



# Safe use of single-end tenoning machines

## Woodworking Sheet No 39

### Introduction

This information sheet is one of a series produced by HSE's Woodworking National Interest Group in consultation with the woodworking industry. It provides practical guidance to help employers satisfy the requirements of the Provision and Use of Work Equipment Regulations 1998 (PUWER 98).<sup>1</sup>

There are currently a large number of the traditional hand-fed, single-end tenoning machines still in operation and the standard of guarding at most of these older machines is 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. A typical machine is shown in Figure 1.

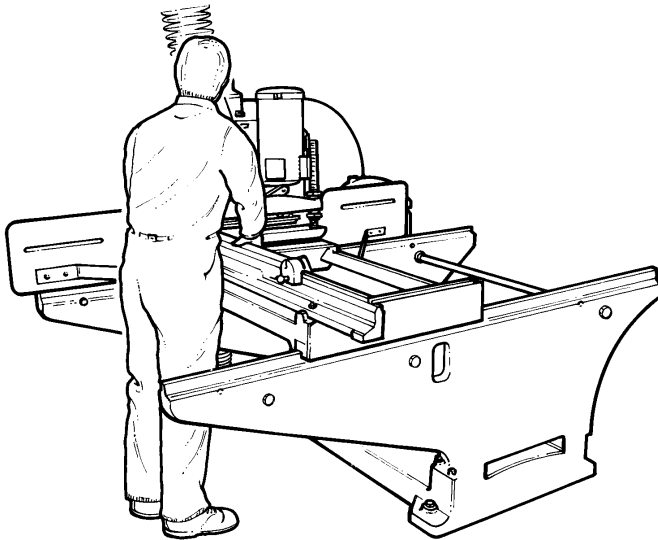


Figure 1 Diagram of older-type machine

However, the Supply of Machinery (Safety) Regulations 1992<sup>2</sup> have resulted in major improvements to the design and guarding of new machines. These Regulations, together with the development of associated European (CEN) Standards including a specific standard for single-end tenoning machines<sup>3</sup> should result in a progressive and marked improvement to the future accident record. While it is not reasonably practicable to upgrade the older type of machines to the new standards, it is possible to make modifications and improvements to their guarding and operation which will reduce the risk of injury to operators and others. This information sheet deals just with the older type (non CE-marked) machines and identifies the areas where these improvements can be made.

### Accident history

An analysis of accidents investigated by HSE inspectors found that 89% were caused by contact with the revolving cutters or saws. Most resulted in the amputation of fingers or serious lacerations. This is not unexpected, but some of the circumstances which caused the accidents are surprising.

For example, 20% arose from the operator or others trying to establish whether the local exhaust ventilation system was running or working properly while the cutters were rotating (often during rundown).

Well over half of the accidents occurred during activities such as setting, adjustment, cleaning or clearing blockages while the cutters were in motion. This was due either to the machine not being switched off, or the operator, having switched off, not waiting for the cutters to come to rest. In most of the 'rundown' accidents, braking of the tool spindle(s) was available. The operator either failed to apply the brakes or braked only one spindle, leaving the others still revolving. **In all of these cases, therefore, the cutters were unnecessarily in motion when the accident occurred.**

### What can be done to stop these accidents?

Accidents can be prevented by a combination of 'hardware' measures and safe working practices. When combined they will greatly improve the safety of these machines.

### Hardware measures

#### Fit braking

On unbraked machines where the rundown times can be 2-5 minutes, it is foreseeable that people will not wait until the cutters have stopped revolving before carrying out adjustments.

Therefore, users should carry out a risk assessment to determine whether braking devices need to be fitted to the machine or any existing brakes are adequate. This requirement arises out of regulation 15 of PUWER 98 and is covered in detail in the PUWER 98 woodworking ACOP.<sup>4</sup> Braking should be fitted no later than 5 December 2003. Practical advice and guidance on the application of appropriate risk assessment criteria and the selection of suitable braking devices is given in Woodworking Sheet WIS38.<sup>5</sup>

### **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. The local exhaust ventilation hoods should form part of the fixed guarding arrangements so they can be positioned as close as possible to the cutting operation, so optimising performance. Adjustable guards should be used to keep the openings through which the workpiece has to pass as small as possible (see Figure 2).

Saws should be similarly enclosed. Where possible, spring-loaded or gravity fall guards which enclose the saw blade, opening only when the workpiece is being cut or withdrawn, should be fitted (see Figure 2).

Additionally, on most machines it is practicable to fit vertical plates to the machining side of the sliding table, situated in front of and behind the workpiece. These plates prevent the operator's hands or arms from coming into contact with the cutters as the workpiece is taken through the machine (see Figure 2).

