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NOISE CONTROL GUIDANCE FOR INDUSTRY

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INTRODUCTION

The Health and safety Executive (HSE) is all to often seen by employers as the Government watchdog with the power of inspection and enforcement of the many regulations concerning Health and Safety in the workplace. While this power of enforcement is seen as a deterrent to help the inspector in obtaining good standards of housekeeping in industry, it is often seen to be more effective to offer advice to employers to achieve the improvements required by negotiation.

It is inevitable that in a climate of increasing amounts of legislation , the majority emanating from Europe, it is difficult for an employer to keep abreast . This is where the advisory role of organisations such as HSE must be seen to provide guidance to assist the employer in compliance of their duties under legislation. Thus the HSE produces publications on many of the varied subjects in the promotion of health and safety risks. This advisory role is even more important in the climate of the Governments policy on deregulation. Deregulation apart from reviewing existing legislation is also seen as an agent in lessening the burden to industry, in particular on the small to medium sized enterprises. Guidance is seen as assisting these employers in their duties.

Good , clear, concise and effective guidance should be seen as the key to better conditions in the workplace. It should help the occupier to initially realise the problem, quantify the risk, indicate effective methods of controlling that risk and also indicate who they can turn to for additional help.

If we turn to the subject of noise, its control must not only achieve a defined objective, in this case noise reduction but must also be seen to be effective in terms of the numbers of persons protected and the cost involved, a phrase I like to use is in terms of " pounds per dB" (or dB /pound).

INITIAL GUIDANCE

It was with this in mind that one of the first Specialist Noise and Vibration Inspectors, the late Brian Miles gathered together a collection of Noise Control case studies whilst on his visits to factories with the intention of producing guidance. To assist in this project he set a target for the

other Noise Specialists of at least six case studies a year to be produced by each individual. This proved to be quite successful with over 100 studies gathered in the first few years.

A defined set of criteria were established for each case study, these were :

* The study should be produced on one side of A4 paper only
* It should include at least one photograph or line drawing
* The problem as encountered should be indicated
* The solution explained
* A measured achieved noise reduction should be given
* An approximate cost for the remedial work given, with a date for comparative purposes
* Where possible an indication of where the case study could be found, and a credit given to the company who carried it out , where applicable.

Before the idea of publishing a document was decided , the collection of examples were printed in house and distributed throughout all the offices within HSE. They were known at this stage as FISM's (Factory Inspectors Special Minutes). They were treated as examples to show an employer what could be achieved in a particular situation when the specialist inspector and sometimes a general inspector were asking for noise control work to be carried out .

When enough examples of these stand alone studies had been collected it was proposed that a booklet be produced for general sale. This was duly published in 1983 with the title " 100 Practical Examples of Noise Reduction Methods"[1]. Since that date it became one of HSE's " best sellers" until stocks ran out in recent years.

The original terms of reference set out earlier for each study were adhered to in this collective document. The first section of the booklet was chosen to show work that had been carried out on a Muiti-spindle moulding machine used in the Woodworking Industry. Eight examples are shown on the one page varying from purpose built enclosures offered as extras by the manufacturer to " home made" examples built by the wood machinists themselves using material that were at hand in the machine shop. The examples are also selected from eight different areas of the country including Northern Ireland to show how wide a coverage of a particular idea could be applied.

The next section is one that gives examples of good design, whereby the noise is reduced at the design and manufacture stage before the product is put on the market. This should be the ideal situation for all new machines. Unfortunately as we all know this is not always the case and the rest of the booklet refers to the control methods used retrospectively to achieve noise reduction. This covers a wide range of methods from treatment by enclosure to the use of room absorption.

Many of the methods are shown in one industrial application only. It was to be hoped that the general principles shown in these examples could be used in many varying applications in all sectors of industry.

The final part of the booklet gave a quick reference to the studies in particular industries in indexed form.

An example of a study from this booklet is shown in Figure 1.

LEGISLATION

Since publication of this original booklet, legislation has moved on , especially with the long awaited introduction of the Noise at Work Regulations in 1989 [2] implementing the European Directive of 1986[3]. Implications for noise control can be found in several of these Regulations.

