs B  
Kahn P  
Mrózek K  
Oxenham J  
Pugh R  
Rahilly A  
Reardon C  
Reddin D  
Royal A  
Stalker K  
Tranter J  
Webber P  
Willis A

### The Institute of Acoustics Certificate results 2022

2022 saw the welcome return of several centres who were unable to deliver certificate courses during the pandemic. During the year, some existing centres were re-accredited and new centres were accredited to deliver the CCENM and CCWNRA courses. Although CCBAM and CCENM continue to be most popular, it is good to see an increasing interest in the CCWNRA course.

#### List of successful candidates

#### Certificate of Competence in Building Acoustics Measurements

**Exam date:** 28 January 2022

#### KP Acoustics Research Labs

Caughey D  
Craze J  
Dyke T  
Finney B  
Gilbert J  
Hardy J  
Liaqat U  
Stonehouse C  
Winkworth S

**Exam date:** 29 April 2022

Ahern S  
Chapman C  
Daly E  
Goodhand D  
Millard S  
Roberts N  
Sherlock-Brown T  
Snodgrass S  
Soika E  
Sutton D  
Wing A

**Exam date:** 8 July 2022

Eccles G  
Iwundu C  
Robinson T  
Taylor G  
Whittle G

**Exam date:** 4 November 2022

Atwal H  
Atwal R S  
Bowles N  
Cryer S  
Flegg S  
Hafeez Z  
Holden J  
Jennings L  
Murphy J

#### Certificate of Competence in Workplace Noise Risk Assessment

**Exam date:** 4 March 2022

#### Make UK

Carey C  
Daniel G  
Mendes B  
Snell L  
Veale T

#### Shorcontrol

Brennan L  
McCann O  
Sikora A

**Exam date:** 30 September 2022

#### Make UK

Cropper I J  
Hance G  
Piper J  
Schafer-Hall S  
Smith P  
Swan A  
Thornley S

#### Shorcontrol

Carroll C  
Donagh C  
Dunbar E  
Healy D  
Kelly J  
Meade J  
Muckian K

**Certificate of Management of Occupational Exposure to Hand-arm Vibration**

**Institute of Naval Medicine**

**Exam date:** 8 April 2022

Baldwin D  
Burnett N  
Fogarty M  
Hammill J  
Jones C  
Murray S  
Stephenson D  
Van der Merwe F  
Waggett G

**Certificate of Competence in Environmental Noise Measurement**

**Exam date:** 13 May 2022

**Colchester Institute**

Boles L  
Cannon G  
Clark B  
Davis D  
Lawrence K  
Mills J  
Pater G  
Pemberton D  
Randhawa S  
Walpole E

**KP Acoustics Research Labs**

Bowder J  
Burton L  
Challender P  
Cherry K  
Evans L  
Giles M  
Harper P  
Head R  
Hughes L  
Ihemefor C  
Lupton R  
Maynard T  
McLean B  
Mills L  
Oliver A  
Palmer A  
Priest B  
Tye L  
Wakeford S  
Wallace W

**London South Bank University**

Gallagher D  
Kluczynski A  
Longo S  
Morris W  
Palmer M  
Rizzo C  
Rondel J  
Roy J  
Ward A



# Acoustics Engineering Technician Apprenticeship

Level 4

Supported by the IOA and ANC, a **Level 4 Apprenticeship Scheme** has been developed with **London South Bank University**. In 2023 this will be a hybrid learning course.



London South Bank University



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Institute for Apprenticeships  
& Technical Education

**Shorcontrol**

Corcoran M  
Downey E  
Horgan L  
O'Connell N  
O'Donoghue D  
Osborne S  
Ryan N  
Young C

**Ulster Environmental**

Evans A  
Cooper S  
Magee G  
McAleenan K  
McCullagh N  
McQuitty C  
McVey G  
O'Connor M  
Stringer O

**University of Derby**

Baker J  
Birdsey N  
Black M  
Britton M  
Brookes C  
Cornwell K  
Dennis S  
Finn E  
Flannery C  
Graham C  
Laville N  
Lunn C  
McCoach K  
Nicholson P  
Pearson A  
Reece S  
Wallis A  
Willis C

**University of Liverpool**

Beera V  
Champ W  
Coney H  
Eslick H  
Fitzmaurice B  
Heep H  
Jack C  
Lancaster R  
Lo H  
Monkhouse J  
Ray C

**Exam date:** 7 October 2022

**BelNoise**

Betts T  
Campbell L  
Gillespie S  
Nash E  
Shaw M

**Colchester Institute**

Asrar D  
Bagley N  
Catchpole L  
Claxton L  
Cook S  
Ghoreishi A  
Latham T  
Mingay S  
Rahman K  
Read N  
Rider L  
Rix O  
Wright K  
Younis A

**KP Acoustic Research Labs**

Bolton D  
Curtis-De Mendonca H  
Figura J  
Hand J  
Jones J  
Kerley E  
Ridgely D  
Thompson D

**Leeds Beckett University**

Catterson J  
Clarke W  
Clewer-Banks R  
Collins L  
Frost R  
Mills J  
Read A-M  
Rogers C  
Stride L  
Willder J

**Moloney and Associates**

Flynn C  
Jennings J  
Lyons L  
Murphy P  
O'Brien R  
O'Connor M  
O'Donnell M  
O'Shea J  
Timmons N

**Shorcontrol**

Browne S  
Cartuyvels M  
Daly M  
Floyd D  
Kay S

**Certificate of Competence in Irish Building Acoustics Measurements**

**Exam date:** 24 June 2022

**KP Acoustics Research Labs**

Ganapathi K  
Griffin B  
Hehir T  
Mc Clean D  
McNamara J  
O'Donoghue D  
O'Driscoll D  
Sweeney B  
Wright D

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# Introducing the IOA's Bursary Fund

The IOA has allocated a small pot of money for members to attend acoustics related training and activities and to provide some financial help to carry out acoustics-related STEM activities.

*By Reena Mahtani, Chair of the Bursary Fund*

**T**his means it can be used for attendance to conferences, to buy props and materials for STEM experiments or even for retraining on a different field of acoustics through a part-time or full-time course. Members of all grades are encouraged to apply, and the maximum that can be awarded per application is £1,000.

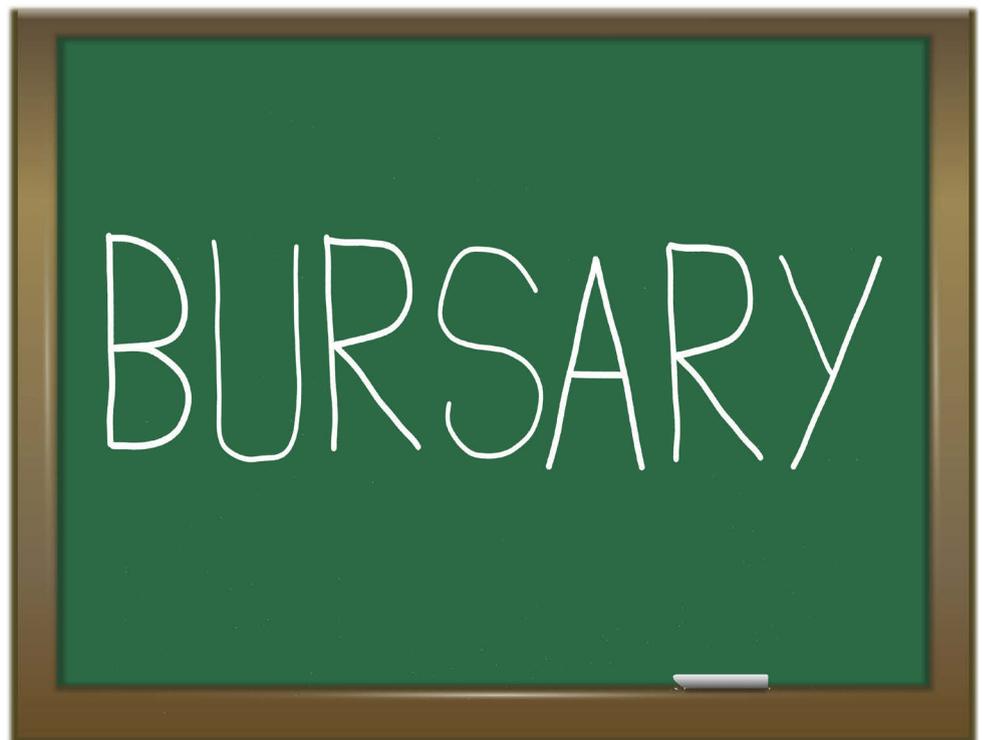
The application form can be found in the Bursary Fund page of the IOA website (<https://www.ioa.org.uk/can-we-help/bursary-fund-application-form>)

Please carefully review the guidance contained on the website before applying. The main requirement is that, if employed in acoustics, the activity needs to be unrelated to the employer's business.

Different priority groups are also established, recognising that since the pandemic, the job market is quite volatile and preference is given to unemployed members, followed by student members, Early Career Members, and then everyone else.

## Benefits for you and the industry

When filling in the form, take your time to make the case and discuss how this activity will benefit the applicant and the wider acoustics industry. This is the most important part of the application, and the review panel is always keen on understanding the circumstances of each applicant before making a decision. We want to know what is drawing you to this activity and what you, and the rest of the acoustics industry, can gain from it.



Applications will be reviewed anonymously, and if successful, as part of the conditions to obtain the funding, you will be asked to provide a written article for the IOA Bulletin or do a presentation to your local IOA Branch to show the acoustics community what you have learnt during the conference or course, or how the STEM activity went.

If this sounds like something that could help you develop your skills further in the new year, please download a form and start working your application. The next round of funding will open in February 2023, and if you have any questions between now and then, we will be more than happy to be of assistance, email [ioa@ioa.org.uk](mailto:ioa@ioa.org.uk) Good luck! ☺

# Call for Papers deadlines coming up:

## SYNTHETIC APERTURE IN SONAR AND RADAR

6-8 September 2023, Villa Marigola, Lerici, Italy

This conference will build on the success of the previous conference and provide a forum for comparison of systems techniques, signal and image processing, experimental results and to stimulate new ideas in each domain.

Prospective authors are invited to submit an abstract to [linda.canty@ioa.org.uk](mailto:linda.canty@ioa.org.uk) by **3 February 2023**. Authors will be notified by 3 March 2023 and invited to submit a full paper by 3 July 2023.

Full details are available on the Institute of Acoustics website.



## AUDITORIUM ACOUSTICS 2023

28-30 September 2023, Stavros Niarchos Foundation  
Cultural Centre, Athens, Greece

Following a hiatus in Auditorium Acoustics conferences due to the pandemic we are delighted to announce their resumption in the Alternative Stage at the Stavros Niarchos Foundation Cultural Centre, in Athens. The conference will provide a forum for discussing auditorium design now and in the future as well as related subjects on room acoustics.

Prospective authors are invited to submit an abstract up to 200 words to [linda.canty@ioa.org.uk](mailto:linda.canty@ioa.org.uk) by **3 February 2023**. Authors will be notified by 3 March 2023 and invited to submit a full paper by 3 July 2023.

Full details are available on [www.auditorium2023.org](http://www.auditorium2023.org)



## ACOUSTICS 2023

16-17 October 2023, The Guildhall, Winchester, UK

The Institute of Acoustics Annual Conference, Exhibition and Dinner will be held over two days with sessions from the IOA's specialist groups including: Building Acoustics; Environmental Sound; Measurement & Instrumentation; Musical; Noise & Vibration Engineering; Physical Acoustics; Sound, Noise & Health and Speech & Hearing.

Prospective authors are invited to submit an abstract up to 250 words to [linda.canty@ioa.org.uk](mailto:linda.canty@ioa.org.uk) by **27 March 2023**. Authors will be notified in 24 April 2023 and invited to submit a full paper by 29 August 2023.

Full details are available on the Institute of Acoustics website.



# Advertising banners on the IOA website (a short history)

Following consultation with Council, the Publications Committee got the go-ahead to run a banner advertising campaign trial on the Institute’s website. The initial banners, which were used to publicise the forthcoming Inter-noise Conference in Glasgow, appeared in the middle of 2022.

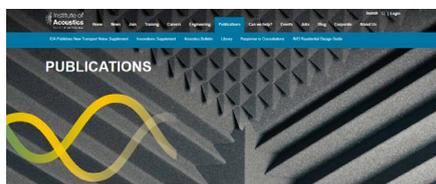
*By Dennis Baylis, Advertising Manager*

**T**hese banners, with their clickable access to advertisers’ websites, generated a good response so the trial was extended to include advertising the IOA’s own Diploma courses and, at the same time, key sponsor members were invited to participate, before opening the banners to more commercial interests.

Encouraged by the positive responses to the extended trial, the first ‘independent’ advertising banner appeared towards the end of September 2022 and subsequent bookings are in the pipeline – bringing a new service to advertisers and a new revenue stream to the IOA.

### Advantages of banner advertising

- banner adverts give advertisers transparency on how many people are seeing their banner and subsequently clicking through to their website;



- banners that have a ‘call to action’ encourage people to click through;
- banner advertising in front of relevant eyes strengthens brand awareness;
- banner advertising is often easier on the purse strings, and adverts can be changed at any time and at short notice;
- they target specific customers;

Left: The Inter-noise banner advert

- they are ideal for product launches or events – where the release date is critical;
- for seminar/training sessions – a regular template banner advertisement can be updated as the training sessions on offer evolve; and
- for regular company/product updates – again, using a basic template allows a varying message throughout an advertising campaign.

The banners feature at the head of the majority of the IOA web pages and are seen by all visitors to the website, IOA members and non-members alike. ☺

For more information on adding your banner to the Institute website, please email [dennis.baylis@ioa.org.uk](mailto:dennis.baylis@ioa.org.uk)

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# IOA Committees need more volunteers

As part of the IOA's commitment to remove unnecessary barriers to participation, the Equality, Diversity and Inclusion Working Group (EDI WG) highlights one of the most rewarding ways to get involved in IOA activities.

**By Ismail Alli-Balogun, Director, Carterhatch Architectural Acoustics, and member of the IOA EDI Working Group**

**T**he work of the IOA is guided by Council and the Standing Committees focused on Education, Engineering, Medals and Awards, Meetings, Membership, Publications and Research Co-ordination. The Institute relies on the voluntary efforts of committee members, who find taking an active part in IOA activities helps to enhance their organisational, management and leadership skills. Many of these committees are looking for new members and welcome the different perspectives that members can bring.

If you are enthusiastic about your professional development and would like the opportunity to contribute to the profession of acoustics, getting involved with a committee is a great way to achieve these goals. Many committees offer a no-obligation trial for prospective members. You can join a meeting or two to get a better understanding of the committee's activities and time commitments, before deciding whether to become a committee member.

In this article I aim to shed some light on the purpose of four committees: Publications, Education, Research Co-ordination and Engineering.

## Publications

The Publications Committee has responsibility for all publications produced by the Institute. This includes Acoustics Bulletin, e-newsletters, proceedings, the



Above: Ismail Alli-Balogun

library, IOA website, members' register, and all associated marketing, advertising and design. The Committee reviews and sets the strategic goals. The IOA employs an editor, advertising manager and marketing manager to handle day-to-day operations and to assist the Committee.

## Education

The Education Committee is responsible for developing and promoting acoustics-related education and training. This includes the Diploma in Acoustic and Noise Control and the Certificate of Competence courses. The Committee also manages the creation of new training programmes to meet specific needs, for example, new courses

currently in development include the Certificate of Competence in Technical Writing and Preparation and the Advanced Certificate of Competence in Report Evaluation.

## Research Co-ordination

The Research Co-ordination Committee aims to increase the status and awareness of acoustics research and improve cooperation between researchers. The Committee currently has a mix of members from industry, government and academia and they meet two or three times a year to discuss various research matters. The Committee also regularly interacts with UK Research and Innovation, UK Acoustics Network, Defra, UK Health Security Agency, Innovate UK and the Noise Abatement Society, among others.

## Engineering Division

The Engineering Division Committee promotes professional engineering within the IOA and puts forward IOA members for registration as Chartered Engineer (CEng) or Incorporated Engineer (IEng) with the Engineering Council. The Committee aims to have a good representation of the diversity of IOA members, with a balance of technical knowledge across all areas of acoustics, noise and vibration. Members of the Committee all hold Engineering Council registration (CEng or IEng) and are given training to become the assessors who provide the essential peer review of candidates seeking registration. ☺

For more information about the Committees please visit <https://www.ioa.org.uk/about-us/committees> where you'll also find contact details.



# soundscape

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[www.head-acoustics.com](http://www.head-acoustics.com)



# The making of the IOA Bulletin

## Episode 3

The IOA continues to broaden its reach to the wider acoustics and acoustics-related communities as well as the public. As part of this, the IOA's Head of Marketing, Alex Shaida, set out in 2020 to create video versions of Acoustics Bulletin.

Linzy Attenborough, writer, director, and producer at Thought Juice Films Ltd, describes how the third episode of the IOA video bulletin was produced at the end of last year.



