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ACOUSTICS BULLETIN



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Published and produced by:

The Institute of Acoustics
Silbury Court,
406 Silbury Boulevard,
Milton Keynes,
Buckinghamshire MK9 2AF
Tel: 0300 999 9675

Edited, designed and printed by:

Warners Group Publications
The Maltings
West Street
Bourne Lincs
PE10 9PH



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Annual Subscription (six issues) £148.00

Single copy £25.00

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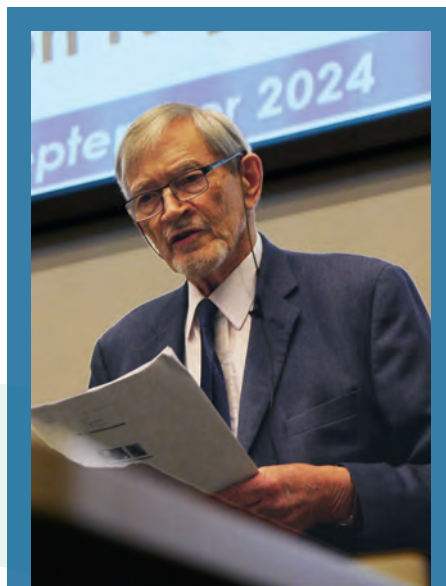


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ACOUSTICS BULLETIN

Acoustics Bulletin Volume 50 No 6 November/December 2024



Cover image: Delegates at this year's IOA Annual Conference heard Professor Malcolm J Crocker deliver his Rayleigh Medal lecture.

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All technical contributions are reviewed by an expert identified by the IOA 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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- 45 **Cover story:** 50th Anniversary Conference – Acoustics 2024

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

As I assume the role of President, I am grateful for the strong foundation laid by my predecessor, Alistair Somerville. Building upon his achievements in improving governance and enhancing member services, I am keen to focus on digital transformation, the UK Acoustics Network (UKAN+) integration, sustainability and collaboration with allied organisations. By pursuing these initiatives, we can continue to strengthen the IOA's position as a leading force in the field of acoustics.

Digital transformation

One of my key goals is to transform the IOA into a digital-first organisation. This involves updating our website, improving our educational offerings and ensuring the long-term viability of the Institute. By embracing technology, we can better serve our members, enhance our educational programmes and strengthen our position as a leader in acoustics.

UKAN+ integration

I am committed to providing a home for UKAN+ within the IOA. By doing so, we can better serve our research members and their collaborations with industry. This includes integrating UKAN+ into the IOA's Research Committee and promoting the recently established new Research Member grade (RMIOA). As UKAN+ funding approaches its end, the IOA is already supporting initiatives and research proposals to form further networks. Our challenge will be to accommodate UKAN+ Special Interest Groups (SIGs) that do not currently align with our existing specialist interest groups, such as bioacoustics.

Sustainability in acoustics

Sustainability in acoustics is a complex and multifaceted issue. We are fortunate to have strong leaders in this area within the IOA and I look forward to working closely with them to advance our efforts. By focusing on sustainability, we can contribute to a more environmentally responsible future and demonstrate our commitment to social responsibility.

Collaboration with allied organisations

The IOA can benefit greatly from collaboration with other professional organisations, such as the Chartered Institute of Environmental Health (CIEH) and the Royal Environmental Health Institute of Scotland (REHIS). By working together, we can leverage our combined expertise and resources to address shared challenges and opportunities. I am delighted that Stephen Turner and Alistair Somerville have agreed to lead these collaborations.

Raising the profile of acoustics

I am also committed to raising the profile of acoustics among policymakers. By providing them with the best scientific and technical advice available through our Parliamentary Liaison Group, we can ensure that acoustics is considered in policy decisions and initiatives.

Leavers and joiners

I would like to take a moment to acknowledge the contributions of those who are leaving their roles and to welcome the new members of our team.

Leavers:

- Stephen Turner, Immediate Past President
- Alistair Somerville, President, now Immediate Past President
- Martin Lester, Hon Treasurer
- James Hill, VP Engineering
- Paul Lepper, VP International

Joiners:

- Paul Shields, President Elect
- Dan Saunders, Hon Treasurer
- Mark Scaife, VP Engineering
- Jo Webb, VP International

Additionally, I would like to mention Ben Mosely, who is shadowing Keith Attenborough until the end of January to ensure continuity before we appoint a Director of Education.

A special farewell

After an extraordinary 34 years of dedicated service to the Institute of Acoustics, Linda Canty is set to embark on a well-deserved retirement. Linda has been an invaluable pillar of strength for the Institute and the HQ office, consistently demonstrating unwavering commitment and professionalism. While Linda's modesty might make her uncomfortable with accolades, it is impossible to let this moment pass without acknowledging her immense contributions. On behalf of the entire IOA membership, I extend our heartfelt gratitude and warmest wishes to Linda for her tireless efforts and the indelible mark she has left on our organisation. Her presence will be deeply missed, and her legacy will continue to inspire us all.

Conclusion

As we embark on this new chapter for the IOA, I encourage all members to participate, support and contribute to our initiatives. Together, we can create a more vibrant, innovative and sustainable future for the Institute and the field of acoustics. I am honoured to serve as President of the IOA and look forward to working with all of you to achieve our shared goals.



David Waddington

David Waddington, IOA President

Engineering Division



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

By Blane Judd BEng FCGI CEng FIET FCIBSE, Engineering Manager

The deadline for this edition arrived before the next round of interviews, so please check back next time to find out how the seven applicants that are being interviewed at the back end of October got on. We have five new interviewers who will be observing the next set of interviews with an aim to have them being part of the team soon. It is a rewarding activity and is a great way to keep your CPD up-to-date whilst giving back to the engineering community. I have just completed two professional review interviews for another Institute as a volunteer, these interviews were in my area of expertise, and it is important to us that we provide candidates with assessors who know about the area of acoustics they are working in. If you have experience in a specialist area of acoustics, we'd love to hear from you so that we can broaden our offering to new candidates.

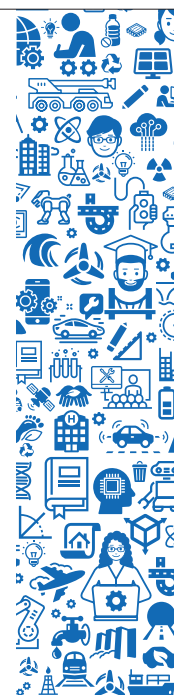
It is really important that you take the time to look at the example PRI report that we send to every applicant. Just lately we have had some submissions that have not followed the example and so needed extra time to complete their application. We will look at submissions and send them to volunteers to review, but only once we think they are close to being the final draft. If you are asked to re-work your submission it is because we only want to put applicants forward who stand a good chance of being successful. We do not want to waste your time or that of the volunteers which is why we go through this process.



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

Fourth edition

Published August 2020



Above: We are now interviewing using the Engineering Council UK SPEC version 4

When drafting the report think if you have selected a particular software to conduct modelling, if so, explain why you chose it, what the shortfalls are, what results you were expecting and how you validated the outputs. These are all part of the A and B competencies and will save you having to do several rewrites.

Because the IOA does not have any accredited training programmes, all applicants must submit an Initial Professional Development (IPD) report. This is a narrative that explains how you have developed from a qualified acoustician into a practicing engineer. We send an example of this report with all applications, so check out the contents and add your own personal information.

Emma Lilliman has worked hard to put the interviews together while supporting new applications. Since we have a limited resource, we try to respond as quickly as possible, but high numbers of candidates all looking for feedback at the same time can cause a backlog, especially during holiday periods. Please bear with us as we try our best to turn around your drafts quickly.

Neil Ferguson still helps us with academic equivalence support for those candidates who do not have recognised qualifications. 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 (see later in the article).

Interviews

We hold several interview events through the year, depending on the number of candidates we have coming forward for registration. Our next set are scheduled for February 2025. If you are interested in taking the next step to becoming a professionally registered engineer, contact us at 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 below).

Recognised qualifications

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 started before September 1999	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 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 and provide the essential peer review process that affirms that you are at the appropriate level for recognition as an Engineering Council Registered Professional Engineer.

Our video explains how members can gain professional recognition and Engineering Council registration through the IOA.

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

IOA EVENTS FOR 2025

IOA CONSULTATION ON THE PROPOSED CHANGES TO BS 8233

14 January 2024

Manchester

Organised by the Early Careers Group

THE ART OF BEING A CONSULTANT

27 March 2025

Manchester

Organised by the Early Careers Group

THE ART OF BEING AN ACOUSTICIAN

28 March 2025

Manchester

12th INTERNATIONAL CONFERENCE ON

AUDITORIUM ACOUSTICS 2025

8-10 September 2025

The Bristol Beacon, Bristol

Annual Conference and Exhibition

ACOUSTICS 2025

October 2025

Organised by the Electroacoustics Group

REPRODUCED SOUND 2025

November 2025

Bristol

For up-to-date information visit www.ioa.org.uk

IOA Bursary Fund update

The IOA Bursary Fund aims to improve IOA members' access to acoustics-related training and activities and also assist them in carrying out acoustics-related STEM activities, where funding from other sources may be limited or unavailable.

By Reena Mahtani FIOA, Chair of the IOA Bursary Fund

The spring round of funding closed in May 2024 with two applications received, both for attendance to

Inter-Noise to present research papers. Then in the summer round, which closed in August, another two applications were received to study the IOA Diploma. There seems to be a pattern on the type of applications we receive in different times of the year! We are happy to confirm that all four applications have been approved and we will hear from them in a future issue of Acoustics Bulletin.

The autumn round of funding is open until the end of November 2024. The application form is available on the IOA website at <https://www.ioa.org.uk/can-we-help>. If you or someone you know could benefit from financial assistance from the Institute, please consider applying. The programme is open to any member of the Institute, including students.

Application

When preparing the application, please pay careful consideration to the personal statement. The review panel needs to understand the circumstances of the applicant, why the Institute should fund the activity and if other means of funding such as a university or research centre have been considered. There is more information about the application process on the website, and if you have any questions, please feel free to send us an email to ioa@ioa.org.uk 



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Inclusive recruitment

Many employers are starting to understand the benefits of having a diverse and inclusive workforce. Employers aiming to be more inclusive should also have inclusive recruitment processes in place.

By Ismail Alli-Balogun, member of the IOA EDI Working Group

A barrier to inclusive recruitment is the tendency to hire for 'cultural fit', which employers may see as assessing how closely a candidate's beliefs align with the existing norms and culture. However, this is best avoided because of the potential affinity bias, where people who are similar to current employees (in terms of their background, how they present themselves or what hobbies they enjoy outside of work) get an unfair advantage. 'Cultural fit' is subjective and can undermine diversity.

Awareness of the potential biases is not sufficient to reduce their impact on the recruitment process. The process itself needs to be structured and objective to help improve inclusivity and diversity. This leads to the question of what constitutes good, inclusive recruitment practices.

The Chartered Institute of Personnel and Development have published a guide on practical, evidenced-based changes to recruitment processes, called *A Guide to Inclusive Recruitment for Employers*. I encourage all those involved in making hiring decisions to read and implement some, if not all, of the advice given in the guide.

Here are some highlights from the guide relating to job advertisements and the selection process:

Writing inclusive job adverts

Make the role requirements clear, specific and behaviour-based. For example, instead of stating character traits (such as 'you are a natural leader') state competencies that can be evidenced (such as 'you have held line management responsibilities'). This way of defining the requirements of the role should also help with the next

recommendation, below, to remove biased language.

Seek to identify and reduce stereotypically masculine language (for example words such as 'decisive' and 'ambitious') and stereotypically feminine language (for example words such as 'empathetic' and 'compassionate').

Advertise specifics relating to policies and benefits, particularly where these exceed legal minimums. These might include parental leave (shared/maternity/paternity) annual leave, sick pay, pension contributions etc. Some benefits are associated with increased inclusion and diversity.

The selection process

Anonymise applications by removing identifying information before hiring managers review them. This could include:

- names (as this could infer race and gender);
- contact details;
- dates of qualifications (as this could infer age);
- names of previous employers (if previous employers are well known, it could lead to a halo effect, whereby this single fact has an undue influence on the perceived quality of the candidate); and
- names of schools and universities (as this could lead to an affinity bias and/or halo effect).

It could be time-consuming to anonymise CVs received by candidates and doing so may lead to errors. To avoid this, employers should consider using application forms. This would allow information relating to personal characteristics to be removed before applications are seen by hiring managers. An added benefit of application forms is the opportunity to have standardised questions, making it easier to

Right:
Download the guidance document here <https://tinyurl.com/CIPDguidance>



compare multiple candidates against each other with more consistency.

Avoid asking candidates for the dates of their previous employment (for example 2020-2024). Instead, ask for the length of time spent in previous roles (for example four years). This helps to remove the biases faced by people who have gaps in employment, which may be due to having caring responsibilities, ill-health or a disability.

Do not wait for applicants to request reasonable adjustments to the interview process. Instead, ask all applicants if they would like to request any reasonable adjustments. Being proactive can promote inclusivity and increase the diversity of candidates.

Conduct interviews that are structured and have predefined questions for all candidates. Responses can then be scored using pre-agreed criteria. This is an effective way to make interviews more consistent and unbiased because it allows for direct and fair comparisons between candidates, using objective criteria.

Final thoughts

Some of these recommendations may be very different to current procedures within your organisation, which could make the suggested changes challenging to implement. There seem to be no shortcuts when it comes to improving inclusivity. We must all seek to learn and do the work required to promote positive change for the good of society. 🌐

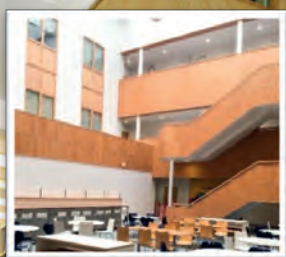


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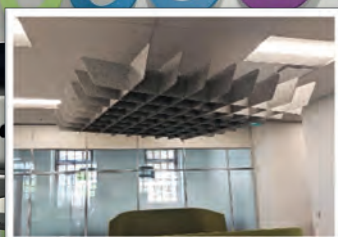
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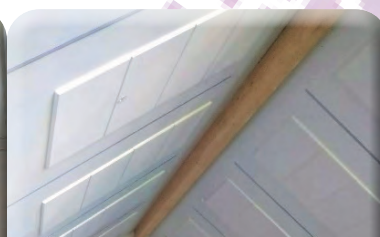
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any questions you may have.

STEM – A look back at 2024

As we approach the end of 2024, we thought it would be a great time to update you on all things STEM for the Institute of Acoustics.

By Anne Budd, Angela Lamacraft, Matt Muirhead and Vicky Wills

This year the STEM committee welcomed two new members in Jenny King and Rachel Bennett. Both have done a fantastic job in hitting the ground running with Jenny delivering the *You're Banned* activity and writing about it for *Acoustics Bulletin* and Rachel leading the communications team for *Project Reverb* (more on that below).

We are also grateful to the IOA for giving us a stand at Acoustics 2024 where we could advertise the work of the Committee and hand out quite a few Lottie dolls too! We hope you enjoy reading about everything we are up to below and, as always, if there is anything that you are interested in, please email us at STEM@ioa.org.uk

The WES Lottie Tour

The Women's Engineering Society's (WES) Lottie doll tour involves organisations borrowing a Lottie doll and taking photos of the doll doing their job – so a bit like work experience for the doll. The intention of the tour is to show young people what it is like to work in STEM careers and hopefully inspire them to work in these fields in the future.

The IOA took part in the Lottie Tour in 2023, and it was so much fun that we are doing it again this year. Pictures and videos will be going live during Tomorrow's Engineers Week (teweek.org.uk) from 11 to 15 November 2024. To follow what Lottie gets up to on Social Media, please follow [#acousticnonamission](https://twitter.com/acousticnonamission), [#teweek24](https://twitter.com/teweek24) and [#weslottietour](https://twitter.com/weslottietour)

Project Reverb

Project Reverb is our new STEM project, where we are bringing together as many people as we can to create a STEM community, improve our resources and reach more young people.

So far, we have gathered together around 60 people onto the project, and have been working on our social media campaign

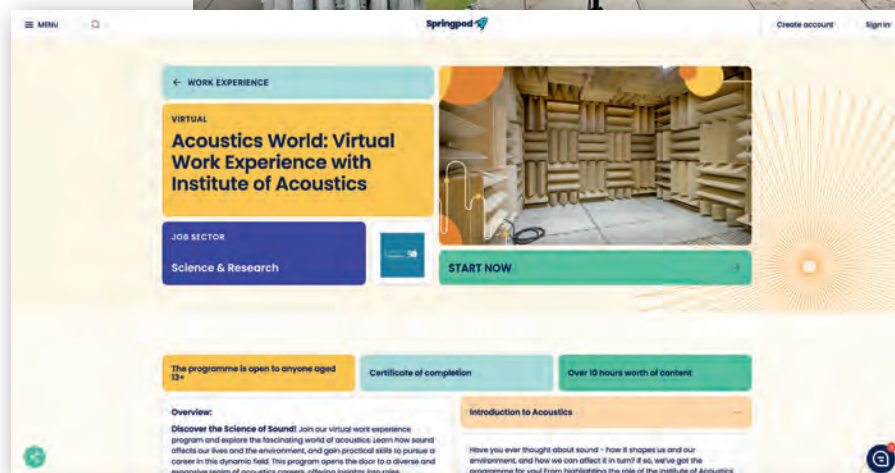
for more volunteers, organising STEM Ambassador training (live on 13 November and then as a recording on the IOA website) and working on our resources, such as handouts and classroom activities. There is still a lot to do, with the end goal being to get many more acousticians into schools during British Science Week, which is 7 to 16 March 2025.

Springpod

The IOA virtual work experience is still ongoing on a rolling basis. It provides around 10 hours of

free content for secondary school students to introduce them to the wide variety of careers in acoustics. We have had hundreds of students engaging with the course this year alone, with some excellent feedback. However, we are always looking for wider dissemination of the programme and any feedback on improvements that could be made, so please advertise it next time you are talking to young people <https://www.springpod.com/virtual-work-experience/acoustics-with-the-institute-of-acoustics/WEXP-00085> **P14**

The EnginEARing Section at Careers Hive in Edinburgh



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Careers Hive and Edinburgh Science

From 28 October to 2 November Scottish Branch members once again volunteered to attend the Edinburgh Science Careers Hive at the National Museum of Scotland.

Volunteers speak about their careers and experiences to S1-S3 high school pupils from Scotland to help them decide the path they will take through their Nationals and into STEM. The event is a fantastic opportunity to reach a huge number of pupils as well as to spend time with our professional peers across the STEM sectors in Scotland.

The IOA has sponsored both the Careers Hive and acoustics-themed activities of the Edinburgh Science outreach programme, which visits participating primary schools across Scotland, since 2017. If you haven't taken part so far then please consider joining the volunteers next year!

School competitions

The IOA Primary School Competition asked children to produce a piece of art based on somewhere with sounds they like. We received a wonderfully large number of entries this year with a great variety of sounds and artwork.

The Secondary School Competition asked children to explore the connection between ecology and acoustics by using an app to find out what birds are present in three different soundscapes.

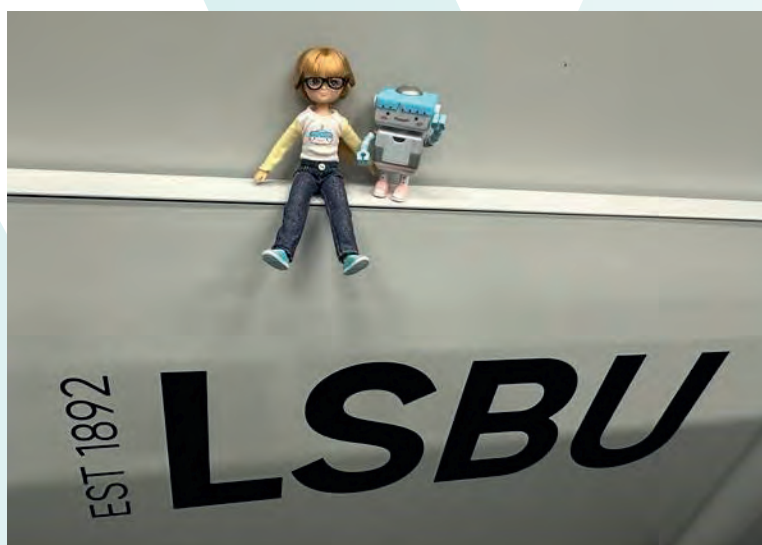
The winners have already been presented with their awards and a full write up on the competition will be provided in a future Acoustics Bulletin article.

So as you can see, there is a lot going on and lots of things to get excited about for 2025. Please drop us an email if you would like to be involved at STEM@ioa.org.uk ©

Lottie at St Oscar Romero School, doing the 'You're Banned' STEM activity



Lottie at the BS4142 Conference at Bletchley Park, testing out an enigma machine



Lottie at the BS4142 Conference at Bletchley Park, testing out an enigma machine



Sound Masking

from aet.gb ltd

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.

An investment in increasing privacy of speech is certainly cost effective, with Sound Masking one of the easiest ways of achieving this aim. Sound Masking systems along with acoustic panels and acoustic door seals are increasingly used to achieve the desired level of privacy by a number of our major clients including:

- Vodafone World HQ
- Procter & Gamble
- Swiss Re
- Mobil Exxon HQ
- Elizabeth Arden
- Barclays Bank
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Sound Masking is also known as sound conditioning or white noise systems



IOA and NAS work towards a better sounding world

The John Connell Awards 2024 were hosted by The Lord Balfe, on behalf of the Noise Abatement Society, and took place at the Palace of Westminster 16 October 2024.

By Gloria Elliott OBE, CEO Noise Abatement Society, Chair and Co-Founder Quiet Mark



Above:

Presentation at the John Connell Awards 2024 from the Noise Abatement Society to the Institute of Acoustics celebrating the IOA's 50th anniversary. Pictured (L-R): Alistair Somerville (IOA Immediate Past President), Gloria Elliott OBE (NAS CEO), Jo Webb (IOA former President), David Waddington (IOA President), Gabrielle Edwards CBE (Director for Environmental Quality, Defra) and Stephen Turner (IOA former President)

The Noise Abatement Society was delighted to celebrate the Institute of Acoustics' 50th anniversary at the John Connell Awards.

Commemorating the IOA's golden anniversary at the event, Gloria Elliott OBE, CEO of the NAS, said: "It is fitting to reflect on the IOA's significant journey and work with the Noise Abatement Society. Over the past five decades, the Institute of Acoustics has evolved from a collection of specialist groups into a unified profession, embodying the culmination of decades of development in the field of acoustics.

