

NOISE / NEWS INTERNATIONAL

Volume 33, Number 3
2025 September

*A quarterly news magazine and
online digital blog published by
I-INCE and INCE-USA*

- NOISE-CON 2025 –
The Nature of Noise Control
- NOISE-CON 2025:
Highlights of the Technical
Program
- Inter-Noise 2025: Highlights
from São Paulo
- Inter-Noise 2025: Technical
Program Recap

Noise Control Conference Spotlight

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NOISE / NEWS INTERNATIONAL

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I-INCE

The International Institute of Noise Control Engineering (I-INCE) is a worldwide consortium of societies concerned with noise control and acoustics. I-INCE, chartered in Zürich, Switzerland, is the sponsor of the INTER-NOISE Series of International Congresses on Noise Control Engineering, and, with the Institute of Noise Control Engineering of the USA, publishes this quarterly magazine and its blog. I-INCE has an active program of technical initiatives. It currently has fifty-one member societies in forty-six countries.

INCE-USA

The Institute of Noise Control Engineering of the USA (INCE-USA) is a nonprofit professional organization incorporated in Washington, DC, USA. The primary purpose of the Institute is to promote engineering solutions to environmental noise problems. INCE-USA publishes the technical journal *Noise Control Engineering Journal* and with I-INCE publishes this quarterly magazine and its blog. INCE-USA sponsors the NOISE-CON series of national conferences on noise control engineering and the INTER-NOISE Congress when it is held in North America. INCE-USA members are professionals in the field of noise control engineering, and many offer consulting services in noise control. Any persons interested in noise control may become an associate of INCE-USA and receive both this magazine and *Noise Control Engineering Journal*.

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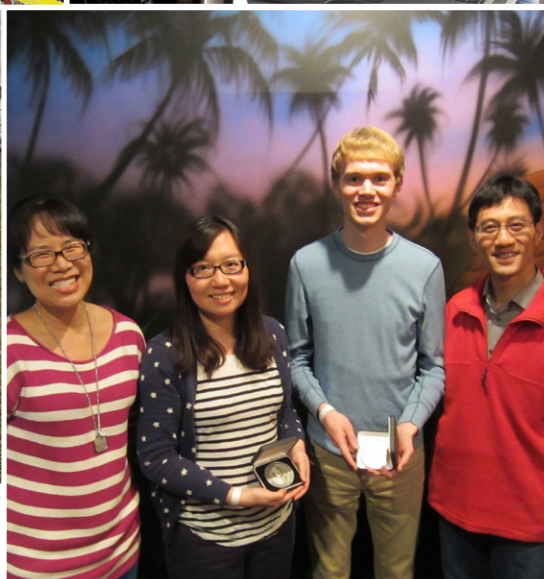
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Editor's Message

As the acoustics community continues to grow, few opportunities are as valuable as our annual gatherings at NOISE-CON and InterNoise. These conferences remain cornerstones of our field—bringing together researchers, consultants, students, policymakers, and industry professionals to share ideas, strengthen connections, and move the science of noise control and acoustics forward.

In this issue of *Noise News International*, we turn the spotlight onto the 2025 NOISE-CON and InterNoise conferences. These events showcased the remarkable breadth of our discipline, with sessions spanning transportation noise, building acoustics, community noise, psychoacoustics, and environmental soundscapes, among others. Beyond the technical depth, they served as a reminder of how collaboration across sectors and across borders enriches both research and practice.

Equally important, this issue highlights the support offered to students and young professionals. Through multiple grants and travel awards, the next generation of acousticians were able to participate fully—presenting their work, networking with mentors, and finding inspiration in the diversity of the community. These opportunities are critical to ensuring that our field remains vibrant, innovative, and inclusive.

The conferences also provided a thriving exposition floor, where sponsors and exhibitors shared the latest tools, technologies, and services that support the acoustics

profession. In this issue, we provide testimonies from some sponsors at NoiseCon 2025 where they talk about their experience. Their positive experiences highlight how the exposition is not only an essential part of the conference, but also a rewarding opportunity for sponsors to engage with a highly focused and motivated audience.

We hope that the stories and reflections in these pages will not only inform, but also encourage you to become more involved in future conferences—whether by presenting your research, or simply engaging in discussions that push the boundaries of our collective knowledge. Looking ahead, preparations are already underway for NoiseCon 2026 and InterNoise 2026. Read on ahead for an introduction to these upcoming conferences. We encourage you to mark your calendars and consider how you might take part.

Conferences are more than a meeting of experts—they are a celebration of community, shared progress, and the pursuit of better soundscapes for all. We look forward to seeing you at the next one!



Sunit Girdhar,
Westside Acoustics and
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Say hello to your organizing committee. From Left to Right: Courtney Schoedel (Public Relations), Les Blomberg (Keynote Speakers), Adam Alexander (TRB Liaison), Ahmed El-Aassar (Technical Chair), Ken Kaliski (Conference Chair), Dana Lodico (Technical Chair), Jeanette Hesedahl (Vice-General Chair), Michael Bahtiarian (Vice-General Chair). Not shown: Sunit Girdhar (Student Coordinator), Patricia Davies Technical Advisor), and Ethan Bourdeau (Accompanying Persons))

NOISE-CON 2025 – The Nature of Noise Control

Each year, we've chosen a venue for our annual noise control conference in a city. After all, cities are close to airports, tend to have larger hotels, and offer a wide variety of offsite dining. But cities tend to be loud, busy, and not necessarily where you would go to unwind a bit. But what if, instead, we hosted NOISE-CON at a resort? We would have natural quiet, more opportunities for people to get together, and a chance to enjoy what nature has to offer.

The venue

That was the impetus beyond NOISE-CON 2025, held at the Lodge at Spruce Peak resort, in Stowe, Vermont. Spruce Peak provided the best of both worlds. It was only an hour from the international airport in Burlington Vermont and provided 56,000 square feet of flexible indoor and outdoor meeting and event space. However, once you step out of the hotel, you immediately notice the difference from a city venue. As you look up, you see Mount Mansfield, the tallest mountain in Vermont, and you hear the sounds of birds and the swift currents of the Little River. The surroundings provided a break

from the usual conference room setting, offering attendees a chance to refresh mentally and physically — leading to greater creativity, bonding, and energy. One attendee reflected, *“The event provided an exceptional blend of educative technical sessions and a naturally serene environment.”*

Given the venue, we made full use of the outdoors. On the second morning of the conference, attendees got to choose between several events – a golf lesson at the resort's golf course, a 5k fun run through the woods around the resort, a dawn soundscape walk to several waterfalls, and ultimate frisbee.

The pre-conference

Before the conference started, we had a full Sunday of activities. 24 people signed up short courses in Acoustical Enclosures, Active Noise Control, and Fundamentals of Acoustics. During the afternoon, we hosted a first-time event – the Sunday Student Symposium. Paul Donovan, Jessica Dlements, and Stephen Hambric gave excellent presentations on vehicle and roadway noise, acoustical

consulting, and the fundamentals of vibro-acoustics. This was followed by a networking session with the students and representatives of the eight consulting company sponsors.

After a long Sunday, it was time for movie night! Filmed in Stowe, Vermont, *The Quietest Year* explores how noise's unpredictability, permanence, and ability to disrupt affects individuals, communities, public health, and the environment. We were fortunate to have the filmmaker, Karen Akins, agree to appear and answer audience questions after the screening.

The conference

NOISE-CON 2025 attracted 424 participants from a dozen countries and 41 of the 50 United States. Of these, 49 were students and 103 were either sponsors or exhibitors. The conference was co-sponsored by the Transportation Research Board, which attracted a bevy of transportation noise papers and presentations.

The conference kicked off with a keynote address by Peter Newman, the Dean of the Rubenstein School of Environment and Natural Resources at the University of Vermont. U.S. national parks and related areas grapple with the perpetual challenge of balancing high numbers of visitors while simultaneously protecting the ecological and experiential values of a place. Dr. Newman's presentation focused on one such impact of visitor use, the ecological and experiential effects of anthropogenic noise and the protection of natural soundscape. It was a dynamic and inspiring presentation. One person commented afterwards that the talk reinvigorated their commitment to noise control.

With that, the technical sessions of the conference began. We had a full technical program with 33 technical sessions, 123 technical papers, 14 vendor presentations, 2 workshops, 5 classic paper presentations, and 5 "young professional" presentations. These are the subject of Dana Lodico's article in this same issue of NNI.

The exhibition

The exhibition attracted 43 booths, including four new exhibitors. The venue for the exhibition was an octagonal room, full of natural light, which is used as ski lodge in

the winter. We held several events in the exhibition hall to drive traffic there, including Monday and Tuesday lunches, and evening opening reception, sponsored by Mason Industries, and coffee breaks. These events were wildly popular, and vendors were overall very pleased with the attendance in the exhibit hall. One exhibitor commented, *"I don't believe the event could have gone any smoother. Very nicely done! Beautiful facility!"*

In addition, 14 vendors took advantage of the opportunity to present their wares in the session rooms prior to the technical presentations. While we were initially worried about mixing commercial and technical content too closely, we had positive feedback on the new format.

The exhibition also included a giveaway of the technical library of George Maling. Students and engineers were able to pick from among the best publications in noise control engineering over the past 80 years.

Social events

A conference would be uninspiring without the chance to get together with colleagues and friends to chat about the latest client problem or even about the deck you're building. In addition to the Tuesday morning activities and meals mentioned above, we hosted a Board Certification informational breakfast, Women in Noise Control Engineering lunch, sponsored by PAC

International, LLC, and the Student Career Mentoring lunch, sponsored by NCAC. The highlight social event was the Tuesday evening social titled "Let's make some noise!", sponsored by The VMC Group and RMP Global. We took a well-earned break from technical sessions and business to relax with friends, family, peers, and

colleagues. This family-friendly event included numerous outdoor games like corn hole, Connect4, and a giant Jenga. We had an excellent dinner, accompanied by a local band, the Christine Malcolm Trio. The meal was topped off by a Ben & Jerry's ice cream cart.

A highlight of the Tuesday social included an auction of three rare books from George Maling's library, including a signed first edition of Leo Beranek's *Noise Control*. After some lively bidding, the auction raised over \$1,000 for the INCE Foundation.

"Outstanding event... strong technical sessions and exhibitors covering nearly every aspect of noise control engineering..."

