
British Standard Code of practice for
Safeguarding woodworking machines
Part 1. General recommendations

Code de bonne pratique pour la sécurité des machines à travailler le bois
Partie 1. Caractéristiques générales

Leitfaden für Schutzeinrichtungen an Holzbearbeitungsmaschinen
Teil 1. Allgemeine Anforderungen

Foreword

This Part of BS 6854 has been prepared under the direction of the Machine, Engineers and Hand Tool Standards Committee.

It is Part 1 of a series of Parts and contains general recommendations concerning the safeguarding of wood-working machines. It should be used in conjunction with the other Parts of BS 6854, as appropriate, for particular types of woodworking machines. The initial Parts will be as follows:

- Part 1 General recommendations;
- Part 2 Circular sawing machines;
- Part 3 Vertical spindle moulding machines;
- Part 4 Planing machines;
- Part 5 Narrow band sawing machines.

The background to this code of practice is the high accident incidence rate encountered by woodworking employees and that an estimated 14 % of all machinery accidents occur on woodworking machines. Although the safeguarding of woodworking machines in this code is mainly directed at stationary machines, the same general principles apply to portable and transportable machines. Account has been taken of the fact that woodworking machines may be used for working on bone, plastics, and materials other than wood or wood products. The guidance provided is also relevant to all woodworking machines designed for domestic use but used for industrial purposes.

This code should be of use to designers, manufacturers, suppliers, importers and users alike since in its development account has been taken of practical aspects of safeguarding woodworking machines together with the legal requirements contained in the Health and Safety at Work etc., Act 1974, the Factories Act 1961, and the Woodworking Machines Regulations 1974. The principles of safeguarding given in BS 5304 have also been incorporated.

The term 'reasonably practicable', used in the Health and Safety at Work etc. Act 1974, and adopted by this code, implies starting from the current state of the art and takes into account the cost of what is done in relation to the improvement secured. A manufacturer or supplier who sells goods produced to a British Standard specification and who makes clear the conditions of use for which they are intended will thereby, to the extent that the standard is adequate and appropriate for the particular workplace, be able to indicate compliance with his general duty under Section 6 of the Health and Safety at Work etc. Act 1974. To a similar extent employers, those in charge of premises and employees will be assisted by the provisions of this code of practice.

The code stresses the importance of built-in safety at the design stage, thus encouraging the concept that safeguarding should be viewed as a prime feature of a woodworking machine and not something which is an afterthought. Guidance is given to manufacturers and suppliers on identifying, eliminating or reducing both mechanical and non-mechanical hazards (e.g. noise, dust) which have a bearing on health and safety of persons when the machines are used.

This code will also be of help to purchasers and users when selecting machines, and provides practical guidance on safe working practices including the use of safeguards and safety appliances (e.g. push sticks). Successful implementation of the guidance given in this code of practice requires discussion between supplier and user, and the provision of adequate information.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Contents

	Page		Page
Foreword	Inside front cover	8 Interlocking distance guard	13
Committees responsible	Back cover	9 Hand fed surface planing machine with an adjustable bridge guard	14
Code		10 Self-adjusting guarding arrangement for snipper cross-cutting sawing machine	15
1 Scope	2	11 Beam panel sawing machine fitted with a trip bar	17
2 Definitions	2	12 Jig for work at a vertical spindle moulding machine	18
3 Statutory requirements	2	13 Push stick in use on a circular sawing machine	19
4 Application of the code	2	14 Push block for use on a surface planing machine for feeding short workpieces between the edge of the bridge guard and the fence	19
5 Design recommendations for safeguards	3	15 A steel spike for use on a vertical spindle moulding machine	20
6 Safe working practices	24	16 Vertical spindle moulding machine with false fence fitted with back-stops and front-stops	21
7 Training and supervision	24	17 A ring fence and bonnet guard fitted to a vertical spindle moulding machine	22
8 Noise	24	18 Pressure pads (Shaw guard) on a planing machine used for rebating	23
9 Extraction equipment	28	19 Method of achieving vibration damping of circular saw blades	25
10 Power systems	28	20 General view of noise enclosure for a band resawing machine	27
11 Maintenance of safeguards	28		
12 Provision of information	29		
Figures		Appendix	
1 A chip deflector hood for the circular cutter block of a thicknessing machine	4	A Recommendations and statutory requirements affecting the safety, welfare and health of persons operating woodworking machines	30
2 A power feed unit fitted to a vertical spindle moulding machine	5		
3 Anti-kickback fingers on a thicknessing machine	7		
4 Start and stop controls	8		
5 Circular saw bench showing a fixed enclosure guard under the bench covering the saw blade	10		
6 Fixed distance guard surrounding sanding machines and work handling equipment	11		
7 Multi-spindle planing and moulding machine fitted with a combined interlocking guard and a close-fitting noise enclosure	12		

