

Horizontal beam and vertical panel saws

HSE information sheet

Information Sheet No 03 (Revision 1)

Introduction

This information sheet has been prepared by HSE's manufacturing sector with help from the woodworking industry. It provides advice for users on the safeguarding and safe use of horizontal and vertical panel saws.

Panel saws are designed to cut a variety of sheet materials such as wood, laminates, medium density fibreboard (MDF), plaster boards and plastics. Both types of saw can cause serious accidents.

Horizontal beam panel saws

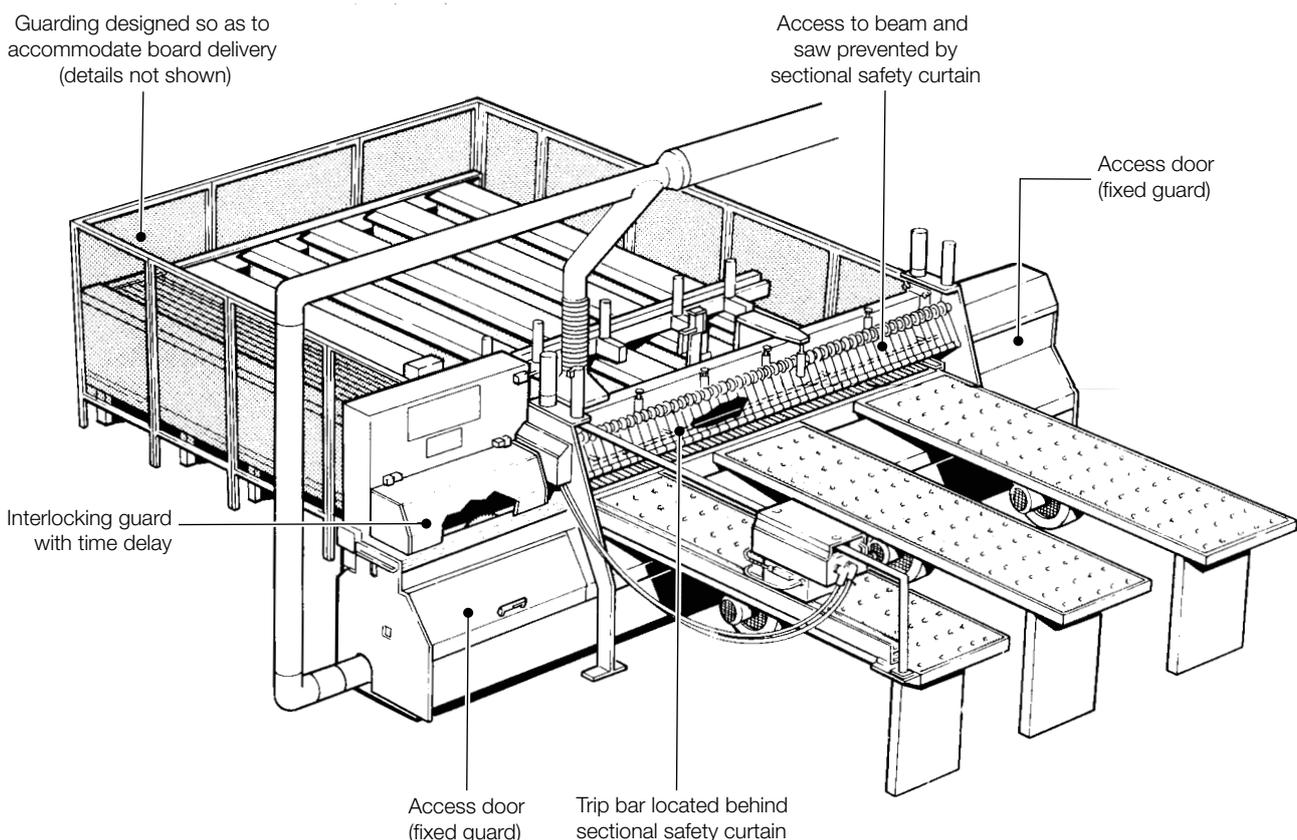
Horizontal beam saws (Figure 1) are travelling rise and fall cross-cut saws that operate with a table. They can be either 'stand alone' or part of a production line with other types of panel-finishing machinery. The panel can

be loaded and unloaded manually or by a powered panel-handling device, such as one with vacuum clamping. A panel-turning device may also be fitted.

