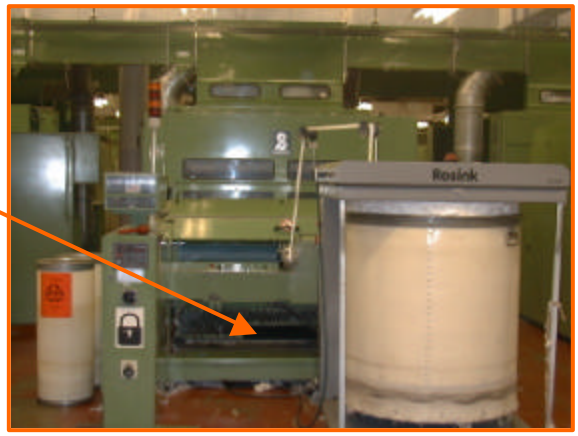
PLAYING IT SAFE WITH CARDING MACHINES

THE INCIDENT

At the **DIFCO - TISSUS DE PERFORMANCE** mill, a worker is about to clean the blades of a carding machine. After turning the machine off he bends down, opens the protector and slips his upper body into the opening above the blades to remove accumulated debris. However, due to the force of inertia, the remover/extruder roll continues to move and the worker's hand gets caught in the mechanism.



THE SOLUTION

The best way to avoid such incidents is to install an interlock switch on the protector guarding the hazardous area of the machine. The interlock switch makes the protector impossible to open until the gear wheel has stopped moving completely. Once all movement has stopped, there is a 3-second delay before the protector can be opened.

The interlock switch is operated with a key and installed on the protector. The key is removed from the switch when the protector is opened, cutting off power to the electrical circuits of the carding machine by means of self-locking contacts.

Two redundant sensors detect any movement of the gear wheel. The protector cannot be opened until the gear wheel is fully immobilized (residual energy). Authorization to open the protector can only be obtained when movement has stopped completely.

The sensors and the interlock switch are wired to a verification module, ensuring an adequate level of safety in case of failure of any electrical components of the safety circuit such as sensors.

In every case, switches are installed on the equipment with special screws that cannot be easily removed in order to avoid any attempts to bypass the procedure.

Testing was conducted on a modified carding machine at the **DIFCO** mill and results proved very conclusive:

Test 1 The protector is impossible to remove as long as the doffer mechanism is moving.

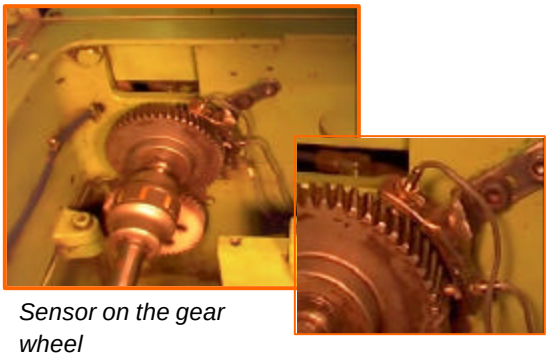
Test 2 Once the doffer has stopped completely, there is a 3-second delay before the protector can be opened.

Test 3 The carding machine cannot be turned on while the protector is open.

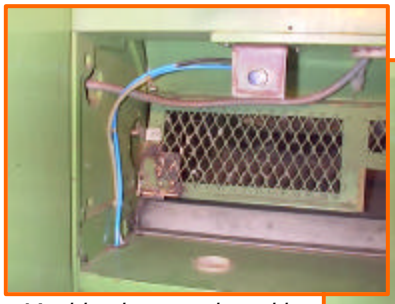
Test 4 If a sensor fails to operate, the machine still works but the protector cannot be opened.

Test 5 The machine cannot be started if the protector is not closed completely.

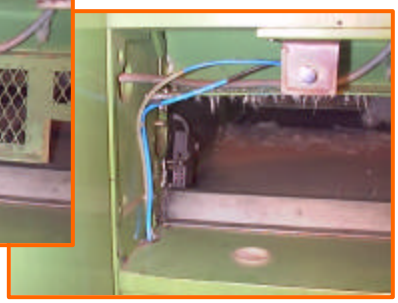
Test 6 The protector cannot be opened even if the power is turned off.



Sensor on the gear wheel



Machine in operation with protector closed



Machine off with protector opened

COST

The project involves the modification of 24 machines. **DIFCO** representatives estimate the cost of the project at ± $1000 per machine, excluding labour expenses.

INFORMATION

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REFERENCES / DOCUMENTATION

Préventex, Vol. 17 No. 3, *Protect yourself from machines*
IRSST, *Amélioration de la sécurité des machines par l'utilisation des dispositifs de protection*