

Australian Standard™

Wood processing machinery—Safety

Part 7: Finishing machinery—Tenoning, profiling and edge-banding machines

This Australian Standard was prepared by Committee SF-007, Guarding of Woodworking Machinery. It was approved on behalf of the Council of Standards Australia on 20 January 2005.
This Standard was published on 11 February 2005.

The following are represented on Committee SF-007:

Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Woodworking Industry Suppliers Association
Construction, Forestry, Mining and Energy Union
Department for Administrative and Information Services South Australia
Department of Infrastructure, Energy and Resources, Tas.
Furnishing Teachers Advising Group
Metal Trades Industry Association
Safety Institute of Australia
Tasmanian Timber Promotion Board
Victorian Association of Forest Industries
Victorian WorkCover Authority
WorkSafe Western Australia

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Web Shop at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Global Standard*, has a full listing of revisions and amendments published each month.

Australian Standards™ and other products and services developed by Standards Australia are published and distributed under contract by SAI Global, which operates the Standards Web Shop.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to the Chief Executive, Standards Australia, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 03432.

Australian Standard™

Wood processing machinery—Safety

Part 7: Finishing machinery—Tenoning, profiling and edge-banding machines

Originated as part of CZ10—1960.
Previous edition AS 1473—1991.
Revised and redesignated in part as AS 1473.7—2005.

COPYRIGHT

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia GPO Box 5420, Sydney, NSW 2001, Australia
ISBN 0 7337 6468 1

PREFACE

This Standard was prepared by the Standards Australia Committee SF-007, Guarding of Woodworking Machinery as a revision, in part, of AS 1473—1991, *Guarding and safe use of woodworking machinery*.

This Standard is one of a series of Standards dealing with the safety of woodworking machinery, which have been developed as a result of requests from regulatory authorities for a new edition of the Standard.

In common with many of the Standards dealing with the safeguarding of machinery this Standard is based upon drafts released by the European Committee for Standardization, CEN. In using these drafts the Committee is maintaining consistency with the machinery safeguarding Standards published in Australia.

This Standard specifies the requirements which are unique to tenoning, profiling and edge-banding machines. The requirements applicable to all woodworking machines are to be found in AS 1473.2, *Wood processing machinery—Safety, Part 2: Finishing machinery—Common requirements*.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	5
1.2 OBJECTIVE.....	5
1.3 REFERENCED DOCUMENTS	5
1.4 DEFINITIONS	5
 SECTION 2 SPECIFIC REQUIREMENTS FOR SINGLE END TENONING OR PROFILING MACHINES WITH MANUAL FEED	
2.1 SCOPE OF SECTION	12
2.2 CONTROLS	12
2.3 PROTECTION AGAINST MECHANICAL HAZARDS	14
2.4 PROTECTION AGAINST NON-MECHANICAL HAZARDS.....	18
2.5 WARNING LABEL	19
2.6 AVAILABLE OPERATING SPEEDS NOTICE	19
2.7 INSTRUCTION HANDBOOK.....	19
2.8 SAFE WORKING PRACTICE.....	19
 SECTION 3 SPECIFIC REQUIREMENTS FOR SINGLE ENDED TENONING OR PROFILING MACHINES WITH MECHANICAL FEED	
3.1 SCOPE OF SECTION	20
3.2 CONTROLS	20
3.3 PROTECTION AGAINST MECHANICAL HAZARDS	21
3.4 ISOLATION.....	23
3.5 INSTRUCTION HANDBOOK.....	24
3.6 SAFE WORKING PRACTICES	24
 SECTION 4 SPECIFIC REQUIREMENTS FOR DOUBLE ENDED TENONING OR PROFILING MACHINES WITH MECHANICAL FEED	
4.1 SCOPE OF SECTION	25
4.2 CONTROLS	25
4.3 PROTECTION AGAINST MECHANICAL HAZARDS	26
4.4 WARNING LABEL	30
4.5 AVAILABLE OPERATING SPEED NOTICE	30
4.6 INSTRUCTION HANDBOOK.....	30
4.7 SAFE WORKING PRACTICES	30
 SECTION 5 SPECIFIC REQUIREMENTS FOR MULTIPLE SAW PROFILING STATION MACHINES WITH OR WITHOUT MECHANICAL FEED	
5.1 SCOPE OF SECTION	31
5.2 CONTROLS	31
5.3 PROTECTION AGAINST MECHANICAL HAZARDS	32
5.4 AVAILABLE OPERATING SPEEDS NOTICE	38
5.5 TOP PRESSURE ADJUSTMENT NOTICE	38
5.6 INSTRUCTION HANDBOOK.....	38
5.7 SAFE WORKING PRACTICES	38

