

NOISE/NEWS

INTERNATIONAL

Volume 17, Number 2
2009 June

*A quarterly news magazine
with an Internet supplement published
by I-INCE and INCE/USA*



NOISE-CON 2010
Announcement and
Call for Papers

INTER-NOISE 2010
Announcement and
Call for Papers

ARTICLES
Planning for a quieter new
Washington State Route 520

Visitor perception of park
soundscapes: A research plan

MEMBER SOCIETY PROFILE
German Standards Committee
Acoustics, Noise Reduction and
Vibration of DIN and VDI



The Institute of Noise Control Engineering's Annual Conference

NOISE-CON 2010

will be held jointly with the

159th Meeting of the Acoustical Society of America

at the

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NOISE-CON 2010 April 19-21, 2010

159th ASA Meeting April 19-23, 2010

NOISE-CON 2010 and Joint ASA-INCE Special Sessions, Abstract and Paper Submission Guidelines.

The 26st annual conference of the Institute of Noise Control Engineering, NOISE-CON 2010, will run concurrently with the 159th Meeting of the Acoustical Society on Monday through Wednesday (April 19-21, 2010), culminating with the Closing Ceremony which will take place with the ASA Awards Ceremony on Wednesday afternoon (21 October, 2010). Many of the Noise and some of the other ASA Technical Committee Sessions (e.g., Architectural Acoustics, Engineering Acoustics, Structural Acoustics and Vibrations) will be part of the joint ASA - NOISE-CON conference, thus forming an exciting and coherent program of noise control related sessions, which reflects the overlap in membership interests between the two organizations, and the spirit of co-operation that led to the decision to have this joint meeting. Note, there will be one registration fee for both conferences, so NOISE-CON 2010 participants are encouraged to take the opportunity to learn about some of the work being done in other areas of acoustics, not usually part of regular NOISE-CON technical programs, by attending the sessions taking place on Thursday and Friday.

Mike Lucas of Ingersoll Rand is the NOISE-CON 2010 General Chair. Courtney Burroughs, *Noise Control Engineering Journal* Editor is the technical program chair. All NOISE-CON 2010 information including abstract and paper submission instructions will be handled through the Institute of Noise Control Engineering (INCE) web site (<http://www.inceusa.org/NC10>). Information about the NOISE CON 2010 special sessions and session organizers can be found at http://www.inceusa.org/NC10/tech_sessions.asp

Abstract and Paper Submission

All presentations in NOISE-CON 2010, including those in sessions jointly organized with the ASA Technical Committees, will be accompanied by a 4 to 8 page paper that will be published by the Institute of Noise Control Engineering (INCE) in the NOISE-CON 2010 Proceedings. ORGANIZERS of JOINT ASA/INCE SPECIAL SESSIONS (see below) should stress to session contributors the need to write papers for the NOISE-CON 2010 Proceedings.

To help facilitate NOISE-CON and ASA Technical Program organization, NOISE-CON 2010 ABSTRACT AND PAPER DEADLINES will be as follows:

- **NOISE-CON 2010 Abstract Deadline: 5th October, 2009**, submission instructions will be posted on the conference website (<http://www.inceusa.org/NC10>). INCE personnel will transfer these abstracts to the ASA database. Thus, contributors do NOT need to send abstracts to both INCE and ASA, only one Abstract submission is required.
- **ASA Abstract Deadline: November 19th, 2009**. Anyone who submits ASA Noise and Architectural Acoustics abstracts of relevance to noise control, but have not submitted an abstract first to Noise-Con 2010, will be encouraged to write a 4 to 6 page paper to appear in the Noise-Con 2010 proceedings, so that they are able to present in the joint ASA-INCE sessions.
- **NOISE-CON 2010 Paper Deadline Date: November 23rd, 2009**, submission information at <http://www.inceusa.org/NC10>. Format instructions for NOISE-CON 2010 papers will also be given on this INCE-USA web site. Note because of scheduling and co-ordination with ASA meeting planning, this is a firm deadline.

More information: See page 56 of this issue.

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Courtesy of the organizers of the INTER-NOISE 2010 congress

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*A quarterly news magazine
with an Internet supplement published
by I-INCE and INCE/USA*

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Produced by

INCE/USA

Noise/News International (ISSN 1021-643X) is a quarterly news magazine published jointly by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA, Inc. (INCE/USA). *Noise/News International* is distributed to the Member Societies of I-INCE and to members of INCE/USA as a member benefit. Advertising sales are handled by Richard J. Peppin. Feature articles for this magazine are selected by the editors. Responsibility for editorial content rests upon the authors, and not upon I-INCE or INCE/USA, the Member Societies of I-INCE, or their members. Product information is published as a service to our readers, and does not constitute an endorsement by the societies or their members. **SUBSCRIPTIONS:** Members and Associates of INCE/USA and the Member Societies of International INCE receive *Noise/News International* as a membership benefit. Other individual or library annual subscriptions are 60 USD in the USA. Subscribers in other countries should add 10 USD per year for first class mailing to Canada and Mexico, and air mail postage overseas. Address inquiries concerning subscriptions to the INCE/USA Business Office, 9100 Purdue Road, Suite 200, Indianapolis, IN 46268-3165. **EDITORIAL CORRESPONDENCE:** Address editorial correspondence to George C. Maling, Jr., 60 High Head Road, Harpswell, ME 04079, USA. Telephone or FAX: +1 207 729 6430; e-mail: maling@alum.mit.edu.

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ADVERTISING: For information about advertising, contact Richard J. Peppin, Advertising Sales Manager, Scantek, Inc., 6450 Dobbin Rd. #A, Columbia, MD 21045, e-mail: PeppinR@ScantekInc.com.

Printed in the United States of America



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INTERNATIONAL

The printed version of *Noise/News International (NNI)* and its Internet supplement are published jointly by the International Institute of Noise Control Engineering (I-INCE) and the Institute of Noise Control Engineering of the USA (INCE/USA).

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 Internet supplement. I-INCE has an active program of technical initiatives, which are described in the Internet supplement to NNI. I-INCE currently has 46 Member Societies in 39 countries.

INCE/USA

The Institute of Noise Control Engineering of the USA (INCE/USA) is a non-profit professional organization incorporated in Washington, D.C., 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 Internet supplement. 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*.

NNI Internet Supplement

www.noisenewsinternational.net

- Links to the home pages of I-INCE and INCE/USA
- Abstracts of feature articles in the printed version
- Directory of the Member Societies of I-INCE with links, where available, to the Member Society Profiles and home pages
- Links to I-INCE Technical Initiatives
- Calendar of meetings related to noise—worldwide
- Links, where available, to NNI advertisers
- Links to news related to the development of standards
- Link to an article “Surf the ‘Net for News on Noise,” which contains links to noise-related sites—worldwide

Will Noise Control be Part of the Package?

In the United States, the President and his Administration's response to the economic crisis may seem to be related to short-term needs, it is, however, focused on long term economic stability and environmental sustainability. Education, healthcare, energy, and the environment are all being targeted. What I see as the underlying theme is that of enabling and caring, and an understanding that without an educated and thus empowered workforce and a philosophy of helping and supporting one other, when the need arises, there is really no way to achieve sustainable global economic prosperity and security.

So where does noise control fit into all of this? Will the emphasis on energy and climate change mean a move of resources from programs targeted at noise issues to programs that address energy generation, energy efficiency and non-acoustic emissions? Of course, we certainly hope not, but is that just "self preservation" speaking? I think not, and I think the move should be to a more holistic approach to solving these problems. Consider the negative impact that the move to encourage more use of bio-fuels had on world food prices; this is a good example of why we should consider a larger systems perspective when considering policy decisions. Green buildings are an interesting challenge: many of the solutions to thermal system and air quality management for energy efficiency seem to run counter to design of spaces for acoustic comfort and speech privacy. What is needed in green buildings is an integrated air quality, thermal and acoustic approach to modeling comfort, and those comfort models need to be directly coupled to models that, given building characteristics, predict chemical concentrations, temperature, humidity, airflow, and sound as well as energy efficiency and exterior environmental impact. By doing so, building design can be optimized to achieve occupant comfort. It is intuitive that buildings that are comfortable are more likely to be productive environments and more healthy environments, but those relationships also need to be more thoroughly tested and understood. The system interactions are complex and there is a strong need for integrated modeling tools for architects and engineers that allow them to explore different building design concepts and let them understand the impact of the various outcomes

of their designs on the occupants. Judging by the number of papers on green buildings submitted to INTER-NOISE 2009 in Ottawa, I think that there are many people grappling with these issues.

Whether we are involved in buildings, machinery design, transportation, military or civil infrastructure, industrial plants, etc., we each have our role to play in reducing the negative impact of the sounds produced by these machines and systems. But, we also need to work with those who focus on the other outputs of the machines to do trade-offs that result in person-friendly and community-friendly systems. The challenge is, of course, to get this dialogue going early so that we are not fixing the noise problems on a design that is already "finalized."

Coming back to the start of this column, my point is that we cannot focus on energy efficiency without understanding the full impact of the machines and systems that are designed. A machine design that initially looks good from an energy efficiency standpoint, may actually not be energy efficient when evaluated as a component in a larger system. If the noise from the machines leads, in the long term, to adverse health impacts requiring a higher level of medical care, the net energy usage may go up. If a noisy environment means that people are less productive, that also has a negative economic impact. The exciting thing about the collaboration of noise control engineers with other engineers in the early stages of machine and system design, and working with others to understand the true impacts of their designs, is that we are much more likely to come up with imaginative designs that can achieve both energy efficiency and reduce a wide range of potentially negative impacts.

I hope that the economic situation will start to improve and that the focus from people in leadership positions will be on making the world a better place for people, and that broader impacts are considered to ensure that problem solving in one area is not problem making in another. Noise control is ultimately about caring and protecting people. ■■■

— Patricia Davies
President, INCE/USA



Patricia Davies
President, INCE/USA

Action on Noise in Europe

An invitation to Edinburgh



Bernard Berry

European Editor
I-INCE VP for Europe
and Africa

In this editorial I would like to talk about our approach to setting up a major international conference on noise control and outline some of the key features of Euronoise 2009 to be held in Edinburgh, Scotland on October 26-28. But first, some history.

Like many of the best ideas, the idea to start the Euronoise series of conferences began with a casual conversation—in this case between Cathy Mackenzie who was the “powerhouse” behind the success of the Institute of Acoustics from the very early days, and Geoff Leventhall, a Past President. The basic idea was—why not set up a big conference in Europe in a year when INTERNOISE was not being organized in that region? The idea became a reality in September 1992 at Imperial College London. I had the task of organizing the technical program. The scale of the event was modest, about 200 papers, but the idea was deemed a success and worth pursuing.

Since then there have been six more such conferences;

- 1995: Lyon, France
- 1998: Munich, Germany
- 2001: Patras, Greece
- 2003: Naples, Italy
- 2006: Tampere, Finland
- 2008: Paris, France (part of Acoustics '08)

At times over the years there has been some uncertainty over the “ownership” of the Euronoise name, but the event is now firmly in the hands of the European Acoustics Association (EAA) which represents the interests of 30 Acoustical Societies throughout Europe, with more than 8500 individual members. For 2009 the EAA chose the UK Institute of Acoustics to host the event, based on a proposal submitted and discussed at the Executive Council of the EAA during Euronoise 2006 in Tampere Finland.

In addition to a large number of structured sessions, there will be three plenary lectures selected to represent noise as a system problem: source—propagation path—receiver. *Adventures in active control* by Colin Hansen will cover source issues, *Modeling outdoor sound propagation: a careful balance between physical rigor and engineering practice* by Dick Botteldooren and Timothy Van Renterghem will detail the propagation path, and receiver issues will be presented in *New directions in noise and health research* by Stephen Stansfield.