Code of practice

1 Scope

This Part of BS 6854 gives general recommendations concerning the safeguarding of the cutters, other dangerous parts and hazards of woodworking machines.

NOTE. The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this Part of BS 6854 the following definitions apply.

2.1 woodworking machine. A machine, whether stationary or portable, designed, manufactured, supplied or used for the processing of wood, cork, fibre board and materials composed partly of any of these materials.

2.2 cutter. A tool on woodworking machines, including circular sawblades of all types, band sawblades, chain cutters, knives, boring tools, detachable cutters, solid cutters and other devices for forming or shaping.

2.3 risk. A combination of the probability of injury and the degree of the injury.

2.4 hazard. A situation which may give rise to personal injury.

2.5 danger. A state or condition in which personal injury is reasonably foreseeable.

2.6 safeguard. A guard or device designed to protect persons from danger.

2.7 guard. A physical barrier that prevents or reduces access to a danger point or area.

2.8 safety device. A device other than a guard that eliminates or reduces danger.

2.9 safe working practice. A safe system of work, i.e. a method of working that eliminates or reduces the risk of injury.

2.10 lock. A safety device that interconnects a guard with the control system or the power system of the machine.

2.11 limited movement device. A control system the operation of which permits only a limited amount of travel of part of the machine on each occasion that the machine control is operated.

2.12 two-hand control device. A device which requires both hands to operate the machine control, thus affording a measure of protection from danger to the machine operator only.

2.13 failure to danger. Any failure of the machinery, its associated safeguards, control circuits or its power supply, which leaves the machinery in an unsafe condition.

3 Statutory requirements

The Woodworking Machines Regulations 1974 detail the guarding required for the cutters of specified woodworking machines and some associated health risks from machinery used at factory and certain other premises such as docks and building sites.

The guarding of dangerous moving parts other than cutters in factory premises is subject to the requirements of the Factories Act 1961. Where woodworking machines are used in other specialized industries, agriculture for example, other specific regulations may apply such as the Agricultural (Circular Saw) Regulations 1962. Woodworking machines are also used in a variety of other industries not subject to the Factories Act or other specific legislation, as in places of education in which case the general provisions of the Health and Safety at Work etc. Act 1974 will apply.

Regulation 15 of the Woodworking Machines Regulations 1974 lays certain duties on persons who sell woodworking machines for use in a factory to provide guards, devices and notices while Section 6 of the Health and Safety at Work etc. Act 1974 lays duties on all those who design, manufacture or supply articles for use at work.

It should be noted that the intention of this code is to promote high standards of woodworking machinery safeguarding. However the code does not attempt to replace or cut across statutory requirements.

4 Application of the code

The ultimate aim of this code of practice is to safeguard the health and maintain the safety of workers in the wood using industries.

To achieve this end requires continuous and sustained effort and cooperation between all parties involved, i.e. designers, manufacturers and suppliers on the one hand, and on the other, the end user together with his workers dealing with all aspects such as procurement of machines, supervision and training, plant maintenance, production and methods, through to the machine operators and all others employed on the shop floor.

Cooperation can best be achieved by a continual exchange of information between all parties concerned. Good systems stem from corrective action being taken on receipt of effective feed-back of relevant information.

5 Design recommendations for safeguards

5.1 Basic recommendations

In the design and construction of woodworking machines, consideration should be given to the basic principles for reducing risk of injury. These principles are, in order of application:

- (a) identification or knowledge of the hazard(s);
- (b) elimination or avoidance of hazard (including measures to reduce the scale of possible injury);
- (c) use of physical safeguards;
- (d) the provision of safety devices.