"As documented by the IOA, its origins date back to the post-war

period when acoustics lacked a unified representation. Visionary figures such as Alan Pickles and Bill Allen were instrumental in forming the Acoustics Group under the Physical Society, which eventually laid the foundation for what is now known as the IOA. Their efforts brought together diverse professionals including physicists, engineers, musicians and architects, fostering collaboration and advancing the science and application of acoustics.

"Over the last decade in particular the Noise Abatement Society has had the privilege of working closely with the Institute

of Acoustics and has witnessed firsthand their unwavering commitment to innovation and excellence in acoustics. Their sponsorship of the Innovation Award at the annual John Connell Awards over several years is but one example highlighting the IOA's dedication to championing the ever evolving state of the art of what is possible in the field.

"This celebration not only marks 50 years of the IOA's excellence and contributions to the multi-faceted world of sound but also marks the ongoing collaboration between our two organisations, united in the pursuit of a better sounding world." 



Isolation Solutions for a quieter world



Machine Mounting



Movement Bearings



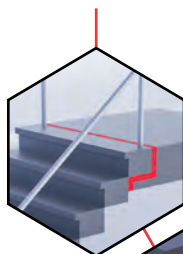
Room in Room



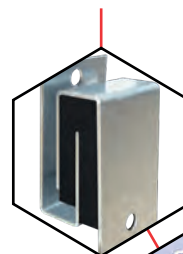
Structural Decoupling



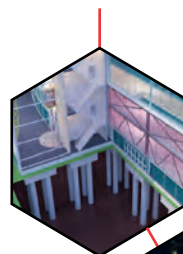
Low
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Stairwells



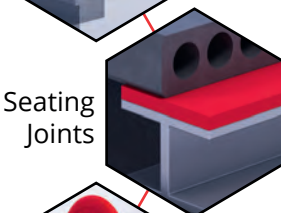
Walls



Foundation
Isolation



Heavy
Duty



Seating
Joints



Ceilings



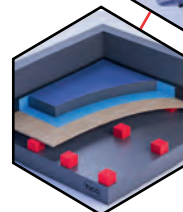
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EARLY CAREERS GROUP

The benefits of IOA student membership

The IOA offers **free** student membership to anyone considering a career in acoustics and is interested in learning more about it.

By Zach Simcox, IOA Early Careers Group Chair

The benefits of becoming a student member include:

- great networking opportunities;
- discounted attendance at paying events;
- invitations to free IOA branch meetings in your area;
- monthly IOA e-newsletter;
- online access to IOA's Acoustics Bulletin magazine; and
- access to IOA specialist group and branch videos.

Joining the IOA as a student member is a great way to get involved, make some useful contacts, give yourself the best professional opportunities and make an impact on your future career.

As we open our doors to welcome all new students, we would also like to invite them to join the IOA Student Representatives Working Group. This group has been created specifically to offer students an opportunity to get involved with the IOA at an early stage and provide comments, opinions and ideas for developing IOA events and other plans from a students' perspective.

What you could be involved in

Earlier this year two Student Representatives, Ellen Crockett and George Mackenzie (University of Salford) hosted an event called *Engaging undergraduate students in professional development*.

It allowed participants to gain insights from both academic and industry professionals, and the lineup of speakers included representatives from the IOA and UKAN+, who shared valuable perspectives on the various benefits of involvement with these organisations, along with speakers from industry and research. It was such a successful, well attended event, that we hope to organise many more like this in the coming year, and we are always open to ideas for topics to tackle.

The more the merrier

The IOA Student Representatives Working Group is dedicated to encouraging greater engagement between university students and the wider UK acoustics community. The group meets throughout the year (in-person or online) to discuss acoustics and explore opportunities for networking and cooperation, as well as developments in the IOA as an organisation. So if you are a student and this sounds like something you would like to get involved with – please contact us at earlycareers@ioa.org.uk ☺

Did you know you can become a Student Rep for the Institute of Acoustics?

You will have the opportunity to bring a unique voice to the IOA of those who are just starting their journey in the world of acoustics and be supported by IOA members in your work as a Student Rep.

Interested? Want to know more?

Watch the video at IOA.org.uk/studentrep
Contact earlycareers@IOA.org.uk

You will gain valuable benefits such as:

- Connecting with students in the UK and beyond
- Reduced fees for conferences
- Participating in your local branch
- Gaining experience of how professional bodies run
- Organising events such as talks and demos from consultants and manufacturers, and visits to sites
- Get positive experience that will make your CV stand out from the crowd.

Get involved and make some noise!

Did you know you can become a Student Rep for the Institute of Acoustics?

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Scan for more
information.



Above: Louise Beamish, new Chair of the Association of Noise Consultants

Acoustics professional elected to ANC leadership role

Louise Beamish, Director of Acoustics at WSP, has been appointed Chair of the Association of Noise Consultants (ANC).

Elected to the role at the ANC's recent AGM, Louise takes over from Russell Richardson, and will serve a two-year term of office.

Louise brings a wide range of experience to the leadership position, built up over decades in the acoustics sector working on a variety of projects from small urban developments through to large, strategically important schemes.

Her specialism at WSP includes environmental acoustics with a particular focus on noise and vibration monitoring, prediction, computer modelling and assessment, within industrial, commercial, transportation, industrial, retail and the renewable energy sectors.

Louise has also provided expert evidence at public inquiries and hearings and throughout her career has supported the wider industry with roles at the IOA as well as leading the ANC's marketing activity as a board member.

Louise said: "I am really looking forward to the term of office and continuing to progress the good work that is already happening across our membership body."

"Russell has made an incredible contribution in his role of Chair, and we have members committed to making a positive difference to the ANC and the wider acoustics sector overall."

"I am particularly keen to continue our collaboration with other technical institutions and trade bodies where there is a desire to further our approaches to technical issues, and to continue raising the profile of the ANC generally."

Phil Dunbavin, President of the ANC, added: "Louise brings a wealth of experience and enthusiasm, and we are delighted to welcome her to the role."

"The Board would also like to thank our previous Chair, Russell Richardson, for his hard work and commitment to the ANC." ©

Launch of the ADO Noise Guide and changes to BS 8233

One-day conference on the launch of the Approved Document O Noise Guide and updates on the effect of changes to BS 8233.

Wednesday 27th November

15 Hatfields, London, SE1 8DJ

The event will cover:

- Launch of the Noise Guide to ADO
- Overheating assessments to ADO
- Consultation preview - major updates to BS 8233
- Proposed residential design guidance
- Sound insulation guidance
- Proposed sound absorption guidance

Places are limited. For more information and to book, see: www.theanc.co.uk/events

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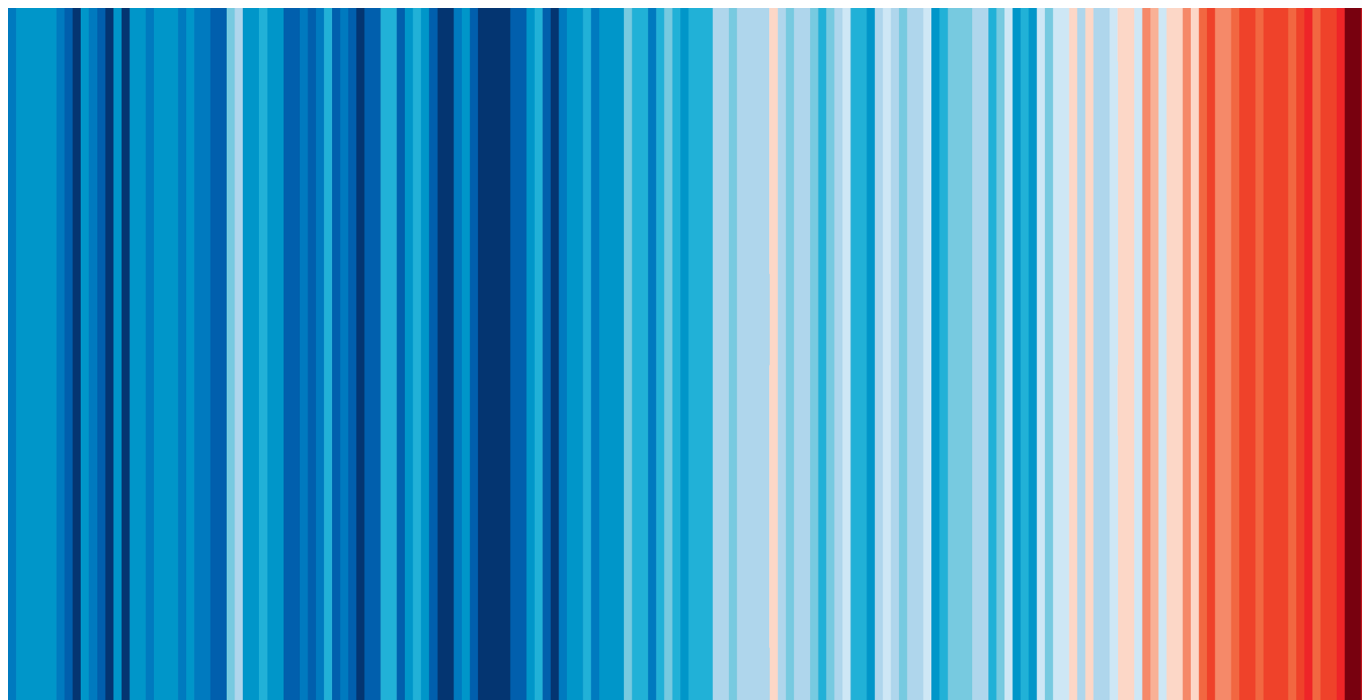


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Sustainability update: IOA takes a leap forward

As we celebrate the 50th anniversary of the Institute of Acoustics (IOA), we are pleased to report significant progress in our commitment to sustainability, suggesting it is the end of the beginning of our journey as a mature organisation.

By Peter Rogers, Sustainability Lead for IOA, Sustainable Acoustics, and Richard Grove, Sustainable Design Task Force Chair



Publications by the Building Acoustics Group¹ and their White Paper² show the emergence of guidance for members. Recent developments at the IOA 50th Anniversary Conference in Manchester and the latest IOA Council meeting have set the stage for a promising transformative journey towards a more sustainable future in our industry, with acoustics playing a major part.

Above:
© National Centre for Atmospheric Science (NCAS) at the University of Reading 2018 SDTF Annual global temperatures from 1850-2017

The Imperative for Change (the big picture)

With less than six years to 2030 (one of the key milestones for climate change) there is no time to waste and the need for action is now.

This might include:

- our human-centric approach to acoustic design requires a rethink to be more inclusive of all species and to create regenerative outcomes; and

- humans are part of nature, and our global systems' health is reliant on independency and is showing distress and breakdown. Engineers (meaning 'ingenious' from the Latin 'ingeniarius') need to turn away from the mechanised past and face the challenge to live up to inspirational integrated solutions which will deliver regeneration to this ultimate system. Acoustic engineering is perfectly placed to do this, provided the interdependence of life and other disciplines is recognised.

References

- 1 Building Acoustics Sustainably: Practical Considerations | Institute of Acoustics (ioa.org.uk)
- 2 White Paper, BAG

As acoustics professionals, we have a unique role to play in building a sustainable future and the IOA has a crucial role in leading the way. Action by all is needed, with an initial focus on net zero and a rapid shift to a model for sustainable business and shaping future environments in a restorative way.

Historic decision at Council meeting (item 24.46.10)

In a landmark decision, the IOA Council Trustees have committed to embarking on the journey to net zero, exploring the implications of aligning with Government targets. This decision, made in the IOA's 50th Anniversary year, marks a pivotal moment in our Institute's history, turning towards a positive future in which generations of acousticians are yet to come. To support this commitment, an advisory group, to be called the Sustainability Advisory Group (SAG), will be formed to develop a detailed route map for achieving our sustainability goals and determine what it would take to deliver that in practice.

From SDTF to SAG: A new chapter

The Sustainable Design Task Force (SDTF), established in 2015 and rebooted in 2023 has played a crucial role in bringing sustainability to the forefront of IOA's agenda again. Led by Richard Grove as Chair, the SDTF formed supported by Barry Jobling, Momo Hoshijima, James Bligh, Ben Fenech and Angela Lamacraft. It again had a planned 18-24 month remit to reinvigorate sustainability efforts within the IOA in the following areas:

- how the IOA is doing against the five areas identified by the SDTF in 2015;
 - legacy reporting on sustainability post Inter-noise 2022;
 - engagement with Edinburgh Science, Net Carbon Toolkit and leading IOA through it; and
 - engagement with the ANC working group on sustainability.
- 20 months on, the key achievements of the SDTF include:

- production of a strategy document (2023-2025) – published May 2023;
- assessment of IOA's progress – to be published in the final report;
- reporting to IOA Council and preparation of recommendations for Council on a road map for the way forward; and
- engagement with external sustainability professionals to help establish the beginnings of a roadmap.

Below:
SDTF stand at Acoustics 2024 in Manchester



As the SDTF concludes its work, once again the SAG will take up the mantle to drive sustainability initiatives forward with urgency.

Sustainability at the 50th Conference

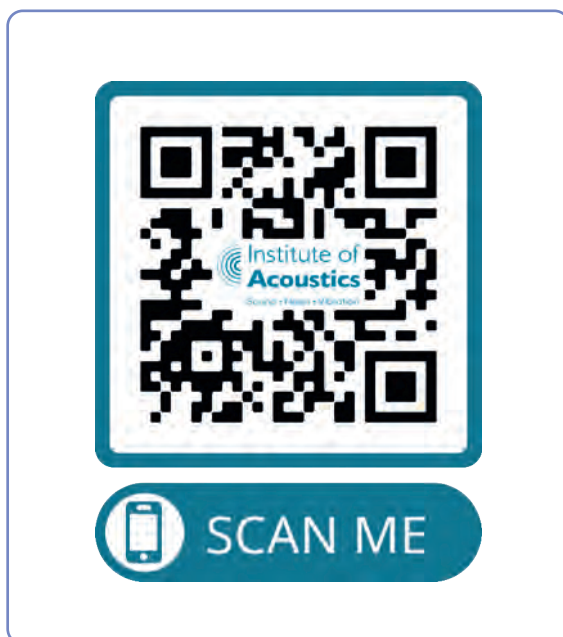
The SDTF organised a stand at the recent IOA conference in Manchester, providing a focal point for members to discuss their sustainability journeys and challenges. Additionally, a survey (see the QR code on this page) was conducted to gather insights on members' needs and expectations regarding sustainability. The results of this survey will inform the inaugural meeting of the SAG as well as papers from the conference by Ben Burgess and Barry Jobling in the UKAN+ conference session. The opportunity to collaborate with UKAN+ on sustainability was also stated as a goal by incoming IOA President, David Waddington.

Looking ahead

The formation of the SAG and the IOA's commitment to net zero represent a significant leap forward for our industry.

We encourage all members to follow these developments closely and align their practices with the IOA's sustainability goals. Together, we can make a meaningful impact and contribute to a more sustainable future.

Stay tuned for further updates as the SAG begins its work and outlines the path towards net zero for the IOA and communicates how members can keep pace. 📺



Above:
Scan the QR to take part in the survey, and let us know your thoughts on acoustics and sustainability, and how the IOA can assist you best

Have our standards slipped?

Are your client reports vulnerable to challenge because the Class 1 sound level meter used may not be Class 1? Can the consultant's report you're reviewing be disregarded because the equipment listed is not Type Approved? Are your sound insulation tests not meeting the required standard because the instruments used are not BS EN 61672 series compliant?

By Charles Greene, NTi Audio

Scenarios such as these regarding questionable measurement integrity are increasingly likely in recent years as the clarity around what is and what isn't Class 1 has become clouded. This article attempts to clarify the requirements of the sound level meter standard series BS EN 61672 in simple terms, how to check if your equipment is indeed Class 1 and the benefits in general of meeting the requirements of the sound level meter standard.

Class 1 sound level meters, why are they important?

The technology which offers precision grade measurements in a hand-held sound level meter or in a fixed noise monitor, has been available for many years. Consequently, the national and international standards to which we work in order to carry out noise surveys or acoustic compliance testing often require this grade as a minimum standard of measurement accuracy.

In some instances, a maximum permitted sound level is incorporated into a legally binding agreement where the agreement may well stipulate that a Class 1 and calibrated instrument must be used to verify compliance with the permitted sound level. In such cases nothing less than Class 1 will do.



Above: Is my sound level meter truly Class 1?

One of the benefits of using Class 1 sound level meters which are fully compliant with the sound level meter standard is that regardless of the model of sound level meter used, from whichever manufacturer, the measurement results are consistent.

An example might be two measurement professionals tasked with assessing the noise level from an air handling unit on different days and under identical operating conditions. Both use Class 1 and calibrated instruments for their measurements. If a difference in measurement result is evident between the two surveys,

then this could be attributed to the variability in background noise, or a change in the prevailing weather conditions or possibly something has changed in the air handling unit load or duty cycle but the difference cannot be attributed to any variability in the Class 1 and calibrated equipment as this is accepted to be correct. The ability to compare measurements between different meters and different practitioners is often taken for granted and is hugely beneficial but it is only possible if the equipment is unquestionably Class 1 and calibrated. **P26**



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for architectural acoustics
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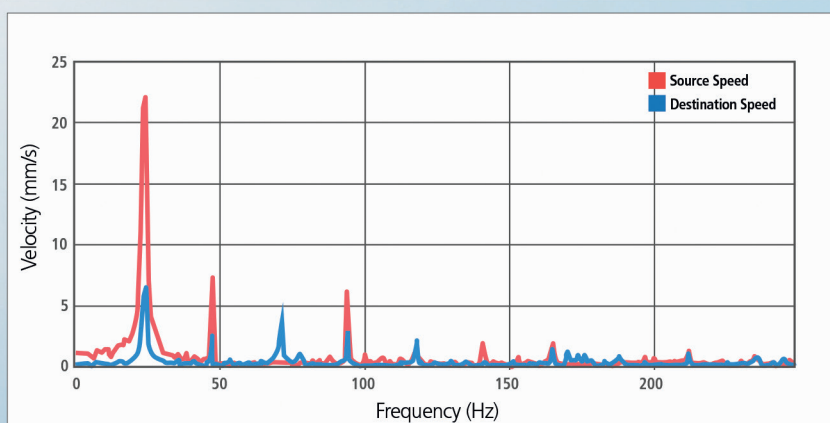
This wireless accelerometer has been developed to work in conjunction with the **AMC MECANOCAUCHO** free of cost mobile app 'Vibration Isolator Pro' for Android and iOS. The app **guides the user step by step** on how to create a **vibration analysis** in a **quick and simple** way. A **summary report** is provided via email and the raw data can be downloaded for further analysis.



ADVANTAGES

- 1 Compact design
- 2 Magnetic mounting
- 3 3 axis accelerometer
- 4 DC to 500 Hz useful bandwidth
- 5 Low noise
- 6 iOS and Android compatible

CHECK THE RESULTS AND RECEIVE THEM BY EMAIL



STEP BY STEP DEMONSTRATION VIDEO





Left: Class 1 and calibrated instruments offer a high degree of precision

Overview of the sound level meter standard series BS EN 61672

The sound level meter standard series BS EN 61672 is an impressive body of work but is not an easy read for measurement practitioners or instrumentation experts. It 'weighs in' at almost 110 pages over three sections with numerous extensive formulae and many technical references to electronic specifications, as might well be expected in an instrument standard.

A helpful overview was published by the IOA Measurement and Instrumentation Specialist Group in the September/October 2019 issue of *Acoustics Bulletin* titled *A guide to sound level meters*. This excellent article covers in a good level of detail the standards, the importance of pattern evaluation and instrument calibration along with a summary of common misconceptions relating to the standards. The guide was prompted by a growing influx of low-cost sound level meters into the UK and Ireland claiming Class 1 performance but falling short on various tests during a standard sound level meter laboratory calibration.

What follows is a short and simplified summary of the key components of the standard.

BS EN 61672 – Part 1 The specification for a sound level meter. This is the recipe for manufacturers to follow in order to design and build a Class 1 or Class 2 sound level meter. Detailed over 50 pages this document specifies the linearity performance, frequency

weightings, time weightings, overload and under-range indication, EMC emissions, response to mechanical vibration and many more specification requirements.

BS EN 61672 – Part 2 Pattern Evaluation also known as Type Testing. As you might imagine Part 1 of the sound level meter standard is comprehensive, wide-ranging and detailed. To ensure that the manufacturer has interpreted the requirements correctly and implemented them reliably in their sound level meter design, the manufacturer has to send a number of instruments to an independent Type Testing organisation such as PTB in Germany or LNE in France for an extensive programme of specification verification. Testing takes many weeks, requires

significant technical support and verifies every aspect of the meter's performance against Part 1 of the standard. A Pattern Approval (Type Approval) certificate is issued by the independent organisation to the manufacturer on successful completion of the process.

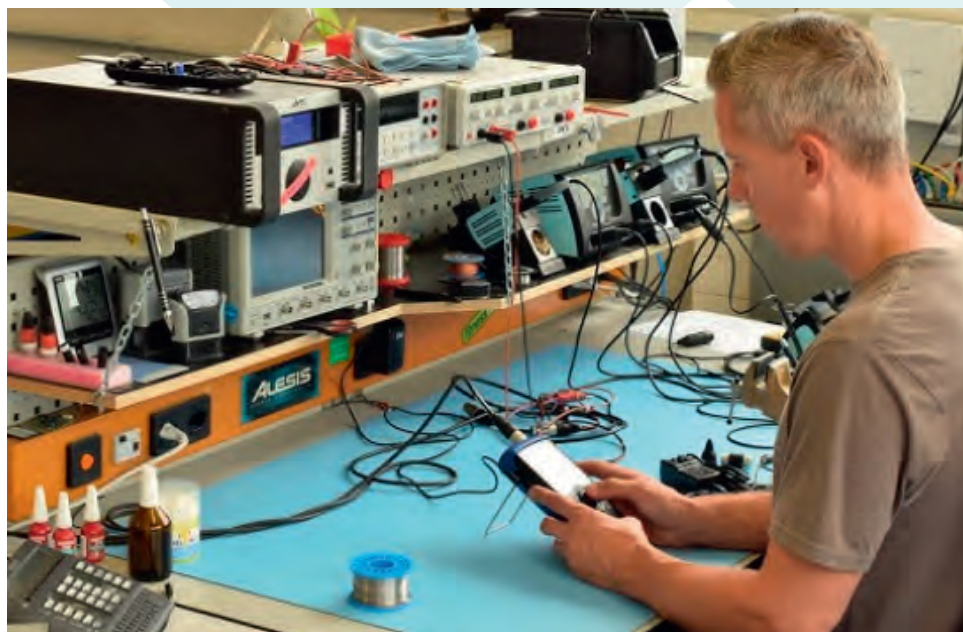
BS EN 61672 – Part 3 Periodic Tests often referred to as Calibration.