The Conference will be officially opened by Roseanna Cunningham MSP, Minister for the Environment in Scotland. Due to the system of “devolved administration” in the UK, there are in fact significant differences in approach to Noise Policy between the constituent countries of the UK, and significant differences in the level of progress which has been made.

The choice of *Action on Noise in Europe* as our theme was made because 2009 is a critical year in European Noise Policy, with the implementation of the 2002 Environmental Noise Directive reaching various key milestones, and with an official review of that implementation coming to a conclusion.

To emphasise the keyword *Action*, we hope to have a number of Workshop discussion sessions involving all the relevant stakeholders to try to ensure that the many words written and spoken about European Noise Policy do indeed become actions.

We would like to issue an open invitation to readers of *NNI* to come to Euronoise 2009 in the beautiful and culturally exciting city of Edinburgh and to be part of the process of ensuring a quieter Europe, and a quieter world. More details may be found at www.euronoise2009.org.uk ■■■

— Bernard Berry

I-INCE Vice President, Europe and Africa Region
European Editor NNI

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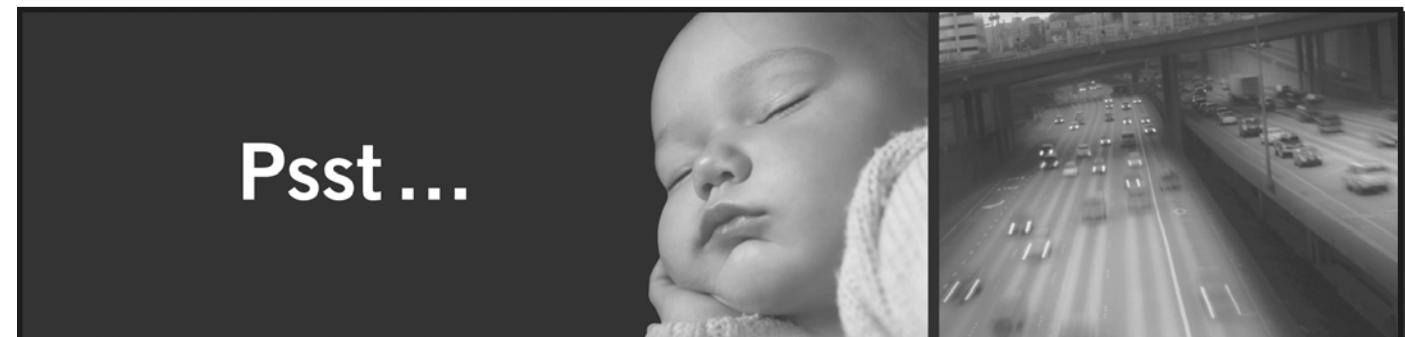
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Member Society Profile

NA Akustik Lärmminderung und Schwingungstechnik (NALS) German Standards Committee Acoustics, Noise Reduction and Vibration of DIN and VDI

The Acoustics, Noise Control and Vibration Engineering Standards Committee in DIN and VDI is responsible for the tasks of the former Acoustics and Vibration Engineering Standards Committee in DIN and of the former VDI Committee on Noise Control, a special division of VDI. The scope of the Acoustics, Noise Control and Vibration Engineering Standards Committee comprises all matters relating to acoustics, noise control and vibration engineering, as far as there are no deviant settlements with other committees in DIN or VDI regarding the development of standards or guidelines, respectively.

The Acoustics, Noise Control and Vibration Engineering Standards Committee in DIN and VDI is responsible for the preparation of VDI Guidelines, DIN Pre-Standards, DIN Standards, DIN EN Pre-Standards, DIN EN Standards, DIN IEC Standards, DIN ISO Standards as well as other forms of publications.

Noise Reduction and Vibration of DIN and VDI Germany have a long-standing tradition in tackling noise and vibration problems. This applies to the VDI, the Association of German Engineers (founded in 1856) as well as to the DIN, German Institute for Standardization (founded in 1917). In 1924, the VDI established the first expert committee dealing with vibrations, which served as a basis for the VDI expert group on vibrations—founded in 1954—and for the VDI Noise Reduction Commission (VDI-KLM)—founded in 1965. The first DIN standard giving guidance on noise indicators and recorders was finalized in 1937. In 1953, the Acoustics Standards

Committee was founded, which later on would also claim responsibility for the field of vibrations.

In 1990, the Acoustics and Vibrations Standards Committee (FANAK) and the VDI Noise Reduction Commission (VDI-KLM) merged into the Standards Committee Acoustics, Noise Reduction and Vibration (NALS) of DIN and VDI. This new standards committee undertook to keep up and foster the tradition of standardization as well as the technical and scientific activities of the VDI-KLM, and particularly the communication between experts which is one of the reasons why NALS is a Member Society of the International Institute of Noise Control Engineering (1-INCE). (The VDI-KLM became a member of 1-INCE in 1976).

In addition, the NALS closely co-operates with the German Electrotechnical Commission (DKE) in the fields of ultrasound and electroacoustics, with the Machinery Standards Committee where machinery safety is concerned, and with the Ergonomics Standards Committee concerning safety at the workplace. The activities of the NALS focus on the development of rules of technology, and on International and European standardization in particular. The NALS is in charge of almost 300 DIN standards and 70 VDI Guidelines which are kept up to date by approximately 540 honorary experts and 10 full-time standardization staff. The NALS is the national partner (mirror committee) for ISO/TC 43, Acoustics, ISO/TC 108, Mechanical Vibration and Shock, CEN/TC 211, Acoustics, and CEN/TC 231, Mechanical Vibration and Shock.

The honorary chairman of NALS is now Lothar Schmidt, Dormagen. For up-to-date information please visit our web site <http://www.nals.din.de/> (or contact joerg.zymnossek@din.de)

This is the 65th in a series of articles on the Member Societies of International INCE.

Member Society Profile is a regular feature of *Noise News International*. If you would like to have your society featured, please contact George Maling at inceusa@aol.com.

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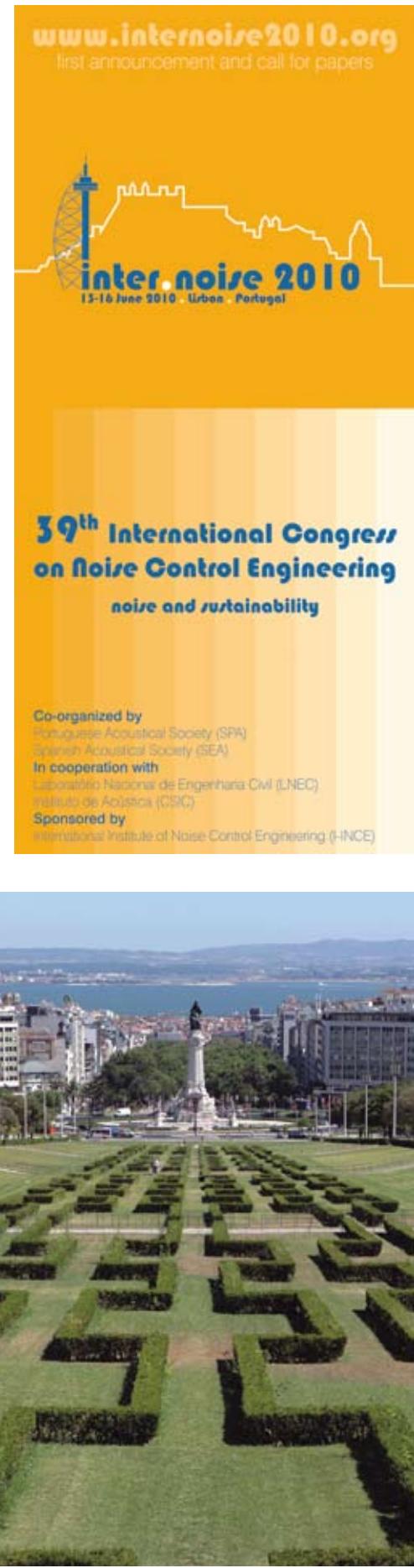
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A photograph showing a large, well-maintained green lawn with a complex hedge maze in the foreground. In the background, the city of Lisbon is visible, featuring the Monumento aos Restauradores (Monument to the Restorers) and other buildings along the waterfront.

WELCOME MESSAGE

Dear Colleagues

INTER-NOISE 2010, the 39th International Congress and Exposition on Noise Control Engineering, will be held in Lisbon, Portugal, from 13-16 June, 2010. The Congress is sponsored by the International Institute of Noise Control Engineering (I-INCE), and is co-organized by the Portuguese Acoustical Society (SPA) and the Spanish Acoustical Society (SEA). The Congress venue will be the modern Lisbon Congress Centre, located on the north bank of the River Tagus in a new rehabilitated tourist waterfront area, full of amazing gardens and esplanades.

Despite the fact that the Congress will be held in Lisbon, it represents the involvement of all the Iberian Peninsula. The main theme of the Congress is Noise and Sustainability. Everyone knows that the societal development creates noise as a by-product. Sustainability enforces and highlights the need to preserve the future generation's stability and existence, without compromising the global development. The junction of these aspects sets up a strong responsibility for all acoustic community as a whole.

Spread over seven hills, Lisbon boasts over 2000 years of History, witnessed by many monuments and historical sites well worth exploring. From Roman town to capital of the Discoveries, evidence of this rich historical background is there to be explored. Lisbon is also an exciting cultural city, offering an array of events from museums, to theatres, to music festivals catering for all tastes. With average temperatures rising well above the 20 °C mark, June is the perfect time to visit this bustling metropolis. By day or by night, there will always be monuments, historical landmarks, shopping centers, cultural sites or open-air locations to be enjoyed. Having all this potentialities, Lisbon is an ideal and pleasant location for the Congress.

The INTER-NOISE 2010 Congress will provide a great opportunity to make contacts and exchange ideas on various fields of acoustics and vibration, such as: Building and Environmental Acoustics, Education, Psycho and Physiological Acoustics, Speech, Measurement and Analysis, Equipments, Noise and Vibration Tools, Material and Technologies for Noise and Vibration Solutions. Many distinguished speakers will share their knowledge and experience with the participants. A large number of exhibitors are expected to attend the Congress showing and promoting their latest tools, equipments and recently developed materials. Short courses on emergent and important themes are also planned.

In addition, the Congress will also provide a wide range of social activities as well as pre and post Congress tours to wonderful and fascinating places, such as Madeira and Azores archipelagos.

INTER-NOISE 2010 will be a very important and fruitful event, and surely a great opportunity to promote and show the scientific research and development of noise control engineering in various fields of applications, to meet old friends and make new acquaintances and partnerships.

Looking forward to meet you all in Lisbon
 Jorge Patrício (SPA)
 Antonio Pérez-López (SEA)
 Co-Presidents, INTER-NOISE 2010

TECHNICAL TOPICS

1. Acoustical Metrology
2. Active Noise and Vibration Control
3. Aeroacoustics and Fan Noise
4. Aircraft Noise Modelling and Control
5. Animal and Bioacoustics
6. Community Noise and Soundscape
7. Costs and Benefits of Noise Control
8. Effects of Sound and Vibration on Humans
9. Environmental Noise Exposure
10. Hearing Protectors
11. Infrasound and Ultrasound
12. Instrumentation and Standards
13. Legislation and Noise Control Policies
14. Musical Acoustics
15. Noise Control Materials
16. Noise Propagation in Ducts and Pipes
17. Non-linear Acoustics
18. Numerical and Computational Techniques
19. Psychological and Physiological Acoustics
20. Room and Building Acoustics
21. Signal Processing and Analysis
22. Sound Quality
23. Speech and Sleep Disturbance
24. Transportation Noise
25. Tire, Road and Rail Noise
26. Underwater Acoustics
27. Vibroacoustics, Isolation and Damping

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IMPORTANT DATES

CALL FOR PAPERS

Papers related to the technical areas listed above are especially welcome for presentation at the INTER-NOISE 2010 Congress, but technical papers in all areas of noise and vibration control may be submitted for inclusion in the technical program. Abstracts must be submitted in the format described in this announcement. The deadline for the receipt of the abstract is February, 1st, 2010. Notification of the paper's acceptance will be sent to authors on March, 15th, 2008. Manuscripts for publication in the conference proceedings are due on April, 15th, 2010.

