



## Wool Press Fatality



### ▶ WHAT HAPPENED?

A wool press operator was killed in December 2005 when he was crushed in the Lyco Maxitech Wool press he was operating. The operator had opened an interlocked gate and was leaning into the press when the platen descended. The wool press was one of two PLC-controlled Lyco Maxitech conveyor-fed presses operated at a carpet yarn factory.

The presses were alternately fed by a conveyor and started automatically. To protect the operator, a single cam-operated interlock switch was fitted to the top access gate of both the presses. At the time of the accident a clean-up was taking place prior to a colour change. It appears that while the operator was reaching into the press to remove wool fragments from the empty fadge, the press started, trapping and fatally injuring him.

### ▶ INVESTIGATION

The interlock switch was set up in the normally closed position. Normally closed limit switches are the type most frequently specified for safety applications. The diagram below right shows the operation of a normally closed switch (not the switch involved in the accident):

The interlock switch (actuated by a cam on the access gate) broke just prior to the accident. When the plunger tip broke off it was no longer in contact with the cam which allowed the spring inside the switch to close the contacts, in turn allowing the machine to operate.

The switch is manufactured by Hella and is commonly used as brake light switch. This switch is designed for a linear action on the plunger and not to withstand the side forces that the cam exerted on the plunger in this application. This switch is not suitable for use in any machinery guarding application.

It was possible to operate a control, which would take the machine out of cycle so that it would not automatically start. A manual for the operation of the press was supplied by the company that designed and installed the PLC operated system. This manual did not include an instruction to operate this control so that the press would not automatically start.

The design of this system was substandard and relied on only one component to protect the operator. When this component failed this tragic accident was the result.



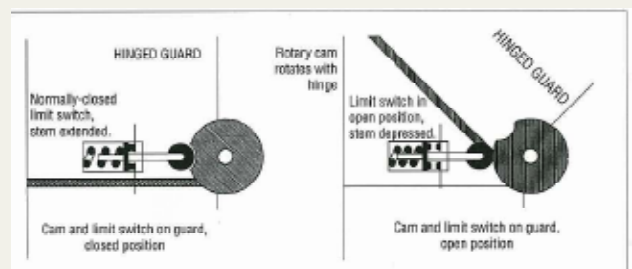
1

The two conveyors fed by the reversible conveyor between them.



2

Entrance to press the operator was leaning through when platen descended



3

Normally-closed switch operated by a rotary cam.



This type of switch is also used on Lyco hand-fed presses commonly used on farms and wool handling premises.

This accident highlights the importance of providing reliable guarding to a high standard for the mechanical hazards associated with this type of machinery. It is essential that interlock guarding defaults to safety instead of to danger.

### RECOMMENDATIONS

1. All owners of wool presses that use this type of interlock switch need to be aware that they may fail without warning. They should contact their supplier or a chartered professional engineer (CP Eng) with a qualification in mechanical engineering for advice on replacement of these switches.
2. The Health and Safety in Employment Act 1992 requires employers to take all practicable steps to ensure the safety of employees. At this time the Department considers that any guarding systems provided for conveyor-fed wool presses must meet or exceed the standard set in AS 4024.1 – 2006 (Series) Safety of Machinery. Any interlock guarding systems used should meet or exceed Category 4 (as described in AS 4024.1) where the result of a safety system failure may be fatal.
3. This standard also provides useful information on control of many machinery hazards. For specialist advice on this standard it is recommended that you contact a chartered professional engineer (CP Eng) with a qualification in mechanical engineering.
4. Safe guarding is only one aspect of the control of the hazards associated with machinery that need to be considered. It is important to ensure that all machinery employees work with or are exposed to, have all hazards identified and appropriate controls provided. Some examples of such controls are training, supervision, lock out procedures and comprehensive written operating procedures.

Advice on safe guarding of machinery is also available in the Department of Labour publications:

- Guidelines for Guarding Principles & General Safety for Machinery
- Guidance notes for Electrical Interlocking for Safety in Industrial Processes.

These documents are available free of charge from the Department of Labour Website at <http://www.osh.dol.govt.nz/order/catalogue/index.shtml>.



4

Gate cam and switch with missing plunger.



5

Switch with broken plunger.