SECTION 6 SPECIFIC REQUIREMENTS FOR SINGLE AND DOUBLE ENDED EDGE-BANDING MACHINES WITH OR WITHOUT MECHANICAL FEED

6.1	SCOPE OF SECTION	39
6.2	CONTROLS	39
6.3	PROTECTION AGAINST MECHANICAL HAZARDS	40
6.4	WARNING LABEL	47
6.5	AVAILABLE OPERATING SPINDLE SPEEDS NOTICE	47
6.6	TOP PRESSURE ADJUSTMENT NOTICE	47
6.7	INSTRUCTION HANDBOOK.....	47
6.8	SAFE WORKING PRACTICES	48

APPENDICES

A	CONTENT OF INSTRUCTION HANDBOOK.....	49
B	SAFE WORKING PRACTICES	50

STANDARDS AUSTRALIA

Australian Standard Wood processing machinery—Safety

Part 7: Finishing machinery—Tenoning, profiling and edge-banding machines

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies additional requirements for the design, manufacture, guarding and use of tenoning, profiling (including automatic feed morticing machines), and edge-banding machines. It is to be read in conjunction with AS 1473.2, which contains general requirements.

1.2 OBJECTIVE

The objective of this Standard is to provide designers, manufacturers, suppliers and users of tenoning, profiling and edge-banding machines with the means of minimizing the risks to the health and safety of persons working with or otherwise near tenoning, profiling automatic feed morticing machines and edge-banding machines.

1.3 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1473 Wood processing machinery—Safety

1473.2 Part 2: Finishing machinery—Common requirements

4024 Safeguarding of machinery

4024.1 Part 1: General principles

4024.3 Part 3: Manufacturing and testing requirements for electrosensitive systems—
Optoelectronic devices

AS/NZS

2211 Laser safety

2211.1 Part 1: Equipment classification, requirements and user's guide

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.1 Climb cutting

When the relative direction of the tool to the workpiece is as illustrated in Figure 1.1(b).

1.4.2 Cuts for jointing structural timbers

The machined projections including tenons on the end of a workpiece to facilitate the joining of workpieces. Examples of such cuts see Figure 1.2.

1.4.3 Cutting against the feed

When the relative direction of the tool to the workpiece is as illustrated in Figure 1.1(a).

1.4.4 Dynamic unit

A processing unit which moves with the workpiece during processing and returns to its starting position ready for the following (succeeding) workpiece.

1.4.5 Ejection

The unexpected movement of the workpiece or parts of it or part of the machine from the machine during processing.

1.4.6 Hand feed (manual feed)

The manual holding and/or manual guiding of the workpiece or of a machine element incorporating a tool. Hand feed includes the use of a hand operated carriage on which the workpiece is placed manually or clamped and the use of a demountable power feed unit.

1.4.7 Integrated feed

A feed mechanism for the workpiece or tool which is integrated with the machine and where the workpiece or machine element with incorporated tool are held and controlled mechanically during the machining operation.

1.4.8 Machine actuator

A power mechanism used to effect motion of the machine.

1.4.9 Machine end

Each end consists of a frame, chain beam, top pressure beam and working units, processing one end of the workpiece; one or both machine ends move to accept different workpiece dimensions. (See Figure 1.3.)

1.4.10 Mortice

The machined slot in a workpiece to facilitate the joining of workpieces.

1.4.11 Profile

The shaping of an edge of a workpiece by milling tools, morticing and drilling tools, saws and/or sanding units. Profiling also includes panel sizing.

1.4.12 Run-down time

The time elapsed from the actuation of the stop control device to spindle stand still.

1.4.13 Run-up time

The time elapsed from the actuation of the start control device until the spindle reaches the intended speed.

1.4.14 Tenon

The machined projections on the end of a workpiece to facilitate the joining of workpieces. This includes profiled tenons.

1.4.15 Morticing machines

Single ended machines having one or more heads for machining mortices in workpieces.

