

# Wood turning lathes

## Safe working practices

### HSE information sheet

### Woodworking Information Sheet No 28 (Revision 1)

#### Introduction

This information sheet gives practical guidance on safe working practices when using hand, copy and rotary knife wood turning lathes. It is aimed at employers and others who have control of how wood turning lathes are used. Machine operators will also find this information of use. Effective safeguards such as interlocked enclosures are often used on automatic copy lathes. However, the simpler hand turning lathes are much more reliant on a safe system of work to control the risks.

#### Accident history

Accidents have been caused on wood turning lathes because the operator has:

- made contact or become entangled with a rotating part or workpiece, often while using sandpaper/emery tape or similar;
- made contact with rotating cutters, often while attempting to move or un-jam a workpiece (rotary knife lathe only);
- been crushed between a rotating workpiece and tool rest, a moving carriage, swinging arm or turret;
- been struck by an ejected workpiece (or cutters).

It is important that the necessary safeguards or safe systems of work are in place for a particular lathe and operators are trained to use/follow them.<sup>1</sup> There have been several prosecutions because safeguards were either not fitted or had been defeated on copy and rotary knife lathes, often resulting in serious accidents.

#### Training and information

It is important that the machine is fitted with the necessary safeguards and machine operators are trained to use them and carry out the work they are expected to do safely. Training is particularly important for those using hand turning lathes, where the operator works close to the rotating workpiece and the risk is controlled by working safely. This should

include the provision and use of personal protective equipment such as eye protection and ear defenders etc.

With rotary knife lathes, setters require detailed training and experience before taking responsibility for cutter setting, to control the risk of ejected cutters. This should include a systematic check of knife security before any rotary knife lathe is started.

No one should be allowed to work on a lathe unless they have demonstrated competence. It is advisable that competent operators are authorised in writing by a responsible person (director, senior manager etc). This will then form part of the training records. Anyone who supervises the use of work equipment must also have received adequate training and both operators and supervisors must have access to information and where appropriate, written instructions.<sup>1</sup> There should also be effective maintenance in place.

#### Legal requirements

Legal requirements covering the use of wood turning lathes are contained in *Safe use of woodworking machinery. Provision and Use of Work Equipment Regulations 1998 (as applied to woodworking machinery). Approved Code of Practice and guidance.*<sup>1</sup> This document gives practical advice on the safe use of woodworking machinery and covers the provision of information and training as well as aspects of guarding and maintenance (see also Further reading).

When buying a new wood turning lathe, it should be supplied with a Declaration of Conformity, a suitable operator's handbook giving safety information and have a CE Mark properly applied. This means that the manufacturer declares that the machine complies with The Supply of Machinery (Safety) Regulations 2008.

#### Hand turning lathes

Hand turning lathes cannot be effectively guarded because of the way the machine is used. However, the dangers of working on hand turning lathes are well

known and can be controlled if the user follows an established safe system of work.

It is important that the necessary safeguards or safe systems of work are in place for a particular lathe and operators are trained to use/follow them.<sup>1</sup>

Hand turning lathes are often used in schools and colleges, see Figure 1. As with most wood lathes, the workpiece is mounted between centres and the operator then uses various types of hand-held chisel or gouge placed on a tool rest to cut the wood from the rotating workpiece.

