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Target audience: All FOD staff

## **HAVS AND NOISE CONTROL CAMPAIGN UNDER THE FIT3 PROGRAMME - YEAR 1: HAVS**

This OM informs operational staff about the hand-arm vibration syndrome (HAVS) and noise control campaign being carried out during 2006-08, with particular emphasis on HAVS in 2006/07. The campaign consists of Programme Directed Inspections, investigation of health surveillance provision, local promotional events and national communication activities, focussing on securing the adoption of control measures and strategies to reduce exposure to HAV and noise, and increasing the uptake of health surveillance. This work contributes to the Noise & HAV Programme within the FIT3 Strategic Programme.

### **BACKGROUND**

1 Ill-health due to occupational exposure to hand-arm vibration and noise continues to be significant. 900,000 employees in the UK are exposed to vibration above the exposure limit set in regulation. 1.1 million employees are exposed to levels of noise above the upper action value set in regulation, and relying on PPE to protect their hearing. Noise-induced hearing loss and hand-arm vibration syndrome account for 50% of new successful industrial injuries compensation claims, and over 50% of claims for compensation through the civil courts for occupational diseases.

2 New regulations on vibration were introduced in 2005, replacing HSE's established guidance on the subject. New regulations on noise come in to force in April 2006, setting reduced action levels.

3 A major aim of the accompanying guidance for both sets of regulations is to emphasise that risks from HAV and noise can in many cases be tackled by the adoption, on the part of the duty holder, of established control measures and strategies.

4 To promote these aims a HAVS and noise control campaign will run during 2006/07 and 2007/08. In 2006/07 the campaign will focus on HAV. Activities in 2007/08 will focus on noise. The campaign is a project contributing to the

Noise and Hand-arm Vibration Programme, within the Fit3 Strategic Programme.

### AIMS

5 The aims of the campaign are:

- a. To promote the adoption of established solutions and strategies to control risks from HAV and noise
- b. To promote the uptake of quality health surveillance for HAVS and noise-induced hearing loss

### OBJECTIVES

6 The objectives of the campaign (2006/07) are:

- a. To secure the adoption of reasonably practicable measures to avoid/reduce use of vibrating equipment.
- b. To ensure dutyholders properly manage risks from HAV where the use of hand-held equipment is unavoidable, through appropriate control measures and strategies.
- c. To increase the number of employers providing suitable health surveillance.
- d. To assess the adequacy and quality of current health surveillance provision.
- e. To obtain intelligence to develop new, and further develop existing, control measures and strategies.
- f. To identify examples of good practice.
- g. To generate publicity and awareness of available control measures and strategies via promotional events, partnerships and direct interventions.

### TIMESCALES

7 Work will be carried out according to the following approximate timescales:

- Initial publicity and communications work Months 1-3
- Inspection to secure exposure reduction and management of risk Months 4-9
- Second stage communications including HAV control surgeries Months 8-12
- Inspection of health surveillance issues Months 4-12

### TARGETS

8 Targets for 2006/07 are activities presenting high risk of HAVS in manufacturing (heavy fabrication, foundries, shipbuilding) and construction.

## ACTIVITIES

### **Programme Directed Inspection**

9 Programme Directed Inspections totalling 416 contact days effort are planned to be carried out in 2006/07. Half of this activity will be carried out by inspectors in Construction Division, the remainder by other FOD inspectors. Appendix 1 of this OM provides notes for inspectors carrying out an inspection on HAV. Inspections should be carried out when specific high HAVS risk processes are encountered in the target premises. The high-risk processes of interest are identified in Appendices 2 (Foundries), 3 (Heavy fabrication) and 4 (Construction). These Appendices provide further briefing for inspectors, and can be left with duty holders if necessary.

10 On encountering a high risk process, inspectors will, with the aid of the information in the Appendices to this OM, be able to form a judgement as to whether the HAV exposure action value is likely to be exceeded. If so, the alternative methods listed in Appendices 2 to 4 should be used as the basis for an intervention to secure compliance with Regulations 6(1) and 6(2) of the **Control of Vibration at Work Regulations 2005**, i.e. to ensure that exposures to, and risks from, vibration are as low as reasonably practicable.

11 Alongside the intervention to secure the adoption of reasonably practicable control measures, inspectors should deal with other matters surrounding the management of HAVS risks where use of vibrating equipment is unavoidable, including selection of work equipment, limiting exposure duration, information, instruction and training, and health surveillance.

12 Thirty inspectors will be selected as 'advocates' for the campaign. The role of advocates will be to provide a locally-based link between the FOD inspection activities and the project team, and to support colleagues. The community of advocates will be provided with specific training in their role, and will be supported in turn by the project team.

### **Practical HAV surgeries for employers**

13 Four regional HAV control surgeries will be held. These events will be led by N&V Specialist Inspectors, supported by HSAO.

14 The intention of these events is to provide practical advice to dutyholders on controlling risks from HAV, by means of case studies highlighting good practice controls measures and strategies. It is intended to develop and present relevant case studies on planning for control, implementing established controls, developing new controls and managing health surveillance.

## Health surveillance

15 Where exposure to hand-arm vibration is likely to be above the exposure action value, health surveillance of the affected employees is required, and inspectors should ensure compliance with Regulation 7 of the **Control of Vibration at Work Regulations 2005**. Inspectors should refer to Occupational Health Inspectors where dutyholders report difficulty in securing suitable health surveillance, and where the quality of health surveillance provided or the feedback and use of the results of health surveillance give cause for concern.

16 OHI will also undertake proactive work on HAVS health surveillance, including inspection of dutyholder compliance. This work, lead by Corporate Medical Unit, will involve targeted inspection based on intelligence gathered by HSAO, and contact with occupational health providers to advise them on procedures and competence. Analysis of the results of this work will inform the development of HSE strategy to improve health surveillance provision.