Above: Linzy Attenborough

*By Linzy Attenborough*

“**T**hird time’s a charm” is what people say and certainly it did seem to run very smoothly this year in terms of the green screen studio shoot. When we agreed a date with our presenter, Rich Keeble, I booked the studio and worked with a small team (camera operator, Filippo Mazzarino and sound recordist, Oliver Beard). We finished in almost half the time planned with only a few complications – mainly the correct pronunciation of the names of some Icelandic glaciers!



Above: Presenter, Rich Keeble



## Production

To make the IOA video bulletin, we recorded former acoustician and presenter, Rich Keeble, in a green screen studio and I interviewed acousticians on Zoom. We then combined Rich's presenting with the interviews and a graphic of a TV studio to give the appearance of a live TV programme.

The IOA's focus this episode was on research, including Dr Yicheng Yu's robots that are used to detect issues in sewers, and Dr Alice Eldridge's study of soundscapes in ecological conservation.

Interviewing Angela Lamacraft, IOA's Diversity Champion, we explored how the IOA is improving the diversity of its members and the acoustics industry at large. We also interviewed Dr John Lincoln about how economics is affecting the acoustics industries and

Dr Hasina Begum to find out how her career has developed since we last filmed her.

Peter Rogers also features in the video, talking about about the work of the IOA All Party Parliamentary Group and the work they are doing to encourage the Government to consider acoustics when making decisions.

We also heard from many other thought-provoking acousticians including:

- Professor Raf Orłowski, on his fascinating career and theatre acoustics;
- Dr Antonio J Torija Martinez, about transport acoustics;
- Onur Gulen, about room design;
- Professor Gary Heald, about his career;
- Alistair Sommerville, about the latest developments for the IOA;

**Above:**  
The production team with Rich

- and
- Neo Cheung, about the acoustic design of a hotel.

Overall, this is our most varied episode yet. From February 2023 you will be able to watch either the complete episode or the individual interviews on IOA's YouTube channel.

I hope this video will be appreciated by both those in and out of the acoustics industries. If you would like to share your research or consultancy developments, please get in touch with the IOA at [ioa@ioa.org.uk](mailto:ioa@ioa.org.uk) so you can be considered for the next episode. 🌐

## Watch again

Acoustics Bulletin video 1  
[https://youtu.be/jo3\\_o2hcGXk](https://youtu.be/jo3_o2hcGXk)

Acoustics Bulletin video 2  
<https://www.ioa.org.uk/video/acoustics-bulletin-2-video>

# Sounding out a future career – our first year of virtual work experience

In this issue IOA STEM volunteer, Vicky Wills, reports on the programme of virtual work experience for school students, that has received a very enthusiastic reception and has encouraged those that took part to consider a career in acoustics.

## By Vicky Wills

In 2021 the IOA STEM Committee investigated running a programme of virtual work experience (VWEX) for GCSE and A-Level students, on careers in acoustics. They discovered that Springpod were offering to create a 10-hour online course covering a range of careers in acoustics with videos, text, live webinars, assignments and games. At the end of 2021, IOA Council approval was given for 1,000 students to undertake VWEX in 2022.

### Encouraging a career in acoustics

The amazing volunteers that worked on the virtual work experience (Matt Muirhead, Eleanor Girdziusz, Chris Barlow, Chris Turner and I) searched far and wide to find and create amazing content on acoustics. This was all sent to Springpod who designed the programme, which included an introduction as well as modules on the environment, architecture, innovation, medical acoustics and routes into the industry, as well as information about apprenticeships.

The first programme ran in May and the second in October, with the recorded 'on-demand' version of the programme available over the summer holidays. In total, almost 1,000 students signed up to the programme, and when asked if they enjoyed it and would recommend it, they marked it 8.2 out of 10 for both.

More than half of the students that attended the programme were female and at least half of the attendees were BAME students. The feedback also showed us that the programme had given the students a much better awareness of our industry, gave them more confidence about finding jobs in the future and made the people in our industry more approachable. The best thing

is that around half of the students would consider a career in the acoustics industry in the future.

In addition, the written feedback was very positive such as:

*"I underestimated the sheer number of opportunities that arise from sound and I loved how all these sectors contribute to improving and maintaining our society. All of the videos that showed people talking about their jobs to do with acoustics were amazing, as they all sounded like they genuinely enjoy what they are doing.*

*"Thank you so much for the time that you have taken to create this programme. This has really helped me so much and allowed me to gauge a wider understanding of what I can do in the future. I love how you have included applications of acoustics, engineering and architecture. This course has been very helpful and will definitely help me in the future."*

### More maths please

A big surprise for all of us was that some of the students who attended in May requested that we put more maths into the programme, which was included for October.

Now that we have worked hard to create the content for the virtual work experience we are planning to run this again in 2023. We are keen that it evolves over time and doesn't get tired, and hope that the more generic videos and content could be replaced by content created especially for the programme.

### How you can contribute

In 2023 you can help by:

- letting us know if you have any great videos that we could include by emailing [stem@ioa.org.uk](mailto:stem@ioa.org.uk) and
- sharing this link with the schools that you know <https://tinyurl.com/yckune4j>

It really was an industry effort including members of the IOA STEM Committee, IOA office staff and IOA Council members. Keen consultants, academics and other brilliant contributors provided content, checked the written sections and took part as our webinar speakers. I think this is something that we can all be very proud of. 🌐



Finally, don't forget that we would love to hear more about what you are doing for STEM, please drop us an email at [STEM@ioa.org.uk](mailto:STEM@ioa.org.uk)



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# Revoking EU Law and acoustics

The IOA Parliamentary Liaison Group (PLG) is continuing to work to raise the profile of the importance of acousticians with politicians and policy makers.

**On 22 September 2022, the UK Government published the Retained EU Law (Revocation and Reform) Bill. Under this law all EU laws retained post-Brexit will be revoked on 31 December 2023 (or prior to 23 June 2026 if agreed).**

The category of Retained EU Law (REUL) was created at the end of the Brexit transition period to encompass EU derived legislation retained in the UK legal framework by the EU (Withdrawal Act) 2018.

The REUL Bill is intended to enable Government to repeal and replace EU derived law easily.

Many regulations within the scope of this Bill affect the management of noise and vibration. IOA Immediate Past President, Stephen Turner, has written to the Public Bill Committee on behalf of the IOA, outlining concerns about the potential impact of revoking these laws on the ability of acousticians to manage noise and vibration – focusing on three areas of concern.

**Above:** The new IOA briefing, Noise Cameras on Our Roads, outlines how noise cameras operate, the legal framework for noise from vehicles on the road, research into noise cameras and knowledge gaps to be filled to enable cameras to be used successfully in enforcement

## 1. Environmental noise

For example: The effective implementation of the Noise Policy Statement England (and the devolved administrations' equivalents), relies on regulations under the scope of the Bill covering motor vehicle sound levels and tyre labelling. Also the Town and Country Planning (Development Management) England Order 2015/595 – setting out procedural arrangements for applications for planning permission including applications for 'EIA

development', requiring noise impact of a development to be assessed including potential human health effect.

## 2. Occupational noise and vibration

For example: Control of Noise at Work Regulations 2005 (S.I. 2005/1643) placing a duty on employers to reduce risk to employees' health from exposure to noise at work, and the Control of Vibration at Work Regulations 2005 (S.I. 2005/1093) which aim to protect workers from risks to health from vibration. This position is supported by the Chartered Institute of Environmental Health (CIEH), who say the removal of these regulations would risk increasing work-related injuries and ill health.

### Marine noise

For example: UK Regulations make it an offence to kill, injure or disturb marine European Protected Species (EPS) in UK waters. This includes potential damage caused by anthropogenic use of underwater sound like seismic surveys, impact pile driving and acoustic deterrent devices.

A number of measures existed in our legislation before we joined the EU. For example, noise from individual road traffic vehicles was regulated. The letter also advises that where an instrument appears to have been based on meeting a European obligation, it does not necessarily mean we only adopted it because we were members of the EU.

In conclusion, the IOA, therefore, urged the Committee to retain the noise and vibration-related regulations in the first instance. The IOA also noted that it is also critical that in the interests of UK-wide coverage, the corresponding regulations in the Devolved Administrations are similarly retained. However, the IOA recognised that, undoubtedly, there is scope with some of the regulations to make them better, but that is a task that can be tackled later.

This view is echoed by CIEH and the Office for Environmental Protection in their submissions, who both recognise there is scope for planned and thorough reviews of regulations with a proper process of consultation, but do not

believe this Bill provides suitable mechanisms for conducting such reviews.

In our submission, IOA stated that we are happy to liaise with government departments to provide guidance and advice on noise and vibration regulations, to provide first-hand experience of how they assist in the management of noise and vibration in our society.

Submissions to the Bill Committee including the letter from IOA can be found at: <https://bills.parliament.uk/bills/3340/publications>

List of Retained EU Laws are at <https://www.gov.uk/government/publications/retained-eu-law-dashboard>

### Consultation: Planning guidance for noise and soundscape Wales

In October 2022, the Welsh Government launched a consultation on new planning guidance relating to air quality, noise and soundscape, which is open until 20 January 2023. Noise and air quality policy were first brought together in Welsh planning policy in 2018. The supporting Technical Advice Note (TAN) 11 is now to be updated. The new TAN 11 aims to help planning authorities and developers implement these air quality, noise and soundscape policies. While retaining an element of decibel-based criteria it gives more weight to good acoustic design and soundscape assessment and design. The revised draft TAN 11 is accompanied by a Supporting Document on soundscape design, developed jointly with the Noise Abatement Society and in discussion with the soundscape subgroup of the Association of Noise Consultants. An IOA response to the consultation is being co-ordinated by Peter Rogers and Jack Harvie-Clarke.

If you would like to make any comment contact: Peter Rogers at [progers@sustainableacoustics.co.uk](mailto:progers@sustainableacoustics.co.uk)

Full consultation: <https://gov.wales/revise-planning-guidance-relation-air-quality-noise-and-soundscape>

## Noise Cameras on our Roads – new briefing

In October 2022 the new IOA briefing Noise Cameras on Our Roads was published. It outlines how noise cameras operate, the legal framework for noise from vehicles on the road, research into noise cameras to date and knowledge gaps to be filled to enable cameras to be used successfully in enforcement to reduce excessive noise impact. Publication coincided with the announcement by the Department of Transport of four areas chosen to trial noise cameras – in Bradford, South Gloucestershire, Great Yarmouth and Birmingham. These trials are now underway. Following an invitation by Transport Secretary, Grant Shapps, in February 2022, 78 MPs put areas forward for the trial. So far, we have sent a copy of the briefing to 20 MPs who we know have an interest in the issue.

<https://www.ioa.org.uk/news/noise-cameras-our-roads-%E2%80%93-new-ioa-briefing>

### Permitted Development for Domestic ASHP in Northern Ireland

The Northern Ireland Department for Infrastructure is undertaking a consultation on permitted development rights (PD), which covers domestic microgeneration equipment – air source heat pumps (ASHP), ground source heat pumps (GSHP). Currently, conditions are more restrictive than in England, Scotland and Wales. It is proposed to bring PD for ASHP and GSHP in line with other UK administrations. There is no intention to bring in PD for domestic wind turbines but views on the issue are invited. The consultation closed on 23 December 2022.

<https://www.infrastructure-ni.gov.uk/sites/default/files/consultations/infrastructure/consultation-pdrights-oct2022.pdf>



**About the author:** Mary Stevens supports the IOA to bring acoustics to the attention of policy makers.

# Online refresher courses for CPD in 2023

Several online refresher courses for CPD are in development that will make it possible for members to accumulate CPD even if they find it difficult to attend meetings.

**By Professor Keith Attenborough, IOA Education Manager**

**Current courses in production include:**

- environmental noise measurement;
- healthcare building acoustics;
- sustainability; and
- gym acoustics.

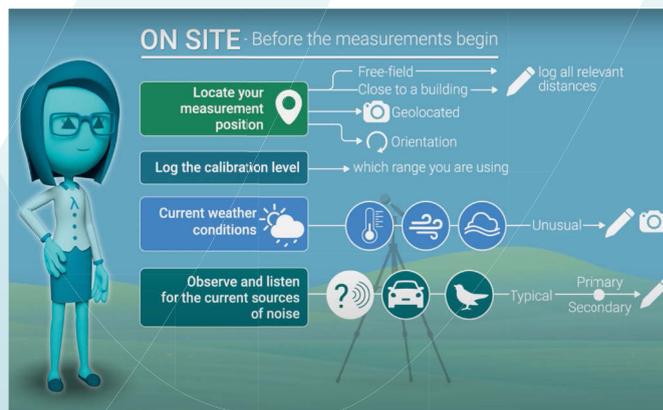
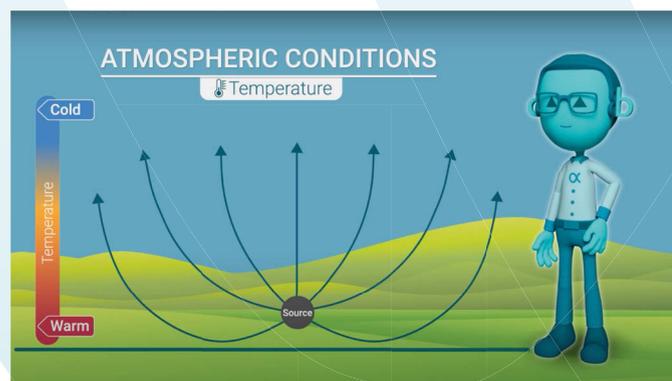
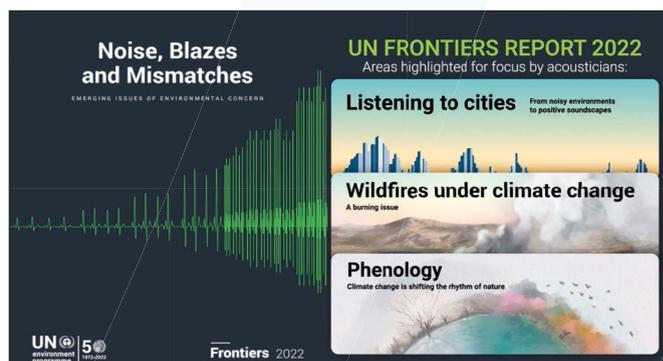
So far, members have self-accredited their own CPD, but it is planned to add quizzes to the online courses with the help of the IOA software consultants to enable members to check they have learned something.

New online refresher CPD courses scheduled for 2023 include 'Why do CPD?' and 'Electroacoustics' (an introduction to electroacoustic systems design, rather than about loudspeaker design and hardware). More are planned for later in the year and depending on the level of interest, further courses will be developed in future.

IOA members will be canvassed for further possible topics. Some that have already been suggested are 'soft skills' (including client liaison

for example) and 'getting CEng'. If you have suggestions for other topics, then please send them to [education@ioa.org.uk](mailto:education@ioa.org.uk)

These courses will also be made available to non-members; however, non-members will have to pay a fee in order to gain access. Depending on the structure of the assessment and certification component, there may also be a small charge for obtaining one's certificate; **however, members will enjoy free access to all IOA CPD courses as a membership benefit.** ©





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# Sound level sample intervals and context

Have you ever felt that the sound you are listening to, is actually not well described by the available acoustic parameters?

By *Tony Higgins*

**O**bviously we have plenty of choice as to how to describe measured sound; sound pressure, sound intensity, and a heap of measurement parameters such as  $L_{Peak}$ ,  $L_{Max}$ ,  $L_{eq}$ , not to mention statistical measures, dose standards, A, C, Z weightings, frequency spectra, etc. and that is before we start talking about reference time intervals, measurement periods and averaging!

All provide measured descriptions of sound that can be, and often is, suitable for the intended purpose, but there is sometimes something lacking...some nuance, some descriptive metric that isn't quite matched by the available metrics in describing the sound. Something that really doesn't quite reflect what it is we actually hear!

One of the issues may be that the way our ears process sound

might not always reflect the way instrumentation can measure it, or the manipulations we use to compartmentalise the measured data into manageable chunks. The question therefore is simple, does the reported sound level parameter, actually reflect what the receiver hears? Or are we simply providing an indication of sound as a level, that may not be reporting the actual perception of the sound under investigation? This in turn leads to whether our measured levels are actually truly representative or whether they should be reported with greater levels of uncertainty where the key feature of any sound is 'missed' by too high, or too low a sampling rate.