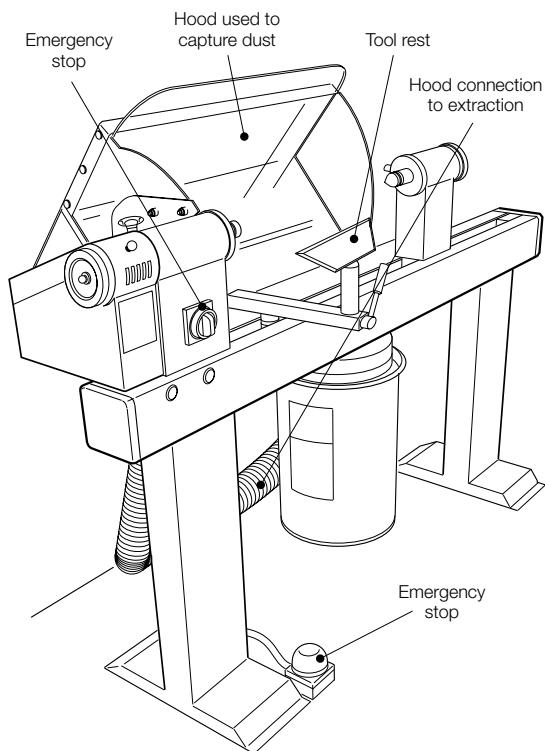


Figure 1 Small hand turning lathe typically used in schools

### Supporting the workpiece

The drive centre, located in the rotating headstock, can be fitted with spurs etc to give a more positive hold onto the workpiece and reduce the risk of ejection, see Figure 2. For a larger diameter/heavy workpiece, additional support from face plates screwed into the ends may be required, see Figure 3. For maximum support the correct gauge of screw should always be used. A single face plate fitted to the headstock is used where one end/face of the workpiece has to be worked, for example when turning a wooden bowl.

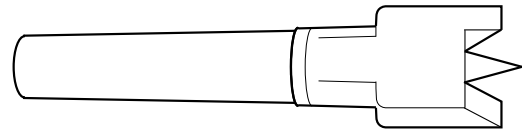


Figure 2 Four-spur driving centre

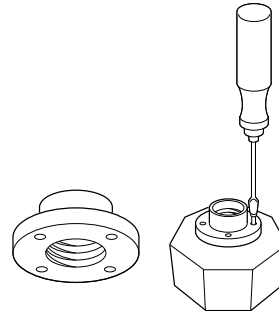


Figure 3 Face plate screwed to workpiece

### Risk of ejected workpiece

Ejected workpieces are one of the main causes of accident during hand turning. Ejection can occur if there is:

- incorrect/inadequate workpiece support;
- inadequate workpiece preparation – it is important that surplus timber is removed from a square section workpiece before turning commences, see Figure 4;
- too fast a speed selected for larger diameter or irregularly shaped workpieces, particularly if first cuts are being made;
- a blunt tool being used.

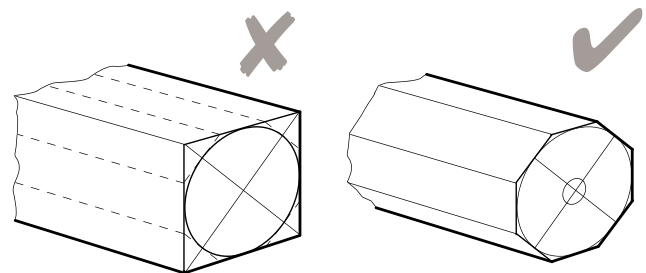


Figure 4 Removing surplus timber from a square section workpiece before turning

### Risk from tool post setting errors

The tool rest should be set close enough to ensure the user can hold the chisel steady with the minimum of effort but it should be far enough away from the workpiece to ensure the parallel portion of the chisel is in contact with the rest at all times during cutting operations.

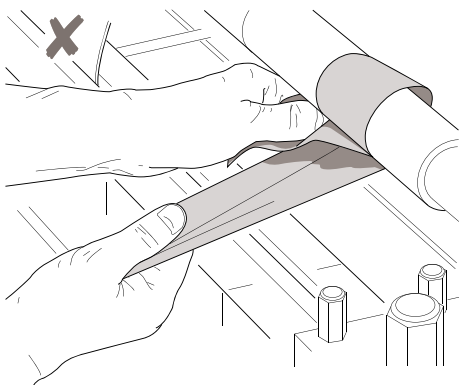
The tool rest height should be such that the chisel cutting edge is set at the workpiece centre line. The user must be prepared to adjust the tool rest if the cutting conditions are not ideal.