Technical Tour

One of the most interesting events of the conference was the technical tour of Beta Technologies, an electric plan manufacturer based on the grounds of the Patrick Leahy International Airport in Burlington, Vermont. The tour provided a behind-the-scenes look at the company's electric aircraft development and manufacturing. We were learned about the systems and operations that support Beta Technologies' efforts to develop an electric transportation system and the company's sustainable manufacturing processes through a tour the fossil fuel-free facility. We also experienced a test flight of one of their aircraft to experience how quiet they are compared to conventional aircraft. In fact, before the tour started, an F35 fighter from the Vermont Air National Guard took off from the airport. The bone-chattering rumble from the F35 was in stark contrast to the almost inaudible sounds from Beta's aircraft.

Lessons learned for a resort conference

If you are going to plan a conference at a resort, there are a few things to keep in mind. First, you need to get people to it, so if public transportation is not available, you'll need to provide buses.

Second, because resorts tend to be more isolated, you'll need plenty of onsite dining or catering to feed participants who would otherwise go to local restaurants.

And third, you'll need to consider the size of the venue. Space is needed for both the technical program and exhibition. In addition, you'll need plenty of hotel rooms or nearby backup hotels. In our case, our main venue block filled up quickly, but we were able to find another room block at the nearby Stoweflake Resort. A shuttle bus between the two resorts was provided.

Conclusion

To be honest, we were nervous about whether people would leave the comfort zone of a big city conference and venture out into the country. But, as the saying goes, "if you build it, they will come"! We had great feedback on the event - scoring 4.7 out of 5.0 on the post event survey for overall in-person conference experience, making NOISE-CON 2025 one of the most successful conferences.

If this was a trial in whether a resort conference venue can work, I say, "Let's do it again!"



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INCE-USA is the only US professional organization devoted solely to Noise Control Engineering.



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The Exchange of Information at NOISE-CON 2025: Highlights of the Technical Program

This year, the annual NOISE-CON conference was held at a spectacular resort in Stowe, Vermont - the heart of the Green Mountains - with a focus on preserving the quiet. The conference was hosted by the Institute of Noise Control Engineering of the USA (INCE-USA) in conjunction with the Transportation Research Board (TRB).

The conference included five concurrent technical session rooms for a full two and half days to host 163 presentations and two workshops. Talks ranged from uses of AI in detection of construction noise to the design of a quiet chicken coop to the optimization of metamaterials to a workshop discussing the changing standards and codes in building acoustics. TRB was fully integrated within the technical program, with transportation noise related sessions occurring for the full program and including topics such as the reduction of noise from underwater vessels and implementation of the updated Federal Highway Administration Traffic Noise Model.

Dr. Peter Newman provided the first plenary talk, which passionately described the challenge of welcoming high numbers of visitors while simultaneously protecting the ecological and experiential values at U.S. national parks. A plenary panel that included Garret Keizer, Judy Rochat, Reuben Peckham, and Les Blomberg provided a discussion highlighting technologies and policies that may have a significant impact in quieting the future soundscape.

New for NOISE-CON 2025 - Additional Students and Young Professionals Opportunities

New opportunities were provided for young professionals - intended to provide opportunities for young people to present their work at a national conference without the added pressure of writing a paper. Students and early-career professionals were also given an opportunity to hear inspirational information about the kinds of projects and work they'll encounter in the workplace from four industry veterans. This is in addition to the other regular student activities, such as the student and classic paper competitions and discounted registration.

Let's Quiet the Airspace - Technical Tour at Beta Technologies

The conference included a technical tour with Beta Technologies, an aerospace company manufacturing quieter electric aircraft. The tour provided a behind-the-scenes look at the company's electric aircraft development and manufacturing. Attendees learned about the systems and operations that support Beta Technologies' efforts to develop an electric transportation system, toured the fossil fuel-free facility that manufactures electric aircraft and learned about the company's sustainable manufacturing practices. After the tour, attendees were able to watch - and listen to - a test flight to experience how quiet air travel might become.

Celebrating Student Excellence at NOISE-CON 2025: How Awards Open Doors for the Next Generation of Noise Control Engineers

Each year, the Institute of Noise Control Engineering of the USA (INCE-USA) recognizes exceptional student achievements in the field of noise control engineering, acoustics, and related disciplines. At the 2025 Honors and Awards Ceremony, held June 11 in conjunction with NOISE-CON 2025, the spotlight shone brightly on emerging talent from across the United States and beyond.

These awards are more than just honors—they provide recognition, networking opportunities, and in many cases, financial support that makes attending the conference possible. For many students, the awards are a stepping stone to further research, publication, and professional growth.

Hallberg Foundation Award – Fueling Student Travel and Participation

Funded through the generosity of the Elizabeth L. and Russell F. Hallberg Foundation, this award directly supports undergraduate and graduate students traveling to NOISE-CON to present their work. By offsetting travel expenses, the Hallberg Foundation Award helps ensure that promising young engineers can share their ideas on a national stage without financial barriers.

For 2025, nineteen recipients from across multiple universities benefited from this travel grant, enabling them to showcase cutting-edge research in front of peers.

Leo Beranek Student Medal for Excellence in Noise Control – Recognizing Technical Contributions

Named in honor of the legendary acoustician Leo Beranek, this prestigious medal celebrates outstanding contributions to the science and practice of noise control.

In 2025, five graduate and three undergraduate medals were awarded from students from various universities for research topics ranging from machine learning in structural acoustics to rocket launch noise analysis—

highlighting the diverse range of problems today's students are tackling.

Undergraduate Student Project Award – Spotlighting Early-Career Innovation

This award honors undergraduate projects of exceptional quality, providing recognition early in a student's academic career and encouraging future contributions to the field. The award often serves as a springboard for students to publish their findings, with recipients eligible for additional funds if their work appears in the *Noise Control Engineering Journal*.

In 2025, **Shaocheng Wu** (Purdue University) earned the award for his groundbreaking work on *Underwater Noise Control for Offshore Windfarms*. His research addresses a pressing environmental challenge: minimizing acoustic disturbance to marine ecosystems from renewable energy installations.

INCE Student Scholarship – Investing in Future Leaders

The INCE Student Scholarship, valued at \$6,000, is one of the most significant financial recognitions offered. In 2025, **Marissa Danielle Kelly** (University of Nebraska) received the award for her exceptional commitment to architectural acoustics, leadership within the acoustics community, and dedication to advancing noise control engineering.

This scholarship not only supports tuition and research costs but also affirms the recipient's potential to lead in the profession.

Student Paper Competition Awards – Elevating Research Communication Skills

Strong research deserves strong presentation skills, and the Student Paper Competition Awards recognize both. At NOISE-CON, students compete not only on the technical merit of their papers but also on the clarity and engagement of their oral delivery.

For 2025, winners included:

Joohyun Lee (Purdue University) – *Feature Analysis for Gear Growl in Electrified Powertrains*

Joshua Kapcsos (Penn State) – *Developments on ground blocking implementation in turbulence tool for sonic boom propagation*

Kara Hardy (Michigan Technological University) – *Bioinspired Acoustic Metamaterials: Mimicking the Cuttlebone*

Carter Paprocki (Penn State) – *Soundscape Source Classification*

Jinghe Yu (Purdue University) – *A Method to Simulate Printer Noise for Use in Psychoacoustic Tests*

Each award carried a \$1,000 prize, with an additional \$500 incentive for students whose work is later published in NCEJ.

Classic Papers in Noise Control Engineering Presentation Award – Honoring History While Inspiring the Future

This award bridges the past and present by challenging students to present seminal papers in the field, connecting decades-old ideas to today's context. By revisiting foundational research, students not only deepen their technical understanding but also gain perspective on how innovations evolve. In 2025, **William Johnston** (Michigan Technological University) was recognized for his engaging presentation of I.J. Sharland's 1964 paper *Sources of Noise in Axial Flow Fans*.

Why These Awards Matter

For many student awardees, the recognition is just the beginning. The tangible benefits—travel support, prize money, and research funding—remove financial obstacles to participating in national conferences. The intangible benefits—networking with industry leaders, receiving feedback from peers and experts, and building a resume with nationally recognized honors—can be just as valuable.

How to Apply for 2026

If you're a student working in noise control engineering, architectural acoustics, or related fields, INCE-USA offers multiple opportunities for recognition in 2026:

Leo Beranek Student Medal for Excellence in Noise Control – Due March 15

INCE-USA Student Paper Award – Due at conference registration

Classic Papers in Noise Control Engineering Award – Due at conference registration

INCE Student Scholarship – Due March 15

Undergraduate Student Project Award – Due March 15

Hallberg Foundation Award – Due at abstract submission deadline

Martin Hirschorn IAC Prize – Graduate Student Project Award – Due July 31 (applications currently open!)

Full details, including eligibility criteria and submission guidelines, are available at www.inceusa.org.

A Call to the Next Generation

Whether you're an undergraduate exploring your first research project or a graduate student pushing the boundaries of noise control technology, these awards are designed to recognize and support you. The 2025 ceremony made one thing clear: the future of the field is bright, and INCE-USA is committed to nurturing that future.

If you have innovative ideas, a passion for sound and vibration control, and the drive to share your work with the professional community, start preparing your submission now. Your research could be the next to inspire—and your name could be among the honorees at NOISE-CON 2026.

Messages from our NOISE-CON 2025 Sponsors



Sigicom Inc. (Gold sponsor and Exhibitor)

Participating as both a sponsor and exhibitor was a rewarding experience that delivered tangible value across multiple fronts. The process from initial coordination to on-site execution was seamless, allowing our team to focus on meaningful NoiseCon attendees' engagement, rather than logistics.

One of the standout advantages was the booth placement afforded by our sponsorship. Being positioned in a well-trafficked area amplified our visibility, facilitated

stronger connections, and sparked more spontaneous conversations with key stakeholders. Overall, the experience elevated Sigicom's presence and our focus promoting our new **INFRA C50 Class 1 SLM**. The exhibition allowed us to deepen relationships and reinforce our commitment to industry leadership.

Certainly, a strategic investment that paid dividends in both exposure and impact.

Soundcoat (Exhibitor)

Participating as an exhibitor was a valuable experience that allowed Soundcoat to connect with key industry leaders, hear about the latest advances in software, techniques, and applications, and gain a deeper understanding of the market challenges shaping our sector. Having the opportunity to present before a session was especially significant for us, as it gave us a platform to showcase our expertise and strengthen our presence in the industry. The event itself was well organized, with clear coordination between the show management team handling logistics and the content team curating sessions, which made the process smooth and easy to navigate. Overall, the experience helped us stay maintain and grow important connections and reinforce our role as an active contributor in acoustics.



