

Safe use of four-sided moulding machines

HSE information sheet

Woodworking Information Sheet No 40

Introduction

This information sheet is one of a series produced by the Health and Safety Executive (HSE) in consultation with the woodworking industry. It provides practical guidance for employers on guarding and safe working practices for four-sided moulding machines.

Accident history

About 30-40 accidents a year at these machines are reported to HSE. Nearly all result in amputation injuries. Other types of accident include trapping or entanglement in the machine, or coming into contact with the feed mechanism and/or workpiece.

Most could have been prevented if the cutters had come to rest before operators approached them. Out of 125 accidents, access to the cutters with the machine running was necessary in only 17 cases. Better guarding of the cutters would also have prevented some of these accidents.

Tables 1 and 2 provide a breakdown of what the injured person was doing at the time of the accident and the main causes:

Table 1 Activity at the time of the accident

Adjusting/setting	34%
Unjamming machine	33%
Cleaning machine	13%
Investigating	10%
Other	10%

Table 2 Significant factors

Machine not switched off	27%
Access during rundown	24%
Guarding inadequate	23%
Unsafe work practices	12%
Access 'on the run' necessary	14%

The law

The main legal requirements covering the use of these machines are the Provision and Use of Work Equipment Regulations 1998 (PUWER 98) for which there is an Approved Code of Practice (ACOP) *Safe use of woodworking machinery* (the Woodworking ACOP)¹ specifically for the woodworking industry.

What can I do to stop these accidents happening?

- Make sure everyone who works with these machines is adequately trained and competent.
- Brake the spindles.
- Fit interlocks to access doors in the noise enclosure.
- Provide and use additional guarding close to the cutters.
- Draw up safe systems of work for clearing blockages and setting.

Training and supervision

Everyone who works at these machines must be properly trained, competent and preferably have written authorisation to use them. Managers or supervisors of people using woodworking machines must also have received adequate health and safety training, including on methods of work, the risks, and the precautions to be taken. The Woodworking ACOP, particularly Appendix 1, gives clear guidance on training woodworking machinists.

Braking

About half of all accidents at four-sided moulding machines are caused by people approaching the cutters while the machines are under full power or during rundown.

On older machines the stopping time of a tool spindle varies between 30 seconds and 5 minutes. This means operators are often tempted not to stop the

cutters or wait for them to come to rest, particularly for a quick intervention on the machine.

The Woodworking ACOP asks you to assess the risks to decide whether retrofitting of braking to your machines is necessary. If it is, braking should be fitted **as soon as possible**, but in the case of four-sided moulding machines, no later than 5 December 2008. You should consult machine manufacturers before retrofitting braking, to make sure that potential problems have been considered, such as whether stopping a machine too quickly could damage it.

Guarding

Adjustable guards around the cutters were provided at almost all moulders when new. Over time, particularly on machines that have had noise enclosures added, these guards are often lost. However, they are important to the safety of the machine because they reduce the risk of coming into contact with the cutters. The guards must be strong and rigid, capable of being adjusted to cover the full width/height of the cutting slot and be properly maintained.

All transmission machinery, eg belts, pulleys, chains, sprockets, gears and revolving shafts should be enclosed by fixed guards – interlock any doors if frequent access (more than once a shift/day) has to be made to these parts.

Ejection

There is a risk of workpiece ejection (kick-back) particularly when using a splitting cutter or saw. In some cases the powered feed rollers may not adequately control the safe passage of the workpiece and other precautions may be necessary, like fitting a riving knife or extra feed rollers.

Modern tooling reduces the risk of kick-back, reduces set-up time and reduces the seriousness of injury if there is an accident.

Machine controls

- Machine controls should be clearly marked to show what they do, and easily reached from the operating position.
- There should be at least one emergency stop at the infeed end, but more may be needed, eg inside enclosures or at the outfeed on long-bed machines.
- Make sure all machine controls are routinely tested and properly maintained.

Safe systems of working

- Unsafe working practices, such as adjusting guards or clearing blockages by hand with the machine running are often a result of inadequate instruction, training and supervision.
- Carefully-thought-out systems of work are needed to minimise risk in those rare situations when it is necessary to approach the machining areas.
- Templates and simple setting aids help minimise set-up time and ensure the set-up is right before the machine is started.
- **Do not adjust the guards while the cutters are in motion.**

Noise from four-sided moulding machines

The Control of Noise at Work Regulations 2005^{2,3} require you to eliminate risks from noise, and, where this is not possible, to reduce them to as low as is reasonably practicable. There are two action levels in the Regulations (measured in decibels (dB)) – a lower exposure action value of 80 dB and an upper exposure action value of 85 dB. There is a risk of hearing damage where daily personal exposures to noise are at or above 80 dB.

Four-sided moulding machines can be very noisy. Levels are normally over 85 dB and at the infeed operator position can reach 105 dB. The main sources of noise are:

- idling noise generated by the cutter heads;
- cutting noise from the impact of the knives on timber;
- vibration of the timber;
- poorly designed chip-extraction systems.