## Risk from entanglement/trapping

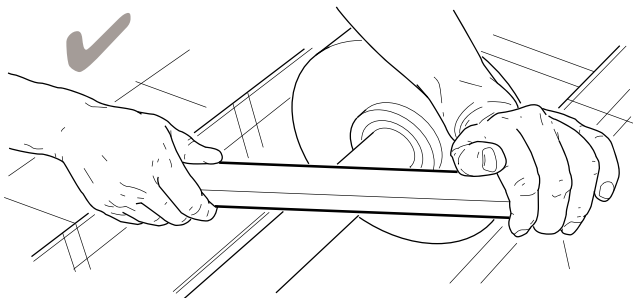
Because the operator works in close proximity to the rotating workpiece during hand turning, there is a higher risk of entanglement. The risk can be reduced by:

- use of a hairnet, or hat with integral hairnet, if the operator has long hair;
- ensuring there is no loose clothing, particularly around the wrists or arms;
- removing jewellery/watches etc from fingers and wrists.

Trapping accidents can occur during sanding operations on all types of lathe. Most accidents happen when each end of a strip of sandpaper is held in separate hands and passed around the back of the component being sanded, see Figure 5a. If it is wrapped around the fingers and/or becomes snagged on the component while it is tightly gripped, then a serious injury is likely. To reduce the risk, use a backing board made of good quality wood, see Figure 5b.



**Figure 5a** Trapping risk when sanding

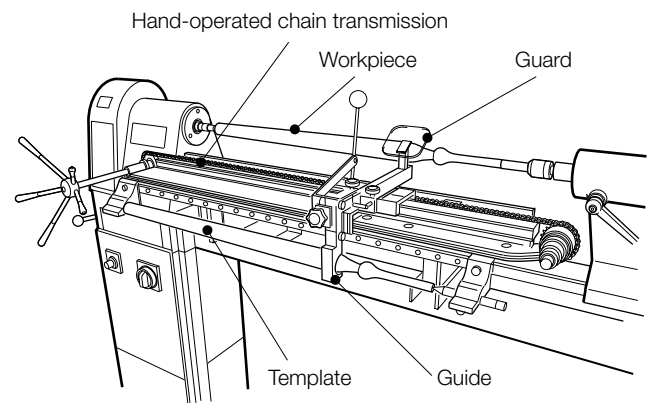


**Figure 5b** Use of a backing board for sanding

If the use of a backing board is not practical then the sandpaper should be used in long strips with one end passed beneath the workpiece. Force should then be applied by pulling both ends of the strip upwards. The strip should never be allowed to go slack or be wrapped around either the operator's finger or the components.