MAXXON

Maxxon was very happy for the opportunity to sponsor Noise-Con 2025 in Stowe, Vermont. Sponsoring and attending Noise-Con provided a valuable opportunity to connect with colleagues in the acoustical consulting and engineering fields from across the country. We look forward to the acoustical conferences because they're great places to learn about solutions that consultants need in real-world applications that we don't see on a day-to-day basis in the manufacturing world. We love the opportunity to make connections with some of the greatest minds in the field.

Working with the organizing team was an easy and smooth experience. We appreciated the flexibility we were given to shape our sponsorship and choose which events and processes we wanted to support. Through our sponsorship we were able to gain visibility while getting the opportunity to contribute to the success of the conference overall. It was an honor to sponsor Noise-Con 2025, and we can't wait to see everyone in Long Beach, California for Noise-Con 2026.

CDM Stravitec

CDM Stravitec was proud to participate as a Gold Sponsor at the 2025 Noise-Con conference held this past June. CDM Stravitec is a Structural Acoustics, and Vibration Technology Company committed to helping the acoustical consultant community make the world a quieter place. We had the pleasure of presenting a paper entitled "Optimizing Floating Floor Design for an Elevator Machine Room", where we outlined a case study with a tailored Stravifloor solution for 45 Strachan Avenue in Toronto, CA.

Our goals in attending were to support thought leadership in the world of acoustics and vibration control and to meet with both existing and new customers in the North American market. We were pleased with the turnout and found that our booth staff had very engaged visitors who were eager to learn more about how we can help them. The conference staff made logistics easy for shipping, receiving, and lead capture. Our booth selection process was also easy.

Overall, our experience with the 2025 Noise-Con Conference was positive. We met new customers and strengthened relationships with existing ones. Noise-Con is a great way to get face time with the acoustical consultant community.

Review of *Noise Control: From Concept to Application (2nd Edition)* by Colin H. Hansen and Kristy L. Hansen

Reviewed by Professor David Herrin (U Kentucky)

Bies and Hansen released the 1st edition of *Engineering Noise Control: Theory and Practice* in 1988. That book is now in its 6th edition and is currently authored by the original authors with Kristy Hansen and Carl Howard. It has doubled in size and is far more comprehensive than the original edition. Criticisms of the first few editions have been addressed, and the book has been consistently updated to incorporate recent research. The current edition is arguably the best single volume reference for noise control engineers. Though it does include some basic calculus in the derivations, mathematics is mostly algebraic, and formulae can be directly used for common noise control applications. Indeed, the authors have also created an accompanying Engineering Noise Control software that incorporates most of the equations in the book. This text has consistently been the first noise control reference book that I turn to. Nonetheless, this book is perhaps not the best textbook for a noise control course. First, it is probably too comprehensive for students. Secondly, the book does not include example problems.

In 2005, Colin Hansen rectified this by paring the book down and adding numerous example problems. The resulting textbook entitled *Noise Control: From Concept to Application* was suitable for an engineering noise control course or a sequence of courses. The second edition of the book arrived in 2022 and is coauthored by Kristy Hansen.

The book consists of 8 chapters which are listed below.

- Chapter 1 – Fundamentals
- Chapter 2 – Loudness, Descriptors of Noise, Noise Criteria and Instrumentation
- Chapter 3 – Sound Sources and Sound Power Determination from Measurement
- Chapter 4 – Sound Propagation Outdoors
- Chapter 5 – Sound-Absorbing Materials
- Chapter 6 – Sound in Rooms
- Chapter 7 – Partitions, Enclosures, and Barriers
- Chapter 8 – Muffling Devices

No obvious topics are missing. The only topic that I include in my noise control course that is not covered is basic signal processing. However, that topic is perhaps better addressed in another course.

The most striking feature of the book is the large number of example problems. For example, Chapter 1 includes 49 example problems with solutions. There are 15 additional problems that can be assigned to students at the end of the chapter. Chapter 2 features 18 example problems with worked solutions and 16 additional homework problems. I am not aware of any other noise control textbook that has a comparable number of problems. Some problems are derivations, and graduate students will greatly appreciate the content. Accordingly, this book is more mathematical than *Engineering Noise Control: Theory and Practice*. Consequently, I think that most working noise control engineers will prefer that book.

However, *Noise Control: From Concept to Application* is certainly more suitable for the classroom. The explanations are clear. Though pared down from *Engineering Noise Control: Theory and Practice*, the book is more detailed and comprehensive than similar texts. Most importantly, students and instructors will appreciate the worked examples. I am very satisfied with the book and plan to use it for my graduate level engineering noise control class in upcoming semesters. I also think it is the most user friendly of all similar books and can certainly be used by noise control engineers looking to better learn the fundamentals. This is a fantastic book.



What is All the Noise About?

Making a difference – Ralph Hillquist

Jim Thompson

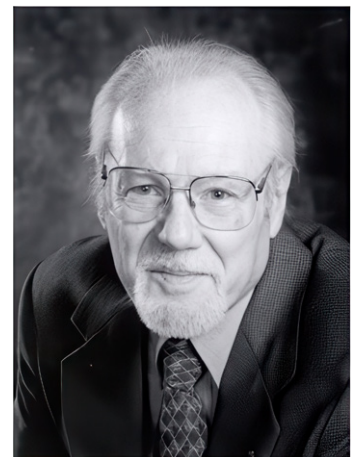
This column is going to be a little different. I want to issue a challenge to those reading this. You are all aware of people who have an idea and make things happen. This is my take on one of them, Ralph Hillquist. Meeting him changed my life. I want to ask if you in some small way can follow Ralph's example.

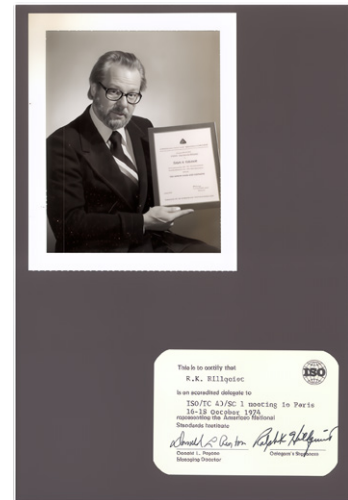
In 1985, the first SAE Noise and Vibration Conference (NVC) was held in Traverse City, Michigan. I met Ralph Hillquist for the first time at this conference. I did not know it at the time, but Ralph had created this conference.

Ralph passionately believed in getting people together to solve problems. He was eager to talk with people about issues related to noise control and the automotive industry. He had worked for General Motors, but his passion really took off after he retired. He made it his mission to create a noise and vibration conference for the mobility industry, and he worked tirelessly to make it happen.

If you saw Ralph at the early NVC events, he was a blur. He was walking quickly from one place to another grumbling about something not being done right or that he had to talk with this person or that. It is no exaggeration to say that he made this conference a success by his force of will. His enthusiasm and dedication were infectious. All of us, even remotely involved in the conference, felt we had to do more to live up to Ralph's example.

The fortieth anniversary NVC was just held a few weeks ago with roughly 900 people attending. It is the largest mobility noise and vibration conference in the world. It continues to be the conference that anyone involved in mobility noise and vibration feels they must attend. The list of attendees includes companies from aircraft to off-highway manufacturers. The supporting industries and suppliers are also there. Clearly, Ralph's legacy lives on.





However, Ralph's legacy is much more than just a conference. Let me jump back to 1985 and relate the impact Ralph had on my life. In 1985 I was standing in line to get my conference proceedings. In those days, you had to register and get a ticket to get your proceedings. They were thick books of hundreds of pages.

As I was standing in line this white-haired guy was walking past me. He suddenly stopped and came up close to read my name tag. He asked if I worked in tire noise, and I said yes. He then grabbed my arm and pulled me into a room off the hall in which I was standing.

This white-haired guy was Ralph Hillquist. He was concerned about efforts in Europe to regulate tire noise and wanted someone from the US involved. After 45 minutes of discussion, I got back in line to get my proceedings. I did not know it at the time, but that meeting changed my life. I had only been at Goodyear for less than two years. I knew just enough about tire noise to be dangerous, but Ralph decided I was the guy to represent the US.

After that meeting, I attended meetings with the EU in Brussels and ISO in Geneva. I served as part of a US tire industry group of experts providing advice and information to a series of international committees. Also, I chaired an SAE standards committee on pass-by noise. I doubt any of this would have happened if I had not met Ralph. It is not an exaggeration to say that he changed my life.

After that first meeting, Ralph always stopped to say hello and talk with me whenever we met. I was just a "peon", and he was a big wheel. His attention really meant something to me. Most of the time at conferences or meetings, Ralph would grab my arm and pull me over

to meet someone. Often neither the person nor I knew why Ralph was introducing us. However, later in my career these people became important acquaintances and advisors. I hope this gives a glimpse of Ralph's impact on me.

To prevent leaving the wrong impression, this is my story, but Ralph was mentoring and encouraging dozens of other people. Many of the people he introduced me to were also those he was hoping could take a leadership role. Ralph's impact was much greater than just that on me. Beyond the conference, Ralph affect the lives and careers of many people.

The Challenge

Can you follow in Ralph's footsteps? Can you make a difference in noise control. Maybe you have already done so but could do more. I do my best to remember the example set by Ralph. He believed in bringing people together to solve problems and worked tirelessly to bring groups together. I have tried to stay involved with INCE and SAE especially with organizing and participating in conferences. My biggest effort toward meeting the challenge of living up to Ralph's ideals has been making the co-location of the SAE NVC and the INCE-USA NOISE-CON conferences happen in 2017 and 2023. I will also be helping with the collaboration in 2027. It took me 10 years to make the event happen in 2017, but heading towards the tenth anniversary, it seems worth the effort. I hope Ralph would appreciate what I have done.

So, what about you? What have you done or what are you going to do to bring people together to solve noise control issues? I would like to hear your ideas and accomplishments.



Inter-Noise 2025 transforms São Paulo into the world capital of acoustics with innovation, Brazilian leadership, and scientific legacy

The conference brought together leading international researchers and promoted Brazilians in the international community

From August 24 to 27, 2025, the city of São Paulo hosted the **54th edition of Inter-Noise - International Congress & Exposition on Noise Control Engineering** – one of the most important international conferences dedicated to acoustic engineering and noise control. Held for the second time in Brazil, the event brought together around 700 experts, including approximately 230 students, from over 30 countries at the WTC Events Center, promoting debates, knowledge exchanges, and

experiences on acoustic solutions for a healthier and more sustainable world.

