Proceedings of the Institute of Acoustics

HEALTH & SAFETY LEGISLATION - WHERE NOW?

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1. INTRODUCTION

In this twenty-fifth year of the Institute of Acoustics I would like to reflect on the movements in the legislation with regard to noise in the work place. Noise has been recognised as a problem for quite a few centuries before Institute was formed. Early mention of noise at work can be found as for back as the 1700's with physicians linked exposure to noise with the symptoms of deafness. Admiral lord Rodney proclaimed that he was deaf for fourteen days after the firing of 80 broadsides from his ship HMS Formidable in the year of 1782.

The age of the Industrial revolution changed the type of noise from that of large impulsive noises as was to be found in naval and military actions to high level noises from the machines of this new age. In the 1800's it was reported that boilermakers were found to be going deaf, in 1825 C.H. Parry described cases where he could show that hearing had been impaired through the exposure to loud noises at work. Dr Barr perhaps the first audiometrician described how he used his pocket watch as a source when determining the amount of hearing loss in workers. Many other cases of industrial deafness were reported from blacksmiths to cotton weavers during the late 1800's into this century.

Occasional mention is also made to environmental noise disturbance. A classic reference being made by Mussolini on the 14 of December 1934, he decreed that 'There shall be no more automobile horns blown in Rome'. Apparently the noise went down as did the number of accidents.

2. REPORTS ISSUED PRIOR TO THE HEALTH AND SAFETY AT WORK - ACT 1974

Several reports highlighted the problem of Noise Induced Hearing Loss. The first was the Wilson Report [1] issued in 1963. This wide ranging report covers all aspects of noise in the United Kingdom. Noise in towns, Noise in buildings, Noise from motor vehicles, railways , boats and hover craft, Aircraft noise, Noise from industry, construction and demolition sites, Entertainment and advertising noise, Noise from mineral workings and Occupational noise

With regard to Occupational noise the report observed the relationship between permanent threshold shift and noise exposure, it also identified temporary threshold shift. It introduced the concept of hearing damage for continuous exposures of above 85dB(A) in any octave band in the speech frequency range (250 - 4K Hz.). By so doing it recognised the concept of exposure time to noise as being a factor in the damage to hearing caused by industrial exposure.

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The report suggests three lines of attack on the problem of what we now refer to as noise induced hearing loss (NIHL). They were :-

(a) more widespread voluntary action within industry on the basis of existing knowledge
(b) legislation on the basis of existing knowledge
(c) research to try to obtain a more definite understanding of the relationship between noise and hearing loss, with legislation to follow, if necessary, when the results of the research are available.

This research on a large section of the industrial population was carried out by Burns & Robinson [2] which forms the basis of the action levels seen in legislation today. The report also recommended the wider use of hearing protection in industry. An important factor this report has identified is the 'date of guilty knowledge' in litigation for those engaged in claims for hearing loss against their employers.

Soon after the Wilson report had been issued the Department of Employment produced a guidance booklet ' Noise and the worker' [3] . This was part of a series on Health and Safety at Work covering such wide subjects from Safety in Laundries to the Safety of drop forging plants. The booklet outlines the dangers of high exposures to noise, methods of measurement (including a first reference to impulsive noise). It then sets the criteria of 90dB(A) for an eight hour working day, which we still use today.

Sections on Noise control , hearing conservation programmes and audiometry complete this document. It must have been popular as it was reprinted as late as 1973. This document along with the Wilson report sets the scene for further action in the fight against noise induced hearing loss in workers.

Nine years passed by before the Department of Environment issued it's next document on the subject of industrial noise. The 'Code of practice for reducing the exposure of employed persons to noise' [4]. This more comprehensive booklet would not look out of place next to the regulations in place today. The broad objectives specify limits for exposure, describes methods of measurement which could be used to see if the limits were being exceeded. Measurement methods for continuous sound, a notional equivalent continuous sound level for fluctuating, impulsive and intermittent noise are described. As a primary aim the guide seeks to reduce noise exposure below the indicated limits. To this end it offered guidance on methods of noise control and hearing protection.

