

# NOISE/NEWS

Volume 20, Number 4  
2012 December

## INTERNATIONAL

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



**JAPAN'S APPROACH TO THE  
WORLDWIDE PROBLEM OF  
AIRPORT NOISE**

**NEW YORK CITY'S APPROACH  
TO CONSTRUCTION NOISE**

**EPIDEMIOLOGY STUDY  
LINKS WIND MILLS WITH  
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**AUSTRIAN NOISE  
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110	Thunder (100 ft)	Discomfort
100	Train (100 ft)	Discomfort
90	Leaf Blower (100 ft)	Discomfort
80	Leaf Blower (100 ft)	Discomfort
70	Leaf Blower (100 ft)	Discomfort
60	Leaf Blower (100 ft)	Discomfort
50	Leaf Blower (100 ft)	Discomfort
40	Leaf Blower (100 ft)	Discomfort
30	Leaf Blower (100 ft)	Discomfort
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*A Qantas Boeing 747-400 (registration unknown) approaching runway 27L at London Heathrow Airport, England. The houses are in Myrtle Avenue, at the south east corner of the airport.*

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# NOISE/NEWS

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

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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 and its Internet Supplement**

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The primary change in this PDF-only volume of *NNI* is the ability to have “hot links” to references, articles, abstracts, advertisers, and other sources of additional information. In some cases, the full URL will be given in the text. In other cases, a light blue highlight of the text will indicate the presence of a link.

- The Internet supplement contains additional information that will be of interest to readers of *NNI*. This includes:
- The current issue of *NNI* available for free download
- *NNI* archives in PDF format beginning in 1993
- A searchable PDF of annual index pages
- A PDF of the current *NNI* conference calendar and a link to conference calendars for worldwide meetings
- Links to I-INCE technical activities and I-INCE Technical Reports

## Farewell...

**T**hey say times flies when you're having fun! Where has the time gone? This issue of *NNI* finds me at the end of a four year term as President. I have served on the I-INCE in several different capacities for longer than I can remember. It is now time to say farewell.

During my term as President, the INTER-NOISE series held its 40<sup>th</sup> Congress in 2011 in Osaka, Japan. Last year in New York City, INTER-NOISE 2012 received 1063 papers. The 40<sup>th</sup> anniversary and the number of papers in recent years are a testimony to the health of the profession of noise control engineering. We should expect this health to continue in the foreseeable future as societal demands for quieter products and a quieter environment are expected to continue. However, the future developments in noise control engineering are critically dependent on continuously attracting young scientists and engineers to the field. In recent years, I-INCE has taken step to ensure that this would happen.

- Starting at INTER-NOISE 2010 in Lisbon, Portugal, I-INCE initiated a program to award travel grants for young scientist and engineers to attend the Congress. Each grant is valued at 500 Euros and comes with a certificate to recognize the award.
- Also at INTER-NOISE 2010, a workshop for your professional was initiated and has continued at subsequent Congresses. At the workshop, attendees have opportunity to network with more senior experts in the industry and to hear technical presentations.
- I-INCE has also started organizing Future Congress Technical Planning sessions. The main purpose of these sessions is to assist the organizing committees of future congresses with planning for structured sessions. In particular, it gives a forum for younger professional to propose sessions and become involved in the planning of the INTER-NOISE Congresses
- During INTER-NOISE 2011 in Osaka, Japan, the General Assembly elected three Directors-at-large representing the three geographical

regions (Europe-Africa, the Americas, and Asia-Pacific) on the I-INCE Board. Member Societies were invited to nominate candidates from their region. They were particularly encouraged to nominate younger candidates so that they can gain experience n the governance of I-INCE and hence provide succession.

In additional, I would to highlight the following three activities.

- I-INCE now provides financial support for specialized symposia in the area of noise control engineering. The support is typically 5000 Euros and the symposium is highlighted as an I-INCE Symposium.
- I-INCE has negotiated a collaboration with CAETS (International Council of Academies of Engineering and Technological Sciences) in the area of global noise policy.
- Finally I-INCE continues with its technical initiatives. There are a number of active Technical Study Groups and thus far a total of 7 technical reports have been published. These are available as pdf files on the I-INCE web site.

It is now time to welcome Joachim Scheuren, the new I-INCE President. Joachim Scheuren has been with Müller-BBM since 1986. He has been an active participant in INTER-NOISE Congresses and he has represented the German Acoustical Society (DEGA) at the I-INCE General Assembly many times. He has experience in organizing various international conferences on Acoustics. He has served as the President and Vice-President of DEGA. I have every confidence that I-INCE will be in good hands! 🙌



**Gilles Daigle**  
*INCE/USA President*  
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## Are we losing the battle to reduce noise?



**James K. Thompson,**  
**PhD, PE**  
*NNI Managing Editor*

**M**aybe to some this seems like a ridiculous question. Aren't home appliances and the interior of automobiles much quieter? Haven't there been major reductions in air transport noise? Clearly there have been significant successes.

However, there are many other areas where noise has not been reduced and may have actually increased. Ask one of the 22 million workers in the US who are overexposed to noise on a daily basis, and the question of noise reduction is not so clear cut. In many cases, hearing protection has been a substitute for noise reduction. When this is combined with a great deal of evidence casting doubt on the effectiveness of hearing protection in actual working environments, it is not clear that workers are seeing noise reduction. As a single example, data show that the mining industry has the highest reported use of hearing protectors of any industry in the US. At the same time, miners have the second highest reported noise overexposure in US industry. Unfortunately, the high use of hearing protectors has not been shown to be successful in preventing hearing loss. An excellent indication of the magnitude of this problem are the data that show by age 60 over 80% of miners have significant hearing impairment. Four out of five miners having difficulty hearing and often report they cannot communicate with their grandchildren does not seem like a strong indicator of success.

It is not only occupational noise exposure where success is in doubt. Ask anyone who lives near a busy highway if noise levels have been reduced. Despite a lot of work by automotive manufacturers and the road pavement industry, most people

living near high traffic roads would not report a significant noise reduction. This is a growing problem as traffic levels have gone up and speeds have increased while higher horsepower engines and wider tires have become more prevalent. All of these factors have contributed to higher noise levels and greater annoyance for the public.

As most of you are aware, the impact of noise is not simply annoyance or even hearing loss. In industrial settings, high noise levels lead to missed instructions and safety signals, fatigue, and other problems that impact health and may contribute to serious accidents. The effects of environmental noise include sleep disturbance and other health effects that can have major long term impact. The cost of these "losses" both for individuals and the economy as a whole are quite large.

So, are we losing the battle? In some areas, I think we are. Anyone who sits in a modern car will clearly find a much quieter environment than only a few years ago. Unfortunately, this is not universal. There are areas where we have not been as successful. In some instances we may have become complacent. The costs or technical challenges may have been too much of a deterrent.

However, the point is that we have not lost yet. We may not be winning in every case, but we must keep working to reduce noise whether it be a consumer issue, an environmental problem, or the overexposure of our work force. We can and must win this battle. We cannot afford to lose. The cost in terms of the quality of life and real economic impact are too large to lose. 

## Austrian Noise Abatement Society



ÖAL  
ÖSTERREICHISCHER ARBEITSRING  
FÜR LÄRMBEKÄMPFUNG

**T**he Austrian Noise Abatement Society is Austria's only independent, multidisciplinary institution in the field of noise protection. It is known by the initials OAL from its name as rendered in the language of the nation, Österreichischer Arbeitsring für Lärmbekämpfung.

A core value of OAL is its interdisciplinary approach to noise in society, a multi-faceted phenomenon that warrants rigorous, coordinated consideration from a wide array of professional disciplines and the specialties within them, architecture, construction, communications, economics, education, engineering, law, logistics, governance, manufacturing, medicine, physiology, and psychology among others.

Functioning in large part through the voluntary service of its members, the OAL convenes the practitioners of these disciplines, orchestrates their talents, facilitates research and discovery, disseminates knowledge and deploys solutions for the benefit of all Austria and affiliated professional societies around the world.

OAL was founded in 1958 as a section of the Austrian Working Group for Public Health.

As a unit of the working group, OAL operated with subsidies from the Ministry for Social Affairs, other ministries, and the governments of the nine states that compose the federal republic of Austria.

The Federal Institute for Heat and Sound Technology led the young organization's technical activities, undertaking to establish guidelines, disseminate the fundamentals of acoustics and noise control by organizing meetings and exchanging information on practical work in noise control within Austria and also with experts from other countries.

In the early years, the most important guidelines covered the measurement of noise emissions from stationary machines and transportation vehicles and the assessment of noise exposure in neighborhoods and workplaces. Other important guidelines covered the physical

### Active Working Groups and their chairmen

- AG 130 — Noise mapping and planning of mitigation measures; Christoph Lechner
- AG 138 — Calculation of the noise level in operation halls; Harald Mayr
- AG 139 — Acoustic Technical Definitions and Measurements; Werner Talasch
- AG 140 — Sound insulation in residential construction - Planning Fundamentals; Christoph Lechner
- AG 141 — The effect of noise on the people - Medical Assessment; Hans-Peter Hutter
- AG 142 — Noise quota; Wolfgang Grat

effects of noise on people, the acoustical basis for the construction of factories, characteristics of low-noise machines, and the human psychology of noise. Later guidelines concerned methods of calculating noise associated with highways and roads, airports, railroads and factories. Other guidelines covered the principles of noise control planning in communities and states and separately labeling machines in regard to their noise ratings.

The independent OAL as it exists today was established in 1992. Its governing statutes were updated in 2000 by the OAL General Assembly.

Some of the most important guidelines in the first years were measurement of noise emission of in machines, measurement of noise emission of vehicles, assessment of noise exposure (in the neighborhood and in the working place), effects of noise on man, the acoustical basis for the construction of factories, low noise machines, and the psychology of noise production by man. Later, guidelines were established for calculation methods for road traffic noise, aircraft noise zones around airports, rail traffic noise, noise propagation outside and in factories, the basics for noise control in town and country planning, and noise labeling of machines.

The guidelines were widely used in Austria by all persons and organizations working in the field of noise assessment and noise control. Some of the guidelines were also introduced in regulations (e.g. calculation of rail traffic noise). In 1987, OAL Guideline 29 on low noise trucks was issued. This guideline defined the criteria for low noise trucks in harmony with criteria already existing in Germany.

When the problems with high noise levels alongside the transit route from Germany to Italy through Austria became serious, the low noise truck guidelines were applied on the relevant Austrian roads during nighttime (combined with a speed limit to 60 km/h).

The importance of low noise trucks grew rapidly in Europe and these trucks are

now state-of-the-art. Now, on all roads in Austria during night time, only low noise trucks are allowed with a maximum speed of 60 km/h (with exemption to 80 km/h on specially identified road sections that are not in a noise sensitive environment).

The aim of OAL has remained steadfast over time: the dissemination of state-of-the-art information in noise control

- especially through the preparation of guidelines in working groups and exchange of experiences in five plenary meetings per year. In 1997, OAL Guideline 36, sound emission maps and conflict maps, planning of noise control measures, acoustical basis for regional and local planning was issued, and at present two working groups — one on calculation of aircraft noise zones around airports and airfields and a second on basics in psychoacoustics, measurements and assessment — are drafting guidelines.

OAL was a member of the Association Internationale Contre le Bruit (AICB) and organized the International AICB Congress in 1962 in Salzburg and in 1982 in Vienna.

OAL is also working within the newly-founded Austrian Acoustics Association in the section noise control, and was been invited to work as a Non-Governmental Organization (NGO) in the Conference on the European Union's Future Noise Policy. 

Member Society Profile is a regular feature of *Noise News International*. If you would like to have your society featured, please contact Jim Thompson at [nnieditor@noiseneewsinternational.net](mailto:nnieditor@noiseneewsinternational.net)

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# Airport Noise in Japan: Challenges and Continuing Efforts to Reduce Impacts

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## **ABSTRACT**

Aircraft noise is a crucial public nuisance, which the Japanese Government once tackled by trying every possible means in pursuit of effective measures for mitigation of severe noise impact in the vicinity of city airports over several decades. Those efforts helped to drastically reduce noise damage around airports, but air traffic has rapidly increased and noise continues to challenge efforts to further harmonize growth of air transportation and the quality of life in cities. This paper reviews these issues with special attention to the Tokyo metropolis and previews future issues.

## **INTRODUCTION**

Noise around city airports is a noise pollution complex consisting of road, rail and air traffics. Below the flight path there are densely populated areas with a complicated network of roads and railways. All these sources form a compound sound environment that must be addressed by performing comprehensive mitigating measures for complex noise effects of compound sound exposure.

In Japan, noise around airports has been a crucial public nuisance, which the government once tackled over recent decades by trying every possible mitigation means at each site of emission, transmission and immission. Noise exposure around airports was drastically reduced and the living environment has been greatly improved, although noise limits are still not satisfactory around several major airports. However, rapid growth in air traffic changed the sound environment around airports from a “red” situation with devastating noise damage to “gray” with frequently repeated exposure to low-level aircraft noise. The gray may be darker if world economy recovers. Aircraft noise continues to impede further harmonization of air transportation and the quality of life in cities.

East Japan experienced a severe disaster of strong earthquakes, tsunami and an accident at a nuclear power plant in early 2011. With help from around the world, the disaster area is gradually

recovering, but issues of radioactive contamination, rubble handling, power shortage and nuclear power plant operations continue to shake the whole country and generate “not in my back yard” sentiments from the public. Noise pollution from air transportation and airport operations produce similar sentiments although perhaps not as strenuous.

## **1. BRIEF REVIEW OF AIRPORT AND NOISE ISSUES IN JAPAN**

### **1.1 The Situation of airports and air traffic**

Tokyo metropolis has been the world’s highest ranked population center for more than 50 years<sup>1</sup>, with 37 million people in 2011, one-third of Japan’s total population. To lessen congestion and pollution in cities as well as solve the depopulation of rural areas, ‘Kakuei Tanaka,’ prime minister in early 1970s, proposed building a high-speed transport network, based on Theory of Remodeling Japan<sup>2</sup>, but it was in vain. The concentration of population into Tokyo continues.

According to Hanaoka<sup>3</sup>, more than 30 cities or urban agglomerations around the world have a multi-airport system, but the form of management is different. Many cities have a function-sharing rule decided by the government or airport authority, whereas other cities have no such rule, but airline companies select their airport use in accordance with their independent strategies or in response to the solicitation from the airport. In case of Tokyo Metropolis, there are two large airports, Tokyo International Airport (Haneda) and Narita International Airport (Narita), together with two small civil airfields and six airbases within a radius of 50km from Haneda.