17 OHI contacts with dutyholders and health surveillance providers totalling 100 contact days effort are planned to be carried out.

18 Corporate Medical Unit will provide briefings to Occupational Health Inspectors on their role in the campaign.

## General communications activities

19 There will be a number of communications and stakeholder engagement events to support the campaign, described in more detail in the Noise & Vibration Programme Communications Plan. These include a launch conference (June 2006), a further four of the successful EEF/HSE Noise & Vibration Roadshows (June/July 2006), and HSAO-organised free seminars, particularly targeted at SME, distributed nationally throughout the 2006/07 according to target audience and demand. The HAVS/Noise control campaign is planned to continue into 2007/08, and communications activities will continue according to demand.

## RESOURCES

20 The campaign has been allocated the following operational resource.

<b>Resource</b>	<b>Allocation (staff years)</b>
FOD General Inspectors	8
FOD OHI	2
FOD HSAO	6
FOD N&V Specialist Inspectors	2

21 The number of planned contact days, and suggested distribution of 'advocates', is as follows:

Division	Contact days	Suggested # 'advocates'
W&SW	31	3
E&SE	58	6
LON	-	-
MID	52	5
Y&NE	31	3
NW	21	2
SCOT	15	2
CDLESE	69	3
CDSN	49	3
CDWMWSW	59	3
CDYNE	31	2

## RECORDING

22 Recording will be via Inspection Report Form (IRF), using Risk Control Indicators. The HAV Inspection Pack has been withdrawn and is currently under revision. In the meantime, it is essential that inspectors carrying out Fit3 Programme Directed Inspections on HAV in 2006-07 are equipped with the means to report their findings on compliance in a way that contributes to meaningful evaluation of this part of the Noise and HAV Programme. For the duration of the campaign the following RCI should be used.

Risk control indicator 1	<b>Adoption of alternative working methods</b>	Exposure from known high risk activities eliminated or reduced to ALARP by adoption of appropriate alternative work processes.
Risk control indicator 2	<b>Management of ongoing &amp; residual HAV risk</b>	Where exposures are likely to exceed the exposure action value, risk and exposure is ALARP by appropriate means such as equipment selection, maintenance, operator training, exposure time management.
Risk control indicator 3	<b>Provision of appropriate health surveillance</b>	Where exposures are likely to exceed the exposure action value, appropriate health surveillance programme is in place

### Assessment scale

Each risk control indicator should be assessed against the following scale. A score of 1 must satisfy all the appropriate criteria of the risk control indicator.

1	2	3	4
Full compliance in areas that matter.	Broad compliance or realistic action plan to achieve compliance in areas that matter.	Some recognition of the need to comply, but confusion and lack of progress.	No recognition the need to take action on HAV risks.

23 An important aspect of the campaign is that Inspectors are providers of intelligence to the Project Team in order to facilitate further work under the campaign and to broaden HSE's understanding of what may be reasonably practicable for control of HAV. Inspectors are requested therefore to note examples of good practice, cooperative duty holders who may be willing to assist in the development of control measures, high risk activities for which there are apparently no reasonably practicable control measures, high risk activities which result in exposures above the exposure limit value when all reasonably practicable controls have been applied, and issues with availability/quality of health surveillance. These matters are to be followed up by N&V Specialists, Occupational Health Inspectors or Corporate Medical Unit as appropriate. Advocates will liaise with inspectors to facilitate the recording and following up of these matters.

#### FURTHER INFORMATION

24 This project is being managed by the FOD N&V Pool. Contact the project managers Bruce Appleton (VPN 515-4366) or Tim Ward (VPN 523-3985) for more information.

## APPENDIX 1

### HAVS AND NOISE CONTROL CAMPAIGN: NOTES FOR INSPECTORS CARRYING OUT A PROGRAMME DIRECTED INSPECTION ON HAV

#### BACKGROUND

1 This Appendix provides information for inspectors taking part in the N&V Programme's control campaign in 2006-07 in the three target sectors: foundries, heavy fabrication (including shipbuilding/repair) and construction. In combination with Appendices 2, 3 and 4 it forms the basis of the training material for this campaign and takes the place of the HAV Topic Pack (currently under revision) for the duration of the campaign. Appendices 2 to 4 contain sector-specific information on HSE's expectations for compliance with the **Control of Vibration at Work Regulations 2005**. This information will also be published on HSE's vibration web pages at [www.hse.gov.uk/vibration](http://www.hse.gov.uk/vibration) so that the same information is available to dutyholders.

#### WHEN TO CARRY OUT A HAV INSPECTION

2 Table 1, column 1, of the relevant Appendix lists work processes that are known to result in high vibration exposures and for which alternatives have been identified. Inspectors should carry out a Programme Directed Inspection on HAV, following these guidelines, when one or more of these processes is encountered and where daily exposure times are such that exposures above the exposure action value are likely (see below). Useful questions:

- “What are you doing?”
- “Why are you doing it at all?”
- “Why are you doing it that way?”
- “How long does it take?”

#### RISK AND EXPOSURE ASSESSMENT

3 Daily vibration exposure is dependent on the vibration level and “finger-on-trigger” time and should be assessed by the employer using vibration data measured in representative working conditions, preferably corroborated using data from a second source. However, for the work activities covered by this campaign, it will usually be possible for employers and inspectors to establish whether the exposure action value is **likely** to be exceeded by using the information in Table 1, columns 1-4, in the relevant Appendix, and knowledge of daily tool use times. This should be sufficient to establish whether the relevant duties in Regulation 6 (elimination/control of exposure), Regulation 7 (health surveillance) and Regulation 8 (information, instruction and training) apply.