### **Restrict third party access by enclosing the machine**

Unless access to the sides and rear of the machine is prevented by walls, other fixed structures or machines, an enclosure or suitable barrier should be erected to deter entry. Care should be taken to ensure that trapping risks are not created between such barriers or enclosures and the moving table or workpiece. This is particularly important on machines with powered tables.

### **Tooling**

Where possible, and in any event by 5 December 2003, only limited cutter projection tooling to BS EN 847-1: 1997 should be used on hand-fed machines.<sup>6</sup> Detailed information on the selection of appropriate tooling is given in Woodworking Sheet WIS37.<sup>7</sup> Particular attention should be paid to the maximum speed, dimensions and weight of the tool and/or tool sets as specified by the tool or machine manufacturers. All tools should be kept sharp and examined periodically for damage and defects. This can also reduce tooling cutter change time

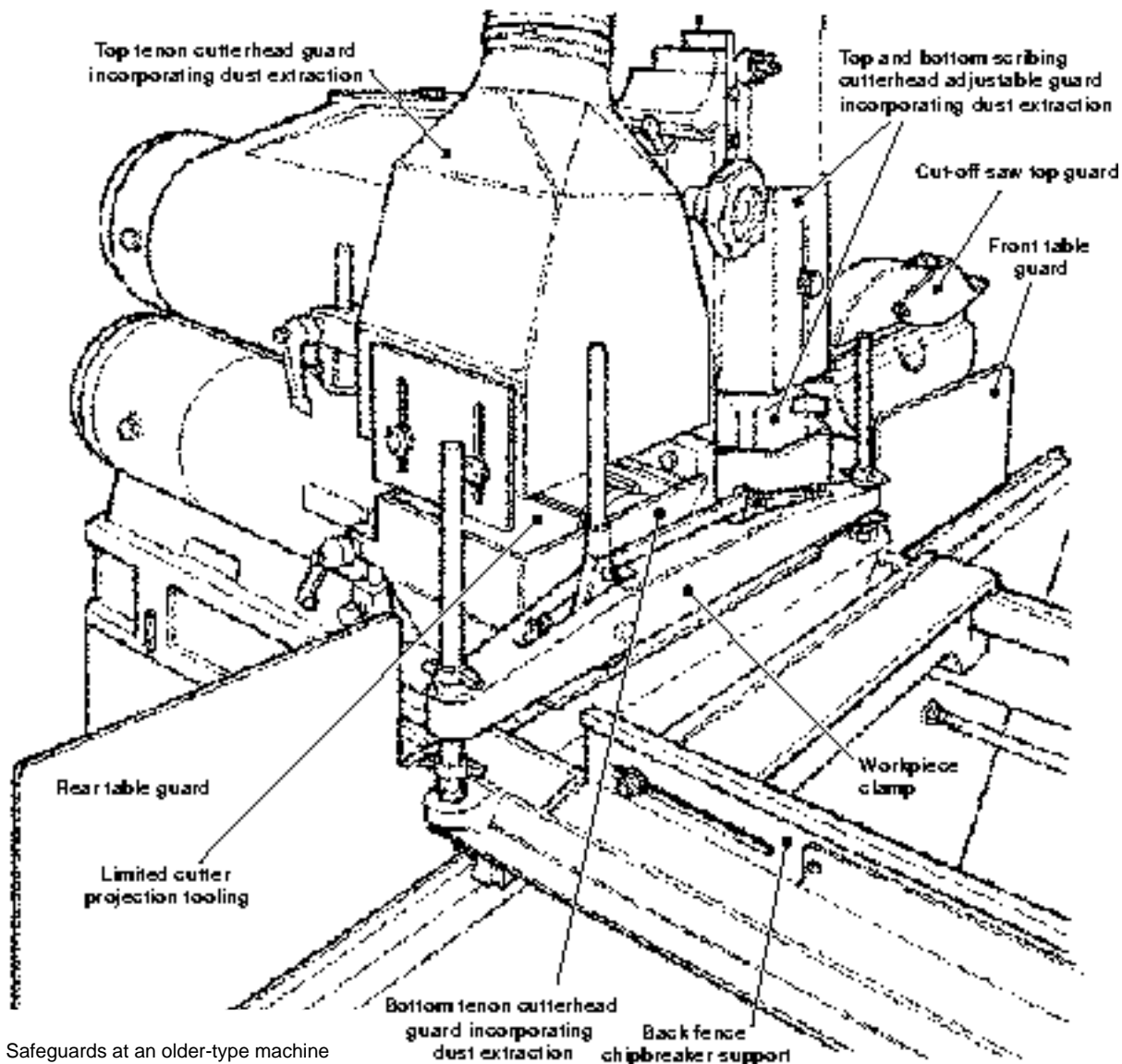


Figure 2 Safeguards at an older-type machine

and problems with blockages caused by large cross-grain chips from the main heads.

