



PUWER 98: Retrofitting of braking to woodworking machines

Woodworking Information Sheet No 38

Introduction

This information sheet is one of a series produced by HSE's Manufacturing Sector in conjunction with the Woodworking Machinery Suppliers Association. Its purpose is to provide advice, primarily to employers, on how to interpret and apply the requirements of regulation 15 of the Provision and Use of Work Equipment Regulations 1998 (PUWER 98)¹ and paragraphs 130 to 135 of the Approved Code of Practice (ACOP) *Safe use of woodworking machinery*² that relate to the retrospective fitting of braking to certain classes of woodworking machinery. It will also be of use to those who have duties under the Supply of Machinery (Safety) Regulations 1992³ and section 6 of the Health and Safety at Work etc Act 1974 (HSW Act).

Why do I need to consider fitting braking to my machinery?

For new woodworking machinery, the provision of an automatic brake is an essential safety requirement of the Supply of Machinery (Safety) Regulations 1992. The Regulations require that the machinery must be equipped with an automatic brake that stops the tool in a sufficiently short time (defined in CEN standards as 10 seconds or less) if there is a risk of contact with the tool while it runs down.

This requirement does not apply to second-hand machinery or to existing machinery that is already in use. However, because of the safety benefits that braking provides, it is appropriate that the same standard is now applied to these machines as to new machines. Regulation 15 of PUWER 98 requires work equipment to be provided with controls which bring the work equipment '... to a safe condition in a safe manner' and to achieve this, the ACOP calls for employers to carry out a risk assessment to determine whether the retrofitting of braking to their machines is necessary. It also includes a list of machines in paragraphs 131 and 132 where braking will almost certainly be required. This list is repeated in 'If I need to fit braking, when must the work be completed?' on page 3 of this information sheet.

If the decision whether or not to fit braking is based on risk assessment, why are some machines listed in the ACOP?

The machines listed are primarily the hand-fed machines which are in common use. For these

machines, the accident record suggests that braking should be fitted and so in all but a very few cases, it is expected that the risk assessment will show braking to be necessary, if there is a risk of contact with the tool while it runs down.

Some classes of woodworking machine have a number of variants and so if a particular machine is not listed, it is no excuse for not fitting braking. Machines with broadly similar functions and operations will have similar hazards and are therefore likely to pose similar risks in their use.

If my risk assessment shows that braking is necessary, how do I do it?

Unless there is technical expertise available in-house, users are recommended to contact the manufacturer of the machine. If this is not possible, specialist engineering advice should be obtained, for example from reputable suppliers of second-hand woodworking machinery.

The main ways of providing braking are to:

- replace the existing unbraked motor with a braked motor;
- fit a direct current (DC) injection braking device to the existing unbraked motor;
- fit a power-operated mechanical brake;
- fit a manual or foot-operated brake.

You can apply these methods singly or in combination, but when selecting the most appropriate, you should take a number of factors into account.

Replacing an unbraked motor with a braked motor

When considering this method, the factors to take into account are:

Space

- Where motors are mounted inside the machine frame, space is more likely to be a problem as braked motors are invariably longer than the unbraked equivalent. There is less likely to be a problem where the motor is mounted externally.

Ease of replacement

- Many motors, particularly on older machines, were purpose-built and incorporate non-standard motor casings and attachment points. In these cases it will probably not be possible to obtain a braked replacement motor to fit the existing mounting points. Either the machine frame will have to be modified to accept the braked motor, if possible, or an alternative solution will have to be found.

Suitability

- Replacing an unbraked motor with a braked motor is not suitable for band re-saws, due to the large amount of stored energy, including heat, that needs to be dissipated on stopping.

Fitting a DC injection braking device to an existing unbraked motor

When considering this method, the factors to take into account are:

Motor type

- DC braking is not suitable for some types of motor, eg slip ring motors. (These are typically the larger motors of 10 horse power or greater.) The motor manufacturer should be consulted before braking is fitted.

Power supply

- Braking is only available when power is available to the machine and so a loss of power would leave the machine unbraked. It is therefore not suitable in workshops where there is a history of power supply instability.

Stopping time

- A range of stopping times are possible with DC braking. Stopping can be very rapid, which can create problems, eg the possibility of a blade coming undone, as may be the case with some circular saws. It is recommended that saws over 25 cm in diameter are retained by pinning them to the drive shaft, or by lock nuts.

Failure of the motor

- There is always the possibility that an older motor will fail as a result of the increased mechanical forces caused by the injection of DC into the windings. In that event, the motor will need to be rewound but if this work is properly carried out, with due consideration of the new operating requirements, the problem should not recur.