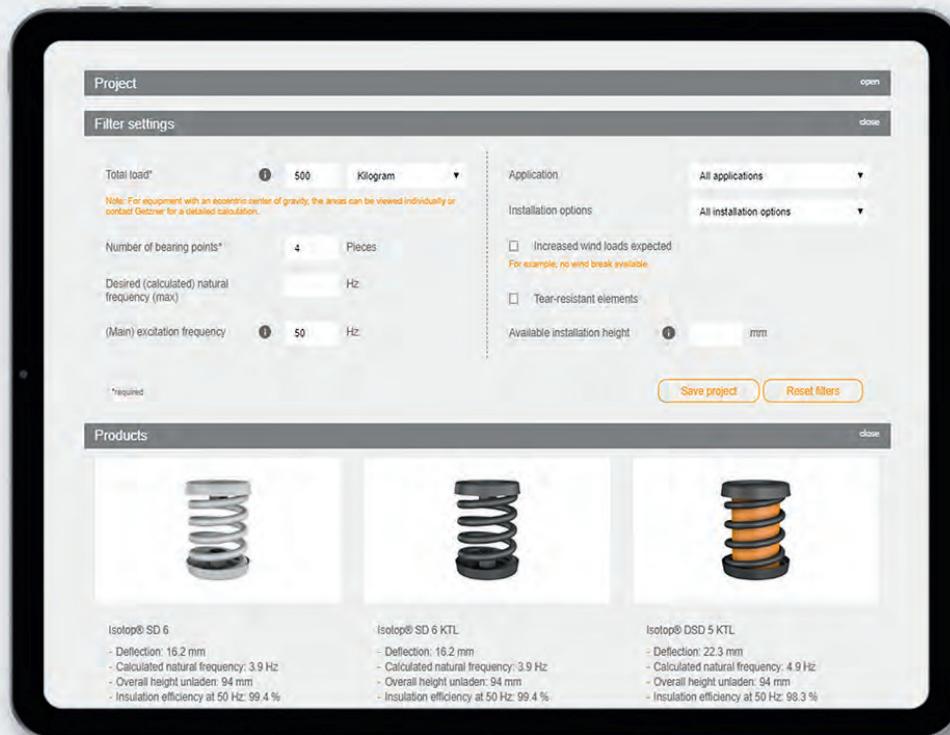
This details the periodic testing (calibration) of a number of key parameters of a sound level meter in order to verify that 'wear and tear' have not taken their toll on the performance of the meter such that it no longer meets the requirements of Part 1 of the standard. Calibration is most certainly not an alternative to Pattern Evaluation as it takes at most two hours to test the key parameters of the meter whereas Pattern Evaluation takes many weeks testing every aspect of the sound level meter operation.

When a sound level meter model has been designed to Part 1 of the standard and awarded a Pattern Approval certificate for successfully meeting all the requirements, then and only then can that model of meter be referred to as Class 1 according to series BS EN 61672.

Any meters which are described as Class 1 without having been Pattern Evaluated have an unverified claim to Class 1 performance and therefore unproven measurement integrity despite the meter possibly having a calibration certificate. **P28**

Below: Laboratory calibration in accordance with Part 3 of BS EN 61672





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They have been used since 1969 to reduce vibrations and noise, improve the service life of bedded components and minimise the need for maintenance and repairs on machines. Our mission at Getzner is to make a valuable contribution to improving the quality of life and reducing noise pollution for people and the environment.



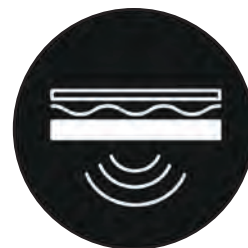
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The calibration certificate must state if the meter has not been Pattern Evaluated to Part 1 of the series BS EN 61672 standard in order to provide context to the calibration.

The Pattern Approval process

The Pattern Approval process is rigorous and some instruments simply don't pass, with some having to be subjected to a design rework while other manufacturers won't revisit the process following an unsuccessful Pattern Evaluation.

The Type Testing process is not unique to sound level meters. The car industry has a similar type of requirement. For example, a car manufacturer planning to introduce a new model must subject their design to a rigorous testing programme which tests every aspect of the car's operation and build including physical size, emissions, electrical safety, crash testing and many other checks. Once approved for road-use the car must be periodically verified, i.e. MOT, to ensure that wear and tear on the vehicle hasn't compromised the car's roadworthy status. The notable difference between the car industry and the sound level meter industry is that successful Type Testing is mandatory before a car is allowed on the roads whereas for sound level meters it's the equipment purchaser's

responsibility to ensure that the meter is Class 1, so it's very much a case of 'buyer beware'!

How to check your meter is indeed Class 1

Peace of mind knowing your sound level meters are Class 1 and fully compliant with the sound level meter standard is reassuring and important regardless of whether your equipment is from a well-known manufacturer or from a lesser-known brand.

There are a number of ways to verify the Class 1 credentials of a sound level meter, a few of which are outlined as follows.

PTB in Germany has been, for many years, the organisation where most sound level meter manufacturers send their meters for Pattern Evaluation in accordance with IEC 61672:2. Meters which are successfully approved are issued with a Type Approval certificate and listed on the PTB website with all the other approved meters, which is now an extensive list going back to 1995. (See more here: <https://tinyurl.com/ptbdeslm>).

LNE in France also publish the full list of instruments which they have successfully Type Approved here: <https://tinyurl.com/lneSearch>

Contact the manufacturer and request a Type Approval certificate for the specific model of meter. Many manufacturers will publish

Type Approval certificates on their websites as it's often considered an important item of documentation relating to the credentials for the meter. The certificate may often not be in English but reference to the sound level meter standard IEC 61672 should be clear.

Contact an accredited sound level meter calibration laboratory to verify Class 1 credentials. The accredited processes of a calibration laboratory require calibration engineers to have a depth of knowledge for a wide range of sound level meter models including the associated Pattern Evaluation status.

In conclusion

Class 1 is a term born out of the sound level meter standard series BS EN 61672. To be a Class 1 device the meter must be designed and built to Part 1 of the standard and independently Pattern Evaluated in accordance with Part 2. Part 3 of the standard outlines the periodic tests of the meter more commonly referred to as calibration and is intended to check key parameters in the measurement chain to verify that the measurement performance is still accurate as per the specifications of Part 1.

Periodic testing or calibration, is not an alternative to Pattern Evaluation.

A high degree of measurement integrity is key to many acoustic measurement applications and the sound level meter standard BS EN 61672 serves to offer a framework for repeatable and accurate measurements which are traceable to national and international standards.

So, when taking your next set of measurements do take care that you're not vulnerable to challenge for using equipment which may not have been Pattern Evaluated as Class 1 and that you can still post photos on social media of your sound level meter in action safe in the knowledge that there is no question of the meter's credentials. ☺

Below: PTB Type Approval certificate for a Class 1 meter





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Laboratory measurement of sound transmission: Improving accuracy at low frequencies

High uncertainties have long been accepted when testing sound transmission of building elements at low frequencies. This is far from ideal in a landscape with abundant low frequency sources like air source heat pumps and ventilation units, noise from aircraft and road traffic, and wind turbines.

By Claire Lomax, Acoustics Laboratory Director

Below:
Validation performed in the transmission suite at the University of Salford using a simple dual leaf plasterboard partition with mineral wool infill

In the laboratories at the University of Salford, Dr Joshua Meggitt, supported by Danny Wong McSweeney and Toby Clarity, have been putting a new *in-direct method* through its paces that avoids diffuse field assumptions and aims to bring those low frequency uncertainties right down.

Measuring sound transmission of building elements – partitions, doors, windows etc – follows the well-known methods described in ISO 10140. Carried out in laboratory conditions using source and receiving reverberation chambers, the approach relies on the assumption that the measurements in both chambers are carried out in a diffuse field.

By definition, that means we expect that all microphone positions in the incident source room and all microphone positions in the receiving room are measuring the same thing. If they are, we can expect a reliable estimate of incident and radiated sound power, and so an accurate estimate of sound transmission. This is a fair assumption at mid and high frequencies. But at low frequencies the assumption breaks down as modal effects of the rooms start to increase in dominance. Well separated modes lead to large variations in the sound pressure level across the space. This inevitably leads to a high measurement uncertainty at low frequencies – not ideal for modern requirements where low frequency transmission from sources like air source heat pumps can be all important. For this reason, there is great interest in alternative methods, particularly suited to low frequencies, that avoid the uncertainties associated with the diffuse field assumption. Over the past year, our laboratories have been working towards developing a new *in-direct method*, that avoids the diffuse field assumption and its associated uncertainties. **P32**





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engineering a quiet future



Above: Microphones positioned randomly in the receiving room at the University of Salford. Plasterboard partition located in aperture

Inspired by an earlier method involving laser doppler vibrometry¹ the proposed in-direct method leads to a practical measurement routine that can be performed with standard acoustic test equipment. Results demonstrate that the method successfully avoids the effects of room modes, whilst providing transmission loss estimates that agree with ISO 10140 in the mid frequency range.

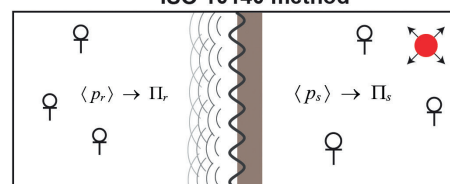
Another important feature of the in-direct method is that the volume velocities obtained are independent of any modal characteristics of the receiving room. In the process of relating the receiver room pressure to the volume velocities, the characteristics of the room (i.e. its modes) are effectively 'removed'. This means the effects of low frequency modes are avoided and the result is a *free field* transmission loss.

The full theory of the method was presented at the IOA conference in Manchester in September² alongside

an experimental validation, performed in the transmission suite at the University of Salford by MSc student, Toby Charity and supported by Dr Danny Wong-McSweeney, the lead of the university's Centre for Acoustics of the Built Environment.

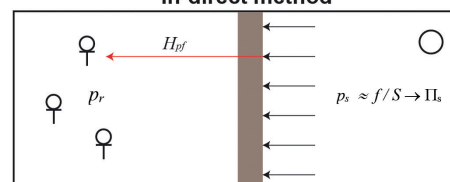
The in-direct method has proved itself a practical method that can be readily incorporated into laboratory measurement routines and the University of Salford laboratories are starting to offer this as a measurement solution to clients requiring more from their low frequency sound transmission results, both in terms of accuracy and resolution. This has large implications for the future measurement of low frequency sound transmission in a world of low frequency noise. ☺

ISO 10140 method

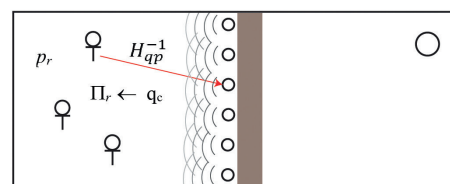


Use averaged sound power levels to estimate incident and radiated power

In-direct method



Step1: Using measured transfer function H_{pf} predict p_r due to synthesised diffuse field p_s with known power Π_s



Step2: Using measured transfer function H_{qp} determine volume velocities q_c from predicted pressure p_r and calculate radiated power Π_r

Figure 1 - Summary of in-direct method vs ISO 10140

References

- 1 N B Roozen, Q Leclerc, D Urbán, T M Echenagucia, P Block, M Rychtáriková, and C Glorieux. Assessment of the airborne sound insulation from mobility vibration measurements; a hybrid experimental numerical approach. *Journal of Sound and Vibration*, 432:680–698, 2018 2
- 2 J W R Meggitt, T Charity, Acoustics Research Centre, University of Salford, UK. Towards an indirect method for low frequency sound transmission. *Proceedings of the Institute of Acoustics, Conference 2024 (Manchester)*



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The 2020s

This is the last issue of 2024, our 50th anniversary year, and we have reached the 2020s in our series of IOA history features. This one brings us bang up-to-date and wisely, contains no promises or predictions for the next 50 years. But we sally forth into the next half century with optimism, drive and ambition for the Institute and all its members.

One of the most notable recent achievements has been the formation in 2017 of the IOA's

Parliamentary Liaison Group (PLG), which successfully engages with Government to raise the profile of acoustics and the IOA with politicians.

Prior to this and even though sound, noise and acoustics pervades almost every aspect of daily life it was a topic that didn't benefit from much discussion, but with concerted and targeted action, the PLG is now enjoying great success and the importance of acoustics is creeping up the agenda with the IOA increasingly becoming the first port of call for expert advice.

The progress of PLG

In 2017, Peter Rogers (now PLG Chair), Colin Grimwood, Stephen Turner and Richard Cowell, formed the IOA's PLG to raise the profile of acoustics in Government and initially, to deal with the potential fallout from the Brexit vote when there was concern that valuable noise management regulations might be repealed.

Work of the PLG began with the development of an IOA Noise Management manifesto and identification of opportunities for the IOA to attend meetings of various parliamentary groups. An early success was with the All Party Parliamentary Group on Healthy Homes and Buildings (APPG-HHB).

As implied by the name, APPGs comprise MPs and Members of the House of Lords across the political divide, who have an interest in a particular topic.

The APPG-HHB was seeking evidence about healthy homes, so the IOA submitted evidence and was subsequently called to give oral evidence to that group at the Palace of Westminster in December 2017. Consequently, the IOA along with the ANC appeared before the APPG and several of the points made were reproduced in the APPG-HHB White Paper published in the following October.

Within a couple of years of the PLG's formation, the IOA was being invited to events in Westminster and started to build on increasingly regular mentions of acoustics in debate sessions. As a result of this significant progress, the IOA hosted a meeting of the Parliamentary and Scientific Committee (also an APPG) in February 2020, where Ben Fenech presented on the health effects of acoustics, Chris Barlow on acoustics education and Stephen Turner on noise management policy. This was followed by a dinner at which the cross-examination from MPs and members of the House of Lords really got underway.

Despite the pandemic, the PLG sought to expand membership of the group and to facilitate the production of briefing notes covering a range of topics. Some of these have been prepared in liaison with CIEH, including on air

source heat pumps. Other subjects have included drones, noise cameras, low frequency sound and the use of green spaces in noise management. (<https://www.ioa.org.uk/publications/briefingnote>).

The work of the PLG enables the IOA to respond to Government consultations. Many members of the IOA are involved in generating those responses, with the various specialist groups carrying out the main work, all under the auspices of the PLG.

2023 was the most successful year so far for the PLG as it gave written evidence to the House of Lord's Science and Technology Committee on the health effects of noise. Subsequently, the IOA (represented by Peter Rogers and Stephen Turner) was invited to give oral evidence. A month or so later Peter and Stephen, along with Rosie Pitt of the IOA's Welsh Branch, gave oral evidence to the Welsh Senedd about their proposed Air Quality and Soundscapes Bill, which has now become law.

The PLG represented the IOA at a debate on noise in the Grand Chamber of the House of Lords at the Palace of Westminster in 2024, an indication that the IOA is now recognised as the experts when it comes to matters of sound, noise and health.



Above:
Stephen Turner, IOA President 2020-2022

Past Presidents

Stephen Turner, 2020-2022

On 12 March 2020, the IOA held a workshop to discuss potential changes to the methodologies contained in CRTN¹ and CRN². The venue was a hotel in Milton Keynes close to the relatively new IOA headquarters. As the date of the workshop approached, the news bulletins were increasingly filled with concern about a virus spreading from the East. It then emerged that several delegates from larger companies were being prevented from travelling because of concerns about infection and consequently thought they would have to miss the event. However, those responsible for setting up the new IOA HQ building had had the prescience to include what was then the relatively novel Zoom technology. So the workshop continued, with the presentations being held in the HQ meeting room with delegates being either online or in person. This was the IOA's first hybrid event, held just 13 days before lockdown.

There was an immediate concern regarding the potential impact of the pandemic on the IOA and particularly its finances. To an extent we were lucky insofar as the bulk of our 2020 subscriptions had been paid so we had revenue. But the education offering was disrupted and, of course, we did not know how long the pandemic would

last and whether members would or could rejoin in 2021. Furthermore, we were faced with many members on furlough and huge uncertainty of how matters would pan out for us (let alone the harrowing events that were occurring in hospitals and care homes).

It became clear that the IOA had a responsibility to maintain contact with its members and so the first Members' Forum meeting was held in early April 2020. Even then contacting our membership was difficult because, for some, the IOA only had the work email address and the rules of furlough meant that those addresses were not accessible by those furloughed.

Members' Forum meetings

The Forums proved to be a great success. Occurring weekly, there was no specific agenda, just a chance for members to speak to each other. It did not take long for themes to emerge including how to undertake baseline surveys in lockdown when the baseline conditions were not typical and travel was not encouraged. A guidance document was produced jointly by the IOA and ANC, which had to be revised several times over the ensuing months to reflect how the travel rules changed. The Quiet Project³ was also born at the Forum meetings, and there were some fascinating moments such as when two eminent acousticians discussed the issues concerning the noise floor of sound level meters. It was the sort of conversation you could imagine them having in a bar, but this time some 50 people listened intently, learning from these experts.

We also heard from some members who said that they had never felt as involved with the Institute as they did then. We soon realised that there are many members who cannot attend an evening branch meeting because of the distance they would have to travel. It became clear that once we were through the pandemic, we had to run our meetings differently.

Acoustics 2021

As we emerged from the pandemic, we felt our way back into in-person meetings with Acoustics 2021 which, through the technical expertise and hard work of some of our members, operated both regional hubs where a few delegates could attend in person but also online. These hubs were interactive and all participants could ask questions of the speakers regardless of their location.

Throughout that period, there had been a team organising Inter-Noise 2022 which the IOA had been selected, a few years before, to host. The event was a real return to in-person meetings (although still with a hybrid element) with around 1,000 delegates from across the globe converging on Glasgow in August 2022.

Through the hard work of the IOA Council and the headquarters staff, our membership held up and the IOA finances emerged from the pandemic intact.

As a result of the lessons learned from the pandemic, the IOA now offers a wide range of in-person, hybrid and online events. It was also realised that meetings previously held in the evening did not have to be, if they were online. So events now occur at different times of the day to enable as many members as possible to enjoy them.



Above:
Alistair Somerville, IOA President 2022-2024

Alistair Somerville – 2022-2024

As we conclude our 50th anniversary year, it's important to reflect on my presidency from 2022 to 2024. [P36](#)

References

- 1 Calculation of Road Traffic Noise
- 2 Calculation of Railway Noise
- 3 'The Quiet Project': a national noise survey written during lockdown by Stephen Dance (LSBU), Lyndsay McIntyre (KSG Acoustics) and Reuben Vazquez Amos (also LSBU)

This period was characterised by key milestones and strategic advancements aimed at enhancing our organisation's impact within the acoustics community and beyond.

Celebrating 50 years of progress

To commemorate our 50th anniversary, we launched specially branded editions of the Acoustics Bulletin, featuring reflections from past Presidents. The year-long celebration, guided by the 50th Anniversary Planning Group, was a resounding success. Our Branches and members took advantage of this opportunity to host IOA-supported events, fostering a strong community and collective identity.

Strategic planning for the future

At the start of my term, I presented a strategic plan outlining the future direction of the IOA. Adopted in March 2023, the plan focuses on enhancing governance processes, expanding our influence in governmental and public spheres, developing educational programmes and improving IOA member services. Principles of sustainability and EDI were confirmed as foundational to our decision-making. I am particularly pleased that on 5 September 2024, Council decided to form a Sustainability Advisory Group, with a remit to develop a route map aiming to achieve net zero by 2050.

Advancements in governance

Improvements in governance include enhanced operational efficiency by implementing an online management app for board meetings and the development of an IT-based document control system.

The creation of two Director posts will provide high level staff accountability and oversight for member services and education. Additionally, new 'Ministerial' oversight volunteer positions will streamline governance and decision-making, offering expert guidance in key priority areas of the strategic plan.

Enhancing educational services

Revitalising our educational services has been a top priority. Our strategic framework aims to expand our offerings, introduce flexible study options and reach new geographic areas. The establishment of an IOA 'Centre for Sound and Vibration Studies' will focus on delivering high-quality educational content that aligns with members' evolving needs.

Strengthening member services

Our member services remain the cornerstone of our organisation. The future appointment of a Director of Professional Standards and Member Services will strengthen our efforts to maintain high standards while providing essential support.

We have particularly focused on encouraging membership from academics and regulatory professionals. Initiatives have included the Research Grade of membership, and a new specialist group to address 'regulatory and enforcement' issues. A Renewable Energy Advisory Group has also been formed to provide a resource to address sustainability-related acoustics challenges.

Recognising the need for a robust online presence, we have approved a significant website redesign aimed at enhancing user experience. This initiative will provide personalised access to content that aligns with members' interests and serve as a platform for our educational services.

Expanding influence and engagement

We have actively sought opportunities to expand our influence in government and public policy. Participation in All Party Parliamentary Group meetings has allowed us to advocate for the inclusion of noise considerations in housing and planning policies.

We have benefited from increased global engagement through our VP International and look forward to this developing further. Collaborative

working with UKAN has provided a platform for innovation in acoustics research and opportunities to help shape future direction.

Achieving Royal Charter status

A pivotal moment occurred when our membership voted in favour of petitioning the Privy Council for a Royal Charter. This decision reflects our collective ambition and commitment to the future of the Institute.

Concluding thoughts

I am grateful for the dedication of our strategic leaders, members and staff, and am confident that the successes we have achieved together lay a solid foundation for the future of our profession and Institute.

Specialist Groups

As the IOA celebrates its 50th anniversary, its specialist groups have been looking back at key developments in their sectors over the past five decades and looking ahead to what the future might hold. In this issue, we look at the work within the Underwater Acoustics Group.

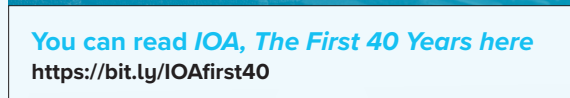
Underwater Group

By Kevin Hamson, Chair of the IOA Underwater Acoustics Group

We know more about the surface of some of the other celestial bodies in our solar system than we do about much of the Earth's deep seas. The IOA Underwater Acoustics Group (UAG) provides a specialist forum for all those scientists, engineers, oceanographers, biologists, academics and others, who practice in this fascinating field.

The UAG has been an active Special Interest Group of the IOA since the earliest years, having been formally inaugurated in 1974. Readers interested in the early years of the group can read the excellent summary provided by Paul Lepper for the 40th Anniversary publication.

Since 2014, the UAG has continued to thrive. It has organised numerous conferences and events.