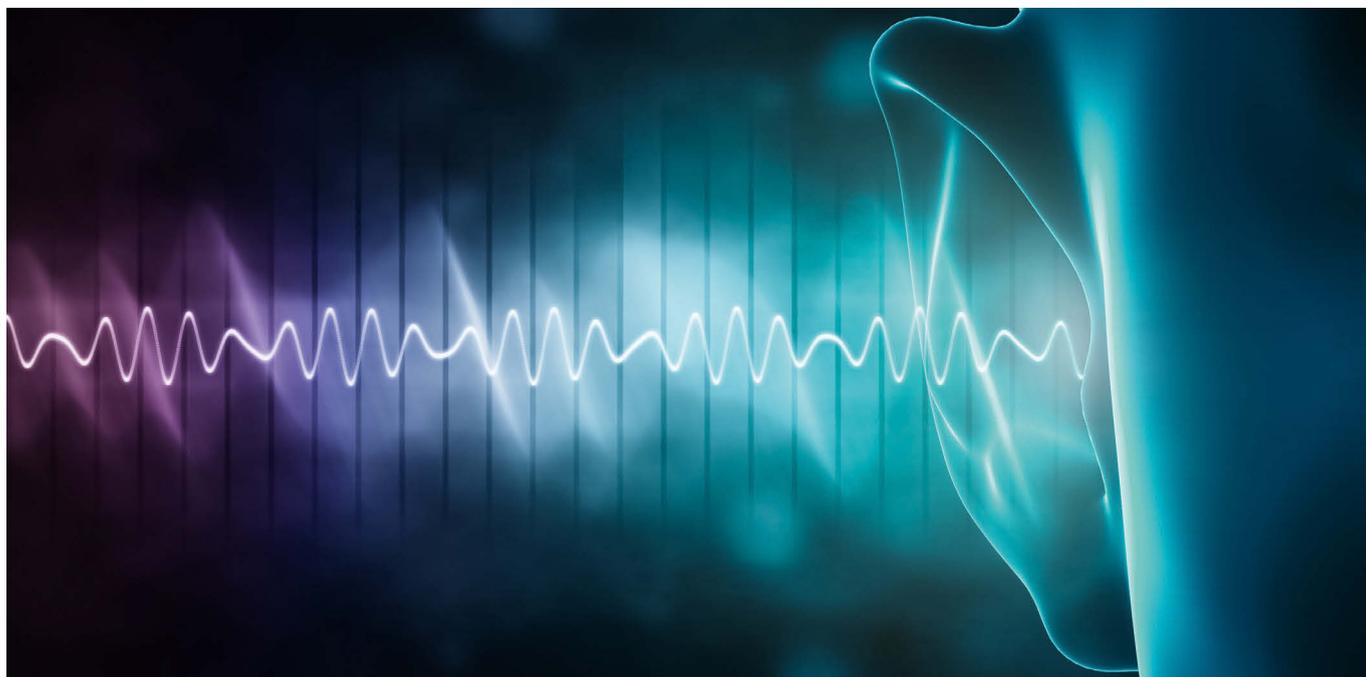
Before we get to that it may be worth evaluating the starting point, what parameters do we have and how to they work in terms of describing the sound we are evaluating?

## Sound pressure

Sound pressure is defined as the instantaneous level derived from the incident sound pressure differential caused by a sound wave and the ambient pressure of the media the sound wave is passing through. It is measured as the root mean square value over a defined measurement period.

## Sound pressure level

Sound pressure level is defined as the above sound pressure compared to the reference sound pressure (taken to be  $20\mu\text{Pa}$ ) and expressed as a log function multiplied by 20 (the decibel). A sound pressure level is quoted over a reference time averaging interval but may be reported as an average over the measurement period or as the variation of sound level over each reference sound measurement period.



Let's take an example. The measurement Fig.1 inset is a sound pressure level time history taken over a period of 5 minutes. The display at the point indicated shows an instantaneous level within that 5-minute period of 52.5 dB. This provides good detail...or does it? Does this actually reflect the sound as observed at the receptor location at that point in time?

Looking more closely (second image) the single point reference (one second) for that same point in that

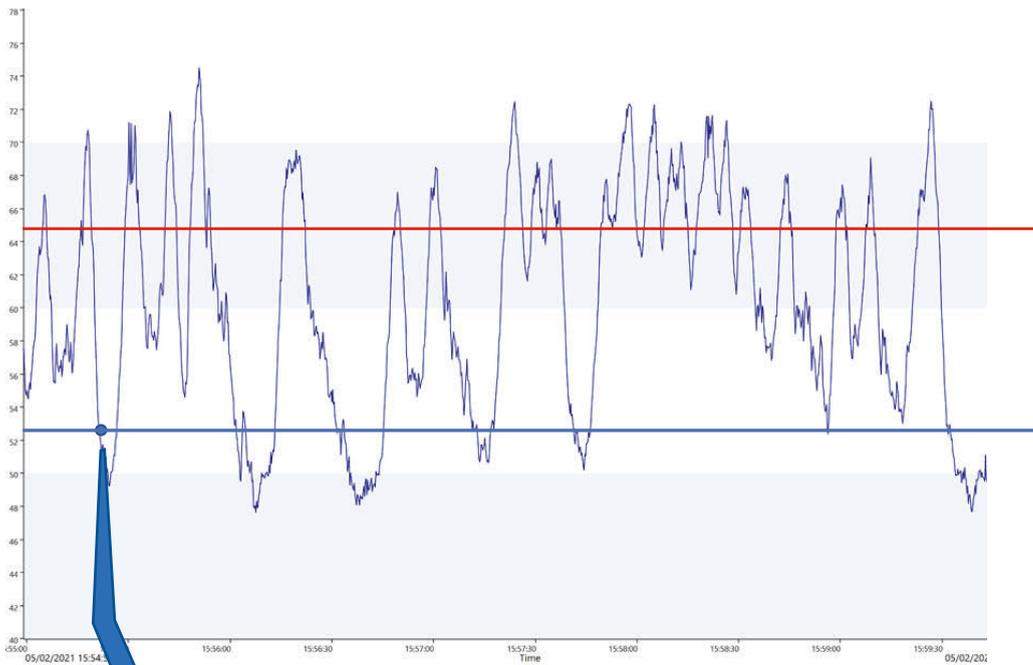
same five-minute graph is obviously an average. The measurement sample rate is much faster, (actually 1/100th second), the levels recorded within that one second vary between 49 dB and 55 dB.

So, is the measured sound level for that one second actually representing what is perceived at that second? Or is it artificially simplifying something our ears have a much greater ability to detect and resolve? What effect does the change in sampling rate actually

have other than to provide greater resolution on the data that may or may not be helpful? And how does all of that relate to the perception of the sound where we average periods of five minutes, 15 minutes, or an hour?

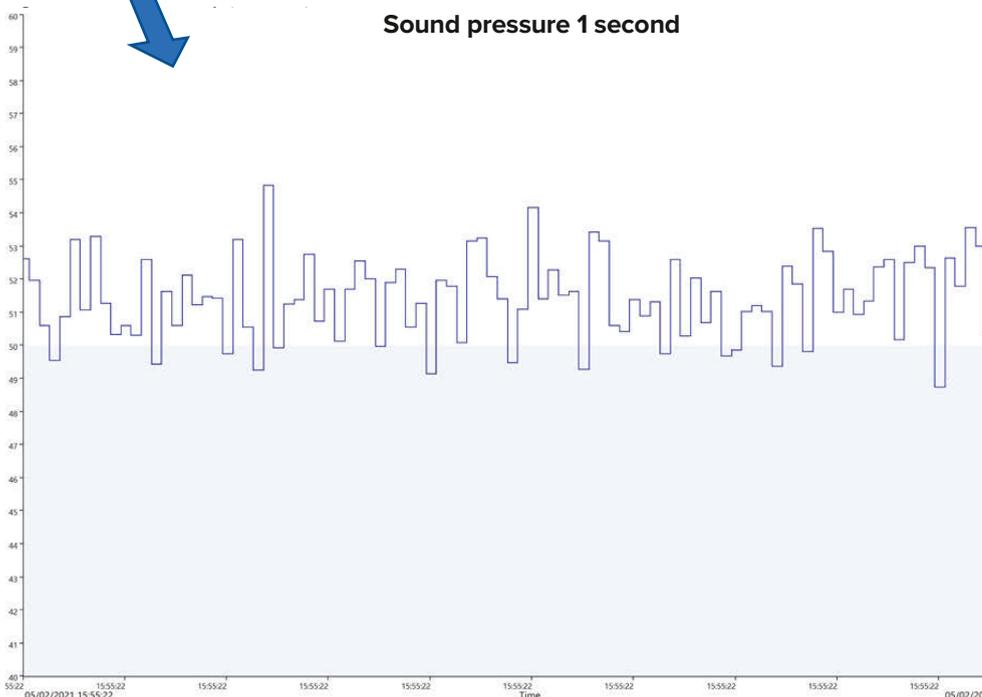
Maybe it would help to display the data in a different format? And maybe the fine resolution at 1/100th second is not actually needed and what is required is something representative of perception? [Pg4](#)

**Sound pressure level over time (5mins)**

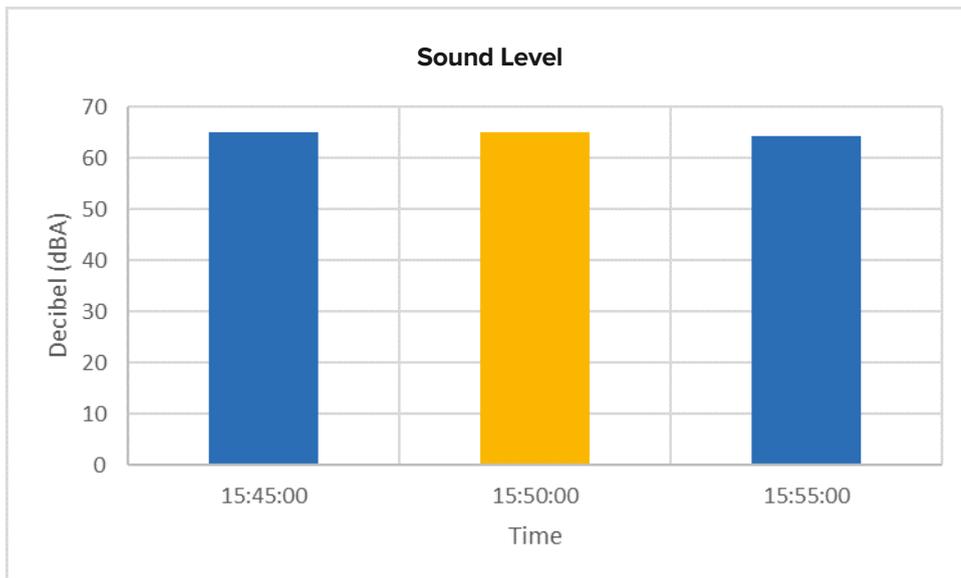


**Left:**  
Figure 1: Time History (1/.100s)

**Sound pressure 1 second**



**Left:**  
Figure 2: Time History (1/.100s)



Left: Figure 3

How about the data presented in Figure 3? Perhaps it is time to use an average... cue  $L_{eq}$ , the levels representing an average had the sound been constant throughout the measurement period. The graph shows the five-minute measurement, (and the two adjacent measurements to help provide context). Is this helpful? Clearly with less detail there is less to interpret but we are no closer to evaluating the source and determining how that source will be perceived. Do we need something more detailed, more nuanced and generally more helpful?

So, what about this? (See Figure 4). The image provided shows the same five-minute period. It shows frequency and sound levels varying over time, with level – surely this will provide all we need to identify the source and provide appropriate context? It certainly provides additional granularity and an ability to see variation in the sound over time. We may even hazard a guess at what the source sound actually is based on this sort of data, or at least be able to describe the changes in level, pitch, tone, and variation over time.

So, we come back to the original question, we need a measurement criteria or method that represents the nuance of a sound, provides a full and frank explanation without compromising the usefulness of single figure data. We need to know that we can rely on the data presented and processed by the sound level meter and that the results are robust for all measured sampling rates.

It seems clear that a single parameter, isn't going to provide that, and neither are multiple, increasingly detailed measurements going to help.

Additional understanding about how the human ear comprehends sound may help. Data to establish what sampling rates the ear uses to identify and recognise sounds might be helpful. I looked but failed to find any robust literature on the subject, research project anyone? So ultimately where does that leave us in interpreting sound level data?

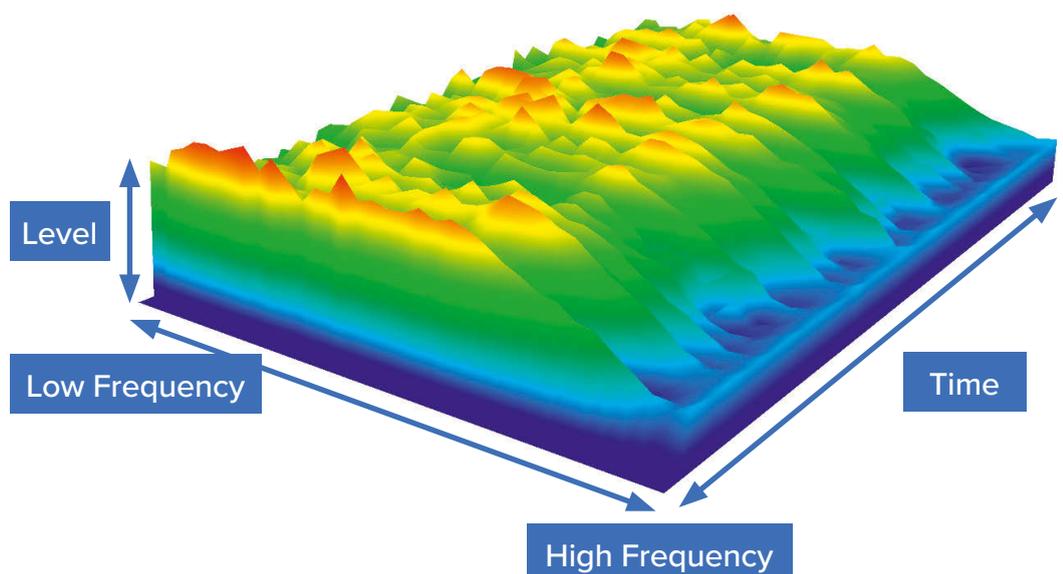
**Reflection**

Instrumentation has the capability to store and display huge quantities of data. The sheer volume of data invites analysis and commentary, but reporting needs to reflect the impact on the receiver, or if we prefer, the context of the perception of the sound.

Below: Figure 4

As measurement parameters get closer to reflecting the human response, sound standards determining the acceptability of particular measured parameters that represent this will arise.

We already have one example; we use a reference A-weighting to reflect a standardised human response to frequency (and its drawbacks are well known). Currently, for environmental noise, the measurement parameters used reflect the standards (and particularly the health-related standards) available, e.g. long-term averages  $L_{Aeqs}$  for occupational noise, and most environment noise, short duration or Peak or  $L_{AMax}$  for event noise, but they don't provide a true indication of the perception of that impact.





The Planning Practice Guidance Table Noise Exposure Hierarchy Table (ref: [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/820957/noise\\_exposure\\_hierarchy.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/820957/noise_exposure_hierarchy.pdf)), provides a useful link between observed levels of impact and practical effects on receptors, that in turn links to measurement standards such as BS4142:2014+A1(2019) terminology and the sound level measurement results that inform the assessment outcome (adverse and significant adverse impacts).

The simple example provided in this article, shows that the sample rate for collating these highly detailed results does vary significantly from the 'average levels' used in standards such as BS4142, the greater granularity offered by sampling very quickly, may or may not be the significant key issue that a receptor picks out, but clearly the variation in level is every bit as distinct for a particular sound as the frequency components, and these

variations are lost when we average the results as required by some of these standards currently in use.

Whether the standards should change to reflect the human response to sound is perhaps something that will emerge more fully over time but what is clear is that the data alone cannot identify the source, no matter how much of it is presented. Identification of sources, and appropriate representation of that source in terms of measured levels, is solely down to the acoustician's preferred reporting metric.

We state what the source is (in this case road traffic – full marks if you guessed!), in order to provide context. That in turn aids the recipient to review the report based on a common understanding/description of that source, using well recognised acoustic descriptions, e.g. road noise, rail noise, barking dogs etc, but would it be as easy to describe a new industrial source, or entertainment noise where music varies over time? Clearly recorded

rock music at a level of 70 dB will be perceived differently than observing live choral singing at the same level. I suspect that this nuance of perception, and we can extend that to our collective enjoyment for the sound in question, will be a key factor in determination of context.

### Minimising uncertainty

While we know the recorded levels are accurate, and they may even be relatively consistent, perhaps it is time to consider not just describing sources, but presenting recorded sounds so that the recipient of reports can appreciate the nature of the sound, and therefore minimise the uncertainty in reporting by offering a common starting point. It may be that this is a necessary precursor for truly understanding context, and it may also be that this is the next big area of difficulty in predicting the impact (in context) of sounds yet to exist in the acoustic environment, and may be simpler (and/or aid) the ISO 12913 methods for assessing soundscape. 🎧

### This article should remind you that:

- The way our ears process sound might not always reflect the way instrumentation can measure it.
- Data to establish what sampling rates the ear uses to identify and recognise sounds might be helpful.
- As measurement parameters get closer to reflecting the human response, sound standards determining the acceptability of particular measured parameters that represent this will arise.

