

# NOISE/NEWS

## INTERNATIONAL

Volume 14, Number 4  
2006 December

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

### **NOISE\_CON 07**

Announcement and Call for Papers

### **INTER-NOISE 07**

Travel Planning

European Noise Policy and its Links  
to Global Noise Policy

### **MEMBER SOCIETY PROFILE**

The Canadian Acoustical Association





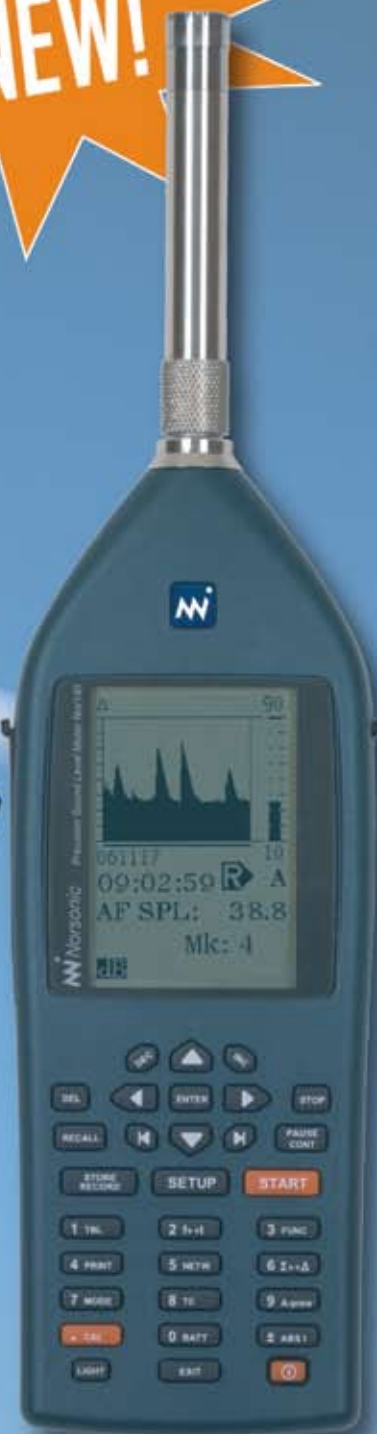
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# NOISE/NEWS INTERNATIONAL

Volume 14, Number 4

2006 December

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*Courtesy of the organizers of Inter-Noise 07, Istanbul, Turkey*

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# NOISE/NEWS

## I N T E R N A T I O N A L

*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](http://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



## Searching Made Easy

**A**s part of a larger project, I recently completed an extensive literature search on the subject of tire noise measurement. In doing this, one thing I discovered was that many of the relevant references were found in conference proceedings, and, in particular, from those of INTER-NOISE Congresses and NOISE-CON Conferences. For some reason, in the tire noise specialty area, as is probably true for others, the number of papers published in peer-reviewed journals is relatively small. Even when reports or publication references were found, they were often identified in the conference proceedings.

Having a reasonable collection of INTER-NOISE (IN) and NOISE-CON (NC) CDs on hand, the searches were relatively straightforward when one has the patience to search one CD at a time. The NC proceedings were available through a project approved by the INCE/USA Board to have the American Institute of Physics (AIP) scan NOISE-CON proceedings and create PDF files. George Maling, as co-editor of the NOISE-CON 2000 proceedings, put these files on the NC 00 CD, and continued the process through NC 05. That CD is now full, and begins with the NC 96 proceedings. As a bonus, the CD also contains tables of content for all of the NC proceedings beginning with NC 73.

For IN proceedings, however, accessing them in one place was just not possible. Thanks to the organizers of IN 94 in Japan for their recognition of the value of papers on CDs, and provision of financial assistance to INCE/USA to create its first CD with the IN 95 (and IN 94) proceedings. Beginning in 1997, all INTER-NOISE proceedings were published as CDs. Those from INCE/USA IN's are available individually on-line or by phone through the INCE/USA page at the Atlas Bookstore. Unfortunately, most of the proceedings from other IN's are no longer available.

Just recently, Courtney Burroughs has taken the first step toward making the IN and NC much more readily available. As of last year, over 2300 papers from the INCE/USA organized meetings are available individually, and are searchable on line at a site maintained for INCE/USA by the AIP. For me personally, this is a big step forward as I can access

those "lost" proceedings and also do searches in one place rather than four or five CDs. When I find a paper of relevance to my search, if I have the CD great, if not, I can order it and obtain it immediately. For the those who have not been able to attend these US-based conferences, access to the papers has been made much easier and possibly more cost effective than purchasing all of the proceedings CDs.

To make this access even greater, Courtney and INCE/USA recently received the endorsement of the I-INCE Board of Directors to solicit the inclusion of all electronic IN proceedings in this data base with the cooperation of the individual conference organizers. As it stands now, permission has been granted to add the proceedings of IN 2005, 04, 03, 01, and 00 with requests back to 97 underway. Addition of these proceedings will be a tremendous service to the international noise control engineering community since these older proceedings are simply not available any longer for purchase and essentially lost. With the inclusion of these additional proceedings, the number of papers available for search and purchase will more than triple. For those in the US and other countries who have not had the opportunity to attend IN's outside of their own country, this opens the possibility of accessing many excellent papers from authors all around the world.

In another step forward, INCE/USA members and subscribers should have received their third *Noise Control Engineering Journal* CD this month. Although there maybe some anxiety over going paperless, this electronic publishing format will open a door of access to many people that was just not there before. In addition to the current *NCEJ* papers being distributed in this manner, all of the Journal papers back to 2001 have been added to each CD, and are searchable.

To compliment this even further, the INCE Foundation through George Maling—with major assistance from the AIP and Janet Moss—has placed all of the *NCEJ* papers from 1973 to 2000 on a searchable CD which can be acquired through a donation to the Foundation. In my tire noise literature search, the use of past *NCEJ* papers was



**Paul Donavan**

2006-2007 INCE/USA  
President

*continued on page 157*

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## Quantifying the Cost of Hearing Loss

I'm sure that every one reading this has at least one friend, colleague or family member who has a hearing loss. I'm also sure that for many of these, the hearing loss either results from or has been increased by, exposure to excessive noise at some time during their working life. Anyone working in the area of noise control engineering knows that there are engineering solutions for most excess noise situations in the workplace. But management may decide that the engineering solution may not be reasonable or feasible to implement. Noise management then has to rely on the use of personal hearing protection, which has limitations.

The decision about implementing an engineering solution is frequently made by management and based on the cost to the company of the work to be done or the changes to the workplace. However the cost to the individual and to society as a whole of hearing loss is rarely factored into this assessment.

Two interesting reports have been produced in Australia that cast some light on this cost. One is a report entitled 'Listen Hear!' commissioned by the Cooperative Research Centre for Cochlear Implant and Hearing Aid Innovation (CRC HEAR) in partnership with VicDeaf (available at [www.audiology.asn.au/pdf/ListenHearFinal.pdf](http://www.audiology.asn.au/pdf/ListenHearFinal.pdf)).

The study reports that hearing loss ranks with asthma, diabetes and musculoskeletal diseases in terms of burden of disability, and should be considered as a national health priority. The report also found that 37% of this hearing loss is attributable to excessive noise exposure (all of which it considers preventable). Excessive noise in the workplace and social environments is not conducive to good hearing retention and the report recommends that approaches to better management of noise prevention are needed.

A separate study has been undertaken by the Australian Government Safety and Compensation

Council on "Work-Related Noise Induced Hearing Loss in Australia" (<http://www.ascc.gov.au/ascc/HealthSafety/EmergingIssues/OccupationalDiseaseReports.htm>). This is one of a series of studies to assist Government to set national action priorities to prevent occupational diseases. The study examined the workers' compensation statistics for those coded with "sound and pressure" as the stated cause. It shows that the direct cost of those claims in 2001/02 was over 30 million AUD, and estimates that this is only 10% of the total cost of the loss of hearing. It is important to acknowledge that this data is only based on those who have made successful workers' compensation claims and so only represents a proportion of the overall cost to society of noise induced hearing loss.

Undertaking such studies to quantify overall costs of something like noise induced hearing loss is always difficult in view of the limited data bases upon which the conclusions must be drawn. Also there are many factors that can alter the statistics dramatically; for instance a small change in the criteria for assessable claims can make a difference in the amount of claims. However such studies clearly highlight that, even in a country that prides itself on providing good working environments, the cost to society of noise induced hearing loss is a substantial amount.

If management were forced to factor into its calculations the total potential cost of noise induced hearing loss to the individual and to society it might affect the decision about whether an engineering approach to a noise control problem is reasonable and feasible. ■



**Marion Burgess**

*Asia-Pacific Editor*



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## The Canadian Acoustical Association

**T**he Canadian Acoustical Association (CAA) will celebrate a significant milestone in April as it notes the 30th anniversary of its official incorporation. The group was founded in 1962 as the Canadian Committee on Acoustics. The name was officially changed to the Canadian Acoustical Association in 1974 with incorporation following three years later. CAA became a Member Society of International INCE in 1978.

A primary goal of CAA is to foster communication among people working in all areas of acoustics in Canada. The organization is also focused on promoting the growth and practical application of knowledge in acoustics and encouraging education, research, protection of the environment, and employment in acoustics. From its initial gathering of 18, CAA has grown to a membership of several hundred that serves as an umbrella organization through which general issues in education, employment and research can be addressed at the national and multidisciplinary levels.


The primary publication of CAA is *Canadian Acoustics*, a quarterly journal distributed at no charge to members. The journal was launched in 1983; prior to its publication, the group shared information in a traditional newsletter format. In addition to refereed articles in two languages (French and English), the journal publishes news items on all aspects of acoustics and vibrations as well as information on research, reviews, and new products. The journal is also a primary source for professionals seeking employment in an acoustics field.

CAA fulfills its education mission in several ways. Since 1990, the organization has hosted an annual "Acoustics Week in Canada" conference. Generally a two and one-half day event, the conference offers papers, seminars, workshops, poster sessions and an exhibit. Conference attendance ranges from 100-150 participants. Summary papers are published in a proceedings issue of the journal. Planning is underway for the 2007 event, which will be held in



Montreal. Conference sessions will be organized around the general theme of aeroacoustics, a fitting topic for a region considered by many as the "aerospace capital of the world."

Students have always been a top CAA priority. The organization actively encourages student participation in its events, frequently sponsoring student paper competitions and offering student travel subsidies. Several prizes are awarded annually to graduate students and post-doctoral fellows. The group also recognizes the efforts of undergraduates and high school students. CAA's significant slate of awards also includes special prizes for researchers.

CAA is governed by an eight-member Board of Directors. The organization has seven officers, including a president (currently, Stan Dosso, School of Earth & Ocean Sciences, University of Victoria), past president, executive secretary, editor-in-chief, and two AWC conveners. General membership inquiries are fielded by the executive secretary (currently, David Quirt, [secretary@caa-aca.ca](mailto:secretary@caa-aca.ca)); information on the journal is available from the editor-in-chief ([editor@caa-aca.ca](mailto:editor@caa-aca.ca)). The organization also has a website in French and English: [www.caa-aca.ca](http://www.caa-aca.ca). 

*This is the 56th in a series of articles on the Member Societies of International INCE.*

# NOISE-CON 2007

21-24 October 2007 • Grand Sierra Resort • Reno, Nevada

WWW.INCEUSA.ORG/NC07

## ANNOUNCEMENT AND CALL FOR PAPERS

**SUBMISSION OF ABSTRACTS—21 May 2007**

**SUBMISSION OF PAPERS—16 July 2007**

**HOTEL RESERVATIONS—20 September 2007**

### OVERVIEW

Join us at Noise-Con 2007 in Reno, Nevada, in the luxurious Grand Sierra Resort and Convention Center.

Meet hundreds of other noise control engineers at our:

- **Technical sessions**, held Monday – Wednesday, 22–24 October

See what your peers are doing to control noise and vibration in buildings, vehicles, personal computers, and many other systems. Take home a CD filled with useful papers on noise control engineering.

- **Vendor exposition**, held throughout the conference

Visit with 40+ vendors; try out the latest vibro-acoustic instrumentation, data acquisition systems, and analysis software; and learn about the many noise control solutions you can apply to your problems.

- **Seminars**, held Sunday, 21 October

Interested in taking the INCE Noise Control Fundamentals exam sometime soon? Take a one-day course and learn what to expect on the test. Want to reduce vibrations and noise in machinery and buildings? Choose from two one-day courses and learn how. Curious about how to use the latest vibro-acoustic software to analyze your noise control problems? Learn about ESI's latest statistical energy analysis software and how you can couple it with finite element analysis.

- **Social events**

Mingle with vendors and friends at the Exposition Social on Monday evening.

Visit the famous National Automobile Museum and enjoy a reception with your colleagues on Tuesday evening.

### STUDENTS!

- Participate in the student paper competition (cash awards!)
- As always, register at the much-reduced student rate of \$100.

New this year—attend lunchtime Careers in Acoustics seminars given by senior INCE professionals and learn how to make noise and vibration measurements and about what jobs might be waiting for you when you graduate.



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## TECHNICAL SESSIONS

Technical papers are welcome in all aspects of noise and vibration control engineering. In addition, special sessions are being organized in the following areas. See the conference website for a complete list of special sessions.

### **Building Acoustics**

Restaurant and nightclub noise control, multi-family and multi-use building isolation, noise control for schools, noise control for hospitals, and plumbing noise

### **Community Noise**

Noise from alternative energy projects, noise around airports, verifying community noise limits have been met, ground-borne noise, community noise issues in developing countries, low frequency noise, providing community noise information to the public, community responses to industrial noise, effects of transportation noise on communities, using alternative noise metrics, local noise policies, case studies on environmental noise assessments

### **Experimental Techniques and Instrumentation**

Instrumentation in structural-acoustics, semi-active and passive sound and vibration control

### **Industrial Noise**

Topics in product noise control

### **Measurement and Control of Product Noise Emissions**

Information technology equipment noise, noise emissions from consumer products, and product noise labeling

### **Passive and Active Noise Control**

Vendor products for noise control, damping and vibration control, active noise control.

### **Perception and Effects of Noise**

Sound quality

### **Prediction and Modeling Techniques**

Numerical methods in structural-acoustics, statistical energy analysis, and energy methods

### **Sources and Propagation**

Noise modeling and mitigation, fan noise, fan noise on spaceflights, modeling emissions and immisions, and impulsive sound propagation

### **Standards**

Regulatory solutions or incentives for noise control, workshop on noise policy—engineering education

### **Structural Acoustics**

General structural acoustics

### **Transportation Noise**

Tire/pavement interaction noise (OBSI and general), noise from transit systems, aircraft and airport noise, automotive noise, marine system noise, space system and launch vehicle noise and vibration

## SUBMIT YOUR ABSTRACTS NOW. ABSTRACT DUE DATE 21 MAY 2007

**VISIT THE CONFERENCE WEBSITE FOR AN  
ABSTRACT TEMPLATE AND INSTRUCTIONS  
ON HOW TO SUBMIT YOUR ABSTRACT  
[WWW.INCEUSA.ORG/NC07/ABSTRACT.ASP](http://WWW.INCEUSA.ORG/NC07/ABSTRACT.ASP).**

**IF YOU'RE A STUDENT ENTERING THE  
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[WWW.INCEUSA.ORG/NC07/STUDENTPAPER.ASP](http://WWW.INCEUSA.ORG/NC07/STUDENTPAPER.ASP)  
FOR DETAILS.**

## EXPOSITION VENUE

A large Exposition with displays of materials, instruments, and services in noise and vibration control engineering will be held at Noise-Con 2007. The Expo will open Monday, 22 October, with a special reception for conference and Expo participants.

