SYNTHESIS REPORT FROM TECHNICAL SESSIONS

NoiseAtWork 2007, the first European Forum on "Efficient Solutions for the Management of Occupational Noise Risks", was held in Lille (France) from 3 to 5 July 2007. With 550 participants from 32 countries, 175 papers presented in 35 sessions and 30 exhibitors, this very first international event exclusively dedicated to the field of occupational noise risks demonstrated the interest in this issue.

The Forum was a unique opportunity for all the concerned parties (noise control engineers, physicians, ergonomists, architects, machine manufacturers, employees and employers, policy makers…) to meet and share views on the subject of occupational noise management. The event was also an occasion to address the topic of the implementation of the 2003/10/EC European Directive.

Thanks to the variety of papers and the priority given to practical solutions, the Forum proved successful in meeting most participant's desires, as confirmed by the positive feedback expressed by a good number of attendees.

This document has been prepared by the co-chairs of the 35 sessions presented during the closing session, by Marc Asselineau, Michael Bockhoff, Pierre Canetto, Michael Dittrich, Jean Jacques, Beat Hohmann, Eva Kotarbinska, Bill Lang, Joachim Scheuren, Peter Sickert, Philippe Strauss and Jean Tourret.

The following presentation is in two parts: first, the major conclusions that may be drawn from the Forum; second, the actions that may be undertaken in light of these conclusions.

PART 1: MAJOR CONCLUSIONS

Risk assessment

Although significant improvements have been achieved in several industrial or service sectors, 60 million European workers are still exposed to potentially dangerous levels of noise for at least a quarter of their work time. Noise-induced hearing loss is still accounting for about one third of all work-related diseases. Noise increases the accident risk. Factors at play include hearing loss, noise-induced loss of vigilance, and masking of warning signals by noise. Even in noisy environments, sounds from alarms are useful in preventing accidents. In the measurement of occupational noise, instrumentation is not a limiting

factor. Instruments and data processing are improving as shown by several presentations. For instance, a system for the individual management of the noise dose was presented, combining sound level measurement with Radio Frequency Identification, with an alert message sent over cellular phone (SMS). This type of device is particularly suited to situations of noise exposure in music venues. Evaluation of noise exposure remains a key issue. If several methods are available, a detailed knowledge of workplaces and work situations is required. One should keep in mind that this is also the first step for noise control and prevention. With regards to risk assessment, simple methods are available; they can be very useful for SMEs (i.e. use of databases).

Methodology

The "collective protection" rather than the "individual protection" of workers is the approach of the future. This means that one should give primary consideration to the engineering control of noise sources. With this in mind, effective noise abatement must take into account several factors in addition to technical concerns: the ergonomics and human aspects, the process requirements, and the economic/financial conditions. The range of available solutions is much wider than most of those presently used in industry. Consequently, a methodological (stepwise) approach is central to the success of occupational noise reduction strategies and must be recommended. The search for solutions requires a true involvement on the part of the company or the organization. For this reason, one should start simple and avoid unnecessary complexity. The company's or organization's progressive approach in the search for solutions should go along with employees' involvement. As the analysis grows in complexity, employees' involvement gives way to greater involvement on the part of experts.

Low noise machines

Procedures and tools for low-noise design of machines and processes exist. They are based on design rules, noise path modeling, transfer path analysis, numerical and analytical tools, measurement methods, etc., applied to the well known "source-transmission-radiation-receiver" chain. Other design constraints should also be accounted for and integrated within a global cost-effective framework. In fact, rules for predicting or reducing noise from machines and processes do exist: this applies to equipment such as compressors and fan installations, conveyors, outdoor machinery and, in particular, earth-moving machines or agricultural machines. Cabin sound levels are a problem that affects the large population of operators, pilots, crew, and occupants of mobile equipment, transportation vehicles, aircraft, and ships. Nevertheless, several solutions exist to handle this issue, including active noise control. Furthermore, product information on noise emitted by machines is often unclear, incorrect, not provided, or open to misinterpretation (emission, immission, exposure values, guaranteed/measured/indicative values). The interface between machine manufacturers and end users needs improving. There is often a lack of understanding of the available information on noise. Market demand for quieter machinery is low. As a result, manufacturers tend to show little motivation to provide such low-noise equipment. On the other hand, quiet machinery is sometimes already on the market, but not promoted as such.