Haneda is located on the sea coast close to the city center, while Narita is in a rural district, 60km from Haneda. Since the opening of Narita in 1978, Narita has been the main gateway of Japanese international aviation. On the other, Haneda had been one of the primary domestic hub airports until 2010, when it resumed international service. Osaka Metropolis has three airports: Osaka International Airport (Itami), a major domestic airport in the midst of urban residential area; Kansai International Airport, constructed



on a reclaimed island; and Kobe Airport, a regional airport constructed on the sea surface.

Among major airports worldwide<sup>4</sup>, Haneda ranks fifth in total passengers per year, but by the normalized rate rpps of total passengers per ship divided by total movements, Haneda ranks first (rpps=197). This is higher by far than all other major airports worldwide, suggesting that the rate of large aircraft movements at Haneda is extremely high due to limited capacity owing to environmental restrictions, available air space, etc. Circumstances in Narita and New Chitose are similar to Haneda (rpps=150~170): they rank with Hong Kong, Bangkok, Singapore and Dubai, followed by London/Heathrow and Beijing, whereas the rate for other major airports remains less than 120.

Japan has a 102 airports<sup>5</sup>, one-twentieth that of the United States (1,977 airports), but the ratio comes to 1.3 if normalized for area. Compared with Asian countries, the normalized ratio becomes 12.8 compared to China (202 airports) and 0.9 compared to Korea (30 airports). Japan has more airports owing to government policy to build a high-speed air transport network based on the Special Account for Airport Development. The 102 airports are composed of three international airports Narita, Kansai and Chubu managed by airport companies, 20 domestic airports including

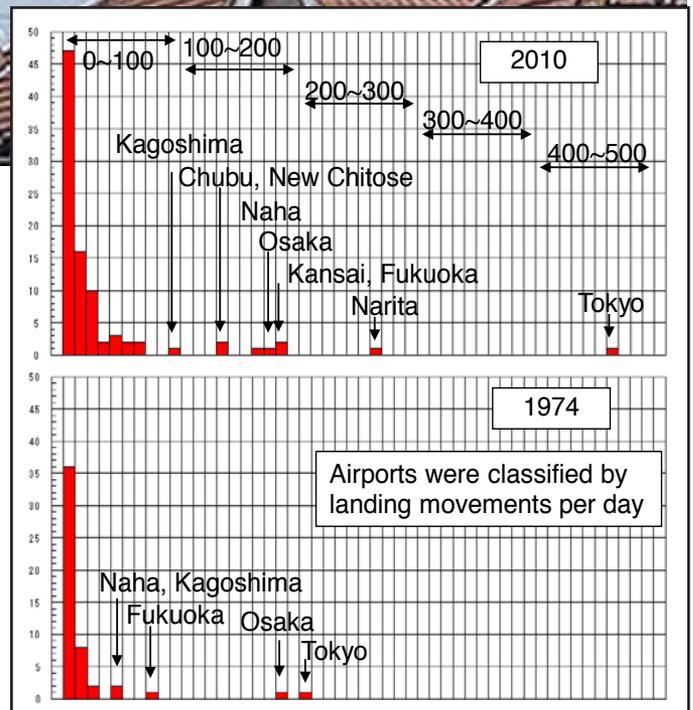


Figure 1. Frequency distribution of airports in Japan.

the government-managed Haneda, and other airports managed by local governments. Many military airfields are located in highly urbanized areas.

Figure 1 shows frequency distributions of airports classified by landing movements per day in 1974 and 2010<sup>5</sup> showing a great increase in traffic volume over the last 30 years. Still, only eight



Figure 2. Geographical distribution of airports in Japan.

airports have more than 100 movements per day. Figure 2 shows a geographical distribution of those airports located in six urbanized regions, including Tokyo and Osaka. These airports operate amid mega cities, and aircraft fly over dense populations and networks of roads and railways.

### 1.2 Brief history

The trend of Japan's GDP over the last 60 years<sup>6</sup> is shown in Figure 3. In the 60s, Japan's economy grew rapidly. Growth rates remained high in the 70s to 80s despite two Oil Shock recessions. Leading up to the mid-90s, high growth continued, and many express roads, high-speed railways and airports were constructed, based on the Theory of Remodeling Japan<sup>2</sup>. Afterwards came financial crisis and global recession, terrorism, SARS, wars, flu pandemic, etc. Growth was depressed to almost zero percent. Even so, construction of the high-speed transport network continues: The second Toumei Expressway was completed in 2012. Linear Motor Car is expected to run from Tokyo through Osaka in 2027-2045.

Figure 4 shows the trend of total passengers for domestic and international air traffic<sup>5</sup>, respectively, similar to that of GDP in Figure 3. Blue line shows actual records, while red line shows predictions based on 2000. In 2001 and beyond, unforeseen incidents and economic recession adversely affected the

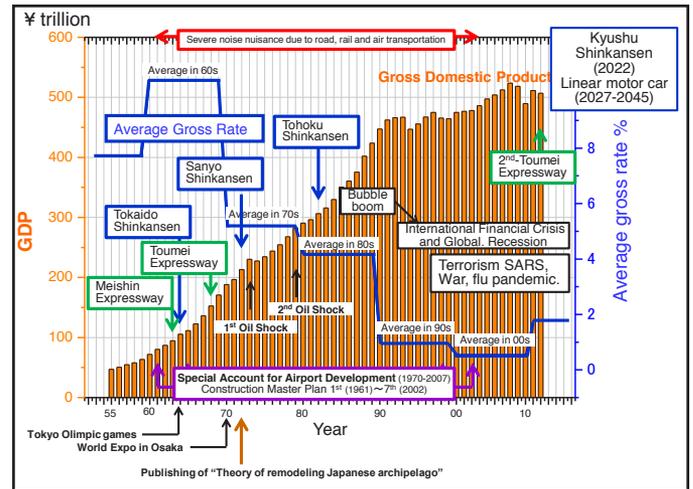


Figure 3. The trend of GDP and average gross rate with infrastructure development.

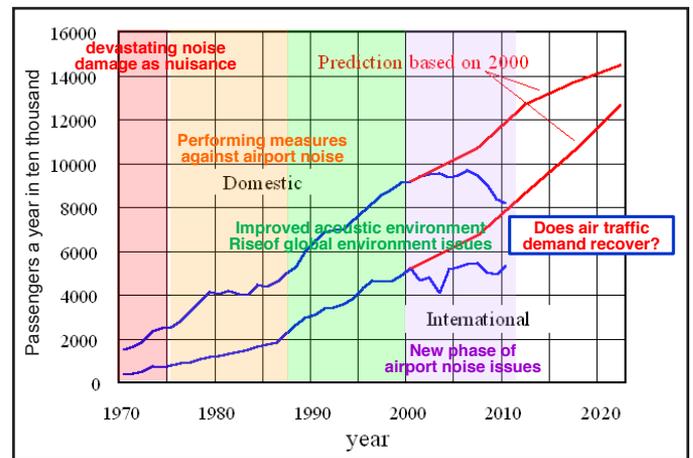


Figure 4. Trend of total passengers by air traffic in Japan.

development of air traffic, resulting in stagnation in the growth of aircraft movements. Up to the mid-70s, jet aircraft brought devastating noise damage, followed by a decade when a variety mitigation measures were performed. Through the remainder of the century, the sound environment around airports improved, while global issues arose. The early 21st century is the era of 'New phase of airport noise issues.'

Mitigation efforts beginning in the 1970s included introduction of low-noise aircraft, flight procedure control, night curfew, construction of offshore airports and environmental remedial measures such as house removal and soundproofing, etc. Figure 5 shows the trend of noise exposure level (WECPNL) at three locations around Osaka International (Itami) Airport. At this airport, a series of lawsuits had been raised seeking compensation for noise damages and restrictions of aircraft movements at night. This resulted in upper limits being set in 1978 for movements by jet aircraft. The trend of level decrease of 10-20dB in

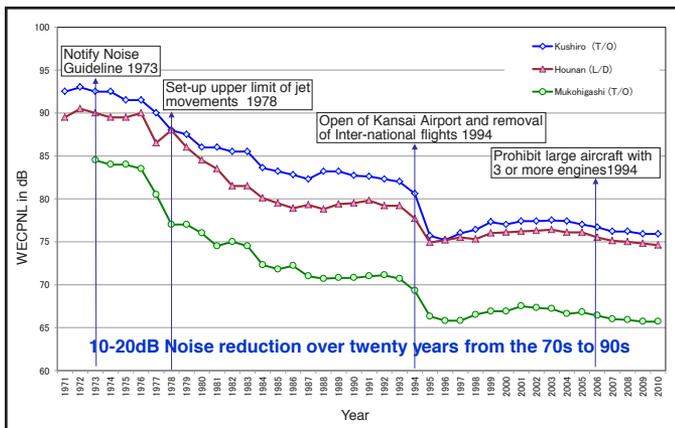


Figure 5. Trend of noise exposure level around Osaka Itami Airport.

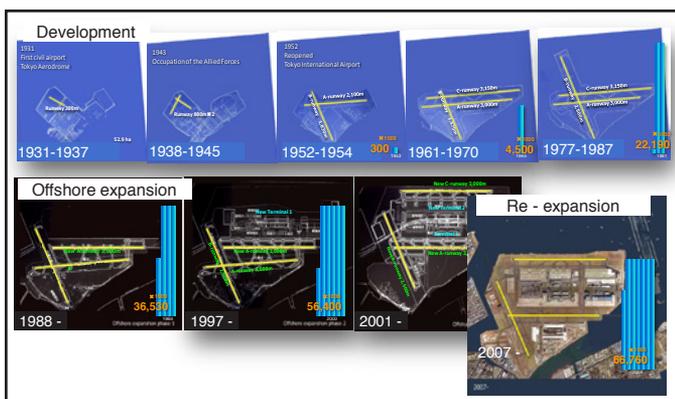


Figure 6. Airport development and offshore expansion at Haneda.

WECPNL over the 20 years from the 70s-90s clearly proved the effectiveness of measures such as noise reduction at source and removal of international flight movements to Kansai Airport in 1994. Besides expenditures of effort and sweat, these endeavors cost 1,400 billion Yen as of 2010. Note that the noise guideline of Environmental Quality Standard for Aircraft Noise was revised to use Lden as noise index instead of WECPNL in 2007.

In Japan, airport development projects were promoted since fiscal 1967 under the “five-year airport development plan” to cope with the increased demand for air traffic, ensure the safety and protect the environmental. Airport construction on the sea surface was considered as the last solution to solve noise pollution. In Osaka metropolis, the government constructed Kansai International Airport on a reclaimed island in 1994 to replace Itami Airport. But, contrary to plan, Itami still operates. Airport construction on the sea surface continued: Chubu International Airport in 2005 and Kita-Kyushu Airport in 2006. In Tokyo metropolis, the removal of Haneda Airport to offshore reclaimed land began in 1984 in response to the request from the Governor of Tokyo City just before the opening of Narita Airport in 1977. Afterwards, four runways, A-D, were built in 1988, 1997, 2000 and 2010 respectively. No doubt, all these airport constructions on the sea

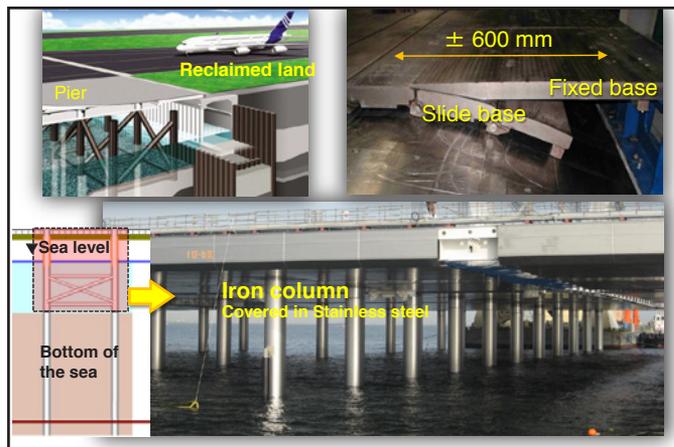


Figure 7. Hybrid structure of D-runway at Haneda.



Figure 8. Construction of D-runway considering ship route and natural environment.

surface greatly contributed to the reduction of noise impact.

Finally, several papers reviewed airport noise issues in Japan<sup>7-11</sup>. In 1984, ten years after the notification of the Environmental Quality Standards for Aircraft Noise, Igarashi pointed out that land use planning is essential, revision of relevant law is not yet considered, immission control has progressed, and emission control has not made progress yet<sup>7</sup>. Afterwards, in 1996, Yamada reported aircraft noise criteria in Japan and discussed changing the noise index from WECPNL to LAeq metrics<sup>8</sup>. Yamada also discussed the latest issues of airport noise issues in 2000 and 2005<sup>9, 11</sup>. In 2003, Igarashi proposed taking account of feasibility of a noise policy when determining standard values, unifying noise metrics among transportation modes, dissemination of necessary information and phase-out of noise zones around airports<sup>10</sup>.

### 2.3 Airport expansion at Haneda

Figure 6 shows a brief summary of airport development and offshore expansion at Tokyo International Airport (Haneda). Haneda was constructed in the 1930s on a sea coast with no

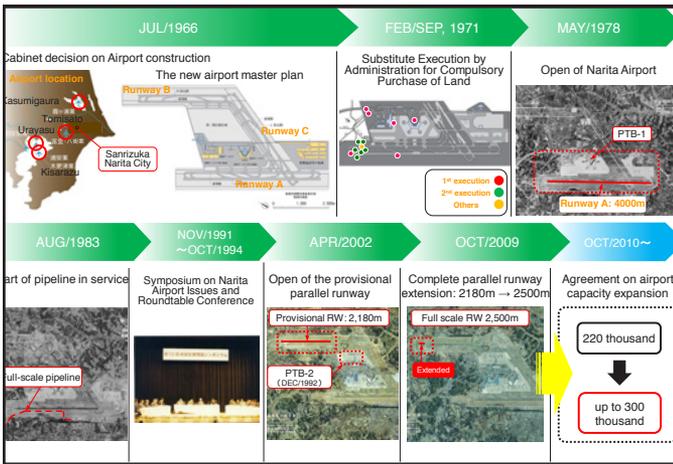


Figure 9. Airport development at Narita.