Cutters of woodworking machines are designed to cut, mould, saw, bore or otherwise work or finish. They may present hazards of entanglement, friction and abrasion, cutting, shearing, stabbing, puncturing, impact, crushing or drawing in as described in BS 5304. Other hazards present may include noise and dust (see clauses 7 and 8).

When designing or manufacturing a woodworking machine knowledge of possible hazards will aid the designer or manufacturer in applying these basic principles. Consideration should be given to eliminating hazards by design but where this cannot be fully achieved it may still be possible to reduce the scale of the hazard, e.g. by reducing forces or using automatic feed devices.

Where a hazard cannot be eliminated or avoided by design or modification other ways of reducing the risk of injury should be sought. The guarding of dangerous moving machinery as a means of minimizing the scale of the injury is a first priority and should take precedence over safe systems or practices.

Every mechanism and control forming part of the safeguard should be designed to minimize a risk of failure to danger. Safeguards should not in themselves create hazards.

Safety devices should always be used where practicable (see 5.4).

5.2 Elimination or avoidance of mechanical hazard (including measures to reduce the scale of possible injury)

5.2.1 Toolholding and cutter design. All cutters, cutterblocks, spindles and their associated parts should be manufactured from material that enables them to be fit for the purpose for which they have been designed. They should comply with the requirements of relevant British Standards, for example BS 411 for circular saws for woodworking and their attachment, and BS 4411 for wood cutting bandsaw blades.

The design of the cutters and their mountings may have a direct effect on safety, for example where detachable cutters are used the securing device should be designed in such a way as to minimize the risk of the cutters working loose and flying out. Cutters with closed slots are less likely to fly out than those with open slots. It should be possible to adjust and tighten the securing nuts or bolts correctly without difficulty.

Where cutterblocks are removable they should be marked with the recommended maximum speed to ensure compatibility with the machine for which they are to be used. Rotating cutterblocks and their knives should be correctly balanced in order to minimize vibration at high speed.

5.2.2 Safety by position or location. Where reasonably practicable the cutters of woodworking machines should be rendered safe by position, that is the machines should be so designed and constructed that in normal circumstances it should not be possible to make physical contact with the cutter. *However, access to the cutter and other dangerous parts may not always be prevented by their location within the machine.* For example, the circular cutterblock on a thicknessing machine might be considered to be safe by location because of its position relative to a chip deflector hood or machine casing, but it should be remembered that this would be the case only if the table is adjusted for thicknessing comparatively thin workpieces and, therefore, the cutterblock is out of reach (see figure 1).

5.2.3 Access for adjustment, lubrication and maintenance. Woodworking machines should be designed as far as is reasonably practicable to enable all routine adjustments, lubrication and maintenance to be carried out without removing the safeguard or without extensive dismantling of machinery components. Ideally lubrication and routine maintenance facilities should be incorporated outside the danger area wherever practicable.

5.2.4 Automation and mechanization. Automation, particularly the use of feed systems, should be introduced where reasonably practicable to improve safety. However, the introduction of automation may not totally eliminate hazards and care should be taken that additional hazards, such as trapping and shearing points, are safeguarded.

Conveyors, transfer mechanisms, etc. should also be safeguarded where these are used to link machines and where additional hazards may be present. This safeguarding may take the form of fixed guards, with interlocking access gates as required, electro-sensitive safety systems (see BS 6491) or, where these are not practicable, other forms of guarding, for example pressure sensitive mats, may be used.

Microprocessor control may be used but might introduce other hazards, (see 5.2.9).

5.2.5 Power feed. Power feed systems should be incorporated where reasonably practicable and their use, for example on sawing machines, vertical spindle moulding machines, planing and thicknessing machines and routing and moulding machines, will eliminate many of the hazards arising from hand feeding (see figure 2).

All work feeding devices, such as feed rolls, feed chains and other moving parts that can create a hazard should be safeguarded.

