

Scrap baling machines

Guidance Note PM 66



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This guidance looks at the dangers associated with work which involves both large static and mobile scrap baling machines.

It suggests recommendations which are aimed at reducing the number and severity of accidents and injuries which are associated with these types of machinery as well as precautions that can also be taken.

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Contents

Introduction	4
The dangers	4
Large static baling machines and box shears	5
Recommendations	5
Radio control	6
Medium static baling machines	7
Additional recommendations	7
Mobile baling machines	8
Training	11
Site access	11
Health and Safety Executive area offices	11

Introduction

- 1 Baling machines are defined as being static or mobile and used exclusively in the baling of ferrous and non-ferrous metals. The static machines, generally in the large capacity high pressure range, handle ferrous metal, while the smaller range handle mostly non-ferrous metals. Box shears are box shaped machines with power closing lids. They compact the charge which is then fed into integral shears to be cut and reduced to a suitable size for subsequent treatment in fragmentising or shredding machines.
- 2 Static machines are generally loaded by crane, but in some cases they can be loaded by hand. Mobile machines are generally manually loaded except the very large type which can be loaded by crane.
- 3 Most machines are installed above ground level, but a significant minority may have the baling box located below ground level.
- 4 Generally static machines have control panels installed well away from the feed hopper while mobile machines have their control panels located and fitted to the main frame of the machine adjacent to the feed hopper.
- 5 Baling machines have controls which give either a single cycle and/or continuous cycling action. Single cycle controls are invariably of the 'dead man' type, ie the operator's hand has to depress the control continuously and if released, will either stop the machine or set it into reverse. Automatic cycle machines are usually fitted with an emergency stop button. Some of the large static machines have been provided with radio control systems.

The dangers

- 6 The following danger points are common to all types of baling machine:
 - (a) a person being pushed by scrap or falling into the charge box before the lid is closed on initiation of the cycle;
 - (b) being trapped by the lid when it closes;
 - (c) being trapped by the compressing and ejection rams if operated when the lid is open and the person is in the charge box;
 - (d) being crushed between the bales of metal when these are discharged;
 - (e) being trapped by the closing of the discharge door;
 - (f) being struck by feed scrap when this is being handled;
 - (g) falling off high platforms or staircases.

NB Potential explosions within the scrap from petrol containers etc, electrical incidents and possible fire and explosion risks from flammable hydraulic fluids are not considered in this Guidance.

Large static baling machines and box shears

The large machines capable of developing pressures of about 3000 tons and producing bales measuring 0.6m x 0.6m (2 feet x 2 feet) of varying lengths are mounted above ground and because of their physical height, require staircases to reach control cabins. Cranes are used to load the feed box. Generally the operator in his control cabin will have a good view of the whole baling operation and will be the only person at any potential risk. Other people can be warned or the operation stopped if they are in a position of danger. To meet these risks, open sides of staircases or platforms should be fenced to a height of 1.07m (3 feet 6 inches) and the danger areas around the feed box should be fenced with an interlocked gate (where necessary) for access for maintenance purposes.

Ideally the control cabin should be physically separated from the press, with access to the cabin provided by a staircase.

The use of radio communication by the machine operator and crane driver should be encouraged.

Recommendations

- (a) When installing these machines the control cabin should be located so that the operator has a clear view of all working functions of the machine, and both the baling box and discharge opening.
- (b) The control cabin should be separated from the machine; but where the control cabin forms an integral part of the machine suitable fencing should be provided to prevent access to dangerous areas. Gates in the fencing should be suitably interlocked so as to prevent access while the machine is in operation.
- (c) Safe means of access must be provided to the control cabin.
- (d) 'Permits to Work' and 'Safe Systems of Work' should be developed to take account of production and maintenance requirements. These should ensure that both the hydraulic and electrical systems are fully isolated.
- (e) Provision must be made to lock out any automatic or semi-automatic controls during this 'isolation' condition. Any operation of the machine considered essential must only be possible in a manual control mode. Account must also be taken of any residual energy in the pressure systems and possible creep movements of rams etc which may necessitate the use of mechanical scotches.



Figure 1 Large baling machine showing rail protection at edge of platform near control cabin



Figure 2 Large mobile baler - loaded by crane and independently powered by diesel engine

Radio Control

7 Radio control systems at large baling machines and box shears enable the machine to be fully controlled by the driver of the crane when used for the loading function. Elevation of the crane driver's cab should ensure that all the working activity can be monitored and the use of signal lights to indicate the state of the operating cycle of the machine should be considered.

- (a) A suitable lock out system should be installed so that the radio control system can be totally isolated and this should also ensure that the machine reverts to the normal control system prior to the commencement of any maintenance or production fault finding operation. This lock out facility should be located at the receiver unit.
- (b) When a radio control system is installed, the operator should either have a clear view of the machine activity or have some visible indication of the operating functions of the machine, eg by the use of mirrors.
- (c) When more than one machine is being operated by a radio control system suitable precautions must be taken to prevent any possible interference between radio signals - eg by the use of different frequencies.



