A purchasing policy for vibration-reduced tools in foundries

Foundries Information Sheet No 12

Introduction

This information sheet was produced by HSE's Molten Metals National Interest Group and Castings Technology International in consultation with the Foundries Industry Advisory Committee (FIAC) and its Noise and Vibration subcommittee. It guides the foundries industry in the selection and purchase of fettling tools in order to minimise the risks of hand-arm vibration syndrome (HAVS), and supplements the advice given in the key HSE publications listed at the end of this leaflet.

Employers' duties

- ***Assess the Risk.*** The Management of Health and Safety at Work Regulations 1999 place duties on employers to carry out an assessment of any risks and implement an action plan to deal with them.
- ***Eliminate or reduce the risk.*** The Health and Safety at Work etc. Act 1974 makes it the duty of employers to eliminate or reduce, so far as is reasonably practicable, the risks to health of their employees while at work.
- ***Provide the right equipment.*** The Provision and Use of Work Equipment Regulations 1998 require employers to select and provide work equipment that is suitable, having regard for the health and safety risks (including vibration) posed by the use of that equipment.

The duties above extend to the risks associated with fettling processes. Where a risk of HAVS is established, your first priority should be to eliminate unnecessary fettling. (Publications listed at the end of this information sheet give detailed advice on possible methods.) Where it is not reasonably practicable to do this, then you can reduce the risks associated with the use of vibrating tools by having a company policy of selection and purchase that rejects high vibration tools.

It is the duty of all employers to ensure that the equipment used in their business conforms to the essential health and safety requirements - in the case of vibration, the risks should be reduced to a minimum.

Suppliers' duties

The Supply of Machinery (Safety) Regulations 1992 (as amended) include duties for manufacturers and suppliers (among others), to design, manufacture and supply tools for which risks from vibration have been reduced to the lowest level. Suppliers should give you vibration emission data and additional information as necessary to explain the vibration risk you will need to manage - including an indication of any special operator training needs, eg correct use and maintenance of vibration reducing components.

Making the right choice

Not all tools are the same. There is considerable variation between the design of tools of a similar type. Tools that incorporate vibration-reduction innovations in their design may vibrate less than other tools. To make an informed choice regarding which tools to purchase, compare similar tools. Make sure you obtain sufficient information about the vibration emissions from the supplier and any other available sources.

The vibration that the user of a tool is exposed to depends upon:

- the vibration emission of the tool, AND
- the length of time that the tool is used.

Therefore, if the performance of two tools is identical, then it is beneficial to select the one with a lower vibration emission, since the worker can use it for a longer period of time. Your aim should be to select tools that can be used as required with the daily vibration exposure of a user remaining below 2.8 m/s^2 A(8). - (here, A(8) is a measure of a person's total daily exposure which is normalised to a standard reference period of 8 hours). Where this is not achieved, you will need to conduct health surveillance for vibration injury and regularly review and update your measures to reduce vibration exposure.

Combinations of average vibration emission and time resulting in a daily exposure of 2.8 m/s^2 A(8) are indicated below:

Duration of the working day (in hours)	16	8	4	2	1	0.5
Corresponding average vibration level for exposure at 2.8m/s^2 A(8)	2	2.8	4	5.6	8	11.2

Methods of calculating daily exposures for combinations of tools are given in HSG88, Foundries Information Sheet 10, and a computerised method is included in HSE's CD-ROM (see 'Further reading' below).

You are likely to find data reported to two types of standard:

- Measurements made according to BS EN ISO 8662 series (mainly for pneumatic tools) or BS EN 50144 series (electric tools) are usually made to report the vibration emission and often made under artificial conditions ignoring the effects of different tasks, materials, working postures etc that are important during real work. Revisions of these Standards should provide figures useful for both comparison of vibration emissions and initial assessment of risk in due course. However, for tools of the same type, you can usually compare the vibration levels - lower vibration level is usually lower vibration risk. The supplier should tell you if the figures are a misleading guide to levels of workplace risk.
- Measurements reported according to ISO 5349 are usually for assessment of exposure or risk from the vibration of hand-held vibrating equipment including equipment in use at work.

To summarise:

- *Comparisons of vibration between machines* can usually be made using the results (declared values of vibration emission) of standardised tests (e.g. BS EN ISO 8662 several parts) but the present test codes are often a poor guide to workplace risk. Differences of up to 50% between quoted figures are often unimportant for equipment with equivalent performance. But tools with substantially high vibration levels should be avoided.
- *Estimates of exposure* are made based on measurements of machines in use (eg ISO 5349-1:2001).