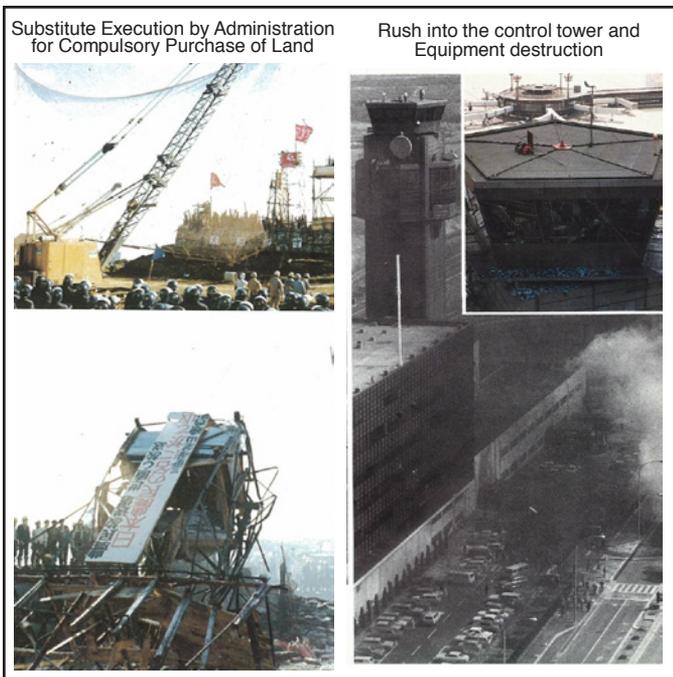


Figure 10. Intensified Opposition against Airport Construction at Narita.

houses nearby. The surrounding area was rapidly reclaimed and developed beginning after World War II and continuing over 30 years through the mid-80s. Severe complaints by residents about jet noise craft limited expansion of airport capacity, leading to airport removal and expansion on adjacent reclaimed land in the mid-80s, which proved very successful in solving the noise issues. Even flyover noise gradually diminished as the removal progressed. Meanwhile, frequent low-level flyovers in regions distant from the airport led to increased complaints as the aircraft movements increased. An airport re-expansion project began in 2000, and finally the 4th runway 'D' opened in 2010, using a hybrid structure of reclaimed land and pier (See Figure 7), to avoid disrupting the shipping route or river current (See Figure 8). The east end of the runway was out of the ship route, whereas

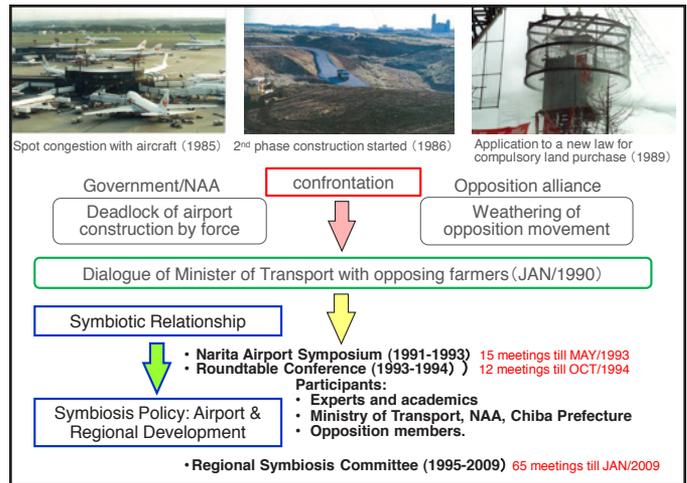


Figure 11. Momentum from confrontation to negotiated settlement at Narita.

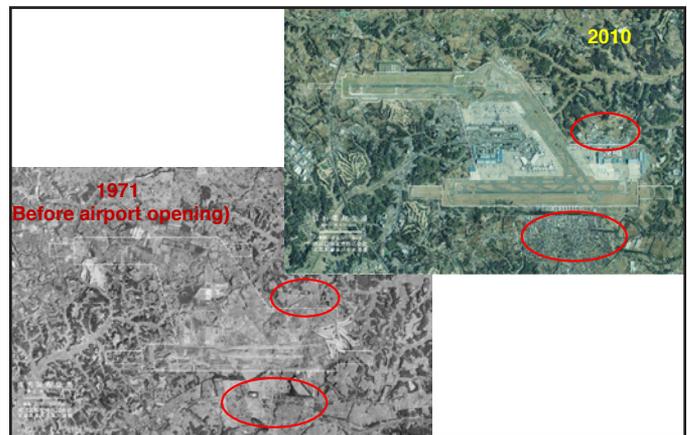


Figure 12. Preventing encroachment at Narita under the Special Act for Aircraft Noise Prevention.

the west part of the runway was constructed as a steel bridge so as to not disturb the river current. Note that the joint connecting reclaimed land with pier flexes in earthquakes and that the pier was designed for a service life beyond 100 years. The inside of the pier is air conditioned to prevent rusting. Note also that international aviation at Haneda was also re-started in 2010 at the time of completion of airport re-expansion.

## 2.4 Airport construction at Narita

Figure 9 shows summarizes airport development at Narita International Airport<sup>12</sup>. Narita was constructed because of insufficiency capacity at Haneda. Planning began in 1966. Sanrizuka/Narita was chosen as the site without sufficient negotiation with land owners, including many farmers. Severe public opposition resulted (Figure 10). As a result, the government reverted to compulsory purchase of land and opened the airport in 1978 with only one runway instead of three as initially planned. Ten years passed without any progress in airport construction. At last in 1990, dialogue occurred between the

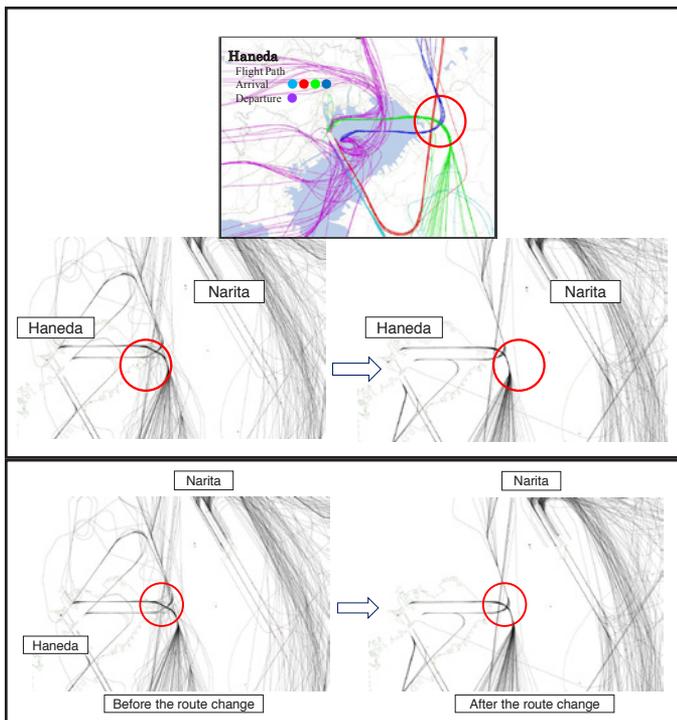


Figure 13. Usual flight routes under good weather conditions at Haneda (upper), and observations of approach routes before and after changing the intersection (lower).

Minister of Transport and opposing farmers. The ‘Symposium on Narita Airport Issues’ was held in 1991-1993 and the ‘Roundtable Conference’ in 1993-1994. A multitude of meetings were held to discuss withdrawal of compulsory means and establishing partnership between regional communities and the government/NAA for further airport construction. (Figure 11) Through this process, ‘Symbiotic Relationship’ was established and a Regional Symbiosis Committee was created to monitor activities of the government and airport authority. At meetings of the Committee during 1995-2009, policies on airport and regional development were settled, such as airport and community planning and airport building to live in harmony with the local community. These led to construction of a provisional parallel runway in 2002, final completion of the parallel runway extension in 2009 and an agreement on airport capacity expansion in 2010.

It is noteworthy that the law known as “Special Act for Aircraft Noise in Areas Surrounding Designated Airports” applies to only Narita Airport and prevents encroachment in this rural (Figure 12).

Finally, Figure 13 shows airport capacity expansion at Tokyo Metropolis including Haneda and Narita. Increases of up to 747,000 movements a year are expected within a few years, which should satisfy air traffic demands for the time being.

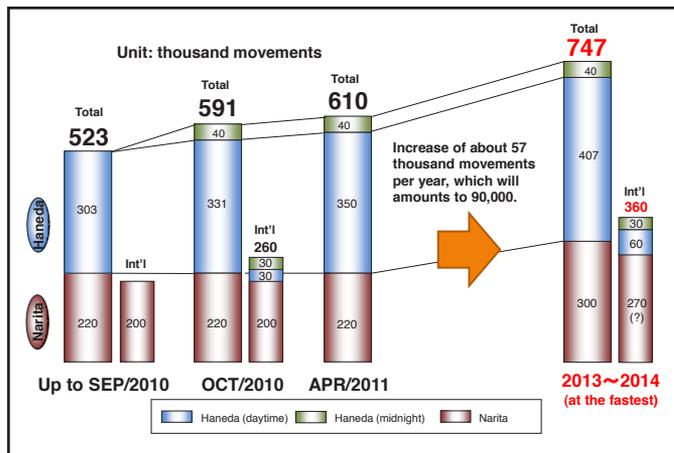


Figure 14. Airport capacity expansion at Tokyo Metropolis.

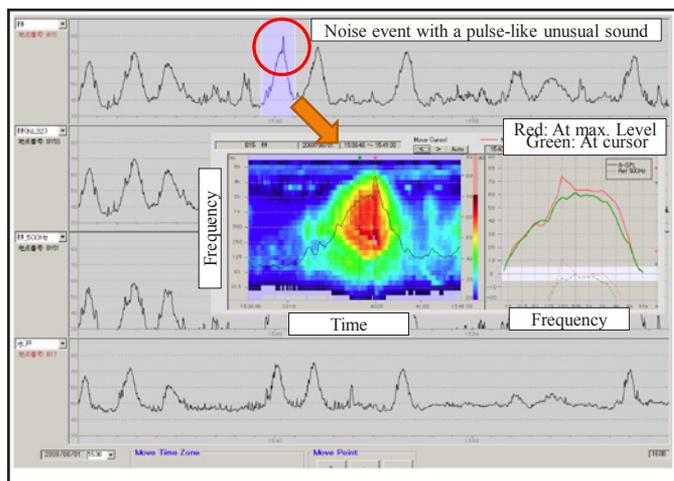


Figure 15. Prominent pulse-like unusual tonal sound observed below approach path.

## 2. CURRENT ISSUES OF AIRCRAFT NOISE IN JAPAN

### 3.1 Trend of noise complaints

Looking at complaints about environmental issues filed at the Environment Dispute Coordination Commission annually since 1966<sup>13</sup>, we find that the seven primary factors (air, water and soil pollution, noise and vibration, smell, and subsidence) held the greater part of the total complaints until 1995 and noise was the primary factor for complaints. Since 1995, air pollution and smell turned to increase. One cause seems to have been in high public interest in the health effects of chemical in the air such. It is, however, worth notice that the number of noise complaints is almost constant over the last fifteen years. The rate of noise complaints about road and air were nearly equal and gradually increase in general.

### 3.2 Revision of noise guideline for aircraft noise

In 2002, when construction of a provisional parallel runway was finished at Narita, local authorities, worried about worsening noise pollution, took measurements and unexpectedly found a slight decrease in noise exposure level WECPNLJ at a few

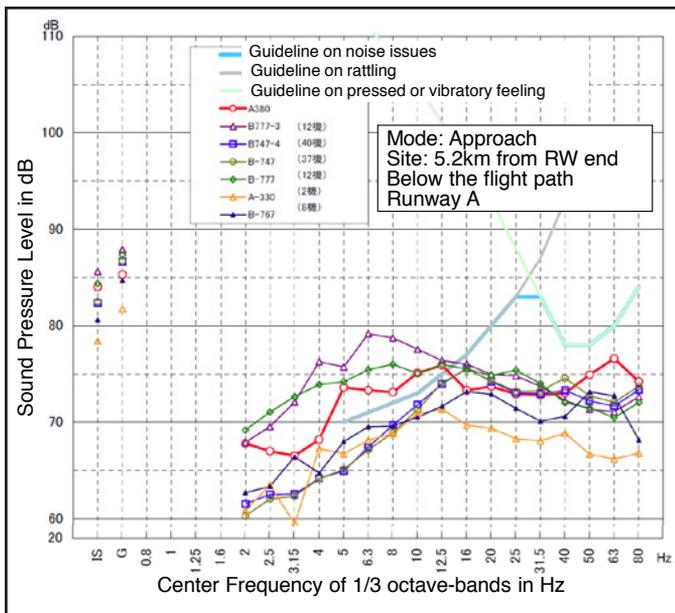


Figure 15. Prominent pulse-like unusual tonal sound observed below approach path.

locations near the airport. This raised a dispute over the reliability of WECPNLJ. After a detailed discussion, the Ministry of the Environment revised the Noise Guideline of ‘Environmental Quality Standard for Aircraft Noise’ in 2007 to use Lden as noise index instead of WECPNLJ, and published a new guidance manual for the determination of Lden by measurement in 2009<sup>14</sup>. The manual was recently revised, after a two-year trial application, in time for enforcement of EQSAN in April, 2013. The revision was intended to adhere to the framework of noise measures but to resolve the subtle contradiction due to an approximation in the Japanese definition of WECPNLJ. It also took account of noise contributions from aircraft ground operations such as taxiing and APU operations. Ground noise is generally low level compared to flyover noise, but often lasts longer.

### 3.3 Issue of noise annoyance in distant region at Haneda

At Haneda, high noise was concentrated on the sea surface by locating the airport offshore, introducing pilot directional guidance known as localizer type directional aid), or LDA, flight route control, etc. Nevertheless, complaints about aircraft noise continued in distant areas, e.g., 10-20 km or farther from the runway. Complaints concern low-level sounds of at most 60-70 dB, comparable to road and rail traffic but sufficiently prominent in a quiet residential area<sup>15</sup>. People are concerned about low-level but frequently repeated noise due to approaching aircraft flying overhead every 1-2 minutes. People are also concerned about aircraft that fly over their homes and off course from a specified route.

The intersection of two routes of approach, even though separated by altitude, recently caused concern about possible collisions when, for example, a larger aircraft flies above a smaller aircraft on intersecting routes. Air-traffic controllers hastened to relocate the point of intersection by several kilometers (Figure 14). Unfortunately, the source of complaints relocated to match.

Incessant fly-over on the same authorized route can raise the question of which is better, concentration or dispersion. Such a situation exists at times of peak operations for people below the approach to Haneda during north winds. Evaluating this noise requires taking an average only during busy hours, although the Noise Guideline requires taking a year-average. Which is fair or more appropriate? Residents also request evaluation of compound noise exposure effects. In certain distant regions, people are exposed to similar level of sound from road or rail traffic in addition to air traffic. Should we start to evaluate the effect of compound sound exposure?