## ALTERNATIVE METHODS

4 The alternative work methods listed in Table 1, column 5, of the relevant industry-specific Appendix have been established as good practice in the industries concerned and will often be reasonably practicable, depending on local circumstances. The list is not exhaustive. Inspectors should seek to secure compliance with Regulations 6(1) and 6(2) through interventions to ensure that, where reasonably practicable, the employer adopts suitable alternative work methods to eliminate vibration exposure or make it as low as reasonably practicable (ALARP).

## MANAGEMENT OF ONGOING AND RESIDUAL VIBRATION RISKS

5 Employers must manage vibration risks, including where process change or alternative working methods cannot be implemented immediately, or residual risks remain after all reasonably practicable measures have been taken to eliminate/minimise the use of hand-operated vibrating machinery. In these cases, if exposure is likely to exceed the exposure action value, employers must ensure that exposure is ALARP and risk is controlled. This will require an appropriate combination of measures such as selection of suitable work equipment, maintenance, providing employees with information, instruction and training and limiting exposure time. Regulations 6 and 8 apply. Table 2 of the relevant Appendix contains further information.

## HEALTH SURVEILLANCE

6 A suitable health surveillance programme must be in place for employees whose HAV exposures are likely to exceed the exposure action value. This should allow for any new cases of HAVS to be detected and diagnosed, for existing cases to be monitored and for adequate information to be fed back to the employer. There should also be a clear policy for the future management of affected employees. Regulation 7 applies. Any concerns over quality or availability of health surveillance services should be recorded for follow up by an Occupational Health Inspector.

## FURTHER INFORMATION

7 The information in Appendices 2 to 4 will be made available on the HSE website and copies of the Appendices may be left with dutyholders. The right hand columns contain references to more detailed guidance, case studies, and other information and includes material from sources other than HSE. Links to the relevant locations on the internet are provided wherever possible, and it is anticipated that all the material referred to, including selected case studies from HSG170 "Vibration Solutions", will be made available online before inspections begin.

## APPENDIX 2

**TABLE 1: ESTABLISHED ALTERNATIVE PROCESSES TO AVOID/REDUCE USE OF VIBRATING EQUIPMENT**

Activity or process	Example vibration magnitude (m/s <sup>2</sup> )	Corresponding time to reach:		Alternative methods	References and related guidance*
		EAV	ELV		
Knock-off, cut-off and fettling castings using:  Large angle grinders  Large straight grinders  Chipping hammers  Pedestal grinders	4 (best) 8 (the rest) - 10 (best) 18 (typical) 10 (typical)	3 h 45 m - 30 m 10 m 30 m	12 h 3 h - 2 h 40 m 2 h	<p>Eliminate or reduce the need for manual knock-off/cut-off or fettling using, where appropriate:</p> <ul style="list-style-type: none"> <li>• good foundry practice and investment casting (lost wax) or lost foam casting techniques to improve casting precision</li> <li>• design castings to minimise fettling (number of joint lines etc.)</li> <li>• decrease ingate/feeder size and reduce cut-off time</li> <li>• design castings suitable for direct machining</li> <li>• challenge inappropriate customer specifications for high standard of finish</li> </ul> <p>Substitute alternatives to manual fettling using, for example:</p> <ul style="list-style-type: none"> <li>• robot fettling machines</li> <li>• automated grinding and manipulators</li> <li>• semi-automatic cut off</li> <li>• cropping machines</li> <li>• jig-mounting for grinder or castings</li> </ul> <p>Design casting and runner systems should allow for these methods.</p> <p>Note: These methods for elimination and substitution will usually be reasonably practicable for large production runs; some may also be appropriate in jobbing foundries.</p>	<p>Hand-arm vibration in foundries (FIAC 2001) L140, p50</p> <p>Video case study [Adtranz knuckle grinding]</p> <p>HSG170 #17 Video [Stantons] HSG 170 #1 &amp; #16 HSG170 #39</p>
Knocking off ceramic mould shells with chipping hammer:	18 (typical)	10 m	40 m	<p>Hands-free alternative processes:</p> <ul style="list-style-type: none"> <li>• Frame-mounted breaker</li> </ul>	<p>HSG170 #19 HSG 170 #30</p>
Furnace/cupola descaling/lining removal with breaker or chipping hammer	8 (lowest) 15 (typical) 25 (highest)	45 m 15 m 5 m	3 h 1 h 20 m	<p>Eliminate the use of hand-operated tools:</p> <ul style="list-style-type: none"> <li>• water-cooled cupola without lining (for capacity &gt;9 tonnes/hr)</li> <li>• hydraulic lining "push-out"</li> <li>• hydraulic machine-mounted breaker;</li> </ul> <p>Reduce the frequency of lining renewal or slag chipping by:</p> <ul style="list-style-type: none"> <li>• Maximising life of lining through good cupola operating practice</li> <li>• Reduce build-up of slag by control of impurities</li> </ul>	<p>Foundries Information Sheet 11: Furnace and ladle relining operations <a href="http://www.hse.gov.uk/pubns/fnis11.pdf">www.hse.gov.uk/pubns/fnis11.pdf</a></p> <p>Push-out video case study [Stantons]</p> <p>Ervin Armasteel chipping example</p>

Activity or process	Example vibration magnitude (m/s <sup>2</sup> )	Corresponding time to reach:		Alternative methods	References and related guidance*
		EAV	ELV		
Ramming moulds with: sand rammers	10 (lowest) 50 (highest)	30 m 1 m	2 h 5 m	In jobbing foundries, where hand-ramming of moulds cannot be eliminated, the risk can be controlled by; <ul style="list-style-type: none"> <li>• mounting an electric hammer in a frame on a balancing rig</li> <li>• mounting a pneumatic rammer in a semi-rigid balancing arm</li> </ul> (See HSE guidance for the cast stone industry)	Information Sheet MISC493: Hand-arm vibration in the cast stone industry: reducing the risk <a href="http://www.hse.gov.uk/pubns/misc493.pdf">www.hse.gov.uk/pubns/misc493.pdf</a>
electric demolition hammers	15 (typical)	15 m	1 h		

Note 1: The vibration magnitudes, and associated trigger times to exceed exposure action value/exposure limit value (EAV/ELV), are indicative only and will vary depending on equipment type and conditions of use.