1.4.16 Tenoning machines

1.4.16.1 *Double end tenoning and/or profiling machines with mechanical feed*

A woodworking machine primarily designed for production of tenons and/or profiles on opposing ends of a workpiece in one pass. The tenon and/or profile is cut by means of milling tools, sawblade(s) and/or sanding units mounted on one or more spindles. The workpiece is typically presented by means of a chain or chains using pads and/or dogs mounted on a continuous chain belt or similar conveyor.

1.4.16.2 *Multiple saw profiling station machines with mechanical feed*

A machine designed for the production of cuts for jointing structural timbers on one end of a workpiece during one cycle. The cuts are made by means of sawblade(s) mounted on one or more spindles.

1.4.16.3 *Single and double ended edge banding machines with or without mechanical feed*

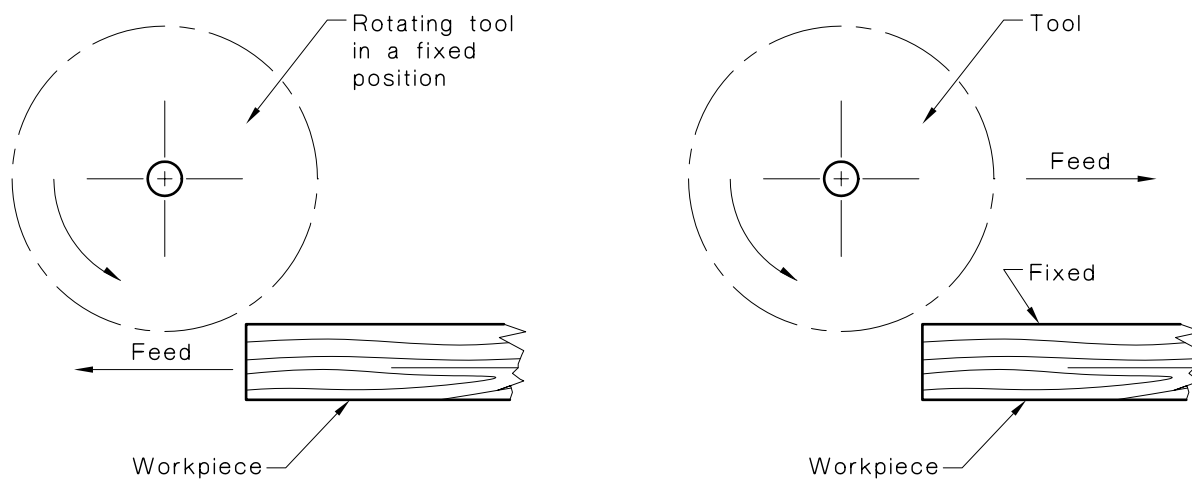
Machines (see Figure 1.4) that consist of an edge-banding zone with various units, e.g. heating, gluing and pressing units for flexible or solid edges and/or a zone for additional operations such as snipping, trimming, milling, sanding, polishing, chamfering, etc. In addition, the edgebanding zone may be preceded by a sizing/profiling zone.

1.4.16.4 *Single ended tenoning or profiling machines with manual feed*

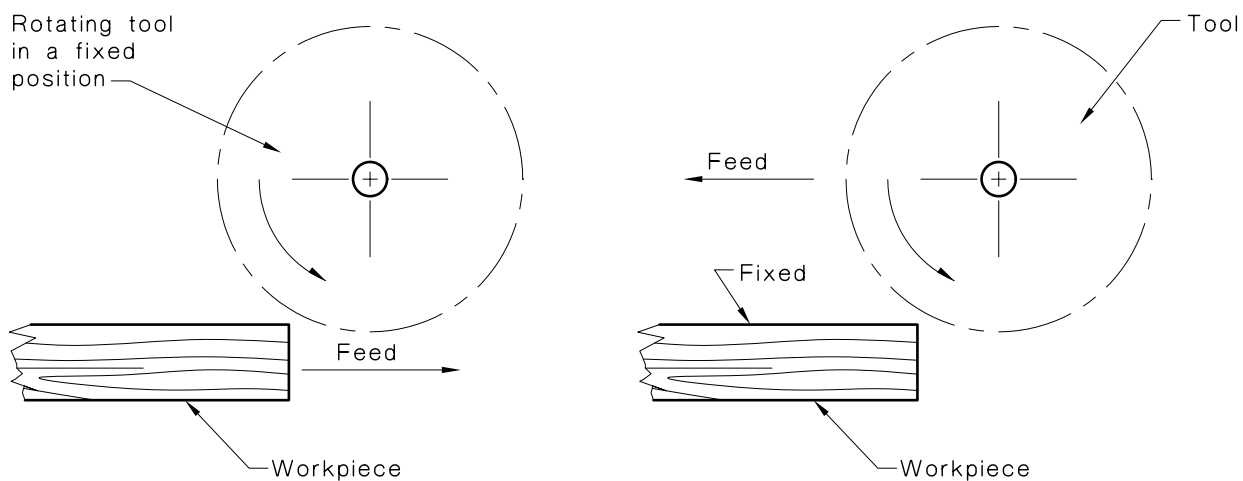
A machine designed for the production of a tenon on one end of a workpiece during one cycle. The tenon is cut by means of milling tools and saw blade(s) mounted on one or more spindles.