# IOA Sustainable Development Task Force rebooted to address key issues

Following the excellent work and outcomes report of the Sustainable Design Task Force in 2015 (led by Peter Rogers, Managing Director of Sustainable Acoustics) and with the pressing need to address issues around environmental, social, and economic sustainability and resilience across all areas of our industry, the Sustainable Design Task Force has been rebooted for 2023 with one goal in mind – to ensure acoustics practitioners have the knowledge and tools to incorporate sustainable thinking to their day-to-day work.

*By Richard Grove, Director | Europe at Inhabit*

**It is critical that the acoustics industry engages with sustainability and future resilience in a meaningful and multi-disciplinary way to ensure it is both considered as part of the development of sustainable solutions, and that we as practitioners have the knowledge and tools to contribute to tackling climate change and contributing to a healthy, prosperous society.**

Richard Grove of specialist engineering consultancy, Inhabit, has been nominated to take over the role of Chair of the IOA Sustainable Development Task Force (SDTF), to drive forward sustainable initiatives. The Task Force will seek to improve cross-disciplinary industry knowledge by weaving sustainable thinking through all aspects of our industry across design, manufacture, measurement, and materials supply, amongst many others. Peter Rogers, Chair of the Parliamentary Liaison Committee (PLG), will play a vital part in taking the work done by the Task Force to Government for inclusion in future guidance and legislation.

Peter said: "In my role as PLG Chair but also as IOA Council Lead on sustainability I will be making sure this important topic remains top of the agenda in IOA discussions and also as we engage politically. With only eight years remaining for us to get our house in order to avoid more than a 1.5 degree rise the climate crisis demands our full attention as

a profession, but if we do not plan now for a sustainable future and what that means for acousticians, our efforts will be in vain. I will give Richard every support in his efforts to drive change and encourage all members to get involved."

## Sustainability at the heart of acoustics

Unlike a traditional committee, the Task Force will take the form of a central core with multiple groups engaging with others in the Task Force, as well as external stakeholders and advisors, to ensure sustainability is woven through each of the existing committees. It is hoped that by integrating sustainability, acoustics practitioners consider it at the heart of their thinking, thereby proactively contributing to conversations around sustainability in their day-to-day work. Existing groups in the Association of Noise Consultants and UKAN+ have been contacted and will be an important interface in developing industry-wide approaches that satisfy the many and varied needs of acousticians across practice and research.

## UN Sustainable Development Goals

The UN Sustainable Development Goals (SDGs) form a useful springboard to create a coherent and considered approach for acousticians to develop sustainable practices. Commonly, acoustics is considered under SDG3, Health and

Wellbeing, however, it is becoming increasingly apparent that the impact of advice provided by, and decisions acousticians make have far reaching consequences, opening up opportunities for wider conversations that can impact all elements of sustainable development.

Key to any approach will be to collect discreet groups of broad minded, enthusiastic practitioners from all corners of the industry, who are keen to work across disciplines and what may be traditionally considered as 'unrelated professions'. These people will help to drive forward key subjects which have been established, as well as generate more key subject areas which need to be addressed.

Key subject areas established to date include these below (in no particular order!):

- operational energy and carbon;
- ventilation and overheating;
- embodied carbon and the circular economy;
- nature and soundscapes;
- biodiversity and habitat impacts;
- public health;
- design for equality, diversity and inclusion;
- path to net zero 2030 to 2050; and
- access to the industry. 🌐

If you are keen to get involved please email Richard Grove at [richard.grove@inhabitgroup.com](mailto:richard.grove@inhabitgroup.com)



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# IOA Early Careers Group

The IOA's active Early Careers Group (ECG) brings together a diverse network of acoustic professionals in the early stages of their career, by promoting peer knowledge sharing and support. It also provides a link to the knowledge of established acousticians and a platform for the continuing development of new and existing skills.

**By Aaron Tomlinson**



**On Thursday  
24 November 2022,  
Aaron Tomlinson reports,  
ECG members met on**

**Zoom for a 'night on the rocks' with Professor Trevor Cox, researcher and lecturer at the University of Salford. Trevor introduced his work in studying, crafting and measuring a scale model of Stonehenge.**

Scale modelling is a well-established technique but isn't without its challenges. Trevor described the processes involved in scaling absorption and reflection properties, alongside the obvious inaudibility of the measurement frequency range (up to 70 kHz).

It was a lesson in history, vocabulary (trilithons anyone?) and intrigue, presented in an engaging and interactive way with plenty of auralisations to boot. Questions were mostly in relation to the modelling techniques which 3D printing may have presented, such as:

- how were the effects of the 3D printed 'layers' solved? and
- how did you decide on the material to use to 3D print the stones?

(Check out the recording of the session to hear the answers at <https://www.ioa.org.uk/video/using-scale-modelling-assess-prehistoric-acoustics-stonehenge>)

## Survey results

Results from the latest member survey, showed a clear interest for webinars on technical topics and the ECG webinars committee continues to confirm more engaging presenters. There are many more ideas in the pipeline, so thank you to everyone who responded to the survey.

## Upcoming events

### ECG Conference

The IOA ECG has joined up with UKAN+ Early Careers (EC) Specialist Interest Group (SIG) to create a special two-day conference; 'The Art of Being a Consultant' and 'The Art of Being an Acoustician'. The event will be held in London in March 2023 and is aimed at acousticians across academia, consultancy and research. The event will be a great chance to learn soft skills, hone your craft and network. More information and sign-up details will be available shortly.

### Webinars

Having recently undertaken a survey on the existing webinar programme organised by the ECG group, the Webinar Committee continues to plan more events for this year on specific topics and standards as requested by survey respondents.

### Socials

Having had a fantastic social event in the summer of 2022, we are planning another in-person network social event, so keep your eyes open for emails from IOA ECG for more details.

## ECG Representatives

Over the next few issues of Acoustics Bulletin, our ECG Representatives will introduce themselves and here we start with two of them:

### Zachary Simcox, Speech and Hearing ECG Rep

Zach is an acoustics engineer with five years' experience and has worked at several acoustic consultancies, specialising in industrial and commercial noise

assessments. He joined the ECG committee in 2020 to support students and early career professionals find their feet in the working world, and to shine a light on areas of acoustics they might not have come across in their studies. Zach's interest in speech and hearing stems from his work at university on the electroacoustic design of hearing devices. He enjoys being a part of the committee as he gets to meet a varied cohort of acousticians in both academia and industry.

### Alec Korchev, Publications Committee ECG Rep

Alec is an acoustic consultant and PhD student specialising in building acoustics. He joined the ECG committee in 2020 to promote acoustics as a profession as well as to get more involved in the acoustics community. As the ECG Rep on the IOA Publications Committee, Alec gets to have a voice in making sure that all IOA publications are accessible and interesting for early career professionals. He also chairs the ANC Future Acousticians Committee and is a STEM ambassador.

## ECG vacancies

There are a couple of ECG regional vacancies – if you are interested, please get in touch with the ECG or the relevant groups directly. 

The ECG is open to all members of the Institute (both corporate and non-corporate) who shall normally be under 35 years of age or within first five years of their career. The group is always keen to hear from members and non-members alike. To join the Early Careers Group, to find out more information or to voice your concerns, visit <https://www.ioa.org.uk/early-careers-group>



**Above:**  
Aaron Tomlinson

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# How the current economic environment affects the acoustics industry

The macroeconomic/external environment is having more impact on enabling tech businesses than we have probably seen at any time in the past 20 years or more. However, interest rates, exchange rates, Horizon Europe<sup>1</sup>, supply chains, labour shortages and other factors all add to the anxiety.

**T**he IOA has just published the third in its series of Acoustics Bulletin videos (see more on page 32).

Included in this episode is an interview with Dr John Lincoln about how the current economic environment is affecting the acoustics industry. Here we share his opinions.

“Like any enabling technologies, we are facing very interesting challenges in the economic environment. We have seen some world-wide supply chain issues around sourcing chips or pieces of control electronics for example. These are improving but slowly, so for those equipment manufacturing companies this is still a serious concern.”

Most recently, the Kwasi Kwarteng budget and short-lived premiership of Liz Truss, provoked economic turmoil that impacted interest rates. John said: “Any economic upheaval of this magnitude affects the cost of imports of technology into the UK making them more expensive and our exports very cheap. Overall, this pressure delivers uncertainty and investment becomes more problematic – especially for acoustics in the built environment.”



## Skills shortage

Although we are seeing record employment figures in the UK, for some time now, the topic that is concerning everyone is the supply of people and talent.

In the interview John said: “At the moment, we have slightly contradictory economic indicators –

we have seen record employment levels frequently reported in the UK, yet at the same time we are hearing people talk about high interest rates inducing a recession, which normally indicates a rise in unemployment. These two contradictions make it a very interesting time to be running a business, because many are finding it difficult to find the talent they need at the price they are prepared to pay – at the same time we are still being told that people are readily available. This just doesn't add up, so we are at a point now where we must think hard about how we increase the supply of people in the future and how we can make it clear to those just starting out in their careers that working in a high-tech industry, such as acoustics, presents good opportunities and interesting career options.

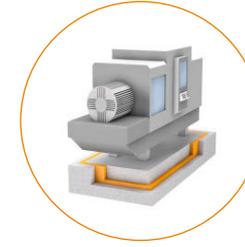
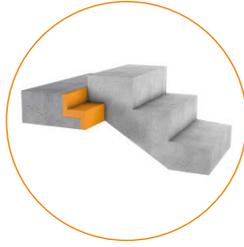
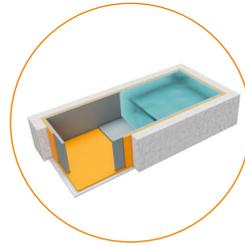
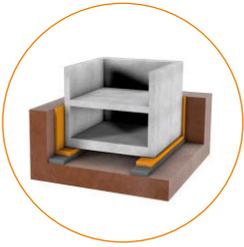
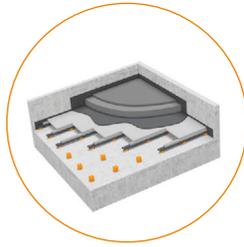
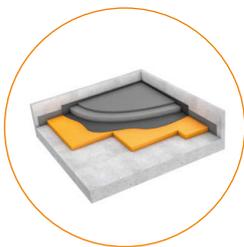
“It is no longer feasible to simply poach recruits from another industry, that cannibalism won't work when every sector is short. Instead, we should be focusing on growing the overall talent pool and retaining the talent we have in the industry and make sure that workers are given every opportunity to progress.” ©

**Above:**  
Dr John Lincoln,  
Director at Harlin Ltd

To hear Dr Lincoln's interview, go to the IOA's YouTube channel or visit the IOA website when it will be published in January 2023.

## References

1 Horizon Europe is the EU's key funding programme for research and innovation <https://www.horizon-eu.eu/sp>



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# Public health and wellbeing

One of the most prevalent occupational diseases in the world is noise induced hearing loss (NIHL). It is estimated that 1.3 billion people suffer hearing loss due to noise exposure<sup>1</sup>, while occupational noise exposure causes between seven and 21 percent of hearing loss among workers<sup>2</sup>. In this article, Professor Chris Barlow, Head of Research and Innovation at KP Acoustics Research Labs, argues that the risks of occupational noise exposure merit greater attention.

**O**ccupational noise induced hearing loss (ONIH) is not a new problem. Reports from the eighteenth century show that copper miners suffered from hearing loss, a consequence of constant exposure to the noise generated from hammering metal. Since then, we have come a long way, both in our understanding of the problem and in the legal requirements placed on employers.

In the UK, the Control of Noise at Work Regulations (2005) requires employers to prevent or reduce risks to health and safety arising from exposure to noise in the workplace. The regulations, which fall under the legal remit of the Health and Safety at Work Act (1974), require employers to take specific action when certain values are reached, and determine that specific noise exposure levels must not be exceeded. For example, without hearing protection, daily or weekly exposure levels must not surpass 85 decibels (A-weighted) and peak sound pressure levels

**Below:** Manufacturing and construction are both examples where occupational noise is an obvious concern, but there are other professions where exposure to noise, albeit infrequent, can have serious consequences if steps are not taken to reduce the risks

must not exceed 137 decibels (C-weighted). These levels rise to 87 decibels (A-weighted) for daily or weekly exposure and 140 decibels (C-weighted) for peak exposure when hearing protection is taken into account. Similar rules and regulations exist in most developed countries.

One thing that motivates employers to comply with the regulations is the potential litigation costs. In the US, for example, it is estimated that annual compensation resulting from ONIH is approximately \$242.2 million<sup>3</sup>.

However, the main thing that needs to change to tackle the scale of the problem and the risks it entails is not more regulation and threats of legal action, rather a greater awareness of the risks of hearing loss and its full implications, both for the individual and wider society. A scientific consensus about the risks of noise exposure and hearing loss clearly exists, but this has not yet fully translated into a greater understanding among employers and employees.

limited to one or two industries, but exists anywhere where there is a noisy workplace, from the music industry to airports.

Exposure to noise does not only lead to direct injury to the auditory system, there is also a range of non-auditory effects. Hearing loss itself contributes to other problems; such as increased risk of dementia and cardiovascular disease, poorer mental health and reduced outcomes in areas such as social integration and even average earnings. As well as poor outcomes for the individual, the negative impact on society at the aggregate level should also justify greater effort to tackle the problem.

One particularly noteworthy risk associated with hearing loss is the increased likelihood of developing dementia. Older people with mild hearing loss have a twofold increased risk of dementia, while those with severe hearing loss face a fivefold increase<sup>4</sup>.

There is also a well-documented correlation between hearing loss and heart disease<sup>5</sup>. Although this is mostly the result of heart problems causing hearing problems, rather than the other way around, there are also studies demonstrating that increased noise exposure raises the risk of cardiovascular problems via its impact on stress levels<sup>6</sup>.

Other significant risks include increased likelihood of developing depression, resulting from communication problems in interpersonal relationships and feelings of isolation. A growing body of scientific literature attests

P52



## Understanding the risks

There are many occupations where a noisy workplace is a potentially significant health and safety issue. Manufacturing and construction are both examples where occupational noise is an obvious concern, but there are other professions where exposure to noise, albeit infrequent, can have serious consequences if steps are not taken to reduce the risks. In short, it is important to understand that the problem is not

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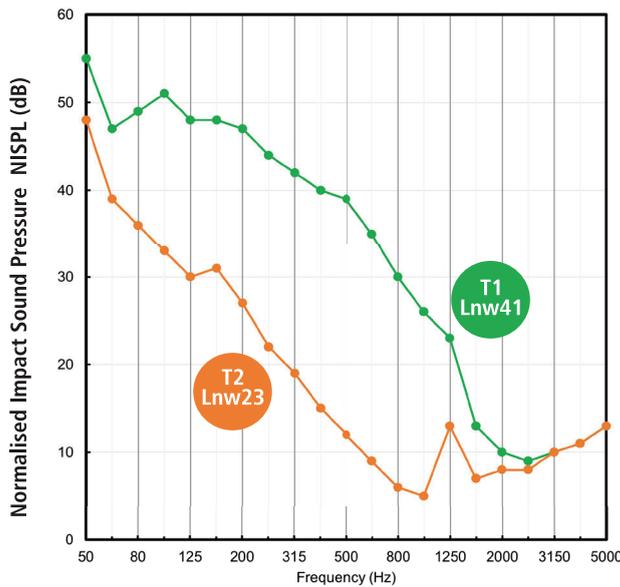
# Akustik + Sylomer® floor mounts and Acoustic hanger Tests



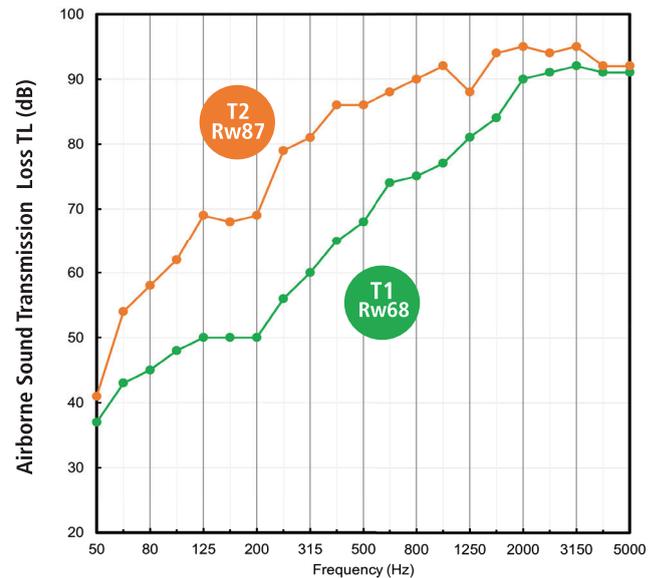
Test results for the **Akustik + Sylomer® Floor Mount 25** on a 150mm concrete slab, achieving values of  $R_w=68$  and  $L_{nw}=41$ .

Adding the **SRS25 + Sylomer® Acoustic Hangers** to the assembly allows us to achieve values of  $R_w 87$  and  $L_{nw} 23$ .