Flight routes at Haneda are established to avoid low fly-overs of the densely populated city center northwest of the airport, a main cause of complaints in distant regions and a barrier to airport capacity expansion. In the Tokyo metropolis, however, six military bases, including Atsugi, operate jet fighters that frequently cause high level noise exposure, even in areas distant from the airfield. The national and local government must confront these issues simultaneously with issues at Haneda and Narita.

### 3.4 Unusual tonal sound and infra- and low-frequency sound

Aircraft fitted with high-bypass jet engines sometimes create sudden, short rise of unusual tonal sound when flying on approach (Figure 15). Investigation at Narita<sup>16</sup> found two categories of unusual sound: 1) tonal sound in a frequency region of 315 Hz to 500 Hz and 2) tonal sound in a higher frequency region of 2k Hz. The incidence rate was about 2 percent, but it causes a prominence of sound pressure level up to 10 dB or higher, compared with usual. According to manufacturers, such sound may occur during approach due to resonance created by automatic volume adjustments designed to control NOX emissions. It is difficult to predict when and where such unusual sound may occur, and it is not possible to take account of such unusual sound in noise modeling. Experiments suggest that the influence of unusual sound on the evaluation of average sound levels is rather low.

Figure 16 shows a comparison of frequency characteristics in infra- and low-frequency regions of measurements of flyover noise<sup>15</sup>. The figure suggests that a few large aircraft with high-bypass jet engines radiate high levels of infra sound components,

which may cause rattling of house windows and furniture, especially during approach.

### 3. FUTURE VISION AND STRATEGY

National land planning since the 1960s was intended to ease the concentration of the urban populations and vitalize the provinces. Nevertheless, concentration in cities, especially the Tokyo region, progressed, resulting in an expansion of transport infrastructure in the Tokyo metropolitan area. The build-and-expand policy in the era of population expansion and economic growth does not fit the context of population decline and low growth rate. In 2010, a new vision and strategy of future aviation policy was proposed from the Committee on Growth Strategy of the Ministry of Transport<sup>17</sup>. The conventional role sharing of 'international flight by Narita and domestic Haneda' was discontinued in favor of two major international hub airports to expand airport capacity. The government carries out a wide range of studies for expansion of airport capacity to cope with increased air traffic demand over the next ten years. No doubt, noise issues continue to be a bottle neck for the promotion of air transportation and capacity expansion, but the new vision and strategy seem to lack such viewpoints.

The banning of nighttime flights once applied strictly to all airports. The policy was effective in preventing sleep disturbance. Airports available 24 hours a day have gradually increased during last twenty years in Japan: Kansai, Chubu, Haneda and Kita-Kyushu. All these airports are constructed on the sea surface, resulting in sporadic complaints about sleep disturbance from distant areas because of the limited amount of nighttime movements and careful control of flight routes up to now, but if night time movements increase, they may aggravate noise issues. Recent research has focused on noise annoyance and sleep disturbance, but in Japan only the study of noise annoyance has progressed due to lack of nighttime flight operations. How should we proceed with this issue?

There is a movement toward evaluating the effect of environmental factors on people in terms of disability-adjusted life-years (DALY), which concerns noise damages from comprehensive effects of various disturbances by noise annoyance, sleep disturbance and other noise effects and environmental factors<sup>18</sup>. Noise effect is not a threat as urgent as dioxin exposure, for example. But assessing noise effects on human health is recognized as being significant; tens of thousands of people have been forced to endure a diminished quality of lives due to noise. DALY shall be calculated as burden of disease, but can we say how much burden noise annoyance and sleep disturbance cause? Besides, airports have both a negative aspect related to environmental issues including noise and a positive aspect including the economic developing of surrounding regions. In Japan various measures have already been applied to most

airports. We may have come to the time that we shall assess noise effects by judging annoyance in a comprehensive manner to consider trade-off between burden and benefit.

Finally, let us refer to new technologies aiming at contribution to further noise abatement around airports in Japan. One is a research project of DREAMS, which aims at developing key technologies for a future air traffic management system<sup>19</sup>. It is intended to control noise exposure in a specified area by optimizing approach paths with consideration to meteorological effects on sound propagation. It may be a solution for low-level noise complaints. Another is the development of a new regional jet aircraft MRJ<sup>20</sup>. It will be a Japan-made aircraft after 40 years since YS-11 and would be the most quiet and clean aircraft in the class. Weight-saving by extensive use of carbon material leads to lower fuel burn, and less noise and emissions.

### 4. CONCLUDING REMARKS

This paper gave a brief review of aircraft noise issues around airports in Japan. The conventional framework of noise measures around airports played an important role to improve acoustical living environment. Over the times, the social and economic situation in Japan strongly changed. It caused our life style and values on the environment totally different from the past. Logistics and movement of people by air transportation steadily expand, and living area has spread to the world. Once aircraft had been the target of noise complaints, but it is now a familiar means of transportation. On the other hand, views on the quality of living environment have become stricter as concern is raised for global environmental issues such as global warming. In such circumstances, the framework for urgent noise measures is no longer appropriate. We must change direction to monitor the situation of noise exposure so as not to deteriorate the situation and to prevent new noise problems. For that purpose, it is essential to understand all risk factors and continue to manage those. In addition, it is necessary to make the prospect of current and future status of airport and air traffic as well as environmental impact, to promote information through various media in an appropriate manner to local residents and to facilitate exchanges with the local community and to promote partnership with the local community. Aircraft noise remains a challenging issue toward further harmonized growth of cities and air transport as well as for the quality of life in cities. We must deal it from various aspects by recognizing it as a part of pollution problem complex including noise, local air quality, global warming, economic situation, social and political relations, etc.

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# Understanding and Complying with New York City Construction Noise Regulation

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Under Mayor Michael Bloomberg, New York City updated its construction noise regulation, effective July 1 2007, the code's first overhaul in 30 years. The new regulation emphasizes proactive avoidance of construction noise by requiring contractors to develop Noise Mitigation Plans. It also provides guidelines for mitigating particularly loud sources such as pile drivers, hoe rams, concrete saws, vac-trucks, and jackhammers. In the five years since implementation the regulation has proven itself to be effective: contractors and engineers are informed; city inspectors enforce the regulation in the field; construction noise complaints are fewer, and the news media, professional societies, and guidance manuals widely praise the code as exemplary. This paper describes the regulation's development, technical considerations, legal standing, political compromises and post-implementation effectiveness of the New York City Construction Noise Regulation.

## 1. PURPOSE AND NEED

*Honk – bang – whir – whiz – roar – ding – beep – chug – boom – rattle – hum – screech – boom* are the familiar sounds of life in densely populated cities, especially New York City. Many residents take such noise in stride, but must they accept such annoyance and distraction, disruption of sleep, reduction in property values, and even physical effects including elevated blood pressure, gastro-intestinal problems, stress and anxiety? A 2006 neighborhood survey (**Figure 1**) of New York City inhabitants, conducted by an independent citizen's action committee, found that *noise* was the top concern regarding quality of life<sup>1</sup>. Noise has been the top complaint to New York City's 311 citizen service hotline, which in recent years could average nearly 1,000 calls a day. In 2006 the New York City Department

of Environmental Protection (NYC DEP) received nearly 5,000 noise complaints per month.

Mayor Michael Bloomberg in 2002 announced *Operation Silent Night*, a multi-agency, quality-of-life initiative that targeted loud and excessive noise. He charged DEP with updating the noise code to address new issues and with vigorously enforcing the code in communities most affected by excessive noise. The mayor in December 2005 praised City Council's unanimous passage of the revision predicted that New York City would become quieter due to stronger standards and commonsense solutions to noise from construction sites, motorcycles, 'boom cars', air conditioners and nightclubs. Mayor Bloomberg praised representatives of the city, the construction and nightlife

industries, neighborhood groups and the City Council for collaborating. He signed the legislation into law on Dec. 29, 2005.

Reducing construction noise citywide would seem to be an idea with wide appeal, but the initiative was not without its critics. Understanding the natural resistance to change, compounded by potential economic consequences of compliance with higher standards, the mayor directed DEP to carefully consider costs and effects on business operations as the department developed source-specific mitigation solutions for construction equipment.

## 2. LEGAL OVERVIEW

The updated regulations were codified as Law 113 of 2005. It amended the Administrative Code of the City of New York in relation to the Noise Control



Code. The law established standards and procedures regarding construction noise management to reduce noise levels. It also established sound level criteria for specific noise sources. Section 24-219 of the Administrative Code also mandated adoption of rules prescribing noise mitigation strategies, methods, procedures and technologies that shall be used at construction sites whenever certain devices or activities are employed or performed.

The new regulation amended Title 15 of the Rules of the City of New York (RCNY) by adding a new **Chapter 28**, establishing (1) the requirement that contractors develop and implement Noise Mitigation Plans prior to performing construction work within the City, (2) describing acceptable work hours, (3) defining after-hour restrictions, (4) establishing

construction equipment source emission noise limits, (5) providing guidelines for the use of noise mitigation barriers around work sites, and (6) describing concerns with particularly noisy construction equipment and providing examples of various equipment noise mitigation methods for the contractor to consider. The new noise emission limits apply to all generic types of construction equipment and are consistent with those found in the new Federal Highway Administration (FHWA) Guidelines<sup>2</sup>.

NYC DEP uses the FHWA guidelines during complaint-based site inspections to determine which construction devices need further noise mitigation and works with contractors to achieve the necessary improvement. On receiving noise complaints, NYC DEP inspectors review

the contractor's Noise Mitigation Plan and measure emissions. Contractors in violation are afforded a "cure period." A contractor who determines that compliance is not possible may file and seek approval of an Alternative Noise Plan in the spirit of reasonable mitigation. The revised NYC DEP Noise Code and Construction Noise Regulation took effect July 1, 2007.

### **3. TEAM APPROACH**

Collaboration was a key to successful passage of the noise code legislation. NYC DEP conducted an all-inclusive process, meeting with community boards and citywide advocates such as the League of the Hard of Hearing. DEP reached out to well-known experts in noise mitigation, namely Erich Thalheimer of Parsons Brinckerhoff (PB) and Eric Zwerling of Rutgers University.

DEP met with trade associations and leading business groups including the Real Estate Board, the Building Owners and Managers Group, the General Contractors Association, the Nightlife Association, the Restaurant Association, Heavy Equipment Contractors, Licensed Plumbers, Affordable Housing, Small Home Builders, and Unions. DEP also included input from major City utilities including Keyspan, Verizon, Con Ed and Empire City Subway. The department even went so far as to meet with food vendors such as Mr. Softie Ice Cream.

DEP also held numerous meetings to obtain approval of the draft regulation from its sister city agencies, especially those involved in construction: the departments of Design and Construction; Transportation; Buildings; Health and Mental Hygiene; Consumer Affairs; Sanitation; City Planning, and Small Business Services.

#### 4. GOOD TIMING

The timing of the regulation update was ideal. The Central Artery/Tunnel Project (The Big Dig), nearing completion in nearby Boston, had produced valuable lessons and precedents<sup>3</sup>. NYC DEP assembled the General Contractors Association (GCA) and various NYC agencies to consider lessons from the Big Dig. The Federal Highway Administration (FHWA) was concurrently also updating its nearly 35-year-old policy and prediction model regarding construction noise<sup>2</sup>. Construction noise was attracting more public attention and research focus by professional societies and industry experts<sup>4</sup>. Networking and the Internet were aiding communication among residents and regulators.

#### 5. REGULATION STRATEGY

The strategic core of the new regulation is proactive avoidance of excessive construction noise coupled with enforcement flexibility for NYC DEP, creating room for compromise that fosters

Equipment Description	Lmax Noise Limit at 50 ft, dBA, slow	Equipment Description	Lmax Noise Limit at 50 ft, dBA, slow
All other equipment > 5 HP	85	-- continued --	-- continued --
Auger Drill Rig	85	Grader	85
Backhoe	80	Horizontal Boring Hydraulic Jack	80
Bar Bender	80	Hydra Break Ram	90
Blasting	94	Impact Pile Driver (diesel or drop)	95
Boring Jack Power Unit	80	Insitu Soil Sampling Rig	84
Chain Saw	85	Jackhammer	85
Clam Shovel	93	Mounted Impact Hammer (hoe ram)	90
Compactor (ground)	80	Paver	85
Compressor (air)	80	Pickup Truck	55
Concrete Batch Plant	83	Pneumatic Tools	85
Concrete Mixer Truck	85	Pumps	77
Concrete Pump	82	Rock Drill	85
Concrete Saw	90	Scraper	85
Crane (mobile or stationary)	85	Slurry Plant	78
Dozer	85	Slurry Trenching Machine	82
Dump Truck	84	Soil Mix Drill Rig	80
Excavator	85	Tractor	84
Flat Bed Truck	84	Vacuum Excavator (vac-truck)	85
Front End Loader	80	Vacuum Street Sweeper	80
Generator (25 KVA or less)	70	Vibratory Concrete Mixer	80
Generator (more than 25 KVA)	82	Vibratory Pile Driver	95
Gradall	85	Welder	73

Table 1: NYC DEP Noise Regulation Equipment Noise Criteria  
(Taken from FHWA Roadway Construction Noise Model2, RCNM, 2006)

growth and betterment of the city while holding compliance costs in check so as to encourage contractors to cooperate. For these reasons NYC DEP ensured that the new measures were both reasonable and feasible. Lessons from other large construction projects proved useful in developing specific noise mitigation rules for each generic type of construction equipment. In this manner contractors could not argue the feasibility aspects of the regulation. Compliance costs remained a prime concern as NYC DEP coordinated with contractors and utilities.

#### 6. REGULATION SPECIFICS

The regulation governs the planning and mitigation of construction noise, specifically:

##### A. — Noise Mitigation Plan

- Contractors must develop and post conspicuously for inspection and review a suitable Noise Mitigation

Plan detailing the steps and measures they will use to control construction noise. NYC DEP allows for Alternative Noise Mitigation Plans and Utility Noise Mitigation Plans for special circumstances.

##### B. — Required General Noise Mitigation Measures

- Contractors must certify that all equipment used on site complies with noise emission limits (Table 1) recently promulgated by FHWA2 in which specific Lmax limits in dBA,slow at 50 feet are provided for generic types of equipment. Noise complaints trigger NYC DEP measurements and evaluations to ensure compliance with the FHWA guidelines. NYC DEP allows a ‘cure period’ if necessary for the contractor to comply.
- All devices must be equipped with appropriate mufflers and silencers.
- Housing doors on equipment must

be shut during operations, and the equipment must be operated at lowest possible power levels.