With the theme “**Connections for a better Sounding World**”, the conference reinforced the importance of international cooperation and technical innovation in tackling noise pollution. Organized by the Brazilian Association for Acoustic Quality (ProAcústica), a member of the International Institute of Noise Control Engineering (I-INCE), **Inter-Noise 2025 SP** established Brazil as a global leader in the field, cementing a legacy that will remain in the history of national research.

Innovative format and international impact

According to the president of **Inter-Noise 2025 SP**, engineer Davi Akkerman, holding a conference of this size in Brazil was a significant achievement. “We were very innovative in the format, with the silent plenary session that accommodated three simultaneous audiences, side by side, without any acoustic interference. We had this great connection between the exhibition and plenary sessions, with leading names in acoustics giving lectures here in Brazil. It was a memorable event, as never before has an Inter-Noise been as impactful and innovative as the one we held in São Paulo,” he celebrated.

The conference welcomed around 700 attendees, including 228 students. Brazilians made up the largest audience, accounting for 56% of the registrations, followed by China (5%), Japan (5%), South Korea (4%), and countries such as Chile, the United States, Italy, Germany, and Turkey (3% each). Brazil also led in the number of presentations, with 39% of the papers, followed by China (8%), Japan (7%), Canada, South Korea, and the United States (4%), and Germany, Hong Kong, Turkey, France, and Italy (3% each).

Technical content and thematic diversity

The technical program was divided into five major themes: Vibration Engineering Science and Acoustics; Industrial and Transportation Applications; Applications in Materials, Architecture, and the Environment; Human Factors; and Multidisciplinary approaches.

In total, 431 presentations were given, including 317 lectures, 78 pre-recorded presentations, and 36 poster presentations in the main hall. Brazil, in addition to bringing the largest number of visitors, also had the largest number of presentations, totaling 39% of the papers. The others countries participating were: China (8%); Japan (7%); Canada, South Korea and United States (4%); Germany, Hong Kong, Turkey, France, and Italy (3%).

The plenary sessions or keynote lectures, covered topics ranging from noise capture and the challenges of audio separation to the possibilities of applying machine learning in acoustic environments. Keynote speakers included Alice Cicirello (University of Cambridge), Chiara Scrosati (CNR-ITC), Júlio A. Cordioli (UFSC), Nilesh Madhu (University of Ghent), Bruno Masiero (Unicamp), Nouredine Atalla (Université de Sherbrooke), and Li Cheng (Hong Kong Polytechnic University).



In addition to the central themes of acoustic engineering, the conference also presented studies exploring the relationship between acoustics, education, and architecture, such as the impact of urban noise on schools and the analysis of typologies focused on music education.

Regarding urban areas, three Brazilian research projects addressed the challenges of noise pollution in cities in the Northeast. Conducted in Arapiraca (AL) and Aracaju (SE), the studies highlight the central role of road traffic as the main source of environmental noise and reinforce the importance of acoustic mapping as a tool for urban planning and public health promotion.

Another presentation featured research conducted by undergraduate and graduate students at the Federal University of Rio Grande do Norte (UFRN), with support from the CNPq (National Council for the Advancement of Science and Technology), which reveals the harmful effects of noise generated by wind farms on the Quilombola Community of Macambira, located in Serra de Santana, in the municipality of Lagoa Nova (RN).

Aeronautical acoustics has also been the focus of national and international studies, which have covered everything from population impacts in large urban centers to immersive sound simulation technologies in aircraft cabins.

Parallel and social activities

One of the most memorable moments was the **Women in Noise Control Lunche**, which celebrated the female presence in acoustics, fostering connections, the exchange of experiences, and reflections on leadership, diversity and representation in the sector. The event's success reinforces the importance of spaces dedicated to the leadership of women in technical and scientific fields, amplifying voices and inspiring new career paths.

Another highly sought-after activity was the **IN25 Soundwalk**, a sound walk guided by Brazilian researcher Dr. Margret Engel (TU Dresden), held near the WTC Events Center. Engel presented measurement instruments, recording techniques, and analysis methods,





using a questionnaire completed by participants as the basis for future scientific publication.

The final activity of **Inter-Noise 2025 SP** was a technical visit to Sala São Paulo, a concert hall whose acoustic design has become a national and international landmark. The project's acoustic consultant, José Augusto Nepomuceno, guided visitors and shared the challenges and solutions developed, such as the movable ceiling panels.

Industry participation and cases study presentations

Industry representatives brought experts to discuss material specifications and present real-world projects. Architect Paula Omizzolo, Knauf's technical and specification manager, demonstrated applications in hospitals, businesses and retail. Saint-Gobain brought

Juan Negreira, a global leader, who presented a spanish case study and participated in a lecture on sustainability and LEED Certification.

The Brazilian company Trisoft, focused on sustainable products, participated with a lecture by CEO Mauricio Cohab, who highlighted the importance of acoustics in architectural projects. Crysound CEO Jason Cao presented acoustic cameras, which sparked great interest among attendees.

A legacy for Brazilian science

ProAcústica President Marcos Holtz celebrated the results of **Inter-Noise 2025 SP**: "It was a very complex organization, because we had to meet many international criteria. We brought innovations like the silent arena, our multimedia system was impeccable, and our app worked perfectly. It was an event of great technical quality and

also a lot of joy. It truly had the Brazilian flair, in the most positive sense of the word.”

The technical program coordinator, Carolina Monteiro, also highlighted the event’s impact: “Since there isn’t such a large number of Brazilians participating outside the country, we were able to receive feedback from foreigners about how good and interesting Brazilian productions are. This is a lasting legacy for our community. It was also an opportunity for many Brazilians to participate in an international conference for the first time.”

At the closing ceremony, the next edition of Inter-Noise was officially announced, to be held in Adelaide, Australia, from August 9 to 12, 2026, with the theme “**From the Outback to the Ocean,**” organized by the Australian Acoustic Society (AAS) and I-INCE.

The event featured the following sponsors and exhibitors:

- **Diamond:** Ecophon Saint-Gobain and Trisoft Revestimentos Funcionais
- **Platinum:** Crysound, Deco Trading, Getzner and Knauf
- **Gold:** Acoem and Ambi
- **Silver:** 3R Brasil, Arkflex, Atenua Som, Aubicon, Diarco, Gerb, Grom Acústica e Vibração, IMMI, KR3, Mason Industries MTS, Oterprem, Senior, Silentium, Técnica, and Zlab
- **Exhibitors:** Bedrok Audio BV, Everisol, HBK Brasil, Müller BBM Group, Norsonic, NTI Audio, Odeon, Seven Bel, Vibtech, and Zxonic Technology





Inter-Noise 2025: Technical Program Highlights

The 54th International Congress & Exposition on Noise Control Engineering (Inter-Noise 2025) took place from August 24-27, 2025, in São Paulo, Brazil. Organized by the Brazilian Association for Acoustic Quality (ProAcústica) and co-hosted by the International Institute of Noise Control Engineering (I-INCE), the congress was held at the WTC Events Center & Sheraton WTC Hotel under the theme “Connections for a Better Sounding World.”

Technical Program Overview

The technical program featured an lineup of keynotes and plenary lectures, parallel technical sessions, and special events designed to foster knowledge exchange among approximately 700 specialists, researchers, manufacturers, and students from around the world. The congress was held in a hybrid format, accommodating both in-person and online participants from more than 50 countries.

Two innovative presentation formats were introduced at Inter-Noise 2025: e-posters (digital screens where poster presentations were displayed) and silent plenary sessions,

which allowed exhibitions, technical sessions, and plenary lectures to coexist without noise interference. The technical program included a total of 431 papers presented across various formats: 317 in-person oral presentations (73.5%), 36 onsite e-poster presentations (8.4%), and 78 online pre-recorded presentations (18.1%). Presenters in the online and poster categories had the opportunity to deliver flash presentations on the main stage, enhancing visibility for their research.

Keynote and Plenary Speakers

The congress opened on August 24 with Dr. Alice Cicirello (University of Cambridge) delivering the inaugural keynote lecture on “Noise and Vibration Challenges Through the Lens of Physics-Enhanced Machine Learning.” Her presentation explored a hybrid approach that integrates data, physical models, and expert knowledge to address complex engineering problems in noise and vibration, including strategies for uncertainty quantification and identification of non-linearities.

On August 25, Dr. Chiara Scrosati (Head of Acoustics Laboratory at ITC-CNR, Italy) presented “Measure by Measure - Obtaining Meaningful Numbers in Building Acoustics.” She addressed the challenges in acoustic performance measurement in buildings, highlighting the importance of reliable parameters for ensuring comfort, health, and well-being in indoor environments where people spend approximately 90% of their time according to WHO estimates. Her lecture included case studies on acoustic interventions in schools near airports and sampling techniques for building classification.

Also on August 25, Prof. Li Cheng (Hong Kong Polytechnic University) discussed “Slow Waves for Noise and Vibration Control,” focusing on recent advances in techniques that manipulate acoustic and elastic waves through structural design. As President-elect of the I-INCE and a world reference in structural acoustics and vibration, Cheng presented phenomena known as Acoustic Black Hole (ABH) and Sonic Black Hole (SBH), demonstrating how to reduce the propagation speed of flexural waves, compress their wavelength, and concentrate energy in flexible structures.

Prof. Nouredine Atalla (Université de Sherbrooke) spoke on “Vibroacoustic Modeling of Lightweight Structures with Coupled Noise Control Materials,” providing insights into advanced modeling techniques for noise control in modern lightweight construction.

Prof. Nilesh Madhu (Ghent University) and Prof. Bruno Masiero (University of Campinas) jointly presented “The Robustness of Data: From Audio Separation to Ecosystem Monitoring with Data-Driven Machine Learning,” showcasing innovative applications of machine learning in acoustic monitoring.

The congress concluded with Prof. Júlio A. Cordioli (Federal University of Santa Catarina) delivering the closing keynote on “On the Noise of Electric Aircraft: From Drones to Electric Airplanes,” examining the acoustic challenges and opportunities presented by the growing electric aviation sector.