The limits set in the code , or as they are described 'desirable sound levels' were defined as:

(1) In steady sound the limit was set at an exposure of 90dB(A) for 8 hours.
(2) If the sound is fluctuating then the equivalent continuous sound or L_{eq} should not exceed 90dB(A) for 8 hours,
(3) The overriding limits in the code , are that the unprotected ear shall not be exposed to 135 dB(A) (meter on fast response) for normal noise and a level of 150dB for any impulse noise.

The codes asks for identification of areas where the limits are exceeded to be ear protection areas, with warning signs at the entrance points. That machines which produce levels in excess of the limits to be identified with a warning sign.

Methods of controlling the noise are given including enclosure of both machine and operator. Silencing is mentioned as is regular inspection and maintenance of machinery. Ear protection

selection, inspection and maintenance is outlined as is education for persons in noisy conditions. There is even a section on the purchasing of new machinery, which asks that in the buying specification noise limits should be set and that manufacturers should furnish noise information to the buyer, which should have been determined to current British Standards. It gives a warning that noise levels from test conditions may vary when the machine is installed

Annexes give the practicalities surrounding some of the issues already mentioned.

This code in 1972 gives sufficient detail for the employer to carry out a noise survey to determine levels and noisy areas and gives sufficient help for the employer to start noise reduction in the workplace.

Up to this point it would have been difficult to enforce any of this guidance as no specific noise legislation existed. But in 1974 things were to change.

3. THE HEALTH AND SAFETY AT WORK ACT etc. - 1974

The health and Safety at Work etc. Act (HSWA) [5] which came into force after the Robens report was designed to encompass all health and safety risks in the workplace. It also formed the Health and Safety Commission which acts on behalf of government, this in turn led to the formation of the Health and Safety Executive (HSE) which administers the law. The HSWA Act applies to all persons at work, employers, the self employed and employees. It also protects the health and safety of the general public who may be affected by work activities.

For the first time there was an all encompassing piece of legislation which allowed the enforcers (HSE) to cover all risks to the work force. Best practices such as that in the 1972 code of practice could be used as evidence when non compliance was found.

The major part of the act is to be found in section 2. This places the duty on employers to ensure the health, safety and welfare of all their employees. It is this duty that employers who expose their employees to high levels of noise are in legal breach. Several early cases were taken under this section of the act, but in the absence of specific noise legislation the task was proved to be difficult. Section 2(2)(e) further emphasises this duty as it asks ' the provision and maintenance of a working environment for his employees that is , so far as is reasonably practical , safe, without risks to health .....'. Here the acoustic environment is considered as to be an integral part and should be treated accordingly.

Section 6 places duties on persons who design, manufacture, import, supply, erect of install any article, plant, machinery, equipment or appliances for use at work will be so designed and constructed as to be safe and without risks to health. This of course was extended by regulation 12 of the Noise at Work Reg's. So in 1974 there was legislation to cover all aspects of risk in the workplace and a body (HSE) to properly enforce it.

4. THE WOODWORKING MACHINES REGULATIONS 1974

These regulations [6] contained the first specific duty regarding the level of noise in the woodworking industry. Regulation 41 asks that if any employed person is exposed to 90dB(A) of greater continuously for 8 hours , then the employer must take reasonable action to reduce the noise and to provide suitable ear protection for every such persons. It continues to ask that any ear protection as issued should be maintained. So for the first time in legislation we have

specific duties regarding noise, with limits taken from the 1972 code of practice. This regulation was repealed when the Noise at Work Regulation came into force as they contained the same duties.

5. SOCIAL SECURITY ACT 1975 - OCCUPATIONAL DEAFNESS

The Industrial injuries advisory council recommendations [7] made in 1975 with regard to the DHSS compensation payments for occupational deafness were :-

> 'Substantial permanent sensorineural hearing loss due to occupational noise amounting to at least 50 dB in the better ear, being the average .....of pure tone losses measured by audiometry over the 1, 2 and 3 kHz frequencies'
>
> For prescribed occupations only
> For persons working in an industry for a minimum of twenty years.

The scale of the disability assessments runs from 20% for 50 dB loss in each ear to 100% for a 90 dB loss. This system is at present under review and more prescribed occupations are expected be added to the list for compensation. This is the DHSS scheme not to be confused with compensation from civil litigation cases.

