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Sound measures

Noise and vibration beyond allowable limits can leave managers on shaky ground. No wonder these issues are climbing plant engineers' priority lists. Steed Webzell reports

The Control of Noise and Control of Vibration at Work Regulations changed plant managers' views of noisy environments and work involving vibration. Around six years on, monitoring instruments, and tools and equipment to minimise problems – such as occupational deafness and hand-arm vibration (HAV) – have become top billing, as plants continue to seek compliance.

So what's permitted? Well, the Control of Vibration at Work Regulations set both an exposure action value (the daily amount of occupational exposure a user can absorb, above which employers are required to take action) and an exposure limit value (which must not be exceeded). HSE guidance sets an EAV of 2.5ms² and an ELV of 5.0ms². Regarding noise, plant engineers should consider anything above 80dB to be actionable.

The regulations state that it may not be necessary to measure vibration levels. The theory is that information on vibration levels emitted by most equipment should be available from manufacturers, on websites, in shared information or in databases.

Good vibrations

There is a problem, however, with not taking measurements, and it is one recognised by many specialists, including Simon Bull, managing director at healthy and safety specialist Castle Group. "The problem occurs in producing evidence in defence of civil claims," he explains. "Without measurements, there is, in practice, no defence, leading to successful claims and huge potential costs."

So, having established that measurement is the most advisable route, the first point is to ensure that the chosen pick-up (an accelerometer) is rigidly fastened to the tool/machine handle. The optimum way would be to drill and tap a hole, and fix it directly – although this sometimes doesn't sit well with the supervisor. If rebuffed, fast-setting epoxy glue or jubilee clips should be used.

"But watch out for overload or under-range messages," warns Bull. "An overload message will occur when the peak of a vibration waveform exceeds the capabilities of the instrument to

Sticking it out

3M is keen to highlight the role that can be played by specialist sound damping tapes in reducing noise from vibration in industrial environments.

The company believes that modern aluminium foil sound damping tapes can help towards meeting the increasing demand for noise reduction on equipment such as compressors, HVAC and production machinery. Further, tapes can deliver effective sound damping, with as little as 10% surface coverage, and can be die cut for ease of application.

measure. This leads to a loss of measurement information and therefore errors. An under-range message will occur, if the measurement reading [RMS] falls too close to the electrical noise within the instrument circuits, which may cause an error. As some percussive tools exhibit a huge difference between the peak and RMS values, it is possible to encounter both states at the same time – especially with older technology instruments.”

If recourse is deemed necessary, most plant engineers will look at employee protection before damping machinery, as the latter can be expensive, technically challenging and time consuming. It may also compromise the process.

So, does PPE have any effect? Well, minimal at best. As Bull puts it: “Gloves are only effective at reducing high frequency vibrations, when it is largely low frequencies that cause the damage,” he says. “The latter contain a lot of energy and absorbing this requires a considerable mass of material that would render a glove un-wearable.”

Remember, a ‘competent person’ training course for vibration at work assessments is often the most practical first step. Remember also that the human cost of non-compliance can be high. Common conditions resulting from exposure to vibration include HAV syndrome, carpal tunnel syndrome, neurological problems and musculoskeletal diseases. And, according to the HSE, nearly two million people are currently at risk.

Among the main causes are abrasive processes. However, there are few secrets to reducing vibration here – mostly amounting to no more than good engineering practice. As Neil Wilcock, technical service specialist within 3M’s abrasive systems division, explains: “For instance, where the use of random orbital sanders is unavoidable, it is critical to use a backing pad matched to the tool, so that vibration is minimised. The pad should be balanced to work with the sander. Other products, such as angle grinders, operate in a more regular pattern, so are less likely to cause serious vibration. However, when using a depressed centre grinding disc, high vibration values can be encountered, so using a tool with an auto-balancer is important.”

As for checking vibration exposure levels, many of the latest instruments have simplified the process of data collection. A case in point is the Excio human vibration meter, from Castle Group, which allows each measurement to be stored with an optional record number, employee name tool reference and location. This means the results can be automatically sorted, searched and interrogated to give daily exposure values and/or tool vibration data.

Moving on to noise, the advice is very similar and the scale of the problem emphasise its importance. According to HSE statistics, approximately 1.7 million workers are exposed to noise above safe levels. The organisation also estimates that around

100,000 people have suffered hearing damage, because of their work.

“In order to implement the correct hearing protection, it is vital that a thorough noise survey of the at-risk groups is carried out to ensure that employees are fitted with the correct hearing protection equipment,” urges David Lummis, CEO at the British Safety Industry Federation. “These surveys need to be carried out on a regular basis to check sound levels and define the risk control strategies.”

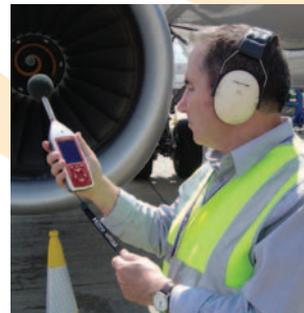
Beyond that, the BSIF believes that plant managers should provide training on how to use earplugs, earmuffs and semi-inserts, and ensure that they fit correctly. Regular testing, combined with the proper use of correct PPE, will ensure that noise-induced hearing loss in the workplace is minimised.

Loud and clear

Just as with vibration, there is a variety of noise measurement equipment – but certain caveats do apply. “It’s vital that noise instruments measure accurately, not only to meet regulations and guidelines, but to clarify whether noise damage is occurring,” suggests James Tingay, marketing manager at Cirrus Research. “Noise surveys will also help determine the most appropriate action to reduce workers’ exposure to damaging levels.”

Noise measuring equipment ranges in price from £20 to £5,000, but Tingay agrees that deciding which to buy can be confusing – and expensive, if the wrong choice is made. To simplify the process, Cirrus has produced an eight-point guide. First, potential purchasers should consider whether the measurement functions comply with the Control of Noise at Work Regulations 2005. Also, does the equipment come with appropriate accessories, such as an acoustic calibrator and windshield?

What about recalibration, servicing and stated performance levels? The regulations state that sound level meters “should meet at least Class 2 of BS EN 61672 – 1:2003”, while personal noise dose meters must comply with BS EN 61252:1997. Clear instructions, ease-of-use and future-proofing complete the checklist. 



Checking sound levels in any environment can be achieved relatively easily, with handheld tools



Octave band measurement

The best method for categorising hearing protection is to measure the octave band frequency levels and compare those against the table provided on the packet by the manufacturer.

“Octave band measurement gives a fairly detailed breakdown of the level of noise protection at various frequencies,” explains Simon Bull at Castle Group. “So, when the manufacturers’ data is applied, a much better picture will emerge of the effectiveness of the hearing protection device.”

Castle Group’s latest introduction is the pocket-sized Sonus sound meter range. At the top of the range is a combined sound and dose-meter, sporting dual frequency measurement and data logging to a sizeable memory.