Technical Sessions

The technical program was organized into five major areas with the following distribution of papers:

- Vibration & Acoustical Engineering Science: 131 papers (30.4%)
- Material, Architectural & Environmental Applications: 125 papers (29.0%)
- Human Factors: 88 papers (20.4%)
- Industrial & Transportation Applications: 65 papers (15.1%)
- Multidisciplinary Approaches: 23 papers (5.1%)

Brazil had the highest representation with 39% of all papers, followed by China (8%), Japan (7%), and Canada, South Korea, and the United States (4% each). This international participation reflected the widespread interest in noise control engineering and the role of Inter-Noise in facilitating knowledge exchange in the field.

Special Events

The congress featured several special events, including:

- A technical visit to Sala São Paulo, one of the world’s most prestigious concert halls with a unique movable ceiling that allows for variations in acoustic properties. More than one hundred participants attended this visit and were treated to an exclusive rehearsal by OSESP (São Paulo State Symphony Orchestra).
- A Women in Noise Control Luncheon on August 26, providing networking opportunities for female professionals and students
- Young Professionals Workshop and awards ceremony for recipients of the I-INCE 2025 YP Grant
- Industry exhibition promoting interaction between exhibitors and participants
- A roundtable with public authorities engaged in urban planning to discuss acoustic quality as a public health issue

For more information: internoise2025.org



Get ready for sunshine and California vibes ...

[NOISE-CON 2026](#), the premiere noise control engineering conference in the United States, will be held in the beautiful coast city of Long Beach, California. Long Beach is in the very Southern part of Los Angeles County and is accessible via multiple airports with direct flights from cities around the world.

The city has so much to offer, from visits to the Queen Mary (retired British ocean liner), Aquarium of the Pacific, and Museum of Latin American Art ...



Judy Rochat,
General Chair,
NOISE-CON 2026



... to seaside and water recreation ...



... to excellent dining, including wine & cheese gondola rides!



The conference includes a full technical program and exhibition with vendors from the noise control engineering and acoustic industry. The plenary presentations and technical tour embrace the So Cal theme, representing ...

- Television and movie sound design (with audience participation!);
- Acoustic challenges in the aerospace industry (instrumentation surviving a launch); and
- Vibration control for the new subway under downtown Los Angeles, in close proximity to performance and recording spaces, including the Walt Disney Concert Hall (technical tour inside the hall).





Venue: The Westin Long Beach, located in the thriving downtown district with excellent walkability to restaurants, entertainment, shopping, beach, biking, and train station.

We look forward to hanging out with you!

Of note:

- **Abstract submission:** December 10, 2025 – February 20, 2026
- **Registration:** Early rate expires May 20, 2026
- **Papers:** Due May 26, 2026
- **Core conference days** are Thursday-Saturday, July 9-11

Make sure to arrive in time for the Wednesday evening (July 8) social event, our luau!

For more information, please visit inceusa.org.





INTER-NOISE 2026: From the Outback to the Ocean

Adelaide Welcomes the World of Noise Control



The Australian Acoustical Society (AAS) and the International Institute of Noise Control Engineering (I-INCE) invite you to Adelaide, South Australia, for the 55th INTER-NOISE Congress, 9–12 August 2026 at the Adelaide Convention Centre.

Our theme — *From the Outback to the Ocean* — celebrates the huge variety of noise and vibration challenges we face in Australia and across the globe. From remote, arid landscapes to busy urban centres, coastal ports, and marine habitats. We will be exploring practical solutions, fresh research, and new ways of thinking about acoustics.

Technical Program and Sessions

Expect an extensive program packed into the three-day conference, designed to spark ideas and collaboration, including parallel sessions of contributed papers as well as keynotes and plenary talks by well-known leaders. Abstracts are encouraged from all areas of noise and vibration including:

- Environmental noise policy and assessment

- Occupational noise and hearing conservation
- Transport noise and vibration (road, rail, air, maritime)
- Urban soundscapes and quiet area design
- Building acoustics and architectural innovation
- Industrial noise and vibration control and product design
- Measurement, modelling, and prediction
- Advances in acoustic materials and metamaterials
- Underwater acoustics and marine fauna protection

Special sessions will shine a light on topics relevant to the Asia Pacific region, such as noise in the renewable energy sector, mineral extraction, drones, and the management of noise impacts in sensitive coastal areas. Dedicated activities will be provided for Women in Acoustics and early-career professionals, focusing on opportunities for networking, mentoring, and forums to share work.



Exhibition, Tours, and Networking

Our exhibition will run alongside the program of presentations, and will feature the latest noise and vibration technology, instruments, products, and services from around the world. You can look forward to being hands-on with innovation that you can take back to your own projects.

A range of technical tours to local facilities and projects will be offered. Representatives of the University of Adelaide will also provide a detailed briefing on the acoustic design and considerations that went into their newly upgraded vibro-acoustics laboratory.

Not to be forgotten, networking is a big part of INTER-NOISE. You can expect a warm welcome at the opening reception, a memorable conference dinner, and plenty of opportunities to connect with peers and industry leaders. You might have a technical session over coffee, or you might take it mobile and explore the city of Adelaide together.

Young professionals and students are particularly encouraged to partake in dedicated social functions and networking opportunities at the congress.

Accompanying Persons Program – Make It a Holiday

Our team are curating an accompanying persons program so your partner, family, or friends can enjoy the best of Adelaide while you're here engaging in the technical sessions. Expect the opportunity to see some of South Australia's best, with guided tours, local wines and wine country, wildlife encounters, cultural experiences, and day trips to some of our most iconic spots.

We encourage you to make a bucket-list adventure out of your trip — arrive early, stay longer, and explore Australia. From the Great Barrier Reef to Uluru, Sydney Harbour to Melbourne's sporting history and grounds, Tasmania's wilderness to Rottnest Island off the Western Australia coastline, Australia has so much to see and do. As many young professionals and students would know, Australia is also known for its accessibility to back-packing and working holidays, so don't be shy to come to Australia and see what is on offer at whatever your budget.

INTER-NOISE 2026 is the perfect excuse to combine professional development and earning, with an unforgettable once in a lifetime Australian holiday.

Host City: Adelaide, South Australia

The Adelaide Convention Centre sits right on the banks of the Karrawirra Pari (River Torrens), is surrounded by parklands and is just a short stroll from the city's CBD and other attractions. The CBD is compact and walkable, with free public transport and plenty of accommodation for all budgets.

Adelaide is a UNESCO City of Music, and you'll find that energy everywhere. From live gigs in small intimate venues, to street performances during our many festivals.

The small bar scene and the multicultural influence on our restaurants is something special. Come and tuck yourself away in a laneway restaurant or bar, explore the rooftop terraces, or just wander the streets and find yourself a sport to reflect on the day.

Beyond the CBD, you'll find South Australia's world-class wine regions like the Barossa Valley, McLaren Vale, and Clare Valley, just an hour or two in each direction.

You can explore the wildlife and rugged beauty of Kangaroo Island, or head north to the stunning Flinders Ranges.

August is the end of winter down under. If you are looking to explore before or after the congress, it is sure to be a great time to enjoy your time outside in the day and then find good food and a warm drink at night.

Travel Made Easy

Adelaide is well connected to the rest of Australia and the World! You will find direct flights from major Australian cities and several international destinations. For many other international airports, it is just a one-stop connection into Adelaide.

With the airport less than 15 minutes from the Adelaide CBD and our main venue at the Convention Centre, you will be into the heart of INTER-NOISE 2026 in no time after stepping off your plane.

Why You Should Attend?

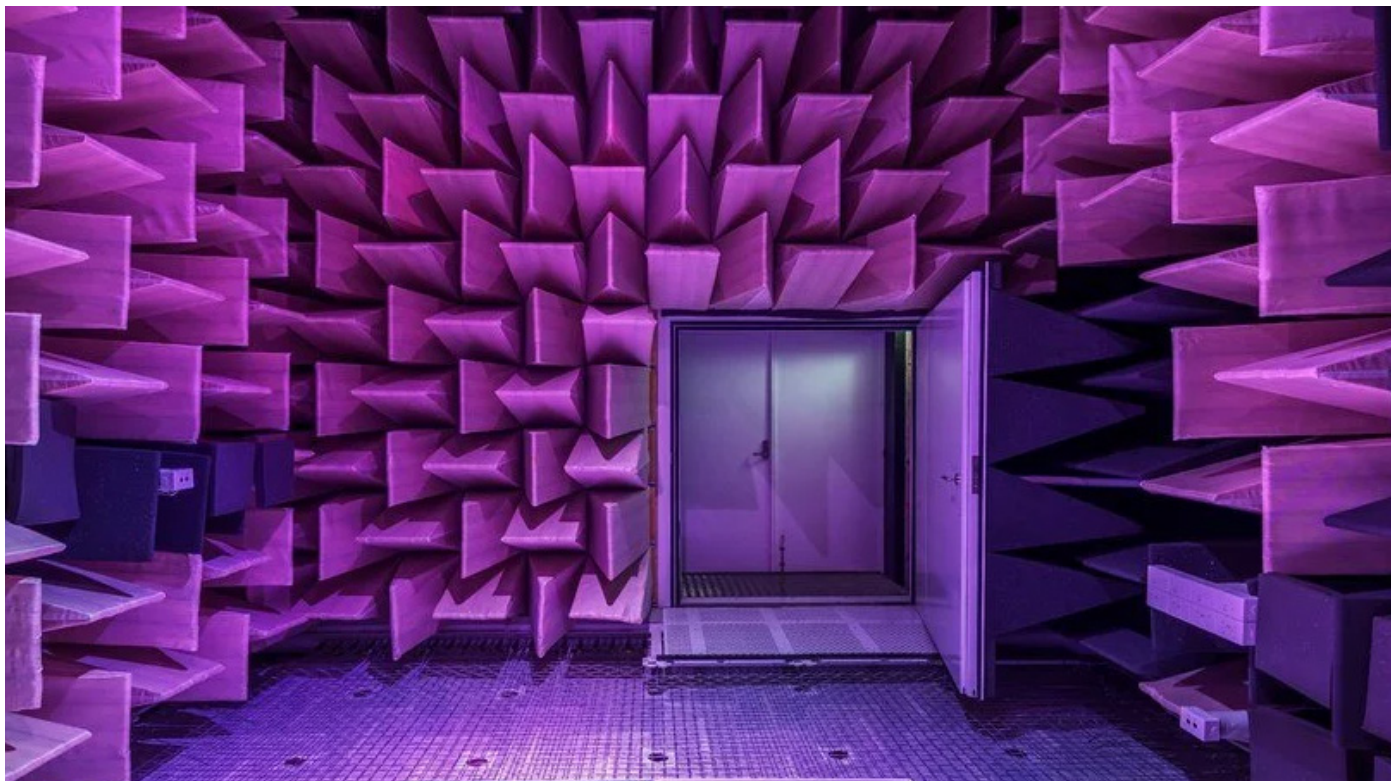
- **Experts** – Hear from and engage with industry leading experts from around the globe, on all aspects of noise and vibration.
- **Content** – Be immersed in the wide-ranging of topics, from advanced theoretical modelling to in practice noise mitigation.