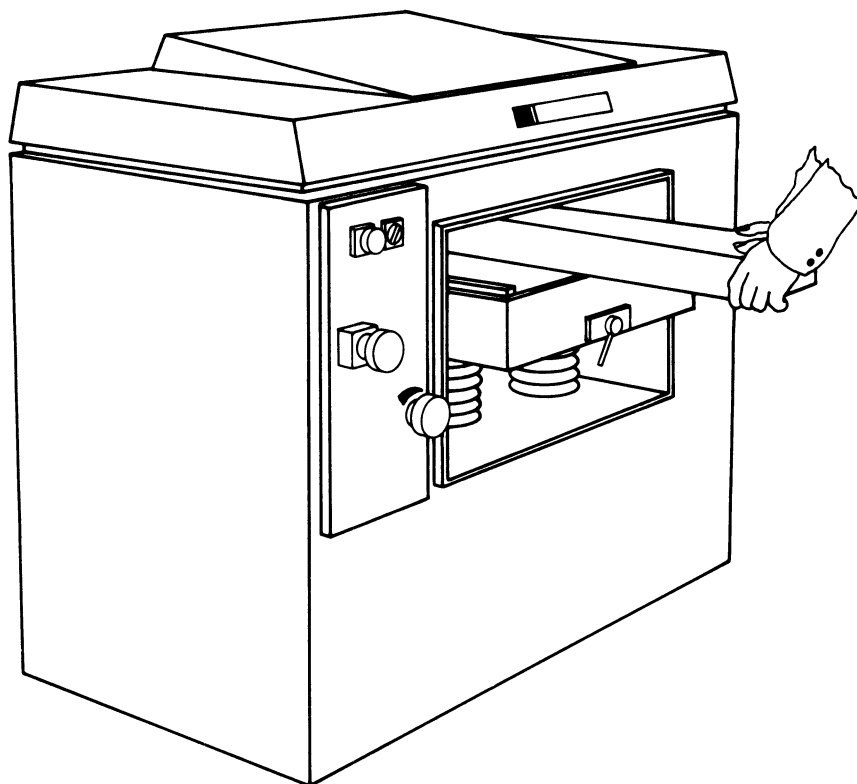


Figure 1. A chip deflector hood for the circular cutter block of a thickening machine