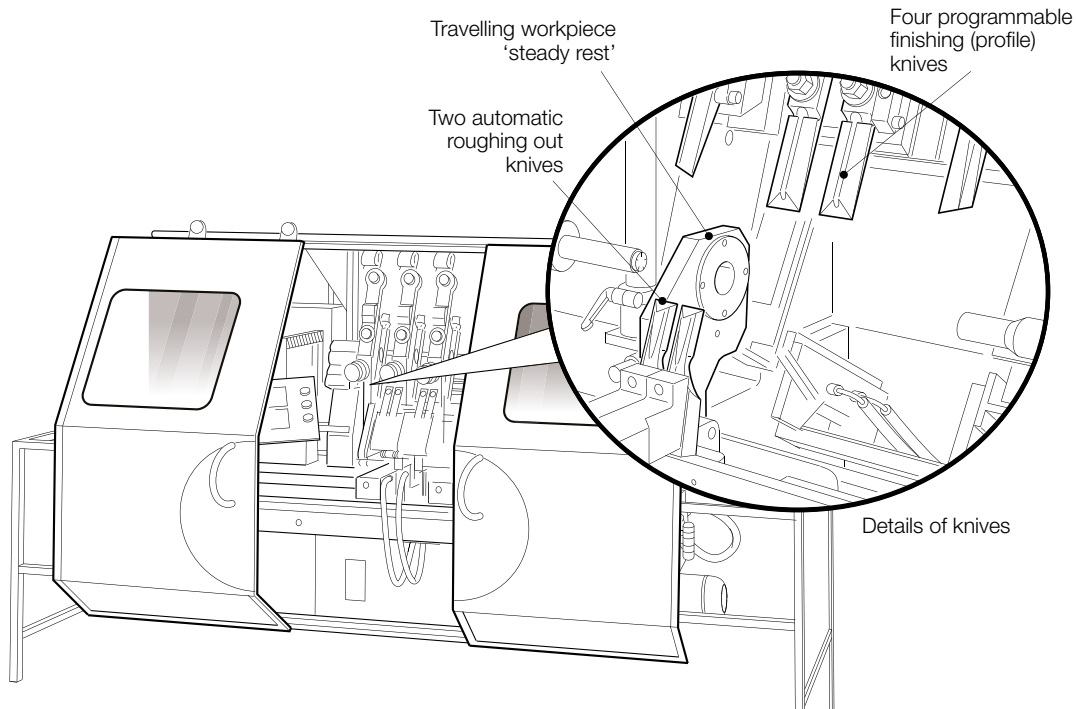
## Copy lathes

Copy lathes can be simple hand-operated models (see Figure 6), semi-automatic or fully-automatic (see Figure 7). They work by having a spring-loaded or hydraulically-operated guide that follows a template. The tool then cuts the same profile onto the workpiece being turned by following the guide via a system of linkages or hydraulics etc. As the operator does not need to be in close proximity to the rotating workpiece, hand-operated copy lathes should have appropriate guarding.



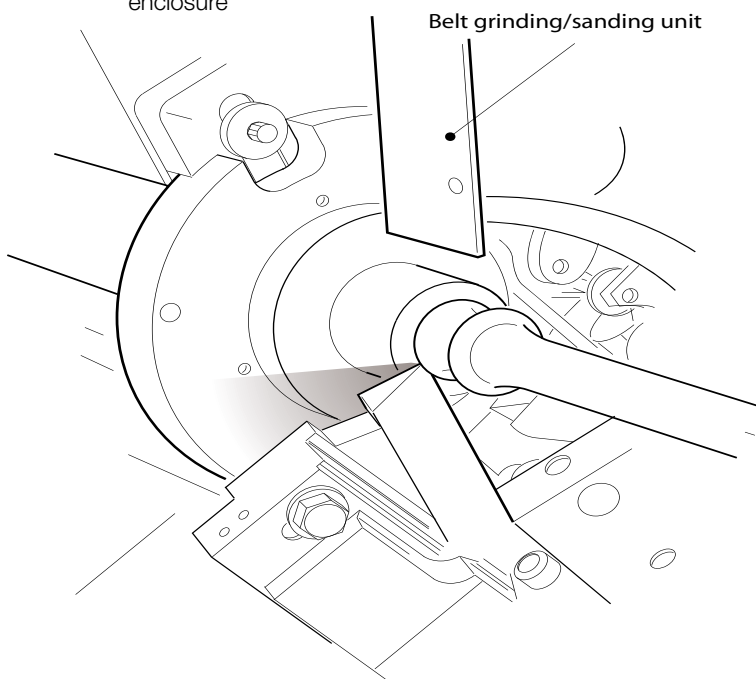
**Figure 6** Simple hand-operated copy lathe

Fully-automatic CNC copy lathes have a number of heads and cutting tools that allow roughing out and finishing cuts without having to change any tools. They can be programmed to automatically produce large numbers of complex workpieces rather than following a template. Some copy lathes are specifically designed for batch production of small wooden parts. There is generally better safeguarding on an automatic copy lathe, with even basic models having adjustable shield guards. More sophisticated machines have all dangerous parts fully enclosed behind an interlocked door, see Figure 7. Automatic copy lathes have a high output and are often magazine-fed but output is usually less than that of a rotary knife lathe. They are however more widely used being more versatile, safer and quieter than a rotary knife lathe. They can also be fitted with an automatic surface grinding/sanding unit, see Figure 8, which reduces the risks to the operator as well as being more efficient.