In the regulation dealing with assessments (Reg. 4) ; section 4.1(b) should point the way at the initial assessment stage as to where noise control may be required. While Regulation 6 asks to reduce the risk of hearing damage. Regulation 7 is far more specific in asking for noise reduction in exposure other than by the use of personnel protection (so far as is reasonably practicable) ie. a noise control programme. The accompanying guidance to the regulations [4] lists the parameters of any such programme :

* Identify noise source (Regulation 4)
* Identify reasonable practicable steps to reduce noise level by Engineering means
* Establish priorities for action
* Ensure action is taken
* Reassess the exposure

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Further guidance to accompany the Regulations [5] contains a section on the engineering control of noise This section indicates the general principles of noise control which could be applied , not as in the earlier guidance which showed practically the specific examples in the actual situation.

NEW GUIDANCE

It is this practicality that in a climate of deregulation, greater use of guidance follows the correct approach seen by the Health and Safety Commission. So it was then decided to produce a second booklet , but instead of the specialist inspectors providing the studies it was seen to be a topic which could be carried out by an external provider.

Several Noise Control consultants were approached and they all prepared their cases . The company of Ian Sharland Ltd. of Winchester were successful and they then proceeded to gather the required information. Again the original criteria were kept for this publication. It was also decided that this time only 60 studies would be included, as the publication date had a deadline of May this year (1995) to coincide with a major health campaign to be carried out by the HSE over the following three years.

OCCUPATIONAL HEALTH MANAGEMENT CAMPAIGN .

This campaign is to be known as The Occupational Health Management Campaign . The first year of the campaign is to be targeted at small to medium size firms that have the particular health hazards of Noise, Respiratory Sensitises or Musculo-Skeletal disorders. The aim of the campaign is to improve the manner in which employers manage health risks. It is to be principally an inspection based programme, heavily supported by publicity. The launch date is to be in May. The work involving the risk from noise is to concentrate on the improving of key areas of weakness that were found in a previous national survey on the compliance of the Noise at Work Regulations carried out by inspectors.

These key areas are :-

for employers:-

* the conducting of assessments where noise exceeds 85dB(A) exposure

* the preparation of an acceptable programme of action for reducing exposure by engineering control measures where the daily exposure exceeds 90dB(A)

* the preparation of ear protection management systems where the daily noise exposure exceeds 90dB(A) to include arrangements for personal issue ; reporting of defects, repair and maintenance ; training and instruction in usage ; and proper supervision to ensure usage.

for machinery manufacturers and suppliers :-

* provide information to customers as required by regulation 12 of the noise regulations

* introduce systems to ' design out ' noise so far as is reasonably practicable

* review existing noisy products with the aim of identifying and then modifying them to reduce noise levels

An additional priority is that initiatives should seek to raise awareness of the duty to assess the need for, and where appropriate provide , health surveillance in noisy industries.

The following projects have been suggested :-

* The national industry groups to identify one or two particularly noisy industries in their sector which could be targeted during the routine inspection programme

* Inspectors pay particular attention to noise control methods during routine preventative inspections

* Target machinery manufacturers and suppliers of specific noise producing equipment for visits under section 6 of the Health and Safety at Work Act

* Target users of particular types of machinery using the guidance on noise control

* To carry out audiometry surveys of noisy industries

* To prepare articles for local, regional and national safety journals

* Arrange seminars / lectures for managers in noisy industries. Making use of demonstrations and guidance on noise reduction techniques

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Thus it can be seen why this new booklet of noise control case studies is published at this time . Hopefully it will show that it is not a black art, and also that it does not have to cost the earth. Thus this guidance should not only appeal to consultant and engineers in the acoustics profession but to the managers of establishments who find themselves with a problem of noise possibly highlighted by a previous assessment . In addition various national interest groups (NIG's) are preparing industry specific guidance (Case studies relative to particular industries).

To assist these managers there is to be included in this issue a checklist to help them as they examine which noise control technique might best solve their problem. The various points included can also be used by the managers as they discuss with a noise control engineer the appropriate route to take. It indicates to them pointers to look for and pitfalls to avoid when a particular method is decided on by the manager or competent engineer.

This targeting of management is also true for two other publications to be released during the Occupational Health Management campaign. These guidance documents relate to the subject of health surveillance in noisy working environments obligated by the Management of Health and Safety at Work Regulations 1992 [6] . One of the publications is again for managers indicating why there is a need for audiometry, what it entails, how to set up a surveillance programme and how to choose a specialist to carry out the testing. The second is for specialist and clinicians carrying out the actual testing and thus is of a more technical nature and it follows on from a previous HSE discussion document on the subject ; Audiometry in Industry [7].

It can be seen that the production of guidance by the Health and Safety Executive, in not only the subject of Noise is given a very high priority in advising industry of overcoming problems in the workplace.