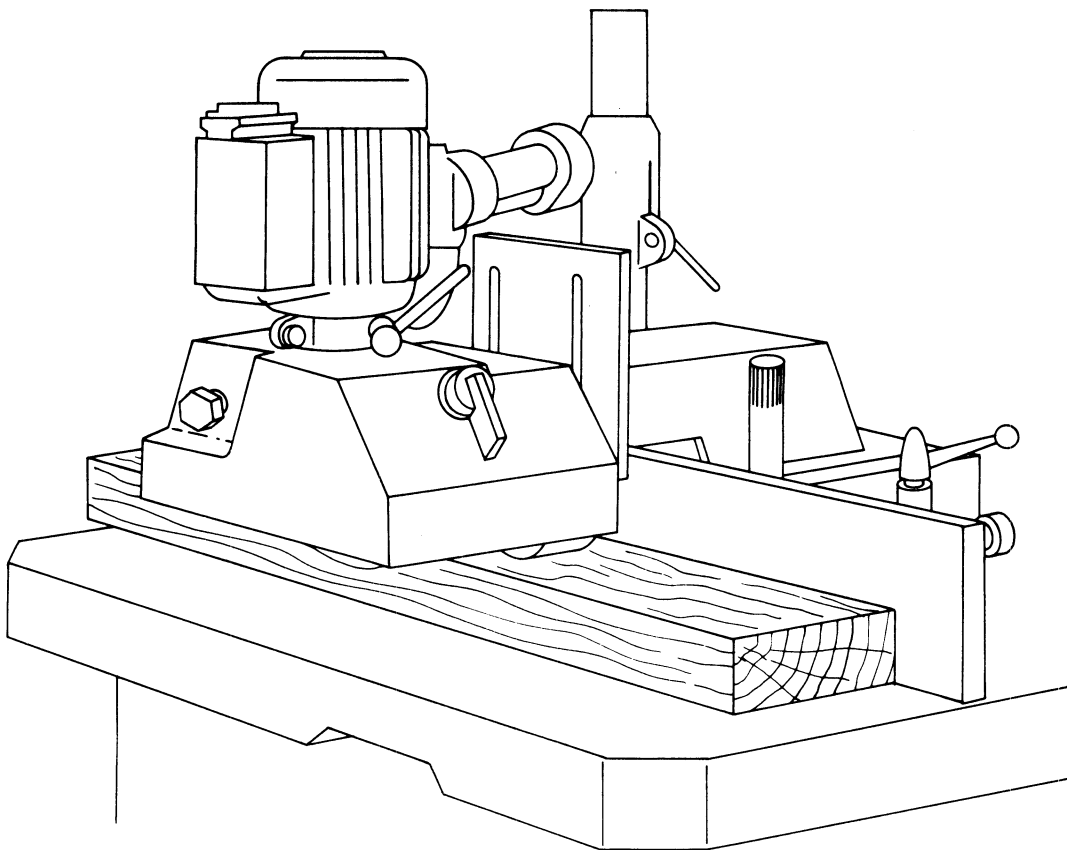


Figure 2. A power feed unit fitted to a vertical spindle moulding machine

5.2.6 Clamping. Where necessary, provision should be made for clamping the workpiece, e.g. mechanical or power clamping. Where the nature of the work is such that power clamping is essential for subsequent machining then the power-operated workholding devices supplied should be designed so that danger is prevented in the event of a failure of the power supply to the system, that is to say the workpiece remains clamped. In automatic systems the control system should be interlocked to prevent the machine from being operated until the power is supplied to the workholding device and the workpiece is clamped. A means should be provided to indicate that the clamp is ON, for example by an indicator visible from the operator's normal working position.

The clamping force should be adequate to hold the timber during machining. Power clamping may introduce a trapping hazard. For this reason two stage power clamping is preferred in which during the initial movement of the clamp the force is reduced so that the risk of injury from trapping is minimized. An alternative is to reduce the clamp/workpiece gap to 6 mm so that finger access into the gap is not possible. Alternatively the clamps should be guarded so that it is not possible to trap a hand or a finger. The design of the control system should be such that the power-operating system for the workholding device cannot be operated to unclamp the workpiece whilst the machine is in operation.

5.2.7 Anti-kickback devices. Anti-kickback devices should be provided where there is a risk of material being ejected. These may be in the form of fingers in the shape of stepped pawls, as on a thicknessing machine (see figure 3), or toothed discs with a non-return action, which should extend the full working width of the machine.

Anti-kickback devices should be designed and constructed to prevent the ejection of material. The fingers or discs should always be free to operate. The clearances between the fingers should not be such that narrow slivers of wood can pass through, otherwise a second row of fingers/discs situated behind the first row may be necessary. The anti-kickback device should be designed to give protection throughout the range of thickness which can be cut. It may be necessary to fix a guard behind the anti-kickback device to prevent thin pieces of wood being deflected through any gap between the top of the device and its supporting casting. The anti-kickback device should be sufficiently strong to withstand the force of material hitting it.

NOTE. The provision of anti-kickback devices is mandatory for certain woodworking machines subject to the Woodworking Machines Regulations 1974.

5.2.8 Work guides. Work guides should be provided to assist in locating workpieces correctly. These may be in the form of fences, for example on table band sawing machines, circular sawing machines and vertical spindle moulding machines.

5.2.9 Controls

5.2.9.1 General. It is a requirement of the Woodworking Machines Regulations 1974 that every woodworking machine has to be provided with an efficient device for starting and stopping the machine and the device should be

in such a position and of such design and construction as to be readily and conveniently operated.

All controls should be designed for ease of use and safe operation.

Where the power sources are external to the machine, for example from a tractor via a power take-off shaft or belt, consideration should be given to providing the operator of the machine with a means of quickly disconnecting the power transmitted from the prime mover.

5.2.9.2 Emergency stop. Where an emergency stopping device is provided this should stop the machine as quickly as possible. An emergency stop is not an alternative to guarding.

An emergency stopping device should not influence the functioning of any equipment which could endanger the operator or the machine, for example by releasing workholding devices and braking systems. In some circumstances, for example where there is a trapping risk, it may be necessary for the operation of the emergency stop to reposition the elements of a machine to reduce the danger.