Organizations and companies wishing to participate as exhibitors should contact: **Richard Peppin ([PeppinR@ScantekInc.com](mailto:PeppinR@ScantekInc.com))**

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ON THE "HOTEL AND REGISTRATION" LINK.**



# inter-noise 2007 Travel Planning

Dear Colleagues,

The Organizing Committee of INTER-NOISE 2007 invites you all to the most popular noise control engineering conference in the best-kept secret of the world: Istanbul, Turkey. The 36th International Congress and Exposition on Noise Control Engineering, sponsored by the International Institute of Noise Control Engineering (I-INCE) and organized by the Turkish Acoustical Society, will be held at the Istanbul Convention & Exhibition Centre (ICEC) from August 28 through August 31 2007.

Istanbul is the unique city in the world embracing and uniting the two continents; Europe and Asia with love, peace and hospitality. Istanbul is the only the city in the world where East and West is bridged politically, socially and culturally.

ICEC and its new Rumeli Fair & Exhibition Hall, are the centerpiece of a complete Conference Valley. Offering more than 6000 guest rooms within easy walking distance of ICEC, including six five-star hotels, the Conference Valley offers the participants unrivalled convenience and flexibility.

The conference will be attracting high quality research work from all the countries around the world and will produce valuable information on the global noise policies. Keynote speakers will present valuable information on interesting areas of noise control engineering. The main theme of the congress is "Global Approaches to Noise Control." It is hoped that the main theme of the congress will contribute to achieve a quieter planet.

You will enjoy the history and the charm of Istanbul and Bosphorus while attending a technically interesting and a high level congress. The state-of-the-art noise and vibration instrumentation, noise control products will also be exhibited. The Organizing Committee sincerely looks forward to welcoming you to show the traditional Turkish hospitality and to introduce the fascinating city of Istanbul.

Sincerely yours,

*H. Temel Belek*

H. Temel Belek

President

INTER-NOISE 2006 Congress and  
Exhibition Organizing Committee

## General Information

INTER-NOISE 2007, The 2007 International Congress and Exposition on Noise Control Engineering will be held in Istanbul, Turkey on 2007 August 28-31. The theme of the Congress is "Global Approaches to Noise Control." The Congress, the 36th in a series of international congresses on noise control engineering, is sponsored by the International Institute of Noise Control Engineering, and is being organized by the Turkish Acoustical Society. The Congress web site is [www.internoise2007.org.tr](http://www.internoise2007.org.tr). The Congress Hotel is the Istanbul Hilton which is adjacent to the Istanbul Convention and Exhibition Centre (ICEC). Congress registration will be at the ICEC, and will be open from 12.00 until 20.00 on Tuesday, August 28. The opening ceremony and a cocktail reception will be held at the ICEC on the same day from 16.00 to 18.00.

## Congress Venue

The Istanbul Convention and Exhibition Centre (ICEC), where the INTER-NOISE 2007 Istanbul Congress will be held, has everything needed to organize memorable and successful congresses and exhibitions in the imperial city of Istanbul.

The Anadolu Auditorium, a world-class venue, 2,000 seats in arm-chair comfort and offers complete technical facilities for even the most elaborate performances.

## Technical Program

Information on the technical program will be posted on the Congress web site. Several structured sessions on a very wide variety of topics in noise control engineering are being planned. In addition, there will be four keynote speakers:

### Global Noise Policy

*William Lang (USA)*

### Psychoacoustics, Sound Quality, and Music

*Hugo Fastl (Germany)*

### Sound Insulation of Buildings

*Jens H. Rindel (Denmark)*

### Modal Analysis and Noise

*David J. Ewins (United Kingdom)*

## CONGRESS REGISTRATION

For congress registrations, the Online Registration Form on the congress website should be completed and returned together with the payment to the Congress Secretariat. After receipt of the form plus payment, the participant will be officially registered and will receive an invoice/confirmation. Please bring this confirmation with you to the Congress registration desk at the Istanbul Convention and Exhibition Center (ICEC). The figure on the next page shows registration fees that are applicable to the participants of INTER-NOISE 2007 Congress.



Registration fees for INTER-NOISE 2007 Congress.

|                       | Before<br>31 May 2007 | Between<br>June-15 August 2007 | After<br>15 August 2007 |
|-----------------------|-----------------------|--------------------------------|-------------------------|
| Congress Registration | 400 Euro              | 450 Euro                       | 500 Euro                |
| Student Registration  | 200 Euro              | 225 Euro                       | 250 Euro                |
| Accompanying Person   | 75 Euro               | 100 Euro                       | 125 Euro                |
| Additional Paper      | 50 Euro               | 50 Euro                        | 50 Euro                 |

*Including Ph.D. students with an official certificate of proof*

All parties are responsible for the payment of bank charges within their own countries.

Registration fees of participants AND students include:

- Attendance to the Congress and Exhibition
- Coffee breaks and light lunch for three days
- Congress documents, Proceedings CD, bag and badge.
- Participation in the opening and closing ceremonies and welcome cocktails

Registration fees of accompanying persons include:

- Participation in the opening and closing ceremonies and welcome cocktails
- Name badge, Turkey and Istanbul brochures, Istanbul city plan
- Half day orientation tour of Istanbul on Tuesday, August 28, 2007

The registration fee should be remitted in Euro in one of the following ways:

- By Visa and Master Card — No other credit card will be accepted (please fill in the type of credit card, number, expiry date and the name of the cardholder in the appropriate space on the Online Registration Form and submit. The Congress web site is secure and protected against internet theft and provides a direct link to the bank account of the Congress Secretariat.)
- By bank transfer — Bank transfers must be net and exclusive of any banking charges.

### Important Notice

Participants making payment by bank transfer are kindly requested to state clearly on the bank order which items these charges include: Registration, hotel deposit, exhibition, daily city tours, pre and post Congress tour.

### Late Payments

Should you forward your registration fee after July 31st, please bring a copy of the receipt with you in order to avoid double payment.

### Cancellation and Refunds

If you register for INTER-NOISE 2007 and are unable to attend, you may transfer your registration to another individual. If this is not an option for you, the refund policy is as follows:

- In case the registration is cancelled before July 15th, an administrative fee of 50 Euro will be deducted and the rest refunded after the Congress.
- For cancellations received after July 15, no refund will be made. Cancellation notification must be made in writing to the Congress Secretariat.

### Name Badges

Admission to the scientific and social activities of the Congress is only possible for those persons wearing the official Congress name badge issued at the registration desk. For some activities and tours, tickets will be provided.



## Istanbul, the City Bridging Two Continents

Due to its unique geographical location between Europe and Asia, unrivaled natural beauty, great historical and cultural heritage, Istanbul has become an indispensable point of interest for emperors, merchants, warriors, philosophers, artists, adventurers and for many others throughout the ages.

Though its intricate history is linked with legends, we can trace the first foundations of today's Istanbul in the 7th century B.C. Besides being an increasingly important of for Christianity starting under the reign of Emperor Constantine from 4th century A.D. on, Istanbul also became the most important center for the Islamic world after the conquest of the city by the Ottoman Sultan Mehmet II in 1453. In terms of controlling the East-West route between Asia and Europe, and the sea connection in the North-South direction, Istanbul always kept its strategic importance as a capital city of three successive empires: The Eastern Roman, Byzantine and Ottoman Empires. Istanbul, today home for about more than 12 million multi-ethnic people, is a huge metropolis and greatest trade and financial center at the crossroads of continents, cultures, religions and civilizations.

# Arrival in Istanbul

It is important to know that there are two international airports in Istanbul: Istanbul Atatürk International Airport [www.ataturkairport.com](http://www.ataturkairport.com) on the European side and Sabiha Gokcen International Airport [www.sgairport.com](http://www.sgairport.com) on the Asian side of Istanbul.

Both are modern, new civil airports, serving domestic and international scheduled and charter flights 24 hours a day. For further details, please check the above web sites of the airports and ask your travel agent or airline the name of your arrival airport in Istanbul. This information is crucial to get to your hotel as comfortably and quickly as possible.

All INTER-NOISE hotels are very centrally located around Taksim Square and in easy walking distance to the Congress venue ICEC. Therefore, to get from either airport to your hotel, you should keep in mind to use the Airport – Taksim track. There are 3 different ways to do it by using public transportation:

## Havas Shuttle Bus Service

Havas shuttle bus services are available every half hour between 06:00 a.m. and 01:00 a.m. from Atatürk airport to Taksim Square and vice versa. Ticket price: 6 Euro. Havas shuttle buses are also operating from/to Sabiha Gokcen Airport.

For more information and detailed schedule of shuttle services please click [www.havas.net](http://www.havas.net)

## Airport Taxi

In Istanbul taxis are inexpensive compared to other cities in most parts of the world. Atatürk Airport Taxi is a big company with a fleet of more than 400 cars, safe and reliable, serving 24 hours a day at International and Domestic Terminals. It costs about 25 Euro from airport to the hotels around Taksim Square. There is a surcharge of 50 % between 00:00 a.m. and 06:00 a.m.

Taxis are also available outside the Sabiha Gokcen Airport, but due to distance from there to Taksim via the Intercontinental Bridge, the price may be higher.

## Light Rail Transportation System (Metro)

Schedules of metro, which has been providing access between the stations of Aksaray and Atatürk Airport are as follows:

Week days from 06.00 a.m. till 00.00 a.m.

Saturdays from 06.15 a.m. till 00.00 a.m.

Sundays from 06.30 a.m. till 00.00 a.m.

Then, we recommend you to get a taxi from Aksaray metro station to your hotel.

## Special Transfer Service for Inter-noise 2007 Participants

This is an optional service for the convenience of INTER-NOISE 2007 participants, specially arranged by the Congress Secretariat. You will be met by our staff with an INTER-NOISE signboard in the International Arrival Hall (after passport control and customs area) of both airports and transferred to your hotel by a private car or mini van.

If you wish to use this service, please fill in the related part of the Online Registration Form and give us your arrival and/or departure flight details with the name of arrival airport.

## Price for Atatürk Airport:

20 Euro per person one way, airport-hotel or hotel-airport;  
35 Euro per person round trip, airport-hotel-airport

## Price for Sabiha Gokcen Airport:

35 Euro per person one way, airport-hotel or hotel-airport;  
55 Euro per person round trip, airport-hotel-airport



# Hotel Reservations

A sufficient number of rooms have been reserved at selected, international standard category hotels in Istanbul. Special reduced rates have been obtained and guaranteed for the INTER-NOISE 2007 Congress participants, which may be applied only if booked by filling in the Online Registration Form on the congress web site.

All Congress participants will be kindly asked to pay their basic hotel account (room + breakfast) to the Congress Secretariat, but not to the hotel. Only the extra hotel expenses such as restaurants, room service, mini bar, laundry, business center etc. should be settled with the hotel's cashier at the time of check-out.

## Booking

Accommodation will be allocated on "first come, first served" basis. As August is Istanbul's high season, early booking is highly advised. No accommodation booking can be guaranteed unless it is accompanied by a mandatory deposit of one night per room. The balance due covering the total period of the stay, must be paid to the Congress Secretariat latest by July 15, 2007. For the payment procedure of balance due, please check the updates on the related part of the Congress web site. Non-payment of the balance due until July 15, 2007 will result in automatic cancellation of the confirmed booking without any further notification.



If there are no rooms left in the hotel category chosen, the Congress Secretariat reserves the right to allocate a room in another hotel of the same category or similar.

### Cancellation and Refunds

If the participants have booked for Inter-Noise 2007 accommodation and are unable to attend, hotel booking may be transferred to another individual. If this is not an option, the refund policy is as follows:

- For cancellations received before May 31st, an administrative fee of 25 Euro will be deducted and the rest will be refunded after the Congress.
- For cancellations received between June 1st and July 15th, the deposit paid will be deducted in full and the rest of your payment will be refunded to you after the Congress
- No refund will be made for cancellations received on and after July 16th

All cancellations and changes must be made in writing to the Congress Secretariat. If a participant does not arrive at the hotel on the confirmed reservation date or leaves before the confirmed date, we regret to inform you that the hotel is entitled to charge full payment for the reserved nights.

### Low Budget Accommodation

A limited number of rooms have been reserved in the Gümüssuyu Guest House of Istanbul Technical University for students and participants seeking cheap accommodation. This type of accommodation will also be allocated on "first come, first served" basis. Due to guest house regulations, no booking can be guaranteed unless it is accompanied by the full payment covering the whole stay (please see The price chart on the right). No cancellations will be accepted, since the guest house administration does not have a refund policy.

### Important Notice:

Please note that ITU Guest House has no breakfast service and any other facilities such as room service, laundry etc. For further details, please apply the Congress Secretariat via [contact@internoise2007.org.tr](mailto:contact@internoise2007.org.tr)

### HOTEL PRICES IN EURO

*Breakfast and 18% V.A.T. is included in the prices*

| Category               | Distance to ICEC<br>(Congress Venue) | Single Room per Night | Double/Twin Room<br>per night |
|------------------------|--------------------------------------|-----------------------|-------------------------------|
| <b>Istanbul Hilton</b> | Next to ICEC                         |                       |                               |
| Garden view            |                                      | 190                   | 210                           |
| Sea view               |                                      | 235                   | 255                           |
| <b>The Marmara</b>     | 13 min. walking                      |                       |                               |
| City view              |                                      | 165                   | 165                           |
| Sea view               |                                      | 190                   | 190                           |
| <b>Divan Elmadag</b>   | 5 min walking                        | 120                   | 125                           |
| <b>Divan City</b>      | 15 min. by metro<br>and by walking   | 90                    | 100                           |
| <b>Konak</b>           | 7 min. walking                       | 100                   | 100                           |
| <b>Metro Park</b>      | 13 min. walking                      | 75                    | 95                            |
| <b>Golden Age 1</b>    | 10 min. walking                      | 80                    | 100                           |
| <b>Green Park</b>      | 10 min. walking                      | 75                    | 95                            |
| <b>Grand Haliç</b>     | 15 min. by bus                       | 70                    | 70                            |
| <b>Inka Hotel</b>      | 15 min. by bus                       | 40                    | 55                            |
| <b>Dedem Boutique</b>  | In the old city;<br>25 min. by bus   | 45                    | 65                            |

### GUEST HOUSE PRICES IN EURO

Single Room per Night 25 • Double Room per Night (per person) 15 • Triple Room per Night (per person) 15

## Additional Information

### Sponsorship and Exhibition

For exhibition and sponsorship details and the application form, please visit the congress website: [www.internoise2007.org.tr](http://www.internoise2007.org.tr) For any questions and queries about the exhibition and sponsorship opportunities, please contact the Congress Secretariat: [contact@internoise2007.org.tr](mailto:contact@internoise2007.org.tr)

### Travel Arrangements

For your air trip arrangements to/from Turkey, you may contact Mr. Sinan KARAKAS of DER-TUR Tours, Travel and Event Management Inc., the appointed PCO for Inter-Noise 2007, via [dertur@dertur.com.tr](mailto:dertur@dertur.com.tr) Please quote the phrase "Attn: KARAKAS - Inter-Noise 2007 Travel Arrangements" as subject of your message.

### Passport and Visa

A valid passport is needed for entry into Turkey. Citizens of some countries are required to obtain visa definitely before arrival and some others are allowed to obtain it at the airport upon arrival. For visa information, please check: [www.mfa.gov.tr](http://www.mfa.gov.tr)



## Climate and Dress

The weather in Istanbul in late August and early September is usually dry, sunny and warm, but occasional rain showers may be expected. The average day temperatures vary between 26 and 30 degrees Celsius (78.8 — 86) °F. Bring light cotton summer clothing, swim wear and a jacket or coat for windy and cool evenings.

## Time

Turkish time is GMT + 2 hours.

## Currency, Banking and Credit Cards

The currency is the Turkish Lira (TL). Foreign currency can easily be exchanged in banks and exchange offices. Exchange rates are announced daily, current exchange rate is 1 USD = 1,42 TL. Banks are open from Monday to Friday between 08:30 and 12:00 hrs, 13:30 and 17:00 hrs. Most exchange offices are open from Monday to Saturday between 09:00 and 20:00 hrs. Major credit cards like Visa, Master Card, and American Express are accepted in most of the hotels, restaurants and shops. There will also be a bank service available at the ICEC during the conference.

