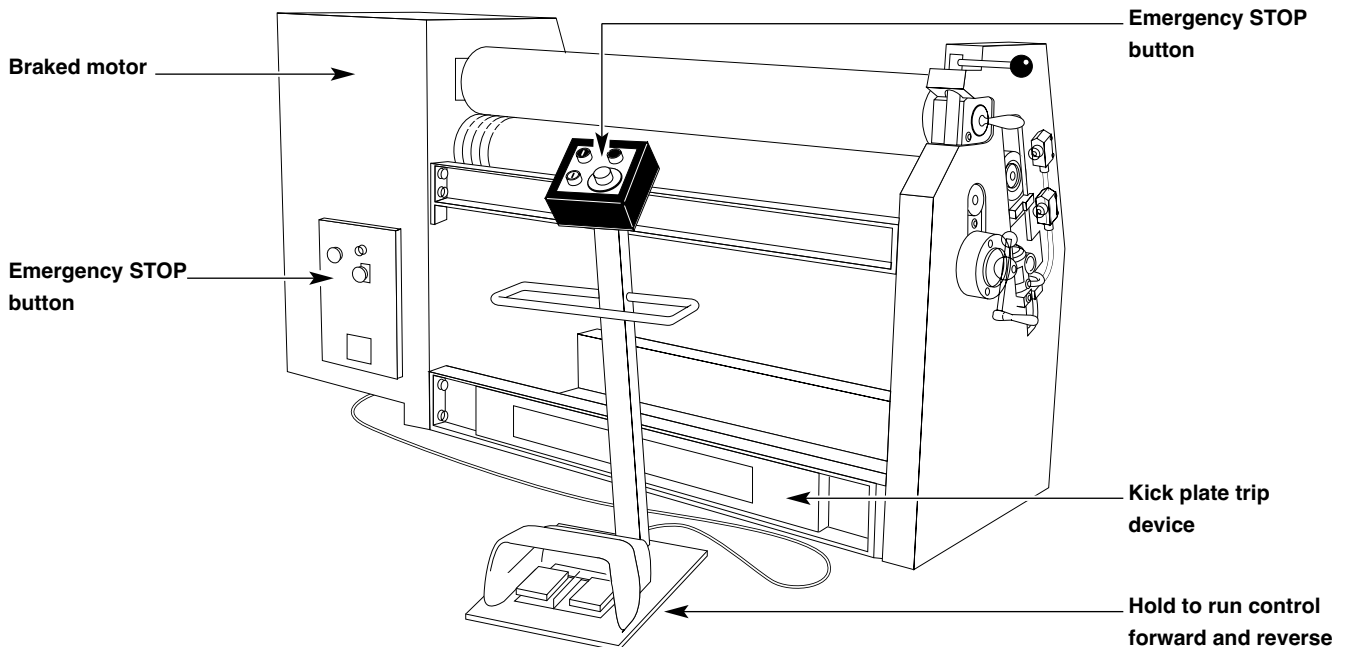




Safeguarding 3 roll bending machines

Engineering Sheet No 7



Introduction

The guidance contained in this information sheet is only intended for manually loaded machines where the nature of the work being undertaken makes the use of fixed or interlocked guards impracticable.

Hazards and risks

The main hazard at these machines is the operator's hands being caught and drawn into the counter-rotating rollers. Injury is most likely to occur during the initial feeding of the workpiece into the rolls.

The moving workpiece may present additional hazards, such as trapping of hands between it and other fixed parts of the machine. A significant number of the accidents at these machines have resulted in amputation or other serious injury. A high proportion of the accidents are associated with the operator wearing gloves. The likelihood of entanglement is increased if gloves are worn.

Safety devices

Protection for the operator and anyone near the machine may be provided by a combination of devices. These include trip devices and hold to run controls, together with suitable safe systems of work.

These safety devices do not directly prevent entanglement or entrapment. They are intended to help

prevent or minimise injury in the event of entanglement etc, by quickly stopping the machine. Operators should therefore be trained to use the safety devices correctly. Managers should ensure that the safety devices are properly installed, maintained and used.