6. 1975 to 1986

To follow the inclusion of specific noise levels in the Woodworking Machines Regulations in 1974 the Tractor Cab Regulations [8] states that ' tractors have to be fitted with approved safety cabs which have noise levels below 90 dB(A). This brought in all new singing and dancing cabs which were reported to have lower and lower noise levels, it became a selling point and manufacturers competed with each other to lower their in cab noise levels.

In 1976 the HSE set up a working party to consider in principle new legislation on noise in the workplace. The starting point for this committee was the publication of the report 'Framing noise legislation' [9] issued in 1974. After a long deliberation between the Trades Union congress and the employers Confederation of British industry ,the HSE published a the findings of the working party [10] followed closely in 1981 by a consultative document 'Protection of hearing at work ' [11], which proposed regulations and a draft code of practice.

Again the proposed limits for action were 90 dB(A) for 8 hours and 600 Pascal's (150 dB). The document contained sections on measurement, control, ear protection, designers and audiometry for which it ask to be carried out for persons exposed above 105 dB(A)$L_{eq\ (8hr)}$. This document was on course for domestic legislation on noise in the United Kingdom when the European Union proposed a directive on the protection of workers from noise in industry which stopped the writing of domestic legislation.

7. COUNCIL DIRECTIVE ON THE PROTECTION OF WORKERS FROM THE RISKS RELATING TO EXPOSURE TO NOISE AT WORK (86/188/EEC)

Issued in the official journal of the European communities of 12 May 1986 this directive [12] which applied all over Europe now gave the enforcers the specific legislation to control noise in the workplace. It put the responsiblity on each individual member state to produce domestic regulation in line with the proposals of the directive by 1 January 1990. This the UK had done by the due date and it followed the directive closly except for one article , that referring to hearing checks (audiometry). It was felt that as the UK had it's own health service this article was irrelevant as the Health service could cope with any audiometry that need to be done.

8. THE NOISE AT WORK REGULATIONS 1989

Brought into force on the 1st of January 1990 the regulations [13] addressed the problem. Three action levels were given:

The first Action level of 85 dB(A) for an eighth hour daily exposure ($L_{EP,d}$)
The second Action level of 90 dB(A) for an eight hour daily exposure ($L_{EP,d}$)
A third Peak Action level of 200 Pascal's (140 dB)

It asks the employer for an assessment of noise exposure when the exposure is above the first action level, reduction of the risk of hearing damage and the reduction of noise exposure when persons are exposed to the second action level or above with out the provision of ear protection. With regard to ear protection it asks for two separate duties depending on which of the action level have been exceeded. Above the first action level and the second ear protection should be available for those who request it, but as soon as the second action level is exceeded the provision and wearing of ear protection become mandatory. Above the second action level ear protection zones have to be identified and clearly marked.

There is a regulation to cover maintenance of equipment whether it be machine control measure or ear protection. Employees have to be told of the risk to their hearing and given proper training in such things as the correct fitting of any ear protection. As mentioned previously section 6 of the HSWA is modified in these regulations to include the provision on noise levels of machines by manufacturers.

A comprehensive set of regulations covering all aspects of noise exposure in the work place. The omission of audiometry returned in a separate set of regulations known as The Management of Health and Safety at Work Regulations 1992 [14] which asks for health surveillance for those at risk from any agent at work.

These Regulations are in force today and are being enforced by HSE inspectors on their inspection visits to premises.

9. THE MACHINERY DIRECTIVE AND REGULATIONS 1992

The Machinery Directive 89/392/EEC [15] and the subsequent domestic Supply of Machinery (Safety) Regulations 1992 [16] are first and foremost product directives allowing member states free trade within the Union. They contain several references to noise emissions from machines. These are identified below:

1.1.2- Principles of Safety Integration

This section asks the manufacturer to identify the risks arising from the use of the machine and to take appropriate action to eliminate such risks that have been identified .

1.5.8 - Design and construction

"Machinery must be so designed and constructed that risks resulting from the emission of airborne noise are reduced to the lowest level taking account of technical progress and the availability of means of reducing noise particularly at source."

1.7.2 - Warning of residual risks.

Where risks remain despite all the measures adopted ,the manufacturer must **provide warnings** of such possible risks which may not be normally evident in the normal use of the machine.

