noise research in France
– new identification methods help battle against noise

Noise is exceptionally difficult to measure and control. Industry is working on the need to reduce noise, but for that it needs to know accurately the cause of the noise. They are concerned not only about eliminating noise but also reducing it at its source. Acoustic engineers are therefore being called on to simulate the noise in future transport systems or concert halls, in order to optimise their acoustical design.

French Research centres are at the forefront of these technologies.

With its team of 40 acoustics engineers, the **CSTB** (Centre for Building Science and Technology) undertakes noise measurement programmes, and also carries out studies on the propagation of sound waves.

For building companies wanting to test the acoustic performance of their windows or doors, the CSTB has constructed a "phonoscopy" test bench. This tool uses a novel principle of acoustic imaging which represents the propagation of noise in the form of an image. It makes it possible to produce a noise map of the product when measuring its acoustic insulation. An automatically positioned microphone captures the sound signals and sends them to a computer, which draws a vibration speed map of the product.

The CSTB also supplies software known as Epidaure for the designers of auditoriums and concert halls to help them optimise the acoustic quality of their designs, which has already been successfully used at the Opéra-Bastille in Paris as well as the Bolshoi in Moscow and the New Academy of Music in Stuttgart.

For predicting noise levels around roads and railways, the CSTB has developed software called Mithra. This takes into account the effects of the ground, the relief and even the weather on the propagation of noise over large distances. "In the large forest in the Landes, bordering the Atlantic, we ourselves studied the effect of a curtain of trees on road noise," says Jacques Roland, head of the CSTB's acoustics department. "We showed that a curtain of trees a few tens of metres deep reduced noise by 5 dB, which is a considerable effect".

Noise analysis and acoustic simulation software have been made possible by the amalgamation of traditional acoustics instrumentation and computer technology.

"When we started, acoustics engineers only had dedicated instruments, such as sound level meters, tape recorders and frequency analysers," recalls managing director Patrick Luquet, of French company **01dB**. "We therefore had the idea of developing a portable microcomputer that combines all these functions, with the advantage of being able to process measurements synthetically." This is how digital acoustics was born.

The computer from **01dB** is linked to a microphone via an analogue-to-digital card which digitises the sound signals. It can replace all the traditional acoustic instruments. With its data acquisition and processing software, it performs the required analyses, through to the production of a test report. Upgradable and versatile, it is suitable for the measurement of noise or vibration, for predicting the acoustics of a building or a site, for frequency analysis or for the teaching of acoustics.

The newest in **01dB's** range is a miniature unit called Symphonie. This represents a new advance in acoustic analysis by enabling simultaneous processing of several signals. Unlike its predecessors, Symphonie accepts the

noise complaints mounting up down under

In Tasmania almost half (48 percent) of approximately 4,000 environmental complaints each year are about noise and in Queensland last financial year the EPA and local authorities received 13,000 noise complaints. In Sydney, police and councils are called to more than 100,000 noise complaints every year, most of which relate to noisy neighbours. In Melbourne's City of Yarra, following a change in residential density guidelines, noise complaints have increased from 177 in 1999 to 450 for the year 2,000. This has forced the City of Yarra to more than double its Community Amenity Unit staffing from three to seven, to cope. The Australian Building Codes Board (ABCB) has earmarked sound insulation of the building envelope for consideration for future versions of the BCA. Currently there is no sound insulation requirement for the external walls of buildings.

signal from any kind of sensor (microphone, accelerometer, intensity probe). It can also process these acoustic signals in two channels, in the time and frequency domains, and of course in real time.

Symphonie stores an audio signal like a tape recorder. It can at the same time act as a data-logging integrating sound level meter, in order to measure the noise level over time. As a frequency analyser, it also integrates the signal. These complementary functions provide the user with a full description of the environmental noise or vibration, whether in urban noise monitoring, the measurement of noise at workstations or the acoustic monitoring of a building.

The applications of digital acoustics are increasingly diverse and they require customised systems. Based on Symphonie, **01dB** has therefore just developed a monitoring station known as Salto, which is designed for long-term monitoring of the noise environment around airports.

patents news

Recent publications in the noise field

Foamed composite panel with improved acoustics and durability

Patent number: EP1094164
Publication date: 25 August 2001
Inventor(s): C. Hallett, A. Adey, W. Fry, J. Felegi, R. Lewis *and* E. Nute
Application no.: EP20000122611 20001017
Priority no.: US19990159987P 19991018

An acoustical panel formed from a fibrous, open-celled material comprised of up to about 50% by weight fibers, between about 3% and about 10% by weight binder, between about 20% and about 75% by weight filler and about 0.01% to about 2.0% by weight surfactant. Additionally, voids are formed within the panel having an average distribution size diameter of about 50 mu m to about 250 mu m. The acoustic panel achieves very high sound absorption properties without the need for additional surface perforations, while maintaining a very high surface hardness.

System and method FOR SPEECH recognition by aerodynamics and acoustics

Patent number: US6205425
Publication date: 20 March 2001
Inventor: Ho Kit-fun
Application no.: US19970953970 19971020

Speech recognition and speech commands are achieved by inputting aerodynamic component and acoustic component of a speech utterance. The aerodynamic and acoustic components are recognized by pattern matching and/or by rules. A helmet for inputting speech is also disclosed.

Acoustic wall

Patent number: S120165
Publication Date: 31 August 2000
Inventor: Knezevic Marjan
Application no.: SI19980000305 19981211

This wall, which is used in the field of interior acoustics, is an independent wainscot, which is attached to walls of concert halls and other premises where musical performances are held, for example recording studios. The concave ribbed segments accept the sound and return it correctly back into the room. The sound is not reflected by walls, but circulates between the openings of the acoustic wall and the wall itself. The sound retains its original loudness and remains pure in the room with a minimum acceptable reflection. The sound audibility in the room, where the walls are covered with the acoustic wall according to the invention is quite uniform.