Note 2: Changes of process to eliminate or reduce vibration may introduce other hazards to health or safety (e.g. chemical, fume, spatter, noise, dust) which must be addressed and managed.

\* All case study and HSG170 material intended to be published on HSE website – in the intervening period please contact the campaign project team

TABLE 2: MANAGEMENT OF HAV RISKS WHERE USE OF VIBRATING EQUIPMENT IS UNAVOIDABLE

Issue	Expectation	References and related guidance*
<b>Selection of work equipment</b>	<p>Tool selection can make a substantial difference to the vibration level (see Table 1, column 2) but the tool must be suitable for the task and used correctly.</p> <p>Employers should demonstrate a sound procurement policy for power tools and hand-guided machines, showing they have considered the following:</p> <ul style="list-style-type: none"> <li>• There is no reasonably practicable alternative method with no (or less) vibration exposure (see Table 1)</li> <li>• Equipment is generally suitable for the job (safety, size, power, efficiency, ergonomics, cost, user acceptability, etc.)</li> <li>• Reduced vibration designs are selected provided the tools are otherwise suitable (e.g. grinders with automatic spindle balancing)</li> <li>• Declared vibration emission is not high compared with competing machines of similar capacity to do the job</li> <li>• Information on likely vibration emission in use (e.g. from manufacturer, hire company, databases)</li> <li>• Available information from the manufacturer or elsewhere on control of vibration risks through: <ul style="list-style-type: none"> <li>• maintenance of tools and accessories (e.g. servicing grinders, sharpening chisels)</li> <li>• selection of consumables (e.g. suitable grit size and hardness of abrasive wheels, pitch of teeth on rotary files/burrs)</li> <li>• correct operation and operator training (see below)</li> <li>• maximum daily trigger times or maximum daily work done with the tool</li> </ul> </li> </ul>	<p>L140 p52-53 and Part 4 INDG175(rev2)  <a href="http://www.hse.gov.uk/pubns/indg175.pdf">www.hse.gov.uk/pubns/indg175.pdf</a>  A purchasing policy for vibration-reduced tools in foundries  Foundries Information Sheet 12  <a href="http://www.hse.gov.uk/pubns/fnis12.pdf">www.hse.gov.uk/pubns/fnis12.pdf</a></p> <p>Hand-arm vibration in foundries (FIAC 2001)</p>
<b>Limiting daily exposure time</b>	<p>Restricting exposure time (“finger-on-trigger” time) may be required to bring exposures below the Exposure Limit Value, even after all reasonably practicable measures to reduce vibration levels are in place.</p> <p>Maximum times can be determined using the exposure points system or supplier’s “traffic lights” tool categories, but these should be derived from soundly-based “real use” vibration emission values.</p> <p>Note: Employers tend to ask “How long can we use this tool?” The exposure must be reduced to the <u>lowest level that is reasonably practicable</u> (Reg 6(2)), so the Exposure Limit Value should not be used as a target, if a lower exposure is reasonably practicable.</p>	<p>L140 p56-57</p> <p>Points system:  L140 p39-41  <a href="http://www.hse.gov.uk/vibration/readyreconer.htm">www.hse.gov.uk/vibration/readyreconer.htm</a></p>
<b>Other risk controls</b>	<p>Control of HAVS risk by means other than reducing vibration exposure:</p> <ul style="list-style-type: none"> <li>• Ergonomic aids such as tensioners or balancers to support weight of tool and reduce forces applied by operator</li> <li>• Pedestal grinders: mount the work rest independently of the machine, to reduce transmission of vibration</li> <li>• Suitable workplace temperature or provision of warm clothing and gloves</li> <li>• Regular breaks from work involving vibration and encourage operators to exercise fingers</li> </ul>	<p>L140 p57-58</p> <p>HSG170 #44</p> <p>Employees’ leaflet INDG296(rev1)  <a href="http://www.hse.gov.uk/pubns/indg296.pdf">www.hse.gov.uk/pubns/indg296.pdf</a></p>

Issue	Expectation	References and related guidance*
<b>Information, instruction and training</b>	<p>Employees at risk from vibration should have received information on:</p> <ul style="list-style-type: none"> <li>• the risks from HAV and how to help reduce them (see above)</li> <li>• the importance of correct operation and maintenance of equipment</li> <li>• arrangement for health surveillance and their duty to cooperate.</li> </ul> <p>Look for evidence that tools are being used correctly, as recommended by the manufacturer. This may require operators to receive specified training – operators and their supervisors should be aware of the need. For example, if an unsuitable abrasive is used, operators may resort to “bumping” the grinder against the casting; this can result in distortion of the wheel and increased vibration, and there is also a risk of wheel breakage.</p>	<p>Employees’ leaflet INDG296(rev1)  <a href="http://www.hse.gov.uk/pubns/indg296.pdf">www.hse.gov.uk/pubns/indg296.pdf</a></p> <p>L140 p58</p> <p>Hand-arm vibration in foundries (FIAC 2001)</p>
<b>Health surveillance</b>	<p>Required where the EAV is likely to be exceeded. Expect to see, as a minimum:</p> <ul style="list-style-type: none"> <li>• use of a periodic health screening questionnaire – ideally annually and for new employees</li> <li>• arrangements for referral of relevant cases to an occupational health provider with HAVS expertise for diagnosis and on-going monitoring</li> <li>• arrangements to receive medical advice on management of affected employees</li> <li>• arrangements for RIDDOR reporting of HAVS cases</li> <li>• arrangements to receive anonymised information to demonstrate effectiveness of controls</li> </ul>	<p>L140 Part 5  Employers’ leaflet INDG175(rev2)  <a href="http://www.hse.gov.uk/pubns/indg175.pdf">www.hse.gov.uk/pubns/indg175.pdf</a></p> <p>Questionnaires etc. on HSE website:  <a href="http://www.hse.gov.uk/vibration/tieredsystem.pdf">www.hse.gov.uk/vibration/tieredsystem.pdf</a></p>