## Electricity

The electric current is 220V AC with a frequency of 50 Hertz. European standard plugs with two round pins are used.

## Health Regulations

A current and valid international vaccination certificate is requested from those participants coming from infected areas. It is highly recommended to check it with the airline company or with the diplomatic mission of Turkey in your country.

## Communication

Turkish Telecom Inc. is the only telecom service provider. All hotels have direct dial telephone system in the

guest rooms. Turkey has 3 GSM operators (Turkcell, Telsim/Vodafone and Avea). Please consult your local GSM operator to find out whether they have a roaming agreement with Turkish operators.

## Sizes and Measures

Turkey uses the metric system and continental European sizes for clothing.

## Shopping in Istanbul

Istanbul is a shopper's paradise for carpets, gold, jewelry, leather goods and fashion. If you would prefer to do your entire shopping under one roof, head for one of the modern shopping malls which offer a rich variety of international and Turkish brand goods. The Tours and Transportation Desk in the registration area will help you in finding out the right choice for you and how to get there.

## Language

Turkish is the official language of Turkey and spoken by 90 percent of the country's population whereas some 70 other languages and dialects are also spoken. In areas frequented by tourists it is easy to find many bilingual citizens.

## Turkish Food and Drink

The variety of dishes that make up the Turkish cuisine, the ways they all come together in feast like meals and the evident intricacy of each craft offer enough material for life long study and enjoyment. Similar to other grand cuisines of the world, the evolution of this glorious cuisine was a result of the combination of three key elements: First, a nurturing environment; second, the legacy of an imperial kitchen; third, the influence of the longevity of social organization — the Turkish state of Anatolia is a millennium old, and so, naturally, is the cuisine.

# Optional Tours and Accompanying Persons City Tour

Beside the tours which are listed here below, there are more interesting options to be organized upon request such as trekking, mountaineering, "Blue Voyage" alongside the Mediterranean and Aegean coasts and a number of special interest tours on archaeology, cookery and winery, bird watching, Jewish heritage, Christian heritage etc. Please, feel free to ask the Congress Secretariat.

More detailed tour information for the tours listed below can be found on the Internet at: [http://www.internoise2007.org.tr/accompany\\_persons.asp](http://www.internoise2007.org.tr/accompany_persons.asp) (tours in Istanbul) and [http://www.internoise2007.org.tr/pre\\_post\\_congress.asp](http://www.internoise2007.org.tr/pre_post_congress.asp) (pre- and post congress tours).

## General Information and Conditions for the Tours

1. Please note that the domestic airfare is not included in the tour prices.
2. When you book your international air ticket, be sure to include the domestic flight mentioned in your tour program in order to benefit from the reduction.
3. Tour fees include transportation, guide, entrance fees and meals where mentioned.
4. A minimum of 10 participants per tour is required. Should fewer participants sign up, the organizers reserve the right to cancel that tour. In such cases, fees already paid can be transferred to another tour.
5. Should participants cancel the whole or a part of a tour, no refund will be made.
6. Children under the age of 7 qualify for a 30 % discount under condition that they share the same room of the parents. 0 - 2 years are free of charge.
7. All optional city tours will start from and end at the Congress Center, if not specified otherwise.
8. For further information on optional tours, you can consult our professional guides at the Tours and Travel Desk open in the lobby of the Congress venue (ICEC) on August 28 between 12:00 and 20:00 hrs and from August 29th to 31st between 08:00 and 18:00 hrs.

## Tours In Istanbul

### **Tour #1M—Orientation Tour of Istanbul**

Date Tuesday, August 28, 2006

09:00 - 12:30 hrs

Free for registered accompanying persons/ No need to show up at the registration desk to take part in this tour; a copy of your registration confirmation is sufficient.

This tour has been planned to orient the accompanying persons with the sights of Istanbul. Drive through the shopping streets of the new parts of the city and pass across the bridge on the Golden Horn to arrive at the old part of the city. Pass beneath the Aqueduct of Valens to the hustle and bustle of Istanbul. Drive to view the Byzantine city walls. Refreshments will be served in a garden by the sea.

### **Tour #2M—Historical Peninsula and the Byzantine Art**

Wednesday, August 29, 2006

09:00 - 12:30 hrs

Price: 40 Euro per person

### **Tour #3A—Ottoman Art and Lifestyle**

Wednesday, August 29, 2006

13:00 - 17:00 hrs

Price: 45 Euro per person

### **Tour #4F—Highlights of Istanbul**

Wednesday, August 29, 2006

09:00 - 17:00 hrs

Price: 70 Euro per person (inclusive of lunch)

This tour is a combination of Tour #2M and Tour #3A with lunch at traditional Konyali Restaurant within the grounds of Topkapi Palace.

### **Tour #5N—Dinner Cruise on the Bosphorus**

Wednesday, August 29, 2006

19:00 - 22:30 hrs

Price: 80 Euro per person

(inclusive of a buffet dinner with wine)

### **Tour #6F—Istanbul, the Meeting Point of Religions and Arts**

Thursday, August 30, 2006

09:00 - 15:00 hrs

Price: 70 Euro per person (inclusive of lunch)

### **Tour #7F—Princes' Islands—A Relaxing Tour**

Thursday, August 30, 2006

09:00 - 17:00 hrs

Price: 70 Euro per person (inclusive of lunch)

### **Tour #8M—Old Istanbul Tour**

Friday, August 31, 2006

09:00 - 12:00 hrs

Price: 25 Euro per person

### **Tour #9A—Traditional Turkish Bath**

Friday, August 31, 2006

14:00 - 17:00 hrs

Price: 60 Euro per person

### **Tour #10N—Fun Night**

Friday, August 31, 2006

19:30 - 22:30

Price: 60 Euro per person

## Extensive Trips Pre- and Post Congress

### **Tour #10—Western Anatolia in Depth (8 Days, 7 Nights)**

Pre Congress dates: August 21 - 28, 2007

Post Congress dates: September 01 - 08, 2007

Price: To be announced soon.

### **Tour #11—Central Anatolia in Depth (8 Days, 7 Nights)**

Pre Congress dates: August 21 - 28, 2007

Post Congress dates: September 01 - 08, 2007

Price: To be announced soon.

### **Tour #12—Pearls of the Turkish Riviera (8 Days, 7 Nights)**

Pre Congress dates: August 21 - 28, 2007

Post Congress dates: September 01 - 08, 2007

Price: To be announced soon.

## Short Trips

### **Tour #13—Day Trip to Ephesus and the House of Virgin Mary**

Pre Congress dates: August 27 and 28, 2007

Post Congress dates: September 01, 2007

Price: To be announced soon.

Arrive to Izmir, the birth place of Homer, by an early morning flight. Depart straight

### **Tour #14—Day Trip to Nicea**

Pre Congress dates: August 27 and 28, 2007

Post Congress dates: September 01, 2007

Price: To be announced soon.

### **Tour #15—Pergamum and Ephesus (2 Days, 1 Night)**

Pre Congress dates: August 27 - 28, 2007

Post Congress dates: September 01 - 02, 2007

Price: To be announced soon.

### **Tour #16—Iznik (Nicea) and Bursa (2 Days, 1 Night)**

Pre Congress dates: August 27 - 28, 2007

Post Congress dates: September 01 - 02, 2007

Price: To be announced soon.

### **Tour #17—Pamukkale (Hierapolis) - Ephesus and the Village of Sirince (2 Days, 1 Night)**

Pre Congress dates: August 27 - 28, 2007

Post Congress dates: September 01 - 02, 2007

Price: To be announced soon.

### **Tour #18—Wonders of Cappadocia (2 Days, 1 Night)**

Pre Congress dates: August 27 - 28, 2007

Post Congress dates: September 01 - 02, 2007

Price: To be announced soon.

### **Tour #19—Treasures of the Mediterranean (2 Days, 1 Night)**

Pre Congress dates: August 27 - 28, 2007

Post Congress dates: September 01 - 02, 2007

Price: To be announced soon.

### **Tour #20—At the Gates of Mesopotamia (3 Days, 2 Nights)**

Pre Congress dates: August 26 - 28, 2007

Post Congress dates: September 01 - 03, 2007

Price: To be announced soon.

### **Tour #21—South Eastern Adventure (3 Days, 2 Nights)**

Pre Congress dates: August 26 - 28, 2007

Post Congress dates: September 01 - 03, 2007

Price: To be announced soon.





# European Noise Policy and its Links to Global Noise Policy

Tampere, Finland - 30 May 2006

## Introduction

In view of the keen interest in noise policy in Europe and overseas, a workshop on European noise policy and its links to global noise policy was held during EURONOISE 2006 in Tampere, Finland, on May 30 and 31. The workshop was organized by William W. Lang and Tjeert ten Wolde.

The first day of the workshop was dedicated to environmental noise. On the second day, sessions on occupational noise and product noise were held. In this article, the programs for each session are presented. These are followed by introductory material presented by William W. Lang, and seven papers on product noise are summarized.

## Session 1 Environmental Noise

- John Hinton, U.K., chairman EC WG  
“Assessment and Exposure to Noise (AEN)” *“WG AEN: results and outlook”*
- Discussion on John Hinton’s presentation & on David Delcampe’s Plenary Presentation *“EU Environmental Noise Policy: progress and outlook”*
- Martin van den Berg: The Netherlands, chairman EC WG “Health and Socio-Economic Aspects (HSEA)”  
*“WG HSEA: results and outlook”*
- Michel Vallet, France, chairman EC WG “Airport Noise” *“Airport noise: Effectiveness of present and future policies”*
- Michael Jacker-Cüppers, Germany, chairman EC WG “Railway Noise”  
*“WG Railway Noise: results and outlook”*
- Anna Bäckman, European Environment Agency (EEA), Denmark  
*“EAA experiences and outlook”*
- Dik Welkers, Environment Ministry The Netherlands *“Who is politically responsible for noise emissions”*
- Alfred Rust, EC, DG Research, Directorate H (Transport), Belgium *“EU Research”*
- Tuomo Karjalainen, EC, DG Research, Directorate I (Environment), Belgium  
*“EU Research on health impacts of noise – from FP5 to FP7”*
- Tjeert ten Wolde, The Netherlands:  
*“On the relationship between European and Global noise policy”*

## Session 2 Occupational Noise

- Esko Toppila: Työterveyslaitos, Finland  
*“Role of various risk factors in noise-induced hearing loss”*

Iiris Turunen-Rise: Standards Norway, Norway *“Occupational noise regulations and standards”*

Ilkka Kyttälä: Sosiaali- ja terveysministeriö/Ministry of Social Affairs & Health, Finland *“2003/10/ EC Code of practice in the music and entertainment business”*

Christoph Hecker: Berufsgenossenschaft Metall Süd, Germany *“Regulatory framework approach of 2003/10/ EC and first experiences with its implementation”*

## Session 3 Product Noise

- Gerhard Hübner: Stuttgart University, Germany *“The Goal of Machinery Acoustics – Quiet Products”*
- Ken Feith: U.S. Environmental Protection Agency, USA *“Global harmonization of noise regulations”*
- Juha Plunt: Ingemansson Technology AB, Sweden *“Customer-driven consumer product noise and sound quality—a matter of competitiveness”*
- Gerhard Neugebauer: Maschinenbau- und Metall- BG, Germany *“Noise emission and immission values – helpful information”*
- Pascal Fodiman: Société Nationale des Chemins de Fer Français, France  
*“Strategies to improve the noise performance of the railway system”*
- Wolfgang Kropp: Chalmers University of Technology, Sweden *“Engineering education for design of quiet products”*
- Eleonora Carletti: IMAMOTER-National Research Council, Italy *“Outdoor Equipment: Current situation on noise emissions and strategies for control”*

## Chair's Opening Remarks—The Challenge of a Global Noise Policy

What is a Global Noise Policy? It is a high-level overall plan that includes the general goals and strategy of an international governmental body or agency for the control of occupational, community, and product noise as well as specific references to relevant codes.

Do we have any effective global noise policies today? We have at least one that has been established by the International Civil Aviation Organization. ICAO is an agency of the United Nations linked to the U.N. Economic and Social Council. ICAO is concerned primarily with the community noise affecting those people who live in the vicinity of airports. ICAO resolutions set upper limits on the noise generated by aircraft landing and take-off.

There are other global policies on single topics like noise control. In May 2003, the member countries of the World Health Organization adopted a historic tobacco control treaty, the Framework Convention on Tobacco Control (FCTC). This United Nations treaty took ten years from conception to realization. Would a similar treaty, a Framework Convention on Noise Control (FCNC) be achievable, and if so how? A framework convention alliance on noise control needs to be established. This would be a global network of NGOs (non-governmental organizations) who would come together to consolidate ideas on actions necessary to initiate a campaign for a framework convention. The alliance would then work through the member states of the U.N. to convene an FCNC. In many respects, this workshop and its predecessors are steps on the road to a global noise policy.

There are signposts along the road to a global noise policy. One of them is the International INCE report prepared by

its Technical Study Group 5. The report was published as a draft in a special issue of *Noise Control Engineering Journal* in 2004. The final version of the report appeared in a second special issue of the same journal in the fall of 2006. The report prescribes what is necessary for a global noise policy to be effective.

Another signpost is the follow-on work now being initiated by I-INCE's Technical Study Group 7 on "Harmonization and Implementation of Global Noise Policies." The mission of TSG 7 will be to expand the TSG 5 final report so that all aspects of noise (occupational, community, and product noise) are covered in depth.

The focus here is on occupational and product noise. What is the link between the two? Occupational noise is produced by machinery and equipment—products. Low-noise products are the first line of defense against occupational noise. The link is then the product. Quoting from the scope of TSG 5:

"All vehicles, devices, machinery, and equipment that emit audible sound are manufactured products; most of these products are involved in international trade.

- "Noise *emissions* of such products are appropriately the subject of international agreements and regulations.
- "Noise *immissions* resulting from the operation of these products are growing in severity as vehicular traffic volumes and the pace of industrialization continues to increase in many parts of the world."

Up to now, attempts have been made worldwide to control the noise levels at the workplace (and in the community) with immission regulations. This is, in effect, working backwards from the immission regulation (of the sound at the receiver's ear) to the noise source emission. This is the key problem. Attempts at working backwards at the regulatory level have not often been effective. Many will agree that the world is getting noisier, not quieter! If

immission regulations were working, that would not be the case.

The logical approach to this dilemma is to reduce product noise emissions to the minimum possible. Note the choice of the word possible, rather than feasible. It will take time to implement this forward approach as it will require that the best technology be implemented in every manufactured product. This is the goal of machinery acoustics that is the extremely important topic of the next presenter on this occupational and product noise policy panel.

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## Panel Presentation Summaries

### The goal of machinery acoustics – quiet products without price increases

*Gerhard Hübner, ITSM, Stuttgart University, Germany*

All technical developments in our society must be considered from both a public interest standpoint and from a cost standpoint. Let me start with some remarks dealing with relevant noise policy to encourage industry to develop low-noise products. Interest will be focused on primary noise control, that is, noise reduction of the principal sources by effective design of the noise generating mechanisms. (Primary noise control by being integral to the design process becomes inherent in the ultimate design of the product.) Secondary noise control measures such as the use of mufflers, absorbing materials, and/or enclosures are also effective; but these usually add to the cost of the product. (An example of primary noise control is the high-bypass-ratio jet aircraft engine and of secondary noise control is the muffler installed on a highway vehicle.)

