

## **Electric Shovel/Hoist Slack Rope Detector** BMA – Goonyella Riverside Mine

### **The Problems**

Slack Rope Definition:

Hoist slack rope detection is used under the hoist drum on an electric shovel to ensure that slack rope does not hit the floor of the machine creating an overlap on the lagging of the hoist drum. Overlapping of the hoist drum lagging leads to cut hoist ropes which are then unserviceable. Prior to the implementation of this initiative a trip wire located across the base of the drum was used to detect slack rope.

BMA's Goonyella Riverside electric shovels were experiencing frequent false and nuisance trips due to the plastic coating on the hoist ropes coming off and catching the slack rope trip wire.

Hazards which were created by this issue include:

- Frequent trip during full swing and hoist operations towards the trucks with the potential to severely injure personal and/or damage the truck
- Loss to production due to down time for resetting the slack rope hoist detector
- Risk of injury while resetting the slack rope hoist detector as the operator was required to crawl under the hoist drum
- Maintenance staff were required to cut the plastic sprags off the hoist ropes which required them to work around and under the hoist drum

Fatal risk control protocols called for the hoist drum area to be guarded and locked during periods of operation. Guards were fitted during a major machine shutdown resulting in restricted access for operators to the slack rope detector. This necessitated both electrical and mechanical maintenance personal to attend the shovel to reset the slack rope detector thus increasing the amount of downtime associated with nuisance trips.



Rear of hoist drum area where operators accessed slack rope detector



View of the restricted access to the slack rope detector

## 2008 QUEENSLAND MINING INDUSTRY HEALTH AND SAFETY INNOVATION AWARDS

---

### **The Solution**

Darren Franklin, an operator on the 4100XPB Shovel at Goonyella Riverside identified the risks associated with the slack rope detector and submitted a proposal for modification to eliminate the hazards and lost production time.

The primary achievement of this project has been the implementation of a hard engineering control which eliminates the risk of exposure and potential injury to employees when resetting the slack rope trip switch. Furthermore, it offers more sturdiness and sustainability than the previously employed trip wire and enables stakeholders to effectively manage the situation while continuing to remain compliant with Fatal Risk Control Protocols.

The new slack rope switch consists of a spring mounted roller which sits under the drum. When a slack rope occurs, the roller is be pushed down by the weight on the ropes and the movement is detected by proximity switches mounted on either end of the roller. When a slack rope is detected, the slack rope alarm is activated to stop any further hoisting from the cab by the operator.

The new mechanism is robust enough to not only handle being tripped by lose pieces of plastic from the ropes it can also handle a fully slack rope meaning it does not require maintenance in the event of ropes slacking.

The reset switch is able to be reset from outside the guarding, has a spring return on either end making it more flexible and far more accurate as well as a bypass switch external to the drum. The external reset box has been placed where users can obtain a full view of the drums allowing the reset process to be time efficient as the operator is only required to walk to the switch, view the drums, confirm procedure and reset.

A trial was conducted for approximately 4 months with the detector now permanently installed on two shovels. The project team are currently measuring and fitting a third shovel.

Since the introduction of the slack rope detector, no new hazards have been identified.

## 2008 QUEENSLAND MINING INDUSTRY HEALTH AND SAFETY INNOVATION AWARDS

---



Front of drum. Slack rope roller floating each end on springs with proximity switchers fitted to each end



View from above rear swing TX, looking down upon the right hand side of the detector

### **Benefits/Effects**

Since the installation of this control, there have been no false trips recorded eliminating the potential risk surrounding operators entering the loaded hoist drum area and reducing the potential number of trips that would see a loaded bucket hit a haul truck.

### **Transferability Across Industry**

This innovation can be applied to a variety of other locations including other shovels and draglines, with the potential to also apply it to any piece of moving equipment where components become slack such as conveyor belts.

BMA's Blackwater Mine is intending to fit the Shovel Slack Rope Detector during an upcoming shovel shutdown and National Plastics (installer of the roller and shaft) are promoting this mechanism to other mines.

### **Innovation**

The shovel slack rope detector was an initiative of Shovel Operator, Darren Franklin who worked closely with Graham Dix and Wave Engineering to create this control which has many innovative aspects in its design.

The mechanism offers a spring either end, dual proximity switches to record movement at either end and a bypass switch which feeds to the PLC enabling the machine to be stopped briefly while the situation is assessed, managed and the switch reset.