

# **Control of Risks from Hand-arm Vibration**

**HSE guidance and expectations**

# Hand-arm vibration syndrome (HAVS)



Serious, disabling and costly ...  
... but preventable



# Talking head



# The new Vibration Regulations - employers' duties



- Ensure health and safety of employees
- Risk assessment
- A hierarchy of measures to achieve control
- Information, instruction and training for employees
- Health surveillance if required
- Already expected for HAV since 1994, under general H&S legislation and HSE guidance on HAV (HSG88, 1994)

# What's new?



- **Exposure Action Value (EAV)  $2.5 \text{ m/s}^2 \text{ A(8)}$** 
  - lower than the old HSE recommended action level
  - but still not a “safe” level of exposure
- **Exposure Limit Value (ELV)  $5 \text{ m/s}^2 \text{ A(8)}$** 
  - higher than the old HSE recommended action level
  - a difficult challenge for some sectors of industry
  - should prevent the worst exposures
  - transitional arrangements until 2010, but only where not reasonably practicable to comply

# Duties of employers (at any exposure level)

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- Assess vibration risks to health and safety
- Eliminate vibration *risk* at source, or reduce to lowest reasonably practicable level
- Provide information and training for employees on vibration risks and control measures

## Duties of employers if the exposure action value is *likely* to be exceeded:



- Reduce *exposure* to the lowest reasonably practicable level; and
- Where exposure still remains above EAV, implement health surveillance

# Duties of employers: the exposure limit value



- Ensure employees are **not** exposed above the ELV
- If they are, take immediate action to prevent recurrence
- Note: transitional period until July 2010 for the ELV where:
  - equipment in use before 6 July 2007; and
  - not (yet) reasonably practicable to comply with ELV

# Who is exposed to HAV?

(from Medical Research Council study, 1999)



- About 5 million exposed to HAV at work
- About 1.7 million exposed above EAV
- About 1 million exposed above ELV
  
- Greatest numbers in construction industry and related trades
- Highest levels of exposure in heavy fabrication, foundry fitters, stone masons

# The approach to HAV risk assessment



- Look for evidence of risk:
  - Industry/process/tools with known HAVS risk?
  - Significant daily operating time?
  - HAVS symptoms in workforce?
  - Tingling, etc. during/after tool use?
  
- Look for solutions:
  - Good practice being applied?
  - Can more be done?

# Exposure assessment



- Exposure likely to be above action value?
  - Action plan to reduce exposure and start health surveillance
- Exposure above limit value?
  - Immediate action
- Get vibration information from:
  - equipment manufacturers (check declared emission represents 'in use')
  - other sources of relevant vibration data
  - workplace measurements if necessary

# Rules of thumb



- Rotary tools
  - EAV exceeded within 1 hour
  - ELV exceeded within 4 hours
    - Some tools exceed ELV within 1 hour
- Percussive tools
  - EAV exceeded within ¼ hour
  - ELV exceeded within 1 hour
    - Some tools exceed ELV within 2 or 3 minutes
- Note: These are ‘trigger times’

# Risk Assessment and Control



- The emphasis in the new regulations is on control, not simply risk assessment
- In many cases a risk assessment will be essential to indicate the options for an action plan to control or manage exposure.
- In future, HSE is likely to be asking for evidence of the action plan, and that the key measures identified are being implemented.

# Control of exposure



- Change the process
  - eliminating or reducing vibration exposure at source;
  - often essential where exposures are very high.
- Select suitable (reduced-vibration) equipment
  - purchasing policies
- Operator training
- Maintenance of equipment
- Time limits, job rotation
  - exposure points system may help