REFERENCES

[1] 100 Practical applications of noise reduction methods HMSO (1983)

[2] The Noise at Work Regulations 1989 HMSO

[3] Council Directive on the Protection of Workers from the risks related to Exposure to Noise at Work OJ L 137 (1986)

[4] Noise Guide No. 1 - Legal duties of employers to prevent damage to hearing HMSO (1989)

[5] Noise Guides 3 to 8 HMSO (1990)

[6] Management of Health and Safety at Work Regulations 1992 HMSO

[7] Audiometry in Industry - Discussion Document HMSO (1978)

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Figure 1. Example from the first book of Noise Control Studies

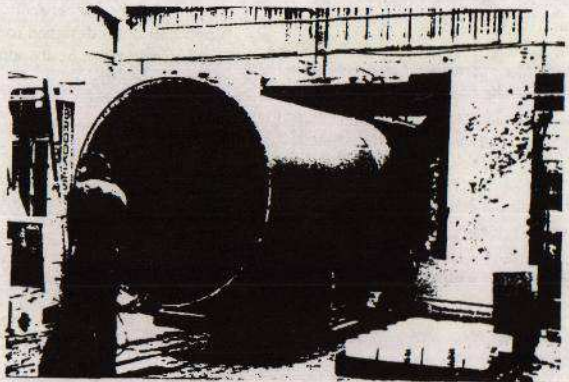
NEW SUPPORT BEARINGS TO REDUCE NOISE OF PIPE SPINNING

A firm manufactures glass reinforced polyester pipe by spinning it inside a rapidly rotating drum, called a mould bed. The original support bearings to the drum created a severe noise hazard which was greatly reduced by using Cooper split plummer block bearings* as shown. Noise reduction was achieved chiefly because:

(i) the bearing cartridges readily swivel to facilitate shaft alignment;

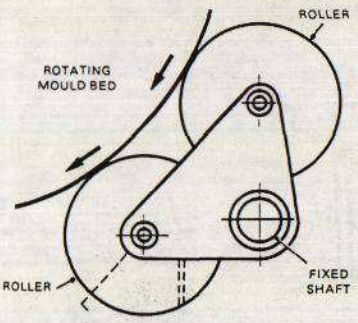
(ii) the new single support wheels are continuously in contact with the mould bed - this was difficult to achieve with the old double wheel system;

(iii) the load on each support wheel is divided on the rotating shaft by a pair of bearings.

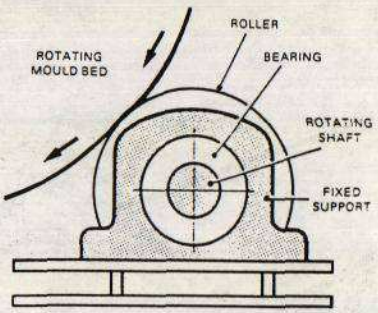


Photograph by permission of Johnstone Pipes Ltd, Dosaley, Telford, Salop

Pipe being withdrawn from mould bed



Old bearing support system



New Cooper bearing system

Other advantages: a much simplified layout and hence easy to maintain

Estimated noise reduction 10 dB(A)

Cost (1981) £4,000 per mould bed

* *Cooper Roller Bearings Co Ltd, King's Lynn, Norfolk*

October 1982

MIFCG/1122/81(12)

Figure 2. Example from the second book of Noise Control Studies (Draft)

2. Quieter by design - air knives

The problem

Many manufacturing processes use air 'curtains' for drying, film control and product wiping. The air knife, for example, consists of a tubular plenum chamber stretching across the width of the product line, with a slot orifice along its length. Air is supplied to the plenum at high pressure and leaves the slot orifice as a high velocity 'blade' of air directed to strike the product line passing below.

Noise levels of between 90 and 95 dB(A) can be generated by a conventional multi-jet system supplied with air from belt driven single stage blowers.

The solution

The use of a long continuous single jet rather than the multiple array of individual jets can decrease velocity shear-generated turbulence, thus reducing noise output from the jet itself. Jet noise can be further reduced if the air supply plenum is designed to have an aerodynamically smooth approach to the blade nozzle entry.

One manufacturer of this type of dryer used two direct-drive multi-stage centrifugal blowers for the air source to produce a flow of some 112 litres per second and a static pressure of up to 16 KPa.

The result

A noise reduction of about 15 dB(A) at 3 metres on a system based on the above.

The cost

About £2,000.