1.4.16.5 *Single ended tenoning or profiling machines with mechanical feed*

A woodworking machine primarily designed for production of tenons and/or profiles on one end of a workpiece in one pass. The tenon and/or profile is cut by means of milling tools, sawblade(s) and/or sanding units mounted on one or more spindles. The workpiece is typically presented by means of a chain or chains using pads and/or dogs mounted on a continuous chain belt or similar conveyor.



(a) Cutting against the feed



(b) Climb cutting

FIGURE 1.1 CUTTING ACTIONS

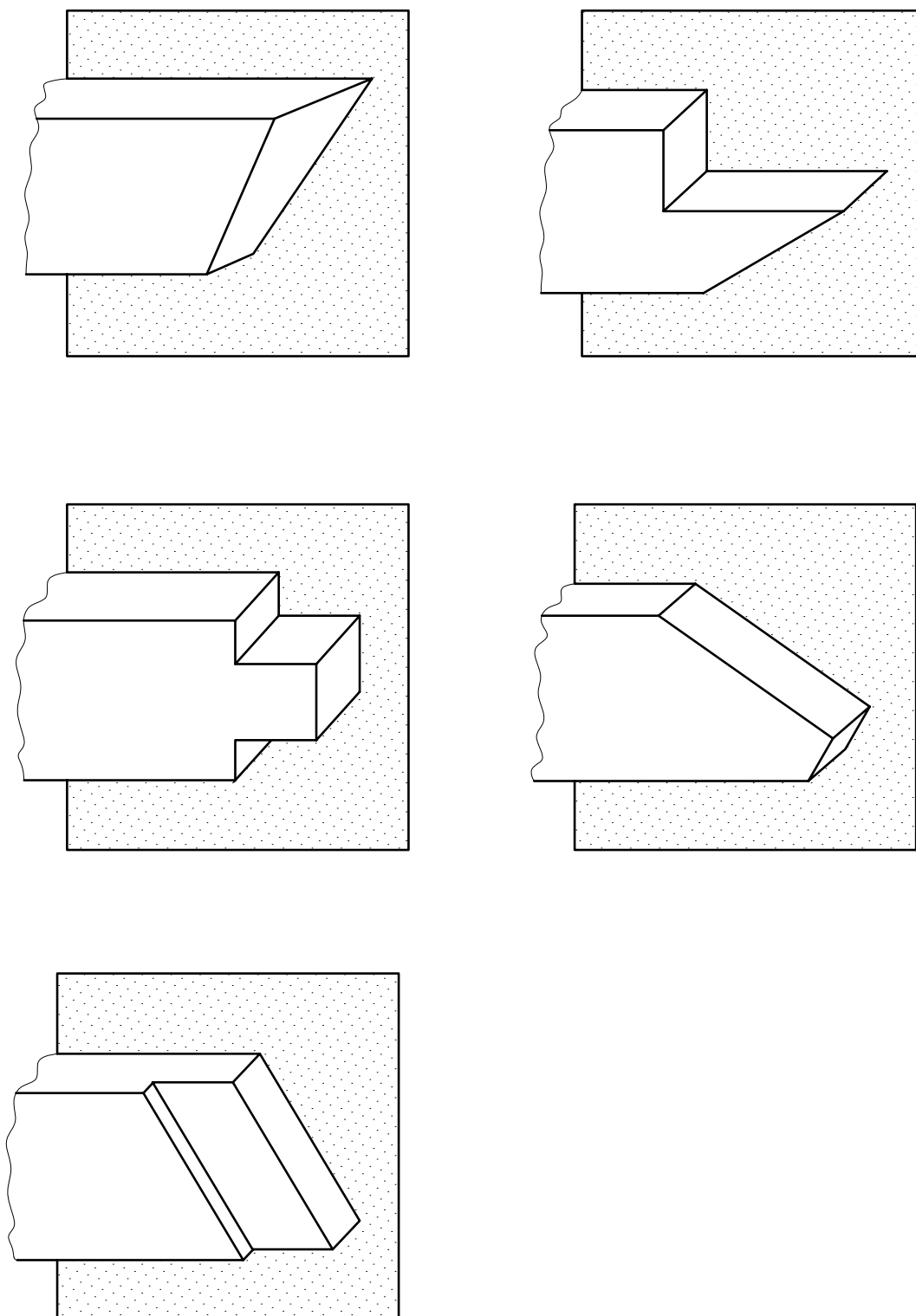


FIGURE 1.2 FOR JOINTING STRUCTURAL TIMBERS—EXAMPLES OF CUTS

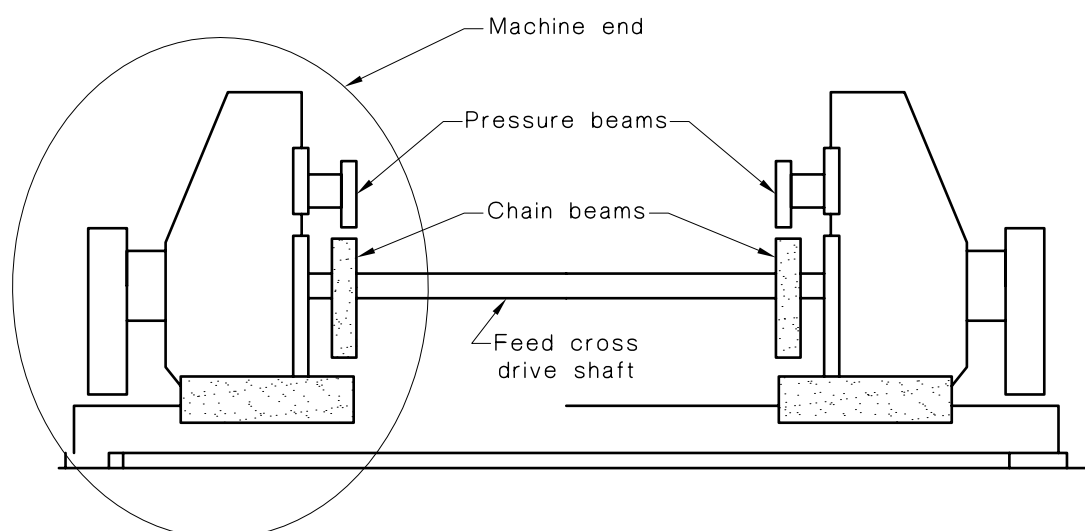


FIGURE 1.3 IDENTIFICATION OF MAIN MACHINE PARTS

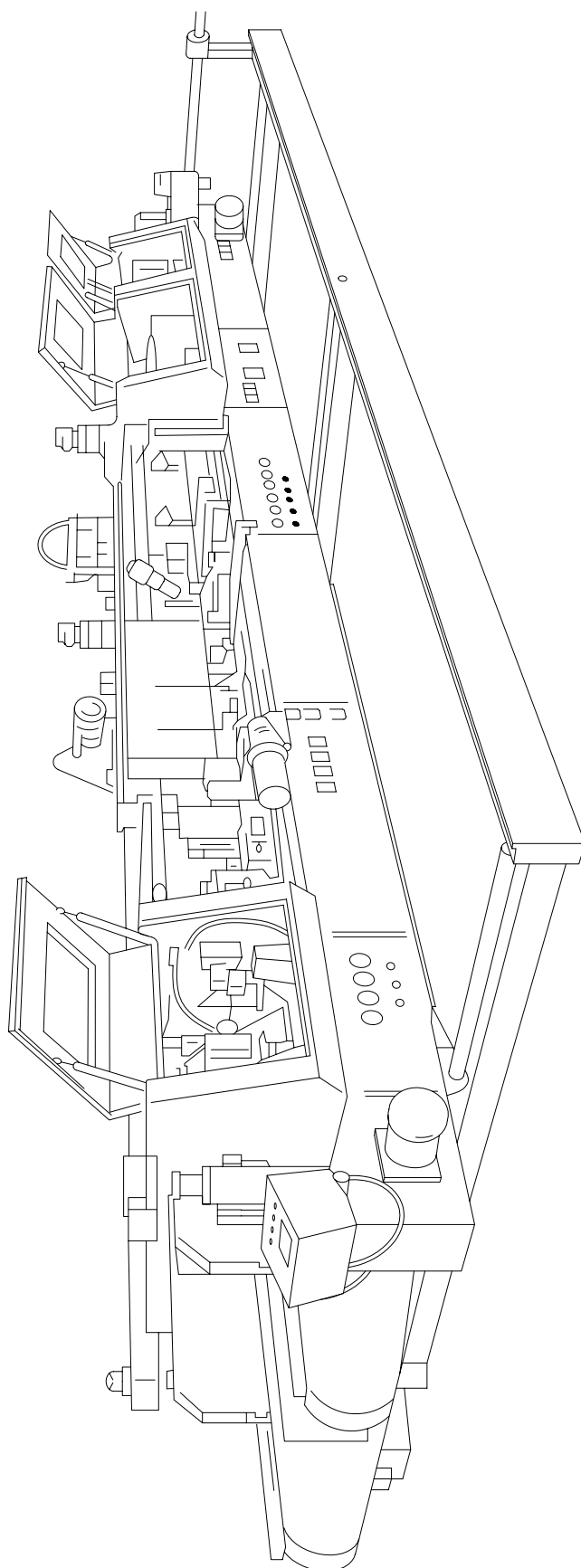


FIGURE 1.4 EDGE BANDING MACHINE

SECTION 2 SPECIFIC REQUIREMENTS FOR SINGLE END TENONING OR PROFILING MACHINES WITH MANUAL FEED

2.1 SCOPE OF SECTION

This Section specifies the requirements and measures to minimize the hazards and limit the risks on single end tenoning and profiling machines with manual feed designed to cut solid wood, chipboard, fibreboard, plywood and also these materials where they are covered with plastic laminate or edgings.

This Section does not apply to—

- (a) machines where the tenon is produced only by means of sawblades;