### **Safe working practices**

The key safe working practices are:

#### ***Authorisation, training and supervision***

Inadequate training and supervision was a factor in many of the accidents where the operator put their hands into the cutting area without the machine being switched off and before the tool spindles had stopped.

No one should operate, set, adjust, clean or otherwise work at these machines unless they have been authorised to do so, preferably in writing. The authorisation should state any limitations on the operations that the person may carry out. A person should not be authorised unless they have been adequately trained in the safe operation of the machine at which they will be working. The woodworking ACOP<sup>4</sup> provides detailed information on the training of woodworking machinists. Particular attention should be paid to young people who should not be allowed to use these machines unless they are assessed to have the necessary maturity and competence and are adequately supervised.

#### ***Clamping the workpiece***

It is important that the workpiece is properly clamped. On most machines this is achieved by vertical or horizontal (side) 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.

There is a risk of the operator being trapped between the clamping device and the workpiece. This risk can be reduced by:

- using two-stage clamping;
- reducing the gap between the clamp and the workpiece to less than 6 mm;
- guarding the clamping area.

#### ***Use of fences, guides and workpiece supports***

The fence, break-out strip and/or guide fitted to the sliding table should be properly secured and well maintained. Where there is a possibility of contact with the tool, the fence, break-out strip and /or guide should be made of material that will not damage the tool or otherwise cause additional danger.

Where necessary, workpiece supports should be provided and used and care taken to maintain a common batch size.

### **Other issues**

#### ***Control of chips and dust***

The area around the machine should be kept free of loose chippings etc and exhaust ventilation should be provided for the safe removal of offcuts and wood dust. Because of the nature of the chippings that are produced by the tenoning heads, the ducts of the exhaust ventilation system are prone to blocking, especially where there are sharp bends. Where possible, the dust extraction system should include a flexible hose to facilitate cleaning the machine.

#### ***Lighting***

Good general lighting is required around the machine. If necessary, additional local lighting to illuminate the cutting areas should also be provided.

#### ***Housekeeping***

Workpieces should be stacked and placed in convenient locations to enable safe and easy feeding to and delivery from the machine.

#### ***Machine drives***

All transmission machinery, eg belts, pulleys, chains, sprockets, gears and revolving shafts etc should be enclosed by fixed guards. Where frequent access is required, any door etc giving access to these parts should be interlocked.

#### ***Maintenance***

The machine should be checked regularly to ensure that the safety-related features are functioning correctly. At the very least, checks should be made at the start of each working day or shift to ensure that:

- adjustable guards are freely adjustable over the full range of work for which they are designed;
- workpiece clamping systems and the sliding worktable move and run smoothly;
- all machine controls, including the emergency stop control, are in working order.

## References and further reading

- 1 *Safe use of work equipment. Provision and Use of Work Equipment Regulations 1998. Approved Code of Practice and Guidance* L22 HSE Books 1998 ISBN 0 7176 1626 6
- 2 *The Supply of Machinery (Safety) Regulations 1992* SI 1992/3073 The Stationery Office ISBN 0 11 025719 7
- 3 BS EN 1218-1: 1999 *Safety of woodworking machines - Tenoning machines. Part 1: Single end tenoning machines with sliding table*
- 4 *Safe use of woodworking machinery. Provision and Use of Work Equipment Regulations 1998 as applied to woodworking machinery* L114 HSE Books 1998 ISBN 0 7176 1630 4
- 5 *PUWER 98: Retrofitting of braking to woodworking machines* Woodworking Sheet WIS38 HSE Books 1998
- 6 BS EN 847-1: 1997 *Tools for woodworking - Safety requirements. Part 1: Milling tools and circular saw blades*
- 7 *PUWER 98: Selection of tooling for use with hand-fed woodworking machines* Woodworking Sheet WIS37 HSE Books 1998
- 8 *Health and safety priorities for the woodworking industry* Woodworking Sheet WIS34 HSE Books 1997

While every effort has been made to ensure the accuracy of the references listed in this publication, their future availability cannot be guaranteed.

## 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.

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British Standards are available from BSI Customer Services, 389 Chiswick High Road, London W4 4AL. Tel: 0181 996 7000 Fax: 0181 996 7001.

The Stationery Office (formerly HMSO) publications are available from The Publications Centre, PO Box 276, London SW8 5DT. Tel: 0870 600 5522. They are also available from bookshops.

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