The panels are positioned for the cut either by hand or mechanically by a panel-pusher mechanism or other equipment. Once positioned, the panel is clamped to the machine table by a power-operated beam before cutting starts. The cut is made by a travelling circular saw blade which rises automatically from a slot in the table. After completing a power-driven cutting stroke, the saw retracts and returns to its start position. A scoring saw usually precedes the travelling saw blade.

A power-operated side pressure device, positioned between the beam and the sectional safety curtain, can be used to push the panel against the fence for right-angled cuts.

Figure 1 Horizontal beam panel saw



Dangers

Different brands of beam panel saws will have their own characteristics. These should all be considered when identifying the hazards and assessing the risks. However, the following hazards will exist on all machines:

- Being cut by the saw blade: during its free travel between packs of material; as it rises up from beneath the saw table; or when it is in the end housings before it has stopped.
- Being trapped: between the beam and panels or table; by the panel feed mechanism and fixed parts of the machine; by various prime movers; by transmission machinery; or by other dangerous parts.

Braking

The saw spindles should be fitted with an automatic brake that stops the saw in less than 90 seconds (where the un-braked run-down time exceeds 90 seconds).

Guarding

Saw blade when in the rest position

Access to the saw blade when the saw unit is in the rest position should be prevented by fixed guards. Any gaps or openings in them must meet the requirements of BS EN ISO 13857:2008¹ for reach distances.

If access is required for maintenance and servicing such as blade changing then:

- where the run-down time does not exceed ten seconds the access door (fixed guard) must have a movable interlocked guard; and
- where run-down time is more than ten seconds then the moveable interlocked guard must have an additional spring applied/power released guard locking device.

Further details can be found in BS EN 1870-13:2007,² which includes the requirements for any powered movement necessary for blade changing.

Saw blade in the cutting area

A sectional safety curtain made from rise and fall blocks or fingers should be positioned as close as possible to the front edge of the beam. A second safety curtain should also be fitted at the rear edge of the beam, if access is possible and has not been

prevented by fixed or interlocking guards. The safety curtain should be linked to the cycle of the machine so that it is fully lowered and prevents access to the cutting path of the saw before the beam descends.

The width of each block or finger within the safety curtain should be no more than 50 mm. This is to reduce the gap at either end of the pack of material being cut. The fingers should be rigid enough to prevent access and strong enough to withstand normal service. The safety curtain should cover the full cutting width and meet the other requirements detailed in BS EN 1870-13:2007.

Pressure beam

Access to the crushing and trapping zone caused when the pressure beam descends should be prevented by a trip bar. This must be rigid (not a wire or rope) and extend over the full length of the pressure beam. Once the trip bar is operated it should:

- first cause the saw blade to retract back beneath the table; and
- then stop and reverse the downward movement of the pressure beam before the distance between the beam and the machine table is less than 12 mm.

The trip bar should operate under fairly light pressure (not more than 50 N).

If access from the rear of the machine has not been prevented then a second trip bar must also be fitted at the rear side of the pressure beam.

Where necessary, fixed guards should prevent access to the beam and saw at either end of the trip bar and safety curtain. They should also prevent access over the top of the trip bar and safety curtain to the leading edge of the beam.

Safeguarding the rear of the machine

Access to any danger point, such as the pressure beam or panel-pusher at the rear of the machine, should be prevented. This can be by either fixed-distance guarding or individual safeguards at each danger point that meet the requirements of BS EN 1870-13:2007.

If a fixed distance guard is used it must be at least 1600 mm in height and must extend to within a maximum distance of 300 mm from floor level, unless distance guards are mounted on the machine frame and access to danger from below the machine table has been prevented.

Any access doors to the enclosure should be interlocked with all movements that could cause danger, for example the saw blade or panel-pusher.

Panel-handling equipment

Access to the crushing zone between the pressure beam, when in its rest position, and the forward movement of the panel-pusher should be prevented either by:

- interlocking the forward movement with the safety curtain, so movement is only possible when the safety curtain is in its guard position; or
- limiting the amount of forward movement so that there is always a 50 mm gap between beam and pusher.