- (b) machines where the design speed of any tool spindle exceeds 6000 r/min;
- (c) machines where the average sliding table feed speed in either direction exceeds 25 m/min $\pm 5\%$;
- (d) combination machines used for tenoning; or
- (e) tenoning attachments on vertical spindle moulding machines.

2.2 CONTROLS

2.2.1 Position of controls

The main controls of the machine for starting the tool spindles, for starting the feed on integrated feed machines, normal stopping and mode selection shall be located at the loading position.

For the position of the emergency stop controls, see Clause 2.2.4.

When power is supplied to a tool spindle motor this shall be indicated, e.g. by a light signal. The means of indication shall be located near to the start control, integrated in the start button or be provided by using a two position switch.

2.2.2 Starting

2.2.2.1 General

For the purpose of this Standard, ‘safeguards in place and functional’ is achieved by the interlocking arrangement described in Clause 2.3.6.2 and ‘operation’ means rotation and/or powered adjustment of any tool spindle and/or powered movement of the sliding table (if provided). It shall be possible to start each tool motor separately.

2.2.2.2 Outboard bearings

For spindles designed to be used only with outboard bearings it shall only be possible to start the spindles if the outboard bearing is mounted.

2.2.3 Normal stopping

2.2.3.1 General

A stop control that stops all machine actuators shall be fitted.

It shall be possible to stop each tool motor separately.

2.2.3.2 Stopping sequence

Where the machine is fitted with electric brake(s) and/or powered clamping, the normal stopping sequence shall be—

- (a) cut power to the tool spindle motors;
- (b) actuate the brake or brakes;
- (c) cut power to the brake(s), if electrical, after the spindle has come to rest, e.g. by using a time delay; and
- (d) cut power to the power operated clamping if provided.

The stopping sequence shall be satisfied at the level of control circuits. If a time delay device is used the time delay shall be at least equal to the minimum braking time. Either the time delay shall be fixed or the time delay adjustment device shall be sealed.

The normal stopping sequence does not apply to a tool spindle in a non-cutting position. However, braking shall be applied.

2.2.3.3 Mechanical braking

If the machine is fitted with a mechanical brake, the normal stop control shall conform to Category 0 in accordance with AS 1473.2.

2.2.3.4 Electrical braking

If the machine is fitted with an electrical brake or a power operated clamping device or both, the normal stopping control system shall conform to Category 1 in accordance with AS 1473.2.

