What is HAVS?
Hazards and Control

Paul Delderfield
HM Specialist Inspector
(Noise and Vibration)
Impact

• HAVS is irreversible, with no viable treatment
  – Physical effects
    • Pain, discomfort, reduced dexterity
    • Affects work and everyday activities
  – Mental and social effects
    • loss of self esteem
  – Financial effects
    • loss of earnings
• However HAVS can be managed and employees can remain working
I can’t do fishing or DIY any more, I can’t pick up small screws.

Turning pages over on the paper, you have to wet your fingers all the time because you just can’t feel the paper.

It affects you in work and out, it’s a constant pain. I wouldn’t have even started the trade I did.

The first signs are the tingling and the tips of your fingers go white.

You couldn’t pick a pen up or write because you’ve got no feeling there.

You can’t unscrew a screw.

It affects everything. Sports, hobbies, whatever you want to do. You just can’t feel your fingers.
1999 HSE Study indicated that:

• 1.7 million exposed above the EAV (100 points daily exposure)
  – 10% of people show HAVS symptoms after 10 years

• 0.9 million exposed above the ELV (400 points daily exposure)
  – 10% of people show HAVS symptoms within 6 years

• HAVS is a reportable disease under RIDDOR regulations 2013

• 700 reports per year since Oct 2013
The Cost of HAVS

• Besides compliance with the law, there is a financial incentive for employers to implement controls for HAV:
  – Reduce civil claims
  – Avoid increase in insurance premiums
  – Reduce the cost of health surveillance
  – Better processes and equipment can lead to productivity increases
Balfour Beatty fined £500,000 for white finger exposure

Balfour Beatty Utility Solutions Ltd has been fined £500,000 after exposing workers to Hand-Arm Vibration Syndrome (HAVS) over a nine-year period.
The Regulations

- The Control of Vibration at Work Regulations 2005
- Published in HSE guidance:
  - Hand-arm Vibration (L140)
  - Free PDF to download
- However these are consistent with clear HSE guidance which was published in 1994 (HSG88)
- Specific guidance on inspection and enforcement is contained in:
  - HAV Topic Inspection Pack (Available from HSE website)
The Regulations

• Action required if daily exposure is above the **Action** value
  – 2.5m/s$^2$ A(8) (100 points)

• No exposure permitted above the **Limit** value
  – 5m/s$^2$ A(8) (400 points)
The Regulations

• Exposures below the EAV are not safe

• For any exposure to vibration that is likely to cause harm, a risk assessment is required (Reg 5(1))
  – Identify risk
  – Estimate of exposures
  – Identify controls
  – What steps do you plan to take?

• Duty to reduce risk from exposure to vibration to as low as is reasonably practicable
Which has the highest daily HAV exposure?

Road Breaker
30 minutes total trigger time

Palm sander
60 minutes total trigger time

Strimmer
4 hours total trigger time
Which has the highest daily HAV exposure?

- **Road Breaker**: 30 minutes total trigger time
- **Palm sander**: 60 minutes total trigger time
- **Strimmer**: 4 hours total trigger time

121 points Above EAV

450 points Above ELV!

390 points At ELV!
Do I have a vibration problem?

• Assuming modern, well-designed tools

• Rotary tools
  – Time to **Action** value ~1 hour
  – Time to **Limit** value ~4 hours
Do I have a vibration problem?

- Assuming modern, well-designed tools
- Hammer-action tools
  - Time to **Action** value ~15 mins
  - Time to **Limit** value ~1 hour
High risk activities

- Medium magnitudes (all around 7m/s²) but high trigger times
- 4 hours/day = 400 points = ELV!
Employer’s Duties

• The employer has general duties with regard to health risks to:
  – Assess
  – Control
  – Check
Employer’s Duties

- The employer has specific duties with regard to HAV to:
  - Reduce risk and exposure to “As low as is reasonably practicable”
  - Provide specific Health Surveillance for HAVS if exposure remains above **Action** value
  - Never exceed the **Limit** value
How do I calculate daily exposure?