Hold to run controls

Machines should be provided with hold to run controls which ensure that roll movement only occurs when the control is held in the run position. The control should automatically return to the stop position when released. This type of control may take the form of a button, joystick or foot switch (see BS 5304, sections 5.3 and 5.4).

Trip devices

A trip device (bar or tensioned wire) should be positioned so that it may be easily actuated by any person caught or drawn towards the rolls and will stop the machine before serious injury can occur.

The trip device will be required at both sides of a machine. Mechanical trip bars including kick panels should be provided with two safety interlock switches (normally closed), one at each end of the bar or panel. Alternatively rotary cam switches may be used operating off the pivot pins. The switches should be arranged to actuate on minimal deflection of the bar or panel (see BS 5304, section 8.1).

Where a trip wire is provided, the safety switches should be of a suitable type which actuate in both the pulled and cut or slack wire conditions (see BS 5304, section 5). The trip device should be interlocked with the machine control circuit. Following operation of the trip device the machine should only be able to be restarted when the safety device reset is operated and the machine is switched on at the normal ON switch. The safety devices should be of robust construction to withstand the stresses of the expected service conditions. Where necessary, susceptible components, such as interlock switches, should be provided with additional mechanical protection.

Braking systems - normal stop

The safety devices are only effective if the dangerous parts of the machine stop quickly. It may be necessary to provide a brake if there is any risk that overrunning, due to inertia, may give rise to injury. The risks associated with overrun will have to be considered under non-load conditions. The maximum operating speed of the rolls (RPM or m/min) and the roll diameters are an important consideration. A braking system may be mechanical or electrical or a combination of both. Preference should be given to disc or caliper brakes in mechanical braking systems. If brakes are to be fitted at a later date to older machines, care should be taken to ensure that the machine is capable of withstanding the stresses induced by the effects of braking (see BS 5304, section 5.6).

Emergency stop buttons

In addition to the measures detailed above, an emergency stop button should be provided at the machine control console and at any remote work station. Emergency stop buttons should be of the 'lock in' type so that the machine cannot be restarted until they have been reset manually. Release or resetting of the emergency stop should not cause the machine to operate - starting should only be possible by operating the normal 'start' control. The emergency stop device should actuate the brake if fitted.

Safe working practice

Supervisors should ensure that safe working methods are followed. In particular the following should be considered:

- (a) The use of gloves with fingertips during initial feeding of workpieces should be prohibited because the tips can be caught and drawn into the roll intake. Where there is a genuine need for hand protection, palm protection only may be sufficient. Loose fitting clothing should not be worn. Overalls with close fitting cuffs and sleeves are preferred;
- (b) Workpieces should always be held sufficiently far back from the edge being fed into the rolls to allow

for the infeed speed of the machine, and therefore prevent close hand approach to the rolls. Where the nature of the work permits, suitable handling aids such as feed tables or rollers should be used;

- (c) The area around the machine should be adequately lit and kept free of materials which might cause slips or trips. When more than one operator is involved with the work, clear operating procedures should be established before work commences.

Maintenance and inspection

Regular maintenance and inspection of the safety devices and brakes is essential. Detailed advice on this should be contained in the machine instruction manual or obtained from the manufacturer or supplier. The cleaning of rolls should only be carried out with the machine switched off and isolated.

Useful publications

- 1 Work equipment. Provision and Use of Work Equipment Regulations 1992. Guidance on Regulations L22 HSE Books ISBN 0 7176 0414 4
- 2 BS 5304: 1988 Code of practice for safety of machinery
- 3 BS EN 60204: 1993 Safety of machinery - Electrical equipment of machines Part 1: Specification for general requirements
- 4 Health and safety in engineering workshops HSG129 1995 HSE Books ISBN 0 7176 0880 8

The future availability and accuracy of the references listed in this publication cannot be guaranteed.

Further information

HSE priced and free publications are available by mail order from HSE Books, PO Box 1999, Sudbury, Suffolk CO10 6FS Tel: 01787 881165 Fax: 01787 313995.

HSE priced publications are also available from good booksellers.

For other enquiries ring HSE's InfoLine Tel: 0541 545500 or write to HSE's Information Centre, Broad Lane, Sheffield S3 7HQ.

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