Manufacturers/suppliers sometimes fail to provide figures that reflect the 'in-use' vibration emissions of their products. In this case, you may have to seek out additional vibration information to ensure that the risk from that tool is being adequately managed.

Considerations in tool selection

The aim should be to choose a combination of tools for a job which, when used together as required, result in a daily vibration exposure of less than 2.8 m/s^2 A(8). Tools purchased should come with information that explains the extent of the vibration hazard you will need to manage. The following course of action can help in making an assessment of the suitability of the tools:

- Arrange for a demonstration of the machine, preferably in the foundry
- Ensure that the machine is capable of doing the job required
- Take the opportunity during the demonstrations to make a subjective assessment of the vibration levels during a real fettling operation
- Ask the fettlers/workforce for their views
- Ask for details of the vibration reduction design features of the machine and any need for special operator training or maintenance (beware of poorly designed elastomeric handles and/or inserts which can amplify vibration)
- Ask for the vibration emission values (eg to BS EN ISO 8662 - various parts) to help you compare the vibration risk of candidate tools
- Ask for details of the test conditions or standards used (machine speed, loading, out of balance level, test positions, frequency etc.) and check that they represent your working conditions
- Ask if the declared emission values are typical of the vibration levels for the work you plan to do. If not, ask what values might be expected and ask for information that explains the vibration risk you will need to manage.

A poor response to these questions may reduce your confidence in the product. Without adequate information, it is not possible to undertake a suitable and sufficient vibration risk assessment. Manufacturers' vibration data should be validated by comparison with data from another source, especially if an explanation of the risk you will need to manage is unavailable. You might obtain helpful data from trade associations, vibration (and noise) consultants, and web sites (such as the European hand-arm vibration resource at http://umetech.niwl.se/Vibration/HAVHome.html). If the data you need is unavailable you might engage a consultant to make measurements for you or you may choose to have a member of staff trained to do this task.

Machines should be adequately maintained

Having purchased a machine that ensures vibration exposure is reduced, it is important to ensure that it is properly maintained. Planned maintenance of the equipment can avoid the deterioration of the tool and may prevent unnecessary increases in vibration. Ensure that vibration reduction components such as springs, dampers, and isolators remain effective. The supplier should be able to provide you with a suitable maintenance schedule to follow.

Machines need to be used properly

Adequate training and supervision should be provided to ensure that machines are used properly - especially if the tools are fitted with vibration-reducing features such as suspended handles. Misuse and abuse such as slamming a grinder down on a fettling bench to stop the wheel not only causes extra vibration, but also unbalances the wheel and puts extra strain on shafts and bearings. This reduces tool life and leads to ongoing increased vibration exposure. The more carefully balanced and precision-engineered vibration-reduced machines may not be as robust as a more basic machine, though this is not automatically the case. Choosing the correct grade of grinding wheel is an important factor in preventing wheel abuse (see guidance booklet *Hand arm vibration in foundries* for further information on the selection of grinding wheels).

Summary

There is a duty to reduce vibration, so far as is reasonably practicable, in order to minimise the risk of hand-arm vibration syndrome. The provision of vibration-reduced machinery is one of the practical methods that can be used (sometimes in association with other measures) to achieve this. Care should be exercised in the selection of machines to ensure that not only are they capable of carrying out the job required, but can also assist in reducing vibration exposure to employees. In order to achieve an ongoing reduction in vibration, the machines will need to be carefully maintained and used properly. This may require additional maintenance and training resource.

Further reading

The following HSE publications may help you in reducing vibration exposure in your factory. Remember that your local HSE office is also available to give further advice and assistance.

Hazards associated with the foundry process: hand-arm vibration in foundries - Assessing the need for action Foundries Information Sheet FNIS 10 HSE Books 1999

Power tools: how to reduce vibration health risks INDG338 HSE Books 2001 ISBN 0 7176 2008 5

Hand-arm vibration in foundries HSE Books 2001 ISBN 07176 1798 X

Hand-arm vibration HSG88 HSE Books 1994 ISBN 0 7176 0743 7

Buying new machinery Leaflet INDG271 HSE Books 1998 (single copy free or priced packs of 15 ISBN 0 7176 1559 6)

Hazards associated with foundry processes - furnace and ladle relining Foundries Information Sheet FNIS11 HSE Books 2002

Other media

Hard to handle Video HSE Books 2001 ISBN 0 7176 1881 1

The successful management of hand-arm vibration CD-ROM HSE Books 2000 ISBN 0 7176 1713 0

While every effort has been made to ensure the accuracy of the references listed in this publication, their future availability cannot be guaranteed.

Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA. Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops.)

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This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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