Reducing the risk of hand-arm vibration injury among stonemasons

Introduction

This information sheet produced by the Health and Safety Executive outlines the risks to workers in the stonemasonry industry from hand-arm vibration. It is aimed at employers, employees and their representatives and deals with:

- the effects of vibration;
- symptoms to look for;
- what action to take if symptoms are suspected;
- how to assess exposure; and
- how to reduce the risks.

What is hand-arm vibration syndrome?

Hand-arm vibration syndrome (HAVS) is a group of diseases caused by exposure of the hands to vibration. The best known of these is vibration white finger (VWF) which is caused by damage to blood circulation.

Other damage may be to the nerves and muscles of the fingers and hands, causing numbness and tingling, reduced grip strength and sensitivity. Carpal tunnel syndrome (CTS) is an example of this and is caused by compression of nerves in the wrist. Pain and stiffness in the hands and joints of the wrists, elbows and shoulders may also occur.[1]

HAVS and CTS are reportable diseases under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995.[2]

Symptoms

VWF is characterised by attacks of blanching (whitening) when the fingers become numb. At first only the fingertips are affected but over a period of time the whole finger may be affected. Attacks last up to half-an-hour and often end with a painful, throbbing return of blood flow as the colour of the fingers changes to bright red.

Tingling and numbness caused by nerve damage can develop independently from blanching and eventually the fine sensation in the fingertips may be permanently lost, making it difficult to undertake delicate jobs.These effects are separate from the tingling that can occur during exposure to vibration. Reduced grip strength has also been found in some exposed workers.

Who is at risk?

HAV usually comes from finger or hand contact with either a powered tool or material being held against a moving surface, eg an abrasive wheel.

The users of rotating or percussive hand-guided tools, where the hands are exposed to high levels of vibration, are at greatest risk. The degree of risk depends on:

- the amount of tool vibration;
- the length of time for which the tool is used;
- whether tool use is intermittent or continuous;
- workplace temperature;
- individual susceptibility;
- the method of work; and
- the ergonomics of the task.

Although in many cases symptoms may take several years to develop, they can appear after only a few months in susceptible people exposed to high levels of vibration.

HAVS among stonemasons

Many stonemasons use a range of powered hand-tools during the working day including chipping hammers, angle grinders, drills, disc sanders/cutters, air rammers and abrasive wheels. Most masons using powered hand-tools are at risk of developing hand-arm vibration syndrome.

Many cases of VWF have been found in UK stonemasons' yards but masons themselves appear reluctant to report their symptoms, often thinking that they indicate arthritis.

A regular vibration maximum exposure level of 2.8 $m.s^{-2}$ A(8) (ie daily average) is recommended by HSE.[3] This feels much like using a powered lawnmower for four hours. Above this level a programme of preventive measures and health surveillance should be introduced.

Working practices and exposure to hand-arm vibration

Powered hand tools are used in many yards but the amount of use varies widely from a few minutes per week to almost continuously. Some masons use one type of powered hand-tool only, while others use a range of tools.

Powered hand-tools are used for tasks including cutting, carving, grinding, sanding, and polishing stone. Most tools are likely to be rotary but a few, particularly for carving, will be percussive.

There is a wide range of work and hand-tools being used at different yards. Vibration levels of up to 40 ms^{-2} have been measured, so many masons are likely to be exposed above the HSE recommended limit.

The following table indicates regular daily usage times for some tools after which a programme of preventive measures is required. Note the way vibration-reduced tools increase the period that tools can be used.

Tool type	*Typical vibration magnitudes*	*Time limit before action recommended*
Chipping hammers	10-40 ms^{-2}	2-40 minutes
Sand rammers	25-40 ms^{-2}	2-6 minutes
Angle grinders	2-35 ms^{-2}	3 minutes-16 hours
Disc cutters	4-10 ms^{-2}	40 minutes-4 hours
Disc sanders	10-15 ms^{-2}	16-40 minutes
Rock drills	15-35 ms^{-2}	3-16 minutes

Assessing exposure to vibration

Exposure to hand-arm vibration is a risk that should be assessed under the Management of Health and Safety at Work (MHSW) Regulations 1992. A written record of the assessment should be made where there are significant risks. Assessments can be done by staff, often an expert or consultant is not needed for this. Taking these four steps will achieve results:

- find out if there is a problem;
- decide what action to take;
- take action; and
- check what has been done.