• Need to know:

• Tool vibration magnitude (m/s²)

• ‘Trigger time’

• Don’t forget combinations of tools
## HAV exposure calculator

### HAND-ARM VIBRATION EXPOSURE CALCULATOR

**Version 5.6 June 2019**

**Company name / work area:**

**Employee ID and/or task name:**

<table>
<thead>
<tr>
<th>Tool or process name</th>
<th>Vibration magnitude m/s²</th>
<th>Exposure points per hour</th>
<th>Time to reach EAV 2.5 m²/s² A(8) hours</th>
<th>Time to reach ELV 5 m²/s² A(8) hours</th>
<th>Exposure duration hours</th>
<th>Partial exposure m/s² A(8)</th>
<th>Partial exposure points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demolition or rotary hammers</td>
<td>18</td>
<td>648</td>
<td>9</td>
<td>37</td>
<td>20</td>
<td>3.7</td>
<td>216</td>
</tr>
<tr>
<td>Drills - Hole saw</td>
<td>10</td>
<td>200</td>
<td>30</td>
<td>2</td>
<td>5</td>
<td>1.0</td>
<td>17</td>
</tr>
<tr>
<td>Needle scalers - non-AV</td>
<td>19</td>
<td>722</td>
<td>8</td>
<td>33</td>
<td>5</td>
<td>1.9</td>
<td>60</td>
</tr>
</tbody>
</table>

**Daily Total exposure:**

- **Exposure duration:**
  - Exposure points m/s² A(8): 4.3
  - Total exposure points: 293

**WARNING:** Exposure potentially above 5 m/s² A(8) ELV (400 points)

For more information, click the 'Help' button.

**Exposure calculation by:**

**Job role:**

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- [http://www.hse.gov.uk/vibration/hav/vibrationcalc.htm](http://www.hse.gov.uk/vibration/hav/vibrationcalc.htm)
Do I have to Measure Vibration?
NO
In conducting the risk assessment the employer shall assess daily exposure to vibration by means of –

(a) Observation of specific working practices;

(b) Reference to relevant information on the probable magnitude of the vibration corresponding to any equipment used in the particular working conditions; and

If necessary, measurement of the magnitude of vibration to which his employees are likely to be exposed,

Regulation 5(2) – The Control of Vibration at Work Regulations 2005
Sources of vibration data

• Quote from Atlas Copco tool catalogue:
  – “The declared values given in this table were obtained by laboratory type testing in accordance with the stated standards”
  – “These declared values are not adequate for use in risk assessments”
Sources of vibration data

- Measured vibration magnitude
  - HAV – 3.3 m/s² (4.5 hrs to EAV)

- Manufacturer data
  - HAV – 2.8 m/s² (6.5 hrs)
  - WBV – 0.5 m/s² (8 hrs)

- Measured vibration magnitude
  - HAV – 5.5 m/s² (1.5 hrs)
  - WBV – 1.9 m/s² (30 mins)
Sources of vibration data
Sources of vibration data

- In most instances this table will be sufficient for risk assessment
- Now 4 pages of credible vibration magnitudes for most common tool types
- Derived from all of HSE SD vibration measurements
- In-use data in real working environments

<table>
<thead>
<tr>
<th>Industry</th>
<th>Tool type</th>
<th>Tool characteristics</th>
<th>Notes</th>
<th>Ranges (LwA) (95% AEP)</th>
<th>Ranges (Lwa) (80% AEP)</th>
<th>Recommended limit value (65% AEP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Drills</td>
<td>Standard drill bit</td>
<td>Vibration values can vary across the many sub-categories (e.g. small to large) and different materials being worked. Larger drills tend to give higher vibration values. Maintaining sharp drill bits is important</td>
<td>3 5 8</td>
<td>2 5 8</td>
<td>4 5 8</td>
</tr>
<tr>
<td>General</td>
<td>Drills</td>
<td>Hole saw</td>
<td></td>
<td>4 12 10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Drills – Core</td>
<td>78–107 mm</td>
<td>Can give very high vibrations if operators push too hard. Maintaining sharp drill bits is important</td>
<td>6 8 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Drills – Impacts</td>
<td>5 and 8 mm masonry bit</td>
<td>Can give very high vibrations if operators push too hard. Maintaining sharp drill bits is important</td>
<td>7 10 11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Grinders – Angle</td>
<td>100–180 mm</td>
<td>Vibration values will depend on force being applied and different materials being worked. Selecting the right grade of abrasive and applying the right forces can help to minimise exposure</td>
<td>3 10 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Grinders – Angle</td>
<td>125 and 100 mm Flapper disc</td>
<td></td>
<td>2 5 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Grinders – Angle</td>
<td>220–300 mm</td>
<td>Vibration values can vary across the many sub-categories and different materials being worked. Applying too much force can produce lobbing of the discs and significantly increase vibration levels</td>
<td>4 11 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Grinders – Die</td>
<td></td>
<td></td>
<td>5 10 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Grinders – Straight</td>
<td></td>
<td>Correct selection of the abrasive will ensure that workers do not apply excessive force and keep vibration magnitudes to a minimum</td>
<td>4 9 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>Nail guns</td>
<td></td>
<td>Measured vibration levels are dependent upon rates of use. It can be difficult to assess appropriate limit correctly</td>
<td>3 10 9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Sources of vibration data