2.2.3.5 Electronic control

For machines with electronic pre-set control, the normal stop control system shall conform to Category 2 in accordance with AS 1473.2. Power may remain only for the electronic equipment.

2.2.4 Emergency stop

2.2.4.1 General

The stopping sequence described in Clause 2.2.3 shall apply.

If the emergency stop meets the requirements in Clauses 2.2.3.1, 2.2.3.3, 2.2.3.4, and 2.2.3.5 then it can be regarded as fulfilling the requirements of the normal stop control.

2.2.4.2 Mechanical braking

If the machine is fitted with a mechanical brake the emergency stop control system shall conform to Category 0 in accordance with AS 1473.2.

2.2.4.3 Electrical braking

If the machine is fitted with an electrical brake or power operated clamping, or both, the emergency stop control system shall conform to Category 1 in accordance with AS 1473.2.

2.2.4.4 Positioning of emergency stops

An emergency stop or emergency stops shall be fitted and located so that the operator can reach an emergency stop with the sliding table in any position.

2.2.5 Mode selection

A mode selection switch shall be provided if a power operated guard has to be released for maintenance, including tool changing. The following requirements for mode selection shall apply:

- (a) It shall not be possible for the guard to be released until power to the tool spindle drive motor is removed.
- (b) Power to the tool spindle drive shall not be available until the guard is closed.
- (c) It shall be possible to release the brakes.

(d) Power to the spindle positioning facilities shall be removed.

If the mode selection switch also allows powered spindle positioning, it shall comply with Items (a) to (d) but power shall remain available for spindle positioning.

Use of the mode selection switch alone shall not initiate any movement.

2.2.6 Speed changing

For machines fitted with a device for infinitely variable (stepless) tool speed changing (e.g. a frequency inverter), the device shall be such that the actual speed does not exceed the selected speed by more than 10%. The actual speed, or exit frequency, may be converted in a comparator, e.g. by the electronic system. The converted actual speed or exit frequency shall there be compared, either by the inverter itself or by an external comparator, with the selected value.

2.3 PROTECTION AGAINST MECHANICAL HAZARDS

2.3.1 Stability

Machines and auxiliary equipment shall be provided with a means of fixing them to the floor or other stable structure, e.g. by providing holes in the base of the machine.

2.3.2 Risk of break up during operation

Powered adjustment of any tool spindle in the working position shall only be possible when the sliding table is at the loading position. Contact between tools and parts of the machine during powered adjustment of the spindles shall be avoided, e.g. by a manually adjustable mechanical restraint device.

Powered adjustment does not include controlled movement during cutting.

2.3.3 Tool holder and tool design

2.3.3.1 Spindle unit locking

Spindle units which are capable of adjustment shall be held in the adjusted position during machining. This may be achieved using any of the following methods:

- (a) Where the setting adjustment is manual, a securing device.
- (b) Where the setting adjustment is by an electric motor, the brake or a self-locking transmission (e.g. a rack and pinion).
- (c) Where the setting adjustment is by pneumatic power, a non-return valve directly connected to the air cylinder.
- (d) Where the setting adjustment is under numeric control the control circuit.

2.3.3.2 Spindle locking

If it is necessary to hold the spindle stationary for tool changing, a spindle holding device shall be provided either by a double spanner arrangement or an integral locking bar inserted in the spindle.

Locking bars shall prevent the spindle from rotating if the spindle motor is inadvertently switched on with the bar in situ.

2.3.3.3 Sawblade fixing

Two saw flanges (or in the case of flush mounted sawblades, one flange) shall be provided for the cross-cut saw spindle.

The diameter of both flanges (or flange for flush mounted sawblades) shall be at least $\frac{D}{6}$ (where D = the diameter of the largest sawblade for which the machine is designed).

For flanges other than those for flush mounted saw blades the clamping surface at the outside part of the flange shall be flat over at least a width of 5 mm and recessed to the centre. Both outside diameters shall be within a tolerance of ± 1 mm.

There shall be a positive connection either between the sawblade and the rear flange fixed to the saw spindle or between the front flange and the saw spindle, e.g. a key.

2.3.3.4 Milling tool fixing

All milling spindles shall be fitted with a tool fixing device which shall be either—

- (a) a lock nut or a spindle screw and separate/integral spindle ring (locking collar) which ensures a positive connection between the ring and the spindle; or
- (b) a lock nut or a spindle screw and a spindle which ensures positive connection between the tool and the spindle.