The run of ICUA was extended this year to ICUA 2024, held at the University of Bath, from 17 to 20 June 2024. Again, the wide range of subject matter that makes up underwater acoustics was explored in a range of sessions including machine learning in underwater acoustics, bioacoustics and biosonar, marine renewables, underwater propagation, effects of sound on marine life, radiated noise from ships, polar acoustics, seabed and sediment acoustics, ambient ocean sound, target

Each year the UAG Committee has the privilege to consider nominations for the award of the AB Wood Medal, with our recommendation being passed up to the IOA Awards Committee. This prestigious award is presented every year to younger practitioners who have made particularly notable contributions to underwater acoustics. The award is made on alternate years to nominees from North America and Canada, and in subsequent alternate years to those from Europe. A feature of the ICUA conferences is that we get to both present the award to the recipients for the two years since the previous conference, and invite them to present an AB Wood Medal lecture. **P38**

This year's lectures came from David Barclay at Dalhousie University, Canada, and from H Özkan Sertlek of JASCO Applied Sciences, Netherlands. The former presenting on passive acoustic oceanography whilst the latter presented on sound energy density and its applications to underwater sound mapping. At ICUA 2022, the awards were presented to Megan Ballard and Sophie Nedelec.

Building on success

Whilst we can be pleased with the accomplishments over the past 10 years, looking forwards we should be ambitious. The intention is to continue building on the success of the ICUA conferences. Currently, these have all been held in the UK, but we are looking to Europe (potentially Norway) for the next conference in 2026. If the success continues to build, then maybe we could arrange a future conference in the US, Canada or indeed elsewhere in the world to underpin the truly 'international' part of the title. Likewise, the ongoing AB Wood awards cements the relationships forged between members in Europe and our colleagues in the US and Canada.

We have ongoing plans to build underwater acoustics into more educational and training programmes, including the IOA's Diploma programme potentially. In parallel, we also have a strong Early Careers Group, with enthusiastic support from committee and members. We anticipate this network to strengthen, providing the basis for industry, governments and academia to support the growing need for underwater acoustics expertise in marine conservation, offshore wind investments, fisheries and mineral extraction, making for a sustainable tomorrow. ☺

Some significant world events during the past 50 years

- In March 1989, Tim Berners-Lee, a British software engineer working at the European Particle Physics Laboratory (CERN), wrote a paper proposing an 'information management' system that became the conceptual and architectural structure for the world wide web.
- In December 1991, the Soviet Union disintegrated into 15 separate countries, bringing an end to the Cold War and reformulating political, economic and military alliances all over the globe.
- At its launch in 2004, membership of Facebook was restricted to Harvard University students. By 2011 the network had grown so large, its population was being compared to that of a country. Today, it has more than one billion registered users and has ambitions to connect five billion people.
- The first-ever call on a handheld mobile phone was made by a Motorola employee, Martin Cooper, in April 1973 using a 2kg handset. In 1979, Japan became the first country to have a city-wide commercial cellular network. By 1993 the first SMS text messages were being sent and data services were beginning to appear on phone screens. From 1990 to 2011, worldwide mobile phone subscriptions grew from 12.5 million to over six billion, reaching about 87 percent of the global population.
- The CT (computerised tomography) scan was invented by Sir Godfrey Hounsfield FRS in the early 1970s at the EMI Laboratories in England. The technology uses x-rays and computer imaging to create cross-sectional slices of the body. It ushered in a new age in medicine and diagnosis.
- In 1996, Dolly the sheep was born on 5 July – she was the first mammal to be cloned from an adult somatic cell by scientists at the Roslin Institute, part of the University of Edinburgh. She was named after Dolly Parton and died just after her seventh birthday.
- In 2000, 191 nations made a promise to free people from extreme poverty and deprivation. This pledge turned into the eight Millennium Development Goals which embody basic human rights – the rights of each person on the planet to health, education, shelter and security.
- Wikipedia, a free, open-source, collaborative encyclopedia, was launched by Jimmy Wales and Larry Sanger in January 2001 and constitutes the internet's largest and most popular general reference work.
- The AIDS epidemic officially began in June 1981 when the US Centers for Disease Control and Prevention reported unusual clusters of a type of pneumonia in five homosexual men in Los Angeles. By August 1982, the disease was being referred to as Acquired Immune Deficiency Syndrome (AIDS). Since it was first identified, AIDS has caused an estimated 40 million deaths worldwide and a similar number are living with HIV globally. The development of antiretroviral drugs has meant that in many parts of the world HIV has become a chronic condition in which progression to AIDS has become increasingly rare.

A penguin is shown on the right side of the image, looking towards a pair of headphones in the center. Four callout bubbles with arrows point from the headphones to various text boxes. The background is a solid blue color.

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Current parliamentary and policy news

Mary Stevens supports the IOA to bring acoustics to the attention of policy makers, and in this article, she outlines the most recent responses the IOA has made to encourage effective noise management decisions that are balanced with societal needs.

National Planning Policy Framework

The IOA have responded to the consultation on the revision of the National Planning Policy Framework (NPPF) for England and wider planning policy. Our response states that the main noise management policies in place within the NPPF do work, advising that to be effective they must be implemented properly. In responding, we take the opportunity to draw attention to the work of the IOA and partner professional organisations to strike the balance between effective noise management and other societal needs, including producing guidance documents to promote good practice and good acoustic design, which includes the Acoustics, Ventilation and Overheating – Residential Design Guide, published with the Association of Noise Consultants (ANC). In addition, by the end of the year, the IOA and ANC expect to publish *Approved Document O – a Noise Guide*, to assist practitioners with the implementation of the overheating mitigation requirements. The IOA believe that following the guidance in both these documents would improve the quality of new homes, and urge government to add them to the reference list in the Planning Practice Guidance on Noise. Overall, our response reminds government that over 20 years ago, a Labour Secretary of State for the Environment described noise as the ‘Cinderella pollutant’, and that some would argue that this is still the case today. This includes the House of Lords Science and Technology Committee who described noise as the “neglected pollutant” in their recent report. We offer our support in addressing this.

Full response: <https://www.ioa.org.uk/publications/response-consultations>

National Highways report noise mitigation 2023-24

National Highways have published their annual report covering 2023-24, which includes an update on

programmed noise mitigation works in England, stating: ‘*We want our roads to work more harmoniously with the communities that live alongside them, and the built, natural and historic environments that surround them.*’ They have a KPI to reduce noise for 7,500 households in noise important areas as identified by Defra noise mapping, during the second road period 2020-25. The report states that during the last year road noise was mitigated for 990 households – exceeding their target of 829 for the year. Mitigation measures included noise barriers alongside junctions 21a to 26 of the M6 which supported 412 households, low noise road surfacing on the A27 at Portfield benefitting 128 households, and noise insulation in the form of acoustic glazing and ventilation were provided for 450 homes. At the time of reporting work has been undertaken covering 5,197 households of the 7,500 targeted for noise mitigation work by 2025. The work is funded by their environment and wellbeing fund.

Read the National Highways 2024 annual report here: <https://tinyurl.com/NHannualreport>

Ireland: Dublin area noise action plan

The City of Dublin and adjoining councils have produced a noise action plan for 2024-28 in line with requirements of the Environmental Noise Directive (END). The action plan is underpinned by a noise policy statement pledging a strategic approach to managing environmental noise. The principles of the statement are prevention of increasing the number of people exposed to undesirable levels of noise; protection of quiet and tranquil areas and mitigation of noise levels where they are potentially harmful. Noise maps have been used to identify priority areas for noise management and Candidate Quiet Areas. In acknowledging that most complaints about noise are usually related to local issues such as noises caused by neighbours,

entertainment or construction, Dublin City Council’s section of the plan includes measures to address local noise nuisances and complaints along with planning and development issues.

Read the Dublin Agglomeration Noise Action Plan here: <https://tinyurl.com/DublinEND>

Wales: Infrastructure (Wales) Act 2024

The Infrastructure (Wales) Act 2024 (the Act) establishes a single infrastructure consenting process for specified types of major infrastructure projects in Wales. A final consultation now covers the new consent regime, which, Cabinet Secretary Rebecca Evans says “provides a transparent, consistent and simple, yet rigorous process which enables local communities and stakeholders to shape developments and better understand how decisions affect them. The proposals are also intended to meet future challenges by being sufficiently flexible to capture the consenting arrangements for developing technologies and any further powers which may be devolved.” While noise and soundscapes are covered in Planning Policy Wales, and under the Environment (Air Quality and Soundscapes) Act 2024 for local planning authorities, this document refers to statutory nuisance and local impact reports. The consultation is open until 13 December 2024.

Read the consultation here: <https://tinyurl.com/Walesconsult>

Aviation: CAA consultations on consumer environmental information

Last spring, the Civil Aviation Authority (CAA) issued a call for evidence on consumer environmental information on aviation, seeking views on what environmental information should be provided to people when they are looking for and booking flights, to enable them to make informed choices about travel options. While

acknowledging that noise has an impact, the request stated 'This Call for Evidence does not focus on aviation noise, but the CAA has expertise and functions on aviation noise which are set out on our website.' The IOA responded noting the conspicuous omission of noise, given the impact of aviation noise on health and the wider environment. The summary of responses published in July acknowledges comments made advocating the inclusion of noise, such as 'There were several comments on the impact on public health of noise emissions from aviation (in answer to this and other questions) and recommendations that information about noise should also be considered for inclusion. There was also a recommendation that the CAA should undertake a call for evidence on the subject of consumer environmental information on noise and update its website as some of the existing published information is out of date.' CAA issued a further consultation on draft principles of consumer

environmental information, which closed on 15 October 2024.

Read the IOA response here: <https://tinyurl.com/IOACAA>

Read the summary of responses here: 22524 ([caa.co.uk](https://tinyurl.com/IOACAA)) and the CAA Consumer Environmental Information: Consultation on draft principles for aviation consumer environmental information here: <https://tinyurl.com/CAAconsumer>

Aviation: CAA Consultation on the future direction of the UK Aviation Environmental Review

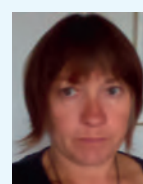
The Civil Aviation Authority is seeking views on the future development of the UK Aviation Environmental Review (AER). They aim to develop the AER into a comprehensive and robust tool that can be used by Government, industry and other interested stakeholders to inform and drive positive environmental change. This consultation seeks feedback on the overall ambition and aims for the AER; and the nature of environmental data reported within the AER, including how this data should be presented.

The consultation is open until 10 December 2024 and you can read it here: <https://consultations.caa.co.uk/policy-development/aviation-environmental-review-consultation/>

Measuring noise from outdoor equipment

Outdoor equipment noise has been regulated in the UK in line with an EU Directive since 2001. The EU have now updated their regulations, reflecting progress in noise measurement methods, and Government are considering whether implementing this approach in the UK will support business. A Call for Evidence was issued aiming to aid understanding of the potential benefits and costs of introducing these measures and inform any potential secondary legislation, and IOA are considering our response.

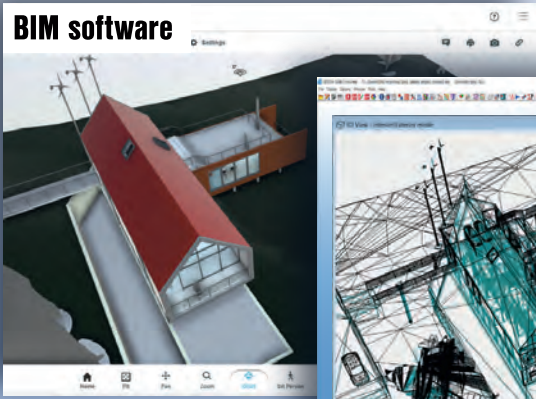
The **consultation** ran until 11 November 2024. ☺



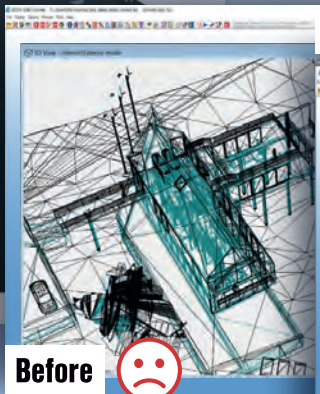
Mary Stevens

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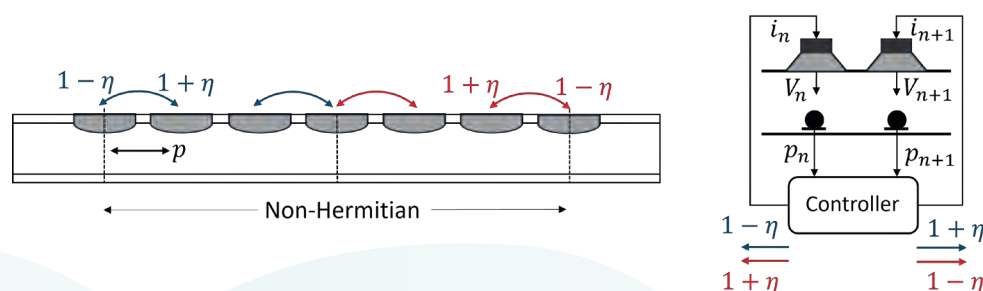
Mimicking quantum tunnelling using programmable active acoustic metamaterials

In a recent pilot study, researchers report a peculiar tunnelling phenomenon that occurs in acoustical systems with non-reciprocal couplings, which can open new opportunities for controlling the propagation of sound waves in ducts and other acoustical waveguides.

By Felix Langfeldt and Joe Tan, Institute of Sound & Vibration Research, University of Southampton, and Lea Beilkin and Sayan Jana, School of Mechanical Engineering, Tel Aviv University

Tunnelling is a phenomenon in quantum mechanics. It allows particles to pass, with a certain probability, through a barrier that would be impenetrable for the particle according to classical mechanics. Known phenomena include, for example, tunnelling of relativistic particles through energy barriers of arbitrary heights and widths in graphene and other structures, across the event horizon of black holes, through superconducting junctions, and more. Translating this exciting property into the acoustic realm holds the potential to substantially advance waveguiding capabilities in acoustical systems.

In the project *Active acoustic metamaterials for non-Hermitian sound propagation phenomena inspired by quantum mechanics*, funded by the UK Acoustics Network's third funding call, the team of scientists from the University of Southampton and Tel Aviv University derived and experimentally demonstrated a new form of a tunnelling-like phenomenon for sound waves through a non-Hermitian barrier. Non-Hermitian physics refers to non-conservative systems that interact with the environment. One of the underlying mechanisms of these systems is non-reciprocity. The wave propagation through such non-reciprocal systems is usually amplified in one direction and attenuated in the other, which is known by the non-Hermitian skin effect.



Above:

Figure 1: Schematic representation of the active acoustic metamaterial setup that was derived and studied during the project. The drawing on the left shows the overall setup with several active unit cells (grey) embedded in the wall of an acoustic waveguide. Each unit cell consists of two loudspeakers and two microphones (right). A programmable controller allows to change the parameter η that determines the strength and direction of the system's non-reciprocity

Design of the active acoustic metamaterial

For studying the behaviour of sound waves propagating through a non-Hermitian acoustic system, the team designed a one-dimensional waveguide with an array of loudspeakers, microphones, and controllers (see Figure 1), forming an active acoustic metamaterial. Metamaterials are periodic structures composed of engineered unit cells that are smaller than the wavelength and by carefully designing the properties of the unit cells and including active elements like loudspeakers and microphones, the behaviour of sound waves propagating through the metamaterial can be tailored towards a desired response. The key to realising non-reciprocity in this system lies in the control parameter η , shown in Figure 1, which determines the degree of

non-reciprocity in each part of the metamaterial. In the left half (blue arrows), the weaker coupling ($1-\eta$) is in the left direction and the stronger coupling ($1+\eta$) is in the right direction. The couplings are mirrored about the centre of the metamaterial. As a standalone system, each half of the system supports the non-Hermitian skin effect, in which modes are accumulated at the boundary of the weaker coupling. However, in the project the team investigated what happens to a wave that propagates along the array and hits the interface. The skin mode accumulation, which effectively constitutes a barrier, forbids wave penetration into the interface, but surprisingly, under certain conditions the wave is transmitted to the other side, keeping the interface dark, as if the wave invisibly tunneled through it, **P44**



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as illustrated in Figure 2. Remarkably, the tunnelling is independent of the interface length.

Time-domain finite element method simulations were used to verify the tunnelling effect in a continuous acoustic system as shown in Figure 1, investigate the impact of the electroacoustic properties of the loudspeakers and how they are driven on the tunnelling performance, and explore possible approaches for re-programming the control laws to achieve different tunnelling strengths or even different non-Hermitian sound propagation effects. To verify the numerical results, the team then built an experimental demonstrator (see Figure 2), which consists of an array of nine loudspeakers and microphones and a digital controller. The experimental results confirm the tunnelling phenomenon, and demonstrate the re-programmability of the system by modifying the control law on the digital controller for each unit cell, e.g. to study different non-reciprocity strengths η .



Above: Figure 2: Experimental setup for demonstrating the quantum tunnelling effect realised using the active acoustic metamaterials developed in the project. This photograph shows the rectangular duct with an array of nine loudspeakers attached to the top wall of the duct, representing the active metamaterial unit cells. The colour map along the centre of the duct is a computer-generated overlay created using a simulation model, illustrating the tunnelling of a sound wave through the metamaterial

Applications

This pilot study uncovered how an interesting tunnelling phenomenon can be realised for acoustic waves using active acoustic metamaterials. This can lead to a range of possible useful applications, e.g. to realise quiet zones in acoustical systems or tunnel sound waves through obstacles for sensing applications. The theoretical, numerical, and experimental framework that was developed in the project will enable further research on this specific

phenomenon, e.g. to study the stability of the control laws, extend the concept to higher dimensions, or investigate wave tunnelling through other types of non-Hermitian interfaces, which may also include nonlinearities, time-dependence and more. ©

Acknowledgement

This project was supported by the UK's Engineering and Physical Sciences Research Council (EPSRC) through the third funding call by the UK Acoustics Network Plus EP/V007866/1.



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50th Anniversary Conference – Acoustics 2024: Manchester Metropolitan University, Thursday 12 and Friday 13 September 2024

This year the Institute of Acoustics Annual Conference was held on 12 and 13 September at Manchester Metropolitan University Business School. The university staff provided excellent site support throughout the conference. AV was provided by Visair Ltd and the refreshments/catering by the university.

By Martin Lester

This year's conference attracted just over 260 delegates as either one or two-day attendees, which

shows that the IOA members are supportive of such an event. On day one of the conference, the UK Acoustics Network (UKAN+) held their annual conference at the same venue and this was attended by 70 delegates.

The conference was opened by Alistair Somerville, the then IOA President, who also chaired the 2024 Rayleigh Medal Lecture: *Sound transmission predictions through walls using SEA and measurements using sound intensity* by Malcolm Crocker of Auburn University, Alabama. This is available to view by all on the IOA website.

Right:
Delegates at the conference dinner, which was held at The Manchester Monastery



Below:
Alistair Somerville opening the IOA's 50th anniversary conference – Acoustics 2024



For the rest of the two-day conference there were four parallel sessions on day one, and five parallel sessions on day two, with all the usual IOA Specialist Groups having at least a session each.

My thanks go to the Specialist Group Chairs, and Session Chairs and Committees for helping making the conference happen and progress smoothly:

- Environmental Sound Group – Steve Mitchell;
- Noise and Vibration Engineering Group – Joshua Meggitt, Nathan Thomas;
- Speech and Hearing Group – Christian Sumner, Katie Gray, Gordon Hunter;
- Early Careers and Senior Members Group – Josie Nixon, Zachary Simcox;
- Building Acoustics Group – James Healey;
- Measurement and Instrumentation Group – Simon Bull, John Shelton;
- Sound, Noise and Health Group – Benjamin Fenech;

- Musical Acoustics Group – Stephen Dance, David Sharp;
- Chartered Institute of Environmental Health (CIEH) and Royal Environmental Health Institute of Scotland (REHIS) – Stephen Turner; and
- Physical Acoustics Group – Shahram Taherzadeh. The inclusion of the session with presenters from CIEH and REHIS was a step taken to provide an opportunity for consultants to hear from Environmental Health regulators.

At the end of the technical sessions on the Thursday, the IOA held its AGM.

Conference dinner

On the Thursday evening there was the conference dinner (with 183 attendees) at the impressive surroundings of The Manchester Monastery. This dinner had no award presentations because the IOA held a separate awards lunch earlier in the year. **P46**

At the end of the conference dinner Alistair Somerville and David Waddington (outgoing and incoming IOA Presidents) gave a short thank you speech for all those involved in making the conference happen.

During the conference, seven of the IOA Specialist Groups held their AGMs: Environmental Sound, Noise and Vibration Engineering, Speech and Hearing; Building Acoustics, Measurement and Instrumentation, Sound Noise and Health and Musical Acoustics.

On the evening prior to the first day, there was a get together for the buddies and mentors (coordinated by Josie Nixon of the Early Careers Group) at Nell's New York Pizza and Bar (sponsored by Getzner and UKAN+), and a social event for the IOA North West Branch at Brickhouse Social (sponsored by Farrat Isolevel).

Here is a summary of each presentation, as provided by the Session Chair(s):

THURSDAY 12 SEPTEMBER 2024

Environmental Sound Group Session, chaired by Steve Mitchell

Application of the Sottek Hearing Model for environmental noise assessment, presented by Roland Sottek, Chalmers University of Technology

Roland described the Sottek Hearing Model, first by overviewing the structure of the model and then describing characteristics of 'roughness', 'fluctuation', 'tonality' and 'loudness' using a series of audio clips to illustrate how these characteristics are quantified to

derive the specific loudness of any sound. He noted tonal noise can be very annoying depending on frequency and signal to noise ratio, and the model splits tonality from noise to quantify its effect. Roland summarised a study that had analysed sound quality from 28 heat pumps using psychoacoustic methods. All sound signals were set at 55 dB(A) with widely differing levels of tonality, correlating variously with roughness, sharpness and impulsiveness, leading to very different propensities for disturbance.

The Quiet Project – A national environmental noise survey undertaken during lockdown, presented by Stephen Dance, London South Bank University; L McIntyre, KSG Acoustics; and R Vazquez Amos, London South Bank University

Stephen summarised this study that collated 1,010 days of high quality environmental sound data collected by IOA members voluntarily at 77 locations from April 2020 when we were all told to stay at home – greatly reducing road and other traffic and other noise sources. A website was designed and developed to advertise the project, provide instructions and to formalise the uploading of high-quality noise data, observations, photos and video. The data was carefully sifted, checked and analysed giving confidence that it was a high-quality dataset that was summarised across three categories: urban, suburban and rural, with suburban being by far the most common.

Stephen noted that because of the reduced human activity this was probably the quietest the country is likely to be. He summarised the results in urban, suburban and rural areas and compared these with previous National Noise Incidence Surveys in 2000 and 2010 and with WHO Community Noise Guidelines. It was noted that, for example at night, no areas complied with the WHO guideline of $L_{eq} 8 \text{ hr } 45 \text{ dB}$ (averaged for urban 52dB, suburban 48dB and rural 48dB).