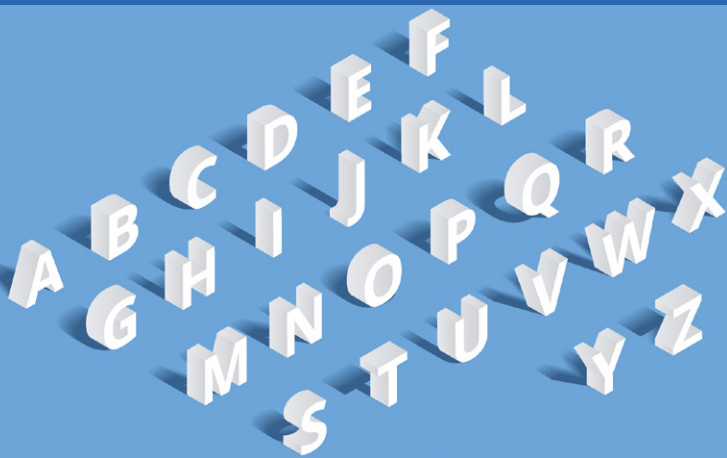
- **Share** – Be a leader yourself, bring your experiences and your recent work to the congress and teach what you have learned in the field of noise and vibration
- **Global** – Learn about global noise and vibration control, with a local twist and insights of Australasia's unique environments, industries, and culture.
- **Network** – Meet and connect with your colleagues across industry, research, and government fields and build career long partnerships.
- **Practical** – Get hands-on with the latest tools and innovations that are taking noise and vibration control into the future.
- **Explore** – Stay longer to enjoy the world-class holiday destination that is Australia and Adelaide, while attending a world-class congress.

Join Us Down Under

Whether you work in the field of research, policy development and regulation, consulting and engineering, or community engagement, INTER-NOISE 2026 will be a chance to share, learn, and be inspired by others. Mark your calendar for 9–12 August 2026 and get ready to absorb the world-class technical content, and experience South Australian hospitality and culture.

For updates on abstract submission, registration, and exhibition opportunities, visit: internoise2026.org.





Editor's Note: We are republishing Eric Ungar's Acoustics from A to Z and Stig Ingemansson's Noise Control: Principles and Practice from previous NNI issues as part of our initiative to include more educational articles. Their lessons are just as valid today. Look for more in future issues and on noisenewsinternational.net.

Acoustics from A to Z

Eric E. Ungar

Nowadays it is not much of a trick to measure accelerations of 1 milli-g (mg) at 1 kHz. The corresponding displacement amplitude turns out to be of the order of a mere 10^{-8} inches, which is equal to about 0.0002 micrometers or 2 Ångström units. Compare this to the 40 micrometer typical diameter of a human hair and to the wavelength of visible light, which is in the 4000 to 8000 Ångström range!

It is interesting to explore what happens if I drop an accelerometer onto a floor from a height of 10 cm, for example. If the floor were to cause the accelerometer to decelerate uniformly, making it come to rest within 10^{-3} cm, then the accelerometer would experience a mere 10,000 g and probably would be damaged. That's one reason for being careful with accelerometers.

In many vibration situations one observes relatively small accelerations and relatively large displacements at low frequencies. At high frequencies, the situation tends to be reversed. That is why displacement sensors are better at low frequencies and accelerometers are better for measurements at high frequencies. Velocity is often used to characterize or specify vibrations, because it tends to exhibit mid-range magnitudes over larger ranges of frequency. Among the criteria that are stated primarily in terms of velocity are those for judging the quality of rotating machines, for determining the perceptibility of vibrations and for assessing the suitability of a floor for various types of sensitive equipment.



*G's refer acceleration
To our earth's own gravitation.
Displacements may be very small
For g's that aren't small at all.
And so, in many situations,
Velocity's used to mark vibrations.*



*The HEARING threshold, it is known,
Is six dB for a pure tone
Precisely at one thousand Hertz,
Agreed upon by most experts.
The smallest pressure we can hear?
A billionth of an atmosphere.*

To be precise, according to the American National Standards Institute's specification for audiometers, the threshold of perception (measured at the ear) of a pure tone at 1 kHz is 6.5 dB relative to the standard 2×10^{-5} Pa. This sound pressure level corresponds to an acoustic pressure of 4.3×10^{-10} atmospheres. The threshold generally is greater at frequencies that deviate from 1 kHz. For example, at 20 Hz the threshold is about 90 dB higher and at 20 kHz it is about 50 dB higher than that at 1 kHz. Although the frequency range of human hearing is generally stated as extending from 20 Hz to 20 kHz, the human ear actually is sensitive to a wider range.¹

The standard threshold of perception applies to "young persons with no otological irregularities." As we get older, our hearing sensitivity at frequencies above a few kHz decreases, causing older people to have increasing difficulty distinguishing 't' from 'p' and 's' from 'f' sounds, for example. Unfortunately, much information content of spoken sounds lies in this range. To quote Bies and Hansen², "Old folks may not laugh as readily at jokes, not because of a jaded sense of humor, but rather because they missed the punchline" – I assume they meant due to a hearing loss.

The threshold of pain due to sound in the audio frequency range is about 145 dB, corresponding to a sound pressure of the order of 0.004 atmospheres. In the infrasound range, below 20 Hz, the pain threshold is higher. As discussed by von Gierke and Nixon³ intense infrasound typically is more felt than heard. It may cause dizziness, coughing, breathing problems and localized pain, but generally has no effect on hearing. Intense ultrasound (above about 17 kHz) can cause headaches, tinnitus (a spontaneous ringing sensation in the ears) and malaise, but its detrimental effect on hearing has not been generally demonstrated. These adverse effects on ultrasound occur only in people who can hear these high-frequency sounds; those of us who are older are safe.

1 Peter Narins, Professor of Physiological Science at UCLA, took me to task – and rightfully so – regarding the statement I made to the effect that the threshold of hearing corresponds to 6.5 dB. He pointed out that the hearing of about 1.5 million visitors was tested at a Bell Telephone exhibit at the 1938 New York World's Fair and it was determined that at 1 kHz the average sound pressure to evoke a threshold sensation was 0.0002 dynes per square centimeter. This value has since been used as the standard reference sound pressure, in reference to which the hearing threshold corresponds to 0 dB. This is correct, of course. The 6.5 dB I cited corresponds to the threshold sound pressure measured at the eardrum. The external ear provides amplification, enabling us to perceive at the eardrum a pressure that corresponds to an external sound pressure of 0 dB. (For more details see Chapter 123, "Hearing Thresholds" by W. A. Yost and M. C. Killion, in the Encyclopedia of Acoustics, edited by M. J. Crocker, John Wiley & Sons, Inc., 1997.)

2 Engineering Noise Control, D. Bies and C. H. Hansen, Unwin Hyman Ltd., 1988.

3 "Damage Risk Criteria for Hearing and Human Body Vibration," H. E. von Gierke and C. W. Nixon, Chapter 16 of Noise and Vibration Control Engineering, L. L. Beranek and I. L. Ver, Eds., John Wiley & Sons, Inc. 1992.



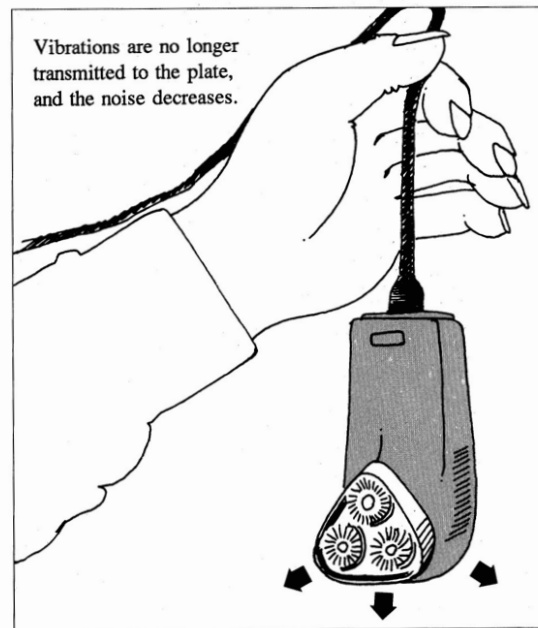
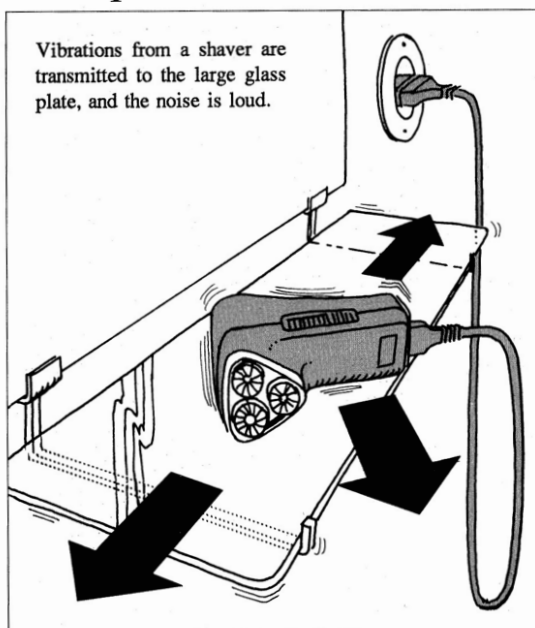
Stig Ingamansson's Noise Control: Principles and Practice

B1 – Sound from Vibrating Plates – Size and Thickness

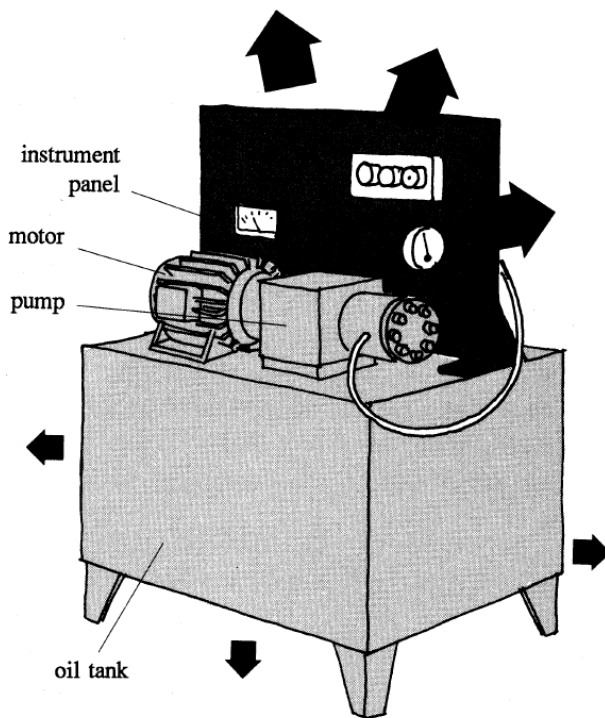
MAKE VIBRATING SURFACES AS SMALL AS POSSIBLE

An object with a small surface area may vibrate intensely without a great deal of noise being radiated. The higher the frequencies, the smaller the surface must be to prevent disturbance. Since machines will always vibrate to some extent, noise will be reduced if the machinery parts and covers are kept as small as possible.