\* All case study and HSG170 material intended to be published on HSE website – in the intervening period please contact the campaign project team

### APPENDIX 3

## ALTERNATIVE WORKING METHODS AND RISK MANAGEMENT FOR HAND-ARM VIBRATION – HEAVY FABRICATION (INCLUDING SHIPBUILDING/SHIP REPAIR)

**TABLE 1: ESTABLISHED ALTERNATIVE PROCESSES TO AVOID/REDUCE USE OF VIBRATING EQUIPMENT**

Activity or process	Example vibration magnitude (m/s <sup>2</sup> )	Corresponding time to reach:		Alternative methods	References and related guidance*
		EAV	ELV		
Manual cutting of steel plate and re-working to correct component profile using:  angle grinders  straight grinders  chipping hammers (rarely)  Nibbling machine (hand-fed type)	4 (lowest) 8 (highest)  6 (typical) 15 (highest)  18 (typical)  10 (typical)	3 h 45 m  1½ h 15 m  10 m  30 m	12 h 3 h  5½ h 1 h  40 m  2 h	Expect to see accurate pre-prep, cutting components to correct size, with a minimum of “green” . <i>“Measure twice, cut once.”</i> Significant exposures from re-work using grinders etc. should be challenged.  Select suitable modern, precision processes for cutting out, as appropriate: <ul style="list-style-type: none"> <li>• CNC oxy-fuel flame cutting</li> <li>• CNC machining</li> <li>• laser profiling (up to approx 5 mm plate thickness)</li> <li>• abrasive waterjet cutting (up to 150 mm thickness) – cold process with no heat distortion</li> <li>• submerged plasma cutting</li> <li>• submerged spark erosion (electrical discharge machining)</li> </ul> <p>Note: improving accuracy and minimising manual reworking is also usually cost-effective.</p>	BMT “Noise Reduction in Shipyards” booklet   Video case study [machining] HSG170 #45 [laser]   Plasma cutting: control of fume, gases and noise. ID 668/22 <a href="http://www.hse.gov.uk/fod/infodocs/668_22.pdf">www.hse.gov.uk/fod/infodocs/668_22.pdf</a>
Weld preparation and finishing using tools as above	As above	As above	As above	<ul style="list-style-type: none"> <li>• Apply bevelled edges for welding while cutting out to avoid unnecessary grinding</li> <li>• Use single sided welding (with a suitable backing material) to avoid routine back gouging associated with double sided welding (resulting distortion can be managed with “strongbacks”, heat line straightening, etc.)</li> </ul>	Noise reduction in the ship repair industry – research report 1992 <a href="http://www.hse.gov.uk/research/crr_pdf/1992/CRR92041.pdf">www.hse.gov.uk/research/crr_pdf/1992/CRR92041.pdf</a>   Control of noise in heavy fabrication SIM 03/1001/14 <a href="http://www.hse.gov.uk/foi/internalops/sectors/manuf/3_01_14.pdf">www.hse.gov.uk/foi/internalops/sectors/manuf/3_01_14.pdf</a>

Activity or process	Example vibration magnitude (m/s <sup>2</sup> )	Corresponding time to reach:		Alternative methods	References and related guidance*
		EAV	ELV		
Removing fairing aids, lifting lugs, etc. using grinders (see above)	As above	As above	As above	<p>Design fairing and lifting processes to avoid temporary welded aids which must be removed by grinding.</p> <ul style="list-style-type: none"> <li>• Use magnetic, vacuum or screw clamps and anchors instead of welded fairing aids</li> <li>• Bolt fairing aids to welded studs which require less grinding to remove</li> <li>• Design welded lifting lugs that can be left in place</li> <li>• Use lifting clamps instead of welded lifting lugs</li> <li>• Use bolted lugs or shackles instead of welded lifting lugs</li> </ul>	<p>BMT "Noise Reduction in Shipyards" Booklets 1 and 2 1986.</p> <p>Noise reduction in the ship repair industry – research report 1992 <a href="http://www.hse.gov.uk/research/crr_pdf/1992/CRR92041.pdf">www.hse.gov.uk/research/crr_pdf/1992/CRR92041.pdf</a></p>
Surface preparation using:				<p>Cleaning steel surfaces and preparing for painting. Use of scaling tools should be minimised (small and awkward areas only) and modern vibration-reduced tools should be used.</p> <p>Where reasonably practicable an appropriate alternative process should be used, for example:</p> <ul style="list-style-type: none"> <li>• shot blasting</li> <li>• abrasive vacuum blasting</li> <li>• ultra high pressure water jetting</li> <li>• dry ice pellet blasting (non-abrasive, "clean" method)</li> <li>• ice blasting (wet)</li> </ul>	<p>Noise reduction in the ship repair industry – research report 1992 <a href="http://www.hse.gov.uk/research/crr_pdf/1992/CRR92041.pdf">www.hse.gov.uk/research/crr_pdf/1992/CRR92041.pdf</a></p> <p>Control of noise in heavy fabrication SIM 03/1001/14 <a href="http://www.hse.gov.uk/foi/internalops/sectors/manuf/3_01_14.pdf">www.hse.gov.uk/foi/internalops/sectors/manuf/3_01_14.pdf</a></p> <p>HSG170 #23 [vacuum blaster]</p>
needle scalars	5 (lowest) 18 (highest)	2 h 10 m	8 h 35 m		
scaling hammers (piston type)	10 (lowest) 40 (highest)	30 m 2 m	2 h 7 m		
deck planers, leaf-type scalars, peening tools	15 (typical)	15 m	1 h		