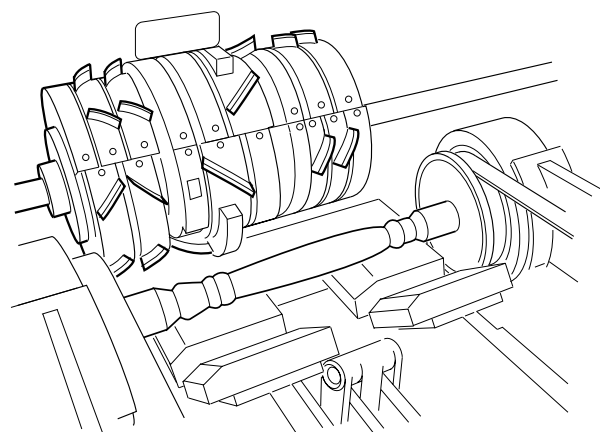


**Figure 7** Fully hydraulic automatic copy lathe with interlocked enclosure

possible. The standard also advises that 'where there is a hazard of ejection and contact with the tool it is always prevented by a system of fixed guards and/or movable guards interlocked with guard-locking and/or self-closing guards'. This comment should be carefully considered when assessing and controlling the risks on copy and rotary knife lathes, particularly with older machines that cannot be fitted with limited cutter projection tooling.



**Figure 8** Automatic grinding/sanding unit



**Figure 9** Modern rotary knife tooling

## Rotary knife lathes

Rotary knife lathes have a cutter-block mounted on a fixed spindle or arbor which then rotates as well as the workpiece, see Figure 9.

Although it is possible to fit limited cutter projection tooling to some older rotary knife and copying lathes,<sup>1</sup> BS EN 847-1<sup>2</sup> does not specifically apply to these machines. However, its guidance is relevant to rotary knife machines and should be followed where

In addition to the accident risks discussed previously, consideration should also be given to potentially high levels of noise and wood dust exposure, see 'Other hazards'. There are three classes of rotary knife lathe:

- manually-operated;
- semi-automatic;
- fully-automatic.

**Manually-operated lathes** are where the rotating workpiece is moved into contact with the rotating cutters, either on a sliding carriage or between swinging arms, by a manually-operated lever.

**Semi-automatic lathes** that operate on a single cycle and one or more of the following functions are automated:

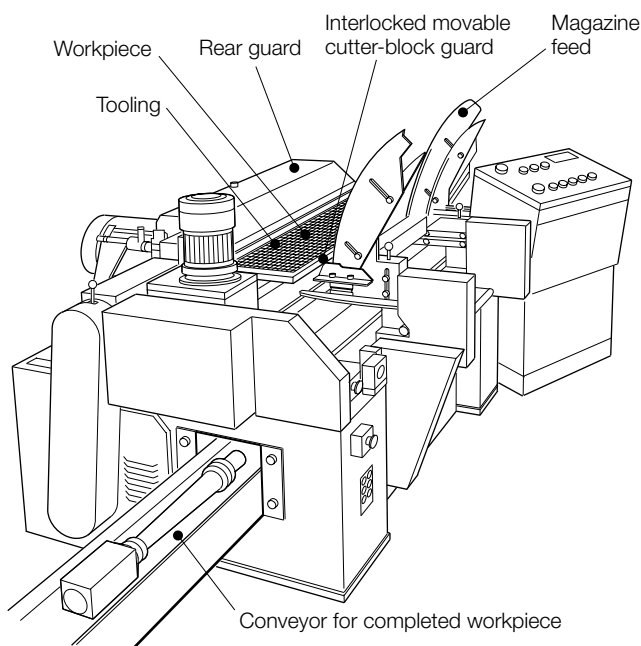
- clamping of the workpiece;
- advancing the workpiece onto the cutter-block;
- advancing the cutter-block onto the workpiece;
- magazine loading.

These lathes are classed as semi-automatic as the operator has to either manually load the workpiece or operate a lever to bring the workpiece into contact with the cutters.

**Fully automatic lathes** are where the operator has only to feed stock into a magazine or onto a conveyor and workpieces are discharged automatically on completion.

### Safeguarding rotary knife lathes

Contact with the cutters should be prevented by effective enclosure of the cutter head. Where possible, this should be achieved by the use of an interlocked guard with guard locking, ie the guard cannot be opened until the cutters are stationary, see Figure 10. All transmission machinery and other dangerous parts should also be safeguarded.