To encourage greater public interest in quiet products, it may be useful to identify the following groups:

- Manufacturers legally required to guarantee relevant noise emission limit values—the motivation is to develop low-price products which will be safe to use and have minimum impact on the environment.
- Customers with a self-motivated interest in low-noise products—their goal is to purchase a quieter product at a competitive price.
- Customers not educated in acoustics who should be encouraged to buy quieter products through product information emphasizing that low-noise products can be had without higher prices and by an easy-to-understand labeling system. One example of this is the energy consumption classification A, B, C... for refrigerators.

Industry must have state-of-the-art knowledge of noise control techniques. This means the laws of noise generation for the different sound sources of their equipment (primary noise control) and methods for secondary noise control must be readily available. (The former requires a detailed knowledge of the physical interactions governing the noise generating and radiating characteristics of the components of a product during its development.) The teaching of machinery acoustics in the universities is extremely important for developing quiet products because it is through these courses that the techniques of primary noise control become available to industry.

The objective of machinery acoustics is the numerical prediction of a product's noise output using a relevant software package prior to the construction of a prototype. The inputs are machinery specific data (including operating conditions) and acoustical relationships (including flow patterns and internal forces). This is not a simple problem, but there is progress. For example, at the present time, the noise produced by magnetic forces within rotating electrical

machines can be determined before the machine is manufactured.

The major topics to be included in machinery acoustics are acoustical measurement techniques, generation of structure and fluid borne sound, sound radiation, and aerodynamically generated sound. Other subjects to be included in courses on machinery acoustics include:

- legal requirements on product noise emissions
- knowledge of international standards for measurements and test equipment
- state-of-the-art research results on product noise emissions
- participation by industry in research, consultation, and instruction

Acoustical measurements produce noise emission data that industry needs to support the financial investment necessary to develop quiet products. This requires attention to the current

measurement standards, especially for measurement uncertainties and verification procedures. New techniques for airborne and structure-borne sound intensity measurement and non-contact vibration measurements by laser techniques, possibly

assisted by robots, are important tools currently under development.

Let me give examples where machinery acoustics provides noise control without increasing the price of the product.

- For a rotating machine operating in air, the sound power radiated varies with the 5.5 power of its rotational speed but with only the first power of its length. Hence, reducing the rotational speed and increasing the length of the rotor is a cost-effective means of noise control in the design stage.
- A second example is the cost-neutral construction of a fan in which the pure tone components of the sound radiated are suppressed by irregular blade spacing.

For structure-borne sound radiation, the construction elements to be considered in machinery acoustics are arbitrarily shaped and the frequency range of interest extends up to about 8 kilohertz. The construction elements considered in structure-borne machinery acoustics differ from those in building acoustics where the elements are straight and plane, and the frequency range covered is more restricted. This means that machinery acoustics requires a description for structure-borne sound generation and radiation by all different shapes, if possible with the same equation that permits changes to be easily studied.

The sound power is the principal quantity to describe the noise emission of a product. This means that the numerical methods for determining the sound radiation should be focused on the sound power of the machine. If possible, this should be done directly, not indirectly with the boundary-element method (BEM) or finite-element method (FEM). A solution for this is the so-called direct-finite-element method (DFEM).

The challenge of machinery acoustics is to achieve noise control in a product by focusing the design on the primary sources and by applying physical laws to the sound generated by these sources, not by adding secondary elements that typically add cost to the product.

## **Environmental noise reduction and global regulatory harmonization**

*Kenneth Feith, U.S. Environmental Protection Agency, USA*

Our world is becoming noisier. Who is responsible? We are! What can be done? It is up to each one of us to think, teach, and buy quiet. Quiet products are on the market as a result of consumer demand as well as government regulation.

What is the role of governments insofar as the noise issue is concerned? Governments are responsible for public health and welfare. They respond to

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### *Low Noise Design*

### *Must Focus on the Primary Sources*

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public demand for a quiet environment and limit environmental noise by regulation. They assure a national uniformity of requirements. Regulations have significant impacts on product design, product viability, product cost, and global competition.

Globally harmonized standards and regulations have many important impacts. They provide a level playing field for product manufacturers and reduce the manufacturing cost for regional product designs. They expand market opportunities by testing and certification once and selling globally. They expand product selection for consumers and may result in lower product cost through broader market competition. The global fora for harmonization are the voluntary standards organizations (e.g. ISO, IEC, SAE), trade associations (e.g. OICA, CLEPA, IMMA), and governmental organizations (e.g. UNECE, ICAO, IMO, WTO).

The United Nations Economic Commission for Europe (UNECE) is responsible for the World Forum for Harmonization of Vehicle Regulations (WP.29). The Working Party on Noise (GRB) is a group of experts on vehicle noise. By a global agreement in 1998 a process was established by UNECE through which countries from all regions of the world can jointly promote and develop globally acceptable technical regulations regarding high levels of safety, environmental protection, energy efficiency and anti-theft performance of wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles. The 1998 Agreement promotes the global harmonization of technical regulations while explicitly recognizing the importance of continuously improving and seeking high levels of safety, health and environmental protection, the right of government to adopt technical regulations that are best suited for their needs to protect health, safety and the environment, then those established at the global level.

The global agreement provides two different paths to the establishment of global technical regulations (GTR). First

is the harmonization of existing national regulations and/or standards. Second is the establishment of a new global technical regulation where there are no existing regulations or standards.

The process of harmonizing regulations is as follows. A Contracting Party may propose any existing regulation(s) within its jurisdiction as a candidate for global harmonization. The regulation is listed in the Compendium of Candidate Global Regulations if supported by a vote of one-third of the Contracting Parties present and voting, including the vote of either Japan, the European Community, or the United States of America. The Compendium expands and contracts in direct proportion to the existence of candidate regulations awaiting global harmonization.

The initiation of work to develop a new global technical regulation requires a proposal from a Contracting Party. The proposal must include an explanation of the objective of the proposed new global technical regulation; a narrative description or, if available, the draft text of the proposed new regulation; and any available documentation to facilitate the analysis of safety, health, or environmental issues to be addressed.

The development of a new global technical regulation requires the following: an assessment of best available

technology and economic feasibility; a comparative evaluation of the potential benefits and cost effectiveness of alternative regulatory requirements, and the development of test methods by which compliance is to be demonstrated.

The establishment of a global technical regulation does not obligate any Contracting Party to adopt that global technical regulation into its own laws and regulations. However, a Contracting Party that voted to establish the regulation is obligated to initiate the procedures used by the Party to adopt such a technical regulation into national law.

## Conclusion

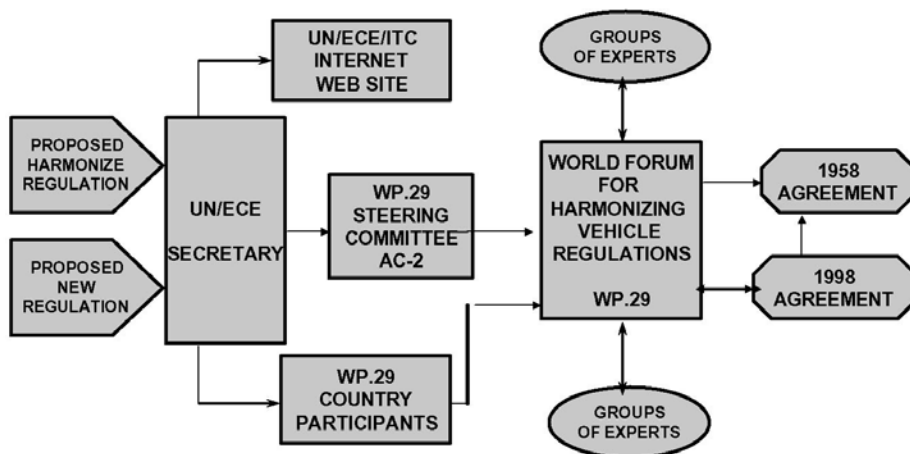
We are now at the beginning of a global challenge. Environmental noise reduction starts and ends with the people. We must adjust our personal actions to reduce noise impacts. Think quiet! We should include quiet in our purchase decisions. Buy quiet! Governments can assist in reducing noise, but only if the people insist that noise is a serious health and welfare issue. Global harmonization of product noise standards and regulations is a start towards a quieter world.

## Glossary of Acronyms

CLEPA—European Association of Automotive Suppliers

ICAO—International Civil Aviation Association

## FUNCTIONAL DIAGRAM OF WP.29



IEC—International Electrotechnical Commission  
 IMMA—International Motorcycle Manufacturers Association  
 IMO—International Maritime Organization  
 ISO—International Organization for Standardization  
 OICA—Organisation Internationale des Constructeurs d'Automobiles  
 SAE—SAE International  
 UNECE—United Nations Economic Organization for Europe  
 WTO—World Trade Organization

## Customer-driven product noise and sound quality—a matter of competitiveness

*Juha Plunt - Ingemansson Technology AB - Gothenburg, Sweden*

### Introduction

The principal objective of product noise control is to reduce the noise emissions of products. Reductions are necessary to meet legal limits imposed by regulations, to provide the customer with a silent alternative, to increase the probability of survival for products used by the military, and to enable the manufacturer to mark the product as having a low noise level. The most common descriptor for product noise emission is the A-weighted sound level.

These objectives are complementary to those of product sound quality improvement. These improvements make the sound produced by a product more pleasing to the user (the customer) and a part of the character of the brand of the product. The metrics for sound quality are more complex than the A-weighted sound level that does not necessarily have to be minimized.

### Legislation versus Customer-driven noise and sound quality targets

Legislation-driven targets must be met in order to market the product. Political compromises setting the target levels may lead to slow progress. What is needed are simple target-setting metrics (e.g.

$L_{Aeq}$ ) and simple control methods. The targets should lead to “binary” product development (OK or not OK relative to the target limits). As far as customer-driven targets are concerned, there are no clearly-defined targets for a product to be competitive. In many respects, sound quality is a moving target as the quality attributes are quite complex. Sound quality plays a major role when “comfortable” noise levels have been achieved. Manufacturers have found that sounds and sound quality communicate total product quality and a pleasing subjective sound impression is important to retain a returning customer.

An example illustrating how competition forces the manufacturers to produce quieter products is provided by floor-standing dishwashers. The Swedish Consumer Agency established a simple rating scale of 1 to 5 instead of dBA where 1 corresponded to noise levels above 60 dBA and 5 to noise levels below 45 dBA. Competition forced manufacturers to produce quieter dishwashers between 1970 when the average for ten different brands was 1 on the rating scale and 1990 when the ratings dropped to 5 or better. When all brands reached a rating of 5, there were no further reductions after 1990; and after the 5-graded noise scale was discontinued we still have units between 5+ and 3. The declared noise levels today range between 41 and 57 dBA.

There are several lessons learned from the example of dishwashers. A simple quality scale (1 to 5) for noise performance is effective to drive noise levels down. Confusing or too precise metrics (logarithmic units such as the decibel) are not assimilated well by the customer and result in a lack of incentive for manufacturers to improve the product if cost is involved. The products available on the market will include noisy products sold by advertising at “a price you can’t resist” since consumers cannot judge decibels versus Euros. Quality scales should be designed so that they can be stretched to quieter values (e.g. a 6 on the dishwasher scale).

The quality of a product is only partly defined by a long and trouble-free ownership of the product. Product quality has two aspects: perceived quality and functional quality. Sound and vibration quality represents an evolution of the sound and vibration attributes of a product. An important part of the perceived quality together with brand image is the sound and vibration quality which is also an indicator of functional quality (Does it sound “solid” or “cheap?”).

### Product Quality Perception at Ownership

A newly-purchased product with high sound quality feels “right” and “easy” to use. (The sound feedback is not intrusive and the impression of quality is confirmed by this sound.) The product is not disturbing. (It has a low overall noise level [dBA] and good sound quality, i.e., comfortable and not intrusive.) The product makes the owner proud because it looks and sounds QUALITY. The product works properly because it emits no unexpected or strange sounds and there are no false indications of possible malfunctions.

### NVH

In the automobile industry, vehicle refinement consists of improved NVH (noise-vibration-harshness), ride quality, and drivability. NVH has been in focus for at least 30 years as a vital part of perceived product quality. Today’s product is more refined than it was 25 years ago with higher performance, more features added, and lower overall product cost.

NVH has evolved from reducing noise levels to designing in sound quality. The first step is to reduce intrusive noise levels. This is the minimum refinement requirement to bring the product to market. The second step is to improve sound quality without increasing the product cost. This makes the vehicle more refined with more perceived value and improves the perception of the product including its competitiveness, better brand image, and increased margins. The third step is to design the sounds to make the perception

of the vehicle unique (e.g. BMW, Lexus, Porsche, Harley-Davidson). The objective is to improve the feedback sounds and the sensation of a powerful/relaxing vehicle.

NVH in the automobile industry drives the technology for noise control and sound quality by design. NVH employs an estimated 5,000 to 8,000 acoustics-vibration professionals worldwide and leads the development of acoustic computer-aided engineering through routine use of massive FEM models for low- and mid-frequency NVH and SEA for high-frequency modeling. NVH leads the development of multi-channels and test systems through routine use of modal analysis, ODS, and transfer path analysis (TPA).

### Summary

Legislation-driven targets are necessary to limit the noise emitted by products into the environment, that is to others than the owner. Legislative targets are simple metrics that are the result of political compromises. This means that there is usually slow progress in reducing noise emissions, there is need for standardization of measurement methods, and there is the binary effect (OK or not OK relative to the target limits).

Customer-driven targets are set by the competitive marketplace. Customer targets are more dynamic and are changing continuously. Rapid progress is possible because it is difficult to predict where competitors will be at product launch. The absence of standardization does not slow down the development process. There is no reason to stop development because a target set at the beginning of a project has been achieved since the targets are continually changing. Target setting is an art since no simple metrics are sufficient as the subjective reactions of the customer must be predicted. Finally, communication to the customer and yet is a vital step for success.

## Noise emission and immission values—helpful information

*Gerhard Neugebauer - Maschinenbau- und Metall- BG, Germany*

### Introduction

This paper describes emission and immission databases and their value in controlling occupational noise. Examples of the use of the databases are given.

### Emission – Immission

It is important to distinguish between emission and immission in an occupational noise environment. Emission relates to the total sound radiated by a source to the environment. Immission is the term used to describe the total sound received at the ear of the worker, listener, or observer. BK 2301: Hearing Loss in Germany gives information on the hearing loss of workers in the following different branches of German industry: metalworking - 41.0%, construction - 23.6%, woodworking - 5.6%, mining - 4.7%, quarrying - 4.6%, trades - 4.6%, and others - 15.9%.

The European Machinery Directive (98/37/ECC) prescribes emission requirements as sound power levels in dBA and immission requirements as sound pressure levels at a workplace in dBA as well as

peak sound pressure levels in dB (C<sub>Peak</sub>). The Directive calls for the implementation of test codes and “C” Standards which are required test codes in Europe.

Emission values provide useful information for a number of different purposes. They are helpful when comparing sound sources under test code conditions, locating low-noise machinery and equipment, identifying levels that may cause noise-induced hearing loss, and planning noise reduction of machinery during the design stage.

The noise emitted by machinery and equipment is measured according to international standards, European standards and test codes. The ISO 3740 Series describe procedures for determining the sound power levels of machinery and equipment (emission values). The ISO 11200 Series yields sound pressure level data at workstations (immission values). “C” Standards describe testing procedures for specific classes of machines. The European Commission has prescribed upper limits on the sound power level of nearly all machines and equipment used in industry.

It is not possible to convert emission values to immission values directly from one to another. A number of factors must be taken into account, e.g., sound reflections in the room, operating conditions according to the test code, other machinery and equipment in the room, as well as the time of the exposure to the noise by the worker whose immission value giving noise exposure needs to be determined.