A questioner suggested a short briefing paper should be prepared and issued to Government noting: 1) even when economic activity is almost ceased, WHO guideline levels are not met; and 2) it is noisy and action should be taken.

Producing new and updated guidance for the noise assessment of renewable energy sources, presented by Richard Perkins, Mott MacDonald Ltd; Matthew Cand, Hoare Lee and J Singleton, TNEI

Richard described the structure and progress made by the IOA's Renewable Energy Working Group, which has been set up to progress up-to-date guidance on noise from renewable energy sources. There are now four active subgroups addressing air source heat pumps, wind turbines, solar and battery energy storage and fusion energy. The air source heat pumps subgroup has been lobbying government for support. The wind farms subgroup has already begun collecting the evidence for a refresh of the IOA Good Practice Guide, 2013, and Government has let a research contract to update the ETSU-R-97 Onshore Wind Noise Guidance. Richard outlined some of the issues where the new guidance will help including amplitude modulation, cumulative conditions, post completion monitoring and offshore wind.

The solar and battery energy storage subgroup has teamed up with the ANC with support from environmental health professionals to produce a guidance note for the impact assessment of noise from solar and battery storage installations. Key issues the guidance aims to address here include defining source noise strength and characteristics. The Government has begun to pave the way for future fusion energy proposals and consulted back in June 2024 on a new National Policy Statement (NPS) for Fusion Energy. The IOA provided a response on acoustic aspects to the proposed new NPS.

The future of soundscape assessment – what can we learn from qualitative disciplines?

Presented by Taylor Cooper, Mott MacDonald

Taylor introduced her talk by noting that the acoustics industry is moving towards integrating soundscape design and conventional noise control which is a quantitative process, whereas other environmental impacts from new developments, such as landscape

Below:
Roland Sottek,
Chalmers University
of Technology



and visual impact assessment (LVIA) use qualitative methods. The word 'soundscape' is the aural counterpart to the word 'landscape', and both are based on perception by people. Taylor first summarised soundscape guidance including ISO 12913 and the Soundscape Indices (SSID) Protocol, before going on to describe the qualitative process used to assess landscape and visual impact. The key process requires first the 'value' of a landscape to be established on a high/medium/low scale, and then the 'susceptibility' of that landscape to impact, to be similarly rated. These two features then form a matrix that allows 'sensitivity' to be derived; e.g. a high value site with high susceptibility will be highly sensitive to significant effects.

Taylor indicated possible criteria to rate the value and the susceptibility of a soundscape using an equivalent qualitative approach to arrive at a sensitivity matrix for assessing impact and suggested some of the strengths and weaknesses of this approach. This proposed approach is not meant to replace other methods for presenting soundscape data. The ideas of standardising value, susceptibility and sensitivity are to aid in consistent soundscape assessments and decision-making. The short answer to the title question 'What can we learn from qualitative disciplines?' is 'we can learn a lot, but not on our own.' Further investigation and collaboration are necessary in order to continue to develop soundscape assessment criteria.

Evaluating human response to air source heat pump noise for sustainable domestic heating, presented by Volkan Acun, Lucy Barton, Trevor Cox, Simone Graetzer, Jonathan Hargreaves, Max Radivan, Antonio J. Torija Martinez, David Waddington and Daniel Wong-Mcsweney, University of Salford

Volkan reminded us that air source heat pumps (ASHPs) are pivotal to the UK Government's goal of achieving net zero carbon emissions by 2050, and noise is a key concern for their deployment. The current guidance on noise relies on simple maximum noise



Above:
NTi stand at the conference exhibition

levels. This study aimed to better understand how people perceive ASHP noise indoors to help inform more detailed guidance that might allow great deployment without creating unacceptable noise disturbance. Laboratory surveys were carried out with 50 volunteers responding to a mixture of ASHP and ambient noise. Negative characteristics of the noise such as 'valence', 'arousal', and 'annoyance' were correlated with features of the noise source such as its operating mode and the level of background noise. The study found various correlations and that higher background noise masks ASHP noise, leading to more positive perceptions, suggesting that ASHP noise emissions are potentially perceived more negatively in rural areas, where the background noises are lower. This should be considered by policymakers.

Updating BS 8233: Aligning residential acoustic design guidance with the health evidence: a new proposal for the UK, presented by Benjamin Fenech, Noise and Public Health, Radiation Chemical and Environmental Hazards, Science Group, UK Health Security Agency (UKHSA) and Jack Harvie-Clark, Apex Acoustics

Ben and Jack reported on research undertaken to inform an update to BS 8233 which is now 10 years old, and should take account of the wealth of health

effects research now available, including that reported by the WHO, so as to be aimed at assessing good health outcomes rather than amenity-based standards. A two-step approach was explained. Step one considers external noise levels and assigns a sound exposure category, 1 to 5, which correspond to worsening health outcomes (e.g. highly annoyed from 10% to 25%, or highly sleep disturbed from 3% to 9%), allowing for the different dose response relationships for different noise sources. The L_{den} and L_{night} metrics were used to align with international research. It was noted that sites with aircraft noise above L_{night} 40dB would all be sound exposure category 5.

Step 2 considers the internal sound levels and the sound insulation standard required to be provided by design of the new building to achieve the preferred internal levels. Options for the internal standard were discussed noting that the health-based evidence for internal noise levels is weaker than for external levels. Options on how to address ventilation and overheating risks were proposed. It was noted that the current standard has guideline levels for external amenity spaces, but the view that this may not be needed with the new approach was offered. A question was asked noting that peak noise events were important and had not been covered, in particular for railways and aircraft sources. [P48](#)



Provoking proportionate considerations of anthropogenic noise on terrestrial animals, presented by Adam Scott, Andrew Bullmore, Hoare Lea

Adam began by reminding delegates that biodiversity in the UK was in a very poor state. He noted the Defra study into noise effects on animals had concluded that there was not enough evidence to produce quantitative guidance. However, he pointed out that whilst individual noise effects could be small, cumulatively, effects can be significant and need to be addressed. Adam advocated a pragmatic proportionate approach based on what we do know. The situation is complicated because different species have very different physiology and so are affected by very different levels and frequencies of noise. Adam summarised some of the research findings across a wide range of different species (e.g. badgers, bats, birds, dormice, great crested newts, invertebrates, small and medium sized mammals, toads, otters, reptiles and water voles). He simplified the findings into a table listing the distances between a noise source and each animal within which an assessment of anthropogenic noise impacts may warrant consideration. He was clear that this was not proposed as an assessment method, only a scope tool to see if further assessment may be required. Several of the main shortcomings of the approach were explained. It was concluded that this type of scoping tool may offer a proportionate approach to consider noise effects on animals rather than not attempt an assessment at all.

Noise and Vibration Engineering Session, chaired by Joshua Meggitt and Nathan Thomas

The following papers were presented during the session chaired by Joshua Meggitt:

Fibre-optic sensing for analysis of turbulent pressure fluctuations in partially filled pipes,

presented by Jah Shamas, Anton Krynkina, Gavin Sailor, Simon Tait, University of Sheffield, Yan Liu, Southern University of Science and Technology, China, Kirill Horoshenkov, University of Sheffield

Research project for National Highways into a new calculation standard for transport noise,

presented by Matthew Muirhead, Aecom

Matthew explained that the Calculation of Road Traffic Noise and the Calculation of Railway Noise methodologies had been developed many years ago to assess noise insulation and whilst some updates had helped, they are now used for wider applications and need to be updated. The work sponsored by National Highways had been paused because of the pandemic but is now moving ahead, and is divided into three main areas: road traffic vehicle sound powers, railway vehicle sound powers, and a common propagation method based on the IMAGINE method, developed in Europe in the 2000s. Matthew described the work on validating road traffic source levels including a literature review and roadside measurements at 56 locations of over 7,000 vehicles. Source levels were derived for three types of light vehicle (internal combustion engine, electric vehicle and van) and heavy goods vehicles. Speeds from 20-148 kph were covered and road surface performance covers a range of 11 dB across 10 types of surfaces. The intention is for the output of this work to form the core component of the road traffic noise part of the new calculation standard.

Above: HBK at the conference exhibition

Low frequency sound at outdoor concerts – a necessary noise,

presented by Dani Fiumicelli, Vincent Parker, Ed Lawrence, Jonty Stewart, Vanguardia

Dani Fiumicelli summarised some of Vanguardia's experience from managing noise from outdoor concerts over the last 10 years.

Low frequency noise below 63Hz is a key element of the full experience of enjoying some modern music types, but it is also the type of noise that propagates well over distance and into people's homes. It can also be impulsive. A-weighting noise levels are not suitable for limiting and managing this type of music and a level of 90 dB(C) has been used instead. There is no dose/response data for this type of music, so Vanguardia had looked at complaints and found a low correlation between complaints and L_{eq} 15 minute levels in the range 85-90 dB(C).

Vanguardia have also found that managing music noise levels so that the difference between the simultaneously measured A-weighted and C-weighted levels is no more than 20 decibels is an effective way of controlling the impact of bass and sub-bass noise, subject to a lower limit of around 65 dBC and an upper limit of 90 dBC.

Comparison of differing amplitude modulation methodologies using test cases and measurements, presented by Krispian Lowe, RWE

Harnessing generative AI: leveraging OpenAI's APIs to enhance acoustic field note-taking, presented by Shenzhi Su, iFieldnotes

The following papers were presented during the session chaired by Nathan Thomas:

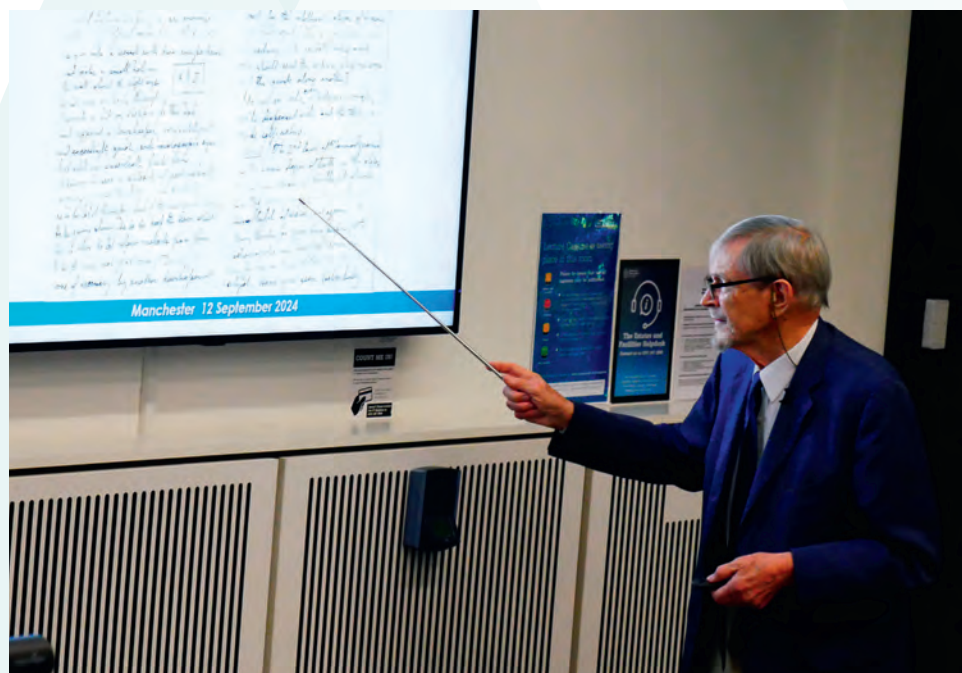
Acoustic implications of low carbon housing, presented by Rebecca Hogg, BSRIA

Successful vibration isolation of a multi-storey building with elastic bearings partly on pile and slab foundation, presented by Dominik Dobler, Andreas Wenz, Ulrich Gerhaher, Getzner

Sound transmission loss in duct with multiple resonators arranged in different patterns, presented by Takumasa Tsuruha, Takenaka RandD Institute, Japan

Citations

The Rayleigh Medal was awarded to Professor Malcolm J Crocker



Above: Professor Malcolm J Crocker presenting his Rayleigh Medal lecture

Below: Professor Malcolm J Crocker, recipient of the 2024 Rayleigh Medal



Professor Crocker is a distinguished and internationally recognised acoustician whose work as a researcher and educator has influenced many in the fields of experimental and theoretical acoustics, vibration and noise control. As a researcher, he has been principal investigator on over 70 research projects

for industry and government, publishing over 350 technical articles and books in acoustics and vibration and noise control. As an educator, he has supervised over 50 graduate students.

Professor Crocker is widely known for his extensive handbooks and encyclopedia on acoustics. He was Editor-in-Chief of the four-volume *Encyclopedia of Acoustics*, published in 1997, and of the *Handbook of Acoustics* in 1998. The *Encyclopedia* won the 1997 award of the American Association of Publishers for excellence in professional and scholarly publishing. His *Handbook of Noise and Vibration Control* was published in 2007, followed by *Engineering Acoustics: Noise and Vibration Control*, co-authored with Jorge Arenas in 2021.

Most notable of Professor Crocker's contributions are his sustained efforts in serving the international acoustics community. He was a founding director of INCE/USA in 1971 and of International/INCE in 1974. He served as General Chair of Internoise 1972 and as the 1981 President of INCE/USA. From 1973 to 1994 Professor Crocker served as Editor-in-Chief of the international peer-reviewed publication, *Noise Control Engineering Journal*.

One contribution in particular stands out; in 1995, together with Hanno Heller, Sir James Lighthill and David Newland,

Professor Crocker established the International Institute of Acoustics and Vibration (IIAV). He has served as its Executive Director ever since and as Editor-in-Chief of the IIAV journal, the *International Journal of Acoustics and Vibration*, since 1996.

The IIAV has been greatly successful in bringing together both academics and practitioners in the two fields of acoustics and vibration, as an institute and through its annual congresses, the *International Congress in Sound and Vibration*.

The congress series began at the University of Auburn in 1990 and again in 1992. In 1994 it was held in Montreal, after which it became an event held in venues throughout the world and remains a major forum for researchers and practitioners to come together from backgrounds in both acoustics and vibration. In 2017, the 24th Congress was held in London in collaboration with the Institute of Acoustics.

The sustained success of both the institute, IIAV, and the congress series ICSV, are largely down to the energy and dedication of its Executive Director, Malcolm Crocker.

For his prolific and distinguished contributions in over half a century to scientific research and education and to the international community in the fields of acoustics, vibration and noise control, it is wholly appropriate that the IOA, in its 50th anniversary year, awards the Rayleigh Medal to Professor Malcolm J Crocker. P50

The IOA Engineering Medal was awarded to Raj Patel

Raj Patel joined Arup Acoustics in the early 1990s having impressed the leaders of the practice that he had the potential for being a highly successful acoustic engineer and a possible future leader. After 30 years at Arup he has not only realised that potential and demonstrated outstanding leadership qualities but exceeded expectations in many areas of acoustics.

In addition to engineering acoustic excellence in most building types from opera houses to railway stations, he has developed the Arup practice in acoustics in the United States and beyond into a leading consultancy, which not only rivals the best in the world but he has persuaded some of the best to join his team.

As well as being an acousticians' acoustician, Raj has promulgated acoustic engineering to a broad range of interested laypeople by his pioneering work on auralisation which is encapsulated in the Arup SoundLab®; a facility that has spread worldwide throughout Arup offices and enables clients to listen to their projects before they are realised. Raj also helped to develop a comprehensive acoustic calculation platform namely, Strutt Acoustics, which has gained widespread use among acousticians.

Following a decade in acoustic consultancy in the UK, Raj moved to New York to develop the Arup team there. He successfully grew the team from nine to 70 acousticians, acquired a specialist practice and developed a substantial portfolio of arts, culture, education, laboratory and transport projects. He started new teams widely throughout America including San Francisco, Seattle, Chicago, Washington DC and Boston.

With regard to digital technology, Raj expanded the capabilities of SoundLab® using Arup's first AR and VR simulations and introduced a vibration simulation motion platform, which provides an enhanced sensory experience. These form the core of the Arup iLab and eLab in offices around the globe.

Some of Raj's outstanding projects include the Stavros Niarchos Foundation Cultural Centre in Athens, Texas High Speed Rail and the Metropolitan



Above:
Raj Patel,
recipient of the IOA
Engineering Medal

Opera 10-year development plan and implementation amongst many others. He has also worked with well-known artists such as Philip Glass, Nick Cave, Lou Reed, Ai Weiwei, Björk and Scott Walker.

For his work in providing acoustic excellence in many building types worldwide, for developing an acoustics engineering practice into a world leader and for demonstrating the potential of acoustic engineering to a wide public, Raj Patel is a highly deserving candidate for the Engineering Medal of the Institute of Acoustics.

Speech and Hearing Group Session, chaired by Gordon Hunter, Chris Sumner and Katie Gray

This year the Speech and Hearing Group ran a full day of talks, supported in part by the UK Acoustics Network+. We specifically invited several speakers who would not ordinarily attend the meeting, to bring cutting edge perceptual work to a wider audience. Acousticians face the problem of how to design and modify spaces (rooms, buildings, even outdoor spaces) in a way which takes account of the people that use them. Psycho-acousticians have developed complex models of speech intelligibility, loudness, the impact of room acoustics and their impact on hearing impairment (or cochlear implants), yet, there is a massive challenge connecting these two domains. How can we bring understanding and models of hearing into acoustics engineering?

The day began with a presentation from Christian Lorenzi at the Ecole Normale Supérieure in Paris. Christian put forward a new name for soundscape perception; 'human auditory ecology', and described his recent work quantifying the human perception of sounds in the natural environment (*Auditory perception of the subtle and transient attributes of natural soundscapes by human listeners*). Later in the day, we heard more about soundscape perception from Andrew Mitchell (UCL), who told us about his journey to produce usable engineering metrics and a software tool for describing how people perceived open spaces (*The soundscape approach in engineering practice: Design metrics and a software analysis tool*). Both are excellent examples of how human responses to the acoustic environment can be characterised with accuracy and utility.

We also heard about some recent advances in fundamental sensory perception. Josef Schlittenlacher (UCL) has been working to test and improve models of loudness perception, which is surely as important to know about as the physical sound level. Josef described his latest experiments characterising the loudness of brief sounds when they appear amid a background of other sounds (*Perception of loudness for brief sounds in background noise: Role of duration and signal-to-noise ratio*). Meanwhile, Katarina Poole (Imperial College, London) described how a small number of measurements of a person's head-related transfer function could be combined with AI techniques to give individuals a much more realistic experience of 3D spatial audio over binaural headphones. (*Personalising the perception of spatial audio over headphones*).

Michael Stone (University of Manchester) brought rigour to the study of speech perception, with an in-depth look at how the splitting of speech signal into envelopes and carriers allowed one to tease apart the acoustic determinates of speech in noise perception, the influence of age, and also how these resulted in challenges for broadcast audio (*One size does not fit all: implications of auditory perception in physical acoustics*). Continuing on the theme of speech perception, Chris Sumner showed that it is possible to **P52**

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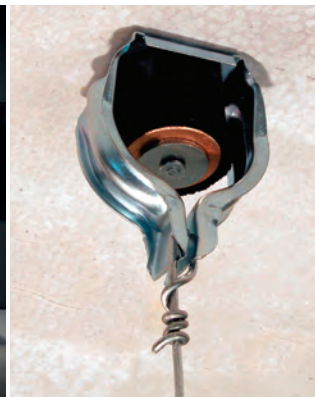
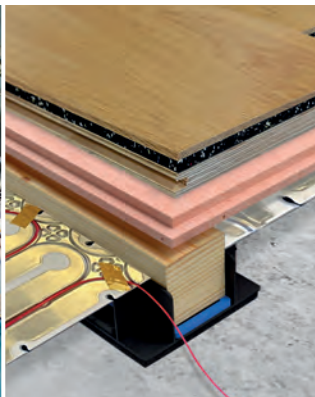
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quantify the complex relationships between differences in speech perception across different sensory modalities (sound only, lip-reading or both together) and proposed that this could be a basis for a more complete description of how difficult it is to communicate in real-life environments (*Can we account for the benefit seeing a talker in real-world communication?*).

Of course, it's not all about speech – unwanted noises affect us on a whole range of levels. Fiona Marshall (University of Nottingham) brought home the particular challenges of unwanted noise in hospitals with a detailed description about how both patients and staff coped with, or occasionally found pleasure in (the rattle of the tea tray splits opinions!) the myriad of noises they each produce (*A sonic journey through acute brain injury hospital settings*).

And (again, of course) it's not all about humans either! Gordon Hunter (Kingston University) fascinated us with an analysis of the begging calls made by sea bird chicks (specifically Manx Shearwater), based on fieldwork carried out by Barbara Francik et al (University of Oxford), and what that could tell us about their health (*Acoustic analysis of the begging behaviour of Manx Shearwater (Puffinus puffinus) chicks*).

Finally, we heard from Eugenio Donati (University of West London) on how it was possible to monitor the pitch quality of singing physically using electrical impedance measurements of vocal fold vibrations, and how this demonstrated a critical role for the stability of fundamental frequency in singing quality (*Evaluation of fundamental frequency stability in speech and singing using bioimpedance measurements*).

There were also two presentations on speech and hearing topics in the poster session. One, by Fabrice Deprez (ENSI-Caen, France), Gordon Hunter and Jayaramakrishnan Kiruthika (Kingston University) described how spectral features in speech could be used to identify a speaker's emotional state. The other, by Julia Tomaszewska (University of West London), outlined her PhD project work on comparing the use of Mel Frequency Cepstral Coefficients (MFCCs) and Gammatone

Cepstral Coefficients (GTCCs) from electroglottographic signals for detecting and assessing laryngeal disorders. The latter won the UKAN+ award for the best poster presented across all the thematic areas of the conference – well done, Julia!

We thank all the speakers for their excellent talks, and the audience for their appreciation and insightful questions. As a final note, Chris leads the UKAN Special Interest Group in Hearing, and is passionate about bringing together academics who study hearing and acousticians, particularly industrial acousticians, closer together. So please drop him an email if this interests you! Email:

christian.sumner@ntu.ac.uk

Early Careers Group Session, chaired by Josie Nixon

The Early Careers Group kick-started the conference on the Wednesday night at Nell's New York Pizza bar with a social event. The event was jointly arranged and sponsored by UKAN++ SIG group and Getzner. We had a fantastic evening with more than 30 people attending. The event was mainly aimed at those early in their careers to have a chance to meet others attending the conference in an informal setting. There was a range of pizzas provided and it didn't stop coming all evening – no-one went home hungry!

A huge thank you to Ben Van Breda along with the rest of Getzner and to Simone Graetzer and UKAN++ for sponsoring, promoting and helping to arrange the event, it would not have been possible without their support and we all had a brilliant evening.