Principle



Application with reduced radiating surface

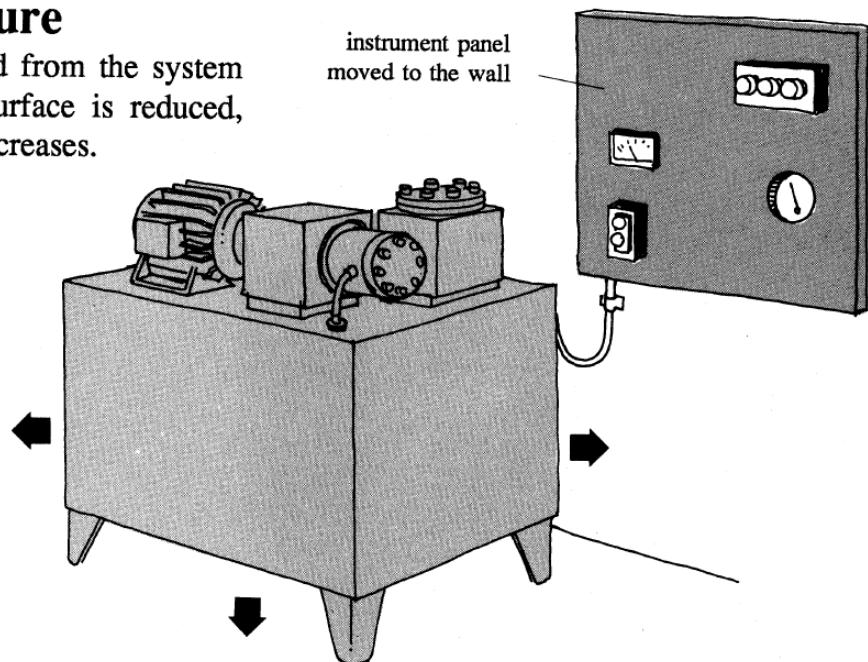


Example

Most of the noise of the hydraulic system noise comes from the instrument panel.

Control Measure

The panel is detached from the system itself, the vibrating surface is reduced, and the noise level decreases.

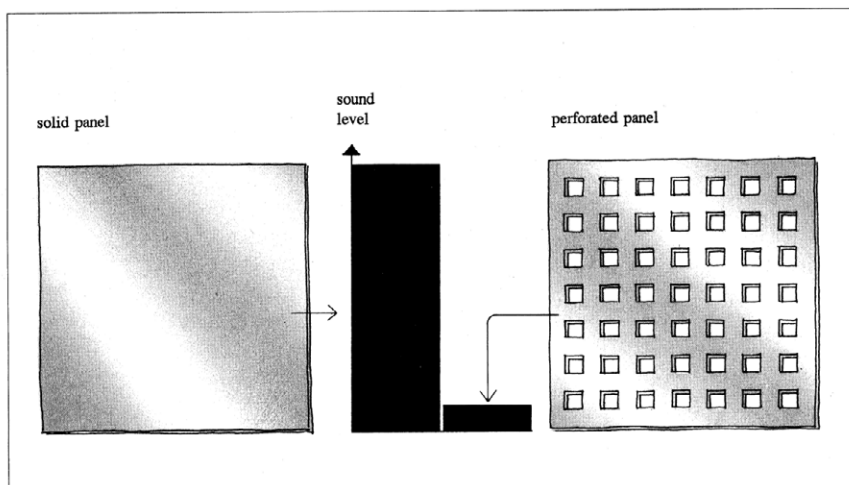


B2 – Sound from Vibrating Plates – Size and Thickness

DENSELY PERFORATED PLATES PRODUCE LESS NOISE

Large vibrating surfaces cannot always be avoided. The vibrating surface pumps air back and forth like the piston of a pump, causing sound radiation. If the panel is perforated, the "piston" leaks, and the pump functions poorly. Alternatives to perforated plates include mesh, gratings, and expanded metal.

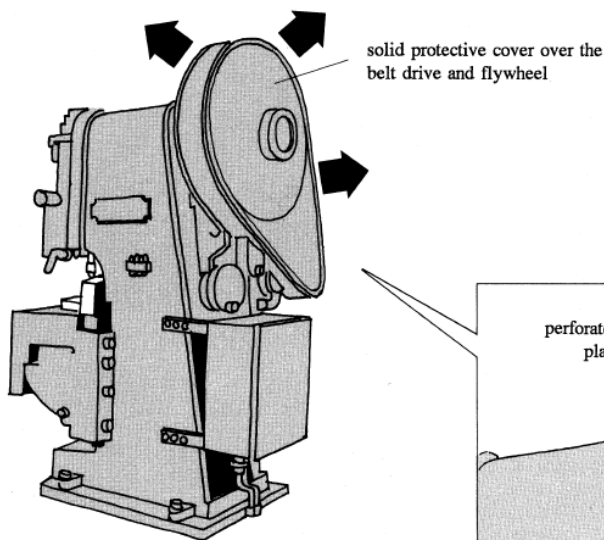
Principle



Application of hoods and protective covers

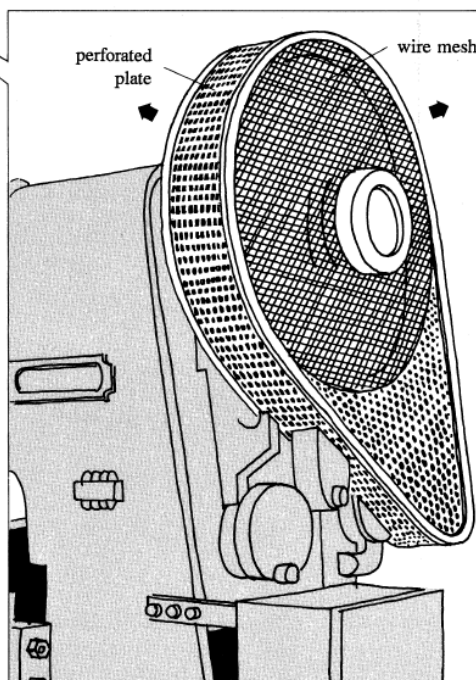
Example

The protective cover over the flywheel and belt drive of a press is a major noise source. The cover is made of solid sheet metal.



Control Measure

A new cover is made of perforated sheet metal and wire mesh. Sound radiation is reduced.



Fantastic Acoustics (Fantastique Acoustique) Comics

Professor Olivier Robin,
Université de Sherbrooke

Acoustics is an essential field of scientific study and a multidisciplinary science. It helps us to understand how sound is generated, propagates, interacts with different structures or materials, and ultimately affects our environment.

Yet acoustics is a little-known science. It is often perceived as primarily related to music or architecture (my friend plays the acoustic guitar - a concert hall has excellent acoustics). Yet noise and sound signals are omnipresent and significantly impact our daily lives. Many areas of acoustics play an essential role in our lives and society, from electroacoustics and biomedical acoustics to underwater acoustics. We wanted to introduce you to them using comics, an art form that remains underestimated despite being a formidable tool for science communication.

'Fantastic Acoustics' is the result of a collaborative effort between artists and research students from four Québec universities - Université de Sherbrooke, École de Technologie Supérieure, McGill and Université du Québec à Rimouski. This unique blend of comics and science has given birth to eight research-based comic stories. The book also features elements from a collaboration with a French university - Le Mans Université. Between each story, you'll thus find a lesson from Kylfa, a bat specialized in acoustics, and Salomon, a funny elephant. In the middle of all these elements, a map of the acoustics world describes the entire field with pictures.

To learn more about the work involved in producing the magazine, visit <https://doi.org/10.1121/2.0002008>. Downloadable PDFs in French and English are available at <https://en.fantastiqueacoustique.net/home>.

FANTASTIC ACOUSTICS



For any request or question, please contact us at the following email address: Olivier.Robin@usherbrooke.ca

Fantastic Acoustics results from the work of many people and organizations listed below

Involved artists - cartoonists :

Drawn research stories: Catherine Bard, Simon Bergeron (ESBÉ), Sandra Breault, Ariane Cloutier, Madeleine Guastavino, Marina Leon, Jordanne Maynard, Juliette Pierre.

Kylfa and Salomon's lesson: Pierre Frampas - With the assistance of Heimana Alberola for colors

The drawn acoustics world: Marsi.

Involved Students:

Cécile Perrier de la Bathie, Coralie BernierBreton (ISMER-UQAR) Michel Demuynck, Lucie Gallerand (ÉTS), Alexis Carrion, François Proulx (UdeS), Christopher Trudeau, Valérian Fraisse, Cynthia Tarlao (McGill)

Coordination: Tamara Krpic

Editing & graphic design: Nadia Zouaoui

Cover illustration: Pascal Lemieux

Management - editing - script (Kylfa et Salomon): Olivier Robin

This project received funding from the Fonds de Recherche du Québec (Dialogue funding, Grant no. 337 363).

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Broken harmony: The distress call of the oceans

Have you ever felt a headache when surrounded by incessant chatter? Or perhaps you've been surprised by your smoke detectors suddenly going off when you least expected it?

If so, you should know that some underwater creatures experience similar disturbances. Dive with us into the depths of the sea and discover the types of noise pollution that exist and their various sources.