- Portable small equipment, such as generators, pumps, and compressors, will be covered with noise enclosures.
- Construction vehicles as of model year 2008 must be fitted with quieter manually adjustable or automatically adjustable backup alarms.
- A 15-foot tall, gap-free, well maintained perimeter noise barrier or curtain must be installed at job sites within 200 feet of a receptor.
- The contractor must ensure that laborers have been trained to understand the new regulation and minimize noise emissions on job.
- The contractor must coordinate and cooperate with job site neighbors to avoid as much disturbance as possible.
- Normal hours for construction are 7:00 a.m. to 5 p.m. Contractor may work additional hours providing that NYC DEP concurs with the contractor’s Noise Mitigation Plan for after-hours operations.

Question	Answer
What triggers NYC DEP to inspect or investigate noise from a construction site?	Noise Complaints — NYC DEP inspectors will respond to noise complaints and can order work stopped and/or initiate fine process.
Does the regulation apply to Federal and State projects, and other NYC agencies and utilities as well?	Yes, but Federal and State projects can claim exemption so an agreement to voluntarily comply is typically established.
Which 50-foot equipment noise limits contained in the regulation are the real limits, “Spec” or “Actual”?	Use the Spec limits — the Actual figures are provided for modeling and to show achievability.
Do all Noise Mitigation Plans need to be filed with, and approved by, NYC DEP?	No. Routine (daytime) noise mitigation plans do not need to be filed, but “after hours” (nighttime) or hardship alternative mitigation plans must be.
Are there additional construction noise limits contained in NYC’s general noise code as well?	Yes. More details are provided about after hours work and Alternative Mitigation Plans. Noise should not exceed Ambient + 8 dBA Lmax when measured inside residences.

Table 2. Common Questions and Answers

**C — Construction Devices and Activities**

- Specific noise mitigation requirements and suggested additional mitigation options are provided for five general categories of particularly noisy construction equipment:
  - Impact Devices – e.g. pile drivers, jackhammers, hoe rams, and blasting
  - Earth Moving Equipment – e.g. vacuum excavators
  - Trucks and Vehicles – e.g. dump trucks
  - Stationary Equipment – e.g. cranes, auger drill rigs, street plates, backup alarms
  - Manually Operated Equipment – e.g. concrete saws



Photo 1. Plywood Barriers on Jersey Bases

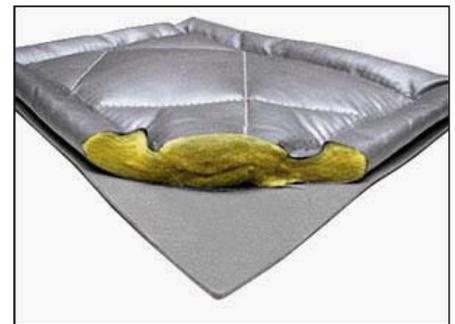


Photo 3. Noise Curtain Material



Photo 2. Trailers as Noise Barrier



Photo 4. Noise Tent Enclosure

**D — Perimeter Barriers, Temporary Barriers, and Noise Curtains**

- Noise barriers or curtains must achieve a Sound Transmission Class (STC) rating of 30 or greater, break the line-of-sight between the noise sources and receptors, and reach a height of at least 15 feet. Barriers/curtains can be made of any suitable material including wood, plastic, Plexiglas, concrete, steel

or earthen berms (Photos 1 and 2).

- Portable ‘noise tents’ of vinyl curtain attached to three sides and the top of a metal frame must enclose small noisy equipment and/or activities such as jackhammers (Photos 3 and 4).

**7. POINTS OF CLARIFICATION**

The understandable questions that arise regarding implementation, interpretation

and enforcement of the construction noise regulations are best addressed directly to Charles Shamon (718-595-6546 or [CharlesSh@dep.nyc.gov](mailto:CharlesSh@dep.nyc.gov)). Common questions are answered in Table 2.

## 8. DEPARTMENT SUPPORT

To avoid unreasonable restrictions and undue burdens for contractors, NYC DEP took care to include contractors and their professional groups in crafting the new regulation from the beginning.

While not every concern or objection could be resolved to the contractors' satisfaction, NYC DEP did reply to every comment received and in most cases replied with specific examples of how noise was mitigated at other projects nationwide.

NYC DEP's willingness to cooperate with contractors can be seen in its support for practical innovations using readily available materials as noise barriers. DEP recommended that a contractor use common shipping containers (Conex Boxes **Photo 5**) as a noise barrier at water treatment plant the Bronx where the work involved extensive rock drilling and pile driving. The containers, 20 feet long, eight feet deep and eight feet tall were stacked to make a 16-foot-tall barrier in which gaps were filled with curtain material similar to the kind shown in **Photo 3**.

Encouraged by DEP, a vendor fashioned a jackhammer muffler, **Photo 6**, from a heavy vinyl cylindrical material with a rubber collar around the bit. DEP staff determined that the muffler reduced noise emissions from various full-sized jackhammers by as much as nine decibels, sufficient to comply with the new emission criterion of 85 dBA Lmax at 50 feet (**Table 1**).

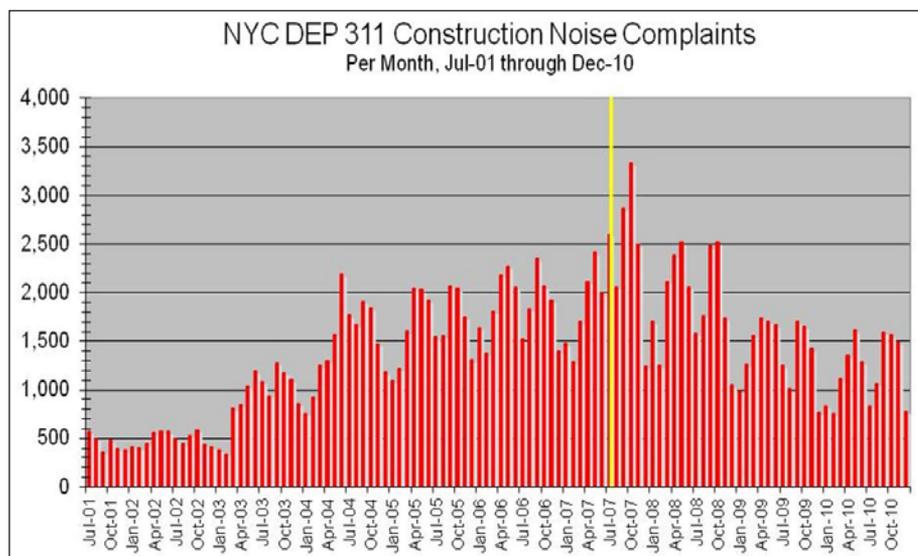
NYC DEP also prepared a *Noise Control Products & Vendor Guidance Sheet*, which is not a list of approved equipment and materials but rather an aid to contractors in selecting quieter equipment and materials,



Photo 5. Conex Boxes as Noise Barrier



Photo 6. Prototype Jackhammer Muffler



(Figure 2. Construction Noise Complaints Before vs After Rule Implementation)

which they have full discretion to choose, provided that their use complies with noise emission limits. The guidance sheet was based on confidential noise emission data provided by multiple equipment manufacturers. Data published in the sheet came exclusively from certified test methods, such as SAE J88 and J1805, EU 88/EC and 14/EC, ISO Standards 3744, 4872, 6395 and 2151, and ANSI Standards S12.23 and S12-51-57.

Heavy equipment manufacturers have come to recognize a competitive advantage in being represented in the *Noise Control Products & Vendor Guidance Sheet*. The procedure for doing so is fairly simple:

1. Have the equipment Lw or Lp determined in accordance with an accepted standard
2. Submit results to Charles Shamon (NYC DEP) or Erich Thalheimer (PB)

3. The noise data will be rank ordered by Lw or Lp for similar equipment categories
4. The quietest several models will be featured on the Products & Vendor Guidance List

## 9. POST-IMPLEMENTATION EFFECTS

While no measured data exists to support comparisons of noise emissions before and after the new regulation took effect, records of city's 311 hotline show (Figure 2), the number of construction noise complaints was rising rapidly through the first half of the last decade, peaking at about 25,500 complaints in 2007. Since implemented in July 2007, the number of such complaints has steadily decreased: nine percent fewer in 2008, 35 percent fewer in 2009, and 44 percent fewer in 2010 relative to complaints in 2007.

## 10. COMMUNICATION & RECOGNITION

The new regulation has been widely praised by professional societies and in acoustical manuals and has received highly favorable print and broadcast coverage by news media across the United States and in Britain, Canada, Israel, Russia, India, China and Australia.

NYC DEP has communicated the new regulation in various ways. It mailed printed copies of the document to general contractors, engineering firms, architects and others. DEP dedicated a page of its website to regulation at <http://www.nyc.gov/html/dep/html/noise/index.shtml>. Department staff members have made personal presentations at numerous professional conferences including NoiseCon 20076, NHCA Workshop 2009, NIOSH Buy Quiet Workshop 2011, and now InterNoise 2012. Strong interest prompted DEP to present the regulation through live Internet seminars to members of the ACEC New York Chapter.

The National Academy of Engineering<sup>7</sup> praised the new regulation in its recently published guidance document *Technology for a Quieter America*. The academy called the regulation an exemplary effort to manage construction noise in a large urban setting and “a good starting point for upgrading existing laws or creating new ones.”

The regulation also won the 2009 ACEC Silver Award from the American Council of Engineering Companies and the 2010 Safe-In-Sound Award from the National Hearing Conservation Association.

## 11. LESSONS LEARNED

The new NYC DEP regulation is very likely the most sweeping effort to date of any municipal attempt to combat and control construction noise. As such it provides useful lessons or the noise control profession.

1. Construction noise can be regulated. No excuse remains for simply accepting excessive construction noise as an unfortunate necessity. A well framed regulation can balance a community’s interest in peace and quiet and the interests of property owners and governments undertake construction.
2. Noise regulations require early legislative cooperation. Primary jurisdiction should be assigned clearly among relevant government agencies to minimize confusion over lines of authority.
3. Extensive dialog and consensus building are essential. The lead agency should reach out and include as many affected parties as possible. This might include legislators, contractors, builders, trade unions, professional societies, enforcement officials, and other municipal agencies and departments.
4. The regulations must be technically correct and defensible. Contractors will be held accountable for noise emissions and for compliance with the regulation, therefore the regulation must be technically correct to insure fair and unambiguous enforcement. Also, no regulation can satisfy everyone, so legal challenges are to be expected.
5. An effective noise regulation must provide for proactive avoidance with reactive ability. The best form of noise control is to avoid producing the noise in the first place. This can be accomplished through carefully considered Noise Control Plans. However, regulations are only as effective as their enforcement, so the lead agency must be empowered, staffed and trained to properly enforce the regulations.
6. There are benefits to the community and laborers alike. The primary aim of the NYC DEP construction

noise regulation was reducing noise in the community, and quieter work practices, quieter equipment, and more conscientious job site conditions reduce noise exposure for laborers as well.

7. The noise regulation need not hinder construction. Noise regulations have a direct effect on the means, methods, schedule and costs associated with construction projects. Contractors were understandably concerned that such potential effects on their business. Fortunately, NYC DEP has no evidence to date indicating this concern ever materialized. 

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# INTER-NOISE 2012 REPORT

## Historical Notes, Future Outlook Add Flourish to INTER-NOISE 2012



*Plenary Session*

**H**istorical notes and future outlooks added flourish and insight to an INTER-NOISE 2012 conference that succeeded on the able work of its planners in attracting nearly 1,500 registrants and nearly 1,100 technical papers.

After an introduction by Congress President Steve Hambric, INCE/USA President Eric Wood welcomed participants to the Aug. 19 opening of the congress in the Marriott Marquis Hotel, Times Square, the heart of New York City. Minutes earlier amid entertainment by a jazz ensemble, a photo slide show had covered 40 years of INTER-NOISE congresses. Numerous references to the

future would punctuate presentations, technical sessions, a public workshop, and discussions over the ensuing days.

Thus bracketed by history and the future, Wood looked back to near the mid-point of the 400-year-old city's life and noted that his great, great grandfather had come to New York in the late 1820s and later formed Normal College, now Hunter College, the first in the United States for women.

With thanks to all exhibitors, authors, organizers and the board of directors, Wood praised INCE/USA for the value it adds to the noise control profession in ways that include burnishing members'

credentials with board certification and recognizing individuals from the United States and other countries who have made significant contributions to the field. He encouraged his listeners to nominate worthy colleagues as distinguished international members of INCE/USA.

Wood thanked Courtney Burroughs for posting INTER-NOISE and NOISE-CON technical papers online and in this way helping to make about 20,000 such documents available worldwide. Wood said that posting online graduate courses for working professionals will gain importance in the future. He thanked Bill Lang for writing the early history of INCE/USA.

Wood encouraged members to donate to the INCE Foundation, which funds INCE/USA programs related to education, including the new Beranek Medals, the outstanding educator award, student awards, and the Martin Hirschorn Prize.

Wood was followed by Brent Paul, representing INTER-NOISE Congress co-sponsor the Noise Control and Acoustics Division of the American Society of Mechanical Engineers. Paul profiled the 500-member ASME/NCAD and its technical committees and awards programs, especially the Per Brüel Gold Medal and the upcoming 2012 edition of the Rayleigh Lecture by Philip Morris of the Pennsylvania State University.

Gilles Daigle, president of International INCE, reported that earlier in the day the board of the global consortium of noise control and acoustical societies had approved Peru as the 43rd member society of I-INCE.

With that welcome news, INTER-NOISE 2012 was formally open.

Assistant Commissioner Mike Gilsenan relayed greetings from the New York City Department of Environmental Protection and Mayor Bloomberg and introduced the joint speakers at the opening plenary lecture, Charles Shamoon of NY DEP and Eric Thalheimer of Parsons Brinkerhoff.

An abstract of their *Understanding and Complying with the New York City Construction Noise Regulation* has been posted at <http://noiseneewsinternational.net/docs204/nyc.pdf>.

Delegates later enjoyed a reception in a hotel restaurant overlooking bustling Times Square.

Dr. Charlotte Clark of the Wolfson Institute of Preventive Medicine told delegates Monday morning, Aug. 20, in a plenary lecture that researchers have strengthened the evidence relating environmental noise to children's intellectual function. In delivering *Transportation Noise Effects on Children's Cognition and Health*, she also discussed chronic noise exposure as a factor that detracts from students' ability to read and remember. Clark cited convincing evidence that aircraft and road traffic noise annoy children and may be associated with raised blood pressure and hyperactivity. Her abstract has been posted at <http://noiseneewsinternational.net/docs204/clark.pdf>.

The rest of Monday and most hotel meeting space was filled with 22 parallel sessions and closed with a reception for delegates and representatives of INTER-NOISE 2012's 68 exhibitors.