The buddy scheme

We ran the buddy scheme again this year and it was great to see so many people wanting to support the scheme, it enabled us to have two mentors per buddy. We had some really positive feedback from the buddies about how valuable they found it, especially the chance to meet a mentor before the conference even started, and a number of the mentors who came along really enjoyed the social event as well!

The day

The ECG was fortunate to host a room with the Senior Members

Group. We hosted on the Thursday and had a range of talks that were well attended. I had a great time listening to everyone. I had the enjoyment of chairing the morning session and we started the day off with a talk by Zachary Simcox who has just become Chair of the ECG. Zach introduced us to the research he is undertaking by using water curtains and expanded metal to reduce blast noise – there was some great footage of the blasts.

Next up Rory Peliza and Richard Jovic from the Environment Agency (EA) gave a talk on uncertainty within outdoor sound propagation calculations for permits submitted to the EA. This was an informative talk, explaining how the EA checks calculations and the improvements they would like to see going forwards.

Our final session of the morning was led by Philip Bowen and Jenna Turnbull from the Welsh Government on the *Next steps for noise and soundscapes in Wales*. This was an engaging presentation and it was interesting to see how Wales is pulling soundscapes into their legislation and guidance and their proposed future steps. I can't wait to see the outcome as they continue to encourage the use of soundscapes.

The first afternoon session was hosted by Zachary Simcox and he introduced Paul Doyle from the Environment Agency. Paul presented on *The Environment Agency and noise impact assessments for environmental permit applications. Where are we now?* It was a great presentation and led to a number of questions and engagement from the audience with suggestions for the future.

The final afternoon session was hosted again by myself and we had a panel discussion, where we were lucky to be joined by Zachary Simcox (ECG Rep), Graham Parry (SMG Rep) and Matthew Robinson (EDI Chair). The panel discussion was on the future of acoustics and considered how the acoustic industry has developed in the last 50 years and discussed the future of acoustics specifically focusing on answers to these questions:

- How has the acoustic industry changed in the last 50 years?
- How has technology/equipment changed and how do you think it is beginning to and will continue

to alter our careers (consultancy, public services, research) in the future?

- Where do you think the acoustic industry will be in 50 years? Will there always be a need for the discipline?

The panel discussion was lively with contributions and thoughts given from the audience along with the panellists. Conversations surrounding the role of soundscapes in future planning applications, the suitability of A-weighting and what the role of acousticians will be in the future were all covered. It was great to listen to everyone's ideas and see the wide range of activities our industry covers.

Thank you to everyone who presented and thank you to everyone who came along to support the presenters and join in the panel discussion. If there are any future ideas for panel discussions that you would like the Early Careers Group to consider for future conferences, please do let us know at earlycareersgroup@ioa.co.uk

Friday 13 September 2024

Building Acoustics Group Session, chaired by James Healey

The following papers were presented during the sessions:

Wind-induced creaking in tall buildings, presented by Alec Korchev, Clarke Saunders Acoustics; London South Bank University; Ed Clarke, Clarke Saunders Acoustics; Stephen Dance, Ottavia Rispoli, London South Bank University

Quantitative measurements of lightweight timber floors using low-frequency impact source; analysis of the accuracy of 1/3 octave band heavy-hard impact prediction modelling in lightweight structures, presented by Tim Patzke, Pliteq UK

Investigating vibration effects on wooden frame buildings: a focus on CLT response to traffic-induced vibration, presented by Jorge D'Avillez, Zijiang Yang, WSP Acoustics UK

Reducing embodied carbon in heavyweight acoustic design,

presented by Tom Van Dongen, Mason UK

Building acoustics and sustainability – some real-world examples, by presented by Ben F Burgess, Atelier Ten

Towards a simplified model for partially open windows: connecting acoustic and thermal comfort, presented by James Healey, Jonathan Howell, Peninsular Acoustics; Jack Harvie-Clark, James Hill, Luis Pereira, Julien Batten, Apex Acoustics; Gioia Fusaro, University of Bologna

Speech babble as sound masking in open plan offices – a statistical approach, presented by Pete Leonard, Anthony Chilton, Max Fordham

Sound power of normal speech for building acoustics, presented by Carl Hopkins, Simone Graetzer, Gary Seiffert, University of Liverpool

Measurement and Instrumentation Group session, chaired by John Shelton

In the afternoon session, there were two papers to wrap up the day, with many contemplating their train times!

The first paper from Joanna Watts of University of Sheffield gave a whistle-stop tour of her work in using a triaxial accelerometer-armed robot in pressurised water pipes, to measure the fluid acceleration vector to spot wall defects in the pipe. Measured results were compared with mathematical simulations, using a real-world ductile iron pipe.

Correlation between real measurements and computed predictions showed some similarities – enough for further work of course, and a quite promising area of research.

The speed of the presentation challenged the audience, but gave plenty of time for questions before the next paper!

Next up was Bill Whitfield from noise.co.uk who presented the results of UKAS-sponsored round-robin tests of building insulation. Having got access to a new-build student accommodation block (time pressure!), eight laboratories were invited to perform standardised measurements of both acoustic

and impact insulation, following Document E of the Building Regulations. Some laboratories provided multiple personnel, allowing the possibility of comparisons intra- and inter-laboratory.

Results were crunched in line with ISO 5725-1, and provided some quite surprising variations across the board, in both repeatability and reproducibility of the measurements.

This gave grist to the following audience discussion, where questions were asked about the possible effects of HF background noise, and whether a higher value of $D_{nt,w}$ will give rise to greater uncertainty.

The project was not made easier by the fact that the constructions were well above the minimum required, and the rooms quite small at 23m² volume. All measurements would have 'passed' the test, but one wonders what would happen if the structures were nearer the knuckle?

With that, the delegates rushed off to catch their various forms of transport after a good session.

Sound, Noise and Health Group Session, chaired by Benjamin Fenech

Acoustics 2024 was the second annual IOA conference with a parallel session dedicated to the health effects of sound and noise, following the establishment of the Sound Noise and Health special interest group in 2022. The session attracted a healthy number of abstract submissions, which led to presentations covering a broad range of topics including human health effects of noise from road traffic, music venues, air source heat pumps, construction and drones, school environments, and effects on biodiversity. All the presentations were very well attended and generated constructive debates. This is all testament to the growing interest in the field of sound noise and health amongst the IOA membership.

Andrew Beamish (National Highways) started the day explaining how National Highways (NH) are working to reduce the health burden due to noise from the strategic road network (SRN). There was a particular focus on Noise Important Areas (NIAs), representing populations subject to the top 1% of high noise levels resulting from major roads. There are over 2,500 NIAs on the SRN in England, containing around 110,000 households. **P54**

NH has a Key Performance Indicator (KPI) to mitigate 7,500 households within NIAs, through their Environment and Wellbeing Designated Fund. Andrew summarised work done to date towards the noise KPI, the methodology for focusing and assessing NIAs, mitigation options available (e.g. resurfacing with a low noise surface, installation of noise barriers and noise insulation), the health benefits from lowering noise from the SRN and future plans for Roads Period 3 (2025-2030). Some of the challenges include older infrastructure, and competing demands of safety and carbon. NH is also looking at initiatives to promote quieter tyres to the public. During questions, attendees noted the importance of demonstrating the value of the Environment and Wellbeing Designated Fund, for example by evaluating the effectiveness of interventions to improve health outcomes. There was also a discussion about ongoing research of influencing public perceptions when changing tyres.



Jack Harvie-Clark (Apex Acoustics) presented a case study exploring the coexistence between a residential development and an adjacent live music venue in Newcastle's Ouseburn Valley. Music noise from the Tyne Bar was reported to receive very few complaints from a nearby residential development, despite the music noise levels exceeding

Above:
Jack Harvie-Clark

traditional noise limit guidelines. Using mixed methods including noise measurements, modelling, interviews and grounded theory, the study team explored several sociocultural factors enabling this tolerance. Interviews with three residents suggested a strong sense of community and cultural affiliation with the venue and a recognition of the Tyne Bar's active engagement with the community. Interviewed residents closer to the venue perceived the noise as an inevitable trade-off of the location, rather than 'unbearable'. Based on the findings from this case study, Jack questioned guidelines relying solely on noise levels and highlighted the need for holistic frameworks integrating objective limits with subjective experiences shaped by residents' sense of place, identity and community relationships. Questions from the audience welcomed the focus on placemaking and the use of grounded theory, however it was also noted that the three interviews may have not captured a fully representative view of the lived experiences in the development.

Hatice Kübra Kuruköse Çal (UCL Institute for Environmental Design and Engineering), described the findings from an online questionnaire study testing whether an association exists between the perceived acoustic comfort of teachers in the school environment and their wellbeing. An online survey was circulated to 1,412 teachers currently working across the UK in March 2023, from which 454 participants were recruited. Acoustic comfort was assessed on a five-point Likert scale and the Teacher Subjective Wellbeing Questionnaire (TSWQ) score was used for assessing teachers' work-related wellbeing. There was a statistically significant, positive correlation between perceived acoustic comfort and self-reported wellbeing. Results suggest that teachers who experience more positive soundscapes report higher levels of work-related wellbeing. Even if the observed correlation was weak, the findings highlight the importance of designing appropriate school soundscapes. The audience welcomed this study as addressing gaps in the evidence looking at the impact of school acoustics on teachers rather than students, and

also potential links with the higher prevalence of voice problems amongst teachers.

Najwa Adnan-Smith (Tetra Tech) presented the results from a noise monitoring campaign in nine areas in the Solent exposed to noise from harbours, ports and other coastal industry. The study team also made observations to correlate noise with potential disturbance and displacement of Special Protection Area (SPA) bird species during the overwintering period. The daytime background noise levels in the nine study areas ranged between $L_{A90,16\text{hours}}$ 43-49 dB, with the exception of one location close to a main road, where the level reached 69 dB $L_{A90,16\text{hours}}$. The results from the short-term noise monitoring did not find an obvious correlation between specific sound frequencies and bird responses. However, the observations suggest that birds are more likely to respond to noise disturbance when the sound pressure levels at their location are at least 20 dB above the background noise level. Visual cues from the activity causing the noise may also cause bird responses. Attendees were interested in the potential differences between seasons and the potential impacts from hovercraft and drone movements.

Elena Prokofieva (Edinburgh Napier University) presented on the importance of the school indoor environment (air quality, temperature, acoustics, lighting) for pupils' learning and wellbeing. She noted potential issues when mechanical or hybrid ventilation is used, but she argued that there are no clear guidelines on decisions to make in the case of incompatibility. The challenges between ventilation requirements and various aspects of environmental noise generated by the proposed systems can only be resolved when the building design experts work together. Further attention should be paid during the design of schools for children with special educational and behavioural needs to support the inclusivity in the education processes for all pupils. Elena gave some examples of good practice used in modern schools built in Scotland, explaining how different incompatibilities were resolved at design and completion stages to satisfy all necessary requirements for both acoustics and ventilation.

Jack Harvie-Clark kicked off the afternoon session with a talk examining the planning and assessment methodologies for domestic air source heat pumps (ASHPs) sound emissions, focusing on the Microgeneration Certification Scheme (MCS) 020 standard and comparisons with acoustic modelling using BS ISO 9613-2. Acoustic modelling of a realistic scenario of a row of terraced houses showed that the MCS 020 method consistently predicted higher sound levels at the neighbouring dwelling first floor window compared to modelling using ISO 9613-2, often by 5-7 dB(A). This discrepancy was attributed to differences in treating reflective surfaces and barrier attenuation. Jack argued that whilst MCS 020 was designed for permitted development, it could also be used for planning purposes; however, it may be overly restrictive in many cases where the sound does not have tonal characteristics. Proposals were made for potential updates to MCS 020, and real-world installation studies to inform future standards and ensure a suitable balance between facilitating ASHP adoption and community sound management. Questions from the audience included whether a typical garden fence acted as a barrier and as a reflective surface as assumed in their ISO 9613-2 modelling assumptions, and the potential pitfalls of doing barrier calculations without knowing the spectrum of the noise source, especially when the source and receiver have near line of sight over the barrier.

Graham Parry (ACCON-UK) and Stephen Turner (Stephen Turner Acoustics) described what may be the first formal process for tackling inequities in noise impacts for a large infrastructure project in England. Noise assessment and management in England tends to focus on the effects on the average person. However it is acknowledged that there is a sizeable minority for whom the adverse effects of noise can be much greater than that for an average person. Although the original impact assessment for the Thames Tideway Tunnel project was based on the effects on the average person, a process was set up to consider impacts on people at a higher risk. Graham Parry chaired Tideway's Independent Compensation Panel and Stephen

Turner was Tideway's Independent Complaints Commissioner. Both Graham and Stephen described their separate responsibilities and gave examples of the issues faced. The compensation panel focused on objectively assessing claimants' arguments for compensation, according to their specific needs. The Independent Complaints Commissioner's role was to ensure that the panel followed the correct process. The scheme's cost constituted only 0.1% of the total project's budget, however it was argued that it made a real difference to people's lives. In the discussion there was recognition that similar schemes should become more common for large infrastructure projects in the UK in line with one of the pillars of sustainable development (reducing health inequalities).

Antonio J Torija Martinez (University of Salford) ended the session by giving an overview of the conference QuietDrones 2024, which took place in Manchester just before Acoustics 2024. The conference covered methods under development for establishing measurement standards on noise from Unmanned Aircraft Systems (UAS) and Urban Air Mobility (UAM) aircraft, as well as new metrics to characterise the impact of their noise on people and environment. The conference included four talks

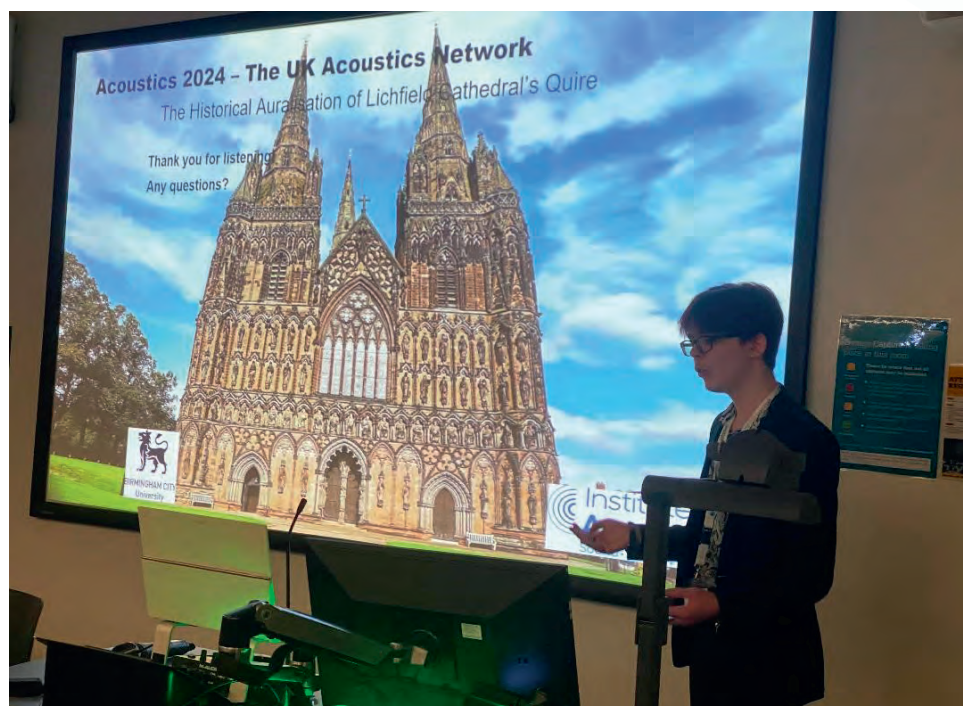
on human response to drone noise and four on community impact assessment. Antonio then provided more details about research currently ongoing at the University of Salford on human perception and short-term annoyance from noise from drones.

Musical Acoustics Group Session, chaired by Stephen Dance and David Sharp

The Musical Acoustics Group organised a whole day of presentations, talks, demonstrations and discussions. The first two sessions were chaired by Stephen Dance and the final session of the day was chaired by David Sharp.

The day started with Stephen Dance providing an update to his 2014 Tyndall Medal lecture on acoustics for the benefit of musicians entitled *Face the Music*. The update included how music has a different physiological effect to noise on the hearing system, how new free-to-use educational tools are available and how new assessment methods might offer the possibility of detecting early signs of hearing damage before permanent injury occurs. David Yates followed with a complementary talk on amateur brass and wind band sound exposure. David described this as his hobby but also how as an acoustician he wanted to know the sound levels his friends [P56](#)

Below: George Moore presenting his bachelor's dissertation on the auralisation of Lichfield Cathedral



know the sound levels his friends were exposed to during a typical two-hour practice. He offered some solutions aimed at slightly reducing the sound level. The final talk before the break was by Peter Wheeler on a potential method for reducing the sound levels produced at music events by reducing/removing the fundamental frequency. Peter explained that the dBA level was not affected at all, but the dBC level at the nearest neighbour indoors could be reduced by 6 dBC, whilst in the audience a reduction of 2-3 dBC was possible without affecting the perceived music quality.

After coffee, we heard from Gokce Kutsal on music performance anxiety amongst vocalists. Gokce used acoustic spectrograms to identify the difference between pre-training, during training and post training using the song *At Last* as a musical example. A benefit was clearly seen in their performances post training, illustrated by a short video. This was followed by a video presentation by a master's student, Vincent JeeSheng Tham, on the acoustics of a choir rehearsal space. Here, Vincent compared a refurbished rehearsal room to the new ISO 29531:2021 standard using acoustic measurements. He also managed to get 22 responses to a questionnaire comparing the refurbished space to the original state. He concluded that sound strength was more important to the singers than reverberation time. To end the morning, George Moore presented his bachelor's dissertation on the acoustics of Lichfield Cathedral. He had measured the quire and then modelled three versions in Odeon; the original Saxon quire 600AD, the Renaissance quire 1600AD and the quire as it currently stands. He then auralised the sound to provide a feeling of the relationship to God of the worshippers.

Immediately before lunch, the Musical Acoustics Group AGM was held, with David Sharp taking the minutes and a new Early Career Representative, Will Lewis, was elected to the committee.

The afternoon session started with an excellent presentation by Marco Aragó Bishop, a physics student at the University of Edinburgh. He described research on an artificially-blown bass crumhorn, using a laser sensor

and high speed video camera to measure the vibrations of the double reed at different blowing pressures. Period multiplication was observed; the instrument had a nominal pitch of F2 with associated oscillation state at 87Hz, but lowering the blowing pressure (underblowing) resulted in a sudden drop in frequency to a second stable oscillation regime at 62Hz. If instead the blowing pressure was lowered very slowly from the 87Hz oscillation state, a further unstable 33Hz oscillation state was observed. This third state could be achieved with greater stability by increasing the blowing pressure from the 62Hz oscillation state.

Next, Patrick Gaydecki of the University of Manchester described the latest advances included in his software/hardware package designed to process the raw output of an electric violin and produce a pleasing real violin sound. The system was originally developed to enable the electric violin output signal to be convolved with an impulse response measurement made on a high end violin such as a Guarneri or a Stradivarius. More recently, the software has been extended to allow the user to adjust a bank of filters to create their own bespoke frequency response. This can be done in real time until the musician is happy with the violin sound produced.

The afternoon session came to a close with Jiaxi You, also of the University of Manchester, describing her PhD research to restore old audio recordings using machine learning techniques. Jiaxi began by outlining how recordings in the early 20th century generally contained lots of noise, both as a consequence of the primitive nature of the recording process itself and poor storage of the recording media, most commonly wax cylinders or discs. She then described her application of a U-Net model for denoising recordings and played audio samples to demonstrate its effectiveness in removing features such as hiss, pops and clicks. Jiaxi moved on to describe the application of compensating filters for enhancement of denoised signals, and then a diffusion model for enhancement, in each case again playing audio samples to demonstrating their effectiveness.

Royal Environmental Health Institute of Scotland (REHIS), Chartered Institute of Environmental Health (CIEH) session, chaired by Stephen Turner

To mark the Institute's 50th Anniversary, the IOA liaised with the Royal Environmental Health Institute of Scotland and the Chartered Institute of Environmental Health to hold this session with speakers coming from various local authorities.



Stephen Turner introducing the REHIS and CIEH session

jointly by Somayya Yaqub from the London Borough of Ealing and Paul McCullough from Armagh, Banbridge and Craigavon Borough Council. Their topic was *Healthy sound environments: surviving engagements with EHPs*. They described examples of some of their cases, noting that they felt that, overall, the EH role is one of addressing inequality. They quoted the range of topics that they have to address, including windows, reconciling sound insulation with ventilation and overheating issues, the need for housing and the ensuing pressure and the better use of planning conditions. They noted the importance of considering the acoustics issues early on in a development so that the requirements are integrated in any design.

Kate Hughes from Halton Borough Council described a long-running case regarding barking dogs. With the statutory nuisance powers not working for her this time, Kate described how a Criminal Behaviour Order eventually succeeded in dealing with the problem. One of her conclusions was that the Statutory Nuisance regime is not robust enough.

The session then heard from Louise Manson from Angus Council who gave an overview of the regulatory regime associated with noise control in Scotland. She touched on the associated timescales that exist for pursuing formal cases and focused on a case when the planning controls imposed on a development failed to address the noise concerns and the issues that remained.

The final speaker was Claire Devlin from the City of Edinburgh Council. She described the different types of concert and event venues that the Council has to regulate and the different challenges involved.

The session concluded with a panel discussion picking up some of the points that had arisen from the presentations. One emerging theme was the view that the statutory nuisance regime needed reviewing because, as one of the speakers said, 'it is a bit clunky'.

It was good to hear from members of REHIS and CIEH who work at the regulatory coal face and hopefully, it will be possible to hold similar sessions at future IOA conferences.

Physical Acoustics Group Session, chaired by Shahram Taherzadeh

This was the last session of the conference. Originally, there were three papers submitted but one had to pull out just before the conference.

The first talk was by Keith Attenborough (Open University) on the influence of slanted pore wall roughness on sound absorption [by rigid porous surfaces]. His talk considered two cases of wall roughness, namely sinusoidal and zig-zag shapes. It included models for allowing the pore wall roughness in determination of pore tortuosity and flow resistivity and, through these, its influence on sound absorption by the porous surface. He applied the model to sound absorption by surfaces made from crushed nuts and wood chips. Optimisation of roughness amplitude and period to produce better low-frequency absorption was considered. One question put to Keith was on the effect of angle of incident sound and pore slant angles.

The second paper was presented by Haydar Aygun Of London South Bank University. His talk was on sound transmission loss through perforated porous slabs made from recycled waste building aggregate material. Results from initial tests using an impedance tube were reported, in particular the effect of adding basalt fibres to waste concrete. The resulting slabs with varying fibre content showed good mechanical performance. Slabs containing shorter basalt fibres showed higher sound absorption. Haydar also reported on some initial attempt at modelling the sound propagation through perforated slabs using a Multiphysics solvers. Questions to Haydar were on details of Multiphysics simulation.