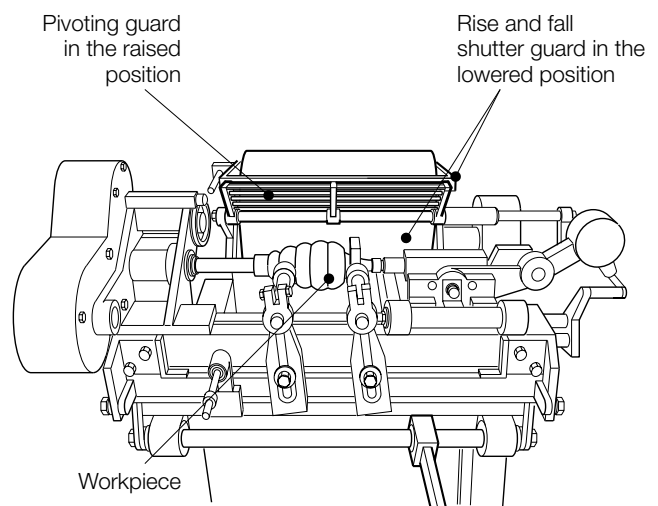
**Figure 10** Automatic rotary knife lathe with interlocked movable cutter-block guard and guard locking

Where an interlocked guard is used on any lathe, openings in the guard should be restricted to

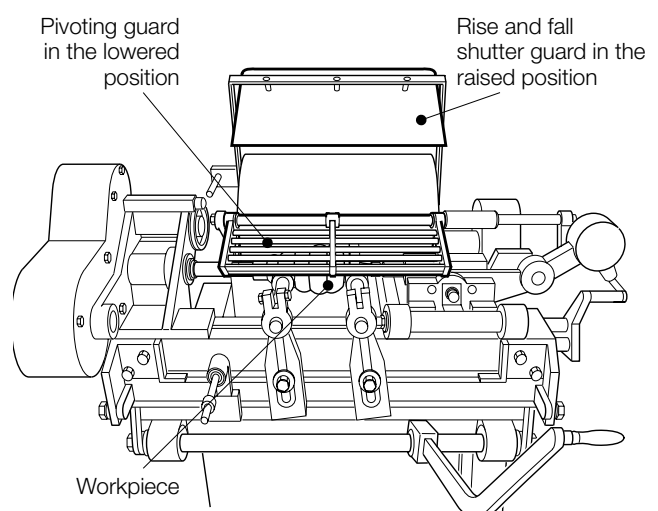
comply with the safety distances given BS EN ISO 13857.<sup>3</sup> Also, any interlocks used should meet the requirements of BS EN ISO 14119.<sup>4</sup>

Some older manual and semi-automatic rotary knife lathes may not be able to achieve this standard of guarding. However, as a minimum they should be fitted with a rise and fall shutter guard, linked with the saddle feed mechanism, so that the cutter is enclosed at all times when cutting is not taking place. An additional pivoting guard should also be linked with the saddle feed mechanism so that access to the cutter-block and workpiece is prevented during cutting, see Figures 11 and 12.

An automation upgrade will also improve safety, ie by the addition of a magazine/conveyor feeding.



**Figure 11** Position of guards during loading of the workpiece (shutter guard encloses stationary cutters, pivot guard raised so next workpiece can be loaded)



**Figure 12** Position of guards during machining of the workpiece (pivot guard lowered to prevent access to rotating cutters and workpiece, shutter guard in raised position)

## Braking

Lathes come within the category of woodworking machine that require braking to be fitted where a risk assessment shows it to be necessary. Some lathes may not be suited to have braking fitted as sudden stopping could affect the integrity of the workpiece or the machine. However, if a risk is identified that could be controlled by braking and it would not affect integrity then automatic braking may need to be provided. This should stop the lathe within ten seconds unless the run-up time exceeds ten seconds. In that case the automatic braking should stop the lathe in less time than the run-up time, but should not exceed 30 seconds.