Note 1: The vibration magnitudes, and associated trigger times to exceed exposure action value/exposure limit value (EAV/ELV), are indicative only and will vary depending on equipment type and conditions of use.

Note 2: Changes of process to eliminate or reduce vibration may introduce other hazards to health or safety (e.g. chemical, fume, spatter, noise, dust) which must be addressed and managed.

Note 3: For shipyards, HSE policy since 1998 has been to serve IN for action plan/control where no progress has been made; PN for old design chipping or scaling tools used for more than 1 hour.

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TABLE 2: MANAGEMENT OF HAV RISKS WHERE USE OF VIBRATING EQUIPMENT IS UNAVOIDABLE

Issue	Expectation	References and related guidance*
<b>Selection of work equipment</b>	<p>Tool selection can make a substantial difference to the vibration level (see Table 1, column 2) but the tool must be suitable for the task and used correctly.</p> <p>Employers should demonstrate a sound procurement policy for power tools and hand-guided machines, showing they have considered the following:</p> <ul style="list-style-type: none"> <li>• There is no reasonably practicable alternative method with no (or less) vibration exposure (see Table 1)</li> <li>• Equipment is generally suitable for the job (safety, size, power, efficiency, ergonomics, cost, user acceptability, etc.)</li> <li>• Reduced vibration designs are selected provided the tools are otherwise suitable (e.g. grinders with automatic spindle balancing)</li> <li>• Declared vibration emission is not high compared with competing machines of similar capacity to do the job</li> <li>• Information on likely vibration emission in use (e.g. from manufacturer, hire company, databases)</li> <li>• Available information from the manufacturer or elsewhere on control of vibration risks through: <ul style="list-style-type: none"> <li>• maintenance (e.g. servicing grinders, sharpening drills and chisels)</li> <li>• selection of consumables (abrasive discs, chisels, drills, etc.)</li> <li>• correct operation and operator training (see below)</li> <li>• maximum daily trigger times or maximum daily work done with the tool</li> </ul> </li> </ul>	<p>L140 p52-53 and Part 4 INDG175(rev2) <a href="http://www.hse.gov.uk/pubns/indg175.pdf">www.hse.gov.uk/pubns/indg175.pdf</a></p>
<b>Limiting daily exposure time</b>	<p>Restricting exposure time (“finger-on-trigger” time) may be required to bring exposures below the Exposure Limit Value, even after all reasonably practicable measures to reduce vibration levels are in place.</p> <p>Maximum times can be determined using the exposure points system or supplier’s “traffic lights” tool categories, but these should be derived from soundly-based “real use” vibration emission values.</p> <p>Note: Employers tend to ask “How long can we use this tool?” The exposure must be reduced to the <u>lowest level that is reasonably practicable</u> (Reg 6(2)), so the Exposure Limit Value should not be used as a target, if a lower exposure is reasonably practicable.</p>	<p>L140 p56-57</p> <p>Points system: L140 p39-41 <a href="http://www.hse.gov.uk/vibration/readyrec_koner.htm">www.hse.gov.uk/vibration/readyrec_koner.htm</a></p>
<b>Other risk controls</b>	<p>Control of HAVS risk by means other than reducing vibration exposure:</p> <ul style="list-style-type: none"> <li>• Ergonomic aids such as tensioners or balancers to support weight of tool and reduce forces applied by operator</li> <li>• Suitable workplace temperature or provision of warm clothing and gloves</li> <li>• Regular breaks from work involving vibration and encourage operators to exercise fingers</li> </ul>	<p>L140 p57-58</p> <p>Employees’ leaflet INDG296(rev1) <a href="http://www.hse.gov.uk/pubns/indg296.pdf">www.hse.gov.uk/pubns/indg296.pdf</a></p>

Issue	Expectation	References and related guidance*
<b>Information, instruction and training</b>	<p>Employees at risk from vibration should have received information on:</p> <ul style="list-style-type: none"> <li>• the risks from HAV and how to help reduce them (see above)</li> <li>• the importance of correct operation and maintenance of equipment</li> <li>• arrangement for health surveillance and their duty to cooperate.</li> </ul> <p>Look for evidence that tools are being used correctly, as recommended by the manufacturer. This may require operators to receive specified training – operators and their supervisors should be aware of the need. For example, percussive tools with suspension systems designed to absorb vibration must be used correctly, and with appropriate force, or the potential reduction in vibration will not be achieved.</p>	<p>Employees' leaflet INDG296(rev1)  <a href="http://www.hse.gov.uk/pubns/indg296.pdf">www.hse.gov.uk/pubns/indg296.pdf</a></p> <p>L140 p58</p>
<b>Health surveillance</b>	<p>Required where the EAV is likely to be exceeded [Chris see my comments in main text ]. Expect to see, as a minimum:</p> <ul style="list-style-type: none"> <li>• use of a periodic health screening questionnaire – ideally annually and for new employees</li> <li>• arrangements for referral of relevant cases to an occupational health provider with HAVS expertise for diagnosis and on-going monitoring</li> <li>• arrangements to receive medical advice on management of affected employees</li> <li>• arrangements for RIDDOR reporting of HAVS cases</li> <li>• arrangements to receive anonymised information to demonstrate effectiveness of controls</li> </ul>	<p>L140 Part 5  INDG175(rev2)  <a href="http://www.hse.gov.uk/pubns/indg175.pdf">www.hse.gov.uk/pubns/indg175.pdf</a></p> <p>Questionnaires etc. on HSE website:  <a href="http://www.hse.gov.uk/vibration/tieredsystem.pdf">www.hse.gov.uk/vibration/tieredsystem.pdf</a></p>