Vibration exposure assessments should identify all groups of workers likely to be exposed above 2.8 $m.s^{-2}$ A(8). There should be an estimate of likely daily personal vibration exposure levels, the number of masons involved in each task and the pattern of exposure, for example daily, three days per month etc. The assessment should prioritise preventive and protective measures for reduction of the risk of vibration injury, taking account of patterns of exposure and other factors as detailed in HSE guidance.[3]

Health surveillance

Health surveillance for vibration injury is required under the MHSW Regulations. This should be a programme overseen by a doctor. A suitable arrangement would be a worker questionnaire completed on-site by an informed member of staff. The completed surveys would be sent to the doctor who would diagnose and make recommendations. It is important that suitably qualified people are involved - see HSE guidance.[3]

Health surveillance can prevent significant handicap. It can confirm that there are weaknesses in control of the risk of vibration injury, indicate where improved control efforts should be concentrated, and occasionally indicate where people should be removed from work. Pre-employment screening, followed by annual checks, is good practice.

Reducing exposure to vibration

Use of high-vibration tooling should be eliminated wherever possible. Mechanisation of processes commonly performed using powered hand-tools is one way of reducing the risk, eg the use of planing machines to rough shape stone, and auto-lettering machinery.

Actions to minimise the risk of vibration injury should include:

- careful selection of reduced vibration power tools;
- using water-powered tools;
- careful selection of the cutting tool (chisel etc) for the job;
- selection of well balanced discs on sanders and grinders;
- maintenance of the power tool, eg anti-vibration mountings; and
- maintenance of the cutting tool (sharpness of chisels etc).

Selection of low-vibration tools

Tools bearing the CE mark are declared by the manufacturer to be safe when used as instructed. Vibration data is given in technical sales literature and the instruction book if the vibration level exceeds 2.5 $m.s^{-2}$ during standard tests.[4] Supplementary information on measures necessary to control risks from exposure to tool vibration should appear in the instruction book.

Manufacturers' vibration data should be used to select a group of relatively low-vibration tools appropriate for a task. This group will usually contain the tools with the lowest vibration for the task but trials may be needed to confirm the lowest vibration tool.

Purchasers should be aware that many tools produce much higher vibration levels during normal use than those declared in the instruction book.

Manufacturers may cover such eventualities in discussion of 'residual risks' in the instruction book.

Low-vibration tool accessories should be selected. For example, well balanced blades or discs on rotary tools substantially reduce vibration levels.

Retrospective vibration controls

There are some instances where retrospective engineering vibration control at source will be reasonably practicable in stonemasons' yards, eg redirecting air exhaust away from the operator's hands.

Poor maintenance contributes to high vibration exposures. Masons should be instructed to report defective tools for maintenance and cutting tools should be kept sharp. Vibration exposures can be reduced by job rotation.

Applying so-called anti-vibration coatings to handles may help to keep your hands warm but it is unlikely to reduce the low-vibration frequencies which are the most harmful.

Personal protection

There is no personal protective equipment that has proved to be effective against HAVS in stonemasons' yards. Anti-vibration gloves may be beneficial in keeping hands warm but they are generally not effective at reducing vibration at the low frequencies which are important in the development of VWF.

However, it is important to keep hands warm, as this increases blood flow. This can be done by wearing thermal gloves and providing localised heating and rest breaks in cold conditions for workers to exercise and keep their hands warm. Exercising hands and fingers and not smoking will also help.

References

1 *Vibration solutions: Practical ways to reduce the risk of hand-arm vibration injury* HSG170 HSE Books 1997 ISBN 978 0 7176 0954 3

2 *Incident at work?* MISC769 HSE Books 2007 www.hse.gov.uk/pubns/misc769.pdf

3 *Hand-arm vibration. The Control of Vibration at Work Regulations 2005. Guidance on Regulations* L140 HSE Books 1995 ISBN 978 0 7176 6125 1

4 BS EN ISO 8662-14:1997 *Hand-held portable power tools. Measurement of vibrations at the handle. Part 14: Stone-working tools and needle scalers* British Standards Institution

Further information

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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.

This publication can be found at: www.hse.gov.uk/pubns/misc112.pdf.