Manuscripts must be prepared according to the format described on the Congress home page. Final manuscripts must be submitted in PDF or MS-word format by April, 15th, 2010.

For the sake of guaranteeing a correct display of text, figures, symbols and equations in final manuscripts, the submission of final manuscripts in PDF format is preferred. All registrants for INTER-NOISE 2010 will receive a printed booklet containing all abstracts, the final technical program, and a CD that will include all INTER-NOISE 2010 papers. The Congress organizers reserve the right to schedule papers for the appropriate sessions and presentation format, i.e., poster sessions versus oral presentation in technical sessions.

Abstracts can be submitted through the registration link on the Congress web site: www.internoise2010.org. The format requirements for the submitted abstracts are listed as below:

1. Paper title (20 words maximum)
2. Subject Classification
3. First author's name, address, phone number, fax, and email for correspondence
4. Additional authors' names and addresses (if any)
5. Indicate specific type of paper
 - invited paper or contributed paper
 - prefer oral or poster presentation
6. Text of the abstract, not exceeding 250 words, and a minimum of 100 words.
The text should include:
 - A brief introduction of the problem being addressed
 - Importance of the problem
 - Method of the development used for problem solving
 - Original contribution of the work
 - Conclusions



CONGRESS SECRETARIAT

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<http://www.spacustica.pt/internoise2010>



GENERAL INFORMATION

SOCIAL PROGRAM

Sunday, June 13

16:00-21:00 hrs

Opening Ceremony with typical cultural performance and welcome cocktail party at the Lisbon Conference Center

Monday, June 14

19:30-21:00 hrs

Institutional reception "Oporto of Honor" at Municipal Garden

Tuesday, June 15

19:00-23:30 hrs

Congress banquet

Wednesday, June 16

17:00-18:30 hrs

Closing ceremony with farewell cocktail at the Lisbon Conference Center

EXPOSITION AND SPONSORSHIP

The organizers invite all the companies and organizations to market their services and products at the congress exhibition. If you are interested in the exhibiting at INTER-NOISE 2010 or possibilities to sponsor the Congress, please contact the Congress Secretariat.

LANGUAGE

The official language of the Congress is English

WEATHER

The average temperature in Lisbon in June is 20 °C (68 °F). The average highest temperature is 25 °C (77 °F), and the average lowest temperature is 15 °C (59 °F). June is the perfect time to stay and visit.

ABOUT LISBON

Lying on the Tagus north bank, Lisbon (or Lisboa, to its natives) smiles to arriving visitors from the top of its gleaming red roofs. At this time of year (June), the light of Lisbon is the first thing one notices when flying in. The either white or brightly colored buildings reflect the sunlight, that, by then, should intensely warm up Portugal's capital. With average temperatures rising well above the 20 °C mark (68 °F), June is the perfect time to visit this bustling metropolis. By day or by night, there will always be monuments, historical landmarks, shopping centers, cultural sites or open-air locations to be enjoyed.

This month, the capital has its municipal festivities that celebrate the patron Saint of Lisbon, St. Anthony. This festive momentum lends itself to the whole of June, when the typical old Lisbon boroughs gown themselves proudly with colorful ornaments in their squares and windowsills.

Spread over seven hills, Lisbon boasts over 2000 years of History, witnessed by many monuments and historical sites well-worth exploring. From Roman town to capital of the Discoveries, evidence of this rich historical background is there to be explored.

Lisbon is also an exciting cultural city, offering an array of events from museums, to theatres, and to music festivals. In June, Lisbon also hosts its annual Book Fair (Feira do Livro).

CONGRESS VENUE

INTER-NOISE 2010 will take place at the Lisbon Congress Centre. Overlooking the Tagus river in a prestigious area of the city, nearby the historical quarter Belém / Alcântara, the Centre is located in a renovated waterfront, full of restaurants and esplanades, at walking distance from 3 important Hotels and at 20 minutes from the Lisbon International Airport. The Centre can be easily reached by Bus or Tramway (10 minutes in average) from other Hotels situated in the downtown. The Centre facilities includes a large Auditorium with 1700 seats, 7 medium Auditoriums (between 200 to 400 seats), 25 meetings rooms and 5 Pavilions with a total exhibition area of 10,000 m². It offers also the possibility to have different entrances, reception areas and large foyers, as well as 2 restaurants with amazing river views.

HOTEL ACCOMMODATIONS

The Organizing Committee has reserved a block of rooms at different hotels at reduced prices for the conference attendees.

Please note that the prices of the accommodations are only available for bookings made through the official Congress Travel Agency – Viagens Abreu, SA. A list of hotels and prices may be found at the congress web site on the Internet.

PRE-AND POST CONGRESS TOURS

Several tours will be offered to Congress attendees. Details may be found at the congress web site on the Internet.

Planning for a quieter new Washington State Route 520

Leonard Sielecki,¹ British Columbia Ministry of Transportation and Infrastructure, Canada

Introduction

In the scenic Pacific-Northwest corner of the United States, between the rugged shores of the Pacific Ocean and the towering Cascade Mountains, lies State Route 520 (SR 520) in Washington State. SR 520 is a vital transportation corridor connecting Seattle, the state's largest city, with its neighboring communities to the east. Each day, the highway enables over 150,000 vehicles to travel across Lake Washington over a series of structures, including the Evergreen Point Bridge, the world's longest floating bridge. As one of only two routes from Seattle across Lake Washington, SR 520 is extremely important for both local and regional traffic, including the tens of thousands of employees of Amazon.com, Boeing, and Microsoft and many other global corporations which contribute significantly to Washington State's economy.

SR 520 has been in operation since 1963. Now, due to its age, the structures along the highway corridor are becoming increasingly vulnerable to earthquake damage because of their hollow concrete column construction. Structural deterioration over the last 5 decades has also left the floating portion of the Evergreen Point Bridge increasingly susceptible to damage by high winds. As a result, many bridge closures have been required over the past several years. By 2016, as funding permits, the Washington State Department of Transportation (WSDOT) will be replacing the entire existing 4-lane highway with a new highway consisting of 4 general purpose lanes, 2 High Occupancy Vehicle (HOV) lanes, and a pedestrian/cyclist lane.

The bridges for the new SR 520 will be designed to the latest engineering standards and built to withstand a 1,000-year event earthquake and weather windstorms up to 152 km/h (95 mph). The extensive multi-year project is expected to cost between 4.5 and 6.6 billion USD.

Since its commencement, the SR 520 Bridge Replacement and HOV Project has focused on the social and environmental issues relating to the local neighbourhoods, communities, and American Indian Tribal Nations. Although safety is its top priority, the SR 520 Project is also committed to good environmental stewardship. Consequently, the highway will be designed and constructed with both the natural and built environments in mind. Under the guidance of Julie Meredith, SR 520 Program Director, extensive community outreach initiatives have actively encouraged public involvement in the planning and design phases. As

a result of public input, the project is particularly concerned about traffic noise and its impacts on local residents and those who use nearby parks, schools and other private and public facilities. In September, 2008, as a part of its comprehensive mediation efforts, the SR 520 Project team organized a 3-day noise reduction strategies expert review panel.

Procedure

The SR 520 Project team assembled a talented and knowledgeable group of internationally recognized pioneers and leaders in traffic noise to participate in the workshop. The panel was well composed in terms of applied and theoretical engineering disciplines. The panel included Dr. Judy Rochat of the United States Department of Transportation Volpe National Transportation Systems Center Acoustics Facility and Dr. Ulf Sandberg of the Swedish National Road and Transport Research Institute. Top private sector acoustic and traffic noise



experts came from leading international engineering firms. These included Dr. Paul Donavan, Senior Scientist, Illingworth and Rodkin Inc.; Gary Fromm, Civil Engineer/Roadway Design, Jacobs Engineering Group Inc.; and Rob Greene, Acoustics-Vibration and Air Quality Practice Manager, Parsons Brinckerhoff Inc. An indispensable regional engineering perspective was provided by Dr. Steve Muench, Assistant Professor, Civil and Environmental Engineering, University of Washington, who contributed his knowledge about quiet pavements and their performance history in Washington State. John Stout, a senior economist with HDR | Decision Economics, scrutinized the cost-benefit implications of traffic noise reduction strategies developed by the panel.

Washington State and the western Canadian province of British Columbia are neighboring jurisdictions which share many common social, economic, and environmental characteristics. The SR 520 Project team was very interested in the British Columbia Ministry of Transportation and Infrastructure's (BCMOT) experience with open-graded asphalts (OGA) and noise walls. Consequently, Mike Oliver, Chief Geotechnical Engineer, and I were invited to join the panel. We were accompanied by Clare Wakefield, principal acoustic engineer, Wakefield Acoustics Ltd.

The SR 520 Project staff was very professional and all aspects of the workshop were well organized and conducted. Prior to the panel convening, project engineers conducted extensive traffic noise surveys along the highway corridor. Comprehensive and detailed project information packages were also assembled and distributed to the panel members in advance. As a result, the panel was well prepared and hit the ground running as soon as its members met. Over the course of the three days, Dr.



Robert Otto Rasmussen, Chief Engineer of the Transtec Group, Inc., and a leading international tire/pavement noise expert, facilitated the workshop. From working breakfasts and lunches, to evening inspection field trips along the highway corridor, every minute of the panel's time was utilized as effectively as possible.

Immediately at the onset of the workshop, the SR 520 Project team invited neighborhood representatives to make presentations about their noise concerns to the panel. The representatives spoke on behalf of all facets of Seattle society, ranging from students living in University of Washington campus residences and boat house inhabitants on Lake Washington, to the chief executives of Microsoft, Amazon.com and Starbucks. The neighborhood representatives were very well informed about urban traffic noise issues and mitigation practices and spoke articulately about their particular noise concerns.

It was obvious from these presentations the representatives of neighborhoods near Lake Washington were quite hesitant about conventional opaque noise walls being constructed along the corridor. Due to aesthetic concerns, they strongly believed quiet pavements would

serve them better by reducing traffic noise while maintaining unobstructed lake views. After each presentation was made, the panel was able to ask questions directly to the neighborhood representatives. When the presentations concluded, panel members were given the opportunity to personally meet the neighborhood representatives and discuss the representatives' concerns.

From the ease at which the neighbourhood representatives spoke, it was obvious the SR 520 Project Team had done a good job of promoting and maintaining positive communications with the neighborhood residents through its community outreach efforts.

Strategies and Conclusions

For the next three days, the panel reviewed dozens of conventional, innovative and conceptual strategies and solutions to reduce traffic noise for the residents. The subjects ranged from quieter pavements and absorptive noise walls to intersection lids and bridge deck encapsulation. The panel found many non-acoustic factors challenged its development of effective noise reduction strategies. For example, although Seattle is famous for its rainy weather, the city is periodically subjected to severe winter

snowstorms and icy roads. The latter is one reason why many drivers use steel studded tires during the winter; something which limits the long-term durability and effectiveness of quieter pavements.

The panel examined the potential issues associated with reduced operational life spans of open-graded asphalts and grooved concretes caused by winter highway maintenance with heavy equipment and the use of studded snow tires by motorists. The panel also advised WSDOT to schedule highway pavement rehabilitation at night to minimize peak volume traffic delays. This operational approach serves daytime motorists extremely well, but can make the preparation and application of temperature sensitive asphalts difficult for all but the hottest summer nights. The Lake Washington area has stunning scenic vistas highly regarded by the local residents. The panel reviewed the potential use of transparent noise barrier to maintain the spectacular mountain and lake views for those living along the highway corridor.