Figure 3 Large baling machine - radio controlled. Note lights at side of original control cabin indicating state of baler. Complete operation controlled by crane driver.

Medium static baling machines

8 This class of machine has a control panel near to the baling box. Most medium size fixed machines are installed in two different ways; (a) below ground so that the opening of the feed box is at ground level; or (b) at ground level with the feed box built up to form a hopper.

The control unit should be located away from the press. A machine mounted below ground being fed by hand and/or crane, creates obvious danger of someone falling into the baling box. A chain on posts as a form of barrier is totally unsuitable. This type of baler should be restricted to one man operation and the approach for a second person eliminated as far as is practicable.

Additional recommendations

- (a) The baling box should where reasonably practicable be installed above ground level;
- (b) if the baling box is located below ground level the automatic mode of operation at the machine should be removed and the machine limited to a single mode operation;
- (c) emergency stop buttons, clearly visible and raised should be provided at suitable positions adjacent to the baling box;
- (d) the opening of the baling box should be fenced as far as is practicable and limited to the extent necessary to allow the loading of scrap;
- (e) the fitting of a suitable sized hopper to the baling box should be considered at all machines so that the machine can be loaded by crane and thereby eliminating the need for manual loading.

Mobile baling machines

9 Most mobile baling machines have a quite small capacity and usually develop not more than 3,000 lbs per sq inch pressure and are used exclusively to bale non-ferrous metals. They are hand fed from the surrounding scrap and produce bales of up to about 0.6m x 0.6m (2 feet x 2 feet) to varying lengths. These machines are normally operated by one man who loads the box then actuates the control to perform the baling cycle. The controls are invariably of a 'dead man' type, and are usually adjacent to the scrap box. Danger arises primarily when a second person approaches the machine, and provided this access is limited within the sight of the operator, this danger can be reduced. The provision of guarding at the feed opening or box is not considered to be practicable.

Precautions

- (a) Mobile type baling machines should be limited to one man operation;
- (b) the controls should be of the dead-man's handle type and should be located at a sufficient distance from the baling box so as to prevent the operator being able to gain access to the trapping points from the operating position. Where this is not possible a suitable screen should be provided to prevent access to the baling box when the machine is being operated;
- (c) where practicable the baling machine should be located against a wall to make it easier for the operator to see the approach of other people to the machine;
- (d) the baling machine lid should not be used as a shear except where of necessity overhanging metal is sheared during the baling operation;
- (e) the floor area around the machine should be in good conditions and kept clear of scrap;
- (f) when the large mobile machines are installed care must be taken to ensure that they are erected on firm ground so as to reduce the risk of ground subsidence.



Figure 4 Box Shears - view of exit chute from shears. Note protective metal shield to prevent cut scrap flying.

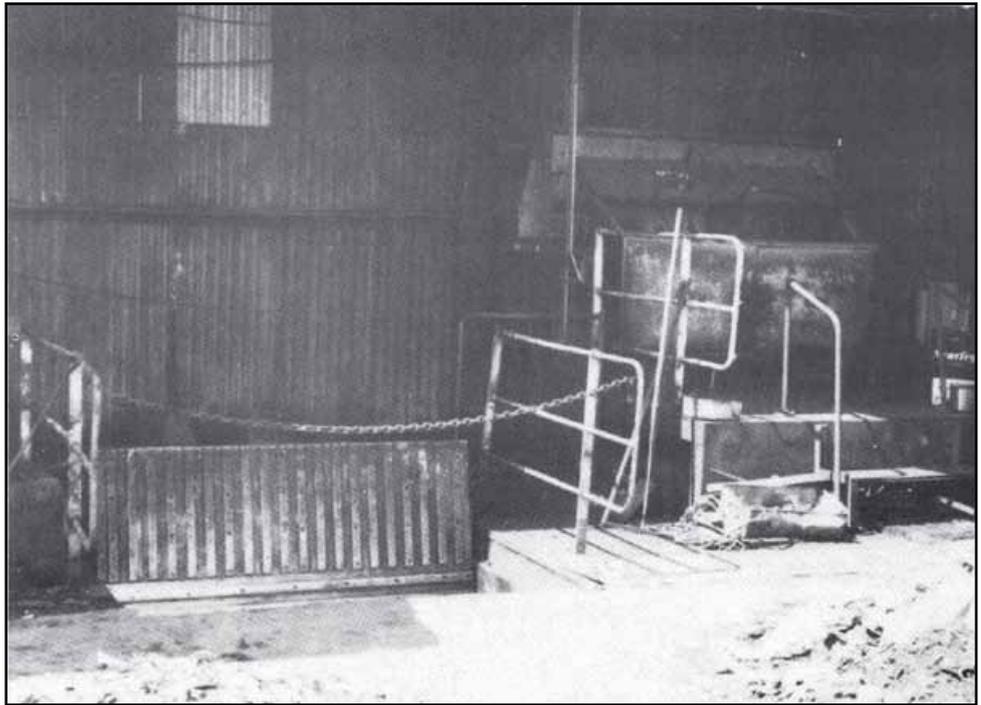


Figure 5 Medium baling machine - Baling box in left foreground of photograph and below ground level. Control console at right rear of photograph. Poor standard of protection by chain/side rails.