If an external panel-turning device is fitted then access to the crushing zone should be prevented by having hold-to-run controls located outside of the crushing zone.

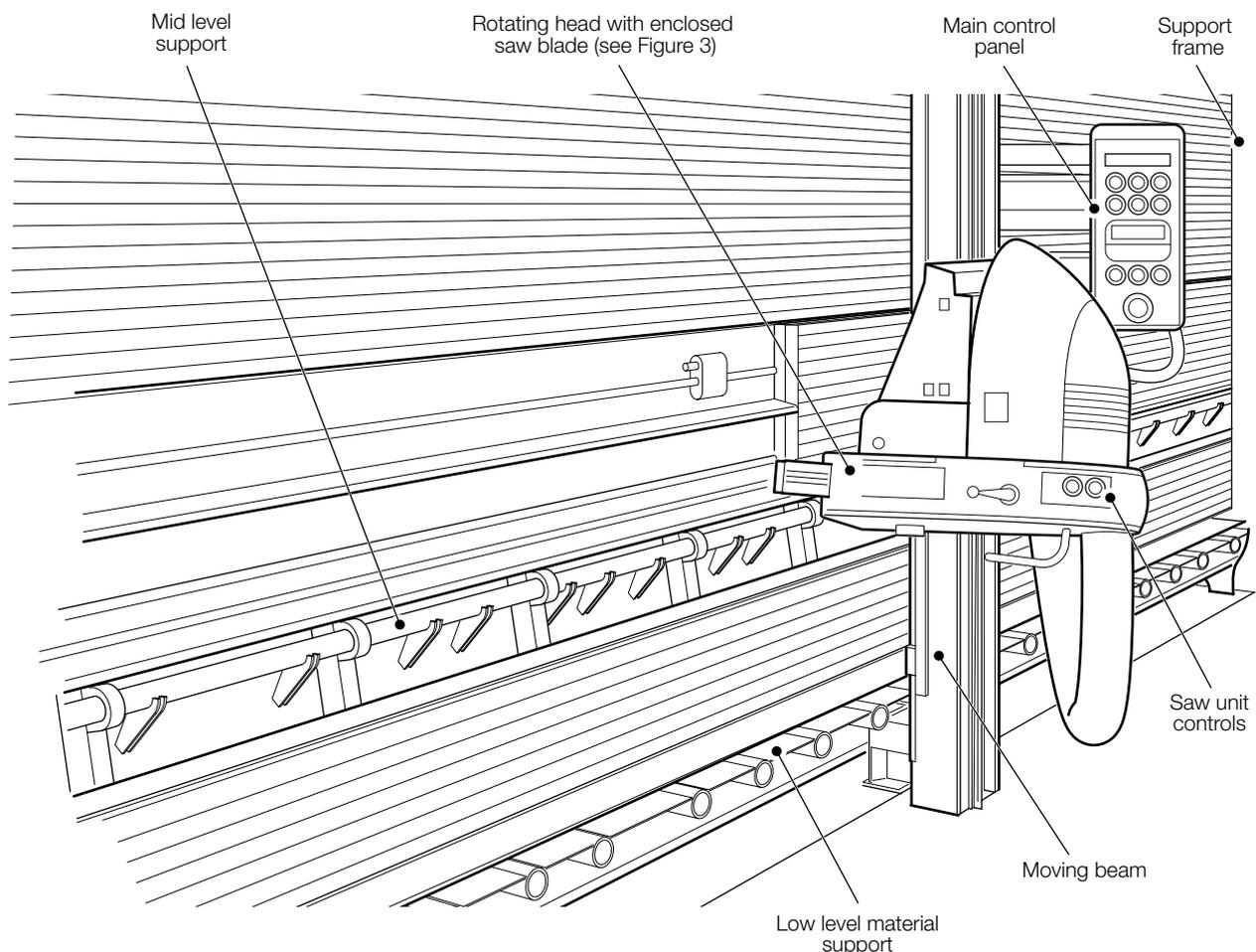
If a pushing-out device is fitted access to crushing and shearing points should be prevented by the requirements detailed in BS EN 1870-13:2007.