Throughout the review, the SR 520 Project Team made efforts to ensure the panel members were aware of all aspects of the project. The panel was given complete access to project information, including engineering reports, impact studies and technical drawings. In addition, project engineers and design staff were made

readily available whenever a technical issue required clarification or elaboration.

During the course of the workshop, the SR 520 Project Team arranged for the panel members to visit and inspect the highway corridor, by both land and water. This ensured the panel members had firsthand knowledge of the natural settings of the highway, the existing highway structures, and the location of residential neighborhoods and recreational facilities. The panel was exposed to rush hour traffic and shown specific problematic noise generating features and characteristics of the existing highway alignment.

During the highway inspections, the panel was shown individual residential and recreational properties which project engineers had identified as potentially being impacted by the new highway. The onsite inspections allowed the panel members to personally examine each location and then immediately discuss the factors contributing to the elevated noise levels with the other panel members. As a result, site specific solutions were individually developed, so they could be incorporated into larger noise reduction strategies.

At the workshop's conclusion, the panel made a presentation of its findings and recommendations to the neighbourhood residents, members of the press and the public. After the panel's presentation was completed, the members of the audience

were allowed to speak freely with the members of the panel. The audience asked many technically astute questions which were fielded by members of the panel depending on their expertise. The SR 520 Project Team efforts to promote and facilitate discussions between the panel and the audience appeared successful.

Following the public presentation, the panel members continued working to formalize their recommendations and present them to the SR 520 Project team. Over the course of the intensive panel deliberations, the immense complexity of the project became very apparent. Numerous key non-acoustic considerations had to be examined by the panel in developing its final recommendations. These included environmental and cultural implications, public sensitivity, constructability and infrastructure longevity, maintenance, and rehabilitation. Strategies outlined included modifications to roadway design, selective application of quieter pavements, strategic placement of absorptive noise barriers, and conducting more complex noise modeling. The panel's final report was developed to be a resource to help the SR 520 Project team successfully address the noise issues of the residents living along the highway corridor, while fulfilling its ultimate goal of providing motorists, cyclists and pedestrians in the Seattle area with a well engineered, safe, efficient and pleasant highway.

Further Information

Information on the SR 520 - Bridge Replacement and HOV Project can be found at: <http://www.wsdot.wa.gov/Projects/SR520Bridge/>

Acknowledgement

An article similar to the above appeared in *World Highways*. Thanks go to Ulf Sandberg who took the photographs that appear in this article. ■■■

Footnote

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Visitor perception of park soundscapes: A research plan

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Introduction

Many studies of noise impacts in U.S. National Parks have utilized “dose-response” studies with the ultimate aim of addressing: “How much noise is unacceptable?” Community noise studies have focused on maximum tolerable noise for decades, but this criterion is manifestly inappropriate for National Parks. An alternative acoustical paradigm seems more apt to evaluate the effects of sounds on visitor experience and visitor judgment of the park soundscape. Juries of listeners routinely have been used to judge the sound quality of automobiles, home-appliances, and other products. An analogous procedure can be used to judge the generalized sound quality of a national park soundscape. The current plan is to develop outdoor sound quality measurement methods and standards by which the U.S. National Park service can accomplish their soundscape assessments. These standards might call upon subjects to help assess the quality of national park soundscapes. In addition, measurement of sound quality will assist the National Park System in meeting their mission of preserving the pristine acoustic environment as a resource for generations to come. Here, we discuss the basis and plan for this measurement protocol development and indicate some standards to be developed.

Shteir (2008) discusses Theodore Roosevelt’s writings from about 1885 saying: “In his quieter moments, Roosevelt hunted and wrote, and his love for the natural world blossomed. In

one passage about the hermit thrush—a small songbird—he describes the ‘serene, ethereal beauty of the hermit’s song, rising and falling in the still evening.’” With increasing noise intrusions, one wonders what Roosevelt would hear today.

National Park System Goals

For U.S. National Park Service (NPS) units (e.g. national parks, national recreation areas, national monuments, national historic sites, etc.), the acoustic environment, or soundscape⁴, is an important resource that the NPS is legally mandated by statute⁵ and policy to protect for the people of the United States. The national park acoustic environment is one facet of the total park environment. To ensure appropriate visitor enjoyment and overall ecosystem health, the acoustic environment must be managed, interpreted, and preserved just like all other park natural, cultural, or historic resources. Furthermore, because the acoustic environment also plays a vital role in ecosystem health, it is imperative that the protection of park soundscapes takes precedence to providing simply an “enjoyable” visitor experience or unconditional access. Lastly, NPS is directed to restore to the natural condition, wherever possible, those park soundscapes that have become degraded by unnatural (non-natural) sounds.⁶

World Context

The topic of visitor response to non-natural sounds in protected natural areas is an active policy issue in several countries (e.g., New Zealand [Cessford,

1999], Norway [Krog and Endahl, 1999], and the USA). Sources of non-natural or anthropogenic sound include motorcycles, automobiles, jet skies, snowmobiles, and off-road vehicles. Aircraft are the most geographically pervasive noise source in U. S. parks (Miller, 2003; Sheikh and Uhl, 2004; Voorhees and Krey, 1999).

Previous Research

Over the past 15 years, there has been substantial research on the issue of sound in parks. Generally, there are two schools of thought for the conduct of this research. One method to conduct this research is put forward by researchers with a traditional acoustics and environmental noise background. These researchers have great experience in the areas of community noise assessment and compatible land use planning. It is natural and expected that this group, with extensive experience regarding aviation or highway noise, would try to bring these time-tested tools to bear on the issue of non-natural sound in parks.

The approach of traditional acoustical researchers is the engineer’s black box approach: measure the inputs to the black box over a range of values (the noise dose received by the community), measure the output values from the black box that correspond to the various input values (the community annoyance levels for various degrees of noise), and find a relationship (function) that best fits the measured data relating output to input. The community is the black box. Thus, the primary tool for assessment has been the dose-response

relationship between a noise metric (usually a long-term average of noise energy such as the day-night average sound level or DNL dose) and the percent of the community exhibiting a stated degree of annoyance such as the percent highly annoyed (the response).

During this same period, psychologists and sociologists have worked with parks and recreation specialists performing research on visitor response to non-natural sound in a similar manner to their research on crowding or haze, etc. In general, in comparison to the traditional acoustics research, this research tends to be more focused on the psychological aspects of the individual's response and is somewhat less quantitative—at least in terms of acoustical measurements.

Conclusions From Previous Research

Several points come out clearly from the existing body of parks research. The first point is that park visitors value natural quiet. McDonald *et al.* (1995) surveyed more than 15,000 visitors to 39 NPS units and found that most visitors (91%) consider enjoyment of natural quiet and the sounds of nature as compelling reasons for visiting national parks. Driver *et al.* (1987) finds that escape from the stresses of urban life, attaining tranquility, and obtaining solitude are primary reasons for visiting national parks and similar natural environments. Of 16 preference areas, escaping noise comes fourth, after enjoying nature, physical exercise, and reducing tension. Similarly, Mace *et al.* (1999) find solitude and tranquility, i.e. peace and quiet, to be major positive attributes of a natural soundscape, and in terms of environmental factors, they find that natural quiet is the second most highly ranked public good—second only to clear, clean air. Hollenhorst (1994) also comments on solitude being a major benefit of a wilderness experience. Recently, Berman *et al.* (2008) has demonstrated clear cognitive benefits from interaction with natural environments.

They show the restorative affects of natural stimuli that modestly grab attention in a bottom-up fashion, thereby allowing top-down directed-attention abilities a chance to replenish.

The second point is that not all park visitors have the same expectations for natural quiet. Jackson (1982) examines differences between the attitudes and expectations of snowmobilers and cross-country skiers who are from urban areas and finds that the skiers are sensitive to and affected by the presence of snowmobilers, while the reverse is not the case. Kariel (1980) compares the evaluation of sounds in a recreational environment by mountaineers and the general public. Included are nature-related, people-related, and technology-related sounds. Kariel finds that although mountaineers considered nature-related sounds to be more pleasant and both people- and technology-related sounds more annoying than did the general public, the rankings according to the degree of pleasantness or annoyance were extremely close. McDonald *et al.* (1995) in their survey of 15,000 national park visitors conclude that the high level of value attached to natural quiet (91% find natural quiet and the sound of nature compelling reasons to visit national parks) indicates that this resource is important to all park visitors and not to specific groups. In summary, while natural quiet and the sound of nature may be important to nearly all park visitors, the body of research indicates that they are at least a little more important to some groups of visitors than to others.

The third point is that there are interactions between assessment of soundscapes and assessment of landscapes. Mace *et al.* (1999) employed a laboratory simulation to study the effects of helicopter noise on visitors to a popular Grand Canyon vista point. They find that the helicopter noise interferes with the quality of the visitor experience and, notably, affects the perceived aesthetic

quality of the landscapes. Anderson *et al.* (1983) use three different procedures to study how the sound of 18 different sources (including children, songbirds, construction equipment, automobiles, aircraft, and wind) affects the esthetic evaluations of outdoor settings. The three testing procedures produced similar results. Natural and wildlife sounds enhanced the evaluations of heavily wooded natural and residential sites; other sounds had detracting effects on these same two types of sites. In contrast, natural and wildlife sounds had little effect on the assessment of two downtown streets, where traffic sounds were most *enhancing*. Similar results are reported by Morinaga (2003) and by Kuwano (2001). These results show that the interaction of a setting's visual and acoustic characteristics significantly influences evaluations of that setting.

In the fourth point, Brown (2004) discusses three essential differences between what is a sound quality (SQ) assessment of a soundscape and a noise assessment. Summarized from Brown, the three essential differences are:

1. Noise assessment in urban areas deals largely with sounds of discomfort, sounds that disturb sleep, interfere with communication, distract or annoy. In contrast, the SQ assessment of a soundscape focuses on factors that are regarded positively, that people prefer or consider as desirable.
2. There is a difference between noise assessment and sound quality assessment in the locus of application. Noise assessment, although it may apply to outdoor areas like a garden or patio, etc., is aimed largely at people who are at home, indoors. Sound quality assessment of a soundscape is likely to involve the assessment and management of sound heard in open spaces, outdoors—although not exclusively so.

3. The third difference is that in noise assessment, undesired sound is typically seen as an extraneous by-product, a waste to be managed. In contrast, sound quality assessment approaches sound as a potentially valuable resource, one to be appreciated, improved, and conserved.

Purpose

This article sets forth the general research blocks required to develop the means to assess and predict the SQ of various park soundscapes. This paper examines the efficacy of alternative methods to assess visitor response to non-natural sound in parks. Some of the basic standards that would be based on this research and would facilitate its technology transfer are indicated.

Previously Used Metrics

As indicated above, the sociological and psychological research on park soundscapes has its roots in similar research for other factors such as haze or crowding. Primarily, this research has tended to examine many other factors than annoyance in order to assess the role that non-natural sound plays in the park visitor's experience. Factors and concepts include soundscapes, appropriateness, acceptability, economics, peace and quiet and relaxation, pleasantness and sound quality (SQ). In addition, many of these researchers discuss annoyance—frequently as a secondary factor.

In contrast, traditional acoustical research in parks is based on current methods to assess noise in residential areas that, in turn, have their roots in methods developed by the Air Force and the aviation community, primarily driven by the introduction of the first generation of jet aircraft, the Boeing-707, the Douglas DC-8, and the Air Force B-52. These were loud machines, and clearly their noise was very annoying to many people, so it was natural to relate annoyance to the noise. Today, the situation is much the same.

Although the aircraft are much quieter, there are many more of them. And since people are still annoyed, it makes sense to continue relating annoyance to the noise in residential neighborhoods.