Handles, bars, push buttons, etc. used for actuating the emergency stop should be:

- (a) coloured red and suitably marked;
- (b) prominently located;
- (c) readily accessible.

Trip wires or similar devices should be located in such a manner as to be clearly visible and so positioned that they can be used conveniently. Any deflection of or breakage of the wire should bring the dangerous parts to rest.

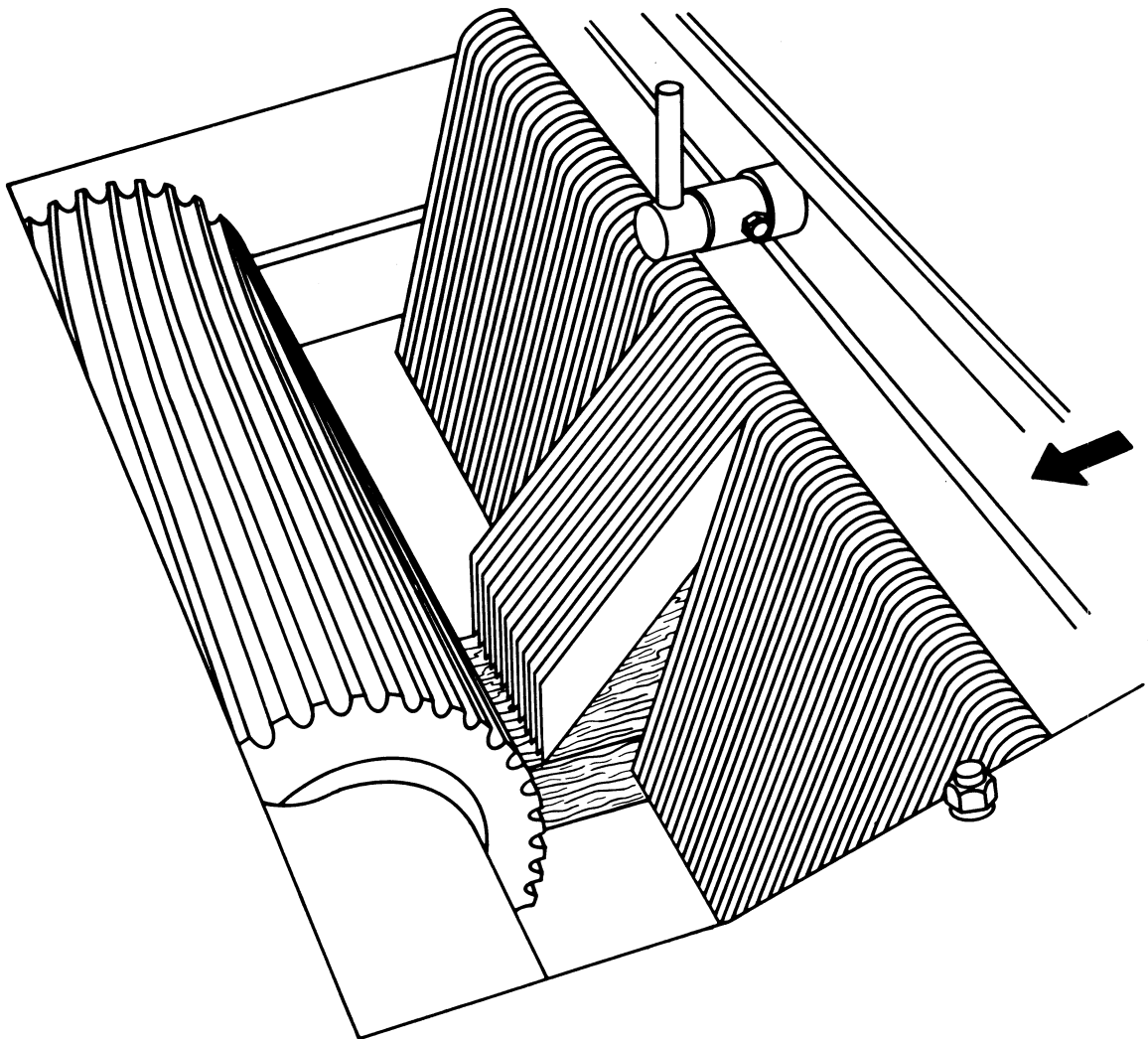
Emergency push buttons should be of the 'mushroom' head type, coloured red on a yellow background (see figure 4). Where there is more than one control station or operating position an emergency stop push button should be positioned at each station. It should not be possible to restart the machine until the buttons have been reset. To achieve this, push buttons actuating emergency stops should be of the lock-in type.