<table>
<thead>
<tr>
<th>Industry</th>
<th>Tool type</th>
<th>Tool characteristic, inserted tool, size, process</th>
<th>Notes</th>
<th>Range-lower (10%ile) (m/s²)</th>
<th>Range-upper (90%ile) (m/s²)</th>
<th>Recommended initial value (75%ile) (m/s²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Sanders – Random-orbital</td>
<td></td>
<td>Vibration magnitudes are very dependent upon applied force. Lower vibration magnitudes can be achieved by applying the correct forces and using the appropriate abrasives</td>
<td>6</td>
<td>14</td>
<td>12</td>
</tr>
</tbody>
</table>

- Use recommended initial value for RA
- Range indicates whether lower vibration alternatives may be available
- Responsibility on dutyholder to demonstrate validity of their data if using lower values
Trigger time

• What if the vibration is not constant?
• Look at job and task (items produced, materials consumed)
  – Where do your employees work, do they move around, how does their exposure differ.
  – Accumulate noise for a “typical” working day or “Typical job, task or process”
Trigger time

• Think job and task – tie your exposures back into your costs/time/labour estimates?
What can we do?

• Monitor?
  - Measure tool magnitudes regularly
  - Log trigger times
  - Traffic light systems
  - ‘stop when you reach the limit’
What can we do?

• NO!
  – Encourages exposure up to the limit
  – ‘What can we get away with before we have to stop’
What can we do?

• Identify your risks and control them
Hierarchy of controls

• Elimination – get rid of the task altogether
• Substitution – find a safer way to do it
• Engineering controls - Source safer tools or equipment/adaptations
• Administrative Controls – Job rotation, time limiting
• PPE
Elimination

- Overall landscape and design
Elimination

- Low maintenance planting
Elimination

• Frequency of cuts
Substitution

- Stand on mowers shown to have lower HAV levels
Hierarchy of Control

Substitution

• Remote Control – reduce noise and vibration, also could be faster
Substitution

- Use machine mounted tools where practical
Substitution

- Consider replacing petrol powered tools with battery
  - Lower vibration and noise
  - Eliminates fumes
Administrative controls

- Last resort
  - Job rotation
  - Time limiting
- Tool timers
- Traffic light system
PPE

• No PPE available to control exposure to Hand-arm vibration

• Gloves and warm clothes help reduce likelihood of symptoms, not exposure

• You should assume no degree of protection from ‘anti-vibration’ gloves
The employer has duties to give information and training to employees on:

- vibration risk assessment
- control measures
- reporting signs and symptoms
- health surveillance
Substitution and training
Steel door manufacture – S Wales

7.5 points/minute
8 minutes per door
8 doors per day
480 points per day

0.5 points/minute
2 minutes per door
8 doors per day
8 points per day
Results of Health Surveillance

• Goal is to keep people in work

• Consider
  – Individual relevant factors
  – Severity of disease or symptoms
  – Degree of functional disability
  – Age of employee
  – Other medical conditions
  – Treatment if applicable

• Aim is to prevent a serious stage developing and in particular to avoid disability

• For younger workers, may be difficult to justify continuing

• Context of likely level of exposure at time of onset of symptoms

• BUT there is no safe level of vibration (negligible risk at 1 m/s², 16 points on the ready reckoner)
Talk to the employees
HSE action

• HSE will take the strongest action:

• When clear negligence is shown eg:
  – For cases where a duty holder has maintained high exposure, contrary to clear guidance, and known HAV problems associated with those processes
Questions?

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