Suitability

- DC braking is most likely to be the best option for a band re-saw, for tenoning machines and for machines which have purpose-built motors (see 'Ease of replacement').

Fitting a power-operated mechanical brake

The main considerations here are the safety, integrity and reliability of the braking system. Ideally, the brake should be applied and held on by means of a spring and require electrical power to release it, although other systems using pneumatic or hydraulic power are also available. Mechanical braking is most efficient when applied to the low torque end of the drive unit.

Fitting a manual or foot-operated brake

This is always an option and this type of braking is already provided on many older machines. The primary consideration is that the stopping criteria can be met. Safety is enhanced if the brake is activated by some form of actuator, eg a pneumatically or electronically operated solenoid.

The ACOP says that braking is not required if the rundown time of the machine is 10 seconds or less. Does this mean that braking must always stop the machine within that time?

No. While it is possible to fit some form of braking to any woodworking machine, for some machines, bringing them to rest within 10 seconds might be positively harmful to the machine and dangerous to the operator or others close by. This is the case where:

- large amounts of energy have to be dissipated during braking (see the earlier example of the band re-saw); and
- there is a danger of blades breaking, for example as a result of a crack, as may be the case on any machine fitted with a band blade.

The overriding consideration should be to bring the machine to a safe stop. The rundown time should be less than the runup time with an overriding maximum of 30 seconds (35 seconds for bandsaws).

Are there any circumstances when braking does not have to be fitted?

If the risk assessment shows that there is no **added** safety benefit, then braking does not have to be provided. One example would be where the cutters are enclosed by interlocked guards which incorporate guard locking, so that the guards cannot be opened until the cutters have come to rest. (Alternatively, the

whole machine might be enclosed, eg by a noise hood, but the same interlocking requirements as above will apply).

Another example is where the blade, tool or cutter returns automatically to a position of safety, such as a cross-cut saw fitted with a spring return which retracts the blade into a protective housing at the conclusion of the cut.

In these situations, the time taken for the machine to run down is immaterial since an acceptable standard of safety has already been achieved by guarding alone and there is no risk of contact with the tool while it is running down. It should, however, be remembered that as well as enhancing safety, braking can improve productivity, since more rapid stopping is an aid to quicker setting, adjustment and unjamming of a machine.

There are some occasions where it might be necessary to temporarily disable the braking system. These include tracking a band re-saw and setting up a double-end tenoning machine or an edge banding machine. In these situations, it is essential that:

- the controls for starting are only operable in the hold-to-run mode;
- the disablement function is automatically overridden and braking is applied if any guard is opened or if the emergency stop control is operated.

If I need to fit braking, when must the work be completed?

The ACOP lays down a timetable for certain specified classes of machine.

For circular saw benches, dimension saws, powered and hand-fed cross-cut saws, single-end and double-end tenoning machines and combined machines incorporating a circular saw and/or a tenoning attachment, the work had to be completed no later than 5 December 2003, ie 5 years after PUWER 98 came into force.

For narrow bandsaws, re-saws, vertical spindle moulding machines (unless fitted with a manual or foot-operated brake), hand-fed routing machines, thicknessing machines, planing/thicknessing machines and surface planing machines, the work must be completed no later than 5 December 2005, ie 7 years after PUWER 98 came into force.

For any other machine not specified above but for which the risk assessment shows braking to be necessary, the deadline is 5 December 2008, ie 10 years after PUWER 98 came into force.

It should, however, be remembered that the phasing in of these requirements is specifically designed to spread the burden, both financial and otherwise, of the work that needs to be done. This applies both to users and to those who will be involved in any necessary modifications. All involved are therefore advised to start planning and preparing at an early stage.

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 *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 HSE Books 1998 ISBN 0 7176 1630 4

3 *Product standards - Machinery - A guide to the UK Regulations* (May 1995) DTI URN 95/650. Copies available from the DTI's Publications Orderline on 0845 015 0010

4 *Buying new machinery: A short guide to the law and some information on what to do for anyone buying new machinery for use at work* INDG271 HSE Books 1998 (Available free for single copies and in priced packs of 15 on ISBN 0 7176 1559 6)

5 *Supplying new machinery: Advice for suppliers of workplace machinery* INDG270 HSE Books 1998 (Available free for single copies and in priced packs of 15 on ISBN 0 7176 1560 X)

6 *Using work equipment safely* INDG229(rev1) HSE Books 2002 (Available free for single copies and in priced packs of 10 on ISBN 0 7176 2389 0)

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

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