

Single-end tenoning machines

Safe working practices

HSE information sheet

Woodworking Information Sheet No 39 (Revision 1)

Introduction

This information sheet contains practical guidance on safe working practices when using a single-end tenoning machine. This information is aimed at employers and others who have control of how single-ended tenoning machines are used. Machine operators will also find this information of use.

Accident history

Severe accidents, including amputations are caused on single-end tenoning machines by the operator making contact with the cutters or saw while:

- checking if the local exhaust ventilation (LEV) was working, often during rundown;
- setting and adjustment;
- cleaning up or clearing blockages.

In all of these accidents, the cutters were found to have been still in motion. This was because:

- the machine had not been switched off;
- the machine had been switched off but the operator had not applied the brakes or not braked all of the spindles.

Training

It is important that the machine is fitted with the necessary safeguards and that machine operators are trained to use them and carry out the work they are expected to do safely. No one should be allowed to work at a woodworking machine 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.¹ There should also be effective maintenance in place.

Legal requirements

Legal requirements covering the use of single-end tenoning machines 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*.¹ 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 single-end tenoning machine, it should be supplied with a Declaration of Conformity and have a CE Mark. Designers and manufacturers must conform to the essential safety requirements of the Machinery Directive and associated European Free Trade Association (EFTA) regulations. One way of achieving this is by designing and constructing the machine to meet BS EN 1218-1.² Cutter blocks should meet BS EN 847-1.³

Safeguarding of single-end tenoning machines

Newer machines are provided with a high standard of guarding with access to the tools prevented by either:

- a combination of fixed and interlocked guards, which together with the workpiece and associated adjustable guards totally enclose or prevent access to the tools;
- guards that only partially enclose the tools but access is prevented by having additional design features (reach distances/gaps) that comply with BS EN ISO 13857;⁴
- power-operated or self-closing guards which make the tools inaccessible at all times except during the working and return stroke of the sliding table. With this option, deterring/impeding devices are also attached to the sliding table.

There are still a large number of older hand-fed, single-end tenoning machines in use and the standard of guarding on many of these machines is often not

very high. This is because of the way the machine operates and the type of work done, both of which make conventional guarding difficult. It is however 'reasonably practicable' to make modifications and improvements to their guarding which will reduce the risk of injury to operators and others.

Improve the guarding of the tools

The tenoning and scribing head(s) should be enclosed to the greatest extent practicable using a combination of fixed and adjustable guards. This will keep the openings, which the workpiece has to pass through, as small as possible. These can often be made 'in-house', see Figure 1.

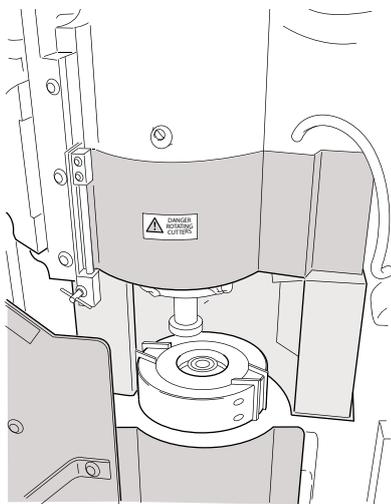


Figure 1 Additional adjustable guard, made by the dutyholder, fitted to the scribing head of an older machine (guard shown in raised position). Any guards must be constructed from suitable materials and not increase the risk of injury.

The LEV hoods should form part of the fixed guarding arrangements so they can be positioned as close as possible to the cutting operation and be more effective in capturing the wood dust and chips, see 'Control of chips and dust'. Where possible, saws should have spring-loaded or gravity fall guards which enclose the saw blade, opening only when the workpiece is being cut or withdrawn, see Figure 2.

It is also 'reasonably practicable' on most machines to fit vertical plates to the machining side of the sliding table (table guards). These are positioned in front of and behind the workpiece and prevent the operator's hands or arms from coming into contact with the cutters as the workpiece is taken through the machine, see Figure 3.



Figure 2 Additional gravity fall guard, made by the dutyholder, fitted to the cut-off saw of an older machine

Restrict third party access

Unless access to the sides and rear of the machine is prevented by walls, other fixed structures or machines, erect an enclosure or suitable barrier to restrict third party access. You should however take care not to create any trapping points between new barriers or enclosures and the moving table or workpiece. This is particularly important on machines with powered tables.