## Case study: changing the process

# Mechanisation removes the risk



- Machine-mounted pick replaces hand-operated breakers



## Case study: changing the process Demolition without vibration

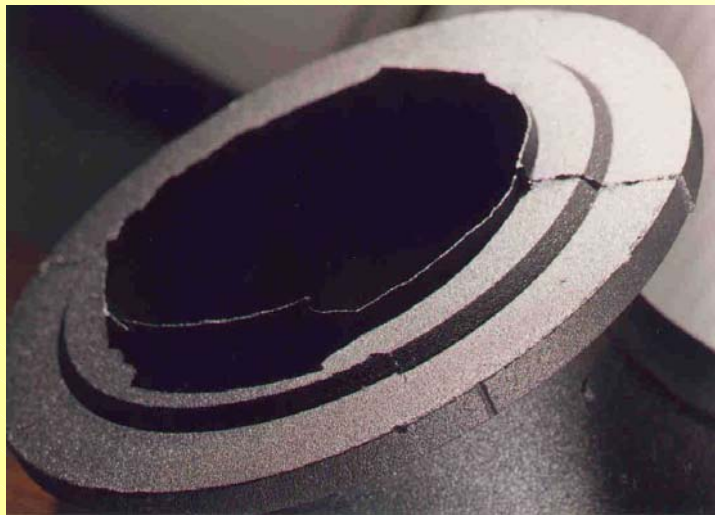


- Use hydraulic crushers instead of demolition hammers

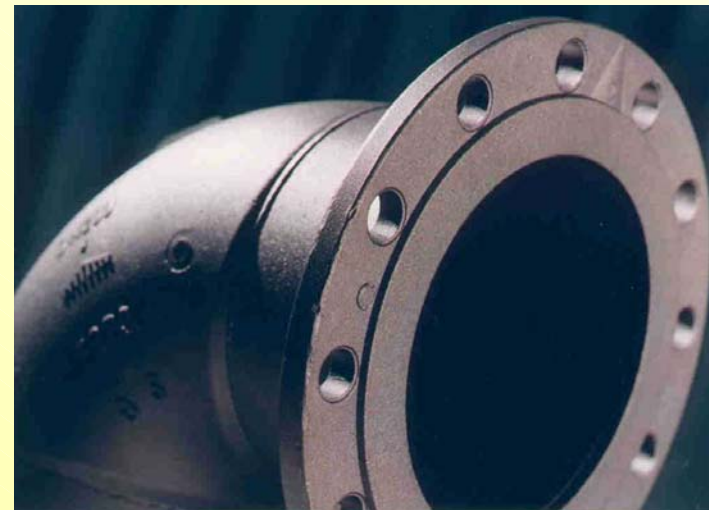


# Case study: changing the process

## Fettling eliminated by improved casting quality



Green sand casting



Lost foam casting

## Case study: changing the process

# Pile cropping



- In construction the biggest reduction in exposure can often be achieved at the design stage

# Case study: engineering control Jigs



- Benefits:
  - Reduced vibration exposure
  - Good ergonomics
  - Increased productivity and quality

## Case study: process change

# Scabbling

- Alternative methods of working:
  - Eliminate process entirely
  - Design out process



# Case study: changing the process: Foundry furnace lining removal



## Old: Pneumatic pick

Slow process with exposure to noise, vibration, dust, heat



## New: Hydraulic push-out

Safer process with shorter down time and reduced long-term cost



# Choose a suitable tool



- Vibration can be very different between tools
- An under-powered or inefficient tool can increase vibration exposure
- Consider the vibration emission of the suitable tools



# Selecting new equipment



- Choose the right tool for the job
  - safety, economy, efficiency
- Declared vibration emission
  - which standard or test condition?
  - realistic vibration level?
- Ask about likely vibration for your intended use
  - effect of consumables, materials, etc.
  - operator training requirements?
  - maintenance requirements?