If there is a powered panel-loading device, it should have fixed distance guarding at least 1600 mm in height that extends to within a maximum distance of 300 mm from floor level. Any gaps in it must meet the requirements of BS EN 13857:2008. The opening for loading a panel stack should be safeguarded by a trip device. This should be an active opto-electronic protective device (AOPD – light barrier) that meets with the requirements of EN 61496-1:2004³ and those detailed in BS EN 1870-13:2007.

Vertical panel saws

Vertical panel saws, commonly known as a wall saw (Figure 2), cut the panels on a vertical work surface. This design has the advantages of reducing the space required and makes material handling easier. Most machines can cut automatically or they can be manually drawn across the panel by the operator. When used in the automatic mode the operator should take care that hands do not enter the danger zone. The saw has the ability to accurately cut both horizontally and vertically as the head can rotate 90°.

Figure 2 Vertical panel saw



Dangers

Vertical panel saws are thought by industry to be safe machines but, when not used correctly, can cause serious injuries, such as finger and hand amputations. Inexperienced operators have accidentally touched the saw blade when they:

- have pushed the panel towards the saw rather than bringing the saw to the panel;
- have had to hold panels because they were either below the safe minimum cutting size or were bowed or irregularly shaped; and
- were unaware that there was an operating saw blade within the enclosed guard.

These dangers should be covered during training on the machines.

Guarding and safety devices

Ejection

To minimise the risk of ejection, vertical panel saws must be fitted with a riving knife that meets the requirements detailed in BS EN 1870-14:2007.⁴

Safeguarding the saw blade

The saw blade is enclosed by a combination of a fixed guard and a self-closing guard (Figure 3).

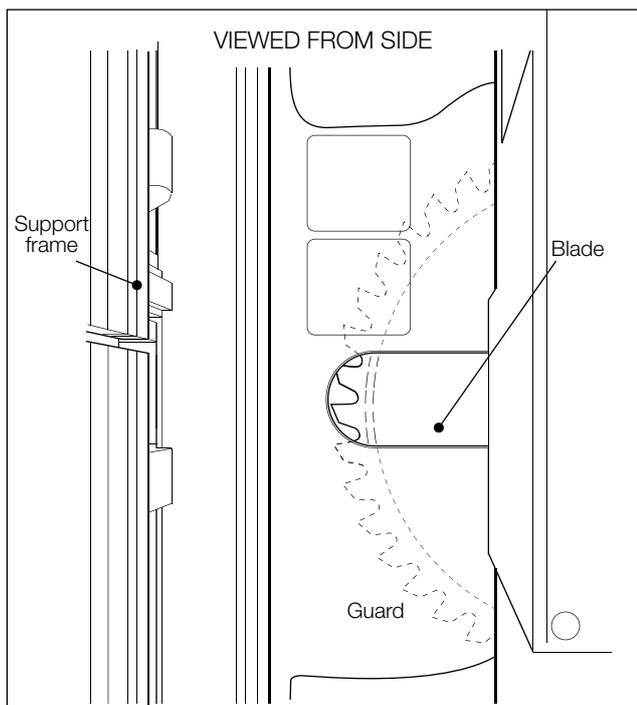


Figure 3 Saw blade inside self-closing guard

During cutting, the self-closing guard retracts when it makes contact with the panel and the saw blade, then projects through a slot. The slot lining must be made from either a plastic or light alloy. These guards also form part of the dust extraction system.

Workpiece supports and guides

For the panel to be stable when being cut it must rest on a vertical support that has a minimum angle of 5° from the vertical. The low-level support has bottom rollers to assist in moving large panels. The mid-level support is used for cutting smaller items and is positioned at an easier level for handling. The mid-level support must be designed so that it can be held in its 'rest' position when not being used, only being folded out when required. Both mid- and low-level supports have a support stop.

To prevent the panel from slipping off the support there should be a lip or other protrusion of at least 5 mm. If there are rollers fitted, there must be no gaps between them, except where necessary for the saw unit to pass below them.

Some vertical panel saws also have a workpiece clamp at the top of the support (Figure 4) to assist in holding large panels.

Any part of the panel-supporting structure that can be hit by the blade must be made from either a wood-based material, plastic or a light alloy.

