

Noise at woodworking machines

HSE information sheet

Woodworking Information Sheet No 13

Introduction

This revised information sheet is one of a series prepared by HSE's Manufacturing Sector in agreement with the Woodworking Machinery Suppliers Association. It gives advice to employers in the woodworking industry on the Control of Noise at Work Regulations 2005, and supplements the free leaflet INDG362 *Noise at work. Guidance for employers*.¹

The problem

People who are exposed to high noise levels, even for a short time, may experience temporary hearing loss. If they continue to be exposed, they will suffer serious permanent hearing loss. This loss is gradual, and sufferers often do not realise that their hearing is being damaged.

Some of the noisiest working environments are found in the woodworking industry. Noise levels can vary widely from machine to machine depending on conditions of use, but typical examples are shown in Table 1.

The law

The Control of Noise at Work Regulations 2005² set out the legal requirements for controlling the risk of hearing damage at work. They aim to eliminate the risks from exposure to noise, or, where this is not possible, to reduce the risks to as low as is reasonably practicable.

Action values

Specific duties are triggered when an employee's personal noise exposure reaches certain levels, known as 'action values', which are measured in decibels (dB). These are based on daily noise exposure (the average over a working day), and maximum short-duration noise (the peak sound pressure). The action values are:

- lower action values: daily exposure of 80 dB, and peak sound pressure of 135 dB;
- upper action values: daily exposure of 85 dB, and peak sound pressure of 137 dB.

You can also use weekly exposure levels when calculating personal noise exposures where noise exposure varies a lot from day to day, eg where people use woodworking machines and power tools on one or two days in the week but not on others.

Exposure limits

There are also noise exposure limits that must not be exceeded. These are a daily personal noise exposure of 87 dB, and a peak sound pressure of 140 dB. The exposure limits, but not the action values, allow the effect of hearing protection to be taken into account.

The peak sound pressure values are unlikely to apply to most woodworking machines, except perhaps nail guns. However, daily exposure for people working with woodworking machines is likely to exceed the lower action value.

What is expected of employers?

The best approach is to engineer out the noise at source, and to organise your workplace so that the minimum number of people are exposed to noise. When noise exposure reaches the upper action levels, the Regulations do not allow you to use personal hearing protection as an alternative to this.

You should assess the noise exposure of your employees to find out if it is above any of the action values. This means taking account of both the levels of noise and how long they are exposed to it. All noisy tasks carried out during a working day will contribute to an employee's daily noise exposure. You can use the information in Table 1, and knowledge of the time that employees spend working at various machines, to establish a likely daily exposure, and to decide on priorities for noise control. There are electronic spreadsheets on the HSE website (www.hse.gov.uk/noise) to calculate this for you.

Table 1 Typical noise levels at woodworking machines

Machine	Typical noise data for machines with no noise-reduction measures
	Noise level (dB)
Beam panel saws and sanding machines	97
Boring machines	98
Band re-saws, panel planers and vertical spindle moulders	100
Portable woodworking tools	101
Bench saws and multiple rip-saws	102
High-speed routers and moulders	103
Thicknessers	104
Edge banders and multi-cutter moulding machines	105
Double-end tenoners	107

Controlling noise

Where any employee's noise exposure reaches the upper action values you must have a planned programme of noise-control measures in place. For woodworking machinery this is likely to include:

- using the best systems of work;
- using the most appropriate machine for the task;
- engineering noise control at source;
- effective maintenance of equipment; and
- limiting how long people are exposed to noise.

Employees have duties to use the noise-control equipment provided and to report any defects in it.

Engineering controls to reduce noise exposures

Engineering control measures are likely to be necessary to reduce noise, eg:

- change to quieter tooling;
- modify dust-extraction systems; or
- provide a noise enclosure.

Machine maintenance

You have legal duties to maintain woodworking machines to reduce noise and to maintain noise-

control equipment (eg noise enclosures) in good repair. Immediate noise-reduction benefits are often achieved by keeping machines well maintained.

