



WHOLE BODY VIBRATION (WBV): RAISING AWARENESS FOR GREENKEEPERS

By Herbert Barker

Over the past few months GI has been working in conjunction with vibration testing services Fivesquared to discuss the implications of Hand Arm Vibration (HAVS), Noise Awareness and Whole Body Vibration (WBV). WBV is the final article in the series.

Overview

In 2002, the European Commission introduced legislation 'harmonising' vibration levels in the workplace for all member states, and gave each state three years to bring it in to effect. The UK 'version' became law in 2005 as the 'Control of Vibration at Work Regulations (2005)' which details the responsibilities and obligations of employers to monitor and control the effects of vibration in the workplace.

Whole Body Vibration in Golf Clubs

Our research shows that a relatively small number of golf clubs have implemented control measures for Whole Body Vibration management in their Golf Club.

We have found that some Greenkeeping staff use Ride-On equipment for periods of four or five hours on a daily basis, this may be using the latest equipment available, the majority of which should have vibration reduction measures built in, but some are using old types of machinery over rough ground in some instances for long periods of their working day. Some golf clubs have

decided that the regulations don't affect their club or indeed the staff who use the equipment and have 'shelved' any action to control vibration in their workplace.

What is WBV?

Whole Body Vibration is a widespread recognised industrial problem affecting many workers, in many industries, but particularly in construction, agriculture, forestry, grounds maintenance, and transport, where vibration exposure from use of vehicles or plant in these industries, is regular, prolonged and frequent. It is a disorder which can affect the lower back, spine, and possibly the neck and shoulders. It has been associated with these disorders, but may not be the whole cause, as the symptoms can be due to other causes associated with posture, and manual handling.

Some vehicles and plant likely to cause or aggravate back problems and involve exposure to high levels of WBV are:

- Off road vehicle · Tractors and farm vehicles · Ride-on greenkeeping vehicles
- Heavy construction/maintenance vehicles and plant · Excavators, loading shovels, road rollers · Quarrying vehicles and plant · Helicopters · Fast boats · Railway vehicles (especially old rolling stock) · Large static machines, used in compaction, hammering or punching.

This list is by no means comprehensive and where people regularly work with vehicles and plant such as these for prolonged periods, there is likely to be a risk of exposure to high levels of

WBV. It is safest to regard regular prolonged use of any high vibration vehicle or plant as suspect, particularly if such devices produce (or are subject to) frequent shocks and/or jolts.

How do I recognise it?

WBV occurs when a person's body is supported on a vibrating surface. This is most likely when sitting on the seat of a moving vehicle, or operating vibrating machinery. Standing, while operating machinery designed for such an operator stance, can also produce WBV in the operator. Prolonged exposure to WBV can affect the lower back, spine, and possibly the neck and shoulders.

WBV can be caused by:

- The movement of the wheels or tracks of a vehicle, crossing an uneven or rough surface. If the driver experiences shocks or jolts, or is thrown around in the cab by such terrain, this will contribute significantly to the levels of WBV.
- Using mobile machines to excavate holes or trenches in the ground.
- Using mobile machines to load materials (e.g. sand) into lorries.
- The rotation of helicopter rotor blades, causing high WBV levels to be transmitted through the airframe into the seats.
- Boats travelling fast across rough seas.
- Railway vehicles (especially old rolling stock)
- The operation of large static compaction, hammering, or punching machines, such as

hammer drills and mobile crushers.

Lower back pain may be caused by prolonged exposure to WBV from the above sources, but there can be other possible contributing factors, such as:

- Poor posture while driving or operating plant.
- Sitting for long periods without being able to change position.
- Poorly placed controls which require the driver/operator to stretch or twist to operate them, or driving over rough ground while checking over the shoulder on the operation of attached equipment.
- Manual lifting and carrying of heavy or awkward objects, especially if this is combined with the effects of WBV from driving or operating vehicles or plant.
- Repeatedly climbing into or jumping out of high or difficult access vehicle cabs.

All the above factors (including WBV) can separately cause back pain. The risk will be increased, however, where a person is exposed to two or more factors together.

WBV can be prevented or mitigated through management of the problem.

Who is at risk?

Any workers seated or standing on a mobile vehicle on a regular or frequent basis, especially if this involves travelling over uneven surfaces, are most at risk.

These occur in a wide range of industries, including: • Road and railway construction/maintenance • Construction • Forestry/Gardening/Greenkeeping • Foundries • Light and heavy engineering • Mining and quarrying • Metal working • Public services • Public utilities

What can I do about it?

The challenge is to determine which information is correct and current. This can be somewhat confusing. Successfully to protect your workforce from the effects of WBV it is vital that employers have an effective Whole Body Vibration Management System to - Assess, Measure, Monitor, Control, and Manage any associated WBV risks.