Where the machine is fitted with a fluid power tool fixing system, a device shall be installed which prevents axial movement of the tool in the case of a failure in the fluid power system.

2.3.4 Devices to minimize the possibility or the effect of ejection

Means, e.g. deflectors or pushers, shall be fitted to move off-cuts away from the sawblade in order to prevent them from coming into contact with the following tools and being ejected from the machine.

Hand fed machines shall be designed so that climb cutting is not possible.

2.3.5 Workpiece supports and guides

2.3.5.1 General

Machines shall be provided with a fence on the sliding table against which the workpiece is located during machining. If the part of the fence guiding the workpiece is adjustable and if there is a possibility of contact between the fence and the tools, this part of the fence shall be made of light alloy, plastic, wood or wood-based material.

2.3.5.2 Chip breakers

A means for fixing a chip breaker, e.g. holes in the fence, shall be provided. Any chip breaker that is provided shall be such that the part of the device which comes into contact with the tools shall be made of solid wood, chipboard, fibreboard, plywood or plastic.

2.3.6 Prevention of access to moving parts

2.3.6.1 General

For definitions and requirements of the various types of guard and safety device, see AS 4024.1.

No crushing or shearing risks shall be created between the sliding table or any other moving element and any fixed part of the machine.

2.3.6.2 Guarding of tools

Access to the tools shall be prevented as follows:

- (a) By means of a combination of fixed and interlocked moveable guards which, together with the workpiece and associated adjustable guards, totally enclose and prevent access to the tools, e.g. see Figure 2.1.
- (b) Where the guards only partially enclose the tools, e.g. see Figure 2.2, Item (a) applies and, in addition access shall be prevented by design features which comply with the requirements of AS 4024.1.

- (c) By means of power operated or self-closing guards such that the tools are inaccessible at all times except during the working and return stroke of the sliding table, e.g. see Figure 2.3. Opening and closing of these guards shall be initiated and controlled by the sliding mechanism. In addition, a fixed guarding device shall be attached to the sliding table. This device shall prevent horizontal access, in a direction perpendicular to the device, to any exposed tool or part of the tool over the full length of the travel of the table. Any such guarding device fixed to the sliding table shall not be removable without the aid of a tool.
- (d) A combination of Items (a) to (c).

2.3.6.3 *Removable parts*

In addition, where it is necessary that parts of the safeguarding provided are designed to be opened or removed, e.g. for tool changing, setting, adjustment, cleaning, off-cut removal, etc., these parts shall be either fixed guards, or interlocked moveable guards with guard locking.

The interlocking devices with and without guard locking shall comply with the requirements of AS 4024.1. In particular, for machines where the maximum run-down time is 10 s or less, guard locking shall be achieved by at least an interlocking device with manually operated delay device.

2.3.6.4 *Machine run-down*

For machines where the run-down time exceeds 10 s, an interlocking device with at least a position monitored shot bolt and time delayed unlocking shall be used.

2.3.6.5 *Safeguarding on integrated feed machines*

The tools shall be guarded in accordance with the requirements of Clause 2.3.6.2.

Where the average speed of the sliding table in either direction is between 20 m/min and 25 m/min $\pm 5\%$, a trip device shall be fitted. This trip device shall extend across the full width of the table (excluding the fence), be positioned between 800 mm and 1000 mm above the floor level, be capable of being operated by any person standing in the path of the sliding table in the direction of travel and, when operated, will stop the table within 50 mm of travel. Examples of trip devices include lanyards, pressure sensitive systems and optoelectronic devices.

2.3.6.6 *Guarding of drives*

The drive mechanism for the tools shall be guarded with a fixed guard. Where frequent access to the drives is necessary for maintenance or adjustment purposes, (i.e. more than once per shift), access shall be via fixed guard or an interlocked moveable guard. Where access to the tools is also possible, the moveable guard shall be interlocked with guard locking.

2.3.7 *Emission of chips, dust and gases*

Provision shall be made for the extraction of chips and dust from the machine, to enable the machine to be connected to a separate chip and dust collection system.

2.3.8 *Periodic testing of safety devices*

Safety devices shall be tested for correct operation as follows:

- (a) *Emergency stops*—by a functional test.
- (b) *Interlocked guards*—by opening each guard in turn to stop the machine and by proving an inability to start up the machine with each guard in the open position.
- (c) *Trip devices*—by a functional test.