The EU regulations are set forth in Directive 86/188/EWG of the council dated 12.5.1986 and Directive 2003/10/EC of the council dated 6.2.2003. The prescribe both action values and limit values, the latest being 80/85 dB(A) and 135/137 dB(C<sub>Peak</sub>). In Germany, these regulations are implemented with UVV “Lärm.” There is also in Germany a special rule (Arbeitstätten Verordnung) that prescribes 55 dB(A) for the limit of work requiring mental concentration and 70 dB(A) for ordinary office work.

Immission measurements in Germany are carried out by the Berufsgenossenschaft – BG Metall according to two German standards (DIN 45641 and DIN 45645.2) as ISO/CD 9612 “Acoustics—Measurement and calculation of occupational noise exposure—Engineering method.” A database of immission data has been established by BG Metall. The database lists the  $L_{Aeq}$  for machinery and equipment. Forty thousand values appear in the database, of which 30,000 are for production machines in the German

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metal-working industry under operating conditions, not under test code conditions.

Information about the uncertainty is given in the above-mentioned German standards. The procedures of ISO 9612 provide data on uncertainty for measurements with the worker absent, measurements with a sound exposure meter, worker in a reverberant sound field, and the worker principally exposed to direct sound from the source.

## Summary

The available databases provide useful information on the differences between emission and immission values in practice and on the differences between test codes and operating conditions. They are helpful in locating the principal sources of noise, providing information on the state of the art of emission reductions, information about the magnitude of noise at workstations, and guidance on the selection of hearing protectors.

The following website gives useful information: [www.osha.eu.int](http://www.osha.eu.int), [riskobservatory](http://riskobservatory), particularly for the construction trades. Emission and immission values are needed and are helpful in providing information for the prevention of hearing loss in practice.

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## Strategies to improve the noise performance of the European railway system through the interoperability concept

*Pascal Fodiman - Société Nationale des Chemins de Fer Français, France*

The European regulation on environmental noise (2003/10/EC) is important to the improvement of the performance of railways. This is being accomplished through harmonized noise emission criteria on new rolling stock that include noise emission thresholds under harmonized testing conditions on a reference track. Measurement standards are in progress. Further noise reductions are expected in the next ten years (through the application of “second-step limits”). The European

regulations contribute to a significant widening of the industrial market in Europe for new rolling stock.

The improvement of railway system noise was initiated by the European Commission Green Paper published in 1996. The principal goal of environmental noise policy is that “no person should be exposed to noise levels which endanger health and quality of life.” Two complementary directives were issued to implement the principal goal. These are the reduction of noise exposure EN Directive that requires information be furnished on strategic noise mapping and action plans for noise mitigation programs; reduction of the noise created at its source, and the Interoperability Directives (*See [www.rssb.co.uk/europe\\_intdir.asp](http://www.rssb.co.uk/europe_intdir.asp).—Ed.*), that limit the noise created by the rolling stock. Other principles of noise policy define harmonized methods (standards and indicators) and require the public be informed.

What is “interoperability” as applied to railway noise? It defines the minimum conditions that the rolling stock should comply with to be considered as interoperable on the Trans European Network (TEN), and that the infrastructure is such that all interoperable rolling stock is able to run on it. As far as noise emission is concerned, “Interoperability” limits the noise at the source of the rolling stock and harmonizes the noise emission limit values, the test measurement methods, and the test conditions. These are defined by the Technical Specifications for Interoperability (TSI) both in the high-speed domain (HS) and in the conventional rail domain (CR).

As far as a HS TSI is concerned, there has not been a consensus in terms of noise indicators, noise limit values, and measuring conditions due to a lack of HS data that are fully compatible. For this reason a decision has been made to start a European test campaign, the NOEMIE (NOise Emission Measurement campaign for high speed Interoperability in Europe) project that will create consistent new TSIs

for conventional rail up to 190 km/h and for HS rail up to 320 km/h.

Considering the noise-generating mechanisms involved, the principal mechanism depends on mechanical interactions through the contact-patch interface. Noise contributions are dominant for the track components at lower frequencies and for the wheels at higher frequencies. The track noise contribution depends on both the acoustic rail roughness and the track vibration response. Both are important and never negligible, but train noise can never be separated from track noise.

The use of a reference track concept is based on the definition of a performance level rather than a component-based definition of the track. A reference track provides test conditions that are close to operating conditions, with the acoustic performance level consistent with the best industrial practice. The reference track permits comparisons and reproducibility of the measurements of different rolling stock on the same test site or on different test site locations. The reference track facilitates line-acceptance tests of rolling stock with an acceptable precision independent of the track parameters.

The NOEMIE project is a major contribution to the HS TSI as far as noise is concerned. It provides an assessment of the different track characteristics at several European sites. The project is working towards a common definition of a reference track for both HS and CR with limits on the two main parameters: upper limit on acoustic rail roughness and lower limit on the track vibration decay rate of waves in the rail. The measurement methods for these limits are currently being standardized.

The NOEMIE project has provided data on pass-by noise of high-speed trains in Belgium, France, Germany, Italy, and Spain measured at 25m distance on reference TSI tracks.

The revised HS TSI specifies noise limit values for stationary noise at 7.5m distance

in dBA. Also, for start-up noise at the same distance and for noise levels within the cab. The revised conventional rail (CR STI) specifies pass-by noise limits at a distance of 7.5m and a speed of 80 km/h. It also specifies limits standing still, during start-up, and within the cab. Section 7.6 of the CR STI deals with re-equipping the existing rolling stock with requirements specifying limits while braking and during other operations. The CR STI is applicable to all new rolling stock today and a "second-step" limit is recommended to be in force in ten years.

This summarizes the actions stimulated by the European environmental noise directive to improve the noise performance of the railways of Europe.

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## Engineering education for the design of quiet products

*Wolfgang Kropp, Chalmers University of Technology, Sweden*

Is noise control engineering a recognized discipline? The science of noise control is based on applications of the fundamental principles laid down by Newton, Hooke, Euler, Helmholtz, and Lord Raleigh.

It has a solid scientific basis that is complemented with new knowledge on behavioral science and human perception. The application of noise control began with industrialization during the early 1900s, and the first conference on noise control was held in 1909 in London with representatives from eight countries. Much progress has been made in recent years, particularly with improvements in measuring equipment, the advent of computers, and digital signal processing.

Noise control is now a fully-developed science offering graduate-level educational courses in many European countries and producing thousands of technical publications each year. However, noise control is often hidden within acoustics and is not always considered on as firm a basis as are other disciplines.

Acoustics is an interdisciplinary field involving physics, mechanics, fluid- and thermo-dynamics, materials science, electrical engineering, signal processing, musical science, psychology, medicine, and others, which creates problems but is also its strength. Should acoustics/noise control engineering be submerged as a minor part of other programs? Should acoustics research be scattered throughout the disciplines mentioned above or should it be concentrated in one area focused on acoustics? There is no simple answer.

Engineering training is needed to produce:

1) engineers who are aware of the problems in noise control, 2) engineers working with the development of products, and 3) engineers concentrating on tools and methods. An example involves the development of quiet tires. The key characteristics of tires are handling, rolling resistance, wear, durability, high-speed performance, wet grip, aquaplaning, design, costs, and acoustic performance (interior and exterior). An engineer working to quiet tires needs expertise contact mechanics, fluid dynamics, tribology, numerical methods, materials science, vehicle dynamics, mechanics, road engineering, and acoustics.

How can we make other engineering disciplines more aware of the importance of noise control engineering? Obviously we need to become highly visible and ready to assist. This means that educational programs in acoustics/noise control engineering must become an essential part of any engineering curriculum.

Most university acoustics departments are part of mechanical engineering, civil engineering, electrical engineering, or engineering physics. Who, then, champions the acoustics departments and their research groups? In Sweden, Germany, and France the university chairs in acoustics have disappeared! Are acoustics departments an endangered species? What if the research resources of the European Commission and the national research foundations were optimized rather than being focused on a few groups that form a well-controlled

research arena? Research funding is necessary if a university is to offer a good education in engineering disciplines. What will be the consequences if research funding disappears?

Perhaps only a limited number of noise control experts are needed in comparison to other areas of engineering; but if there are no experts, then future prospects for a quieter world are poor. Is it feasible for education in noise control engineering to be supported from an economic point of view? Could universities be awarded research support per student trained?

Noise control engineering is a difficult discipline which involves a multitude of physical phenomena, advanced mathematics and measurement tools, a wide range of technical products, and the perception of sound by human beings. But difficult as it is, this makes noise control engineering attractive as it permits the newly-graduated engineer to find his or her own niche; and that encourages recognition of expertise in a very challenging discipline.

Perhaps the most important aspect of education in noise control engineering is its interdisciplinary character. Those of us in the teaching profession are used to working with people with different educational backgrounds. We are open and interested in understanding the way that others work in neighboring disciplines. Our education program in acoustics/noise control is adapted to students with different interests and backgrounds. A comprehensive university program is shown in the schematic below (taken from the Nordic Institute of Acoustics [NINA]), a program extending over two academic years. Such programs are necessary to educate both generalists and specialists in noise control engineering. However, such programs are having increasing difficulty finding the required space and resources in today's educational systems. To build alliances between acoustics groups at different universities could be one way to ensure that such important programs exist in the future.

## Outdoor equipment: Current situation on noise emissions and strategies for control

**Eleonora Carletti - IMAMOTER-  
National Research Council of Italy**  
[Summary received; panelist unable  
to present.]

The new EU noise policy for a “quieter” Europe is significantly affecting research in noise control. Attention has been focused on the reduction of noise emitted by outdoor/ indoor industrial equipment and mobile machinery. Although outdoor equipment covers a wide range of mechanical devices, most are operated by an internal combustion engine and, consequently, have the same dominant noise sources (diesel engine, exhaust, and cooling system). For these machines and equipment, several noise and vibration research programs have been completed. New concepts in the design of these components have been introduced as have innovative noise and vibration control technologies.

The target defined by EU noise policy for outdoor equipment is to reduce by 50% the noise annoyance caused by these sources. To achieve this goal and be in line with

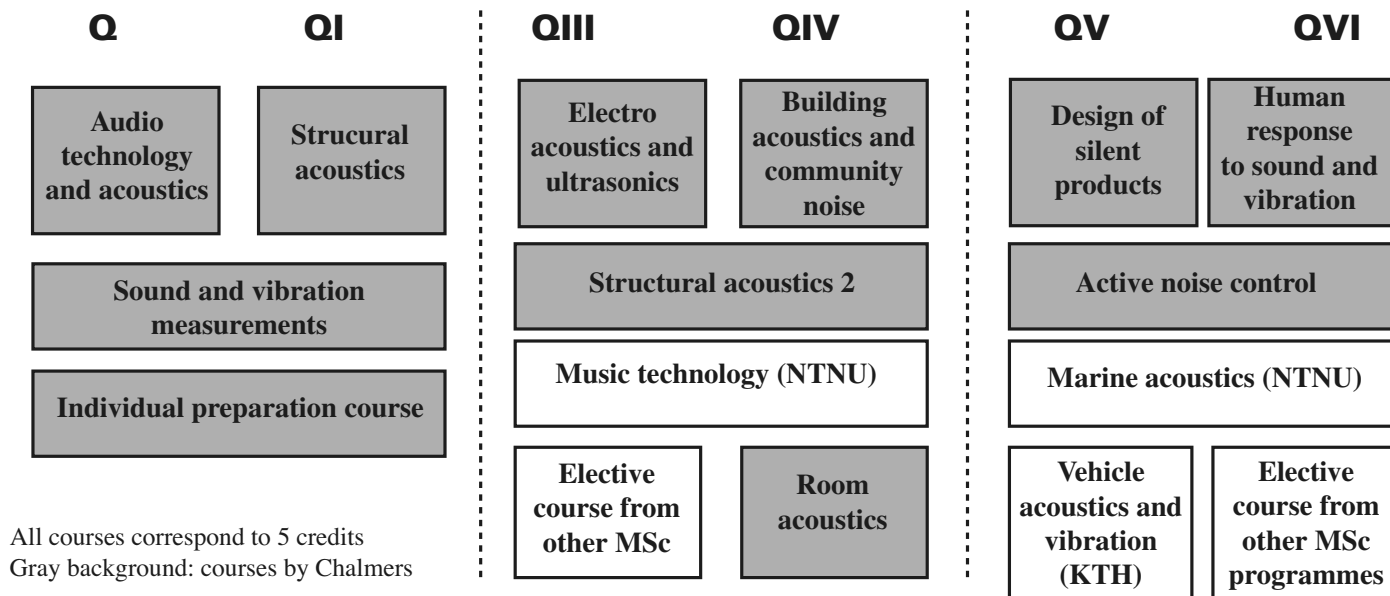
the expectations of the Environmental Noise Directive (2002/49/EC), a specific Directive relating to noise emission in the environment by outdoor equipment has been in force since 2001 (2000/14/EC). This Directive defines measurement methods and permissible sound power levels. It applies to 57 types of outdoor equipment—35 of these require noise labels and 22 require compliance with permissible sound power levels. The Directive established noise limits in two stages: Stage I starting in 2002 January and Stage II, with reduced levels, starting in 2006 January.

Prior to 2006, studies on possible noise reduction for some types of equipment were carried out to determine to what extent technical progress would guarantee the fulfillment of the reduced noise limits. For example, an extensive study was carried out by CETIM in 2002 to establish the state of the art in lawnmower noise. This study showed that further reductions were technically possible but would require substantial investment that would affect the selling price of new lawnmowers. For this reason the study recommended deferring the date for Stage II of the 2000/14/EC Directive for all mowers with internal combustion engines, because of

the anticipated difficulty in significantly improving engines.

Studies of construction vehicles—experimental investigations to identify dominant noise sources and/or modeling and simulation studies for predicting the principal noise sources—showed the effectiveness of noise control strategies in the design stage. Studies of steel-tracked construction vehicles showed that noise generated by the different machine components, such as engine, exhaust, and cooling systems, has been significantly reduced through progress in noise control technology. However, their noise emissions are still high due to track noise; and no viable solution has been found yet to reduce this noise source.

Proposals were presented to the Commission by industry and Member States for modifying Stage II of the 2000/14/EC Directive. The EU Working Group on Outdoor Equipment (WG7) prepared a report in 2004 indicating that some Stage II noise limits, due to become mandatory in 2006 January, were not technically feasible. WG7 suggested that equipment unable to meet these reduced limits still be placed on the market. Directive 2005/88/EC, published in 2005



### Example of other courses available to students in the programme during QIII-QVI

NTNY, Acoustic programme:

Remote sensing, 3D sound, Room acoustics, Numerical acoustics

KTH, Sound and Vibration:

Flow acoustics, Energy methods, Numerical methods



to amend Directive 2000/14/EC, permits the noise limit for Stage I to continue in force for some equipment (compaction machines, steel-tracked construction machines with net installed power greater than 55 kW, pavement finishers, hand-held concrete breakers/picks, lawnmowers, and lawn trimmers/lawn-edge trimmers).

What are European priorities for research on outdoor equipment? Answers should be provided to open questions in the legislative framework, and legislative requirements should be coordinated with technical progress. Two topics are of strategic importance.

First, new technologies need to be developed for reducing noise emissions at the source for the equipment for which the introduction of the reduced limits (Stage II of the Directive) was delayed. A promising approach is Noise Synthesis Technology (NST), a methodology developed within the framework of the European Project “Nabucco” (Noise Abatement using Current Component-Product Optimization) for the low-noise design of machines and equipment. This method, which requires a sub-structuring of the entire machine as the sum of a restricted number of partial noise sources, is able to predict the machine noise emission as well as to evaluate the influence of many important parameters to optimize noise reduction. These include the suppression or replacement of different noise sources and the influence on the overall sound power of each partial source.