Watch again

All these presentations were recorded and are on the IOA website. So, if you didn't attend, or you wanted to be in two places at the same time, you can watch the presentation that you missed. Special thanks are due to Chris Barlow who assisted with the initial discussions with the AV provider, and managed the helpers (from Farrat Isolevel) in each room during the conference. Thanks go to the helpers; Salim Hassan, Thomas Jebson, Jameel Malik and

Kyle Shippey, and to Oliver Farrell and Ryan Arbabi for allowing them to be available throughout the conference.

Overall, the conference was a great success, with the feedback being very positive of the venue, AV, catering and the organisation of the event, which (as has been the case for many years now) was arranged and managed by Linda Canty at the IOA head office (with the assistance of Fiona Pizzey (IOA) at the conference, IOA CEO Allan Chesney who was Secretary for the IOA AGM, and photographs by Alex Shaida (IOA Marketing)).

Linda's leaving

Finally, compiling this report gives me the opportunity to give a very big thank you to Linda Canty for all her years of service to the Institute, for arranging and enabling the many varying conferences over many years, and for assisting me in my role as Conference Chair since 2016. Linda is retiring at the end of this year, and her knowledge of, and dedication to, the Institute will be a great loss.

Happy retirement Linda.

We look forward to seeing as many as possible at Acoustics 2025. Further details will be released as soon as they have been finalised. ☺

List of sponsors

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(Christie and Gray, Cirrus Research, Getzner, and KP Acoustics sponsored the IOA 50th anniversary items, and Farrat Isolevel sponsored the conference dinner drinks reception).

List of exhibitors

AMC Mecanocaucho	Hottinger Bruel and Kjaer
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Irish Branch

By Siobhan Maher, Redkite Environmental Ltd

The Irish Branch held its AGM on 26 September 2024. A new Chair, Diarmuid Keaney of ICAN Acoustics, was nominated and duly elected at the AGM. Diarmuid is passionate about acoustics and plans to increase awareness in Ireland. We would like to thank the following for their work and input to the Committee; outgoing Chair, James Mangan (RSK Ireland); Damian Brosnan (MKO Ireland), who is stepping down as Honorary Secretary and David Coon (Causeway, Coast and Glens Borough Council) who has completed his term and is stepping down from the committee. Damian will continue as a member of the Committee.

The remaining roles have been assigned within the Irish Branch Committee:

- Paul McCullough (Armagh, Banbridge, Craigavon Borough Council) continues as Vice-Chair,
- Siobhan Maher (Redkite Environmental) steps into the role of Honorary Secretary,
- Ted Dalton (Dalton Acoustics) continues as Membership Secretary,
- Gary Duffy (Enfonic) takes up the role of Meetings Coordinator,
- Jacques Dalton steps into the role of Early Careers Group Representative, and,
- Damian Brosnan steps into the role of Acoustics Bulletin's editorial contact.

The remaining Committee members are:

- Martin Lester (Lester Acoustics),
- Sarah Middleton (HSE Ireland),
- Damian Kelly (AWN Consulting), and,
- Derek McCreanor (Enhance Acoustics).

The Irish Branch plans to hold two talks before Christmas; the rescheduled Gerry McCullagh Memorial Lecture by Peter Rogers on Pro-Pg Gym Acoustics Guidance and a second talk by Doug Manvel on changes to ISO 9613:2-2024.

London Branch

By Jack Tunstall

On Wednesday 9 October, the Branch welcomed a presentation by Ben West, lecturer at Birmingham City University, on the topic of office soundscape assessment and the suitability of existing methods.

The soundscape approach has been utilised in recent research for residential environments, but applications to indoor working environments remain limited. This talk discussed the suitability of soundscape evaluations for open-plan office acoustics. Perceptual assessments were completed by occupants of eight open-plan office floorplates, using the affective dimensions outlined in PD ISO/TS 12913-3:2019 and indoor soundscape studies.

Results indicated the suitability of the PD ISO/TS 12913-3:2019 two-dimensional model to open-plan office environments and a relationship between office soundscape perception, psychological wellbeing and work-related quality.

Following the excellent talk, discussions continued over drinks at the local pub. The Committee would like to thank Ben for his interesting and informative presentation.

50th anniversary event

To celebrate 50 years of the IOA, the London Branch hosted a special event on Wednesday 6 November 2024 at The Slug & Lettuce in Aldgate.

This included a panel discussion with past committee members sharing the history of the London Branch and providing their personal insight of the industry over the past 50 years. There was also a short quiz on the history of the London Branch and IOA. In addition, members had the chance to share their personal experiences, (be it best and worst moments!) while working in acoustics.

Get involved

The Branch organises regular meetings, typically on the second Wednesday of each month. All meetings are held in a hybrid format, allowing you to either attend virtually, or in person (typically at AECOM's office in Aldgate or at London South Bank University).



Ben West from Birmingham City University providing an in-depth look at research taken into looking at soundscape assessments within typical office spaces

The aim of these meetings is to keep our members informed about the latest developments and research in the field, while also providing opportunities for members to network with others. We are always on the lookout for new and exciting research from all industries to share with the membership. If you are interested in presenting at the London Branch or have a topic suggestion, please get in touch.

If you haven't already, make sure you're registered with the London Branch to stay informed about upcoming events.



North West Branch

By David Terry

To celebrate the 40th anniversary of the NW Branch, members gathered at Team Sport's indoor electric karting track in Warrington, on the evening of 6 July 2024. It was great to see lots of people in attendance and the event drew out some new faces, including those located in the Warrington area and those members with a particular set of skills i.e. driving fast. I could not believe the high standard of all attendees, and therefore, I am not ashamed to say I was pretty much the slowest person around the track. There was a good showing from Atkins (SNC Lavalin), Noise Consultants Limited and PDA. There were two separate groups, each competing in a Grand Prix style event (practice, qualifying and race) and the overall winners, one from each group, were Luke Hatton (Atkins) and Chris Wright (PDA Ltd).

The three fastest laps from the entire evening were awarded a trophy provided by CMS Danskin. First was Zach Simcox, second was Mark Metcalfe and Jamie Scanlan was third.

With pizza, drinks and socialising afterwards, it really was a lovely way to celebrate being part of the IOA and the NW Branch, which is still re-building and will be aiming to repeat this success in the coming months and years.

Scottish Branch

By Eleni Kontesidou, RMP and Peter Brooks, RES

The IOA Scottish Branch celebrated the IOA's 50th anniversary with an event at Built Environment – Smarter Transformation (BE-ST) in Hamilton on 13 June 2024. We were privileged to hear a fascinating summary of our acoustic history in Scotland (and beyond) by our five special guests; Alistair Somerville, Professor Murray Campbell, Professor Robin Mackenzie, Dick Bowdler and Professor Robert Craik.

This was followed by a very relevant talk from Tim Patzke of Pliteq UK Limited, who focused on quantifying and reducing embodied carbon in the acoustic design of mass timber buildings.

Our third excellent talk by Professor Sean Smith of University of Edinburgh explained the construction, energy and infrastructure challenges we face to meet Scotland's commitments on sustainability and the role which acousticians have to play in this.

We completed the day with an in-person tour of the BE-ST factory seeing the future of Scottish housing. This included homegrown Scottish cross-laminated timber solutions, recycled bricks, Passivhaus construction methods and mechanical ventilation with heat recovery systems.

It was wonderful to see the room full to capacity and a good number of online attendees too. Thanks to all those who took the time to attend and we greatly appreciate the support provided by Pliteq UK Limited and the IOA who sponsored the event. We are looking forward to the next 50 years!

International Women in Engineering Day

Later in June, a group of acousticians from the Scottish Branch came together on International Women in Engineering Day (INWED) to celebrate Dr Marion Ross (1903-1994) of the University of Edinburgh, and her contributions to acoustics. From recollections of her peers (Prof. Murray Campbell, Prof. Robin Mackenzie and others), we understand that Dr Ross, in addition to her numerous and impressive achievements, devised a course in acoustics for music students at the University of Edinburgh. This later developed into the very popular and innovative degree 'Physics and Music' offered by the UoE as well as the 'Acoustics and Music Technology' undergraduate and postgraduate degrees being taught at the university to this day. We were delighted to find out that in 2014 a road in the UoE King's Buildings campus was named in her honour and enjoyed visiting the site despite the rain. We hope to have a further presentation focussing on Dr Ross at a future Scottish Branch event.



Right: INWED Scottish Branch members gather at Marion Ross Road, (L-R) Anne Budd, Eleni Kontesidou, Christabel Goode, Emily Tilbury and June McClung



Attendees at the Scottish Branch 50th anniversary event at BE-ST in Hamilton

Southern Branch

Next-generation room acoustic modelling using cloud-computing, BIM integration, and wave-based simulations

By Teli Chinelis, Cahill Design Consultants

The IOA Southern Branch kicked off the new academic year on 25 September 2024 with an insightful and forward-looking event on *Next-generation room acoustic modelling using cloud-computing, BIM integration, and wave-based simulations*. Held online via Zoom, the session attracted an impressive 70 participants and concluded with a vibrant Q&A session, demonstrating the strong interest in cutting-edge tools for acoustic design.

The event featured a presentation by Dr Finnur Pind from Treble Acoustics, who expertly guided attendees through the advanced methodologies shaping the future of room acoustic modelling. His presentation covered a wide range of topics relevant to acousticians and professionals involved in architectural acoustics design.

Dr Pind introduced the participants to some of the most exciting advancements in acoustic simulation, focusing on how new tools can streamline workflows and enhance the accuracy of design assessments. He explored:

- **Wave-based modelling** and its hybrid approach with geometrical acoustics, offering improved precision in simulating sound behaviour in complex environments.
- **Cloud-accelerated simulations**, a growing trend that enables faster,

scalable processing for acousticians, reducing the computational time traditionally required for detailed simulations.

- **BIM integration**, a critical area for modern design workflows, where automated room geometry simplification aids in the creation of more accurate acoustic models. This automation significantly reduces the time and effort involved in preparing designs for simulation.
- **Absorption modelling**, where Dr Pind highlighted the shift from traditional energy-based absorption coefficients to impedance-based absorption. This method allows for more realistic modelling of sound absorption properties in various materials.
- **3DoF auralisation** and the concept of shareable auralisation via web platforms, opening up new possibilities for collaborative acoustic design across teams.
- **Python-based scripting and machine learning** applications for automating workflows and improving the efficiency of simulations. These tools can help acousticians overcome repetitive tasks and enhance the overall precision of acoustic assessments.

Throughout the presentation, Dr Pind showcased real-world case studies, including examples from open-plan offices, meeting rooms, and critical

listening spaces. These case studies demonstrated how the tools discussed could be applied to tackle both common and complex acoustic challenges.

The session was well-received by the audience, with active participation throughout. The Q&A session following the presentation was particularly lively, with participants posing a variety of insightful questions. These questions ranged from the practical implementation of the new modelling tools to the potential future advancements in acoustic simulations.

Dr Pind addressed the queries in detail, offering both technical advice and practical guidance for integrating these next-generation tools into day-to-day acoustic work.

For those who missed the live event, the recorded presentation is available for IOA members on the IOA website. CPD certification was also offered to participants, with details provided at the end of the session.

This event marked a successful start to the Southern Branch's series of events for the new academic year, providing attendees with valuable insights into the future of acoustic modelling. The integration of cloud-computing, BIM, and machine learning is set to play an ever-increasing role in the way acousticians approach design, and this session offered a detailed introduction to the possibilities ahead.

Yamaha piano, free to appreciative home

If any member would truly appreciate this beautiful Yamaha piano, please email Debbie Magoffin at gholamiamir748@gmail.com. It belonged to her late husband and is free to the best home it can find.



Yorkshire and North East Branch

By Benjamin Fenech, David Hiller and Jack Harvie-Clark

Proposed revisions to BS 8233: Aligning residential acoustic design with recent advances in the health evidence, and new proposals for sound insulation and sound absorption in non-domestic buildings

On 30 September, the IOA hosted a webinar presenting proposed revisions to BS 8233. The webinar was chaired by David Hiller (Arup), who is also Chair of the BS 8233 Revision Drafting Committee. Benjamin Fenech (UKHSA) and Jack Harvie-Clark (Apex Acoustics) talked about the proposals for the major changes. The webinar attracted more than 500 participants, reaching the limit on the IOA Zoom account for the first time – testament to the level of interest within the acoustics community. The proposed changes represent a significant shift in approach, aiming to align residential acoustic design more closely with recent advances in the health evidence, and offer more explicit guidance for sound insulation and sound absorption in non-domestic buildings. This article summarises the key points presented and provides additional information for some of the questions and concerns raised by attendees.

Background and need for change

BS 8233 was last updated in 2014, and since then, there have been significant developments in understanding the relationship between environmental noise and public health. The current standard specifies guidelines for internal sound levels within dwellings. This was largely based on the recommendations in the WHO Guidelines for Community Noise (1999) which were informed by evidence gathered from the 1960s to the early 90s. Since then there has been an exponential growth in high quality epidemiological evidence based on more accurate noise exposure estimates and more standardised methods for health outcome ascertainment. The majority of this evidence is expressed in terms of external sound levels, which is reflected in the way the latest (2018) WHO noise guidelines have been presented.

The proposed revision aims to:

1. Align with the WHO Environmental Noise Guidelines (2018)
2. Reflect recent scientific evidence on noise and health effects, using high quality systematic reviews and meta-analyses where available
3. Address the challenges of balancing housing development needs with health protection
4. Consider the interdependencies between noise, indoor air quality, and indoor temperature
5. Introduce simpler and more explicit guidance for sound insulation and sound absorption in non-domestic buildings.

Key proposed changes – residential developments

1. Two-step approach

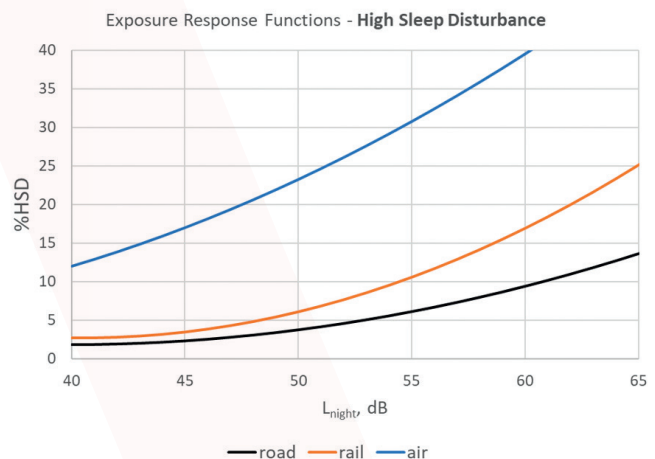
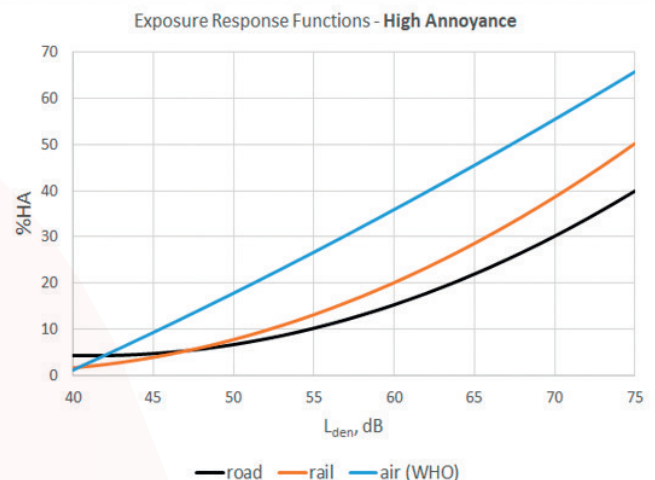
The revision proposes a two-step approach, that is broadly consistent with ProPG (2017):

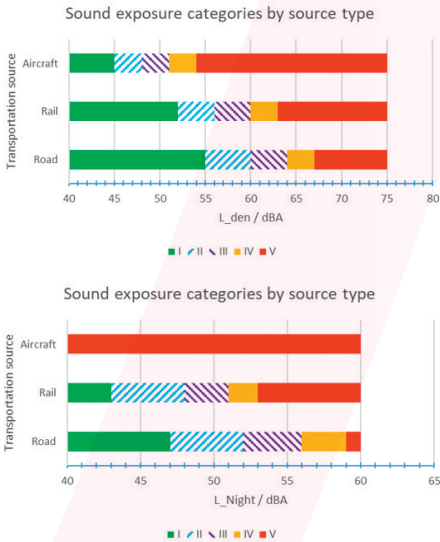
a) External sound levels: use external sound levels as the primary design driver for good environmental acoustic design, informed by the recent noise and health evidence. This step emphasises the importance of site layout, building orientation, massing, landscaping and noise barriers in minimising external sound impact on residential façades.

b) Building envelope design: once external levels are minimised, design the building envelope to achieve good internal environmental quality. This step considers the façade sound insulation performance in conjunction with ventilation and overheating mitigation strategies.

2. Sound exposure categories (SECs)

The proposal introduces five sound exposure categories based on the percentage of people highly annoyed (% HA) and highly sleep disturbed (% HSD). Category I aligns with the absolute risk increases used by the WHO for setting the 2018 guidelines levels, i.e. $\leq 10\%$ HA, and $\leq 3\%$ HSD. The categories increase in 5% steps for HA, and 2% steps for HSD. The highest Category V is open ended, where the effects are $> 25\%$ HA, $> 9\%$ HSD. These health risks were then converted to sound levels using recent systematic reviews and meta-analyses based on studies published since 2000. In accordance with the scientific evidence, annoyance is based on the L_{den} indicator, and sleep disturbance is based on the L_{night} indicator.



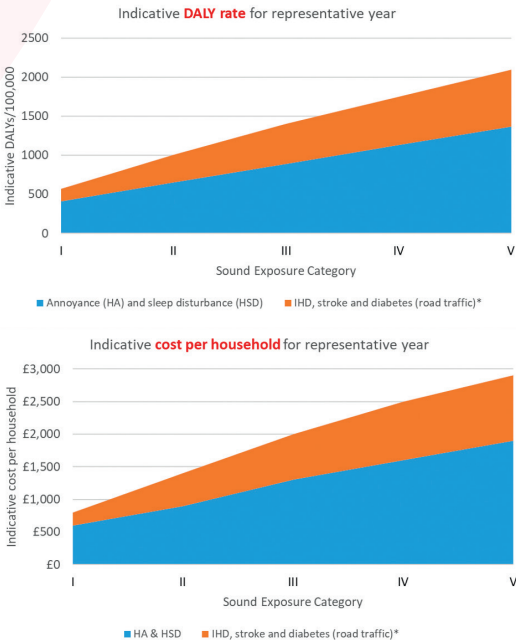


The sound levels delineating the five categories differ for road, rail and air traffic sound, reflecting differences in their associated health impacts for the same averaged sound level.

3. Health impact quantification

Given that it is currently not feasible to restrict all residential development solely to Category I (which

would be equivalent to meeting the WHO guidelines), the sound exposure categories represent a framework for demonstrating the increased risk to public health from building homes in areas with higher noise exposure. Whilst it was not possible to estimate the full extent of market and non-market costs associated with the associated adverse health effects, estimates of the social effect (DALYs) and monetary social cost (GBP) were produced for each category. These estimates may inform a more transparent assessment of the health implications of different noise exposure categories when developing local plans, and can aid in cost-benefit analyses of noise mitigation measures. Note that the draft BS8233 revision will not include this information.



4. Façade sound insulation requirements

The proposal suggests façade sound insulation requirements based on the Sound Exposure Categories. For road traffic the proposed façade sound insulation is $D_{nT,A,tr} \geq L_{den} - 32$ dB; for a standardised road traffic spectrum externally, this would be equivalent to an internal level of 35 dB L_{den} . A minimum value of 30 dB $D_{nT,A,tr}$ is proposed. Other

sources of transportation noise have the same level of sound insulation in the same SEC, as shown below. These requirements aim to provide commensurate levels of protection against external sound for levels that give rise to equivalent adverse health effects across different transportation noise sources. As SEC V is open ended, the façade sound insulation is calculated from the sound level for each transportation type.

	Façade sound insulation, $D_{nT,A,tr}$ / dB				
Sound exposure category	I	II	III	IV	V*
Road traffic					$\geq L_{den} - 32$
Railway traffic	≥ 30	≥ 30	≥ 32	≥ 35	$\geq L_{den} - 28$
Air traffic					$\geq L_{den} - 19$

* Minimum value in SEC V is 35 dB $D_{nT,A,tr}$

5. Provisions for ventilation and overheating

The proposed approach considers ventilation needs for indoor air quality and provisions for mitigating overheating risks holistically alongside internal acoustic conditions. It suggests different constraints for daytime and nighttime periods based on the SECs:

- Daytime provisions: Based on L_{den} SEC
- Nighttime provisions: Based on L_{night} SEC

The approach allows for opening windows in lower SECs but requires alternative solutions in higher SECs, particularly for nighttime periods. In the daytime intermittent operation is possible, but at night intermittent operation would disturb sleep. A more detailed assessment is proposed in the intermediate SECs, shown hatched.