Parallel sessions consumed Tuesday, Aug 21, capped by the congress banquet and



2012 Student Paper Competition Winners: Michael Hayward, Alexander Sell and Bruno Campolina. Not pictured: Kuba Mazur.



Courtney Burroughs receives the INCE/USA Distinguished Noise Control Engineer (DNCE) Award. He is shown with his wife receiving this award.

an enjoyable performance of the musical *Back to Broadway*.

Larry Finegold and David Sykes on Wednesday co-chaired the Community Noise Public Outreach Workshop, featuring ten speakers covering a variety of relevant issues. The program has been posted at <http://www.noiseneewsinternational.net/docs204/workshop.pdf>.

## INTER-NOISE 2012 Exhibitors

3M Thermal Acoustic Systems	Commercial Acoustics Div. Metal Form Mfg. Co. Inc.	HEAD acoustics, Inc.	National Institute for Occupational Safety and Health (NIOSH)	Sound Fighter Systems, LLC
ACO Pacific, Inc	Data Physics Corporation	International Cellulose Corporation	Navcon Engineering Network	Sound Seal Acoustical Products
Acoustic Systems/ETS-Lindgren	DataKustik GmbH	JAMISON DOOR COMPANY	NTi Audio AG & NTI Americas Inc	SoundPlan
American Acoustical Products	Eckel Noise Control Technologies - Eckel Industries, Inc.	Keene Building Products Co., Inc.	Odeon A/S	Soundproof Windows, Inc.
Armtec	Empire Acoustical Systems	Kinetics Noise Control, Inc.	Overly Door Company	The Green Glue Company
Atlantic Industries Ltd.	ESI North America	Lencore Sound Masking and Acoustics	PAC International, Inc.	Toyota Tsusho America, Inc.
BASF Corp	Free Field Technologies	LMS North America	Pliteq Inc	TRANE
BASWA acoustic North America, LLC	G.R.A.S. Sound & Vibration	Maxxon Corporation	Pyrok, Inc.	Trelleborg Rubore Inc,
Brüel & Kjær	Getzner – the good vibrations company	MBI Products Company, Inc.	RION Co.,Ltd	Tritek / TEAC Data Recorders
BSW GmbH	gfai tech GmbH	Microflown Technologies	Scantek, Inc.	ViAcoustics
BSWA Technology Co., Ltd.	Gyp-Sorb	Microtech Gefell GmbH	Sensidyne	Vibro-Acoustics
CESVA INSTRUMENTS SLU	Hangzhou Aihua Instruments Co.,Ltd	Müller-BBM VibroAkustik Systeme, Inc	SINUS Messtechnik GmbH	Zero International
Cirrus Research plc		MULL-IT-OVER Products		



*In Session*

Penn State's Philip Morris delivered *Jet Noise Prediction-A Historical Perspective and Future Directions* as the latest recipient of the Rayleigh Lecture Award for pioneering contributions to the sciences and industrial applications. His abstract has been posted at <http://www.noiseneewsinternational.net/docs204/rayleigh.pdf>.

the INCE/USA award ceremony, a plenary lecture by INTER-NOISE 2011 Congress President Ichiro Yamada, and a closing ceremony.

The INCE/USA Award Ceremony followed the lecture and a number of awards were presented to students and others on behalf of INCE/USA. A description of the awards may be found in the INCE Update Department in this issue of NNI.

Dr. Ichiro Yamada delivered the final plenary lecture of INTER-NOISE 2012. Representing the Japan Aviation Environment Research Center of the Airport Environment Improvement Foundation, Yamada reviewed the history of noise policies and land use planning and environmental noise guidelines and laws. The paper also described recent advances in noise modeling, sound source identification for unattended noise monitoring and other technologies. His

abstract has been posted at <http://www.noiseneewsinternational.net/docs204/yamada.pdf>.

INTER-NOISE 2012 President Hambric and I-INCE President Gilles Daigle closed the congress with thanks to all of its contributors, including Rich Peppin for excellent leadership organizing the event; Tom Lago for managing the audio system; Larry Finegold and David Sykes for organizing the Community Noise Workshop; Brent Paul for representing ASME/NCAD; all of the speakers for preparing and delivering their presentations; Courtney Burroughs and George Maling for producing the Congress DVD; Steve Conlon for organizing the technical program, and he said that the performance at the banquet was true Broadway quality. Hambric thanked his wife and daughter for their patience during the three years of preparation for the event. He said that 62 countries were represented at the meeting and listed the 12 countries that sent the most delegates: USA, 551; Japan, 129; France, 71; Germany, 66; Korea, 65; Canada, 61; UK, 56; Sweden, 49; Denmark, 40; Brazil, 42; China, 39; Netherlands, 33.

With INTER-NOISE 2012 formally closed, Werner Talasch invited the delegates to join him at the INTER-

NOISE 2013 Congress in Innsbruck, Austria, as described at <http://www.internoise2013.com>.

### **This and Five Other Conferences' Papers on DVD**

Delegates received the conference program, abstract booklet and a DVD of 1,063 pdf files of the presentations submitted as written papers. Regrettably, the abstract booklet author index included several errors. A corrected index may be downloaded from the INTER-NOISE 2012 conference website at [www.internoise2012.com](http://www.internoise2012.com). The Proceedings DVD also contains five other INTER-NOISE Congresses:

- INTER-NOISE 1995, Newport Beach, California, USA
- INTER-NOISE 1999, Fort Lauderdale, Florida, USA
- INTER-NOISE 2002, Dearborn, Michigan, USA
- INTER-NOISE 2006, Honolulu, Hawaii, USA
- INTER-NOISE 2009, Ottawa, Canada

The DVD has been indexed, and is searchable by any string of text using an Adobe Acrobat Reader. The DVD is available from the INCE/USA page at the Atlas Bookstore. Go to <http://www.bookmasters.com/marktplc/00726.htm>.

The DVD, Stock No. IN12, is 75 USD plus 2 USD for shipping and handling in the USA and 5 USD for other countries. It may also be ordered from BookMasters, Inc., Distribution Services Division, 30 Amberwood Parkway, Ashland, OH 44805, USA. Telephone: 1 800 247 6553 (USA and Canada only) ; Fax: 1 419 281 6883; e-mail: [order@bookmasters.com](mailto:order@bookmasters.com). 

## Variety in Methods Makes Noise Data Comparisons Meaningless

Straightforward comparisons of estimated noise exposure data submitted from European member states and posted on the Internet are meaningless because, unfortunately, different methods have been used to determine the reported data.

This is the premise of a paper, *Comparative Analysis of Methods to Estimate Urban Noise Exposure of Inhabitants*, that analyses the sources of uncertainty in the estimation of people exposed to urban noise, namely the determination of noise façade levels and the assignment of population to these levels. The data were developed under the [Environmental Noise Directive \(2002/49/EC\)](#).

The paper, noticed by the European Commission in an online [news alert](#), focuses on possible variations in people exposure estimate due to the method used to calculate noise levels at receivers and to assign levels to buildings, as well as to associate population to each building. Results show that the choice of the method to estimate noise exposure of inhabitants is crucial for planning effective noise mitigation actions.

The authors, [G. Licitra](#), [E. Ascari](#), and [G. Brambilla](#), propose that a simple method, considering only the noise level at the grid point closest to the building, would be suitable to inform and to be understood by the public, even though it is not appropriate for epidemiological studies or definition of action plans. Because inaccurate estimations of noise exposure may lead to misleading allocation of resources in action plans, the objective of the estimated exposure should be clear at the time of the choice of the calculation method in order to select the most appropriate one.

## Royal Academy Study Eyes UK Wind Power Implications

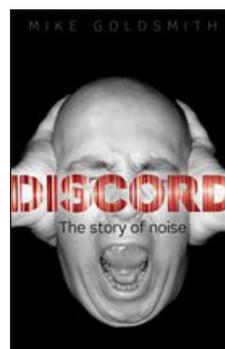
The Royal Academy of Engineering launched a study on the implications of large-scale deployment of wind power on the UK electricity system. The study was to concentrate mainly on the engineering implications of wind power, including the installation, operation and decommissioning of the grid and the effect on related industrial activities. Costs and carbon emissions were also slated to be considered as the UK faced questions about secure, affordable and low-carbon energy. The study timeframe was set to encompass 2030.

Government policy commits the UK to provide 15 percent of its energy from so-called renewable sources by 2020. This would require 15 gigawatts of on-shore turbines and 13 gigawatts of off-shore turbines amounting to thousands of turbines in total.

Wind power in particular has been found to emit low- and ultra-low-frequency noise that can harm the health of people living near industrial wind turbines.

## Book by UK's Goldsmith Tells the History of Noise

Mike Goldsmith does what few scientists can, write books that appeal to general readers. Now he's done what no author ever has, write the history of noise.



In *Discord — The Story of Noise* from [Oxford University Press](#) Goldsmith covers the long history of the battle between

people and noise — a battle that has changed lives and molded societies. He relates rising noise levels to humanity's technological progress and describes the development of our scientific understanding of sound and hearing. Nature gets her due in passages about the remarkable ability of shrimps and other animals use noise as a weapon and to catch prey. Goldsmith concludes *Discord* with a commentary about likely noise sources of the future and their interplay with science and new ideas.

Goldsmith deploys the scientific expertise he acquired while earning a PhD in astrophysics at Keele University by researching variable supergiant stars and cosmic dust formation and later during a 20-year career at the UK's National Physical Laboratory, including many years as head of the NPL Acoustics Group. The good news for readers is that Goldsmith discards the passive voice, impersonal tone and mechanical syntax that are associated with the anesthetic quality of much scientific and technical writing.

“This is not a textbook; it is the first and only history of noise in all its forms,” Goldsmith explained at the publisher's [on-line catalogue](#). “Though there is plenty of science here — and plenty of opinion too, of course — the primary point of this book is to tell a story.”

And tell it he does. “*Discord* is an extremely attractive and accessible, well-written and engaging book,” said Peter Pestic in *American Scientist*. *Discord* is a “spectacularly good book,” according to *New Scientist*. Andrew Robinson of *The Lancet* called the book an “engaging, often entertaining, history of noise from prehistoric times to the present day.”

Discord is one of 30 books on scientific subjects that Goldsmith has written since 1999 for general readers.

## WHO Publishes Noise Policy Guide

The World Health Organization in cooperation with the European Commission's Joint Research Centre issued a technical document as guidance for national and local authorities in assessing risk and planning policies related to environmental noise. [Methodological Guidance for Estimating the Burden of Disease from Environmental Noise](#) summarizes:

- The principles of quantitative assessment of the burden of disease from environmental noise;
- The status of implementation of the European Noise Directive, and
- Lessons from the project on Environmental Burden of Disease in the European countries.

The document also reviews evidence on exposure-response relationships between noise and cardiovascular diseases.

It presents step-by-step guidance on calculating the burden of cardiovascular diseases and sleep disturbance and covers the limitations and uncertainties of estimating disability-adjusted life years and the usefulness and limitations of noise map data.

Noise pollution is one of the most frequently perceived environmental health issues in Europe, according to WHO. One in three individuals is annoyed during the daytime and one in five suffers disturbed sleep at night because of traffic noise.

Epidemiological evidence indicates that those chronically exposed to high levels of environmental noise have an increased risk of cardiovascular diseases such as myocardial infarction. Thus, noise pollution should be considered as a threat to public health in modern times

## Consultation Says End Noise Abatement Zones In England and Wales

Comments submitted to the UK Department for Environment, Food and Rural Affairs unanimously supported the proposed repeal of noise abatement zones created for England and Wales under the Control of Pollution Act of 1974, the department [announced](#).

Once empowered by the 1974 law, local governments established 86 zones as means to control creeping background sound levels and unacceptable noise from multiple sources. The zones proved to be burdens on local governments. Only two remained in active current enforcement. Five were disbanded, and 79 remained on the books but without enforcement due to both the burden of responding to inquiries arising from property transaction searches and the bother to local governments of repealing the zones they had created. Hence, the department and the Welsh government reasoned that repeal of the primary, enabling law was more efficient.

## Parliament Curbs Vehicle Noise

[The European Foundation for Transport and Environment](#), T&E, said the European Parliament Environment Committee voted to tighten future noise limits for vehicles.

Nearly half of all EU citizens are exposed to road traffic noise over the level the World Health Organization says may pose health risks, according to T&E, whose policy officer Cécile Toubeau said the vote shows that members of parliament support smart rules to cut vehicle noise.

The changes will not take effect for another seven years, T&E said.

An earlier attempt at compromise on revising noise limits for vehicles was postponed after proponents of tighter restrictions became convinced that Porsche had drafted text bound for the

European Parliament in an attempt to weaken existing standards.

T&E had accused Miroslav Ousky, the Czech MEP who is steering the legislation through Parliament, of passing off as his own work a compromise amendment drafted by Porsche. Ousky accused T&E of trying to blackmail him by threatening to reveal Porsche's links with the compromise unless he tightened the noise limits.

T&E is an independent European association whose main concerns include cars, carbon dioxide, low-carbon fuels, and transport noise. The [European Climate Foundation](#) is a major source of funding for T&E.

## HPA Asked to Take On Noise and Health Role

The Department of Health of England and the Devolved Administrations asked the Health Protection Agency to take on responsibility for certain aspects of noise and health, mainly on environmental and neighborhood noise such as that produced by transport.

A work plan was developed for the HPA to set the scope of its potential new role, allow for discussed and serve as a basis for developing a work program when resources become available. The draft work plan was published in 2012 and comments were taken subject to future publication on the HPA website.

The consultation [document](#) remained available online and inquiries were invited via [noisecomment@hpa.org.uk](mailto:noisecomment@hpa.org.uk) at the Centre for Radiation, Chemical and Environmental Hazards, HPA.

## UK Noise Police Project Accepts INTER-NOISE Paper

The INTER-NOISE 2012 paper *Environmental Noise and Cardiovascular Disease — Observations on a Well Known Dose-Response Relationship* gained acceptance by the Department

Environment Food and Rural Affairs of England for publication in connection with the department's project entitled *Identification of Significant Observed Adverse Effect Levels SOAEL and Lowest Observed Adverse Effect Levels LOAEL, in support of the Noise Policy Statement for England NPSE*.

The authors are H. E. Laszlo, MRC-HPA Centre for Environmental Health, Imperial College London; B. F. Berry, Berry Environmental Ltd, Shepperton, UK; P. Abbott, AECOM, Glasgow, UK; and A. L. Hansell, MRC-HPA Centre for Environmental Health, London.

### Seminar to Mark 50 Years of ISVR

The Institute of Sound and Vibration Research (ISVR) will celebrate the 50th anniversary of its founding with a two-day symposium, July 11 and 12, hosted by the faculty of the Engineering and the Environment, University of Southampton.