1.7.4 - Instructions

In sub paragraph (d) : Any sales literature describing the machinery must not contradict the instructions as regards any safety : it must give information regarding the airborne noise emissions referred to in sub paragraph (f).....

In sub paragraph (e) : Where necessary, the instructions must give the requirements relating to installation and assembly for reducing noise and vibration.....

In sub paragraph (f) : The instructions must give the following information concerning airborne noise emissions by the machinery, either the actual value or a value established on the basis of measurements made on identical machinery.

- Equivalent continuous A-weighted sound pressure level at the workstations, where his exceeds 70dB(A); where this level does not exceed 70dB(A), this fact must be stated.(ie. measurements **must** be made)

-peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20Pa)

-sound power level emitted by the machinery where the equivalent continuous A-weighted sound pressure level at the workstations exceeds 85dB(A).

-In the case of very large machinery, instead of sound power level, the equivalent continuous sound pressure levels at specified positions around the machine may be indicated.

-Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery

Here we see specific duties placed on manufacturers with regard to noise and the declaration of emission values, which while they are connected with a product standard it is hoped that they will have an effect on lowering noise levels in the workplace.

10. WHERE NEXT?

10.1 PHYSICAL AGENTS DIRECTIVE (PROPOSED)

The European Commission is proposing that the European Community should adopt a new directive [17] made under Article 118A of The Treaty of Rome, which deals with the protection of workers from exposure to Physical Agents (of which noise is one), which is established under the Directive 89/391/EEC Framework Directive. If adopted , the UK would have to produce new legislation to implement the directive. The proposal outlines various levels of exposure to noise as well as Peak levels noise at each of the new Action levels.

These are shown in the table 1 ,along side the levels contained in the existing Noise at Work Regulations 1989. As can be seen there are now more action levels included in this proposal The EC Economic and Social Committee discussed this proposed Directive in June 1993 and it was forwarded to the Council of Ministers and published in September 1993. The European Parliament is due to discuss the proposal in March 1994 and an opinion is waited. It is felt that it is unlikely that there will be rapid progress in moving the proposals through the political process.

The position of the UK Government is one of opposition based on the following points:

a) There is no evidence that the EC needs to legislate to meet the risks in the proposal ,as they are adequately covered elsewhere.

b)the EC impact assessment failed to:

-identify the health benefits anticipated by the introduction of new controls.

- satisfy the commitment in the existing directive on noise at work, for improvements to be made on the experience gained in the application of that Directive.

c) the proposal would impose substantial costs on industry with out the commensurate benefits.

The latest information on the progress of this directive is that so far as noise is concerned the member states have decided at present that the noise aspects of the directive will be put on hold. Four member states UK, Germany, Finland and Austria are at present working towards a proposal for the Vibration both Hand/Arm and Whole Body to submit to the EU. Which were agents in the the original directive. There has been some talk of proposing a section on non-ionising electromagnetic fields due to the concern with exposure by mobile phones, but this is in the future. So for the near future noise legislation will be dominated by the Noise at Work Regulations and the Supply of Machinery (Safety) Regulations.

By training our general inspectors on the specific risks facing the work force from high levels of noise , it is hoped that together with employers and employees we can reduce the incidence of Noise Induced Hearing Loss significantly in the very near future.

NAW 1989	Lex (8hr)	Proposed Physical Agents Directive
N/A	60dB(A)	Sleeping Areas
N/A	75dB(A)	Threshold Level (Risk and Information)

N/A	80dB(A)	Health Surveillance (Optional) PPE (Optional) ,Provision of Information
Peak 112Pa (135dB)		
1st Action Level	85dB(A)	Training, Assessments, Control measures, Records of Assessments, Workers to be provided with results of assessments
Peak 112Pa (135dB)		
2nd Action Level	90dB(A)	Compulsory wearing of PPE and Health Surveillance under the Supervision of a Doctor, Marking of Hazardous Areas
Peak 200 Pa (140 dB)		
N/A	105dB(A)	Declare exposed persons to Authorities
Peak 600Pa (150dB)		

Table 1 - indicating the relationship between the existing Noise at Work regulations and the Proposed Physical Agents Directive

The information in the table above will only apply if the proposed Directive is adopted as written

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