Resetting emergency stop devices should not cause the machine to operate. Restarting should only be by operating the main start control.

5.2.9.3 Digital programmable electronic systems.

Where machines are controlled by a microcomputer based system, those responsible for the system specification, design, manufacture and testing should examine the specification, hardware and software and carry out any remedial action found necessary to ensure that failures or errors, which could expose the operator to the risk of injury, are minimized. This examination should pay particular attention to the effect that mains borne or radiated interference has on the safe operation of the machine. Due to the difficulties in determining, during the examination, whether control systems dependent on software are free from error, hardwired systems will often be preferred.

Emergency stops incorporated in the control system should be hardwired and independent of software controls.



NOTE. The hood guard covering the feed roller has been removed.

Figure 3. Anti-kickback fingers on a thickening machine

5.2.9.4 Position. Controls should be so positioned and spaced as to provide safe and easy operation and there should be ample clearance between each control and adjacent parts of the machine. Near each START control there should be a STOP control.

Two-hand controls should comply with BS 5304 and should be so placed, separated and protected as to prevent them from being operated by any means other than with two hands.

5.2.9.5 Prevention of inadvertent operation. START controls should be shrouded, gated or so positioned that they cannot be operated inadvertently.

Handles, handwheels, levers, etc. should be so positioned that when the operator is using them he cannot inadvertently operate any other control.

Foot-operated controls, other than for EMERGENCY STOP, should be shrouded or positioned to prevent accidental operation by falling or moving objects, or unintentional operation by someone accidentally stepping on them (see figure 4).

5.2.9.6 Identification. Controls should be clearly identifiable and readily distinguishable from each other. Where necessary they should be identified either by using symbols as specified in BS 3641 or wording to indicate their function or the consequence of their use.

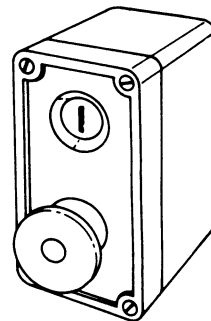
The colour coding of push buttons should comply with BS 2771.

5.2.9.7 Handwheels. Handwheels which are used for manually-operated mechanisms, which can also be power driven, should be of the solid type, without spokes or handwheel pegs and/or provided with handholds of a restricted size.

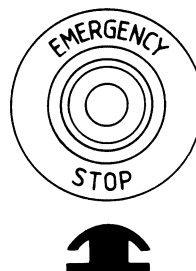
5.2.9.8 Multi-station machines. On multi-station machines where controls are duplicated, for example inside a sound enclosure with another set of controls outside the sound enclosure, they should be so arranged that when either set of controls is operable the other set is automatically isolated, except for the emergency stop. Where this is not practicable safe working practices should be operated. Provision for complete electrical isolation overriding all other controls should be made at the master control station.

5.2.9.9 Machines in combination. In certain circumstances machines may be used in combination, that is single purpose machines linked by transfer equipment to form a production unit. Such units would normally have controls situated at each individual machine and transfer unit. Where a central control station is used to operate a combination of machines, each machine should have an emergency stop button. The controls for starting and stopping the machines and other devices should be in such a position and of such a design and construction as to be readily and conveniently operated by the person operating the machines. So far as is reasonably practicable, all controls should be so positioned relative to the machine that the operator has adequate vision for control of the process.

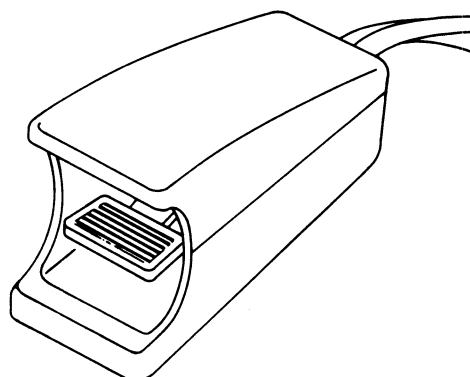
The stopping of one machine or one part of a production unit should not create a hazard.