What affects noise from woodworking machines?

See Table 2 to find out what can affect noise levels when using woodworking machines and consider these factors when planning your noise-reduction measures. Make supervisors and employees aware of these issues, particularly when reducing noise exposure depends on following proper systems of work.

You should also follow the manufacturer's or supplier's advice to ensure that the installation and operation of woodworking machines results in the lowest noise levels possible. Noise control case studies can be found on the HSE website (www.hse.gov.uk/noise).

Buying new machinery

Manufacturers of woodworking machines are legally obliged to design and manufacture them so they produce as little noise in use as possible. Information about the noise produced by a machine should be provided in the manufacturer's instructions as well as how to operate the machine as quietly as possible.

When buying new woodworking machinery you should include noise emission in the specification. This will allow you to make informed judgements about the likely noise exposures from a particular machine before you buy it and identify the machine that will introduce least noise into your workplace.

Noise data

When providing noise data, the manufacturer should describe the type of work being carried out by the machine when the measurements were made. This will help you to decide if the noise data is relevant to the work that you intend the machine to do. If it is not, ask the manufacturer or supplier for extra information.

Suppliers and manufacturers of machines should take into account the various ways in which a machine might be used and provide information on how certain variables affect noise levels, eg type of cutter, different workpieces and feed rates (see Table 2).

If you define your maximum acceptable noise level for new machinery, you can include this in the purchase contract. You can then check that your criteria have been met before you make the final payment.

Low-noise features

Manufacturers and suppliers of woodworking machinery should be able to describe the low-noise features of their machinery. Appropriate design measures vary depending on the machine type, but will in general include:

- the machine structure is designed to minimise direct noise radiation, eg flexible panels should be avoided or treated;
- anti-vibration mountings;
- acoustic absorbents, shields or enclosures for control of unavoidable noise sources;
- use of advances in cutter design, eg damped or low-noise blades for sawing machines, segmental cutters for moulders and helical cutters for planers;
- machine tables with slotted lips to reduce noise when air gets trapped between revolving cutters and fixed surfaces;
- systems for minimising noise from workpieces;
- design of waste extraction to reduce noise generated by woodchips;
- silencers to reduce noise at compressed air exhausts and jets;
- optimised spindle speeds, tooling diameters and feed rates.

More advice on buying new machinery is in INDG271.³

Personal hearing protection

While you are developing your noise-control measures, your employees' hearing will be at risk. Even with all reasonably practicable noise-reduction measures in place, it is likely there will still be a risk of hearing damage, so personal hearing protection will be required.

Noise-reduction measures may not remove the need for employees to wear personal hearing protection, but they may benefit from being able to use a protector with a lower rating.

If an employee's personal daily noise exposure is below the upper exposure action value, you should make hearing protection available if the employee requests it, and encourage them to use it until the noise-control programme achieves exposure levels below the lower exposure action values.

If an employee's personal noise exposure reaches or exceeds the upper action values then hearing protection is compulsory. The employer must provide it and employees must use it. You need to ensure that, by using it, their noise exposure is reduced to at least below the exposure limit value.

Avoid protectors that reduce the level at the ear to below 70 dB as this over-protection may interfere with communication and hearing warning signals.

Hearing protection zones

Mark hearing protection zones with appropriate signs. Any woodworking machine which produces average noise levels higher than 85 dB at its operator position should be in a hearing protection zone. The zone should be extended to include any people working near the machine who might be subject to noise above this level.

Hearing protectors

Hearing protectors vary in the degree of protection given. Select them to:

- protect against the noise levels in the workplace;
- be comfortable; and
- be suitable for wearing with other personal protective equipment.

They should also be:

- issued on an individual basis;
- kept clean;
- regularly checked and maintained; and
- replaced when necessary.

Make employees aware of the need to wear hearing protection whenever they are exposed to noise. Not wearing hearing protection for even a short period of time in a noisy environment will significantly reduce the protection they receive over the working day.