Employers are obliged to provide information and training for employees to ensure knowledge of health risks, health monitoring, vibration management systems, safe use of equipment, and awareness of problems associated with WBV.

Assess

The first stage is assessment – “Do I have a problem?”

This can be achieved with a simple questionnaire asking the present workforce whether they are suffering from any of the symptoms of WBV, and the prevalence of lower back pain occurring in the workforce.

The responses to the questionnaire will determine what to do next, as there is no specific appropriate Health Surveillance for WBV as the

symptoms displayed can be caused by other factors. However, employers can use informal health monitoring to regularly check on reports of back pain etc. to identify possible risks from WBV, manual handling, or driver posture.

Potential employees should also be questioned on previous employment to ascertain previous work which may have entailed vibration from vehicles driven over rough ground, and hobbies which may involve high vibration – e.g. motorsports.

Health Surveillance

There is no specific appropriate Health Surveillance for WBV.

Regular check ups may be necessary to monitor employees suffering lower back pain symptoms.

Vibration Levels of Equipment

Sources from which employers can obtain vibration data for vehicles are – Manufacturer’s Literature, Equipment Suppliers, Internet databases, Research Organisations, Trade Associations, HSE, Vibration Consultants.

Measurements in the workplace

Of these, the most accurate tends to be Measurement in the workplace, which gives vibration levels for YOUR machines or equipment operating under YOUR working conditions.

Having obtained vibration levels under working conditions, employers should determine the highest vibration machines and attempt to re-design the job or process to eliminate the use of high vibration machines in these processes. This may prove to be practically impossible, as there are few examples of other methods of work that eliminate or reduce exposure to WBV.

The legislation set lower values for Whole Body Vibration in 2005.

Daily Exposure Action Value (EAV) – 0.5m/s² (metres per second squared).

Vehicles or processes having vibration at this level or above must have a risk assessment; the workforce must have information or training to recognise the symptoms of WBV; and PPE issued to mitigate the effects of vibration and cold. No PPE is specifically available to combat the effects from WBV. However, any PPE that provides protection from inclement weather conditions (i.e. keeps the wearer warm and dry) will assist in combating any effects of vibration exposure.

Daily Exposure Limit Value (ELV) – 1.5m/s² (metres per second squared).

For vehicles or equipment having vibration at this level or above (which have an economic life) employers should attempt to reduce the vibration levels to below

the ELV, by fitting any appropriate anti-vibration fittings, suspension seating, or purchase new

vibration reduced vehicles or equipment.

Vibration Dose Values

A slightly different action level known as the Vibration Dose Value (VDV) can also be used. This measures the sum of WBV exposure to jolts and shocks. The daily exposure action level for VDV is 9.1 m/s^{1.75}. The VDV daily exposure limit value is 21 m/s^{1.75}.

Although Vibration Dose Value (VDV) measurements are not compulsory in the calculations of the Daily Vibration Exposure, they can be used in conjunction with the Daily Exposure values to assess any remedial action necessary to any vehicle.

Vibration Dose Values (VDV) are more sensitive to the effects of instantaneous shocks or jolts and, (if compulsory) could potentially indicate extremely limited use for a particular vehicle, or make it commercially impractical to use the vehicle.

They are, however, useful to prioritise action for vehicles exceeding the VDV Action levels, even though these vehicles may not exceed the Daily Exposure action levels.

Where vibration levels are still above the ELV after vibration reduction measures have been implemented, then the only other option is to reduce the time each person uses the vehicle or equipment.

Monitor, Control and Manage

If an operator uses one vehicle per day, then monitoring and control of vibration levels becomes relatively simple. The problem occurs when operators use several vehicles for shorter periods than allowed by the vibration levels measured. Each ‘burst’ of vibration has to be added to ensure the operator is not exceeding his/her daily vibration level.

There are several methods in use but the simplest is a system whereby vibration values can be converted into ‘points’ (using suitable formulae) and the vehicle is ‘tagged’ with this information.

The operator simply has to note the number of points on the tag, and multiply by the time used (driver seated – engine on) to determine how many points have been used on each separate use of vehicles.

There is a ‘daily’ maximum number of points, and as long as this is not exceeded, then the operator will not exceed his daily vibration level.

This is an effective, real time, management system, in use by many of Fivesquared’s clients including – Local authorities, public utility companies, large construction companies, and many golf greenkeeping departments.

About the author

Herbert Barker is Technical Manager

Fivesquared

– Vibration Management Solutions

A Division of Earlsmere ID Systems Ltd

www.5sqd.co.uk

0800 848 8052