Braking

Un-braked single-end tenoning machines can have a run-down time of between two and five minutes. To reduce the risk of contact with the cutters and saw during run-down, single-end tenoning machines should have been fitted with a braking device after 5 December 2003.^{3,5} The braked run-down time should be less than ten seconds, but where the run-up time exceeds ten seconds it should be less than the run-up time but not exceed 30 seconds.

Tooling

Always use limited cutter projection tooling on hand-fed machines such as single-end tenoning machines. This has been a legal requirement since 5 December 2003.³ This type of tooling reduces the severity of injury should the operator's hand contact the tool. It also has other advantages such as reducing the tooling cutter change time and the smaller chips produced are less likely to cause blockages in the LEV. Limited cutter projection tooling should be designed to BS EN 847-1³ and more detailed guidance can be found in Woodworking Information Sheet WIS37.⁶

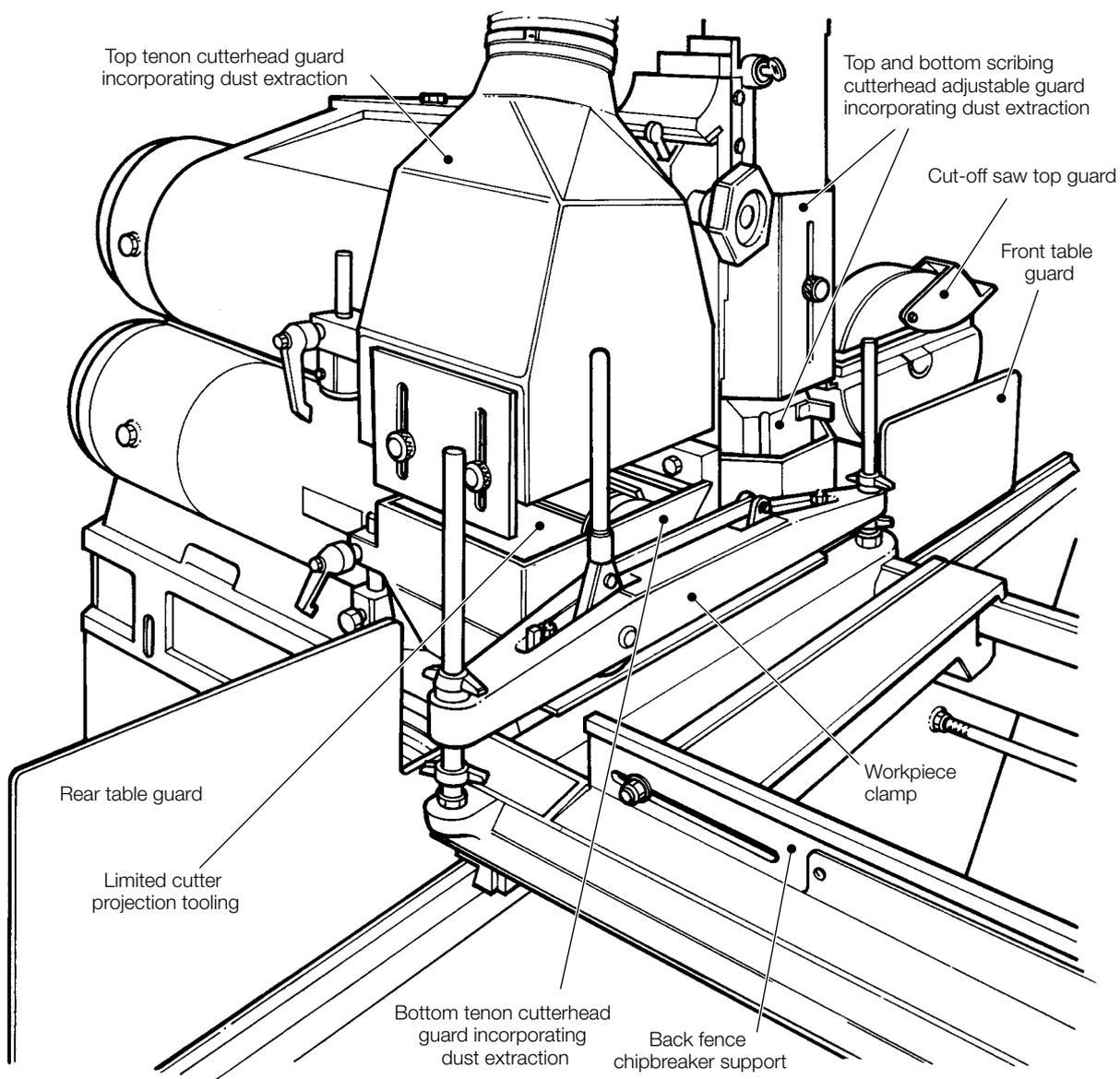


Figure 3 Older machine with additional safeguards fitted

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Clamping the workpiece

All machines should be provided with workpiece clamping as it is important that the workpiece is held securely whilst being machined to prevent it from being ejected. On most machines, this is achieved by vertical or horizontal (side) clamps. Newer machines may have powered clamping but on older machines there are often hand-operated clamps. Where more than one workpiece is to be machined at a time, additional clamps should be provided and used or other clamping arrangements made to ensure that all workpieces are held securely during the machining process.

With powered clamping, there is a risk of a crushing hazard between the clamping device and the workpiece. This can be prevented by any of the following options:

- using two-stage clamping, with a clamping pressure not exceeding 50×10^3 Pa for one second, followed by full clamping pressure;
- reducing the gap between the clamp and the workpiece to 6 mm or less by a manually adjustable device and stroke limitation to a maximum of 10 mm or less;
- limit the clamp closing speed to 10 mm/second or less;
- guarding the clamp by a guard fixed to the clamping device that reduces the gap between the workpiece and the guard to 6 mm or less. The maximum extension of the clamp outside the guard should not be more than 6 mm.

Any powered clamping should have a facility for releasing the clamp(s).

Use of fences, guides and workpiece supports

There should be a fence on the sliding table against which the workpiece is located during machining. It is important that the fence is properly secured and well maintained. Where there is a possibility of contact between the fence and the tools, then that part of the fence should be made out of light alloy, plastic, wood or wood-based material.