Sound Exposure Category (SEC)	I	II	III	IV	V
Daytime provisions (L_{den} SEC)	Opening windows				Closed windows
Nighttime provisions (L_{night} SEC)					

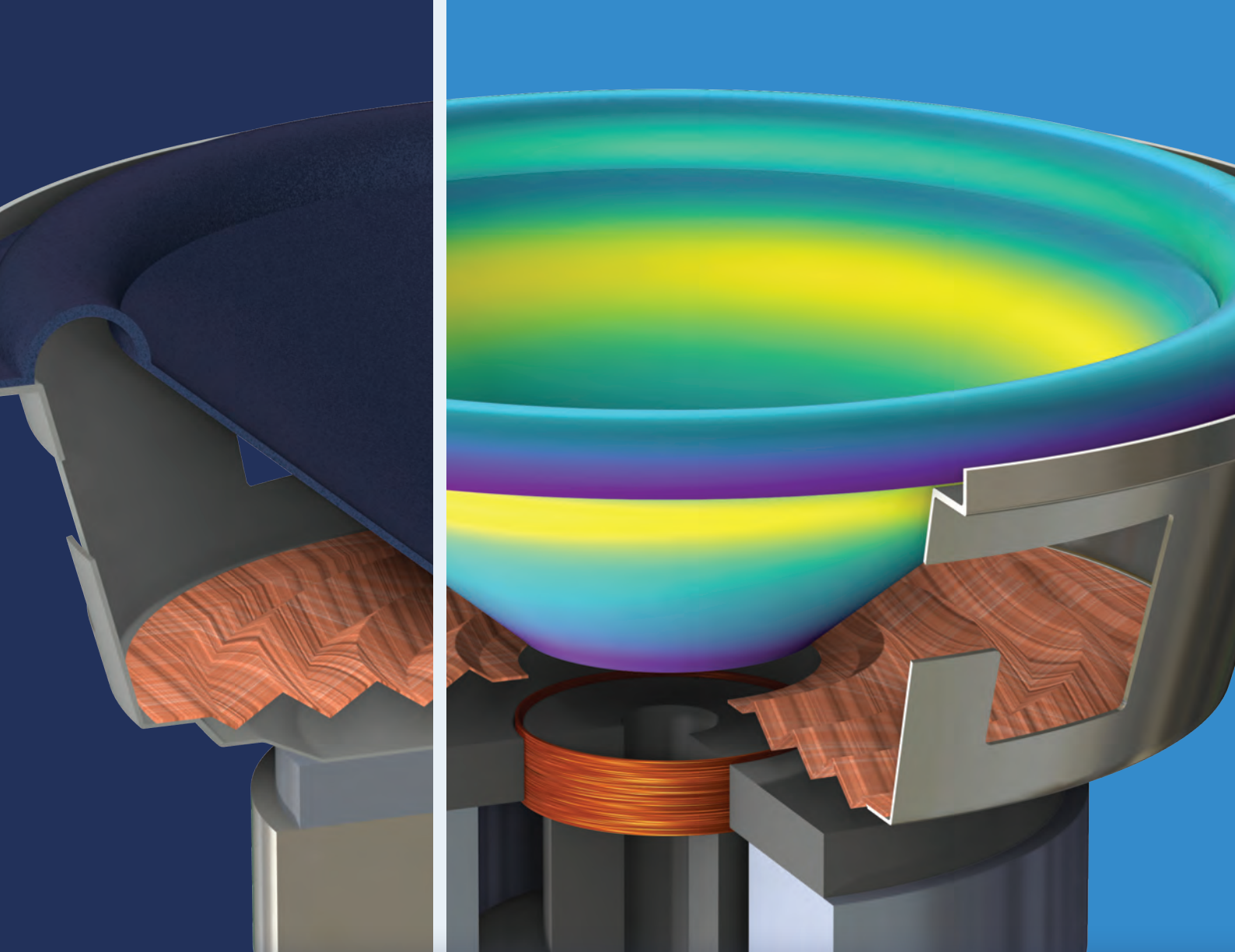
6. Removal of fixed internal targets

The proposal moves away from prescribing fixed internal targets in all cases. Instead, it focuses on achieving good façade sound insulation performance relative to external noise levels. This shift recognises the limited evidence base for specific internal noise levels and their relationship to health outcomes.

7. Sound insulation in non-domestic buildings

The revised standard proposes significant changes to the guidance on sound insulation between spaces. Key updates include:

- A new approach to specifying sound insulation requirements for offices and meeting rooms using the privacy factor concept. For meeting rooms in offices, this results in a table with categories A to D, providing clear semantic descriptions of the acoustic conditions achieved.
- Guidance on furniture elements in open-plan offices and their role in achieving speech privacy.
- Criteria for podcast rooms, reflecting the increasing prevalence of these spaces in modern office environments.
- A simplified two-dimensional sound insulation matrix for other situations, replacing the current three-dimensional matrix which can be challenging to interpret consistently.



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8. Sound absorption

The proposal introduces a more comprehensive approach to sound absorption design, particularly for controlling reverberant sound in various space types. Key elements include:

- Categories from A to F for sound absorption performance, based on absorption per unit volume (A/V) for rooms up to 2.5m in height, with adjustments for taller spaces.
- Guidance on applying these categories to different room types across various building sectors, including education, healthcare, offices, hospitality and retail, transportation hubs, industrial buildings, sports facilities and cultural and religious buildings.
- Recognition that in some spaces, such as performance venues or worship spaces, absorption design should be based on specific intelligibility or musicality requirements rather than general reverberant sound control.

Implications and benefits

1. Evidence-based approach: The proposed changes align more closely with current health evidence, leading to better health outcomes for residents.

2. Flexibility for local authorities: The Sound Exposure Categories provide a framework for local authorities to develop guidelines appropriate to their circumstances, allowing for more nuanced decision-making in planning processes.

3. Holistic design: By considering ventilation and overheating alongside acoustics, the proposal encourages a more integrated approach to building design, with the aim of improving overall indoor environmental quality. These aspects are currently covered by separate guidance documents.

4. Transparency in health impacts: Quantifying health impacts in terms of DALYs and monetary costs provides a clearer picture of the consequences of different design choices, facilitating more informed decision-making.

5. Source-specific considerations: The majority of the scientific evidence, and the latest WHO Guidelines, are noise-source specific. By differentiating between road, rail, and air traffic noise, the proposal acknowledges the varying impacts of different noise sources, leading to more appropriate mitigation strategies.

5. Improved sound insulation guidance: The new approach to specifying sound insulation requirements, particularly for offices and meeting rooms, offers clearer and more practical guidance. This could lead to better decision-making for acoustic environments in workplaces and improved speech privacy.

6. Comprehensive sound absorption design: The introduction of categories for sound absorption performance across various building types provides a more structured approach to controlling reverberant sound. This will result in improved acoustic comfort in a wide range of spaces.

Challenges and considerations

1. Transition period: There would likely be a period of adjustment as planners, regulators and the industry move from the current fixed internal noise criteria to the proposed approach based on external sound levels and façade performance.

2. Cost implications: The more nuanced approach to acoustic design may lead to increased costs in some cases, particularly where higher levels of façade sound insulation are required. However this is driven by the higher health and societal costs associated with building homes in areas with high noise exposure.

3. Applicability to existing buildings: The new standard may pose challenges when applied to refurbishment projects or changes of use in existing buildings, where options for good environmental acoustic design are limited.

4. Balancing competing requirements: Achieving the desired sound absorption performance while meeting other requirements (e.g. thermal mass for passive cooling) may present design challenges in some building types.

Conclusion

The proposed revisions to BS 8233 represent a significant shift in approach to acoustic design for residential and other buildings. By aligning more closely with current health evidence and adopting a more holistic view of indoor environmental quality, these changes aim to improve health outcomes and acoustic comfort for building occupants and potentially reduce health inequities.

However, the transition to this new approach would require careful management. The consultation process will be crucial in refining the proposals and addressing practical concerns raised by users of BS 8233. If implemented, it will be essential for all stakeholders – acousticians, architects, planners, and policymakers – to engage with these changes and work collaboratively to ensure their effective implementation.

Ultimately, while the proposed revisions present challenges, they also offer an opportunity to demonstrate the key role of acoustic design in creating healthier, more comfortable and inclusive living and working environments. As the built environment continues to evolve, so too must our approaches to acoustic design, and these proposed changes to BS 8233 represent an important step in that direction.

Addressing key FAQs and concerns

1. Similarity to PPG24 Noise Exposure Categories: While the SECs may seem reminiscent of PPG24, they differ in crucial ways. The SECs are based on current health evidence and provide a more nuanced approach that accounts for different noise sources. Unlike PPG24, the new approach doesn't imply planning guidance, but encourages good environmental acoustic design within a robust, evidence-based framework.

2. Mixed transportation sources: although not discussed in the current proposals, it is considered that where more than one transportation type affects a residential façade, each modality is evaluated separately, and the most onerous requirements adopted.

3. Non-transportation noise sources: The current proposal focuses on transportation noise due to the robust evidence base available. For industrial or commercial noise, BS 4142 remains applicable. Proposals to accommodate non-transportation sound are welcome. Future revisions may incorporate guidance for other noise sources as the evidence becomes available.

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4. Complexity and implementation: There may be concerns about the complexity of the new system for Environmental Health Officers (EHOs) and local authorities. The drafting committee recognises the need for comprehensive guidance and training to support implementation. The consultation process will be crucial in refining the approach, and consider concerns raised by the different stakeholders. The proposals are considered to be much simpler than the current range of information and processes for acoustic design. Are they too simplified? Sound Exposure Categories present an explicit picture of noise risk that is intended to be easier for EHOs to interpret than the current system.

5. Internal noise criteria: The shift away from fixed internal noise criteria is based on the limited evidence linking specific internal levels to health outcomes. The focus on façade sound insulation relative to external noise levels aims to provide appropriate protection while acknowledging the variability in individual responses to noise.

6. Criteria for L_{max} : The proposed guidelines omit criteria for noise from events, typically expressed in terms of L_{max} . Whilst event based metrics such as L_{max} are incredibly important to investigate physiological sleep disturbance, and for the detailed health impact assessment of changes in transport infrastructure during the night time period and shoulder hours, they are less useful when defining exposure categories based on long term health effects. Defining sound exposure categories in terms of L_{max} would necessitate detailed analysis of the level and distribution of all sound events occurring during the sleeping period, which many would consider unfeasible, especially for road traffic noise. Furthermore there is currently a lack of evidence associating short term awakenings with long term health effects. It is important to note that the evidence used for the night-time aspects of the proposals considered three dimensions of sleep disturbance: perceived awakening from sleep, the process of falling asleep, and general sleep disturbance. Furthermore, aligning the facade sound insulation with the source-dependent annoyance and sleep disturbance inherent in the Sound Exposure Categories is thought to take account to some extent of the variations in temporal characteristics of sound from rail and air traffic compared with road traffic.

7. External amenity area guidelines: Criteria for external amenity areas are also deliberately omitted. The SEC associated with L_{den} indicates the extent of annoyance when at home (i.e. indoors and outdoors). Local planning authorities may consider at what level of annoyance they may wish to set thresholds for acceptability, if that is what they desire.

8. Compatibility with existing practices: While the new approach represents a significant change, many elements of current practice remain relevant. The proposal aims to provide a framework that enhances rather than replaces existing expertise in acoustic design.

9. Evidence base: Questions about the evidence linking external noise levels to health impacts are important. The proposal draws on the most recent and comprehensive studies available, including those underpinning the WHO Environmental Noise Guidelines and more recent systematic reviews and meta-analyses. The drafting committee welcomes further discussion and evidence review during the consultation process.

10. Economic implications: The quantification of health impacts in monetary terms aims to provide a basis for informed decision-making, not to suggest direct compensation from developers.

It's a tool for balancing the costs and benefits of different design approaches, if this method is desired.

11. Applicability to various building types: The new guidance on sound insulation and absorption is designed to be applicable across all building types. However, specialised spaces require additional considerations beyond the scope of BS 8233.

12. Verification and compliance: Concerns about verifying compliance, particularly for façade sound insulation, are acknowledged. Practical methods for on-site verification are standardised in ISO 16283-3, which is also currently under revision.

13. Overheating and ventilation: The simplified approach to acoustics and overheating may be over simplified. The drafting committee welcomes further discussion and evidence-based proposals during the consultation process.

14. Compatibility with other guidance: concerns have been raised about potential alignment with other guidance, such as criteria in Building Bulletin 93. It is considered that the proposed guidance in BS 8233 represents the range of acoustic conditions that may be suitable for different types of spaces. BB 93 represents the legal minimum standards for schools, for example, but does not identify 'good'. It would be useful to raise significant conflicts with other guidance in the consultation.

The drafting committee encourages all stakeholders to engage with the BSI consultation process, providing detailed feedback and suggestions. Collaboration will be crucial in developing a standard that is both evidence-based and practical for implementation across the diverse range of scenarios encountered in acoustic design. The consultation is set to run from 15th November until 31st January 2025. You can comment here: <https://standardsdevelopment.bsigroup.com/>

Further reading: the IOA Acoustics 2024 conference paper *Updating BS 8233: Aligning Residential Acoustic Design Guidance With The Health Evidence*, J Harvie-Clark, B Fenech, Proc. IOA Vol. 46. Pt. 2. 2024, available at: <https://www.ioa.org.uk/catalogue/paper/updating-bs-8233-aligning-residential-acoustic-design-guidance-health-evidence>

Please refer to the letter on BS 8233 that we publish on page 66 of this issue.

If you would like to respond to this article, please email the editor at nickyr@warnersgroup.co.uk and we will publish them in the next available IOA e-newsletter and future issues of Acoustics Bulletin.

Reductive proposals for BS 8233 update – ‘The emperor’s new standard’

By Ed Clarke MIOA and Dani Fiumicelli MIOA

Introduction

The case for updating BS 8233 is good. The Standard needs to be updated to align and co-ordinate with other guidance on ventilation, overheating and thermal comfort, in particular. Another significant gap is around the approach to non-transportation noise sources, especially industrial noise, for which signposting to BS 4142 does nothing to assist in the design of new dwellings.

Recent studies show higher levels of annoyance and sleep disturbance due to transportation noise than those established historically, and this important ‘big picture’ work provides a good imperative to improve the protection provided to citizens and thereby reduce the burden of noise-related disease.

One of the fundamental challenges encountered by practitioners implementing BS 8233:2014, as identified by the ANC’s Acoustics Ventilation and Overheating Guide, was the mismatch between controlling façade sound insulation through planning conditions, and ventilation through building regulations but without any explicit means of addressing overheating. We now have Approved Document O to plug this gap, and a revision of BS 8233 provides the ideal opportunity to align and clarify guidance and best practice.

Proposals

Fenech and Harvie-Clark set out the basis of the proposed draft in their IOA paper¹ (also see page 61 of this issue) and presented this to ANC and IOA meetings recently with Drafting Committee Chair, David Hiller, stating: “*The main goal of this paper is to initiate a constructive dialogue within the acoustics community and relevant stakeholders to develop a more evidence-based and public health-oriented approach to residential acoustic design in the UK.*”

They have certainly initiated a dialogue, which we can only hope can become constructive. If their intention was to shock the acoustics community into paying attention to this standard revision with a ‘straw man’ proposal, it has been a resounding success.

The main problem is this: To align with public health research the proposal is to assess and control noise exposure via the external sound levels, under the mistaken assumption that this alignment with the evidence base justifies a departure from controlling internal levels.

I don’t think anyone has ever actually suggested that the community health impacts from environmental sound on residents in buildings is predicated more on the noise levels outside the buildings in

which they are exposed than those they experience internally. It is just much more difficult to do large-scale studies on actual internal levels in comparison with the convenience of large-scale noise mapping. Hence all the recent studies refer to external levels as a proxy.

By definition, a proxy is not the parameter we are trying to control to the benefit of residents to deliver suitable internal living conditions. It’s like trying to drive a car looking only at the sat-nav screen!

This lack of precision – the failure to target the parameter itself rather than the more convenient proxy is uniquely problematic in relation to exposure of individuals to environmental sound.

Noise is unlike other pollutants that affect health. If we use broad-brush measures that move population exposure to physical pollutants in the right direction, the population scale benefits accrue accordingly. Noise is different, it needs to be controlled more precisely. If, for example, rather than achieving internal conditions at night of 30dB $L_{Aeq,8hr}$ with L_{max} levels in the low 40s in two apartment buildings, we get one building with 20 $L_{Aeq,8hr}$ (L_{max} in the low 30s) and one building at 40 $L_{Aeq,8hr}$ (L_{max} in the low 50s) then BOTH sets of residents have dramatically compromised living conditions due to annoyance and sleep disturbance in the under-

References

- 1 Updating BS 8233: Aligning residential acoustic design guidance with the health evidence. Proc IOA Vol. 46. Pt. 2. 2024

attenuated case and high levels of neighbour noise disturbance in the over-attenuated building.

We have an established mechanism for controlling internal conditions in the UK using average daytime and night-time L_{Aeq} criteria, with an informed consideration of night-time maximum noise events. When looking for evidence on which to justify a revision to the standard, we should be looking for ways to improve this process, not dispense with it. There seems to be no evidence to contradict the WHO 2018 confirmation that the internal values from WHO 1999 are still valid.

The UK has a reputation for practical delivery against internal criteria. It's what we do really well. As with the delivery of sound insulation between dwellings via pre-completion testing and Robust Details, acousticians in other jurisdictions look on with envy at the UK's track record for effective delivery against measured in-situ performance.

The suggestion that we dispense with this process to align with the proxy parameter used for convenience in the broader-brush epidemiological studies is a reductive and retrograde proposition.

Call to action

The consultation draft will be published shortly, and we'd like to urge all members to review in detail and participate in the process. It would be great to seize this opportunity to engage the power of all the stakeholders in the IOA to deliver real improvements to this highly influential standard. Some examples of key questions we, the undersigned, would like to address are set out below:

- How do we best align with internal level requirements in Approved Doc O?
- How do we address commercial/ industrial noise without just pointing to BS 4142 ?
- How do we address leisure noise sources that are not considered elsewhere?
- How can we tackle sleep disturbance from L_{max} in a way that is both contextual and consistent? 🧠

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Alex	Brooker	MIOA
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The consultation is set to run from 15 November 2024 until 31 January 2025. You can comment here: <https://standardsdevelopment.bsigroup.com/>

If you would like to respond to this letter, please email the editor at nickyr@warnersgroup.co.uk and we will publish them in the next available IOA e-newsletter and future issues of Acoustics Bulletin.

‘Pistols in St Paul’s’ by Fiona Smyth

Pistols in St Paul’s plots an interesting journey through the development of auditorium acoustics as a science, over the first half of the 20th century.

Reviewed by Chris Middleton



On a winter's night in 1951, shortly after Evensong, the interior of St Paul's Cathedral echoed with gunfire. This was no act of violence but a scientific demonstration of new techniques in acoustic measurement. It aimed to address a surprising question: could a building be a musical instrument?

Pistols in St Paul's tells the fascinating story of the scientists, architects and musicians who set out to answer this question. Beginning at the turn of the century, their innovative experiments, which took place at sites ranging from Herbert Baker's

Assembly Chamber in Delhi to Abbey Road Studios and a disused munitions factory near Perivale, would come to define the field of 'architectural acoustics'. They culminated in 1951 with the opening of the Royal Festival Hall – the first building to be designed for musical tone.

Review

The book features a broad and diverse range of buildings in the UK and around the world, from Westminster Cathedral to the League of Nations Assembly Hall and the more modern Royal Festival Hall. Smyth provides a rich narrative of how each building came to life, including the context from which they emerged and the personalities of those who designed them.

The histories of the buildings themselves are blended with biographies of famous acoustics pioneers such as Hope Bagenal, and the first attempts to apply the work of Sabine. There are amusing insights into the variance of opinions between architects, musicians and acoustic specialists which will be familiar to present day designers. Critiques of the early auditoria from the RIBA journal, the Daily Mail and the Times range from gushing praise to indignation, including 'faulty acoustics', 'defective acoustics' and 'wasted speeches'.

Another rich thread running through the book is the progress of the acoustic science, from early experiments with choirs and orchestras brought in to test completed buildings, to the first measurements of reverberation time using tape recorders, and the construction of acoustic test laboratories such as the Building Research Station (BRE) and National Physics Laboratory. Progress was interrupted by the two world wars, but afterwards the redundant arms factories and surplus military vehicles were repurposed for acoustics research.

The tone of the book is easy going, with plenty of illustrations and diagrams of the buildings and the people who designed them. The drawings of the early test laboratories are particularly interesting and look very similar to those in modern text books, or the BBC engineering guide.

In this present age where computer aided ray traced acoustic analysis, a wealth of acoustic data and the introduction of AI are taken for granted, it is humbling to read about the hard work of those who laid the foundations of modern auditorium acoustics science. This book would be a valuable addition to the library of acoustic specialists, but is also accessible to a wider audience. ©

Pistols in St Paul's is published by Manchester University Press

Author, Fiona Smyth, is Associate Professor in the School of Art History and Cultural Policy at University College, Dublin

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Committee meetings 2024/2025

DAY	DATE	TIME	MEETING
Thursday	14 November	10.30	CCENM Examiners
Thursday	14 November	13.30	CCENM Committee
Tuesday	19 November	10.30	ASBA Examiners (Edinburgh)
Tuesday	19 November	13.30	ASBA Committee (Edinburgh)
Thursday	21 November	10.30	Membership
Tuesday	26 November	10.30	Research Co-ordination
Thursday	28 November	10.30	Executive
Wednesday	4 December	10.30	Council
Tuesday	28 January	10.30	Membership
Tuesday	4 February	All day	Engineering Interviews
Thursday	6 February	11.00	Publications
Tuesday	18 February	10.30	Engineering Meeting
Thursday	20 February	10.30	Diploma Tutors and Examiners
Thursday	20 February	13.30	Education
Tuesday	25 February	10.30	Meetings
Tuesday	4 March	10.30	Diploma Examiners (London)
Thursday	6 March	10.30	Executive
Thursday	13 March	10.30	Council
Tuesday	1 April	10.30	CCWPNA Examiners
Tuesday	1 April	13.30	CCWPNA Committee
Thursday	10 April	10.30	Membership
Thursday	24 April	10.30	Meetings

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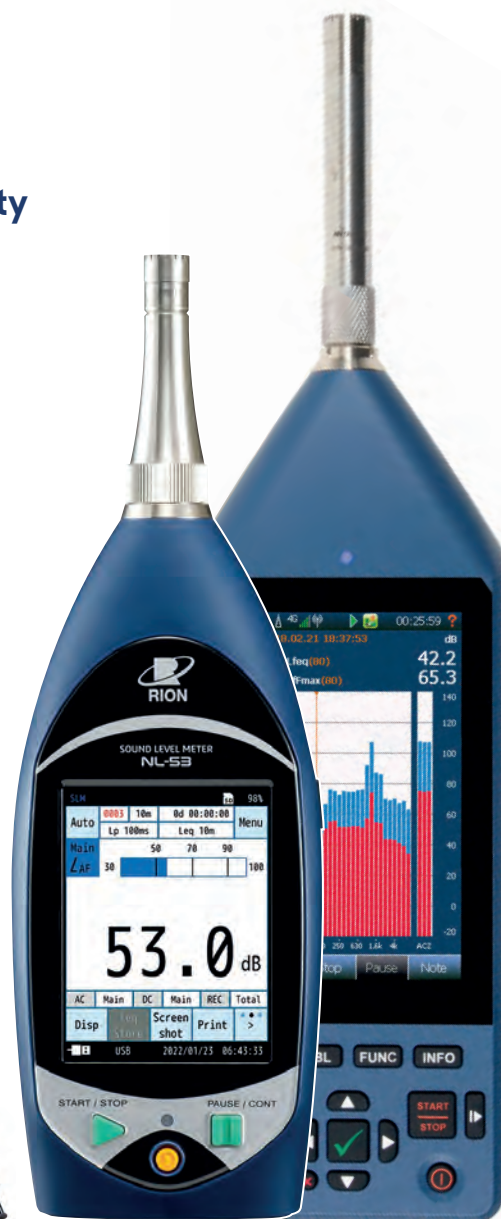
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