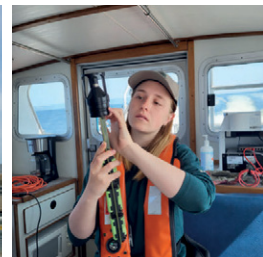
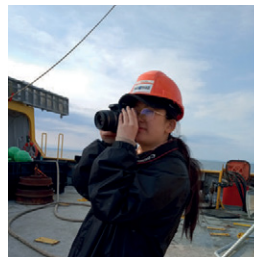
In this comic strip, you'll discover the main repercussions and victims of this marine pollution. You'll see the abrupt impact of recent years on areas which, not so long ago, were considered untouched, but which are now undergoing drastic upheaval due to global warming.

But rest assured, solutions are being developed: researchers in underwater acoustics are using their expertise to preserve these marine environments... but you also have a role to play!

Team members

Students at Université du Québec à Rimouski (UQAR)

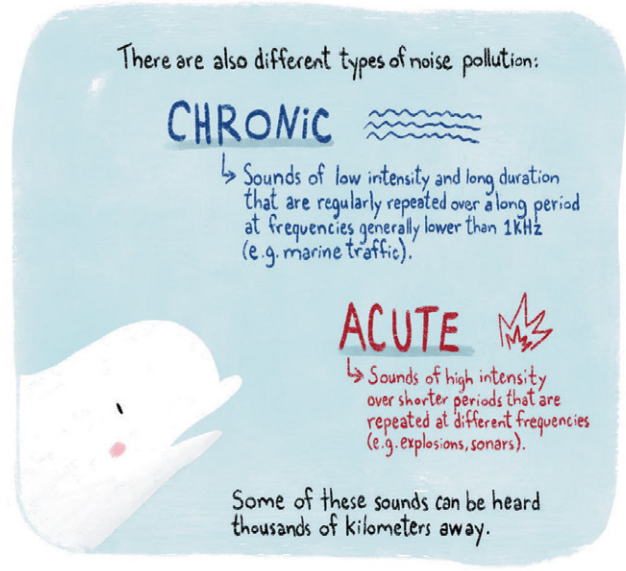
- Cécile Perrier de la Bathie
- Coralie Bernier-Breton

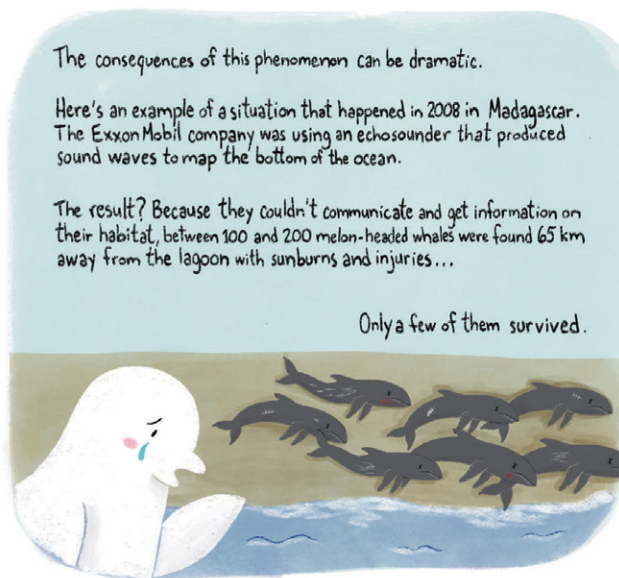


Artist/Cartoonist

- Catherine Bard







Communication masking isn't the only impact of noise pollution. Indeed, several other repercussions have been documented for a wide variety of species. Here are few examples:



For a long time, the ocean has been a haven of peace... particularly the Arctic Ocean. Even more so when its water is covered with ice, which limits the sounds produced by the wind, the waves and the precipitation.



There is now less and less ice and longer periods of formation and melting of icebergs, which produce loud sounds in the marine environment. Moreover, sounds travel faster in warm waters... we can therefore expect that climate change will intensify noise pollution.



The melting of ice also opens up certain maritime passages that were once blocked due to permanent freezing... We are therefore seeing an increase in maritime traffic, which can have harmful consequences on the marine life.



In the Arctic, it is estimated that human-generated noise has **DOUBLED** in 6 years, whereas it took up to 40 years to observe the same phenomenon in other parts of the ocean. It's so fast! And it's hard to predict the long-term impacts!



Oh! What can we do to help?



At the governmental level, we can:

- ESTABLISH MARINE PROTECTED AREAS
- REGULATE BOAT NOISE LIMITS
- CONTINUE RESEARCH TO BETTER UNDERSTAND THE EFFECTS ON MARINE LIFE AND FIND WAYS TO ENSURE ITS CONSERVATION



At the technological level, we can:

- DECREASE BOAT SPEEDS
 - DECREASE VIBRATIONS AND UNDERWATER NOISE PRODUCED BY BOATS
- ↳ For example, we can reduce the noise by soundproofing the engines



At the population level, we can:

- CONSUME LESS TO LIMIT FREIGHT TRANSPORT BY BOAT
- BUY LOCAL ♥

We have coexisted for millennia... it's time to return to balance. Don't you want to?



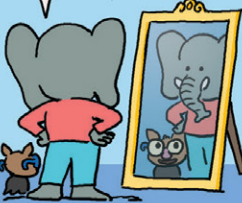
© BARD

HEARING



KYLFA, NICE TO MEET YOU!

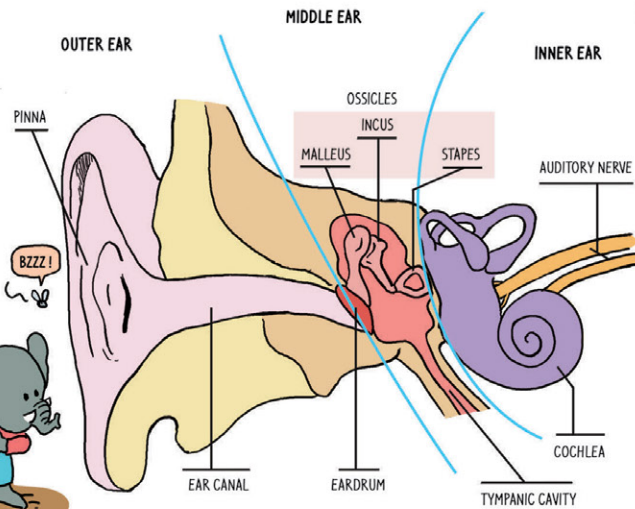
MAGIC MIRROR, TELL ME WHO HAS THE MOST BEAUTIFUL BIG EARS?



AND DID YOU KNOW HOW THESE BIG, BEAUTIFUL EARS WORK?

IN HUMANS, THE EAR HAS THREE PARTS, EACH WITH ITS OWN ROLE.

VERY IMPRESSIVE!



AND I AM SALOMON!

THE OUTER EAR CONSISTS PRIMARILY OF THE PINNA, WHICH CAPTURES SOUND VIBRATIONS. OUR TWO PINNAE ALSO PLAY A MAJOR ROLE IN LOCALIZING SOUNDS IN SPACE.



SOUND VIBRATIONS ARE THEN TRANSMITTED THROUGH THE EXTERNAL AUDITORY CANAL TO THE TYMPANIC MEMBRANE (EARDRUM).

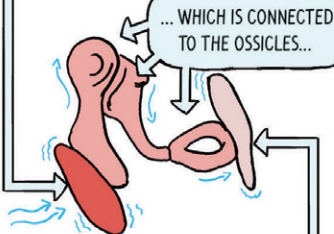
SO, WHEN YOU WEAR EARPLUGS TO PROTECT YOUR HEARING, YOU PREVENT SOUND FROM REACHING THE MIDDLE EAR?

EXACTLY!



WAIT, I CAN'T HEAR ANYTHING, I'M WEARING EARPLUGS.

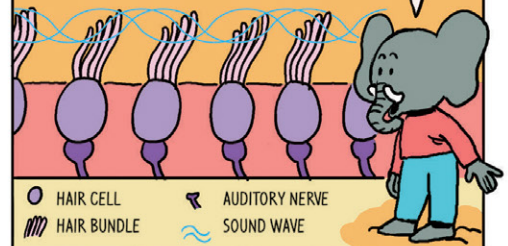
THE EARDRUM IS THE START OF THE MIDDLE EAR. SOUND VIBRATIONS CAUSE VIBRATIONS IN THE EARDRUM...



... AND THE VIBRATIONS EVENTUALLY REACH THE OVAL WINDOW, THE ENTRANCE TO THE INNER EAR. A BIT LIKE DOMINOES...

AND FINALLY, THE INNER EAR. THE VIBRATIONS THEN SPREAD THROUGH THE SNAIL-SHAPED COCHLEA. IT CONTAINS THE HAIR CELLS, WHICH VIBRATE AT DIFFERENT PLACES IN THE COCHLEA, DEPENDING ON THE FREQUENCY.

THE HAIR CELLS ARE LIKE SEAWEED IN THE OCEAN, MOVING TO THE RHYTHM OF THE WAVES



FINALLY, THE MOVEMENTS OF THE HAIR CELLS ARE TRANSFORMED INTO NERVE SIGNALS, THEN ANALYZED BY THE BRAIN, WHICH PROCESSES ALL THIS SOUND INFORMATION.

DING

AH, A NEW MESSAGE FROM THE EARS...

HMMMM...

THAT SOUNDS LIKE A BUZZING FLY TO ME.



EVERYTHING WE'VE JUST DESCRIBED HAPPENS CONSTANTLY (UNLIKE OUR EYES, OUR EARS STAY OPEN AT NIGHT).

SO, THEY NEVER STOP WORKING?

ALL OF WHICH LETS ME COMMUNICATE, HEAR WARNING SIGNALS, AND KNOW WHERE SOUNDS ARE COMING FROM.

JUST LET ME SLEEPEE...



AMAZINGLY, EVEN SOME OF OUR BONES (SKULL, JAW) ALSO LET US HEAR; THIS IS CALLED BONE CONDUCTION. WE HEAR OUR OWN VOICE THROUGH BONE CONDUCTION AND THE AIR, UNLIKE A VOICE PICKED UP BY A MICROPHONE, WHICH COMES ONLY FROM THE AIR.

YOU'VE REACHED THE VOICE MAIL OF ULTRASALOMON...

YOU'VE REACHED THE VOICE MAIL OF ULTRASALOMON...

IS THAT REALLY HOW I SOUND?

OH, YOU GET USED TO IT...



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■ JULY 9–11, 2026

NOISE-CON 2026

Long Beach, California

■ AUGUST 9–12, 2026

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