For integrated-fed machines there should be a chip breaker (anti-splinter device) provided. For hand-fed machines there should be a means for attaching the chip breaker, eg holes in the fence. Where there is any possibility of contact with the tools, the chip breaker should be made out of solid wood, chipboard, fibreboard, plywood or plastic.

The area around the machine

Control of chips and dust

The area around the machine should be kept free of loose chippings and off-cuts. The best way to control wood dust is to have fixed LEV that will effectively control the dust at source as it is produced. When cleaning up, use vacuum equipment that meets at least the dust class M (medium hazard) classification. Do not use compressed airlines or hand brushing, particularly on clothing, as these will just create dust clouds and redistribute the dust. For more information on the health and safety risks from wood dust and how they can be controlled see Woodworking Information Sheet WIS23.⁷

Work pieces

To avoid falling objects and tripping hazards, all work pieces should be carefully stacked and placed in convenient locations. This should allow safe and easy feeding to and delivery from the machine.

Lighting

Good general lighting around the machine will also reduce tripping hazards as well as assist the operator during the machining process. If necessary, provide additional local lighting to illuminate the cutting areas.

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 Books 2014
www.hse.gov.uk/pubns/books/l114.htm
- 2 BS EN 1218-1:1999+A1:2009 *Safety of woodworking machines. Tenoning machines. Single end tenoning machines with sliding table* British Standards Institution
- 3 BS EN 847-1:2013 *Tools for woodworking. Safety requirements. Milling tools, circular saw blades* British Standards Institution
- 4 BS EN ISO 13857:2008 *Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs* British Standards Institution
- 5 *Retrofitting woodworking machine brakes* Woodworking Information Sheet WIS38(rev1) HSE 2013 www.hse.gov.uk/woodworking/wis.htm
- 6 *Tooling for use with hand-fed woodworking machines* Woodworking Information Sheet WIS37(rev1) HSE 2013
www.hse.gov.uk/woodworking/wis.htm
- 7 *Wood dust: Controlling the risks* Woodworking Information Sheet WIS23(rev1) HSE 2012
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

More examples of fitting additional guarding on single-end tenoning machines can be found on HSE's woodworking website:
www.hse.gov.uk/woodworking/singletenon.htm

Further information for suppliers, installers and users of new and second-hand machinery can be found on HSE's work equipment and machinery webpages:
www.hse.gov.uk/work-equipmentmachinery/index.htm.

Further information

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: 0845 086 9001
email: cservices@bsigroup.com.

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www.hse.gov.uk/woodworking/wis.htm

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