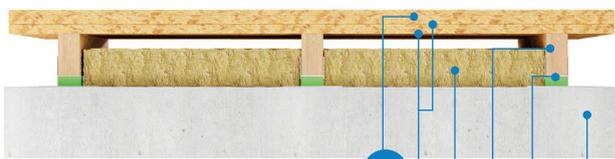
## Normalised Impact Sound Pressure Levels



## Airborne Sound Transmission Loss



### T1 Akustik + Sylomer® Floor Mount 25



- 1 10 mm Plywood
- 2 2 x 19 mm Plywood
- 3 89 mm Glass Fibre Insulation
- 4 2 x 89 mm Wooden battens
- 5 25mm Akustik + Sylomer Floor Mount 25
- 6 150 mm Precast Concrete Slab

### T2 Akustik + Sylomer® Floor Mount 25 and SRS25 + Sylomer® Acoustic Hanger



- 7 276 mm air gap SRS25 + Sylomer Hanger
- 8 22 mm Furring Channel
- 9 89 mm Glass Fibre Insulation
- 10 2 x 16 mm Type X Gypsum Board



to the nature of the problem, but the stigma attached to hearing loss means victims often go many years without reporting the issue<sup>7</sup>.

There are two different types of noise exposure that need to be considered. One is exposure to loud noise over a period of time. Although we are all different, and some bodies are more resilient than others, the human ear is very delicate. Noise exposure is a dose-based concept so exposure to very high levels of noise for short durations, or lower levels for longer durations can both significantly increase the risk of long-term hearing damage.

For example, in the engine room of a ship, the average sound pressure level can be between 105 and 110 decibels. If someone entered that area to carry out some maintenance checks, even very short-term exposure could be severely damaging. In this scenario, without wearing hearing protection a worker could exceed their recommended maximum daily dose of noise exposure in a couple of minutes.

In a manufacturing plant where levels might average around 90 decibels it would take an unprotected worker about 2.5 hours to exceed the maximum daily dose. However, in both scenarios if the worker was regularly exposed to more noise beyond that point they are likely to incur hearing damage.

This is more common in industries where workers are continually exposed to occupational noise. It is no surprise that research has confirmed that those employed in construction, manufacturing, mining, agriculture, utility, transportation, the military, and musicians are at higher risk of ONIHL<sup>8</sup>. It is therefore important to understand that even if the overall noise level does not appear to be excessive, continued exposure can bring the average level of noise exposure during an eight-hour working day to a level that is likely to significantly increase the risk.

The second type of noise exposure, in contrast, is short term, impulsive noises of very high level such as gunfire, drop hammers and nailguns. These contribute

relatively little to the overall sound energy received, but they carry a disproportionately high risk to the hearing system with risks including instantaneous acoustic trauma as well as damage to the inner ear, and occupations exposed to impulsive noises are at the greatest risk of ONIHL.

## Be careful with personal protective equipment

An overreliance on personal protective equipment (PPE) is symptomatic of a lack of appreciation of the risks. Equipment like ear defenders should be understood to be a last resort. Occupational and health and safety professionals use the 'hierarchy of control' to determine how to implement feasible and effective controls. This approach groups actions by their likely effectiveness and is visualised as an inverted pyramid, with the most effective methods at the base of the pyramid and the least effective at the inverted tip. You might be surprised to learn that protecting workers with PPE is regarded as the least effective<sup>9</sup>.

One common problem with much PPE is that it does not always do what it says on the tin. We have worked with many companies to test noise control products to make sure they can perform in the way intended. As the lab tests are carried out in a carefully controlled

environment, they often give a significantly higher performance than is ever obtained in the real world. Issues such as quality of fit, user error, and degradation of the item all affect real world performance of hearing protection – with user error being by far the biggest contributor to performance.

User error is more common than you might assume. Workers who are regularly in noisy environments might become complacent and desensitised to the risks, for example, a common risk unknowingly taken is temporarily lifting ear defenders to have a conversation in a noisy area, instead of moving to a quieter area. In this scenario, the amount of sound energy in that few moments could be enough to exceed the daily amount of energy that is known to be likely to lead to hearing loss. The ear defenders haven't done their job. Another key error is incorrect insertion of earplugs by untrained users, which can reduce protection by as much as 20 decibels.

The change that allows us to tackle the world's single greatest occupational health disease involves educating ourselves and our employees. Greater awareness and understanding of the risks can lead to the behavioural and administrative changes necessary to keep everyone safe at work. 🧠

As industry professionals, IOA members ought to be confident enough to be able to warn people about occupational noise induced hearing loss whenever they see it happening (e.g. builders cutting concrete blocks without wearing earplugs). Clause A2.3 of the IOA Code of Conduct states: *Members shall raise a concern about a danger, risk, malpractice or wrongdoing which affects others and support a colleague or any other person to whom you have a duty of care who in good faith raises any such concern.*

Members who are also registered with the Engineering Council ([engc.org.uk](http://engc.org.uk)) have an even wider duty: *Engineering professionals have a duty to obey all applicable laws and regulations and give due weight to facts, published standards and guidance and the wider public interest.*

*They should:*

- hold paramount the health and safety of others and draw attention to hazards.

The risks of hearing loss from socialising in noisy environments without due care and protection if necessary, can have equally debilitating consequences.

## References

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# You can now access the apprenticeship from anywhere (in England\*)

The Acoustics Engineering Technician Apprenticeship has successfully rolled out under the experienced watch of London South Bank University, and is supporting our first cohort of apprentices on a day release basis (see November/December 2022 issue of Acoustics Bulletin).

*By Richard Grove, Director | Europe at Inhabit*

**A**s part of the ongoing commitments of the Trailblazer Group, and by the time you read this, London South Bank University will have fully established the hybrid (virtual) learning platform and course, ensuring that the apprenticeship is accessible to anyone in England as of the 2023 intake.

The platform, which has been successfully deployed on several other courses, will include delivery of taught sessions over video conference complimented by field experiments carried out at the apprentices' place of work, and a three-day block of laboratory experiments at LSBU's London campus. To create a sense of community, the IOA Early Careers Group is developing an acoustics apprenticeship virtual network, giving these trailblazers access to one another even if they aren't in the same area.

These important steps are being driven by the Trailblazer Group to ensure apprenticeships provide full accessibility for everyone who wants to get into the acoustics industry, without geographic limitation. In doing so, we hope to provide budding acousticians with access to work, learning, and further educational courses available at several educational institutions across the country.

## We need you (to advertise for an apprentice!)

Now location is no barrier, apprentices can be employed anywhere in England. As with anything, there are hoops to jump through to become registered and take advantage of the funding offered by the government. To alleviate this, London South Bank University has offered to assist in getting over these hurdles and on to the exciting part of hiring, mentoring, and working alongside your future teams who started their careers as an apprentice!

If you have any questions regarding the delivery of the apprenticeships or generally want to offer support and suggestions, please free to contact Acoustics Engineering Technician Apprenticeship Trailblazer Chair, Richard Grove, at [richard.grove@inhabitgroup.com](mailto:richard.grove@inhabitgroup.com)

For any queries related to registering to take on an apprentice via the Government Portals, please get in touch with either Sammy Shummo ([sammy.shummo@lsbu.ac.uk](mailto:sammy.shummo@lsbu.ac.uk)) or Nicola Adams ([adamsn8@lsbu.ac.uk](mailto:adamsn8@lsbu.ac.uk)) at LSBU.

## What the apprentices say:

**Acoustics apprentice, Marwaan El Hamini (AECOM)**

"I find that it's a great way to learn more about the industry in which I work. I also develop new skills and gain work experience that will help me advance quicker than a graduate that just completed his degree. There will be no tuition debt if you work and earn at the same time."

**Acoustics apprentice, William Harris (AECOM)**

"The acoustics apprenticeship has really opened a new door for me within the industry. I was fortunate enough to be enrolled on to the scheme and so far, I'm having a very positive experience working mainly within the environmental acoustics group. I believe the apprenticeship has been beneficial to me as it has given me the opportunity to apply the knowledge I've gained whilst learning, in addition to acquiring vital on the job training and experience." 🌟

\*Apprenticeships are part of devolved responsibilities. If anyone is reading in Scotland, Wales, or Northern Ireland, and wants to develop a programme of apprenticeships for their region, please get in touch with the Trailblazer Group who will be happy to help.

# Celebrating the career of IOA Past President, Tony Jones

There were great celebrations on 3 October 2022, to mark 50 years since Dr Anthony (Tony) Jones started his career at AIRO and his lifelong service to the profession of acoustics.



**A**coustical Investigation & Research Organisation Ltd (AIRO) was incorporated in 1958 to cater for the then growing need for technical expertise in the acoustics and noise assessment and control fields. The inauguration of the consultancy service was soon followed by the opening of the laboratory facilities at Hemel Hempstead in 1959.

This was the first fully equipped, independent commercial acoustics laboratory to operate in Britain – previous laboratory facilities had been confined to the Department of Scientific and Industrial Research and to the Research Department of the BBC.

Since its inception, AIRO has carried out a wide range of testing and consultancy work for private individuals, developers and corporations, and local and national government organisations here and around the world.

**Above:**  
Dr Tony Jones, celebrating 50 years at AIRO

At a drinks reception hosted by David Watts, Technical Director at AIRO, the Mayor of Dacorum, Councillor John Birnie, unveiled a plaque (pictured) to mark Tony's 50 years at AIRO, and colleagues gathered to celebrate Tony's remarkable career.

In his opening speech, David commented that Tony could be characterised by many of his acquaintances and colleagues as someone who keeps his cards close to his chest and who operates on a 'need to know basis', remembering that, in Tony's case, such characteristics are driven by an innate modesty and dignity.

Describing Tony's career, David said: "Since starting work in 1972, Tony has made an enormous contribution to acoustics in the UK both professionally at AIRO and in his numerous volunteer roles.

"Professionally, in 1978 and at only 31, he was appointed Managing Director and a decade

later bought the company. This was not a safe bet for him – acoustics was still a young industry.

"Links with the Building Research Station (later the Building Research Establishment) led to AIRO developing concepts such as assisted resonance (a system invented by Peter Parkin and notably secretly installed in the Royal Festival Hall to improve the acoustics) into commercial systems which were installed and maintained by AIRO in large halls and concert spaces in the UK and across the world. This activity had been driven by Geoffrey Berry, Tony's predecessor as AIRO's MD. Upon Geoffrey's untimely death, Tony assumed the mantle of responsibility.

"The pinnacle of this work was the design and installation of the assisted resonance system for the Tokyo Metropolitan Theatre Concert Hall in the early 1990s, after winning a head-to-head competition with Yamaha. The earlier systems were risky ventures and needed the clear-sighted and commercial ability that Tony had to deliver those projects.

"At the same time, during the 1970s, 80s and 90s, AIRO was undertaking research projects, for example, in relation to the sound insulation between dwellings, which fed into the Building Regulations and laboratory research for new products such as aircrete for the Autoclaved Aerated Concrete Products Association.

"Tony was also acting as an expert witness for public enquiries and tribunals for the burgeoning road construction schemes, was

responsible for diverse projects such as the acoustical design of the EMI building in London and the environmental noise control of the major Riding Mill Pumping Station in Northumbria and still found time to carry out smaller acoustical consultancy assignments (and run the business!)

“AIRO carried out the measurement work for the National Noise Incidence Studies in 1990 and 2000 having been commissioned to design the sampling strategy, and carried out pilot measurements in and around Watford prior to that.

“Despite the obvious time and pressure associated with running and developing a business in a maturing sector, Tony has always dedicated time, selflessly volunteering with institutions and associations related to acoustics. These include the IOA, the Association of Noise Consultants, the British Standards Institution, the Association of Consulting Scientists, the Department of the Environment Noise Review Working Party, and the Department of Trade and Industry Acoustical Metrology Working Group.

“In several cases he has been elected as the Chairman after serving as an ordinary member, which demonstrates the respect he has of his peers. To date, he has the rare distinction of having been both President of the IOA (2004 to 2006) and Chairman of the Association of Noise Consultants (1992 to 1995) having also been Honorary Secretary of both bodies.



He has played no small part in stabilising and professionalising such volunteer organisations, often behind the scenes, such as dealing with fallout from various issues, the unglamorous but arguably more important aspects of leading volunteer organisations as a trustee.

“He has supported education in acoustics through the numerous work experience and sandwich placements that AIRO has provided,

**Above:**  
(L-R) Councillor John Birnie, the Mayor of Dacorum, with Tony Jones

supporting staff who volunteer for STEM ambassador activities, and encouraging staff to take relevant courses and qualifications such as the IOA’s Diploma in Acoustics and Noise Control. He was a visiting lecturer for the MSc course in environmental design and engineering at University College London during the 1980s.

“Tony does not seek the limelight or glory and it is easy to overlook or undervalue the contribution he has made to the industry. The UK acoustics sector has benefitted from Tony’s leading role and contribution to its development, becoming more mature, better run and more developed in a professional and enduring way.

“When Tony started at AIRO, the country had a Conservative Prime Minister, inflation was high, there were many strikes and we were in the midst of an energy crisis. In 1978, Tony became Managing Director – the country had a Labour Prime Minister, inflation was high and a winter of discontent was looming. Today, after 50 years, those who dislike change can take comfort in the familiar times we find ourselves in, a Conservative Prime Minister, high inflation, industrial disputes over pay and an energy



crisis. Through Tony's stewardship, AIRO has been and continues to be a beacon of stability.

"Tony is modest, understated, meticulous, devoted to AIRO and acoustics, never late, never ill, always discrete and circumspect. I could go on.

"In an echo of the recent commentary about the late Queen, Tony shows a similar sense of duty, putting duty before personal gratification. To use a contemporary acronym (and wheedle in an atrocious pun), Tony is the GOAT who never passes the buck."

### Congratulatory messages

Some people were unable to attend the event, but sent messages of support and congratulations, including this one from former IOA president Geoff Kerry.

He wrote: It is particularly sad that I won't be given the opportunity of reminding Tony and any others who may be interested, that I may well have been the first person to work with Tony on a real acoustics project. For your information, the job involved the evaluation of open plan office acoustics in the building at Kew that was eventually destined to be the National Archives but, which in its first phase was set up as a prototype to test open plan office configurations. Had the concept been approved, which it wasn't, we would have seen thousands of civil servants re-housed in new open plan type offices in Whitehall. At Salford, my colleague, Brian Day, had been modelling the acoustics in open plan office configurations and was given the chance by the then Ministry of Works to test theory against practice. At the time the prototype office housed the government's telecommunications directorate and various studies were under way to test civil servants' reactions to the open plan environment. Salford's part was to assess the effect on sound propagation within the office for different furniture layout/screen configurations using a broad band sound source and a tracking microphone. The problem was that we could only work at night when the office was empty of people and we had to remove the equipment, and, in particular, the microphone track after we

**Right:** Through Tony's stewardship, AIRO has been and continues to be a beacon of stability

had finished in the early hours of each morning and replace it the following evening.

After assessing the situation I decided an additional pair of hands was required. Tony was in his first year of his PhD studies, researching human response to vibration under the direction of Dave Saunders, and was awaiting delivery and installation of a suitable large vibrator for his experimental work, and so volunteered to help us out. Thanks to Tony's additional assistance we did manage to successfully complete the job without upsetting the civil servants. We also made great friends with the night caretaker, who always referred to us as "studenties" and who not only supplied ample cups of coffee but also allowed us to visit the rather vast vault under the building, which had been built to house some of the national archives once they had been relocated. So please pass on my congratulations and best wishes to Tony and feel free to remind Tony of that 'first job'.

### Remarkable contribution

Robert Hill joined AIRO in 1979 and became a principal consultant until his retirement in 2016. He was Honorary Secretary of the IOA, receiving the 2003 Award for Services to the Institute and was made an Honorary Fellow in 2014. Rob wrote an open letter to be read out at the presentation, it said:

Dear Tony  
I am very sad that I cannot be with you on this special day. I did intend to come until a tree got in the way.  
As you know, when I completed my architecture course, the

careers adviser at the Bartlett arranged for me to meet with Geoff Berry to talk about a career in acoustics, which it appeared would suit me better than architecture. As a result of that meeting, I was very taken with the idea of joining AIRO and then applied (many times) to get myself a job there. I believe that I applied for and was interviewed for an appointment that was advertised in 1972. In his letter to me afterwards, Geoff informed me that I had been unsuccessful and that the post had been offered to a "more experienced candidate". He did, however, encourage me to try again! I was obviously disappointed at the time but I am very aware that Geoff was right and that he appointed the better candidate for that post. Life can be very strange at times and all too soon you suddenly had to step up to replace Geoff, something that I could never have done but which you appeared to achieve almost effortlessly! We had the opportunity to meet and work together while I was at the GLC and through the IOA. I did keep trying to join AIRO and I am so grateful to you for, in the end, inviting me to join your team to take the business forward. I believe that we did indeed have a special working relationship with a mutual respect that served us well. I thank you for your friendship, the trust you placed in me and the opportunity of working with you for 33½ of your 50 years. I hope you have a wonderful day and that it will bring back many happy memories for you.