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## APPENDIX 4

### ALTERNATIVE WORKING METHODS AND RISK MANAGEMENT FOR HAND-ARM VIBRATION – CONSTRUCTION

TABLE 1: ESTABLISHED ALTERNATIVE PROCESSES TO AVOID/REDUCE USE OF VIBRATING EQUIPMENT

Activity or process	Example vibration magnitude (m/s <sup>2</sup> )	Corresponding time to reach:		Alternative methods	References and related guidance*
		EAV	ELV		
<u>Tunnelling</u> by hand with clay spade or jigger pick.	16 (typical)	10 m	45 m	Mechanised tunnelling methods, to eliminate hand digging. This is expected for all but the smallest tunnelling jobs.	British Tunnelling Society CoP being prepared: <a href="http://www.britishtunnelling.org/">www.britishtunnelling.org/</a>
<u>Breaking</u> concrete, asphalt, etc. with hand-operated breakers in ground work, road maintenance, etc.	5 (lowest) 12 (typical) 20 (highest)	2 h 20 m 10 m	8 h 90 min 30 min	Plan construction work (e.g. casting-in ducts, detail box-outs) to minimise breaking through new concrete/masonry.  Use alternative method/equipment as appropriate: <ul style="list-style-type: none"> <li>• machine-mounted hydraulic breakers</li> <li>• floor saws</li> <li>• directional drilling/pipe jacking to avoid trenching</li> <li>• hydraulic crushers</li> <li>• hydraulic bursters</li> <li>• diamond core drilling</li> <li>• diamond wire cutting</li> <li>• hydro-demolition (UHP water jetting)</li> </ul>	Construction Industry Council guidance H20.001 and H20.002 at <a href="http://www.safetyindesign.org">www.safetyindesign.org</a>  HSG170 #10
<u>Demolition</u> of concrete/masonry using hand-held hammers/breakers	8 (lowest) 15 (typical) 25 (highest)	45 m 15 m 5 m	3 h 1 h 20 m		HSG170 #9 HSG170 #4 HSG170 #6  HSG170 #7 HSG170 #5
<u>Pile cropping</u> using hand-held hammers/breakers	8 (lowest) 15 (typical) 25 (highest)	45 m 15 m 5 m	3 h 1 h 20 m	Pile cap removal using hand-operated breakers is <b>not acceptable</b> . Use alternative method as appropriate: <ul style="list-style-type: none"> <li>• Elliott method</li> <li>• Recipieux method</li> <li>• suspended hydraulic pile cropper</li> <li>• the above alternatives to hand-operated breakers, especially machine-mounted breakers</li> <li>• design pile spacing and pile re-bar for mechanised cropping</li> </ul> <p>Note: some dressing using hand-operated tools may still be required.</p>	Pile cropping. A review of current practice (Inspector information leaflet, Aug 02)  Information from Loughborough University: <a href="http://www.lboro.ac.uk/research/design4health/public_area/press_rel/pile_case/pile_case.html">http://www.lboro.ac.uk/research/design4health/public_area/press_rel/pile_case/pile_case.html</a>

Activity or process	Example vibration magnitude (m/s <sup>2</sup> )	Corresponding time to reach:		Alternative methods	References and related guidance*
		EAV	ELV		
<u>Scabbling</u> using: needle scalars hammer type scabblers pole type scabblers	5 (lowest) 18 (highest) 40 (highest) 10 (lowest) 40 (highest)	2 h 10 m 2 m 30 m 2 m	8 h 40 m 8 m 2 h 8 m	Scabbling purely for architectural aesthetic effect is <b>not acceptable</b> . Specify finishes that do not require scabbling. Some finishes can be designed into shuttering using special moulds or chemical retardants and water jetting. Surface preparation to ensure a good concrete bond. Use alternative methods where technically appropriate: <ul style="list-style-type: none"> <li>grit blasting (wet or dry)</li> <li>use of chemical retarders and pressure washing</li> <li>cast in proprietary joint formers e.g. mesh formwork</li> <li>UHP water blasting (refer to CoP for safety guidance)</li> </ul>	HSG170 #34 HSG170 #33 HSG170 #32 <a href="http://www.waterjetting.org.uk">www.waterjetting.org.uk</a>
<u>Wall chasing</u> using hand-held breakers	8 (lowest) 15 (typical) 25 (highest)	45 m 15 m 5 m	3 h 1 h 20 m	<ul style="list-style-type: none"> <li>in new buildings, specify built-in ducting</li> <li>in existing buildings, consider overcoating existing plaster and building in the ducts</li> </ul>	<a href="http://www.safetyindesign.org/NOISE.pdf">www.safetyindesign.org/NOISE.pdf</a>
<u>Drilling</u> masonry/concrete using: electric hammer drills or “combihammers”	6 (lowest) 9 (typical) 25 (highest)	1½ h 40 m 5 m	5½ h 2½ h 20 m	Design and plan to avoid unnecessary drilling. Use, where appropriate: <ul style="list-style-type: none"> <li>jig-mounted drilling</li> <li>diamond core drilling (clamped in rig)</li> <li>cast-in anchors and channels for wall fixings instead of drill-and-fix types</li> <li>use of direct fastening tools</li> </ul>	

Note 1: The vibration magnitudes, and associated trigger times to exceed exposure action value/exposure limit value (EAV/ELV), are indicative only and will vary depending on equipment type and conditions of use.