But parks are not the same as urban or suburban residential neighborhoods, and the role people play as residential dwellers is different from their role as park visitors. A residential dweller is an inhabitant of the area. He or she chooses to live in a certain locale for a variety of reasons and trade-offs. Schools, crime, congestion, noise, taxes and many other factors all enter into a decision as to where to dwell. The residential dweller, as a park visitor, has gone on vacation from job and residential environment, with the expectation of experiencing the unique environment and soundscape of the park. The park visitor is just that, a visitor, a guest, a patron of what the park has to offer.

The traditional acoustics research community has tried to accommodate to these differences. They have gone from DNL to other metrics such as "noise free interval," "percent time audible," "percent time above (level)," and "number of events above (level)," and they have introduced the notion of soundscapes. But they have retained the notion that annoyance is a salient factor, and they have pointed to research data showing that, overall, visitors to these parks are pleased with their experience and will return. On the basis of low rates of annoyance and survey data showing a willingness to return, some have postulated that the problem of non-natural sound in parks is minimal and should be ignored.

If one takes a step back, it becomes clear that the concept of a park visitor enduring selected degrees of annoyance is an inappropriate concept to apply to a visitor, a guest. As a business proprietor such as an innkeeper, museum administrator, or church clergy, one would want his guests' interactions to be free

from annoying factors; for the guests' experience to be one of quality. The notion that substantial numbers of park visitors must not want to return before one can say that there is an impact on the soundscape is specious at best. Although some correctly note the informational, cognitive, and aesthetic aspects of noise (Blauert, 1986), the differences between typical noise assessment and assessing the sound quality of the soundscape in a park are the three by Brown (2004) as given above. As they do in other areas such as access, cleanliness, visibility, etc., "proprietors" of parks and wilderness areas should be asking what is the quality of the soundscape that we present to our guests and visitors? Assessment of a park soundscape needs to change from quantifying levels of annoyance to quantifying the sound quality of park acoustic environments. Never should the question be: "How bad are we?"

Assessing the Sound Quality of a Landscape

Clearly, we must develop methods to assess the SQ of existing and potential park soundscapes. Our first question is: Is the SQ of a visitor's experience best represented by judgments of the SQ of whole hikes, the more egregious events during a hike, or some combination of these two? Experience in non-park settings suggests that it is the whole hike judgments that are important. And this is probably true for the serious hiker that comes to hear and experience all that nature has to offer. But for another segment of park visitors, the SQ at inspirational points, vistas, and lookouts may be all that is important. Our recommendation is that the research initially tests both whole-hike responses and individual event responses to determine their relative importance.

Our second question is: Should primary subjective data collection be conducted in the field, the laboratory, or some combination of the two? Context and presence impose some challenges for

virtual park environments (Witmer *et al.*, 1998). The goal for virtual laboratory testing is that responses correlate with real, field responses, and therefore the need for aural realism may require the use of binaural recordings and playback (Krebber *et al.*, 2000; Larsson *et al.*, 2002). But additionally, our environment is perceived by the integration of multi-modal information, and therefore senses other than hearing are important. The context for “real life” evaluation of park sounds always includes visual (spatial) cues of the environment. Many provide evidence that the visual context is important for aural assessment (Carles *et al.*, 1999; Abe *et al.*, 1999; Ozawa *et al.*, 2003; Abe *et al.*, 2006; Bulkin *et al.*, 2006). But how do you simulate in a laboratory setting, the context of walking through an environment, with a time and space varying visual and aural stimulus? What are the important characteristics of long-hike hikers versus short-hike hikers? The subject’s expectations, socio-cultural background, and emotional state are significant parameters that need to be investigated (Schulte-Fortkamp *et al.*, 2007), and therefore this should be considered in the experimental setup process. Also, there will be many technological challenges to laboratory testing. Just recording, playback, and presentation of some of the quieter park soundscapes (A-weighted levels less than 20 dB) will push the limits of current instrumentation. Because all these questions relate to obtaining reliable laboratory data, our recommendation is that initial subjective data collection be primarily in the field, and that if later laboratory testing is used, the initial focus should be determining source-to-source variations and answering questions about how to best present the time or space dependent stimuli of a hike.

As noted, SQ assessment requirements are expected to vary with activity. For example, research has shown that visitors engaged in a long, multi-day hike have a greater expectation for enhanced SQ

than do visitors that drive to a lookout point. Hikes that include inspirational sites are expected to have even greater expectations for enhanced SQ since it is the total landscape and soundscape that defines such sites. These inspirational locations might be named destinations such as Cathedral Grove in Muir Woods or Pt. Sublime at the Grand Canyon, or they may be from the multitude of stopping points along park hikes such as the Marufo Vega, Dodson, Mule Ears, or Mesa de Anguila trails in Big Bend National Park. On the other hand, it may be that stops along a densely forested trail could be perceptually important because the trees limit the extent of the visual landscape and may provide significant acoustical absorption, perhaps opening up the senses to the nearby soundscape.

To develop the research plan, we first consider the case of back-country whole hikes – an important park experience, and the most difficult case to consider. We propose the use of juries of subjects to rate the SQ of whole-hike situations. Their responses for various hikes (differing sources, differing lengths, differing temporal exposure patterns, etc.) will be compared to metrics calculated from the measured, average time-varying acoustic signal along the hike. The goal is a metric that is predictive and that correlates well with SQ judgments. Two major research elements for developing the protocol to assess the SQ of a whole hike acoustic environment are (1) jury judgments of whole hikes and (2) a measure of the corresponding time- and space-varying park soundscapes. However, it will be impossible to measure the complete context and experience of many different hikes, so methods must be developed to extrapolate from known whole hike soundscape assessments to other unstudied hikes.

Measuring the soundscape experienced by any specific hiker is problematic—for multiple reasons. For privacy reasons, it may not be possible to follow hikers,

recording what they say, do and feel, and it would likely be difficult to “instrument” the average hiker and obtain fully accurate data, so we propose to measure the ensemble of hiker SQ judgments and relate this distribution to a separately measured ensemble of park physical soundscape measurements.

The appropriate baseline, of course, is the total absence of self-generated sound, which occurs naturally when a hiker stops and becomes more attentive. While whole-hike sound probably could be measured by binaural in-ear microphones or the use of a stereo variation on audio dosimetry microphone placement, the fundamental, natural soundscape baseline probably is not best measured using any version of direct, on person measurements. Rather, a fixed point sampling technique that includes the entire trail should be considered.

One option for jury judgments of whole hikes is to have the subjects rate whole hikes at their completion. The ensemble of field judgments on a specific hike will be compared and related to the corresponding ensemble of physical measurements made along that hiking trail. Also, as discussed below, subjects may use simple electronic devices to log the location and time of events that significantly detract from the sound quality, and thus, develop data for egregious events.

Since this kind of detailed, labor-intensive study can only be performed at a very small fraction of potential hikes, methods will be needed to relate these results to other hikes in other parks, other locations, and other times of year, etc. We propose two types of research in order to make these kinds of relations. *First*, we propose research that will assess perception of one type of sound source (e.g., a helicopter) compared to a second type of sound source (e.g., a propeller airplane). This will be done by field SQ testing using binaural field recordings of the various sources presented to juries of subjects in

the traditional SQ testing fashion. The goal is to lessen the importance of context and expectations, to the extent possible, for a change in source but no change in temporal pattern or hike. It is hoped that this initial limited laboratory SQ testing can yield acceptable results.

The measurement of sound quality for consumer products is well established—especially in the automotive industry. The automakers want a car that sounds appropriate and pleasing to the customer, not noisy and annoying. The methods of SQ measurement, including standardized loudness assessments, are used for many other products, especially in Europe. To the extent practical, this park SQ testing will build on the existing body of knowledge regarding jury protocols and methods (Otto *et al.*, 1999).

Second, we propose the development of the theoretical model to predict the whole hike SQ based on a time-varying soundscape as the input to the model. The methods proposed by De Coensel and Botteldooren (2008) provide a good starting point for development of this theoretical model. The theoretical model takes the time-varying sound as its input and models the attention paid to this input by a distribution of listeners. This model will be used to assess soundscape temporal patterns that differ from the measured soundscape temporal patterns.

In addition to the whole hike evaluations, subjects may use simple electronic devices to log the location, time, and their response to events that significantly detract from the sound quality. In this fashion, information will be gathered on single-events so that we can determine the types of areas that are most affected by noise and the contribution of single egregious events to the overall judgment of the whole-hike SQ.

Certain park areas typically are simpler to assess because the extent of temporal and spatial variation is much less. For

example, a five to ten minute visit from a car to a lookout point should be readily amenable to field-laboratory SQ testing. The situation is similar for built-up areas such as service stations, shops, and visitor centers. Campgrounds represent an intermediate situation where the temporal pattern is at least several hours long, but there is much less spatial variation. The theoretical model developed for hikes should also facilitate predicting judgments of sound qualities in campgrounds.

Potential Standards

Ultimately several standards should be developed to support this methodology. Four of these standards would be:

1. Methods to measure and assess the SQ of lookout points, inspirational points, and short hikes (i.e., less than 1 hour).
2. Methods to measure and/or quantify the whole-hike acoustic setting
3. Methods to assess the SQ of non-natural sound sources as the sound is received in parks.
4. Methods to assess the SQ of long-duration (i.e., 1-hour to 2 days in duration), time- and space-varying park soundscapes.

Acknowledgement

This research is funded by the Natural Sounds Program of the US National Park Service.

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Footnotes

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4. The term acoustic environment is chosen rather than soundscape in order to emphasize the resource aspect of park sounds and potential impacts to wildlife in addition to the implied human perception viewpoint.
5. 16 USC 1a-1, Sec. 1a-1, Pub. Law 88-577, Pub. Law 100-91, Pub. Law 106-181,
6. For purposes of this paper, the term "parks" will generally refer to units of the national park system, including federally-designated wilderness areas within parks. See <http://www.nps.gov/legacy/nomenclature.html> for examples of national park system units.

NOISE-CON 2010

(See the inside front cover for more information)

Special Sessions

Special Sessions that will be part of the NOISE-CON 2010 program are being organized by INCE and also jointly by INCE and the ASA Noise, Architectural Acoustics, Engineering Acoustics and Structural Acoustics Technical Committees. The INCE organized Special Sessions are listed below and also in the complete special sessions list above. Technical papers in ALL areas of noise control engineering are welcome, so your paper need not be part of one the special sessions. However, if there is synergy with particular special sessions, suggest it be part of a particular session when you submit your abstract. More information about the special sessions and session organizers can be found at www.inceusa.org/NC10/tech_sessions.asp

Exposition

A MAJOR TECHNICAL EXPOSITION will be held at this joint NOISE-CON 2010 conference and 159th Meeting of the ASA. The exhibits will include computer-based instrumentation, multi-channel analyzers, sound quality systems, software for noise and vibration control analyses, acoustical materials, passive noise control devices, active control systems, and other products. Details regarding the exposition can be obtained from Richard J. Pepin of Scantek, Inc., who is the exposition manager.

Hotel, Travel Information and Registration

There is one registration fee for both conferences and registration for the conference will be handled by the Acoustical Society. Information will be posted on <http://asa.aip.org/meetings.html>. Hotel and travel information will also be posted on this site. The Baltimore Marriott Waterfront has their own web site <http://www.marriott.com/hotels/travel/bwiwf-baltimore-marriott-waterfront>. Note that there are several Marriott Hotels in the Baltimore area, make sure you are booking at this one for the conference.