Noise awareness

Provide information, instruction and training to managers, supervisors and employees about their likely noise exposure and the risk of hearing damage. Employees should know how to minimise the risk of hearing damage, eg by following systems of work, and correctly using noise-control equipment and hearing protection. Make sure they are trained to carry out regular maintenance on noise-control equipment and know when and how to report defects.

Health surveillance

Where an employee's daily noise exposure regularly exceeds the upper action values, they should have regular hearing checks as part of a health surveillance programme. These can be used to detect when employees might be suffering from the early signs of hearing damage. Where there has been damage, you should take action to prevent it getting worse. A pre-employment check will provide a baseline against which future measurements can be compared. This will show how effective your noise-control strategy is.

Table 2 Factors affecting noise levels when using woodworking machinery

Variable	Relevant factor	Effect
Timber	Species	Hard, stiff timbers mean more noise (eg 2 dB difference when cutting oak and pine at a band re-saw) and more noise transmission.
	Width	Wide workpieces radiate noise over a greater area (eg a working width of 200 mm is likely to cause an increase of 2 dB over a working width of 100 mm).
	Thickness	Thinner workpieces generally vibrate more. Planing under 20 mm thicknesses can greatly increase the noise level.
	Length	Long workpieces transmit noise away from the cutting area towards the operator.
	Moisture content	Dry timber is brittle and a good transmitter of noise.
Tooling	Width of cut	Unless helical or segmental cutters are used, the noise level immediately above the cutter increases roughly in proportion to the width of the cut (eg doubling the cutter length increases the noise by 3 dB).
	Cutter sharpness	Dull knives and worn blades and bands exert more force on the timber and so make more noise.
	Cutter projection	Increases in knife projection mean that more air is trapped during rotation and so more noise is produced (typically 2 to 3 dB more for each millimetre projection above 1.5 mm).
	Speed	Noise increases with tool speed (typically just under 1 dB for every m/s change in peripheral speed in the range 20 to 35 m/s).
	Balance	Out-of-balance tools means vibration and changes in cutting conditions, increasing noise.
Machine setting	Timber control	The freer the timber is to vibrate, the greater the noise level (eg poorly set chip breakers and pressures at multi-cutter moulders lead to more transmitted noise).
	Timber support	Noise is increased if fences, bed plates, chip breakers etc which support the timber close to the cutting circle are not in line and as close as possible to the cutting point.
Extraction	Air velocity/ system design	In a system with turbulent airflow, wood chips strike the ducting more and, without damping, this can increase noise levels.

References

- Noise at work: Guidance for employers on the Control of Noise at Work Regulations 2005* Leaflet INDG362(rev1) HSE Books 2005 (single copy free or priced packs of 10 ISBN 978 0 7176 6165 7) www.hse.gov.uk/pubns/indg362.pdf
- Controlling noise at work. The Control of Noise at Work Regulations 2005. Guidance on Regulations* L108 (Second edition) HSE Books 2005 ISBN 978 0 7176 6164 0
- Buying new machinery: A short guide to the law and some information on what to do for anyone buying new machinery for use at work* Leaflet INDG271 HSE Books 1998 (single copy free or priced packs of 15 ISBN 978 0 7176 1559 9) www.hse.gov.uk/pubns/indg271.htm
- Noise reduction at band re-saws* Woodworking Information Sheet WIS4(rev1) HSE Books 2007
- Safe use of four-sided moulding machines* Woodworking Information Sheet WIS40 HSE Books 2007

Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 2WA Tel: 01787 881165 Fax: 01787 313995 Website: www.hsebooks.co.uk (HSE priced publications are also available from bookshops and free leaflets can be downloaded from HSE's website: www.hse.gov.uk.)

For information about health and safety ring HSE's Infoline Tel: 0845 345 0055 Fax: 0845 408 9566 Textphone: 0845 408 9577 e-mail: hse.infoline@natbrit.com or write to HSE Information Services, Caerphilly Business Park, Caerphilly CF83 3GG.

This leaflet contains notes on good practice which are not compulsory but which you may find helpful in considering what you need to do.

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