**The IOA joins Tony's colleagues in congratulating him for his remarkable contribution to our industry. 🎉**



# Alleged private nuisance through emissions of noise

In this article, Dani Fiumicelli considers *Ray v Windrush Riverside Properties Ltd (2022) EWHC 2210 (TCC)*. This was a private nuisance action in the High Court which considered issues around BS 4142 and includes consideration of how the nature and character of a locality influences what might be considered a legal nuisance, within a broader discussion of the legal principles of nuisance.

**T**he claimant was the owner of property in Bourton-on-the Water, a picturesque, popular tourist destination in the Cotswolds. She did not live in the property but rented it out.

The claim related to the noise and the smells from an adjoining fish and chip shop. While a particular focus of the claim was the allegedly noisy plant that had been installed without obtaining planning permission, the claimant also sought a mandatory injunction to remove the mechanical plant and financial damages for loss of rental income due to alleged nuisance.

The claimant described the noise impacts in her evidence as *'The impact of the noises, is that our garden cannot be a place of relaxation, there is no peace. It is hard to hold a normal level conversation or enjoy birdsong. The noises are irritating and impact on concentration and wellbeing. Our garden was designed as a haven for the environment and was like an oasis for all the years happily alongside the previous food businesses.'* Secondly, it was claimed that it had not been possible to let the property because of the noise (and smell).

Three different acoustic consultancies were engaged by various parties and each applied BS 4142. The rating level differences with representative LA90,T background noise levels established by each consultancy ranged from 6 dBA to 20 dBA, and after the required context assessment the ratings were graded from indicative of an adverse effect to a significant adverse effect.

The judge raised several issues relating to the BS 4142 assessments including whether a submitted report included the information recommended in the standard and the validity of the representative LA90,T background noise levels used in the BS 4142 assessments.

## Nature and character of locality

The character and locality of the area in Bourton-on-the-Water was found not to be one of 'tranquillity' as pleaded by the claimant, but rather a busy tourist area. Restaurants and takeaways were a part of the tourist nature of the area. For example, the judge commented that:

*'The character of the neighbourhood was inconsistent with the calm and meditative location which she wished to provide for her guests. Looking at her ownership position in isolation from neighbouring activity, clearly it was not objectively unreasonable for Mrs Ray to contemplate using Kevinscot in that way but, for the purposes of applying the law of nuisance and adopting the language in Walter v Selfe, the standards she had created for her the holiday let business mean that the allegation of nuisance has been presented from a position of 'delicacy or fastidiousness.'*

Several essential points come from this case:

1. Questions relating to planning permission have little relevance regarding legal nuisance.
2. The best evidence is that which the expert witnesses gather themselves, rather than relying on information from others. There

- is a risk the court may downplay evidence where an expert has not been responsible for taking the measurements recorded within their evidence and has not visited the site when the noise was operating or subsequently.
3. Legal nuisance heavily depends on the nature and character of the locality, not the complainant's intended use of land or perception of impact of the noise.
4. When using standards and guidance to assess noise it is important to make sure such use is within the scope of the guidance, to follow the guidance as closely as possible or, if deviation is necessary, to be able to explain and justify why and fulfil all reporting requirements in the standard or explain why not if you don't.
5. There is no such thing as 'the' background noise level. Instead, as with any other metric, LA90,T background noise levels are variable and any value chosen as being representative is open to challenge and therefore should be robustly established based on relevant and comprehensive data set.

The full judgement can be seen at <https://www.bailii.org/ew/cases/EWHC/TCC/2022/2210.html> ©



**Author:**  
Dani Fiumicelli

# Innovative solutions for quieter devices

Dirk Wehowsky and Siegfried Muehlbachler, Getzner Werkstoffe GmbH explain how efficient vibration isolation reduces airborne noise by approximately 8 dB(A).

*By Dirk Wehowsky and Siegfried Muehlbachler, Getzner Werkstoffe GmbH*

“It’s loud. There’s a buzzing noise and I can’t sleep.”

Manufacturers, installers, planners or end customers of HVAC devices, are familiar with this problem. People are becoming increasingly aware of noise as a disruptive factor, but despite this, we do not want to lose out on the convenience that modern building technology has to offer. Measures that prevent vibrations in devices and therefore significantly reduce noise levels are growing in importance. Finely tuned elastic bearings with polyurethane (PU) elements make this possible and can reduce noise levels by up to 8 dB(A).

In HVAC equipment with a built-in compressor, the compressor plays a crucial role as a source of vibrations. The latest inverter technologies are increasing the efficiency of devices, but they are also presenting us with new challenges when it comes to noise. Variable rotation and excitation frequencies lead to an unpleasant, low-frequency ‘buzzing’ noise, in particular, within the partial load range.

Efficient vibration isolation counteracts this by preventing the transfer of vibrations to adjacent parts of the building and thus prevents the formation of structure-borne noise. If the compressor is mounted on an elastic bearing, the excitation of housing parts is reduced, cutting the primary airborne noise. When incorporating vibration isolation components into rotating machinery it is important to carefully control the damping characteristics. Low damping can lead to resonance effects with high

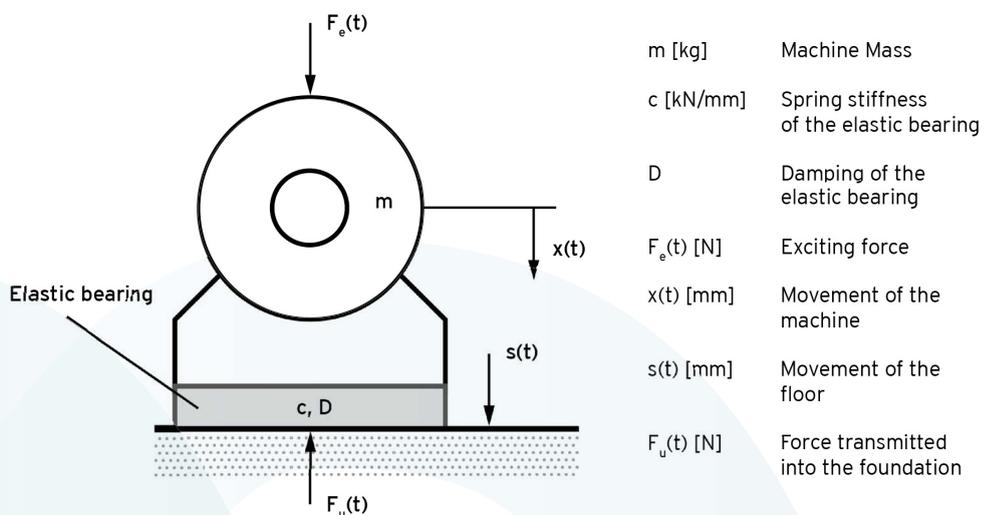
vibration amplitudes and, therefore, may reduce the service life of the machinery.

### Principles of vibration isolation

In practice, a slight imbalance in the compression process on components with rotating parts (such as fans or compressors) causes the device to vibrate, thereby generating primary airborne noise. These vibrations spread inside and outside the device, leading to the excitation of additional surfaces that emit noise again (secondary airborne noise).

An elastic bearing decouples a vibrating mass from its environment and thus prevents the transfer of vibrations to adjacent structures. This isolation effect is best explained based on the single-mass oscillator model (see Figure 1). If you consider a vibrating system component with mass  $m$ , which is bedded on elastic bearings with dynamic stiffness  $c$ , this is known as an ‘oscillatory system’. This system has a natural frequency  $f_0$  at which it would vibrate briefly if excited by an impulse, such as if it was hit by a rubber hammer. This natural

**Below:** Figure 1: From a physical point of view, the machine and elastic bearing form an oscillatory system known as a single-mass oscillator



frequency is a very important parameter for the isolation effect of the system and can be calculated as follows:

$$f_0 = \frac{1}{2\pi} \cdot \sqrt{\frac{c}{m}}$$

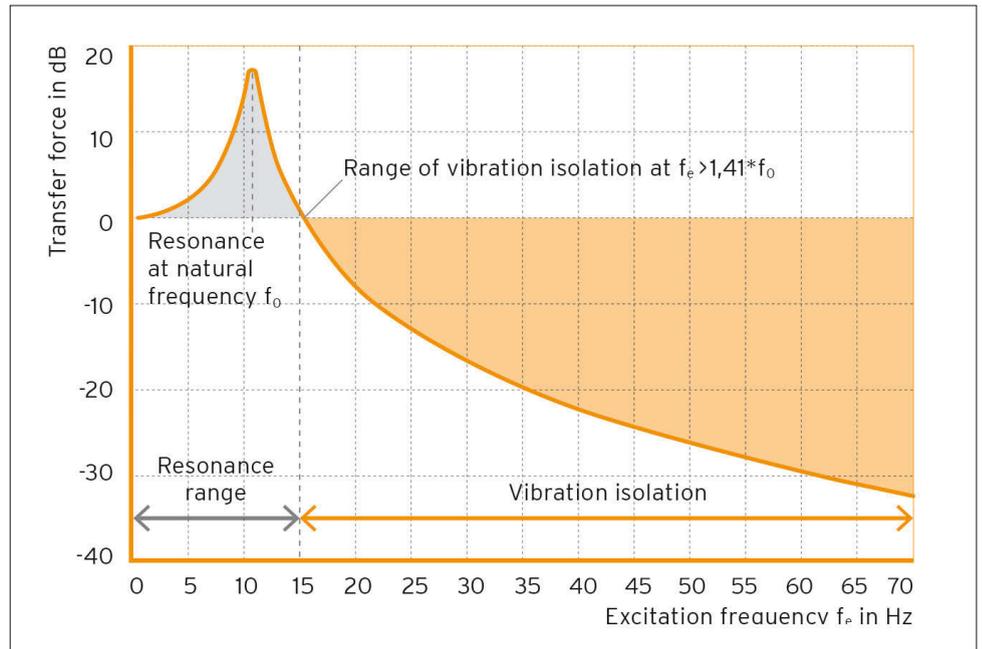
The speed-controlled compressors frequently used in modern air conditioning units generate vibrations with different excitation frequencies  $f_e$  depending on the rotational speed. The isolation effect of an elastic bearing depends on the ratio of excitation frequency to natural frequency:

$$\eta = \frac{f_e}{f_0}$$

If the excitation frequency matches the natural frequency, this leads to resonance (see Figure 2). This situation is to be avoided at all costs, as this will likely also cause damage to the device due to the high vibration amplitudes. An isolation effect, i.e. a reduction in the forces transmitted, is to be expected from a frequency ratio of  $\eta = \sqrt{2}$ . In practice, it should be ensured that the natural frequency of the bearing always equates to only roughly 1/3 to 1/5 of the dominant excitation frequency of the device.

### Polyurethane elements have the ideal degree of elasticity

The relationship between the vibration of surfaces and the emission of secondary airborne noise is frequently noted and forecast models have also gained a foothold in corresponding standards. Measurements show that a reduction in vibrations in the device also leads to a reduction in (primary) airborne noise emission.



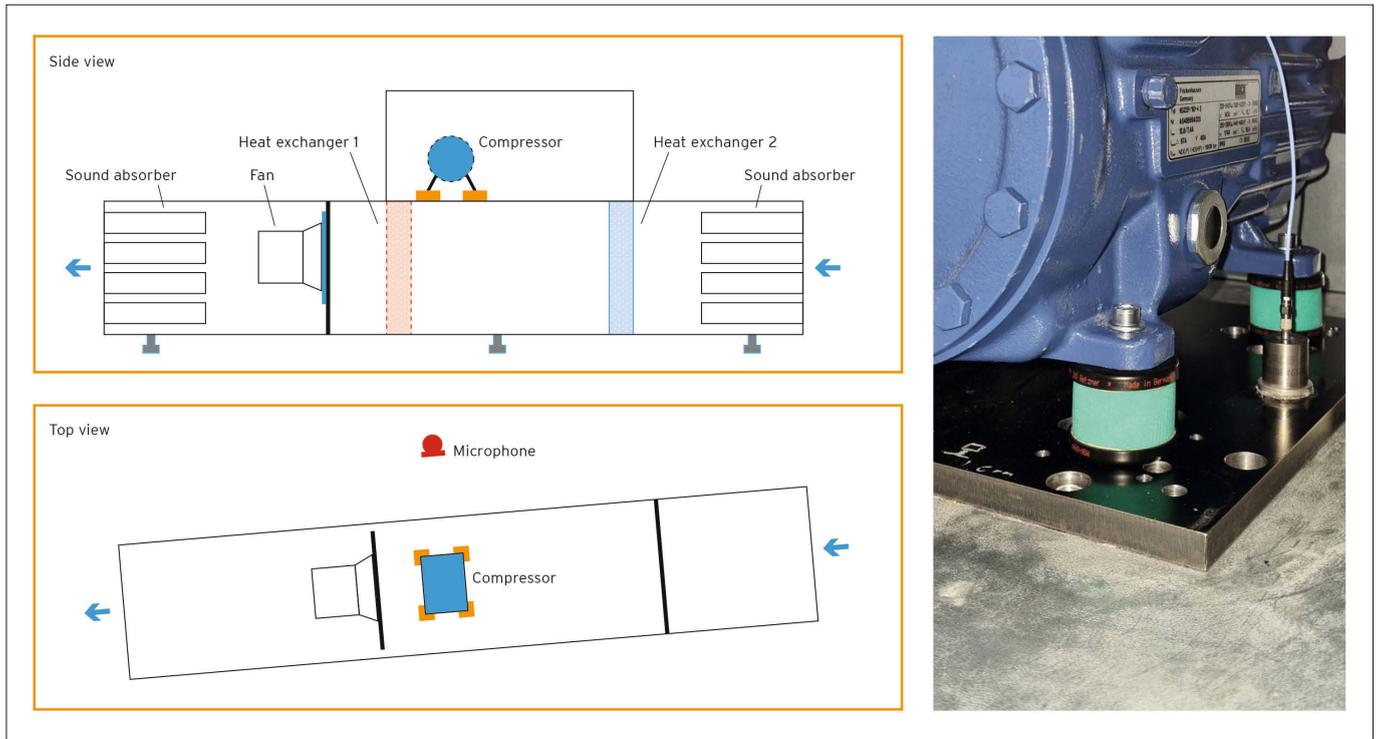
**Above:**  
Figure 2:  
The isolating effect occurs if the ratio of excitation frequency to natural frequency is greater than  $\sqrt{2}$

Elastic components made from polyurethane are ideal for meeting the ever-increasing demand for the reduction of vibration-induced sound radiation. Their excellent dynamic properties are advantageous compared to rubber-metal elements.

Polyurethane (PU) elements are particularly long-lasting and resistant to hydrolysis. For example, they are used in railway superstructures where consistent material behaviour is required over decades, even under high loads and changing environmental conditions. PU materials gain the majority of their elasticity from their microcellular foam structure. This means that their volume is

reduced with the application of pressure, and they require neither softeners nor complex geometric shapes to achieve the optimum degree of elasticity for vibration isolation. PU materials of varying densities are used depending on the weight class.