**Lathes should have been fitted with a braking device if supplied after 5 December 2003.**<sup>1,5</sup>

## Other hazards

To control wood dust exposure, effective hoods connected to an extraction system should be used, see Figure 1. More information can be found in *Wood dust: Controlling the risks*.<sup>6</sup>

Noise levels on rotary knife lathes can often be in excess of 100 dB(A). Some noise level reduction can be achieved by the use of chip limited cutters<sup>7</sup> and choosing the correct cutting speed. However, it may be necessary to build a noise enclosure around the machine to effectively reduce noise levels, see Figure 13. More information can be found in Woodworking Information Sheets 4<sup>8</sup> and 13.<sup>9</sup>

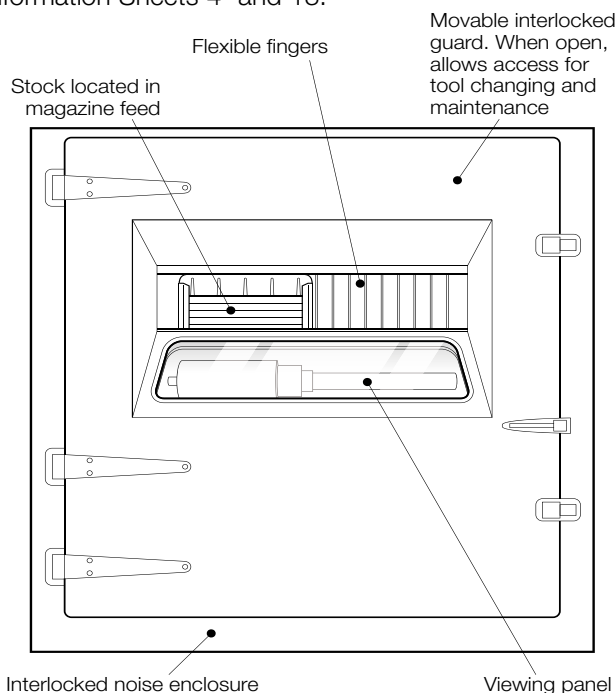


Figure 13 Interlocked noise enclosure

## References

- 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* (Second edition) HSE 2014 [www.hse.gov.uk/pubns/books/l114.htm](http://www.hse.gov.uk/pubns/books/l114.htm)
- 2 BS EN 847-1:2013 *Tools for woodworking. Safety requirements. Milling tools, circular saw blades* British Standards Institution
- 3 BS EN ISO 13857:2008 *Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs* British Standards Institution
- 4 BS EN ISO 14119:2013 *Safety of machinery. Interlocking devices associated with guards. Principles for design and selection* British Standards Institution
- 5 *Retrofitting woodworking machine brakes* Woodworking Information Sheet WIS38(rev1) HSE 2014 [www.hse.gov.uk/woodworking/wis.htm](http://www.hse.gov.uk/woodworking/wis.htm)
- 6 *Wood dust: Controlling the risks* Woodworking Information Sheet WIS23(rev1) HSE 2012 [www.hse.gov.uk/woodworking/wis.htm](http://www.hse.gov.uk/woodworking/wis.htm)
- 7 *Tooling for use with hand-fed woodworking machines* Woodworking Information Sheet WIS37(rev1) HSE 2014 [www.hse.gov.uk/woodworking/wis.htm](http://www.hse.gov.uk/woodworking/wis.htm)
- 8 *Noise reduction at band re-saws* Woodworking Information Sheet WIS4(rev2) HSE 2014 [www.hse.gov.uk/woodworking/wis.htm](http://www.hse.gov.uk/woodworking/wis.htm)
- 9 *Noise at woodworking machines* Woodworking Information Sheet WIS13(rev1) HSE Books 2007 [www.hse.gov.uk/woodworking/wis.htm](http://www.hse.gov.uk/woodworking/wis.htm)

## Further reading

*Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and guidance L22* (Fourth edition) HSE Books 2014 [www.hse.gov.uk/pubns/books/l22.htm](http://www.hse.gov.uk/pubns/books/l22.htm)

More information on woodworking can be found on HSE's woodworking website: [www.hse.gov.uk/woodworking](http://www.hse.gov.uk/woodworking)

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