More information is available at [isvr50@soton.ac.uk](mailto:isvr50@soton.ac.uk).

### Berry Receives Lifetime Award

The Noise Abatement Society bestowed its Lifetime Achievement Award on Bernard Berry for his many years of extraordinary work and expert advice on the effects of noise.

Berry has been a consultant to industry, the European Union and national and local governments and has collaborated on research projects with a number of organizations. He is an adviser to the World Health Organization and a member of its Working Group on Aircraft Noise and Health. He is also an adviser to the European Centre for Environment and Health in Bonn.

An author of more than 120 published papers, reports and book chapters and a presenter at more than 100 conferences, Berry is chairman of the British Standards

Institution Technical Committee on Acoustics.

He was President of the Institute of Acoustics from 1996-1998. And was the Institute's Vice-President for International Relations from 2001 to 2007. In October 2009 he was presented with the Institute's Award for Distinguished Service – "for his outstanding contribution to the life of the Institute".

In April 2010 Berry was elected a Distinguished International Member of the Institute of Noise Control Engineering of the United States of America. This distinguished, honorary status is conferred upon individuals who have personally made extraordinarily significant contributions to the theory and/or practice of noise control engineering.

### Inaugural Underwater Acoustics Conference Set

Following a merger of the European Conference on Underwater Acoustics and the Underwater Acoustic Measurements: Technologies and Results, the first International Conference and Exhibition on Underwater Acoustics is scheduled for June 23 to 28 on the Greek island of Corfu in the Ionian Sea. The newly formulated conference will be held

every other year. Find more details at <http://www.uam-conferences.org>.

### Integrity-Reliability & Failure Conference Set for Portugal

The 4th International Conference on INTEGRITY-RELIABILITY & FAILURE June 23-27 in Funchal, Madeira, Portugal will include a symposium on vibration and structural acoustics analysis. Organized by [Dr. Cesar Vasques](#), Universidade do Porto, the seminar will feature papers solicited on vibration analysis, analytical and computational structural acoustics and vibration, material systems and technologies for noise and vibration control, passive, semi-active and active control technologies, piezoelectric and viscoelastic damping, shape, position and fluid flow control, nonlinear dynamics and vibration, vibration-based structural health monitoring, evaluation and damage prognosis, machinery noise, vibration and diagnostics, reciprocating machinery and rotor dynamics, experimental testing in vibration and structural acoustics, experimental modal analysis, modeling of the dynamics and damping of complex systems, noise and vibration on high-speed trains, structural and musical vibro-acoustics, applications and case studies in structural acoustics and vibration. 



**ACCOLADE FOR WORK AND ADVICE – Crystal in hand and flanked by his wife, Bernard Berry receives the Lifetime Achievement Award from the Noise Abatement Society.**

## Windmills Harm Human Health in Proportion to Distance from Homes

### Epidemiological Research Findings

New epidemiological research adds tangible evidence to the growing body of information about the ill effect that industrial wind turbines have on people in once-quiet communities that find themselves flanked by giant, spinning emitters of low- and ultra-low-frequency sound.

“This study supports the conclusions of previous studies, which demonstrate a relationship between proximity to IWTs (industrial wind turbines) and the general adverse effect of annoyance but differs in demonstrating clear dose-response relationships in important clinical indicators of health including sleep quality, daytime sleepiness, and mental health,” wrote the authors of *Effects of Industrial Wind Turbine Noise on Sleep and Health*.

The levels of sleep disruption and the daytime consequences of increased sleepiness, together with the impairment of mental health and the dose-response relationships observed in this study (distance from IWT vs. effect) strongly suggest that the noise from IWTs results in similar health impacts as other causes of excessive environmental noise,” *Effects of Industrial Wind Turbine Noise on Sleep and Health*. “The degree of effect on sleep and health from IWT noise seems to be greater than that of other sources of environmental noise, such as, road, rail, and aircraft noise.”

The study was written by Michael A. Nissenbaum of Northern Maine Medical

Center, Fort Kent, Maine; Jeffery J. Aramini of Intelligent Health Solutions, Guelph, Ontario; and Christopher D. Hanning of University Hospitals of Leicester NHS Trust, Leicester, UK. Their paper was published in the interdisciplinary international journal *Noise & Health*.

Nissenbaum, Aramini and Hanning determined as other studies have suggested that the common occupational noise measure LAeq, or averaged noise level adjusted to human hearing, is not appropriate in regard to the low-frequency sound, below 150 cycles per second, and the infrasound, below 20 cycles per second, that characterize the noise emitted by industrial wind turbines.

The use of LAeq “has led to an underestimation of the potential for adverse health effects of IWTs,” the authors wrote.

The stratified, cross-sectional study involved two groups of residents living near IWTs in two Maine towns, the island community of Vinalhaven in Penobscot Bay along the middle coast and Mars Hill, about 150 miles north on the border with New Brunswick, Canada. The near group lived from 375 meters to 1,400 meters from the windmills. The far group was 3.3 kilometers to 6.6 km distant.

Among the study’s statistical results:

- Participants living near IWTs had worse sleep, as evidenced by significantly greater mean scores on the Pittsburgh Sleep Quality index and the Epworth Sleepiness Score.

- Participants living near IWTs were significantly more likely to report an improvement in sleep quality when sleeping away from home.
- The near group had worse mental health as evidenced by significantly higher mean Mental Component Scores.
- Nine participants in the near group reported that they had been diagnosed with either depression or anxiety since the start of turbine operations, compared to none in the far group.
- Nine of the 38 participants in the near group reported that they had been prescribed new psychotropic medications since the start of turbine operations compared with three of 41 in the far group.

Nissenbaum, Aramini and Hanning conclude that “the noise emissions of IWTs disturbed the sleep and caused daytime sleepiness and impaired mental health in residents living within 1.4 km of the two IWT installations studied. Industrial wind turbine noise is a further source of environmental noise, with the potential to harm human health.”

The authors deemed current regulations to be insufficient to adequately protect the human population living close to IWTs.

“Our research suggests that adverse effects are observed at distances even beyond 1 km. Further research is needed to determine at what distances risks become negligible, as well as to better estimate the portion of the population

suffering from adverse effects at a given distance.

### Maine Court Orders Lowering of Nighttime Noise from Wind Farm

The Maine Supreme Judicial Court vacated a Maine Board of Environmental Protection decision that permitted nighttime noise levels as high as 45 decibels at the Saddleback Ridge Wind Project in Carthage, Canton and Dixfield, as reported online by the [Bangor Daily News](#).

Following the BEP's decision, the state legislature lowered the permissible limit to 42 decibels. The court, Maine's highest, ruled that 42 decibels was the appropriate limit for noise at the wind project.

Project developer Patriot Renewables of Quincy, Mass., told the [Lewiston-Auburn Sun Journal](#) that it will comply with the 42-decibel standard. "Despite the fact that these sound levels were not in place when this project was originally permitted, we are prepared to abide by the ruling of the Law Court," said Todd Presson, chief operating officer for Patriot Renewables.

Meanwhile, a 14-turbine wind project proposed for Passadumkeag Mountain won new life when the citizens' Board of Environmental Protection overturned a decision by the state Department of Environmental Protection to reject the project, according to a report published on the [Bangor Daily News](#) website.

Penobscot Forest LLC met most of the standards of the Maine Wind Energy Act, DEP Commissioner Patricia Aho ruled against it over concerns that the wind turbines would spoil the scenic view of Passadumkeag Mountain.

### Bill Limits Car Stereo Sound in Sao Paulo

Sao Paulo Council voted to approve a bill that authorizes fines of £ 1,000 for owners



*BIG PUNCH – A car associated with Sao Paulo's mass street parties known as pancadao, or 'big punch' in Portuguese. Photo credit: Leonardo Cardoso % [cardoso@utexas.edu](mailto:cardoso@utexas.edu) posting at [Sounding Out!](#)*

of cars that emit music above 50 decibels after 10 p.m. and before 8 a.m. The bill awaited approval by Mayor Fernando Haddad, according to news posted on the website of the Brazilian professional society [Pro Acustica](#).

Council members who authored the measure said they wanted to curb activity commonly seen in gas stations and other public locations, where people park cars equipped with powerful speakers, listen to loud music and drink in preparation for going to nightclubs. The council members called such behavior reprehensible and criticized both the volume and the message content of the music, which typically extols sex, drug use and violence.

The bill also would restrict group dancing during impromptu partying, or pancadao, on public streets. The fine for violating the decibel limit could be doubled and tripled for subsequent offenses. Vehicles could be seized and owners held responsible for towing and storage.

The legislation confronts issues that have been the focus of Operation Pancadao, a

joint effort of military and civil police, Sao Paulo's anti-noise agency (PSIU) and other civil authorities to measure, control and prevent excessive noise from street parties, as described by [Leonardo Cardoso](#), a Brazilian ethnomusicologist whose field work in Sao Paulo is described at [Sounding Out!](#), a website produced by The Binghamton University Sound Studies Collective, Binghamton, NY.

The pancadao, meaning 'big punch' in Portuguese, are parties that happen mostly in the peripheral neighborhoods of São Paulo, where very little leisure space is able to accommodate large numbers of people, according to Cardoso. Parties occur on the streets and plazas, attracting thousands of youngsters to flirt, drink, and dance to the sound of Brazilian funk blaring through the night from multiple large speakers installed cars that are sometimes parked three or more together.

"Once you cut the sound, partygoers disperse — often seeking another pancadao close by. One police chief

**See Pan-Am News p.32**

## News Agency Says Noise Tortures Hanoi Residents

A news [report](#) out of Hanoi describes how a preference among merchants for loud music to lure customers combines with lax law enforcement, traffic noise and society's tolerance for high decibels to make urban life very loud in Vietnam.

Merchants of various kinds — clothing, electronics, groceries, restaurant food and drink, entertainment, and banks — compete for attention by pumping up the volume, according to Viet Nam News, the nation's English-language daily.

Nguyen Thi Thao, the owner of the Karaoke Restaurant in Ha Dong District, told a reporter that she uses big speakers to attract clients. She said local order and security forces sometimes warned against it, but she said if she didn't blast passers-by, no one would stop at her restaurant.

Nguyen Tien Tho, an audio consultant with Hoabinh audio told Viet Name News that stores often used Chinese speakers which cost only a few million dong. According to Dang Duong Binh, who is in charge of Environmental Management at the Department of Natural Resources, Environment and Housing in Ha Noi, capital city people have to endure noise beyond all permissible limits, but it is still not as bad as in Ho Chi Minh City.

Lawyer Nguyen Quoc Viet told the news agency that according to Decree No73/12/2010/ND-CP, disturbing the peace between 10 p.m. and 5 a.m., even near hospitals and nursing homes, was subject to fines of VND100,000 - 200,000 (US\$4.80 to -9.60).

And, he added, those using loudspeakers, gongs, horns, trumpets or other means to promote their wares can be fined between VND 300,000 - 800,000 (\$14.40-38.40).

"This is too low to make anyone stop the habit," he said.

After studying 400 people living or working near noisy places, including roads, a research team from the Institute of Occupational Medicine and Environmental Hygiene said people had higher levels of neurological diseases, headaches, insomnia, difficulty concentrating and higher anxiety, according to Viet Nam News.

Brian Lamprell, [blamprell@gmail.com](mailto:blamprell@gmail.com), wrote in a posting to the VNS web site that one bus route passed his residence when he moved there in 2008 but now 15 routes use the road beside his home. Loud air horns, repeater horns and the audible turn indicators start sounding off before 5 a.m. and continue until nearly 10 p.m.

"The part I find most incredible is that the local Vietnamese people tolerate it," Lamprell said. "People having coffee or a meal at the outdoor eateries have this blasting of sound throughout their meal or coffee. But no one remonstrates with the bus drivers. Are the locals deaf or just willing to take this continuous audible abuse?"

## Bankok Set as Venue for Sound & Vibration Congress

The 20th International Congress on Sound and Vibration will pack 50 regular sessions and 32 structured sessions into five days, July 7-11 2013 in Bangkok, Thailand.

The conference will feature keynote lectures entitled Hearing Loss Prevention and Auditory Awareness in the Noisy Workplace; Numerical Prediction of the Signature of Maritime Platforms; Saving Campbell Diagram for Dynamic Analysis of Complex Rotor Systems; Urban

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reports having mapped more than 200 places of pancadao in Sao Paulo," wrote Cardoso. "These parties persevere because everything is mobile: the music, the drinks, the drugs, and even the place for having sex — everything is supplied by the cars and can move around whenever there is a risk of conflict with the police."

## Room Acoustics Symposium Set

The triannual International Symposium on Room Acoustics, a satellite of the International Congress on Acoustics, will convene Toronto on June 9, 2013. The conference will take place at the Royal Conservatory of Music, 273 Bloor St. West, and will run through June 11.

The conference will include contributed, as well as invited papers, and several special keynote presentations on room acoustics related to performance spaces for speech and music. More information is available by contacting [info@isra2013.com](mailto:info@isra2013.com) and by visiting [www.ISRA2013.com](http://www.ISRA2013.com).

## Structural Dynamic s Conference Set for Italy RASD 2013 Recent Advances in Structural Dynamics, 1-3 July 2013, Pisa, Italy

The Institute of Sound and Vibration Research at the University of Southampton will hold the 11th international conference RASD 2013 Recent Advances in Structural Dynamics July 1 -3 in Pisa, Italy. Find more details at [www.soton.ac.uk/rasd2013](http://www.soton.ac.uk/rasd2013). 

Noise Management and its Practical Implementation; Statistical Energy Analysis (SEA) Applications in Vibration and Noise; Applications of The Acoustical Boundary Element Method (BEM) and Related Green's Functions; and Bionic Design of Acoustic Localization System Based on Auditory Orientation Mechanisms. More information can be found at [www.icsv20.org](http://www.icsv20.org).

### New South Wales EPA Publishes Noise Guide

The Environmental Protection Agency of New South Wales has published an online pamphlet to help citizens better understand the characteristics, sources, protective measures and remedies associated with bothersome and harmful noise.

“You can often stop noise that disturbs you without involving your council, the

police or the Environment Protection Authority,” readers are advised in [Dealing with Neighbourhood Noise](#). “Try to solve the problem amicably by talking to who(m)ever is causing the noise. Often people do not realise they are being noisy and are happy to work with you to solve the problem.”

Failing the do-it-yourself approach, the pamphlet identifies the government agencies with enforcement powers and provides a table of common nuisance noises and the agency best prepared to deal with it. The pamphlet defines offensive noises in legal terms and lists periods of week days and weekends when noises from household equipment should not be audible in the living quarters of neighbors’ homes. The pamphlet closes with advice on quiet neighborliness, including a suggestion to use a rake or

broom to clear leaves and grass clippings instead of a gas-powered blower.