Individual hearing protection

Individual hearing protection using Hearing Protecting Devices (HPD) should be considered as the "last solution" to reduce noise at the workplace, i.e. when no other collective approach (noise suppression at the source or control of the propagation paths) can be used. Several types of HPDs are available depending on the required attenuation, comfort and need for communication. The selection of HPDs should take into account the work environment, the noise level, the type of noise (constant, impulsive, intermittent), the ergonomics, and the use of other personal protection. When communication is required, one-way or two-way electronic ear plugs or ear muffs (wireless or wired) can be used. Various types of active or semi-active headsets, particularly well adapted to the suppression of tonal or impulsive noise, are now available. Such devices enable easy communication in very noisy environments. When using HPDs for safety purposes, perception of warning signals and communication are crucial aspects that should be taken into account. Comfort is a critical issue in achieving maximum acceptance of hearing protection. For ear-muffs, the major factors that influence comfort are cushion pressure and temperature. For custom ear molds, the factor that influences comfort the most is the proper fit of the ear impression.

Occupational noise control in industry

Occupational noise control is still a major concern in many industries. This is the case for a number of industry sectors, such as: mechanical industries and metal industry, concrete and quarrying industries, building and public works, chemical plants and offshore platforms, food processing, packing, textile, printing, etc. A wide range of cost effective solutions has been implemented to successfully reduce noise in various factories and construction sites. If the case studies presented at the Forum show that the "appropriate solution" is nearly always within reach, the wide range of situations makes it clear that solutions are not "off the shelf" and need to be tailored to individual workplaces. The actual knowledge transfer of all potentially available information to the various sectors of activities is far from being satisfactory.

Occupational noise in the service sector (offices, call centers, schools, hospitals, etc.)

In open offices, the use of measures that exclusively relate to room reverberation is not sufficient to evaluate work performance reduction due to speech noise. The STI value (speech transmission index) is deemed more appropriate. Room acoustic noise control is an efficient way to improve the sound environment. However, this approach requires simultaneous control of high room absorption, appropriate background noise levels, and appropriate screening. In call centers, noise exposure can be a significant problem. Noise levels can exceed 85 dB in the ear canal because of the poor quality or misuse of headsets. Special concern should be paid to the choice of headsets and education of the operators. In computer data centers (server rooms), sound levels can exceed 85 dB because of the increased need for cooling. Possible cases of deafness have already been observed.

Regulations pertaining to the acoustics of workplaces exist but they are not yet sufficiently made known and not always complied with. In the service sector, there is a need for a global approach (acoustics, thermal science, ergonomics, etc.).

Noise policies and dissemination of information

Although noise remains an occupational health problem, many employers and workers still do not view it as a serious issue or health threat. While many professionals involved in reducing noise-induced hearing loss participated in the Forum, representatives of industry management, machinery manufacturers, and trade unions were largely absent. The European directives lack practical guidelines for reducing occupational noise. Resources to implement complicated rules are lacking, especially for small enterprises. The conflicts between public health concerns – noise exposure during leisure-time activities, particularly among the young, including MP3 players, rock concerts, skeet shooting, etc. – and occupational health concerns (noise at work) are real and need attention. Efforts to address these concerns need to be coordinated. Many multimedia tools have been developed to help companies disseminate information about occupational noise: websites, databases of industrial solutions, soundproofing product databases, etc. The variety of noise prevention actors, added to the narrowness of this topic with regards to companies' concerns, makes it difficult to disseminate information on this subject. Many employers need to be convinced that it is profitable to them (cost/benefit analysis) to reduce their workers' noise exposure.