Note 2: changes of process to eliminate or reduce vibration may introduce other hazards to health (e.g. noise, dust) or safety which must be addressed and managed (e.g. hazards associated with lifting operations in some mechanised methods for pile cap removal)

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Issue	Expectation	References and related guidance*
<b>Selection of work equipment</b>	<p>Tool selection can make a substantial difference to the vibration level (see Table 1, column 2) but the tool must be suitable for the task and used correctly.</p> <p>Employers should demonstrate a sound procurement policy for power tools and hand-guided machines, showing they have considered the following:</p> <ul style="list-style-type: none"> <li>• There is no reasonably practicable alternative method with no (or less) vibration exposure (see Table 1)</li> <li>• Equipment is generally suitable for the job (safety, size, power, efficiency, ergonomics, cost, user acceptability, etc.)</li> <li>• Reduced vibration designs are selected provided the tools are otherwise suitable (e.g. breakers with handle suspension)</li> <li>• Declared vibration emission is not high compared with competing machines of similar capacity to do the job</li> <li>• Information on likely vibration emission in use (e.g. from manufacturer, hire company, databases)</li> <li>• Available information from the manufacturer on control of vibration risks through recommendations for: <ul style="list-style-type: none"> <li>• maintenance (e.g. sharpening chisels)</li> <li>• selection of consumables (chisels, drills, abrasive discs, etc.)</li> <li>• correct operation and operator training (see below)</li> <li>• maximum daily trigger times or maximum daily work done with the tool</li> </ul> </li> </ul>	<p>L140 p52-53 and Part 4 INDG175(rev2) <a href="http://www.hse.gov.uk/pubns/indg175.pdf">www.hse.gov.uk/pubns/indg175.pdf</a></p>
<b>Limiting daily exposure time</b>	<p>Restricting the exposure time (“finger-on-trigger” time) may be required to bring exposures below the ELV, even after all reasonably practicable measures to reduce vibration levels are in place.</p> <p>Maximum times can be determined using the exposure points system or supplier’s “traffic lights” tool categories, but these should be derived from soundly-based “real use” vibration emission values.</p> <p>Note: Employers tend to ask “How long can we use this tool?” The exposure must be reduced to the <u>lowest level that is reasonably practicable</u> (Reg 6(2)), so the Exposure Limit Value should not be used as a target, if a lower exposure is reasonably practicable.</p>	<p>L140 p56-57</p> <p>Points system: L140 p39-41 <a href="http://www.hse.gov.uk/vibration/readyrec_koner.htm">www.hse.gov.uk/vibration/readyrec_koner.htm</a></p>
<b>Other risk controls</b>	<p>Control of HAVS risk by means other than reducing vibration exposure:</p> <ul style="list-style-type: none"> <li>• Ergonomic aids to support weight of tool and reduce the grip and other forces applied by the operator</li> <li>• Suitable workplace temperature or provision of appropriate warm clothing and gloves</li> <li>• Regular breaks from work involving vibration and encourage operators to exercise fingers</li> </ul>	<p>L140 p57-58</p> <p>Employees’ leaflet INDG296(rev1) <a href="http://www.hse.gov.uk/pubns/indg296.pdf">www.hse.gov.uk/pubns/indg296.pdf</a></p>

Issue	Expectation	References and related guidance*
<b>Information, instruction and training</b>	<p>Employees at risk from vibration should have received information on:</p> <ul style="list-style-type: none"> <li>• the risks from HAV and how to help reduce them</li> <li>• arrangement for health surveillance and their duty to cooperate.</li> </ul> <p>Look for evidence that tools are being used correctly, as recommended by the manufacturer. This may require operators to receive specified training: are the operators and their supervisors aware of the need? In particular, breakers with suspended (sprung) handles must be used correctly, and with appropriate downward force, or the potential reduction in vibration (e.g. from 20 to 5 m/s<sup>2</sup>) will not be achieved.</p>	<p>Employees' leaflet INDG296(rev1) L140 p58</p> <p>L140 p59-60</p>
<b>Health surveillance</b>	<p>Required where the EAV is likely to be exceeded. Expect to see, as a minimum:</p> <ul style="list-style-type: none"> <li>• use of a periodic health screening questionnaire – ideally annually and for new employees</li> <li>• arrangements for referral of relevant cases to an occupational health provider with HAVS expertise for diagnosis and on-going monitoring</li> <li>• arrangements to receive medical advice on management of affected employees</li> <li>• arrangements for RIDDOR reporting of HAVS cases</li> <li>• arrangements to receive anonymised information to demonstrate effectiveness of controls (although this may not be meaningful for casual/short-term workers)</li> </ul> <p>In construction, short-term employment presents difficulties for managing health surveillance; cooperation between employers should be encouraged.</p>	<p>L140 Part 5 INDG175(rev2) <a href="http://www.hse.gov.uk/pubns/indg175.pdf">www.hse.gov.uk/pubns/indg175.pdf</a></p> <p>Questionnaires etc. on HSE website: <a href="http://www.hse.gov.uk/vibration/tieredsystem.pdf">www.hse.gov.uk/vibration/tieredsystem.pdf</a></p> <p>MCG guidance on health surveillance <a href="http://www.mcg.org.uk/health.shtml">www.mcg.org.uk/health.shtml</a></p>

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