Figure 6 Small baling machine

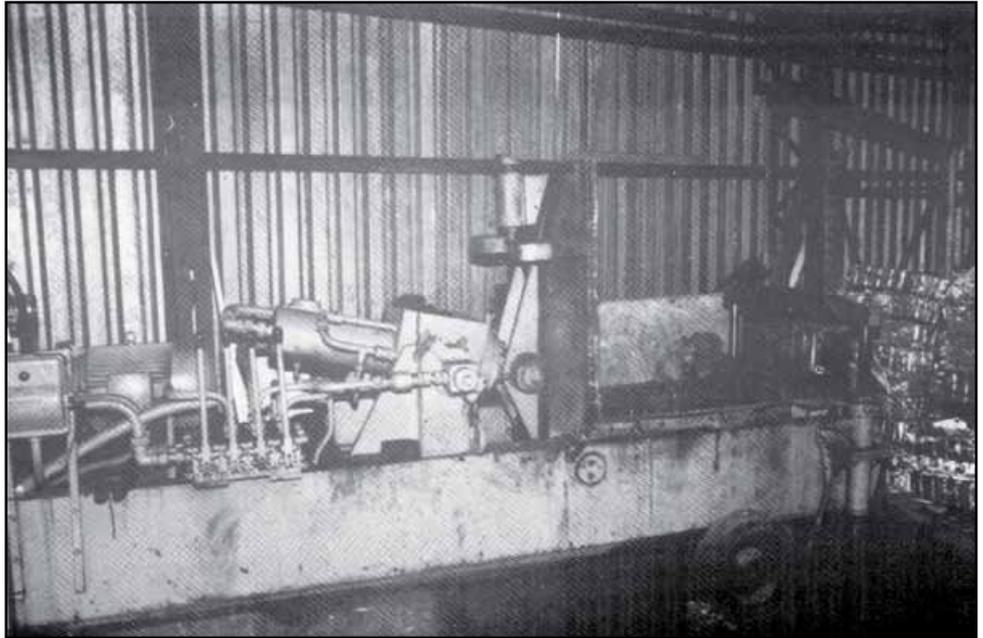


Figure 7 Small mobile baling machine showing location of controls at left side of baling box. Note siting of baler close to wall and clear access at front.

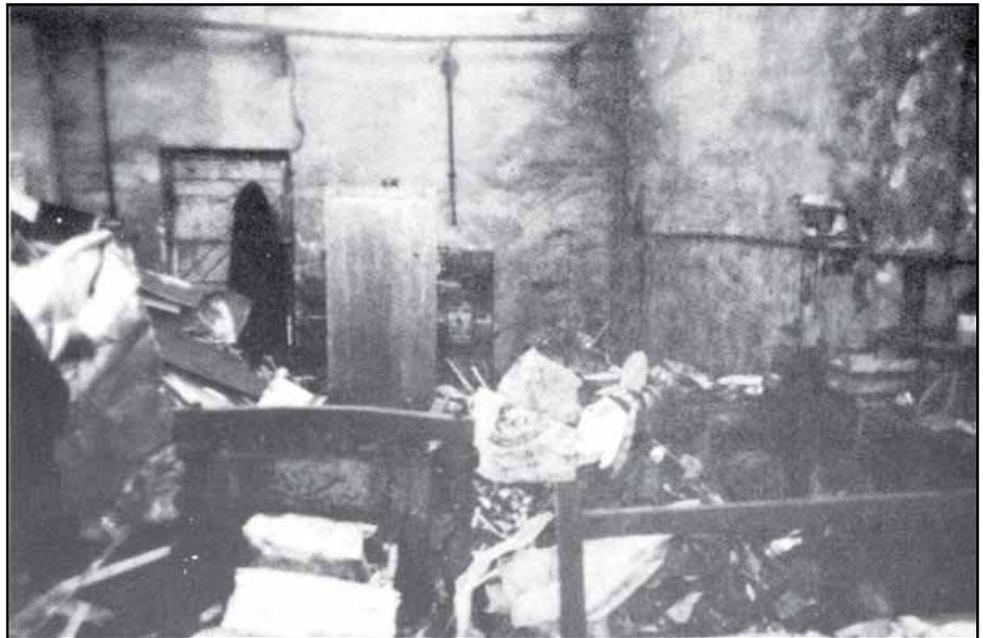


Figure 8 Small Mobile Baling Machine showing unsafe access to scrap box for operator

Training

10 People should be properly trained and warned of the dangers associated with these machines.

Site access

11 Safe means of access should be provided to all machines and places of work. The area around baling machines should be kept clear of scrap metal spillage.

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