# Suppliers can help



- Suppliers must warn of vibration risk
- Suppliers must declare vibration emission
  - or state that it is below  $2.5 \text{ m/s}^2$
- Manufacturers' information:
  - Can help identify (and avoid) unusually high vibration equipment
  - Standard emission data is sometimes poor for estimating exposure
  - Supplementary data on residual risk should help

# Information, instruction and training for operators

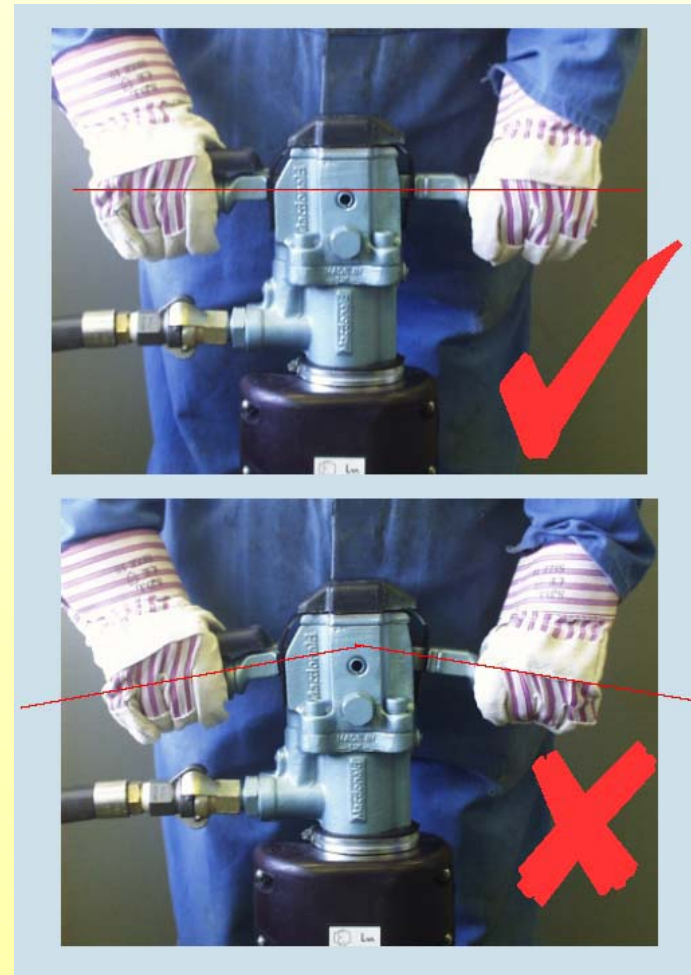


- Correct selection of equipment
- Correct operation of equipment
  - especially important with some vibration-reduced designs
- How to recognise (and report) symptoms of HAVS
- How to minimise risk (exercising fingers, keeping warm, breaks from exposure, not smoking, etc.)

# Operator training requirements



- Example - vibration-reduced breaker:
  - Keep the moil point sharp
  - Break a little at a time, don't get jammed
  - Don't force anti-vibration handles
  - Stop breaker before pulling out



# Controlling daily exposure



- Limit daily exposure durations
- Job rotation
- New exposure points system:
  - EAV = 100 points
  - ELV = 400 points
  - Points can be added - easier to manage and record exposures
  - Often presented as 'points per hour' (or ¼ hour)



# “Traffic lights” system



- Some tool suppliers and hirers have established a three colour system of tool classification:
  - **Green: use up to 8 hours** (before ELV likely to be exceeded)
  - **Amber: use up to 2 hours** (before ELV likely to be exceeded)
  - **Red: refer to supervisor**
- Construction industry enthusiastic
- HSE currently working with industry to improve quality of vibration data and accompanying guidance

# HAV exposure calculator

[www.hse.gov.uk/vibration](http://www.hse.gov.uk/vibration)



## HAND-ARM VIBRATION EXPOSURE CALCULATOR

Version 3

	Vibration magnitude m/s <sup>2</sup> r.m.s.	Exposure points per hour	Time to reach EAV 2.5 m/s <sup>2</sup> A (8)		Time to reach ELV 5 m/s <sup>2</sup> A (8)		Exposure duration		Partial exposure m/s <sup>2</sup> A (8)	Partial exposure points
			hours	minutes	hours	minutes	hours	minutes		
Tool or process 1	2	8	12	30	>24			15	0.4	2
Tool or process 2	6	72	1	23	5	33	0.5		1.5	36
Tool or process 3	3.5	25	4	5	16	20	1	30	1.5	37
Tool or process 4										
Tool or process 5										
Tool or process 6										

### Instructions for use:

- Enter vibration magnitudes and exposure durations in the white areas.
- To calculate, press the Enter key, or move the cursor to a different cell.
- The results are displayed in the yellow areas.
- To clear all cells, click on the 'Reset' button.
- For more information, click the HELP tab below.