On HVAC devices, the elastic bearing is dimensioned in such a way that the natural frequency of the system consisting of compressor and bearing is ideally at roughly 10 Hz, so that degrees of isolation of ~60% are possible at inverter frequencies of just 20 Hz. This is a major advantage if the sound radiation is to be minimised at night, in particular, during partial-load operation. **P60**



**Proven reduction in noise**

To confirm the theoretical statements, measurements were taken (see Figure 3 for measurement setup). It was necessary to check to what extent the (primary) airborne noise could be improved through the introduction of an optimised vibration isolation solution for the compressor. In several trials, the airborne noise level in the area surrounding the system was first determined in relation to the rotational speed of the compressor. For this purpose, the frequency converter was used to increase the frequency continuously at 10 Hz/min steps over the entire

**Above:**  
Figure 3:  
Measurement setup for determining the airborne noise level

**Below:**  
Figure 4:  
The measurements showed that the airborne noise levels are significantly increased at certain frequencies. Considerable improvements were achieved in the three frequency ranges examined by installing Isotop MSN-DAMP

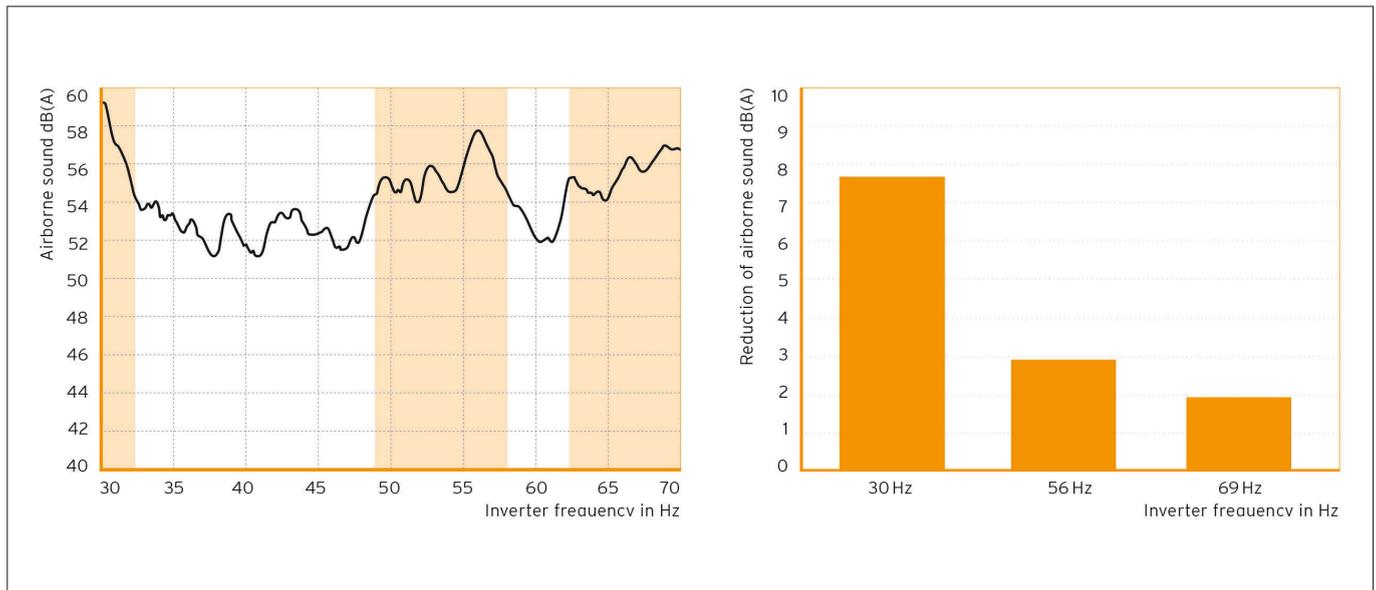
setting range from 30 Hz to 70 Hz, and airborne noise levels as well as the accelerations and vibration velocities of the housing and floor covering were measured (see Figure 4).

In Figure 4, the areas of extremely high sound radiation are marked in orange. Rubber-metal bearings were converted into elastic bearings with Isotop MSN-DAMP after all the measurements had been taken. The new measurement of the sound level at a low rotational speed resulted in considerable potential for improvement of roughly 8 dB. (A). But an improvement can also be seen in all areas with high sound radiation. The cause of the

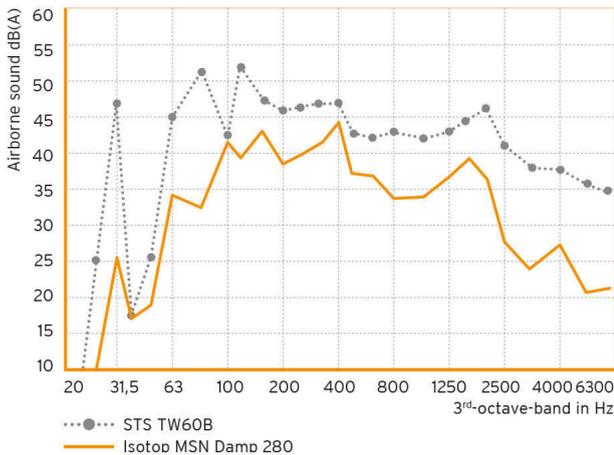
extremely large differences at low rotational speeds of the compressor lies in the fact that the isolating effect of the PU bearing with a low natural frequency of 10.8 Hz comes into effect considerably earlier than that of the rubber bearings.

**Low-frequency sources of disturbance efficiently isolated**

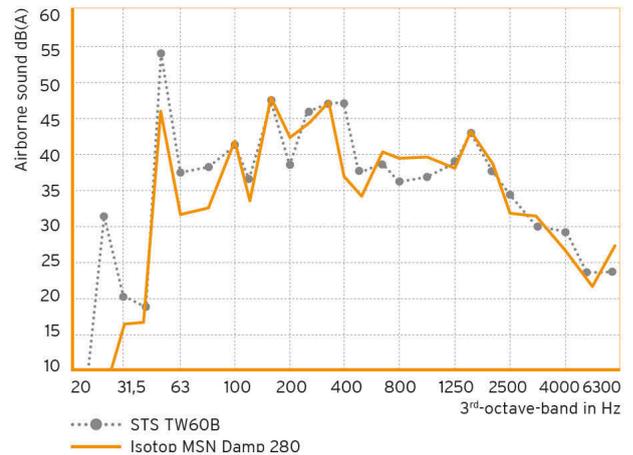
In urban areas, low-frequency noise can be extremely disturbing. This can only be shielded very poorly with conventional measures and is perceived by some people as extremely disruptive. Using a one-third octave band analysis, it can be shown that a significant



### Airborne sound 3<sup>rd</sup>-octave-spectra at low inverter frequency of 30 Hz



### Airborne sound 3<sup>rd</sup>-octave-spectra at low inverter frequency of 56 Hz



improvement in the critical low-frequency range is achieved with Isotop MSN-DAMP. At low rotational compressor speeds of 30 Hz, there is a significant reduction in sound radiation over the entire frequency spectrum; at higher rotational speeds there is a drastic improvement, especially in low-frequency ranges (see Figure 5).

**Above:**  
**Figure 5:**  
The one-third octave band analysis showed that a significant improvement can be achieved in the low-frequency range with Isotop MSN-DAMP

Due to the increasingly widespread technology of load-dependent modulation of the compressor rotational speed (inverter technology), minimising the dynamic forces on the housing excited by the compressor at different rotational speeds is decisive on sound radiation. This is achieved by selecting a suitable bearing that is specially designed for the respective application. Polyurethane materials have been proven to be ideal for this purpose, providing efficient vibration isolation and a quieter device. ©

### Quieter equipment thanks to effective vibration isolation

The results presented here show that a significant reduction in primary airborne noise is possible by optimising the elastic bearings used for compressor mounting.

#### This technical article should remind you that

- Low damping can lead to resonance effects with high vibration amplitudes and could reduce the service life of the machinery.
- An elastic bearing decouples a vibrating mass from its environment and thus prevents the transfer of vibrations to adjacent structures.
- Excitation frequency matching the natural frequency leads to resonance.



**About the author:**  
Siegfried Mühlbacher,  
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**About the author:**  
Dirk Wehowsky, Senior Engineer  
Product Development at  
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# Winning sound measurements

Following the success of its secondary schools' competition, first run in 2021, IOA included primary schools for its latest competition. The winner of the primary school category will receive their prize in February, so we will report on that in the next issue of *Acoustics Bulletin*, but in this issue we congratulate pupils at St Oscar Romero School, winners of the 2022 secondary school prize.



Left:  
St Oscar Romero School's sound heatmap

**T**he purpose of the competitions is to encourage children to think about acoustics, as it isn't a subject they get much exposure to in the curriculum.

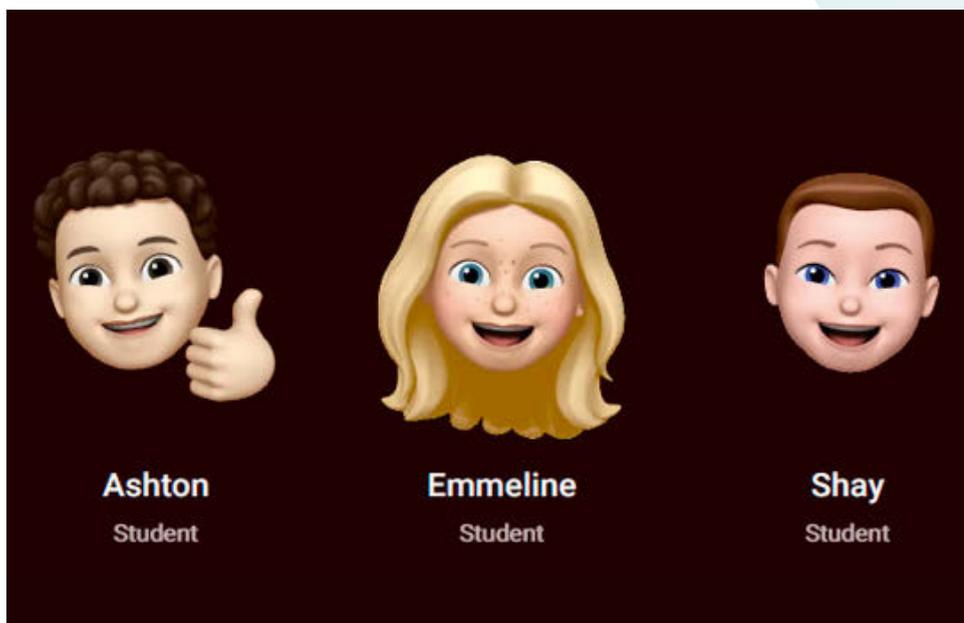
The success of St Oscar Romero School shows that the competitions can inspire children to want to learn more about this fascinating topic and we hope that it may even lead to some children continuing their education in acoustics by studying it at university, or by joining the acoustics apprenticeship scheme.

## Secondary Schools' Competition 2022 – Measurements of sound

This competition was for a small team of up to three pupils aged between 11 and 16. They were asked to think about the basics of sound measurements and perform measurements of their own. To keep it simple and inclusive, all the pupils needed was access to a smartphone so that they could download Decibel X, and a method for recording their results. To help them on their way, schools were provided with user guides for Decibel X, which had been prepared by IOA members.

The brief was to measure different types of sound (at least three indoor sounds and three outdoor sounds), including some they liked and some they didn't. They were asked to think about how the duration of their measurement might affect their results; what other information could they provide about the sounds, what produced them and their results.

Below:  
Winning team avatars from St Oscar Romero School





**Left:**  
Sound measurement equipment

“We are incredibly proud of what our students have achieved. The sheer complexity of the project and its real-life application is both inspiring and important for our school’s development.”

Peter Clarke, Head of Physics at the school said: “This competition captured the imagination of the students, and really got them thinking about the measurement of sound. They mapped out sound levels across the school and used their findings to investigate a noise problem, suggesting possible solutions. A fantastic extra-curricular experience. I’m delighted that the students’ hard work over many weeks has been rewarded with this competition success.”

If they decided to use more than one smartphone and got different results, they were asked to work out why this might be.

They were asked to describe the sounds they had measured, what factors affected the sound level they measured on their phones and for one of the sounds they didn’t like, they were asked to suggest what could be done to make it more pleasant for people to hear.

### Winners

For the second year running, the winner of the Secondary School Competition was St Oscar Romero Catholic School in Worthing, Sussex. They received their prize at the Noise Abatement Society’s (NAS) John Connell Awards 2022, which were held at the Palace of Westminster in October, hosted by Sir Peter Bottomley MP, Member of Parliament for Worthing West. The awards were presented by David Hill, Director General Environment, Rural & Marine, Defra.

Gloria Elliott OBE, NAS CEO said: “Congratulations to the winning team of pupils at St Oscar Romero Catholic School for their highly impressive submission which demonstrated real depth of investigation as well as practical problem-solving skill and all beautifully produced”.

Alistair Somerville, IOA President was there and said: “The IOA Schools Competition is now an annual event which encourages young people to explore the wonderful world of acoustics. This year’s winners demonstrated an innovative and thorough investigation into the sounds in their school. Then, focusing on the school bells, they developed sound recording technology from readily available and affordable resources, produced a sound heatmap of the noise impact and recommended mitigation measures.”

Peter Byrne, Head at St Oscar Romero Catholic School said: “The presentation of the findings of the project, using a website, was outstanding.

The winning entrants each received a prize of £25 plus £500 for their school and an engraved crystal trophy.

The John Connell Awards are named after NAS’s founder, John Connell OBE, who lobbied the Noise Abatement Act through Parliament in 1960 when noise became a statutory nuisance in the UK for the first time. These awards, known as the ‘Noise Oscars’, acknowledge the importance of the quality of sound in our lives, and champion vital advances in reducing the negative impact of unnecessary noise and health promoting soundscapes for the public benefit. More than 250 recipients have now been honoured for the significant impact they have made to improve the sound environment.



**Above:**

The Noise Abatement Society John Connell Awards 2022, held at the Palace of Westminster last October (L-R) Sir Peter Bottomley MP for Worthing West, with Ashton Billett, Emmeline Turner and Shay Wheeler, pupils at St Oscar Romero Catholic School, winners of the IOA Secondary Schools Competition 2022, with Alistair Somerville, IOA President

# SPECIALIST GROUP NEWS

## Musical Acoustics Group one day meeting

On 19 October 2022 the long-awaited return to in-person events was welcomed by 24 delegates who attended the one-day Musical Acoustics Group meeting.

The venue, Birmingham City University Millennium Point building was organised by Dr Islah Ali-MacLachlan. The five presenters gave seven talks over the course of the day, with two presentations given by an EC (early careers) researcher. More than 40% of the delegates were in the early stages of their career.

### Erdem Atbas

The day started with Erdem Atbas of the University of Manchester presenting his PhD work on improving the immersive experience for sound source localisation. This work was heavily affected by COVID with just two listeners undertaking the barrage of subjective tests necessary to discern improvement in azimuth and vertical localisation in the physical and virtual environment. Erdem was followed by his supervisor, Patrick Gaydecki, who presented a real-time spectrum editor tool for bowed string instruments, which allowed modification of the  $\pm 2$  Hz of the instrument's impulse response. He had characterised dozens of acoustics instruments using a hammer and calibrated microphone under anechoic conditions. The editor allowed the 'brilliance' of an instrument to be enhanced while mitigating the circular convolution problem by adding a fader option in the time domain. The real-time nature allowed the delay to be just 1.6 ms, well under the human perception limit of 5 ms.

### Professor Stephen Dance

After the coffee break, Professor Stephen Dance, London South Bank University, presented the room acoustic results for a sitzprobe rehearsal (this kind of rehearsal is when the orchestra and opera singers work together for the first time). At the Royal Opera House, the fire curtain is lowered providing very little space for the vocalist to stand, hence they loom over the orchestra raising the sound level in the pit. Room acoustic measurements showed that 250 Hz was significantly reduced in the auditorium and the sound level increased by 7 dBA in the pit. Solutions were offered to mitigate against this increase for those most exposed.

### Patrick Gaydecki

This was followed by a presentation by Patrick Gaydecki on a new product in development, which incorporated multi-effect algorithms for sub-bass, bass, mid-presence and brilliance based on 300 impulse responses. Three presets were loaded onto the system for these live effects as used during a performance.

Lunch and the AGM was held with all committee members willing to continue. Conner Magennis become the Early Career representative and new member, Patrick Gaydecki,



**Above:** Professor Stephen Dance of London South Bank University

was co-opted on to the committee. Many thanks for Linda Canty for taking the minutes of the meeting.

After lunch, Erdem Atbas presented his early PhD work on real-time personal delivery systems without the need for headphones. Under free-field conditions using 32 loudspeakers he showed, through simulations, how sound can be beamed formed to an individual with a 27 dB signal to noise ratio across 500 to 8000 Hz. His work was verified under anechoic conditions with a complex setup to measure a slice of the sound field. After Erdem, Stephen Dance presented his latest findings on using otoacoustic emissions to assess the hearing of classical musicians. This work has led to the publication of new best practice guidance on hearing assessment by the British Society of Audiology. Stephen showed how it was possible to detect hearing damage at the very earliest stage.

### Murray Campbell and Arnold Myers

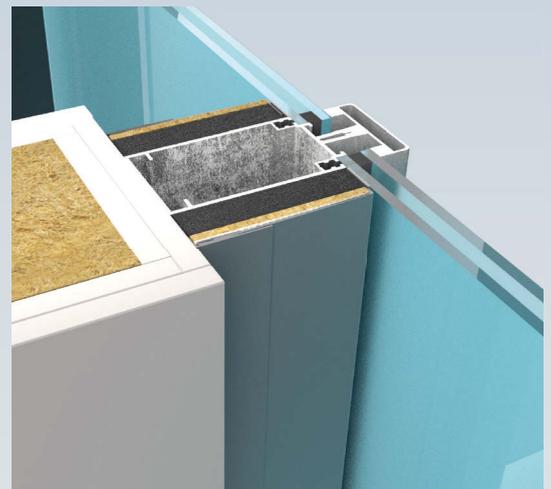
Murray Campbell and Arnold Myers, both of the University of Edinburgh, presented the meeting finale on the 'brassiness of brass instruments'. Using live demonstrations, Murray showed how non-linear acoustics, due to high pressure in the instrument caused specific behaviour in different lengths of brass instrument. As such, four and half feet instruments (flugelhorn, trumpet and cornet) had different brassiness to nine feet instruments (trombones) and to 18 feet instruments (tubas). Arnold explained that he had measured the bore diameter of hundreds of brass instruments and can categorise them by their spectral enrichment (E parameter) and brassiness (B parameter). So French and German instruments can be distinguished by their design and sound.