Second, the different targets of the 2000/14/EC and 2002/49/EC Directives must be harmonized. These are the reduction of the sound power levels emitted by the different machines and the reduction of the annoyance caused by the exposure to these noise sources. To attain this harmonization, the following problems must be faced:

- The discrepancy between the real operating conditions of some equipment and the testing procedures defined in the 2000/14/EC Directive for determining their sound power levels. For construction machinery, the 2000/14/EC testing procedure may differ from real operating conditions due to lack of interaction with the ground. If the test conditions are not consistent with actual working conditions, a noise limit reduction may not correspond to an actual immission reduction. In

such cases the legislative requirements are ineffective. A study initiated by the CALM network (See [www.calm-network.com](http://www.calm-network.com).—Ed.) checked the correlation between the noise emitted by each type of machine during actual operation and the noise emitted while operating according to the legislative test code. This study showed that the divergence was due to the interactions between equipment and material

to be charged/discharged or between machine and ground. Three machine test procedures were identified: 1) representative of real operating conditions, 2) potentially incomplete—operations of secondary importance to noise emission may have been omitted, and 3) potentially incomplete—operations of primary importance to noise emission may have been omitted. Improved test procedures are needed to determine the contribution of each noise source and machine operation to the overall noise level during real working conditions and to identify the sound power level corresponding to the lowest immission level.

- The possibility of finding a relationship between the noise limits indicated by the 2000/14/EC Directive in terms of sound power levels and the related sound perception effects. Recent research showed that, even if some machines meet the noise limits issued by legislation, they can still elicit negative responses such as annoyance and interference with activities. Just as noises having equal  $L_{Aeq}$  values can

evoke different subjective reactions, the sound power level, even if of great importance, may not adequately describe the auditory perception. The noise quality approach may play a significant role, providing an objective description of the noise related to the hearing sensation. Research of particular interest to the EU is the development of an “annoyance index” that classifies and quantifies the annoyance caused by different noise sources and compares different designs or technological solutions in terms of noise perception.

- The development of precision models to assess the effect on the perception of noise emitted by several machines operating close to each other at the same time. One procedure currently used is based on the assumption of uncorrelated continuous noise sources; their noise signals are summed on an energy basis. Such an approach, unfortunately, can only provide a qualitative first approximation, particularly when coherent sources are present.

More sophisticated approaches should be developed to evaluate the equivalent sound pressure level of an entire working site and to take into consideration all the parameters, e.g. the number and types of equipment, mean operation time per working day for each unit, and different work phases for each unit.

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## Wednesday, May 31, 2006 Afternoon Discussion

### The Public must be Involved

**Q:** Mr. Feith, how do we convince the public of the health effects of noise?

**A:** Experts in the field of acoustics can talk to each other forever and won't see many changes outside. We have to get public support, public reactions. In the tobacco area worldwide awareness was focused on the issue because it received national attention through television and other news media. We have the responsibility as people knowledgeable in the field of acoustics and noise control to define the issues in terms the

public can understand. Unless we can tie noise to adverse health and welfare, progress will be limited because the driving force is absent. Governments will not fund activities that don't bring benefits to the public, and the public has to make it known that they want these benefits. The only way the public will raise the issue is if they understand the potential adverse effects.

**C:** It's not necessary to convince those who live near airports. They put pressure on the authorities and things start to happen. This develops the market for quieter aircraft, for example, and quiet procedures at the airports. Why doesn't this work in other areas? For example, road traffic noise; why don't we see the same result in that area?

**C:** Because you can identify more easily a plane and the one who is operating the plane than the one who is driving a car or operating a lorry. In Wales we have the same problem. Road traffic noise is one of the issues that we have to deal with. How can we identify the sources and the people who are creating the noise?

### **WP.29 Membership and the Working Party on Noise (GRB)**

**Q:** Mr. Feith, is there a chance that more non-European Member States will join WP.29? How could its effectiveness be improved? Does the GRB on noise consider uncertainty?

**A:** Yes, the membership is growing. Indonesia, Malaysia, Korea, China, Japan, Australia, South Africa, Mexico, and Argentina are now members. Brazil has been participating in the meetings but has not become a contracting party to the agreement. Under the 1998 agreement we had hoped to establish another forum within the UN other than the ECE, but for economic reasons that was virtually impossible. There weren't any countries that were prepared, including my country, to fund a new organization. And so the ECE mandate has become much broader.

The second question deals with the GRB and its noise mandate. This

organization was initially formed to get uniform design characteristics for vehicles, e.g. tail lights, head lights, and warning lights would be uniform across Member State borders. The GRB was staffed by people primarily from road transport. Since 1995 more emphasis has been placed on the environment such as exhaust emissions where tremendous progress has been made. But in noise control there is still a lot of work to be done.

Regarding the third question on uncertainty, who is sitting at the table? Mechanical engineers, manufacturers, and regulators. The manufacturers traditionally have a defensive posture and are not advancing concepts that could be used by the regulators. So the whole concept of uncertainty is never brought to the floor.

**C:** A comparison with railway noise may be useful because 20 years ago it was in a similar situation at which time it was realized that there should be a holistic approach. There has been tremendous progress in that area since that time. That change of attitude has yet to happen in the motor vehicle industry.

**C:** The GRB is not concerned with design, but product design must be considered to achieve noise reductions. The mandate to the GRB is for safety, but to my knowledge the GRB has never been tasked to achieve a certain noise reduction goal of say 5 dB or 10 dB by 2010. If those goals were to be proposed this would tell industry where the regulators—the GRB and WP.29 are regulators—want to go. Industry's problem is a fast response time, such as two years. With a design cycle of about four years, if given a timetable that extends beyond four years, they can plan. In the past WP.29 has been politically driven; if government says we need to reduce the noise level of transport by 3 dB, the technicians scramble to figure out how they can reduce the noise level. The manufacturers say that nothing can be done on the source on short notice, so they propose to change the test track. We can pick up 3 dB that way. Under the mandate of the 1998 agreement,

WP.29 can look 10 or 20 years out as is done for air quality where the target is to clean up the air by 2020. It takes time, planning, and money to effect changes. Since governments do not have the time to do the research to change the technology, we need the universities. Where will they get support? The governments must provide grants. WP.29 is an example of a body that has the potential for improving the environment, e.g. noise. But it will take outside forcing functions to convince governments to agree to go in that direction.

### **Product Declarations and Test Codes**

**Q:** Dr. Neugebauer, Test Code EN60745 states that surface sound pressure is considered as noise immission level (exposure level). Can these values be used in the assessment of noise exposures of workers on the job?

**A:** I think we must determine if the test code describes the actual work situation. If it does, you can use these values. But, in my opinion, typically you cannot use them. The problem is to develop test codes more representative of the actual work situation. My database has values very close to actual practice.

**Q:** Dr. Neugebauer, this afternoon's presentations and discussions made it clear that many product noise declarations are made under unrealistic conditions (e.g. idling). Can this situation be improved?

**A:** It could be improved with better test codes.

**C:** I know of several products for which the test codes have simulated operating conditions. But there is still the question of whether the simulation is sufficiently good. The operation of machines for sawing and hammering may be easily simulated. But we simply do not know how good or bad our test codes are for many machines. I would like a program to investigate the quality of our test codes.

**C:** For some machines it is easy to develop test codes, but not for the

larger machines. It should be easy to make realistic test codes for hand-held machines.

- C:** Perhaps the best way to establish a test code is to require measurements *in situ* of a large machine operating in the factory where it is first installed.

### Announcement from Finland

**C:** Anni Rimpilainen of the Finnish Ministry of the Environment has just now announced: "We have the pleasure to inform you that the Finnish Government has today made a decision in principle on noise control in Finland. There are goals to reduce noise in living areas, more education, and efforts to save quiet areas. We will have an action plan to the year 2020. There are many codes such as the ones we have heard of today. So we are now on the way to this global noise policy, and I hope that the others will follow us."

**Q:** It is very exciting that your country takes this stand. Can you share with us the motivation for Finland to take that position?

**A:** We have had action plans before but never received sufficient money to carry them out. For example, prior to this announcement there was always something of higher priority than noise control and noise barriers. Now the action plan has some firmer backing.

### Noise Control Engineering Education

**Q:** There were two very different views presented of NCE education — specialists in product design versus generalists. Can the generalist solve product noise design problems?

**A:** During early education at the university, it is important start with the basics. But if you want to be successful in the design or re-design of quieter equipment, you need to specialize. Experience is also important because noise and vibration do not exist while

you are designing the equipment. It's completely quiet unless you have fans in your CAD terminal.

**C:** If you design a low-noise product from its inception, it is different from adding a noise control feature after the product is already designed. It requires a great deal more experience and education as a specialist to be able to start at the beginning of a product development cycle with the concept of a low-noise product at the end than it is to apply some last-minute fixes when the product doesn't meet market requirements.

**C:** The question of how to educate noise control engineers is very important. In Stuttgart we have the advantage of being in the center of an industrial area, especially for motor vehicles, and we maintain close connections between the university and industry. All students studying motor vehicle engineering take technical acoustics, as must the students studying environmental protection engineering. Consequently, in technical acoustics I have more than 300 students. This course is finalized with an examination; it is not sufficient to just attend the lectures. In these lectures on machinery acoustics, the fundamental rules for noise control are presented as well as parallel examples from our basic standardization work. Then we have the machinery specific standards which are correlated with machinery specific lectures offered by other professors and institutes within Stuttgart University. A final remark is to look for the quality of the professors in the field of noise control engineering. It is very important that they have some industrial experience.

**Q:** Dr. Hübner, can the subject of noise control engineering be taught at an undergraduate level? I realize that the educational systems around the world are different. In the U.S. we have a four-year level where the student of engineering receives a bachelor's degree. This is followed by two additional years to a master's degree. Most of the courses in noise control engineering in the U.S. are taught in those two years. Some educators in America believe it is not possible to teach noise control engineering in the four-year

curriculum because the students do not have the background that is necessary to understand the basic principles that are needed for the design of products. To apply a fix to a product after it is already designed is easy because one need only go to a handbook. Designing a product to be quiet from its inception is very difficult and requires a higher level of skill. Please comment on the skill background of your students.

**A:** During the basic lectures on technical acoustics, the fundamental principles are presented. Most students coming to the university do not understand the decibel and must learn to think in logarithmic terms. Teaching this is not so easy, but I include experiments with the basic lectures. I think it is also very important for the students to see the differences between acoustics and noise control and the other fields of engineering. An education in machinery acoustics should be finalized with relevant diploma work followed by a doctoral thesis. Then students are fully educated and will have successful careers in industry.

**C:** I agree that it is essential to have education in acoustics and noise control in the first 3 or 4 years of university education, but advanced coursework to be adequately qualified. The situation at Stuttgart University is exceptional with 300 students being educated in the basics of acoustics and noise control engineering.

**C:** One difficulty in noise control engineering education here in Finland is that we don't have enough competent professors. In any academic profession at least 40 to 60 weeks of study are needed, but here we have only 6 weeks. Few people are interested in dedicating their life to noise control because there can be no guarantee of a life-long career in this field.

**C:** For a product to be successful, it is important not to have a lot of add-ons at the end of the product development cycle. They may add significantly to product cost and require a higher selling price which may lower profits. The solution is to do it right at the concept stage for a new product. It takes a lot



of experience to recognize problems in design at the concept stage. You may not have time to do modeling, and you may not have all the details of expected product performance. Virtual modeling of the product comes later when you start the detailed design. In the early stages you are working with a virtual development of the product. An additional problem is that the noise control and acoustics/vibration specialists capable of this work are not very well rewarded.


**C:** My job at Siemens was to reduce the noise of large rotating electrical machines to a level prescribed by the consumer. This job required not only knowledge of machinery acoustics and mechanical engineering but, most importantly, a spirit of good teamwork. Good contacts with the other engineers were essential. It is important when you start with a firm that you have detailed knowledge of the product you will be working with; in particular, what is essential for the design and cannot

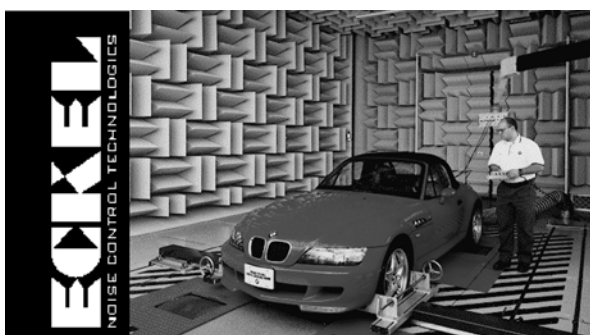
be changed. At first the acoustical engineer is an outsider and must become accepted as a member of a team. Others must be willing to hear your arguments and you must be willing to hear theirs. Only by cooperation can good solutions be reached.

**C:** There are many who don't have an opportunity to go to the university. In the U.S. auto racing is very popular with modified vehicles. There are young people in our high schools who are making radical changes to the design of the engine and the performance of an automobile. They're learning through a mentor system. These young people could make significant contributions. High schools could offer technical training in various aspects of noise control that do not require calculus or an understanding of the wave equation. They don't need to understand what a dB is. They can measure it with a meter—it's a number. In the universities there are not many noise control engineering students. We could relieve

this shortage by training young people in high schools who are interested in this field. Professional societies could assist with such a program to train students in this field for jobs that do not require a college degree.

## Concluding Thought

**C:** I will end this discussion with a new point of view. We will never get a silent automobile or an automobile that doesn't have any bad emissions. Here in Finland, dust is very bad when the snow melts. Because of this dust, people have difficulty breathing. Every time an automobile goes by it blows up the dust. We should not talk about how to make a silent car or how to make a silent train, we should talk about how to create silent traffic. And to create silent traffic we have another possibility than cars, trains, and busses. We have also bicycles; the roads were first made for bicycles. 



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## President's Column *continued from page 131*

quite limited. First, I do not have all the volumes, and second, what I do have are not in one place or even loosely organized. As a result, I only accessed papers that were first referenced elsewhere. It would have been good to do a more complete search, but the thought of going through all of those volumes was staggering.

As a remedy for this, in the very near future, all of the *NCEJ* papers will also be available and searchable on-line providing the same degree of access as the IN and NC proceedings. Global, instant access to the Journal will certainly advance the shared vision of INCE/USA and I-INCE of *NCEJ* being a truly international publication solely devoted to the field of noise control engineering.

In the coming issues of NNI, more detailed information on these on-line initiatives will be provided. However, I want to take this opportunity to give our readers a "heads-up" on what is out there now and will be there in the near future. I also want to be one of the first to publicly acknowledge and thank those behind this progress. In particular are efforts of Courtney Burroughs, George Maling, Jim Thompson, and Joe Cuschieri in their perseverance and commitment to seeing this through. And, certainly, the INCE/USA Directors and leadership in sharing and supporting the vision. 

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*Istanbul*

*Workshop:*

*Public*

*Pressure—The*

*“Silent” Force*

## FRANCE

The First European Forum on Effective Solutions for Managing Noise at Work will be held at the Lille Grand Palais in Lille, France on 2007 July 3-5.

This Forum aims at improving the dissemination of knowledge in all sectors where occupational noise is an issue; Endeavoring to bring solution providers and potential users more closer together, it pursues the following objectives:

- Reviewing the basic rules for noise control applied to sources, machines and buildings,
- gathering and disseminating rules of good practice already existing in the main sectors of industry and services,
- exhibiting and demonstrating low noise machines or processes,
- illustrating the effectiveness of new materials and systems for noise control at work, including advanced hearing protections,
- offering a platform of exchanges between individuals within similar sectors and also inducing cross fertilization among sectors, industries and research, and
- initiating new dissemination processes.

Around 60 million employees in Europe are exposed to potentially dangerous levels of noise for at least a quarter of their work time. Besides, noise induced hearing loss is still accounting for about one third of all work-related diseases. In 2005, the European Week for Safety and Health at Work focused on the issue of noise at work, under the slogan, “Stop that noise!”.

The 2003/10/EC Directive on minimum health and safety requirements for noise exposure is currently being transposed in all Member States. The main changes brought by the Directive are the more stringent action levels (which are lowered from 85 dBA and 90 dBA to 80 dBA and 85 dBA respectively), as well as the introduction of a noise exposure limit of 87 dBA.