Daily exposure m/s <sup>2</sup> A (8)	Total exposure points
2.2	75

Reset

# HAV exposure ready-reckoner



- All values are exposure points
- Colours show exposures re. EAV & ELV

	Above limit value
	Likely to be above limit value
	Above action value
	Likely to be above action value
	Below action value

Vibration magnitude m/s <sup>2</sup>	Daily exposure time									
	15 m	30 m	1 h	2 h	3 h	4 h	5 h	6 h	8 h	10 h
40	800									
30	450	900								
25	315	625	1250							
20	200	400	800							
19	180	360	720	1450						
18	160	325	650	1300						
17	145	290	580	1150						
16	130	255	510	1000						
15	115	225	450	900	1350					
14	98	195	390	785	1200					
13	85	170	340	675	1000	1350				
12	72	145	290	575	865	1150	1450			
11	61	120	240	485	725	970	1200	1450		
10	50	100	200	400	600	800	1000	1200		
9	41	81	160	325	485	650	810	970	1300	
8	32	64	130	255	385	510	640	770	1000	1200
7	25	49	98	195	295	390	490	590	785	865
6	18	36	72	145	215	290	360	430	575	720
5.5	15	30	61	120	180	240	305	365	485	605
5	13	26	50	100	150	200	250	300	400	500
4.5	10	20	41	81	120	160	205	245	325	405
4	8	16	32	64	95	130	160	190	255	320
3.5	6	12	25	49	74	98	125	145	195	245
3	5	9	18	36	54	72	90	110	145	180
2.5	3	6	13	25	38	50	63	75	100	125
2	2	4	8	16	24	32	40	48	64	80
1.5	1	2	5	9	14	18	23	27	36	45
1	1	1	2	4	6	8	10	12	16	20

# Health surveillance



- Required when the EAV is likely to be exceeded
  - or where risk assessment shows the need
  - Intended to prevent progression
  - .....
- Important for HAVS because:
  - Some high exposures are unavoidable;
  - there is no effective personal protective equipment
- More on this later in the day



# HSE's Priorities



- Target interventions at industries where there are:
  - high exposures; and/or
  - large numbers of people at risk
- To minimise the number of exposures above the ELV by 2010:
  - ensure the application of established good practice; and
  - encourage the further development of good practice where required

# HSE's guidance

- New employees' pocket card
- New employers' leaflet
- New Handbook:  
*Hand-arm vibration: Control of  
Vibration at Work  
Regulations 2005. Guidance  
on Regulations (L140)*
- Plus existing video and case studies  
book



## Hand-arm vibration

Advice for employees



## HARD TO HANDLE

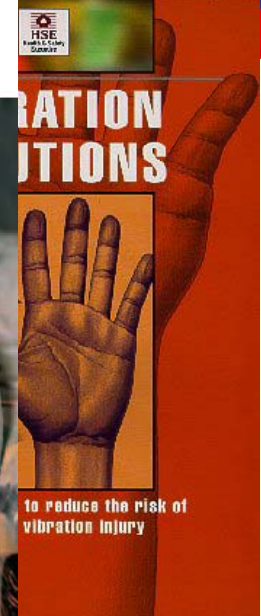
Vibration - manage the risk



Health and Safety  
Executive

## Control the risks from hand-arm vibration

Advice for employers on the Control of Vibration at Work  
Regulations 2005





[www.hse.gov.uk/vibration](http://www.hse.gov.uk/vibration)