(a) START and STOP buttons
(marked with symbols according
to BS 3641)



(b) EMERGENCY STOP (should be of
the mushroom head type, coloured red
on a yellow background)



(c) Pedal control, protected against
accidental operation

Figure 4. Start and stop controls

5.2.9.10 Universal/combined woodworkers. Combined machines or universal woodworkers, for example machines combining circular sawing and surface planing machines, may have spindles driven alternately or simultaneously by a single motor, or each spindle may have a separate motor. The controls should be positioned and identified as for other types of woodworking machines.

5.2.10 Braking systems. Braking systems are described in BS 5304. Consideration should be given to the reduction of run-down time as a means of reducing risk of injury.

5.2.11 Guard locking systems. Such systems can be considered when the opening or removing of a guard does not eliminate the hazard before access is possible.

The guard locking system will normally consist of a timing or motion/position sensing device together with a guard locking device. Guard locking devices are described in BS 5304.

5.2.12 Stability. Woodworking machines other than hand-held machines should be designed to be stable, that is, they should not fall over or be capable of being moved unintentionally by vibration, impact or other foreseeable external forces. It is a requirement, as laid down in the Woodworking Machines Regulations 1974, that the design also has to allow secure fixing of the machine to a foundation floor, or to a substantial part of the structure of the premises in which it is to be used.

5.2.13 Ergonomics

5.2.13.1 General. Designers should take account of human limitations at the initial stages of designing or modifying woodworking machines (see BS 5304). These may be considered under the headings to 5.2.13.2, 5.2.13.3 and 5.2.13.4.

5.2.13.2 Environment. Consideration should be given to the environment in which the machines are expected to be operated, i.e. the atmospheric conditions, the anticipated noise levels, the adequacy of natural light and the presence of dust and fume.

5.2.13.3 Man/machine relationship. The necessity for the whole work area to be visible to the operator should be considered. Audible signals, especially those for warning of danger should be distinguishable from background noise. Similarly visual signals should be distinguishable from glare. All controls should be easily distinguishable and their relationship to the operation of the machine should, as far as possible, be as expected.

5.2.13.4 Other factors. Other factors to be considered include the machine layout, the quantity of information the operator needs to deal with at one and the same time and the amount of energy required to do the work.

5.3 Physical safeguards

5.3.1 Guards and their construction. There are several types of guard as described in BS 5304 but those in more general use on woodworking machines are as follows:

(a) *Fixed guard:*

- (1) fixed enclosure guard (see figure 5);
- (2) fixed distance guard (see figure 6).

(b) *Interlocking guard:*

- (1) interlocking enclosure guard (see figure 7);
- (2) interlocking distance guard (see figure 8).

(c) *Adjustable guard* (see figure 9).

(d) *Self-adjusting guard* (see figure 10).

5.3.2 Selection of safeguards

5.3.2.1 General. This subclause is concerned with the selection of appropriate safeguards for woodworking machines. For certain types of machine, e.g. planing machines, *there are specific statutory requirements* concerning the guarding of the machine. Where this is the case the comments in this section should be considered in conjunction with *but do not replace or modify these statutory requirements*.

In selecting an appropriate safeguard for a woodworking machine it should be borne in mind that a fixed guard is simple and should be used where access to the danger area is not required during the operation of the machine or for cleaning, setting or other activities.

As the need for access arises and increases in frequency, the importance of safety procedures for the removal of a fixed guard also increases so that interlocking should be used. The requirements of safety procedures and/or interlocking will become more stringent as the level of risk increases.

Guidance on the selection of the type of safeguard for use during normal operation and for use in circumstances other than during normal operation is given in 5.3.2.2 and 5.3.2.3.

A combination of safeguards may be required. For example, where, in conjunction with a fixed guard, a mechanical feed device is employed to feed a workpiece into a machine, thereby removing the need for access to the primary danger point, a trip device may be required to protect against the secondary danger of trapping between the mechanical feed device and the fixed guard.