### The Forum is organised by:

#### ASSOCIATION AINF (Association

Interprofessionnelle de France pour la prévention des risques et la promotion de la sécurité et de la santé au travail) - [www.association-ainf.com](http://www.association-ainf.com)

**CIDB** - Centre for Noise Information and Documentation - [www.bruit.fr](http://www.bruit.fr)

**INCE-Europe** - International Institute of Noise Control Engineering - [inceeurope.org](http://inceeurope.org)

### The organisations under which patronage the Forum is held are:

**EAA** - European Acoustics Association - [www.european-acoustics.org](http://www.european-acoustics.org)

**I-INCE** - International Institute of Noise Control Engineering - [www.i-ince.org](http://www.i-ince.org)

**SFA** - Acoustical Society of France - [www.sfa.asso.fr](http://www.sfa.asso.fr)

**French Ministry of Labour** - [www.travail.gouv.fr](http://www.travail.gouv.fr)

**French Ministry of Health** - [www.sante.gouv.fr](http://www.sante.gouv.fr)

**French Ministry of Ecology** - [www.ecologie.gouv.fr](http://www.ecologie.gouv.fr)

### The organisations that collaborate to the Forum are:

**ABAV** - Belgian Acoustical Society - [www.abav.be](http://www.abav.be)

**BAuA** - German Federal Institute for Occupational Safety and Health - [www.baua.de](http://www.baua.de)

**CETIM** - Technical centre for mechanical engineers (France) - [www.cetim.fr](http://www.cetim.fr)

**CIOP** - Central institute for labor protection (Poland) - [www.ciop.pl](http://www.ciop.pl)

**FIA** - Iberoamerican Federation of Acoustics - [www.fi.ufsc.br](http://www.fi.ufsc.br)

**FIOH** - Finnish Institute of Occupational Health - [www.ttl.fi](http://www.ttl.fi)

**HSE** - Health and Safety Executive (GB) - [www.hse.gov.uk](http://www.hse.gov.uk)

**INRS** - National Research and Safety Institute for occupational accidents prevention (France) - [www.inrs.fr](http://www.inrs.fr)

**IRSST** - Institut de recherche Robert-Sauvé en santé et en sécurité du travail (Canada) - [www.irsst.qc.ca](http://www.irsst.qc.ca)

**OSHA/EU** - European Agency for Safety and Health at Work - [www.fr.osha.eu.int](http://www.fr.osha.eu.int)

**SUVA** - Prevention, insurance and rehabilitation fund (Switzerland) - [www.suva.ch](http://www.suva.ch)

For more information, go to the Internet URL [www.noiseatwork.eu](http://www.noiseatwork.eu)

## TURKEY

### Global Noise Policy Workshop to be Held at INTER-NOISE 07

A fifth Global Noise Policy Workshop will be held during INTER-NOISE 2007 in Istanbul, Turkey, on Wednesday, August 29. The theme of this workshop is Public Pressure—the “Silent” Force. The workshop will feature morning and afternoon sessions with presentations by interested parties from countries around the world, and each session will be followed by a question-and-answer discussion period.



Panelists will speak on the effectiveness of public pressure to influence politicians at local, member state, and national levels to enact noise control policy. Participants will learn how non-governmental organizations representing the public can work together to form an alliance against excessive noise. As we move toward global cooperation in noise control policy, it is now time to involve those affected by noise which damages our hearing and our health and diminishes our quality of life.

We have not previously explored the possibility of establishing a framework alliance for noise control. Many participants in earlier workshops have been engineers involved in the technical aspects of noise control, but now we hope to provide direction on ways to involve the public and those organizations that represent the public. We also seek the support of the manufacturers, testing laboratories, standards-setting bodies, and other organizations who are concerned with the “global” requirements on the noise levels of products.

This will be the fifth of a series of workshops that are an outgrowth of a special session on noise policy held during INTER-NOISE 1999 in Ft. Lauderdale, Florida. In a special technical session of that congress, the following question was addressed: “Is noise policy a global issue or is it a local issue?” The consensus was that noise is a global policy issue, although many noise problems can only be solved with the active participation of local authorities. The I-INCE General Assembly decided in 2000 that the development of global noise control policy is a high-priority task and established I-INCE Technical Study Group 5, Noise as a Global Policy Issue, to report on this policy question.

The first workshop in 2004 August in Prague, Czech Republic, was devoted to a discussion of the draft report prepared by TSG 5, “A Global Approach to Noise Control Policy,” which considers both general policy and specific policies related to occupational, community, and product noise. This workshop included detailed discussions of the findings of TSG 5 that were summarized in the 2004 December issue of this magazine.

The second workshop held in 2005 August in Rio de Janeiro, Brazil, addressed specific policy issues in South America, Europe, and the Far East.

The third workshop held in Tampere, Finland, during 2006 May focused primarily on European noise policy and its links to global noise policy. (*See the feature article on page 144 of this issue.—Ed.*)


The fourth workshop in Honolulu, Hawaii, was held in December, 2006, and focused on the development, implementation, and enforcement of noise policies worldwide.

### **UNITED KINGDOM** **IOA Advances Government’s** **Sustainability Targets**

Members of the Institute of Acoustics have been working with the Government to advance sustainability. The Institute therefore welcomes the announcement by Ruth Kelly MP on 13 December 2006 on the new Code for Sustainable Homes, and the inclusion of sound insulation within the new Code. The inclusion of points/credits for higher levels of sound insulation will assist towards creating more sustainable communities.

The increasing density of housing and the advancements in home entertainment sound system technology does require increasing levels of sound insulation above the regulatory minimum standards. Previous developments under the Approved Document E (2003 with 2004 amendments) included the introduction pre-completion testing and robust details.

The new Code will encourage further innovation into new products and systems which can lead to advanced levels of sound insulation for new build attached homes. The IOA through its members whether in applied research or building acoustic consultancy will no doubt be at the forefront of advancing such new innovations.

Colin English, President of the Institute of Acoustics, says “The Institute of Acoustics is pleased that the Government chose to recognise the importance of sound insulation in modern homes and is striving to improve the quality of the environment.” 

## *The British Government Recognizes the Value of Sound Insulation in Homes*

## *Congratulations to Bill Cavanaugh and Alan Marsh*

### **Two INCE/USA Past Presidents Receive ASA Awards**

Two past presidents of INCE/USA have received technical area awards from the Acoustical Society of America (ASA). Both awards were presented on December 1 in Honolulu, Hawaii at the 4th Joint Meeting of the Acoustical Society of America and the Acoustical Society of Japan. The meeting immediately preceded the INTER-NOISE 06 congress which was held in the same hotel in Honolulu.

William J. Cavanaugh, 1993 INCE/USA President and a Boston-area acoustical consultant, is the recipient of the Wallace Clement Sabine Medal of the Acoustical Society of America (ASA). The Wallace Clement Sabine Medal is presented to an individual who has furthered knowledge of architectural acoustics, through contributions to professional journals and periodicals or by means of other accomplishments in the field. Only a dozen other individuals have earned this distinction since the medal was introduced in 1957.

He has provided research and consulting services in all aspects of architectural and environmental acoustics since 1954. His work involves the control of unwanted sounds (noise) as well as the enhancement of desired sounds (speech and music) for listening spaces of all types indoors and outdoors. His principal interests are in the development of criteria for acceptable acoustics for people in building interior and exterior environments and in teaching architectural acoustics at schools of architecture throughout the United States. He has served on the adjunct faculties at the Rhode Island School of Design, the Boston Architectural Center School of Architecture, Roger Williams University, Cornell University and others.

He received a degree in architecture from MIT, and is the president of the MIT class of 1951. He is a veteran of the Korean War and a member of the Army Engineer Association. He worked at Bolt Beranek and Newman Inc., Cambridge MA, from 1954-70 where he served as Senior Consultant, Divisional

Vice President and Director of the Architectural Technologies Division.

William Cavanaugh is a fellow of the ASA and has served in many capacities within the organization, including as Member of the Executive Council (1994-97); Chair of the Technical Committee on Architectural Acoustics (1974-77); Chair, Committee on Regional Chapters, 1985-88; and Chair, Committee on Public Relations, 1994-97. In 1985, he was awarded the Distinguished Service Citation by ASA.

Alan H. Marsh, a founding member and 1989 president of INCE/USA and a pioneer in aircraft acoustics, has been awarded the Acoustical Society of America's Silver Medal in Noise. The medal recognizes outstanding contributions to the study and control of noise.

He has spent much of his career researching and reducing noise from and in aircraft. He is a founder of the acoustical-engineering consulting firm DyTec Engineering. From 1956 to 1976, he was a supervisor on the acoustical engineering staff of the Douglas Aircraft Company.

He is a fellow of ASA and chaired the Technical Committee on Noise from 1983-1986. He has served as associate editor of the *Journal of the Acoustical Society of America* and as editor in chief for the *Noise Control Engineering Journal*. He has chaired numerous national and international acoustics meetings, most recently NOISE-CON 2000, held in Newport Beach, California.

For many years, Alan has participated in the ASA's program for American National Standards in acoustics and also in the development of International Standards for technical committees of the International Electrotechnical Commission and the International Standards Organization.

He received his B.A. in physics from Williams College, his B.S. in electrical engineering from MIT,

*continued on page 162*

## AUSTRALIA

### ACTIVE 06 was a Huge Success

The Sixth International Symposium on Active Control of Sound and Vibration, ACTIVE 2006, was held from the 18th to 20th September in Adelaide by the SA Division in collaboration with the University of Adelaide. The conference was deemed a huge success by all who attended and the organising committee received numerous communications from delegates thanking the organisers. The organising committee is particularly grateful to all those who took part in the conference and the sponsors who made the event possible. The companies that sponsored the event were Brüel and Kjær, Texcel, HW Technologies, Acticut International, Kingdom and Polytech.

The conference featured 73 technical papers on a range of topics written by 149 authors from 17 countries. Two papers of note were those which won prizes; James Mabe of Boeing Phantom works was awarded the best paper prize for his paper on 'Boeing's morphing aerostructure for jet noise reduction', and Noah Schiller of Virginia Polytechnic Institute and State University was awarded the best student prize for his paper on 'A high authority / low authority strategy for coupled aircraft-style bays'. There were five keynote speakers: Sen Kuo (Northern Illinois University, Illinois, USA), Marty Johnson (Virginia Tech, Virginia, USA), Scott Sommerfeldt (Brigham Young University, Utah, USA), Jie Pan (University of Western Australia) and Paolo Gardonio (Institute of Sound and Vibration, Southampton, UK). All the keynote speakers presented their latest findings in the area of active control of sound and vibration. Steve Elliott (Institute of Sound and Vibration, Southampton, UK) presented a special paper on the natural feedback mechanisms within the inner ear which sparked a lot of interest.

The conference reception was held at the SA Art Gallery, where delegates were entertained by the South Australian chapter of the Australian Girls Choir and treated to drinks and canapés. The following evening the conference banquet was held at the Stamford Grand Hotel in Glenelg. The famous H-

type Adelaide trams were loaded with champagne and used to transport delegates back and forth to Glenelg. So that none of the international delegates left Australia without having seen a kangaroo, a tour of the Adelaide Zoo including drinks and canapés was arranged for the Tuesday evening. The conference concluded on Wednesday with a BBQ held on the University grounds, where delegates got a chance to eat some genuine Australian cuisine, including some of our macropodidae national icon.

The CD-ROM prepared for the symposium contains not only the papers presented at ACTIVE 06, but also the 561 papers presented at ACTIVE 04, ACTIVE 02, ACTIVE 99, ACTIVE 97, and ACTIVE 95. The CD-ROM can be purchased from the organizers for AUD 220, which includes GST, shipping, and handling. Contact the AAS Secretary, School of Mechanical Engineering, the University of Adelaide, S.A. 5005 Australia. Fax: +61 8 8303 4367. E-mail: luke.zoontjens@mecheng.adelaide.edu.au.

The SA division of the AAS wishes to thank INCE/USA for the opportunity to hold this conference.

Mike Kidner and Carl Howard  
ACTIVE 2006 Chairmen

### AUSTRALIA/NEW ZEALAND Noise of Progress

The first joint Annual Conference of the Australian and New Zealand Acoustical Societies was held in Christchurch from 20 to 23 November 2006 with the theme the Noise of Progress. Of the almost 200 registrants, three quarters had travelled across the water from Australia. The conference commenced with a plenary address which was an overview of underwater acoustics given by Chris Tindle from the University of Auckland. The plenary on the second day was given by Michael Vorlander from Aachen University on building acoustics from prediction to auralisation. Over 87 contributed papers were given in the three parallel sessions for the two and a half day conference.

*continued on page 163*

*The ACTIVE 06  
Proceedings are  
Available*



## Pan-American News *continued from page 160*

and an M.S. in engineering from UCLA, where he studied aeroacoustics.

### **NASA Offers Audiology and Hearing Conservation Software**

The NASA Glenn Research Center Acoustical Testing Laboratory is pleased to announce the release of a free PC software application that was developed for instructional use in audiology and hearing conservation learning environments. MACSUG (Microprocessor Audiometer Computer Simulator User Gizmo) is a graphical audiometer interface that allows the user to simulate and display the process of manual audiometry. A computer using MACSUG software may be used to demonstrate basic manual audiometry techniques to large groups in a classroom setting using a computer projector system. MACSUG may also be used to teach principles of audiogram review using a real-time display of calculated metrics such as shifts and Standard Threshold Shift (STS). A computer with MACSUG may be used for individual or small-group practice or homework or as a desktop counseling tool in a clinic environment.

MACSUG is produced and distributed by the NASA Glenn Research Center Acoustical Testing Laboratory in collaboration with the NASA Johnson Space Center Audiology and Hearing Conservation Clinic.

You may download MACSUG after completing a registration form at <http://www.grc.nasa.gov/WWW/AcousticalTest/HearingConservation/Resources/MACSUG.html>. 

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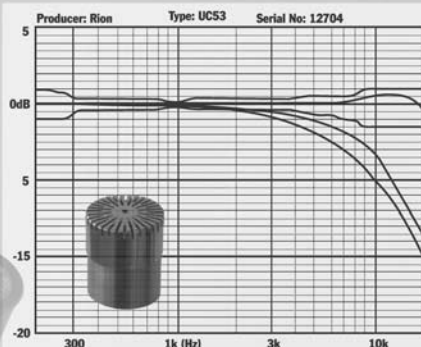
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## Asia-Pacific News *continued from page 161*

The dinner in the Christchurch Town Hall commenced with a spirited explanation of the design and acoustics by Sir Miles Warren and Dr. Harold Marshall. The excellent acoustics was aptly demonstrated by the music from the string quartet and the clarity with which announcements from the stage were understood. The conference was certainly a great success and there is already talk of the next combined conference.

### JAPAN

Railway is a major transportation system in Japan and its competitors are road and air transportations. The traffic noises from these competitors are already regulated and well monitored. However, the railway noise, except the Shinkansen or high speed train at a speed of above 200km/h, has been excluded from the Japanese noise regulations. Due to the recent increase in the numbers of complaints to commuter train noise, the Ministry of the Environment decided to collect noise level data around railways. The first step is to set up the noise measuring method. In 2006, the ministry contracted with INCE/Japan and the working group was organized. The measured level will be  $L_A S_{max}$  that is the same one as the Shinkansen railway noise and  $L_{AE}$  for  $L_{Aeq}$  that many countries introduce as noise immission level. 

## The INCE/USA Page at the Atlas Bookstore

[www.atlasbooks.com/marktplc/00726.htm](http://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
- Active Noise and Vibration Control
- Building Acoustics
- Community Noise
- Barriers
- Fan noise and aeroacoustics
- Highway, automobile and heavy vehicle noise
- Machinery noise
- Noise policy
- Product noise emissions
- Railway noise
- Sound quality.