INCE Update

International INCE I-INCE Board and General Assembly to Meet in Ottawa

There will be several meetings related to International INCE activities before and after the INTER-NOISE 09 Congress in Ottawa, Canada. The schedule is:

- Saturday morning, August 22 — Congress Selection Committee
- Saturday afternoon, August 22 — Board of Directors
- Saturday evening, August 22 — Board of Directors
- Sunday morning, August 23 — Technical Study Groups
- Sunday afternoon, August 23 — General Assembly
- Wednesday evening, August 25 — Board of Directors (after the farewell reception)

INCE/USA New Distribution Policy for Noise Control Engineering Journal

The INCE/USA Board of Directors has approved a new distribution policy for *Noise Control Engineering Journal* (*NCEJ*). A compact disc (CD-ROM) will be sent to members once a year, at the end of each volume, instead of bimonthly. The year-end mailing will also include all papers published in *NCEJ* beginning in 2001 with Volume 49. Members will be notified by e-mail when papers in a new edition are available for download. Download is from the Scitation platform hosted by the American Institute of Physics (AIP).

Members may access *NCEJ* papers anytime through the INCE/USA website: www.inceusa.org and selecting INCE Digital Library on the right hand side

of the page, or directly through www.incedl.org. In addition to viewing the latest published issue of *NCEJ*, papers may be searched via author names, words in the paper title, INCE subject classification (via keywords), or via author affiliation.

NCEJ is divided into two parts on this site; the first part contains Volumes 1 to 19(1) and the other part contains Volumes 19(2) to present. In addition to access to all published *NCEJ* papers, members of INCE/USA now have free access to over 8,300 INCE conference papers. This is a relatively new benefit to INCE/USA members and *NCEJ* subscribers. Conference papers may also be searched by author, title, subject classification or author affiliation.

Members can create an account for free downloads of conference or *NCEJ* papers once they have the registration code from the INCE/USA Business Office or received a solicitation email from AIP Scitation services. Go to the site: <http://scitation.aip.org/journals/doc/SCITATION/register/registration>

INCE/USA Elects New Officers and Directors

The Annual Meeting of the INCE/USA Board of Directors and the Annual Meeting of the Institute were held on 2009 March 7-8 in Indianapolis, Indiana.

Patricia Davies, Director of the Ray W. Herrick Laboratories, Purdue University is serving her second year as president. Paul Donavan, Illingworth-Rodkin, is the immediate past president. James K. Thompson of Brüel and Kjaer North America was elected president-elect, and will become president in 2010. Christopher W. Menge, Harris Miller

Miller and Hanson, Inc. was elected vice president-public relations, and Kenneth Kaliski, Resource Systems Group, was elected vice-president-board certification. Michael Lucas, Ingersoll-Rand, was elected vice president-publications.

The election of three directors was certified at the Annual Meeting of the Institute. They are Gordon L. Ebbitt, Carcoustics, Robert A. Putnam, Siemens Power Generation, Inc., and Scott D. Sommerfeldt, Brigham Young University. Three directors, Mandy Kachur, Richard Kolano, and Ralph Muelheisen were elected for a one-year term by the Board at its Annual Meeting.

Patricia Davies and Paul Donavan are continuing as directors. Deane B. Jaeger, Charles T. Moritz, Thomas E Reinhard, J. Stuart Bolton, Paul Burgé, and Mardi Hastings also continue as directors.

Eric Wood of Acentech, Inc. continues as vice president—membership, Steven Hambric, The Pennsylvania State University, continues as vice president—technical activities. Todd Rook, Goodrich Aerospace, continues as secretary, and Steven E. Marshall continues as treasurer.

Courtney Burroughs continues as editor of *NCEJ*, Joseph M. Cuschieri continues as executive director, and George C. Maling continues as managing editor of NNI. Richard J. Peppin of Scantek, Inc., continues as NNI advertising manager and INCE/USA exposition manager. Ralph Muehleisen of the Illinois Institute of Technology continues as chair for student activities.

Christopher Menge, Kerrie Standlee, and Dan Kato have completed their three-year terms on the Board. ■

Canada

Acoustics Week in Canada

Acoustics Week in Canada 2009, Canadian Acoustical Association's annual conference, will be held on October 14-16 at Niagara-on-the-Lake, Ontario. The conference will include three days of technical sessions, plenary lectures, an equipment exposition, and a banquet. More information is available on the conference website: <http://www.caa-aca.ca>.

USA

New American National Standard published:

"Measurement and Evaluation of Broadband Vibration of Surface Ship Auxiliary Rotating Machinery"

The Acoustical Society of America has announced the recent publication of ANSI/ASA S2.28-2009, *American National Standard Guide for the Measurement and Evaluation of Broadband Vibration of Surface Ship Auxiliary Rotating Machinery*. This is a revision of ANSI S2.28-2003.

This Standard contains procedures for the measurement and evaluation of broadband mechanical vibration of non-reciprocating auxiliary machines on surface ships, as measured on non-rotating parts. It applies to acceptance tests on new machinery (shop tests or on-board tests) and to *in-situ* tests on existing machinery on board ship. This American National Standard is related to the ISO 10816 series that provides guidelines for the evaluation of different types of machines.

This Standard was developed by Accredited Standards Committee S2, Mechanical Vibration and Shock, with the assistance of Working Group 10/Panel 2, Operational Monitoring and Condition Evaluation, under operating

procedures accredited by the American National Standards Institute (ANSI). These procedures assure that the standard represents the consensus of opinion among those with a direct and material interest in the subject matter. The peer-reviewed standard was drafted by a working group comprising experts from all segments of the ship and shipbuilding related acoustical community.

ANSI/ASA S2.28-2009 is priced at \$110.00. This standard and many other national and international standards can be obtained from the Acoustical Society of America Online Store at: <http://asa.aip.org>. Standards may also be ordered by phone, fax or mail from: Acoustical Society of America, 35 Pinelawn Road, Suite 114E, Melville NY 11747-3177, Phone: 631-390-0215 Fax: 631-390-0217, Email: asastds@aip.org

NIOSH and NHCA present first Safe-in-Sound Excellence in Hearing Loss Prevention Awards

Noise-induced hearing loss is a permanent but preventable problem. The National Institute for Occupational Safety and Health (NIOSH), in partnership with the National Hearing Conservation Association (NHCA), is pleased to announce the recipients of the first four Safe-in-Sound Excellence in Hearing Loss Prevention Awards™, honoring companies that have shown their dedication to the prevention of noise-induced hearing loss through excellent hearing loss prevention practices in the work environment. The awards were presented at the 34th Annual Hearing Conservation Conference held on February 12-15, 2009 in Atlanta, Georgia. The award honors hearing loss prevention programs in the construction, manufacturing, and service sectors. In addition, there is a fourth award

recognizes an organization for innovation in hearing loss prevention and their dedication to fostering and implementing new and unique advances in the prevention of hearing loss.

The recipients in the Manufacturing Sector are:

Pratt & Whitney - East Hartford Facility, CT. Pratt & Whitney, a United Technologies Corp. Company, was recognized for the comprehensive approach taken, aiming at excellence in every component of the hearing loss prevention program; for their exceptional commitment to noise control and for promoting the active involvement of the workforce in their efforts.

Domtar Paper Company, Kingsport Mill, TN. Domtar Paper Company was recognized for the comprehensive integration of their hearing loss prevention program and a demonstrated commitment to extend hearing loss prevention practices beyond the occupational work environment into recreational and community activities enjoyed by their workers and their families.

The recipient in the Services Sector is:

The Montgomery County Water Services (MCWS), OH. Public entities in Ohio do not fall under the purview of Federal or State Occupational Safety and Health Administration (OSHA), but the MCWS proactively addresses each of the components of an effective hearing loss prevention program, often extending beyond minimal regulatory requirements. The Montgomery County Water Services was recognized for the comprehensive approach taken, aiming at excellence in every component of the hearing loss prevention program; for developing innovative strategies for addressing the variable work routine of its noise-exposed

Continued on page 60.

Denmark

Third International Conference on Wind Turbine Noise Aalborg, Denmark, June 17 – 19 2009

The third international conference on wind turbine noise was held in Aalborg, Denmark on June 17-19, 2009. This initiative by INCE/Europe is now firmly established as the leading international meeting devoted to exploring the origins, propagation and effects of wind turbine noise. More than 160 delegates from 25 countries came to Aalborg, following an invitation to INCE/Europe from Aalborg University Acoustics Department to hold WTN2009 in their city.

The 46 papers which were scheduled divided into the following topics:

- Effects of Wind Turbine Noise (6 papers)
- Regulations for Noise Limits (5 papers)
- Airfoils (4 papers)
- Modelling (5 papers)
- Instrumentation (4 papers)
- Measurements (9 papers)
- Propagation and Prediction (5 papers)
- Planning (3 papers)
- Case Studies (5 papers)

The program can be viewed on the conference web page, www.windturbinenoise2009.org

Copies of the proceedings CD are available at a cost of GBP 55.00 including airmail postage. Contact: INCE/Europe, Riverside House, 4 Oakland Vale, New Brighton, Merseyside, CH45 1LQ, United Kingdom. Fax: +44 (0) 151 639 5212; e-mail: cathy@cmmsoffice.demon.co.uk. A limited number of proceedings CDs from the previous conferences (Berlin 2005 and Lyon 2007) are also available.

INCE/Europe is now actively planning the fourth conference in this series. Keep this URL for future reference:
www.windturbinenoise2011.org.

Belgium

ISMA 2010

The next ISMA Noise and Vibration Engineering Conference will be held in Leuven on 2010 September 20-22. The conference is being organized by the division PMA of the K.U. Leuven. The conference is one of a series of biennial international conferences on noise and vibration engineering, structural dynamics and modal testing.

ISMA 2008 was organized in September 2008 and was attended by more than 550 persons. The technical program was composed of 330 technical papers scheduled into 8 parallel tracks and 3 plenary poster sessions. Full CD-ROM conference proceedings were published and referenced in the ISI Web of Science. More information on the conference can be found at <http://www.isma-isaac.be>.

Obligatory tire labeling on fuel, noise and safety a step closer

Motorists should soon be able to get more information on which tires cut their fuel consumption, which improve their safety and which are quieter, following a vote in the European Parliament's industry committee in March.

In an agreement that could by-pass the need for national legislation and become law directly, the MEPs on the committee said all retailers should be obliged to show "fuel efficiency, wet grip, and external rolling noise classes" in any technical promotional literature for tires to be fitted to passenger cars, light and heavy duty vehicles. Labels similar to the European energy colored bar-chart would have to be clearly displayed wherever tires are sold, and MEPs said the information should also be printed on receipts and stamped onto the side of tires.

Transport and Environment policy

officer Nina Renshaw said: "In the past, buying tyres has been a confusing and frustrating exercise. There was no official information for consumers to compare which of the thousands of different models really save money or offer better grip. This should mean real savings in fuel costs and CO₂ emissions."

Transport and Environment has also been calling for stricter noise and fuel efficiency standards for tire makers, as better tires are technically feasible but EU requirements for tires have not kept pace with technological advances. For more: <http://www.transportenvironment.org>.

United Kingdom

New Centre Will Research Effects of Pollutants on Health

Environmental Protection UK has strongly welcomed the establishment of a new research center that will further our knowledge of the health impacts of pollutants in our local environment. The new GPB 5 million initiative, funded by the Medical Research Council (MRC) and Health Protection Agency (HPA), will aim to develop our understanding of how human health is affected by the many pollutants that we are exposed to in our everyday lives.

Among the three projects that have been announced is research into the health of people living near London's Heathrow, to explore how air and noise pollution from air travel and road can affect human health. The study will aim to understand the effects of simultaneous exposure to both noise and air pollution, which currently are thought to have different effects on the cardiovascular system.

Environmental Protection UK, www.environmental-protection.org.uk, is the environmental protection charity supported by pollution control professionals. 

Australia

Aviation Noise Information

WEBTRACK is an innovative system introduced by Air Services Australia to provide the community with information on where and how high aircraft fly, as well as noise levels of these operations. It allows members of the public access to detailed information on aircraft operations around major Australian airports.