How to reduce noise

- The best approach is to reduce machinery noise at source, eg provide a noise enclosure and organise your workplace so that fewer employees are at risk.
- Using limited cutter-projection blocks can achieve reductions of 10 dB, and slotted or perforated tables can reduce idling noise by 5 dB.
- Where you can use helically bladed cutter blocks, they can significantly reduce noise and the more commonly available segmented blocks can make a 5 dB reduction when used at the bottom first head.
- If you reduce the cutter rotation speed and increase the number of knives, this can also reduce noise without affecting the quality of the finish.

Noise-reducing hoods

Integral hoods or part enclosures can reduce both idling and cutting noise when processing short lengths of timber. However, they are not as efficient when longer and wider material is being machined and may not reduce levels below 85 dB in these cases.

Full noise enclosures

Full noise enclosures are the only effective means of reducing idling and cutting noise below 90 dB, but they will only achieve this if you follow this advice:

- Feed openings should be as small as possible, adjustable or no larger than the maximum cross-section the machine can process (see Figure 1).
- Machine controls should be outside the enclosure (see Figure 1).
- When machining longer and wider workpieces, which will vibrate and transmit noise outside the enclosure, use larger and longer enclosures or use sound-absorbing tunnels at the feed apertures. These can still be reasonably effective even if they are open-fronted (see Figures 2 and 3).
- The infeed and outfeed conveyors should not be connected to the machine bed.
- Use damping techniques where possible to reduce vibration. Feed attachments can reduce infeed noise levels by 5 dB.
- Any necessary openings in the enclosure should be as small as possible and acoustically treated to prevent the release of noise.

Where full enclosures are used, it is sometimes necessary to get into the enclosure with the cutters running, for example, when fine-setting the pressures and for operations such as jointing. You should preferably carry out these operations in setting/adjusting mode, with the machine under a hold-to-run control. Where provided, the switch that selects between the setting mode and normal running should be lockable to prevent the machine being started up by mistake by a second person.

Safe workplace

- Keep the area around the machine free of loose chippings.
- Make sure offcuts and wood dust are removed safely.
- Where possible the dust-extraction system should include a flexible hose to allow cleaning of the machine.
- Make sure there is good general lighting and, if necessary, extra localised lighting to illuminate the cutting areas.
- Stack unmachined and finished workpieces and place them in a convenient position to enable safe, free and easy feeding to and from the machine.
- Where necessary, provide and use suitable workpiece supports and try to maintain a common batch size.

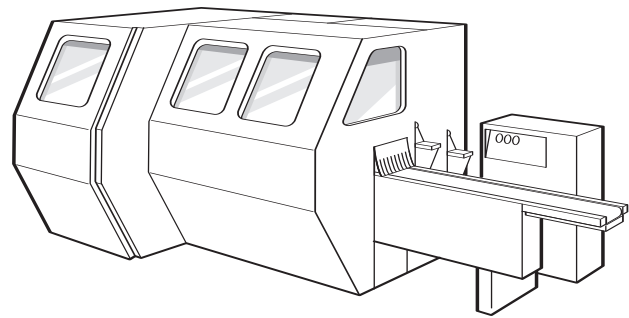


Figure 1 Integral enclosure – close-fitting round feed area with controls outside and overlapping strips across opening

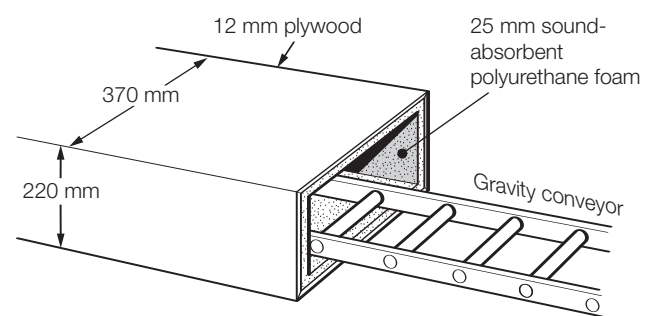


Figure 2 Full tunnel

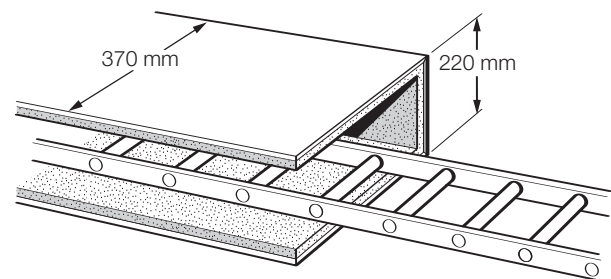


Figure 3 Partial tunnel

NB The size of the tunnels depends on the maximum workpiece dimensions the machine can process. Tunnels should be a little larger than the maximum size of the timber.

References and further reading

1 *Safe use of woodworking machinery. Provision and Use of Work Equipment Regulations 1998 as applied to woodworking machinery. Approved Code of Practice and guidance* L114 HSE Books 1998
ISBN 978 0 7176 1630 5

2 *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
www.hse.gov.uk/pubns/indg362.pdf

3 *Noise at woodworking machines* Woodworking Information Sheet WIS13(rev1) HSE Books 2007

Further information

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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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