The event was kindly supported by the UK Acoustics Network (UKAN). 📍

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# BRANCH NEWS

## Southern Branch

### Good acoustic design solutions talk, by Colin Cobbing

By Teli Chinelis, Finch Consulting

On Thursday 10 November, around 100 IOA Southern Branch members had the pleasure of welcoming speaker, Colin Cobbing who talked about the principles of a good acoustic design process and its relationship with national policy on noise.

Colin reminded attendees of the principles in the Professional Practice Guidance on Planning and Noise for New Residential Development (ProPG) document, where the use of good acoustic design is an inherent part of the recommended approach that will help to deliver national planning and noise policy objectives.

Good acoustic design should help produce sustainable buildings that:

- provide healthy conditions for future occupants;
- that are sensitive to the likely expectations of future occupants and to the acoustic characteristics of the location;
- that are efficient in the use of resources and energy both during construction and subsequent occupation; and
- that are matched by an appearance that demonstrates good aesthetics as far as possible.

Colin acknowledged that while passive design is good for people’s health and quality of life, it is also good for the planet. Being able to keep windows open is necessary for natural ventilation, to cool buildings during the summer months, to prevent mould growth, to reduce pollutants indoors and to remove odours. People may also like to have windows open to be able to connect with their external environments.

Colin then went on to discuss passive façade solutions which should be considered as part of a good acoustic design process, as recommended in the ProPG and, in particular, he described



Above: Figure 1: The acoustic windows are a specially designed box-type or plenum window

Inner and outer opening/mm	With attenuator
	Sound reduction rating – Rw/dB
0	54
18	42
38	38
76	33
142	29

Above: Table 1: Levels of noise attenuation across the windows that can be achieved at different opening settings with a central attenuator

the development of the acoustic plenum windows by his company, Acoustic Façades Limited (winners of the John Connell Award for Innovation 2022 from the Noise Abatement Society – sponsored by the IOA) and the contribution they can make to good acoustic design.

Helpfully, Colin confirmed that such windows alone are unlikely to provide

sufficient airflow to combat overheating, but they may be installed in conjunction with other passive or active means of combating overheating.

He also explained plans to develop the design of the windows further so they will meet specific challenges and opportunities associated with new buildings, retrofit and heritage buildings. 📍

# It's time to renew your membership

Your membership expired 31st December 2022 and renewals will be issued from mid-January 2023

Membership of the IOA enables professional recognition and greater influence in shaping the world in which acousticians work and live.

Membership also brings a wealth of additional training resources as well as unrivalled opportunities for professional career development and networking.



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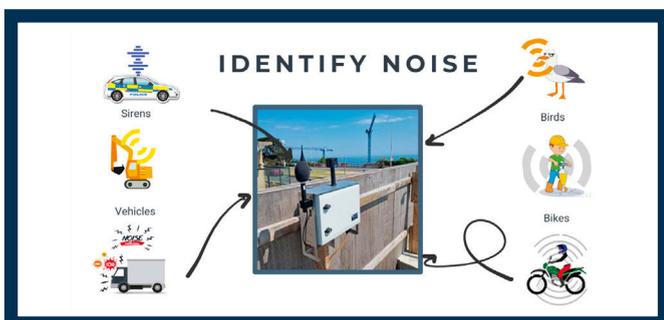


## Using artificial intelligence from Sonitus Systems

Sonitus Systems uses the same artificial intelligence as Siri and Alexa to improve the noise recording capability of its noise monitor the EM2030 and Sitesens noise and dust combined monitor.

The EM2030 audio capture option already records sound and logs it on the Sonitus Cloud ready for playback and human interpretation by acoustic consultants, but now the noise identification job is done by automated noise identification (ANI).

Instead of just reporting that 'a' sound was recorded at a certain point in time, the audio capture option categorises and labels the recordings with the actual cause of the noise, ready for playback on any smartphone, tablet, or PC. Now when acoustic consultants log onto their Sonitus Cloud they will see noise recordings colour coded and labelled with, for example, traffic, aircraft, birdsong etc., and there's a running total of each category to help quantify noise types - a significant amount of listening time can now be saved through the automatic labelling of audio files thanks to ANI.



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# Sonify by Zentia, a new innovative customisable acoustic ceiling solution

**UK ceiling manufacturers, Zentia, have launched Sonify, a discontinuous acoustic ceiling solution that allows architects to unleash their creativity on every project.**

Sonify by Zentia adopts a digital first approach to designing a ceiling system. Sonify 3D Studio is an online parametric configurator that allows each design to be visualised and exported as a Revit file to support digital workflows and the Golden Thread.

John Spicer, Head of New Product Development at Zentia, said: "We looked at the issues surrounding the specification, distribution and installation of highly customisable discontinuous ceiling solutions and developed Sonify to overcome them.

"Sonify by Zentia uses a range of pre-engineered panel shapes and sizes, combined with a wide range of standard colours to provide a hybrid approach to ceiling installation and suspension, including height adjustment options.

"Sonify Create offers a range of suspension solutions that includes a patented grid system that delivers unrivalled accuracy, speed and stability with regards to installation. There is also the option to add colour to the grid and turn it into a design feature in its own right."

Sonify by Zentia is designed to bring distinction to a wide range of new-build and refurbishment projects; providing aesthetic ways to absorb sound in schools and hospitals for example.



Zentia's Sales and Marketing Director, Graham Taylor, said: "Delivering a complete and personalised acoustic ceiling solution while offering unsurpassed levels of value, quality and reliability is now a possibility for every project.

"We have worked hard to ensure we offer a complete system with a short lead-time at a competitive price. We are excited to see people explore the possibilities with Sonify by Zentia."

## Acoustic Associates Sussex Ltd has a new name

**Following their transition to an employee-owned company (EOT) last year, Acoustic Associates Sussex Ltd has changed its trading name to Acoustic South East. This change will come into effect on 1 February 2023.**

Acoustic Associates Sussex Ltd has been trading for more than 25 years and during that time their consultancy and areas of expertise have grown. They have also expanded their operations over a larger region so the name 'Acoustic South East' better reflects the geographical area that they typically work in.

The company remains at Shoreham Airport with their team of dedicated professional consultants and technicians at hand to assist clients with any noise and/or vibration requirements.

**Acoustic South East**



## Next generation of data acquisition

**To empower engineers with an efficient workflow and strengthen their measurement processes, HBK has released HBK FUSION and HBK ADVANTAGE; a data acquisition (DAQ) system designed to keep up with the demands of development, qualification, and certification.**

The versatile HBK FUSION DAQ hardware provides all-round measurement for developing, qualifying and certifying new products. It establishes new standards in efficiency with reduced setup and test time, plus enhanced performance via high data throughput and channel density.

The HBK ADVANTAGE software has an ergonomic design which makes data acquisition simple, flexible, and fast. As a result, it can dramatically increase efficiency and productivity. It's automated sensor configuration, along with the HBK COMPANION app for assigning sensors to measurement points, provides users with quick setup so they can hit the ground running, test with precision and share the results with colleagues.



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# Providing vibration diagnostics to award-winning dynamics experts

Led by the University of Sheffield's Dynamics Research Group (DRG) the Laboratory for Verification and Validation (LVV) is designed to allow those in academia and industry to verify and validate engineering models in a range of environmental conditions.

The scheme comprises strong floor and wall areas, a wave tank, laboratory spaces and three climatic test rooms, one of which houses a circa 3m x 2m Multi Axis Shaker Table (MAST). The table is capable of accelerating 1,000kg to a maximum of 3g peak acceleration through a frequency range of 5-70Hz (x-axis, y-axis & z-axis).

Under certain operational conditions of the MAST, the glazing within double height curtain walled partition between the main laboratory and the office/desk space area began to visibly vibrate. Concerns were raised about the potential for damage at which point Hoare Lea was engaged to investigate the cause of the problem and offer solutions to mitigation.

Before mitigation measures could be proposed, a series of diagnostic elements were undertaken namely:

- precision acoustic measurements within the main laboratory space and MAST chamber including appraisal of infrasonic components;
- in-situ transmissibility assessment of MAST supports (seismic mass);
- glazing vibration measurements under varying MAST operational conditions, including problematic scenarios; and
- frequency response function (FRF) measurements of glazed components, natural frequency and damping estimation.

The results of the measurement campaign indicated that the shaker table, acting as an infrasonic loudspeaker, was exciting acoustic modes within the main factory area, which matched natural resonant frequencies of the glazed wall system. A series of steps were then undertaken to develop a mitigation strategy.

Firstly, a series of finite element (FE) simulations were performed to develop a deeper understanding of the vibro-acoustic



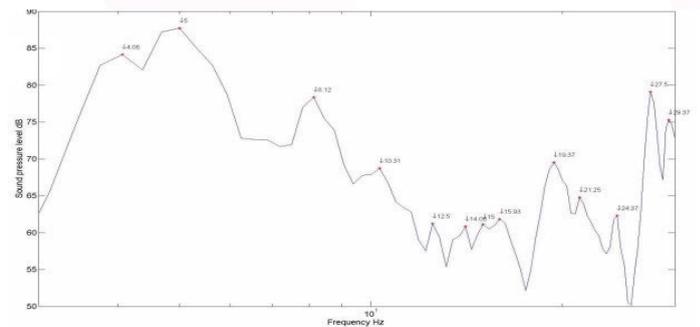
phenomena observed. Simulated FE acoustic and structural modal surveys provided close fit to measured response.

Capturing modal behaviours permitted subsequent predictions of fluid structure interactions (FSI) to be undertaken. This allowed interrogation of vibration response to acoustic sound pressure levels – confirming the response between air and glazing was dominant. Framing systems could therefore be modelled efficiently as simple supports.

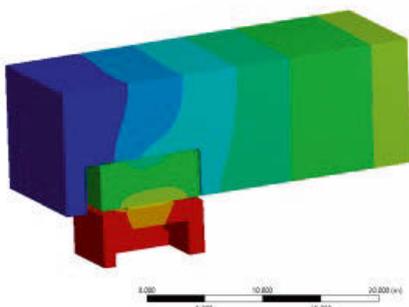
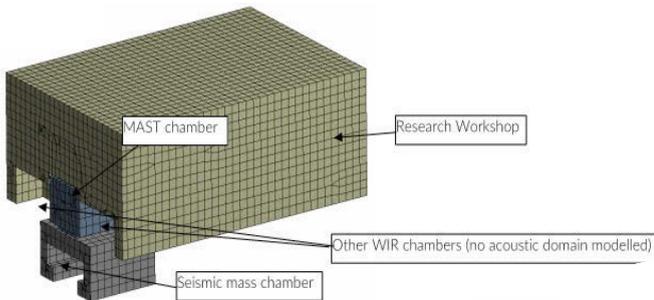
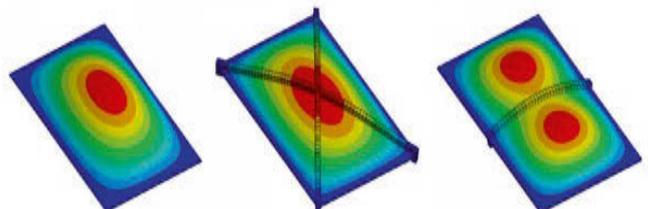
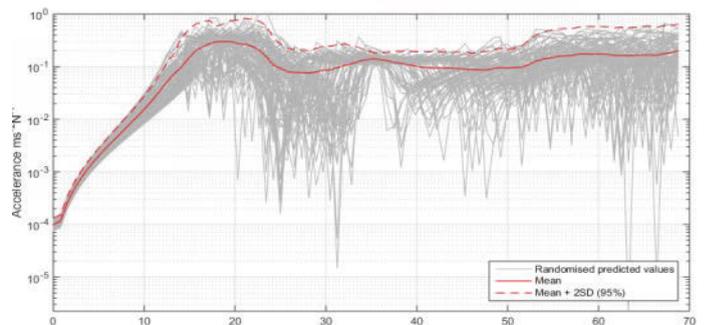
With baseline simulations established, a second round of simulations was undertaken to understand the level of improvement that may arise from glazing modifications. Since FE models are set up with a given set of material parameters, a series of Monte Carlo randomised input simulations were performed to ensure that any simulated output was sufficiently resistant to changes in material parameters.

The results of the output allowed 'tuning' of the glazing system to reside within 'lulls' where few acoustic modes would side, further optimising benefits alongside panel stiffening. ☺

Cavity modes-natural frequencies



G3-type: 100 randomised FRFs (1 response point)



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## Committee meetings 2023

DAY	DATE	TIME	MEETING
Thursday	19 January	10.30	Membership
Thursday	2 February	11.00	Publications
Thursday	9 February	10.30	Meetings
Thursday	16 February	10.30	Diploma Tutors & Examiners
Thursday	16 February	13.30	Education
Tuesday	22 February	10.30	Engineering
Wednesday	23 February	10.30	Engineering
Tuesday	7 March	10.30	Diploma Examiners (London)
Thursday	9 March	10.30	Executive
<b>Wednesday</b>	<b>15 March</b>	<b>10.30</b>	<b>Council</b>
Tuesday	21 March	11.00	CPD Committee
Tuesday	4 April	10.30	CCWPNA Examiners
Tuesday	4 April	13.30	CCWPNA Committee
Thursday	20 April	10.30	Membership
Thursday	27 April	10.30	Meetings

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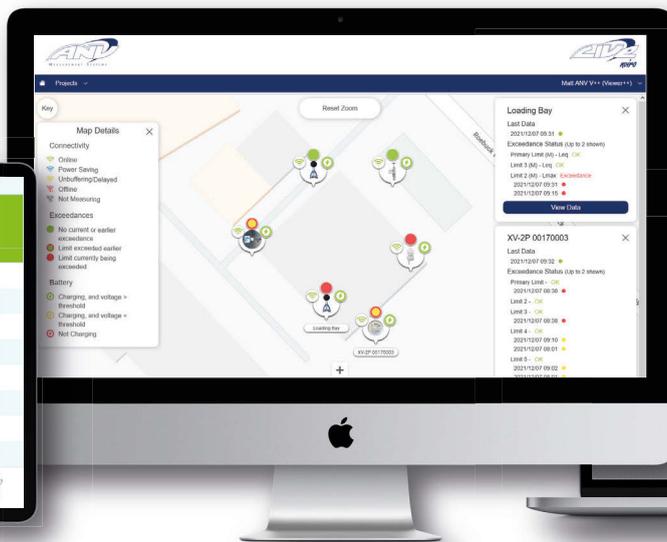
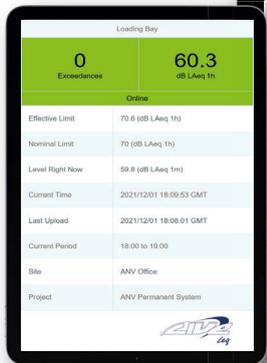
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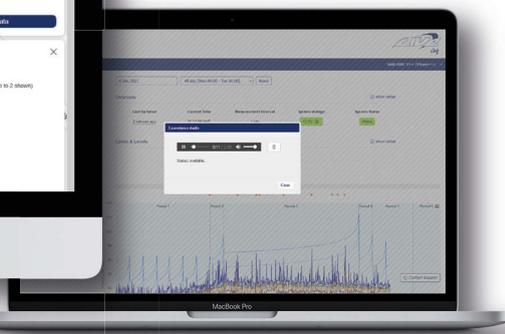


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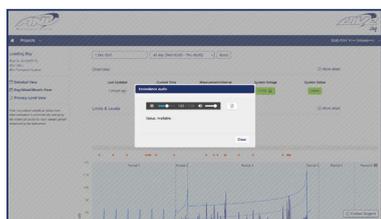
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Just a few examples of the many features that have been recently introduced

### AUDIO

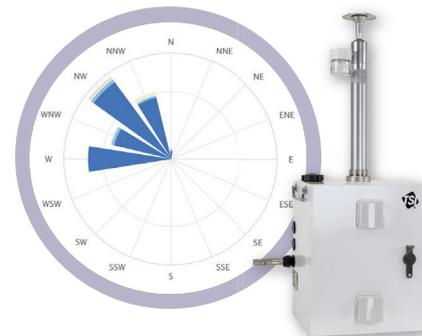


- Triggered when individual limits are exceeded
- Separate audio-only trigger option available
- Audio-on-demand function for recalling any audio within the previous 24-hours
- Control .wav recording on the meter remotely



### POLLUTION ROSES

- Daily, weekly and monthly pollution roses

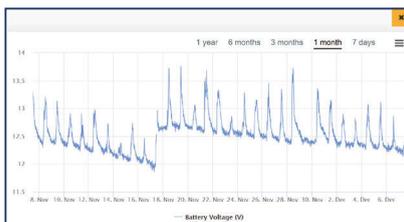


### POWER

Monitor the power consumption and battery status of each position.

New PowerSave option:

- Units buffer and upload data once per hour
- Easy-to-use scheduler can be used to control when PowerSave is enabled
- Up to 50 hours with a single 12Ah battery and 2 weeks with a 100Ah battery
- Solar options available to power noise, vibration, weather and dust 24/7/365



Existing customers Contact us now to begin enjoying these new features free of charge