WebTrak is part of the largest integrated Noise and Flight Path Monitoring System in the world. It uses information from air traffic control secondary surveillance radars to monitor aircraft within 55 km of the airport up to a height of 3000 m above ground level. Aircraft noise data is downloaded daily from noise monitors strategically located about the communities close to the airport.

The information is then displayed on a detailed map (road or aerial) which enables the user to zoom down to their street level. In Current Flights mode you can view current operations (delayed by 40 minutes for aviation security reasons) around the airport. In Replay Mode you can access flight information and noise data for the previous two weeks.

For access to webtrak www.airservices.gov.au/aviationenvironment/noise/webtrak.

Invention winner

The Australian television program, New Inventors, showcases three inventions each week and there is a weekly judged winner and public winner. The innovative product, QuietWave, from Acoustica, has recently been both the judges and the public winner and proceeded to the final. The product uses a 100% organic rubberized material to dampen the transfer of sound through a partition. This product was also a finalist in the Australian Engineering Excellence Awards for 2008.

China

WESTPAC X

WESPAC X, the 10th Western Pacific Acoustics Conference, will be held in Beijing, China on 21-23 September 2009. The Congress is co-organized by the Acoustical Society of China (ASC), the Institute of Acoustics, Chinese Academy of Sciences (IACAS), and the National Laboratory of Acoustics Chinese Academy of Sciences, The organizers warmly invite and welcome all the prospective participants around the world coming to join us in Beijing and to communicate in the up-to-date advancements in acoustics.

The Congress will feature a broad range of technical papers from around the world and distinguished lectures. An extensive exhibition of acoustics technology, measurement instrumentation and equipments, various social activities will be provided.

More information can be found on the Internet: <http://www.wespacx.org>

Japan

ASJ RTN-Model 2008 is Released

The Acoustical Society of Japan (ASJ) has published a new version of road traffic noise prediction method "ASJ RTN-Model 2008" on April 1 2009. It is an up-grade version of the previous model proposed in 2004. In this version, motorcycle is newly included in the classification of road vehicles, which sometimes radiates loud noise in urban areas. Noise prediction method at signalized road intersection is developed and included in the model. Acoustical durability of low noise pavement is treated and the sound source description is improved based on a long term vehicle noise survey data collected at drainage asphalt pavements.

On the other hand, recent road traffic noise prediction model has come to play an important role on administrative measures. One is for the prediction tool of the noise assessment in the future environment based on the Environmental Impact Assessment Law (enforced in 1999), the other is the noise estimation tool of the regular environmental monitoring based on the Noise Regulation Law (Article 18, revised in 2000). In addition, the prediction model is used as a design tool for noise mitigation measures. In consideration of such a situation, the 2008 version was developed.

The English version of the model will be published in the January 2010 issue of Acoustical Science and Technology edited by the Acoustical Society of Japan. ■■■

Pan-American News

Continued from page 58.

workers and for promoting the active involvement of the workforce in its safety and health efforts.

The recipient for the Innovation in Hearing Loss Prevention award is: **Sensaphonics Hearing Conservation, Inc., Chicago, IL.** Sensaphonics was recognized for being a pioneer in combining products, audiology services, and education to reach their hearing loss prevention goals, for their culture of innovation and educational outreach, and for having raised awareness of the importance of hearing loss prevention among audiologists, the music industry and the general public. ■■■

International Representatives

Below is a list of international contacts for the advertisers in this issue and, as a courtesy, for the advertisers in recent issues. Future listings will only have contacts for current advertisers. Please send any updated information to INCEUSA@aol.com.

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Eckel Industries

Casella USA Releases new CEL-600 Sound Level Meter

The new DSP based CEL-600 range is said to feature many benefits for the novice and experienced user of mid range sound level meters. The meter features a common body with the ability to upload various firmware versions to suit the functionality that may be required by the user. A large, quarter VGA screen provides a user interface in high resolution that guides the user through the correct operations needed to make most noise measurements. Yellow headers on the screen indicate the meter is in the calibration mode which occurs automatically when the acoustic calibrator is placed over the microphone. The instrument recognizes the tone and sets the meter circuits to the correct level without user intervention. Red headers indicate the meter is in the stop mode prior to a run taking place and green shows that the meter is running and acquiring new data. Stored run results are displayed with a blue header for easy recognition.

Key features of the CEL-600 include simultaneous measurement of all the popular noise indices over a 120 dB dynamic single range with the A, C and Z frequency weightings, the S, F and I time responses and the 3, 4 and 5 dB exchange rates. Octave and third octave band results are available depending on the model and both ANSI and IEC type 1 and 2 accuracies are possible according to the selected microphone chosen. Connection to a personal computer could not be any easier as all units are provided with a high speed USB interface that means the computer sees the CEL-600 as a memory card allowing stored runs to be easily transferred to a hard drive and opened in standard office programs such as spreadsheets for reporting. A dedicated Casella CEL software program called dB36 is available if required and the meter will download to the new Data Management Software package called Insight from Casella USA.

More information can be found on the Internet:
www.casellausa.com

pinta acoustic Introduces WHISPERWAVE™ Products

pinta acoustic, inc. has introduced WHISPERWAVE curved accent acoustical control products available

as panels, baffles, ceiling clouds and awnings. These products can be suspended from the ceiling as a cloud or baffle, mounted along the wall like a ribbon or used as an awning. WHISPERWAVE products are said to provide exceptional acoustical control across all frequencies, making them ideal for use in classrooms, cafeterias, multipurpose rooms, indoor swimming pools, offices, libraries, religious facilities and other large open areas. The products are available in natural white and light grey or can be Hypalon® coated (black, grey, white, almond or charcoal) or painted (charcoal, beige, brown or blue). Custom colors also are available to match school colors or any décor.

WHISPERWAVE products are made from willtec® foam, which is Class 1 fire-rated for flame spread and smoke density. willtec natural also meets the corner burn test UL 1715. For more information, go to www.pinta-acoustic.com/whisper.

An Audiometric Booth Brochure is Available

Several series of ready-to-use audiometric screening booths are detailed in a 4-page brochure from Eckel Industries, Inc., Acoustic Div., Cambridge, Massachusetts. The pre-assembled Models AB-200 and AB-2000, as well as the Eckel Audiometric Booths in the AB-4200 series, feature a 2-inch thick all-steel construction. These booths are said to be suitable in a wide range of medical/hospital, clinical, school, and industrial hearing testing programs and evaluation studies. For hearing screening tests in shopping malls, retirement homes, fairs, and similar uses, the lightweight, portable Model AB-150, with its all aluminum panel construction, is ideal, as this unit can be easily set-up and disassembled.

The specifications for the Series 4200 booths also are discussed. These include the units' featuring Eckel's cam-locking, interlocking panel design, flush-mounted entry door, double-glazed acoustic window, and silenced forced air in-wall ventilation. Pre-wired electrical, light/fan switch, phone jacks, and vibration isolators or H.D. casters are integral. Units in this series are fully demountable. Several optional accessories for these models and for the AB-200 and AB-2000, such as non-standard jacks, window in

door, swivel chair, fold-down shelf, and non-standard colors (standard color is beige) are listed.

In addition, the brochure itemizes features for the portable Model AB-150, a booth with acrylic full-size double doors and 4 phone jacks. Unit is medium grey in color.

For a copy of *Audiometric Screening Booths*, contact Eckel Industries, Inc., 155 Fawcett Street, Cambridge, MA 02138, USA or Eckel Industries of Canada, Attn: Dawn Stark, 15 Allison Ave., Morrisburg, ON K0C 1X0, Canada. E-mail:eckel@eckel.ca.

Acoustic Monitoring Extends Uptime on Paper Rollers

PCB Piezotronics, Inc. has introduced its low cost, non-contact Model 130D20, ICP® electret microphone for frequency analysis and amplitude trending in the paper industry. When large capital equipment such as paper rollers, break down, it costs companies large sums of money for repairs and lost revenue from downtime. By using frequency analysis or trending the amplitudes, maintenance technicians and plant engineers can predict when machines will need minor maintenance that will help avoid major repairs.

By using PCB® electret microphone Model 130D20, and running the ICP® output signal through a programmable logic controller (PLC), the machine operator can set control limits in the PLC to alarm output any changes in sound waves. When the amplitude increases, or the frequency changes from normal set points, the alarm allows the machine operator time to investigate the source and plan for maintenance, which can end up saving money repairs and downtime. For more information about PCB Piezotronics, visit wwwpcb.com.

MEMS Shock Accelerometers

Save up to 50% when you trade up!

PCB Piezotronics, Inc., has introduced a new series of MEMS shock accelerometers. PCB® Series 3991/3501 MEMS shock accelerometers represent state-of-the-art industry technology for miniature, high-amplitude, DC response

acceleration sensors, capable of measuring long duration transient motion, as well as responding to and surviving extremely fast rise times typical of high-g shock events. Offered in packaged and OEM configurations, these sensors are able to fulfill a variety of installation requirements.

The design concepts were born from more than 20 years of PCB® expertise in very high G shock (> 20,000 G) measurement applications and sensor development. The air-damped acceleration sensing element, which is micro-machined from silicon, is manufactured with the latest advances in etching techniques and equipment. Measuring just 2.5 x 1.7 x 0.9 mm, the sensor incorporates a seismic mass, protective over range stops, and a full-active, piezoresistive Wheatstone bridge, making it the industry's smallest, most accurate and durable shock accelerometer.

PCB® is offering a 50% trade up discount for any competitor's shock accelerometer or a 25% trade-up discount for any PCB® shock accelerometer on select models.

For more information about PCB® visit wwwpcb.com.

New Noise and Air Pollution Software

A new release of IMMI Noise and Air Pollution Mapping Software is now available. IMMI 2009 features a series of improvements and enhancements will simplify the use of the software and make it more powerful.

Many enhancements and amendments were made rendering IMMI 2009 more intuitive in use and more powerful in calculation. IMMI 2009 is the expert choice for small- to large-scale projects in noise and air pollution mapping.

For further information, contact: WÖLFEL
Meßsysteme · Software GmbH + Co. KG,
International Sales Office, Vervierser Str. 43, 4700
Eupen, Belgium
Telephone: +32-87-56 10 02
Fax: +32-87-56 10 04.
E-mail: wms.international@woelfel.de
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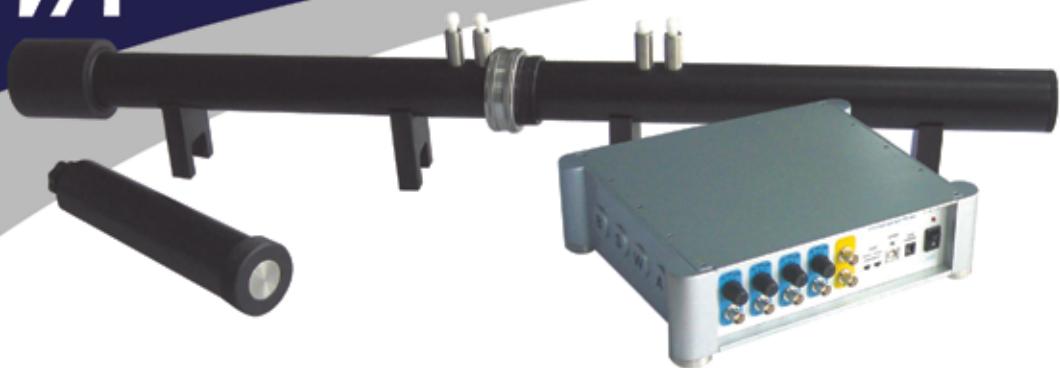
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New Zealand	Centre for Sound Studies
Portugal	Laboratorio Nacional de Engenharia Civil, Lisboa
Sweden	Department of Applied Acoustics, Chalmers University of Technology, Gothenburg
USA	Graduate Program in Acoustics, The Pennsylvania State University, State College, Pennsylvania

Conference Calendar

Below is a list of congresses and conferences sponsored by International INCE and INCE/USA. A list of all known conferences related to noise can be found by going to the International INCE page on the Internet, www.i-ince.org.