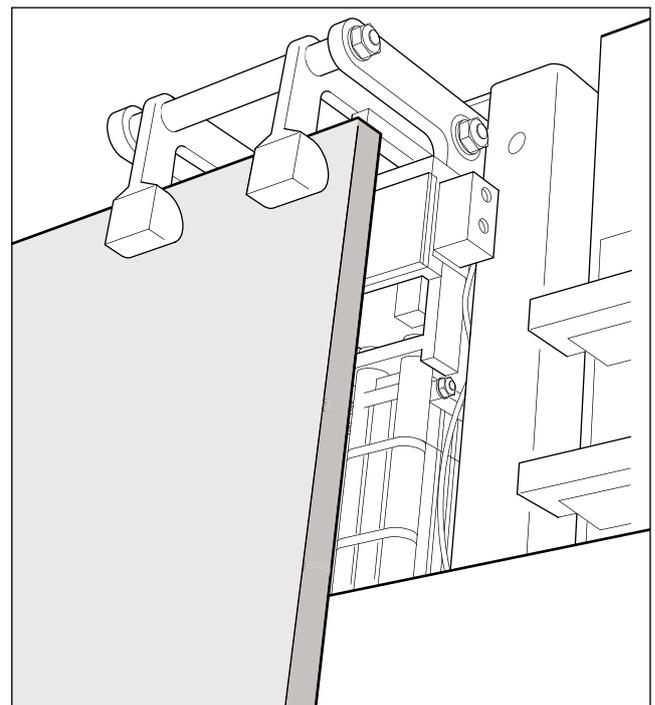


Figure 4 Workpiece support clamp

Braking

An automatic brake should stop the saw in less than ten seconds, the same requirement as for a traditional dimension (panel) saw.

Emergency stops

The emergency stop should be located with the normal start and stop controls on the front side of the main control panel (Figure 2). If the saw has an integrated feed, there must be an additional emergency stop located at each end of the machine frame. There should also be an emergency stop on any auxiliary control panel.

Safeguarding the rear of the machine

Access from the rear of the machine to the saw blade or any of the moving parts is prevented by filling in the rear frame. Any gaps must meet the requirements of the reach distances in BS EN ISO 13857:2008.

Maintenance and safe system of work

Both types of panel saws and their safety devices should have a system of inspection and maintenance by a suitably trained person. The safety devices should be checked at the beginning of each shift and also at appropriate intervals. This will depend on the amount of use and the manufacturer's recommendations.

All users of both types of panel saws should have received adequate training.

If anyone has to enter a potentially hazardous area for maintenance, adjustments or removal of off-cuts, then the machine should be effectively isolated.

References and further reading

- 1 BS EN ISO 13857:2008 *Safety of machinery – Safety distances to prevent hazard zones being reached by upper and lower limbs* British Standards Institution
- 2 BS EN 1870–13:2007 (incorporating corrigendum June 2008) *Safety of woodworking machines – Circular sawing machines – Part 13: Horizontal beam panel sawing machines* British Standards Institution
- 3 EN 61496–1:2004 + A1:2008 *Safety of machinery – Electro-sensitive protective equipment – Part 1: General requirements and tests* British Standards Institution
- 4 BS EN 1870–14:2007 *Safety of woodworking machines – Circular sawing machines – Part 14: Vertical panel sawing machines* British Standards Institution
- 5 *Application of electro-sensitive protective equipment using light curtains and light beam devices to machinery* HSG180 HSE Books 1999 ISBN 978 0 7176 1550 6

Further information

Further information on health and safety for woodworking can be found on HSE's woodworking website: www.hse.gov.uk/woodworking/

For information about health and safety, or to report inconsistencies or inaccuracies in this guidance, visit www.hse.gov.uk/. You can view HSE guidance online and order priced publications from the website. HSE priced publications are also available from bookshops.

British Standards can be obtained in PDF or hard copy formats from BSI: <http://shop.bsigroup.com> or by contacting BSI Customer Services for hard copies only Tel: 020 8996 9001 email: cservices@bsigroup.com.

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

This document is available at www.hse.gov.uk/pubns/wis3.pdf

© *Crown copyright* If you wish to reuse this information visit www.hse.gov.uk/copyright.htm for details. First published 06/11.