### Australian Society to Host INTER-NOISE 2014

The Australian Acoustical Society will host [INTER-NOISE 2014](#), Nov. 16 to Nov. 19 in Melbourne, the modern, dynamic capital of Victoria. Participants will convene at the Melbourne Convention and Exhibition Centre, superbly located on the banks of the Yarra River just a short stroll from the central business district.

Papers will cover all aspects of noise control, with additional workshops and an extensive equipment exhibition to support the technical program. The Australian Acoustical Society warmly invites you to attend what promises to be a thought provoking Congress “down under.”

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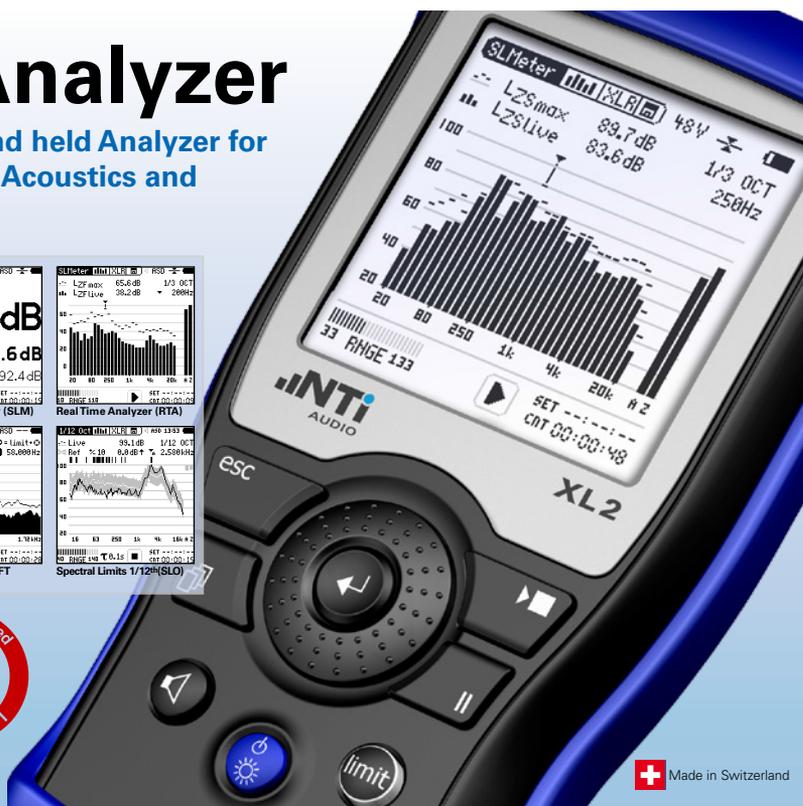
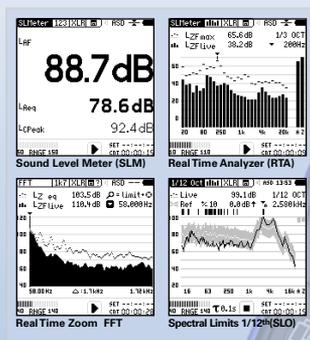
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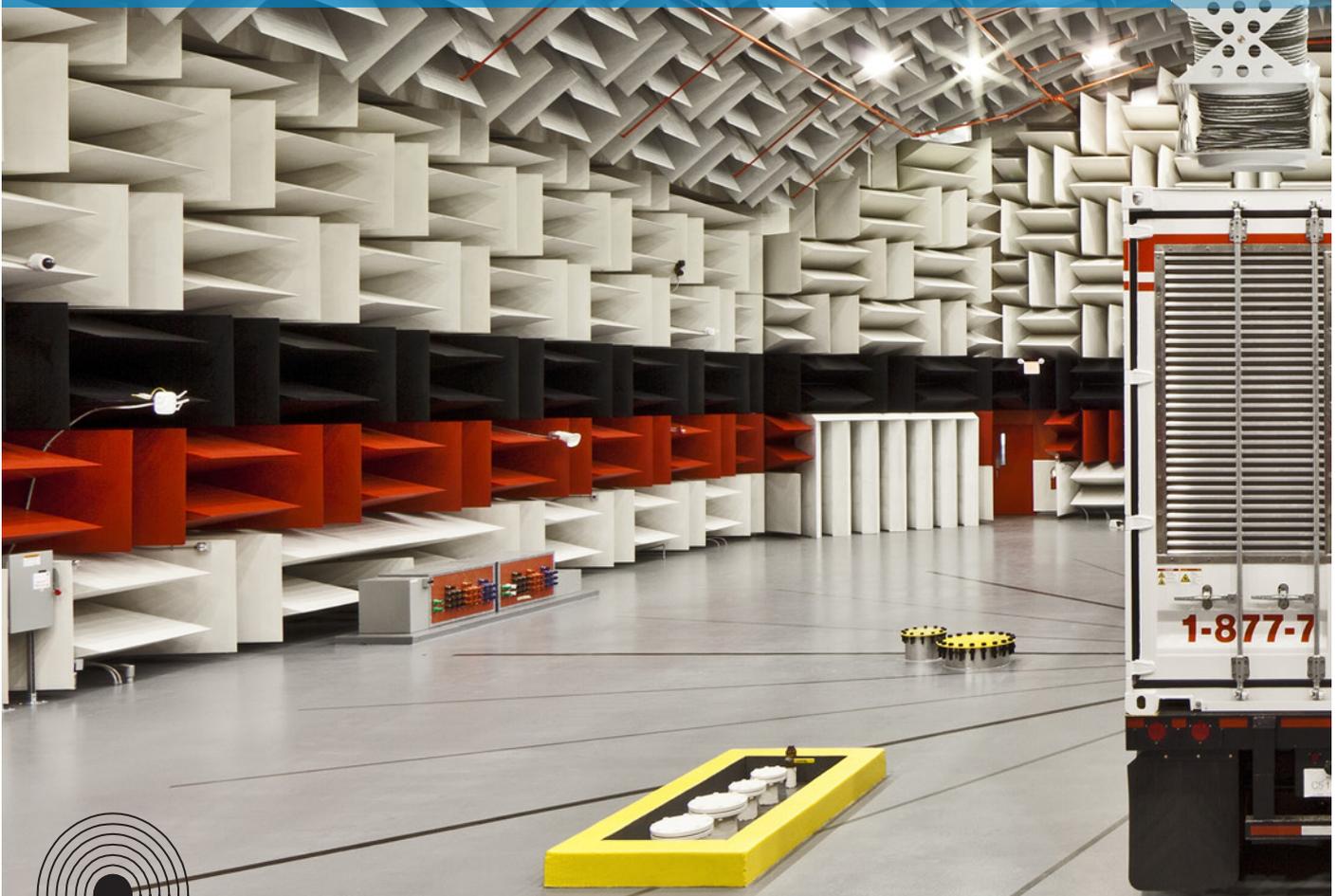
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## **RICH PEPPIN FORMS ENGINEERS FOR CHANGE**

Richard J. Peppin, founder and former president of Scantek, Inc., of Columbia, Maryland, announced that he has formed the non-profit consulting company Engineers for Change.

Peppin's new venture offers 40 years' experience in noise and vibration associated with building acoustics, environmental acoustics, training, speech intelligibility, industrial noise, community noise, enforcement, and building and machine vibrations, among other specialties.

"The company is different from many others in that it is non-profit and all volunteer-run," he said. "That means 100 percent of all fees earned are to be donated to charities. Only out-of-pocket, travel-related, expenses are reimbursed to employees."

Fees paid to Engineers for Change cannot be considered for an income tax deduction, Peppin said, but donations can be considered tax-exempt. Engineers for Change will direct its charitable work to groups involved in health care, poverty, environmental issues, animal rights, and peace.

The mission, philosophy, professional alliances and areas of interest are described further at the organizations website.

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## **SignalCalc Turbo Gains Traction**

Data Physics Corporation said SignalCalc Turbo, its advanced, portable, turbo-machinery vibration analyzer, was gaining acceptance with global manufacturers. The company said measurement and

analysis of vibration is a cost-effective, non-destructive method of evaluating machinery condition and diagnosing the potential failure conditions and that U.S., European, Indian and Asian makers of steam and gas turbines, generators, electric motors, and centrifugal pumps were among the manufacturers adopting its product. More information can be found at [www.dataphysics.com](http://www.dataphysics.com) and by contacting Bourke MacDonald, Bourke. [macdonald@dataphysics.com](mailto:macdonald@dataphysics.com), 408-437-0100.

---

## **New LEXSYS-shock Video Available from Loggers**

Netherlands-based Loggers B.V. released on its [website](#) a new video explaining the operation and advantages of its LEXSYS®-shock in absorbing vibration and shock, including explosions, in exhaust lines on naval ships such as frigates, mine hunters and submarines.

The system consists of a well-attuned set of Loggers' shock-proof compensators, shock mounts and special sliding points capable of taking up high deflections.

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## **Meggitt Sensing Systems Offers New Technical Paper**

Noting that any undesirable signal within a measurement chain qualifies as noise, Meggitt Sensing Systems of San Juan Capistrano, California, published a [technical paper](#) offering an overview on low-noise piezoelectric accelerometers, and specifically, noise generated by the electrical and mechanical components of the accelerometer, amplifier and cables. It includes the application conditions under which low-noise devices are commonly specified, as well as the engineering trade-offs associated with design of such a low-noise device.

---

## **New Accelerometer Out from Meggitt**

Meggitt Sensing Systems [announced](#) the global market introduction of the Endevco® 65HTLPF-10-XX miniature triaxial ISOTRON® (IEPE-type) accelerometer with integral two-pole low-pass filtering.

The low-impedance transducer was designed for test and measurement applications requiring high-temperature operation, resonance suppression and the effective attenuation of high-frequency, high-g signals which can otherwise obscure required low-frequency data and saturate electronics. The model suffix -XX denotes the customer designated low-pass filter corner frequency at -3 dB. Of the two available standard options, the Endevco® 65HTLPF-10-02 features a 2 kHz corner frequency; while the Endevco® 65HTLPF-10-10 features a 10 kHz corner frequency. Other frequencies are available.

---

## **PCB Expands 'Platinum Stock'**

PCB Piezotronics, Inc. announced the expansion of its PCB Platinum Stock product program, offering additional 18 test and industrial sensors with a lifetime warranty and an in-stock guarantee. The program aims to provide high-level service without any additional expediting fees or minimum orders. Ready-to-ship inventory levels will be maintained for almost 100 of PCB's most popular models.

More information can be found at [www.pcb.com/platinum](http://www.pcb.com/platinum). 

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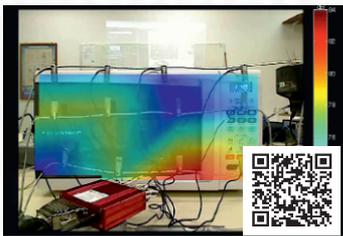
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To register visit the website  
<http://www.microflown.com/newsroom/events/internoise-2012-usa-august-19-22th-2012.html>

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# 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).

### 2013 August 28-30

#### NOISE-CON 13

Denver, Colorado, USA

Contact:

Institute of Noise Control Engineering-USA

Suzanne Basse

100 East Washington Street

Springfield, IL 62701

Telephone: +1 217-528-9945

<http://www.inceusa.org/nc13>

### 2013 August 30-September 1

#### Wind Turbine Noise 2013

Denver, Colorado, USA

<http://www.windturbineoise2013.org>

### 2013 September 15-18

#### INTER-NOISE 13

Innsbruck, Austria

Contact:

Austrian Noise Abatement Association

Dresdner Straße 45/3.19, 1200 Wien

Tel.: +43-664-1865630

Fax.: +43-2287-4963

E-Mail: [internoise@oal.at](mailto:internoise@oal.at)

<http://www.internoise2013.com/>

### September 7-10, 2014

#### NOISE-CON 14

2014 National Conference on Noise Control

Engineering

Ft. Lauderdale, Florida

### November 16-19, 2014

#### INTERNOISE 2014

2014 International Congress on Noise Control

Engineering

Melbourne, Australia

### August 9-12, 2015

#### INTERNOISE 2015

2015 National Conference on Noise Control

Engineering

San Francisco, California

# Directory of Noise Control Services

Information on listings in the Directory of Noise Control Services is available from the INCE/USA Business Office, 100 East Washington Street, Springfield, IL 62701 +1 217 528 9945. Telephone: +1 317 735 4063; e-mail: [ibo@inceusa.org](mailto:ibo@inceusa.org). The price is USD \$460 for 4 insertions.

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Mark your calendar and plan to participate!

## INTER-NOISE 2013

Innsbruck, Austria • September 15-18

INTERNOISE 2013, the 42nd International Congress and Exposition on Noise Control Engineering, will be held in Innsbruck, Austria from 15-18 September 2013. The Congress is sponsored by the International Institute of Noise Control Engineering (I-INCE), and is being organized by the Austrian Noise Abatement Association (Österreichischer Arbeitsring für Lärmbekämpfung) (ÖAL). The theme of the congress is **Noise Control for Quality of Life**.

INTERNOISE-2013 will be held at the Congress Center Innsbruck. A large block of rooms has been negotiated at highly competitive rates.

We anticipate a large, broad program of sessions on a variety of acoustics and noise topics. As usual, a large exposition of vendors offering noise control materials, software, and measurement devices will be held. In addition to the full program, INTERNOISE 2013 offers several short course on September 15 for noise control professionals, as well as several social programs and tours for accompanying persons.

Registration is now open at <http://internoise2013.com/index.php/registration.html>

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

### The NOISE-CON 2011 Proceedings Archive (1996-2011)

NOISE-CON 2011 was held jointly with the Transportation Research Board (TRB) ADC40 Committee on Transportation-Related Noise and Vibration on 25-27 July, 2011 at the Marriott Downtown Waterfront Hotel in Portland, Oregon. One hundred forty seven (147) technical presentations were given at the conference and of those, 132 were submitted as written papers that are included on this DVD.

This DVD contains the proceedings of ALL NOISE-CON conferences held since 1996. This includes the years 1996, 1998, 2000, 2001, 2003, 2004, 2005, 2007, 2008, and 2010. Also included are the proceedings of two sound quality symposia, 1998 and 2002. So, including the NOISE-CON 2011 papers, a total of 1621 technical papers are included on this DVD. All papers are in PDF format.

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- Use of rechargeable batteries
- Continuous detailed measurements for one month



## Vibration Analyzer

VA-12

Vibration Meter with  
FFT Analysis Function

### Major Application Fields

- Product development
- Quality assurance
- Maintenance
- Simple diagnosis
- Precision diagnosis

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