2009 August 23-26

INTER-NOISE 2009

The 2009 International Congress and Exposition on Noise Control Engineering

Ottawa, Canada

Contact:

Institute of Noise Control Engineering-USA

Jenni Vincent, Congress Coordinator INCE Business Office

7150 Winton Drive, Suite 300

Indianapolis, IN 46268, USA

Telephone: +1 317 735 4063

E-mail: ibo@inceusa.org

ACTIVE 09, the 2009 International Symposium on Active Control of Sound and Vibration will immediately precede INTER-NOISE 09.

2010 April 19-21

NOISE-CON 10

Baltimore, Maryland

Joint with the 159th meeting of the Acoustical Society of America.

Contact:

Institute of Noise Control Engineering-USA

Jenni Vincent, Congress Coordinator INCE Business Office

7150 Winton Drive, Suite 300

Indianapolis, IN 46268, USA

Telephone: +1 317 735 4063

E-mail: ibo@inceusa.org

2010 June 13-17

INTER-NOISE 10

Lisbon, Portugal

Contact: Portugese Acoustical Society

LNEC

Av. do Brasil 101

1700-066 Lisboa

Facsimile: +351 21 844 30-28

www.spacustica.pt/internoise2010/text/invitation.html

2011 September 4-7

INTER-NOISE 11

Osaka, Japan

Contact: INCE/Japan

c/o Kobayasi Institute of Physical Research

3-20-41 Higashimotomachi, Kokubunji

Tokyo 185-0022

Facsimile: +81 42 327 3847

e-mail: office@ince-j.or.jp

home page: <http://www.mmjp.or.jp/INCE-JAPAN>

Directory of Noise Control Services

Information on listings in the Directory of Noise Control Services is available from the INCE/USA Business Office, 9100 Purdue Road, Suite 200, Indianapolis, IN 46268-3165. Telephone: +1 317 735 4063; e-mail: ibo@inceusa.org. The price is USD 400 for 4 insertions.

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Mark your
calendar and plan
to participate!

Inter-Noise 2009

Ottawa, Canada

23–26 August, 2009

Ottawa, Canada, will be the setting for the 38th International Congress and Exhibition of Noise Control Engineering (Inter-Noise 2009). The annual Congress opens 23 August with a special ceremony, lecture and reception, and continues through 26 August. Several plenary sessions and hundreds of papers on various aspects of noise control will be presented during the four-day event. A large vendor exposition will be held during the congress and the ACTIVE 09 Symposium will be held immediately before the congress.

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The INCE/USA Page at the Atlas Bookstore

www.atlasbooks.com/marktplc/00726.htm

INTER-NOISE 06 Proceedings

This searchable CD-ROM contains the 662 papers presented at INTER-NOISE 06, the 2006 Congress and Exposition on Noise Control Engineering. This, the 35th in a series of international congresses on noise control engineering was held in Honolulu, Hawaii, USA on December 3-6, 2006. The theme of the congress was "Engineering a Quieter World."

The technical topics covered at INTER-NOISE 06 included:

- Aircraft and Airport Noise Control
- Community Noise
- Fan noise and aeroacoustics
- Highway, automobile and heavy vehicle noise
- Machinery noise
- Noise policy
- Product noise emissions
- Sound quality.

The NOISE-CON 05 Proceedings Archive (1996-2005)

This searchable CD-ROM contains 198 papers presented at the joint NOISE-CON 05/ASA 150th meeting as well as 749 papers from the NOISE-CON conferences held in 1996, 1997, 1998, 2000, 2001, 2003, and 2004 as well as the papers from the Sound Quality Symposia held in 1998 and 2002. All papers are PDF files.

Several papers are taken from sessions organized by the Noise, Architectural Acoustics and Structural Acoustics Technical committees for this 150th ASA meeting. The three plenary lectures related to noise and its impact on the environment are included. Also included are papers in one or more organized sessions in the areas of aircraft noise, tire/pavement noise, and hospital noise.

Noise as a Public Health Problem

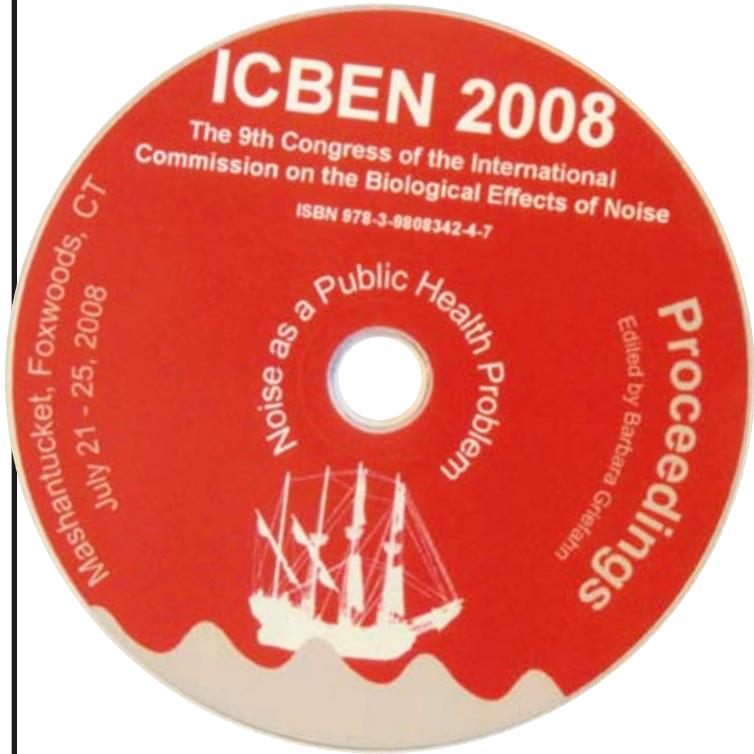
The Proceedings of ICBEN 08, the 9th Congress of the International Commission on the Biological Effects of Noise, are now available. The Congress was held on 2008 July 21-25 in Mashantucket, Connecticut, USA. In his keynote address, Adrian Davis, MRC Hearing and Communications Group, Manchester University, UK opened with:

Noise is a major public health challenge. It is major because noise is all pervasive in our societies at a level that it can seriously affect population health and quality of life throughout the lifecourse. It is a challenge because the noise sources are constantly changing as the pace of technology and change gathers globally. As some areas of the world legislate or change their strategies the issue is displaced or changed rather than lessons being learnt and applied globally. There is much that we know in terms of solutions in good practice that is reduced in effectiveness because it is not known widely or is not applied / seen as a priority. There are also huge gaps in our knowledge of current population exposure and effectiveness of new ways to combat noise e.g. in particularly challenged groups such as in military or in airline/airport industry.

Scientific papers were presented in ten areas:

- Noise-Induced Hearing Loss (38 papers)
- Noise and Communications (11 papers)
- Non-Auditory Effects of Noise (15 papers)
- Noise and Performance (18 papers)
- Effects of Noise on Sleep (16 papers)
- Community Response to Noise (27 papers)
- Noise and Animals (5 papers)
- Noise Policies: Regulations and Standards (14 papers)

The table of contents for the ICBEN 08 Proceedings may be downloaded free of charge from the Web address at the bottom of this page.



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NOISE-CON 08 CD-ROM

This searchable CD-ROM contains PDF files of the 161 papers presented at NOISE-CON 08, The 2008 National Conference and Exhibition on Noise Control Engineering which was held in Dearborn, Michigan, USA on 2008 July 28-30. Also included are all of the papers presented at NOISE-CON 07 which was held in Reno, Nevada, USA in 2007 October. The CD-ROM also contains the proceedings of SQS 08, the 2008 Sound Quality Symposium.

This CD-ROM supplements the NOISE-CON 05 CD which contains all of the papers presented in NOISE-CON Proceedings beginning in 1996.

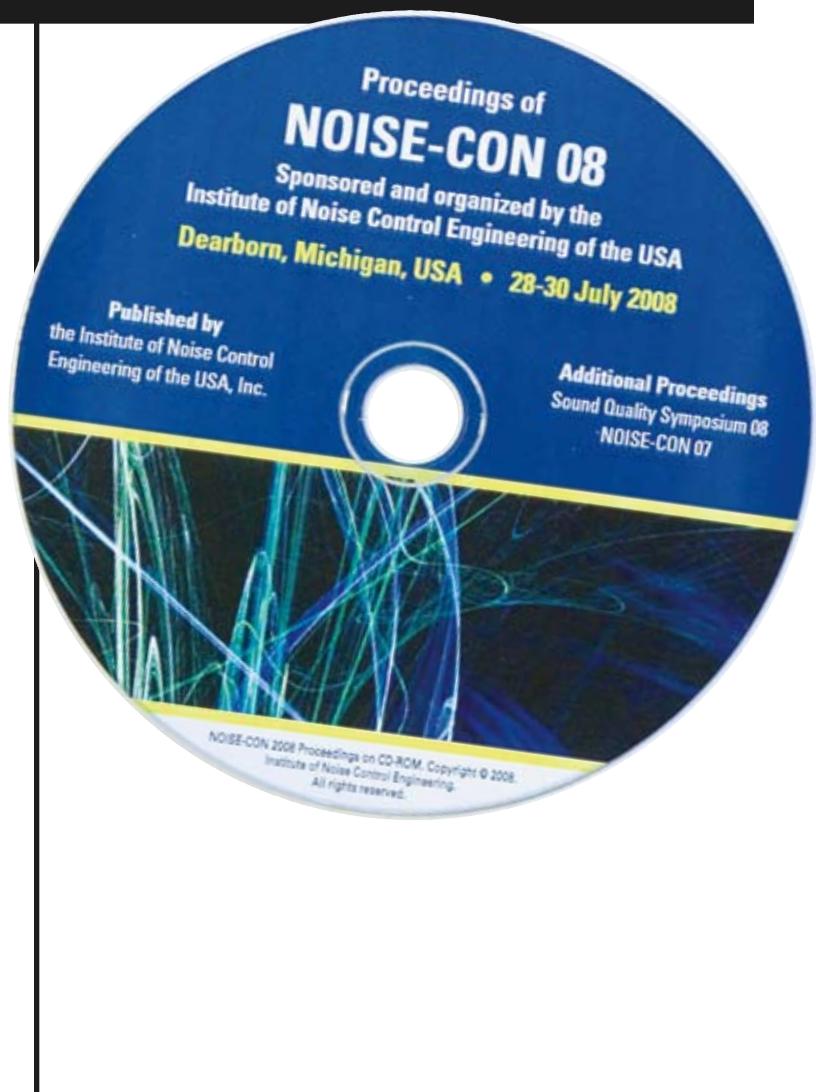
One feature of this year's NOISE-CON was that several papers addressed two emerging topics:

- Flow tones and instabilities as a NOISE-CON/ASME-NCAD joint session, for flow induced noise generation and transmission (6 papers),
- Hearing loss prevention in industry/bio-acoustics, particularly with possible application of auditory system simulation to noise control (7 papers)

Technical papers were presented in more than 40 technical sessions. There was emphasis on the subjects below;

- Vehicle Interior Noise (14 papers, co-organized with ASME-NCAD)
- Modeling and Measurement of Acoustic Material Properties and Design for Noise Performance (13 papers, co-organized with ASME-NCAD),
- Numerical Methods in Acoustics (12 papers, co-organized with ASME-NCAD),
- Information Technology Noise (11 papers)
- Aircraft interior Noise (11 papers)
- Experimental Techniques and instrumentation in Noise and Vibration (10 papers)

The tables of content of the NC08, NC 07, and SQS Proceedings may be downloaded free of charge from the Web address below.



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