PART 2: ACTIONS TO BE UNDERTAKEN

Risk assessment

Efforts should be made toward developing and promoting systems enabling communication of warning signals and messages in high ambient noise levels. Information and standards relating to alarms should be encouraged as well.

ISO 9612 standard on the determination of occupational noise exposure is open for comments. It presently relies on an engineering method that is not simple to use in many practical situations.

One should strive to develop and promote cheap noise "alert systems" or "indicators" for monitoring ambient noise in working environments or specific work stations. Lastly, simple assessment methods tailored to the needs of (very) small enterprises should be developed and promoted.

Methodology

There is a need for increasing the attractiveness and use of the methodological approach. When implementing methodologies, both employers' and employees' involvement ought to

be taken into account. Methodologies for various levels of analysis complexity should be provided. To design the most suitable solutions, simulation tools should be used.

Low-noise machines

Methods, rules, and tools for low-noise design of machines are available but need to be applied on a more systematic basis in order to produce cost-effective and economic solutions given increased performance and other design constraints. A better dissemination of knowledge at the European level is required which explain the state of the art and give a review of current cost-effective solutions. Also, there is a need for another indicator besides dB(A), especially for comfort in cabins or environment-related noise. One should promote correct use of the data enabling the characterization of machinery noise emission, pulling all available levers, also in contracts. This requires that proper explanations be provided. There is a need for a European database or other means of collecting noise data and carrying out market surveillance. Lastly, it seems crucial to improve the synergy of several Directives, namely: Machinery Dir., Outdoor machinery noise Dir., Occupational noise Dir., and others.

Individual Hearing Protection

There is a need for promoting the idea that individual hearing protection should be used only when a collective solution cannot be applied. To this end, increasing HPD users' information, motivation, and training is recommended. There is general agreement that non-wearing time of HPDs may be reduced by providing a choice of HPDs and increasing their comfort. Manufacturers of HPDs should continue to improve the comfort of HPDs. Increasing the dissemination of information on HPDs that enable communication and perception of warning signals seems essential. In the case of impulsive, high-level noise (e.g. firearms), one should work out specific criteria to select HPDs. As for the assessment of "real world" exposure when HPDs are worn, experts agree on the need to work out methodologies making this evaluation possible.

Occupational noise control in industry

In all industrial domains, a much stronger dialogue should be encouraged between manufacturers of equipment or processes, users of equipment (employers and employees), and prevention experts. The development and promotion of noise control systems or materials adapted to specific industry uses should be encouraged. A sector-by-sector dissemination of information in all branches of industry appears to be the best approach for efficient transfer.

Occupational noise in the service sector (offices, call centers, schools, hospitals, etc.)

Efforts should be made to standardize measurement methods as well as establish European recommendations for acoustic target levels. Additionally, standardization work should be intensified on the subjective aspects of the acoustics of offices.

Noise policies and dissemination of information

Communications with industrial management, machinery manufacturers, and trade unions should be significantly improved through cooperation with the appropriate organizations. This may require convincing them that "collective" rather than "individual" protection should receive primary consideration; persuading them that the key point in a risk prevention strategy is to make both employer and employee sensitive to the noise risk; and endorsing a communication campaign for the dissemination of information on occupational noise. When implementing such campaigns, efforts should be made towards overcoming the perception that engineering noise control of the source is too difficult and too expensive; reducing the reliance on personal hearing protection; presenting case studies making it clear that solutions are possible even if they are not "off the shelf" and need to be tailored to individual workplaces; using the web as an effective tool for communicating with both employers and employees; overcoming the lack of awareness in the population regarding the consequences of hearing loss; and distinguishing between on-the-job and leisure-time exposures that may produce the same hearing impairments.