### The NOISE-CON 05 Proceedings

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. Other papers cover noise materials, mufflers and silencers, statistical energy analysis, acoustical facilities, product noise emissions, sound quality and perception, sound insulation of buildings, community noise, and environmental noise criteria. A collection of papers on United States and international noise policy is also included on the CD-ROM.

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*continued on page 166*



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## *Norsonic*

## *LMS*

### **Norsonic**

#### ***Norsonic Wins Large Chinese Noise Monitoring Contract***

Norsonic AS has won a large contract for noise monitoring in Beijing, China. The order consists of 95 Noise Monitoring Stations which will be placed at selected sites within the Chinese capital as part of a city wide environmental noise control program. The entire system will be operative beginning in the summer of 2007. Noise data will be fed to a central computer system where new software programs will report on the impact of noise on the quality of life within the capital, and from this noise control actions will follow.

During the past years, Norsonic of Norway has invested a large portion of their R&D resources into new products for environmental noise monitoring. There is clearly an increasing demand worldwide for such systems in determining the true impact of noise on city dwellers, and as a manufacturer of instruments for noise and vibration, Norsonic is well placed to be a major player in this new market segment.

This new contract shows that the R&D investments is starting to show a return, and Norsonic expects further orders within this field in the months to come as further new products are released. The noise monitoring system in Beijing is based on the new Nor1520 Environmental Monitoring Terminal which includes the very successful Nor118 Sound Analyzer as well as the well-proven Nor1210 Outdoor Microphone produced by GRAS in Denmark.

For further information please contact Mr Svein. Arne Nordby at Norsonic AS, Phone: +47 3285 8932 or e-mail: sanordby@norsonic.com.

### **LMS**

#### ***LMS Test.Lab Supports Audi in Handling Increased NVH Testing Workload***

LMS has announced that Audi successfully deployed LMS Test.Lab for NVH testing and engineering to meet increasingly tight deadlines in new car development programs. Superior NVH

quality is said to be a top priority in Audi's strategy of brand differentiation, and the company is a longstanding user of LMS testing systems to ensure new models comply with specific sound profiles. After an extensive evaluation, Audi decided to migrate to the LMS Test.Lab software suite and to deploy the new testing system for more than 50 users. The implementation is comprised of multiple NVH testing systems for lab and field testing based on the LMS SCADAS III data acquisition front end.

According to Kay Schammer, Noise and Vibration Testing Engineer at Audi, one of the primary benefits of the deployment was the increased testing productivity provided by LMS Test.Lab for the diverse range of NVH testing assignments. "This implementation strengthens our capability in handling the increasing workload and complexity for NVH engineering work in developing the distinct sound packages for Audi vehicles," said Schammer.

"In a typical vehicle test program, we only have a car for a short time slot. Instrumenting the vehicle with accelerometers and microphones requires a lot of time, and only half a day often remains for running tests, gathering data and analyzing results. At this stage, time is critical. Tests must be performed quickly and reliably. There is no room for error and no time for repeating tests."

Schammer notes that all data acquisition, analysis and reporting tasks are tightly integrated in LMS Test.Lab, which performs acoustic, vibration, structural and rotating machinery tests on a single unified platform. A user-friendly graphical interface has prompts and automated features for fast setup and data analysis. "As tests are being run, on-line monitoring lets users clearly see results in real time on color-coded maps, comparative plots, waterfall diagrams and other displays," explains Schammer. "In this way, engineers can immediately determine if measurements are valid and quickly identify where further study of problems may be warranted."

Visit [www.lmsintl.com](http://www.lmsintl.com) for more information on LMS.

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## **SoundPLAN**

### ***Noise Mapping and Planning For Non-Acousticians***

New software is available for those who may not have in-depth knowledge of acoustics but want accurate results of a noise calculation in the smallest amount of time, with the maximum amount of professionalism. SoundPLAN-essential was conceived with this in mind.

SoundPLAN-essential is a compact version of SoundPLAN, known for its power, fast data processing and graphics. It is said SoundPLAN-essential is so easy to use, even engineers without special training for noise control will have no trouble with it. And, as it includes SoundPLAN's noise contour map capabilities, presentations are easy to create and easy to understand.

SoundPLAN-essential is a single document application including all the basic information for noise control planning. It calculates noise from roads, railways or industry. Each is included in the software, but the calculations are completed for a single noise type at a time. Specific country calculation guidelines and assessment methods are installed automatically, so each user installs his country specific setup.

SoundPLAN-essential calculates any amount of data, so it can process any job. Data is imported from GIS and CAD, or digitized on top of bitmaps. It includes all the basic tools and editing functions.

Noise processes are described in result tables and graphics. The emission level calculations and results of the noise propagation are presented in tabular form in predefined tables.

Grid noise maps are used for color contour maps for day and night or the  $L_{den}$  time slots, depending on the standard. The grid noise maps and noise contour maps show the dB values using color bands or the dB value itself.

Noise walls and berms are a popular means of reducing noise. For these, the results tables and graphics show the dB values without and with the noise protection.

SoundPLAN-essential calculates single receivers, noise limit and regular contour lines. A "single receiver" calculation shows the noise levels, assesses the correct time slots and applies the level additions for the noise descriptor required in the country for all receivers and floors. The level chart shows the magnitude of the noise received. A single receiver map shows the results from single receiver calculations, and presents the noise limit contour lines for the calculated time slots.

Whether modeling noise from roads or parking lots, or evaluating noise protection walls, SoundPLAN-essential allows standard cases to be processed quickly, efficiently and inexpensively. For occasional users and non-acousticians, SoundPLAN-essential is the way to save time and money for noise reduction planning.

For further information, contact NAVCON Engineering Network, 701 W. Las Palmas Dr.  
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### ***Adchem Corporation Provides a Broad Range of Foam Bonding Adhesive Tapes for Sound Attenuation and Vibration Damping***

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Adchem provides more than 50 adhesive solutions for customers' foam bonding needs. For additional information and samples, please contact Adchem Corporation, 1852 Old Country Road, Riverhead, NY 11901 Phone: +1 631 727 6000 Fax: +1 631 727 6010 or visit our website at [www.adchem.com](http://www.adchem.com).

***SoundPLAN***

***Adchem Corporation***



## ***Blast Deflectors, Inc.***

## ***illbruck acoustic, inc.***

### **Blast Deflectors, Inc.**

#### ***Blast Deflectors Inc. Announces Acquisition of R&M Airport Protection Systems GmbH, Further Advancing Airport Safety***

Blast Deflectors, Inc. of Reno, Nevada, a leader in jet blast and airport noise protection, recently announced the asset acquisition of R&M Airport Protection Systems GmbH, a German firm based in Munich that specializes in ground runup enclosures and barriers for jet blast protection. The company will continue to be based in Munich and will be renamed APS Germany GmbH.

The acquisition of R&M APS helps BDI significantly increase its market share and reinforce its industry leadership. The merger is also expected to extend BDI's reach into key European market segments, including the rapidly expanding Eastern European airport industry. For more information visit [www.apsgermany.de](http://www.apsgermany.de). and [www.blastdeflectors.com](http://www.blastdeflectors.com).

### **illbruck acoustic, inc.**

#### ***illbruck acoustic Introduces BIOLINE™ Wood Ceiling Tiles***

illbruck acoustic, inc. has introduced a new line of wood ceiling tiles called BIOLINE. Not only do the wood tiles create warmth and subtle elegance, but they are also environmentally friendly, made from renewable, recycled material.

BIOLINE Wood Ceiling Tiles are available in Solid-Finish — with or without a perforated pattern — and in Organic-Texture.

BIOLINE Solid-Finish tiles — available in cherry, beech and maple real wood veneers — are composed of 70 percent recycled, post-industrial material (by weight); feature coordinated core color and veneer (no edge banding required); and have a self-centering revealed edge. They are Class 1 fire-rated and offered in a variety of perforations and custom cutouts. BIOLINE Solid-Finish perforated tiles have a minimum noise reduction coefficient (NRC) of 0.40.

BIOLINE Organic-Texture tiles — available in light, medium, dark and custom wood shades — are composed of 80 percent recycled, post-industrial material (by weight). The Organic-Texture tiles have an NRC of 0.55; when used with illbruck's willtec® acoustical foam or fiberglass backer, the NRC is 0.65 to 0.80. They are Class 1 fire-rated (ASTM E84), with a flame spread of 25 and a smoke density of 70. Tiles have a self-centering, high-strength, molded revealed edge.

All BIOLINE Wood Ceiling Tiles fit illbruck's or other conventional grid systems and feature urea-formaldehyde-free core; certified green, UV-cured, waterborne-finish with UV blockers for color stability; excellent impact resistance; and rigid, durable material that tolerates a broad range of job site environmental conditions. For information about BIOLINE Wood Ceiling Tiles, contact illbruck acoustic, inc., 800-662-0032, or visit [www.illbruck-acoustic.com/wood](http://www.illbruck-acoustic.com/wood).

illbruck acoustic, inc. manufactures a broad range of ceiling tiles, wall panels and room acoustic products for commercial applications, including CONTOUR® Ceiling Tiles, HARMONI™ Ceiling Tiles, SQUARELINE® Metal Ceiling Tiles, WHITELINE® Ceiling Tiles, FABRITEC™ Wall Panels, SONEX® Panels and Baffles, and PROSPEC® Barrier, Composite and Foam Materials. illbruck acoustic, inc. is a company of illbruck elements GmbH.

# Acknowledgements

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| Acoustical Solutions               | Richmond, Virginia           |
| Cavanaugh Tocci Associates         | Sudbury, Massachusetts       |
| G.R.A.S. Sound and Vibration       | Vedbaek, Denmark             |
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| France      | Centre Technique des Industries Mécanique, Senlis   |
| Korea       | Center for Noise and Vibration Control Engineering,<br>Korean Institute for Science and Technology,<br>Science Town, Taejon-Chi |
| New Zealand | Centre for Sound Studies  |
| Portugal    | Laboratorio Nacional de Engenharia Civil, Lisboa  |
| Sweden      | Department of Applied Acoustics, Chalmers University<br>of Technology, Gothenburg   |
| USA         | Graduate Program in Acoustics,<br>The Pennsylvania State University,<br>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](http://www.i-ince.org).

## 2006 September 18-21

### ACTIVE 2006

#### *The 2006 International Symposium on Active Control of Sound and Vibration*

Adelaide, Australia

Contact: ACTIVE 2006 Conference, School of Mechanical Engineering, The University of Adelaide, SA 5005 Australia

Internet: [www.active2006.com](http://www.active2006.com)

## 2006 December 03-06

### INTER-NOISE 2006

#### *The 2006 International Congress and Exposition on Noise Control Engineering*

Honolulu, Hawaii, USA. Contact: Institute of Noise Control Engineering, INCE/USA Business Office, 210 Marston, Iowa State University, Ames, IA 50011-2153. Tel. +1 515 294 6142; Fax: +1 515 294 3528; e-mail: [IBO@inceusa.org](mailto:IBO@inceusa.org). Internet: <http://www.inceusa.org>.

## 2007 August 28-31

### INTER-NOISE 2007

#### *The 2007 International Congress and Exposition on Noise Control Engineering*

Istanbul, Turkey.

Contact: Turkish Acoustical Society

Yeni Krizantem Sok. No 78

Ic Levent, 34330 Istanbul, Turkey

Tel: +90 212 279 95 22 • Fax: +90 212 264 65 07

E-mail: [contact@internoise2007.org.tr](mailto:contact@internoise2007.org.tr)

Internet: [www.internoise2007.org.tr](http://www.internoise2007.org.tr)

## 2007 October 22-24

### *NOISE-CON 07, The 2007 National Conference on Noise Control Engineering*

This conference will be held at the Grand Sierra Resort in Reno, Nevada. Contact: Institute of Noise Control Engineering, INCE/USA Business Office, 210 Marston, Iowa State University, Ames, IA 50011-2153. Tel. +1 515 294 6142; Fax: +1 515 294 3528; e-mail: [IBO@inceusa.org](mailto:IBO@inceusa.org). Internet: <http://www.inceusa.org>.

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# Directory of Noise Control Services

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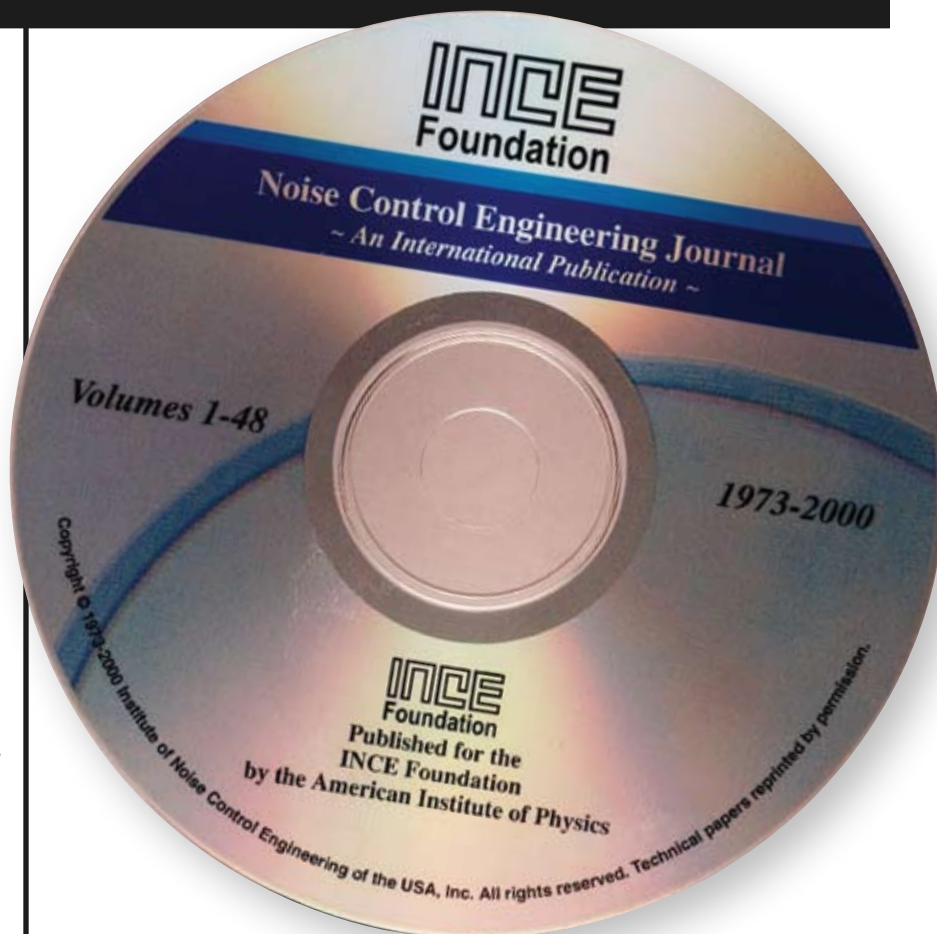
# NCEJ CD: Volumes 1-48

## 1973-2000

In early 2005, the INCE Foundation proposed to the INCE/USA Board of Directors that a CD-ROM be created for the technical papers published in the back volumes of *Noise Control Engineering Journal* (NCEJ) from its launch in 1973 until 2000. This CD-ROM is now available in return for a gift to the Foundation of 100 or more U.S. dollars. The CD-ROM is searchable by any string of characters, and also contains three indices: the papers are indexed according to the INCE Classification of Subjects, by author, and by the papers in each issue. Links from these indices to the individual papers have been created, making retrieval easy. All papers are in PDF format. The papers from 1973 through 1992 have been scanned, and an OCR layer added; the later papers were originally created as PDF files.

INCE/USA is now publishing *NCEJ* on CD-ROM beginning with the 2001 issues. With the availability of this CD-ROM, all papers published in *Noise Control Engineering Journal* are available as PDF files.

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