



Industry &
Investment

MINE SAFETY

INVESTIGATION UNIT

Fatality of a truck driver
loading from a surface bin
18 February 2009

The incident

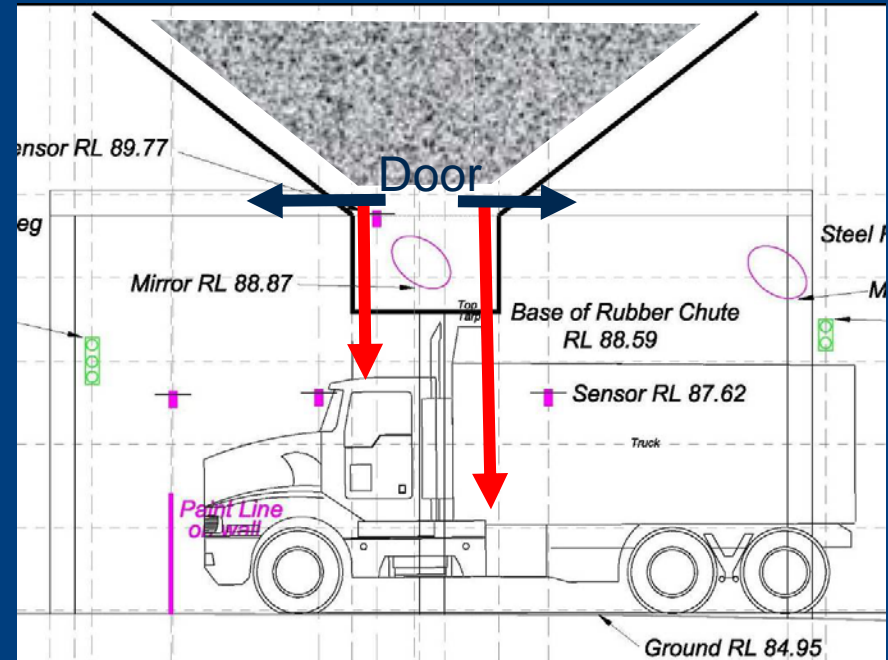
- *What happened*
 - Unintended operation of the bin door before the truck was in the correct loading position.
 - Electronic control system did not detect the truck out of position.
- *Result* - Truck driver crushed inside the fibreglass cabin of a road registered truck and dog trailer vehicle.
- *When* – about 2:30am
- 18 February 2009
- *Where* – loading rock waste material from underneath a 500 tonne capacity storage bin, Hunter Valley, NSW.



Post incident simulation of a similar truck located in the correct loading position under the bin door and chute

The incident

- The fibreglass cabin roof of the truck collapsed onto the truck driver located in the drivers seat as a result of 10 tonnes of rock material being released in 2½ seconds from a bin door located 2m directly above the cabin roof.

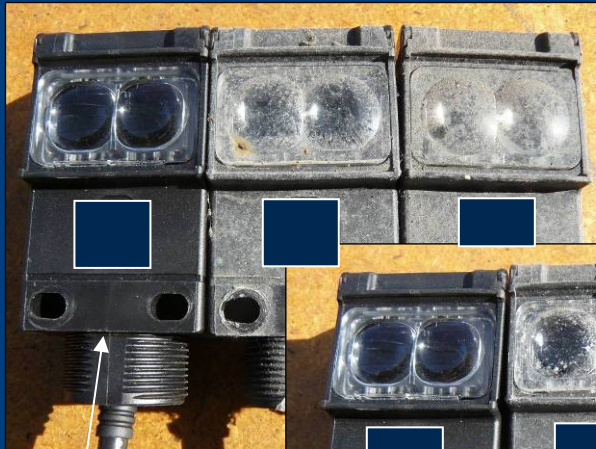


The result

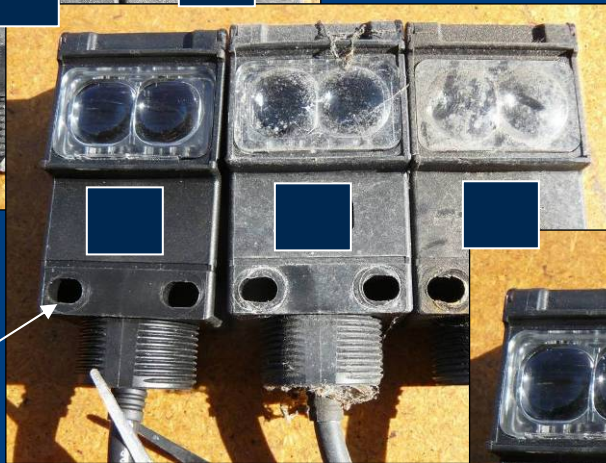
- The fibreglass roof of the cabin failed to withstand the dynamic loading of rock material falling onto the roof from height



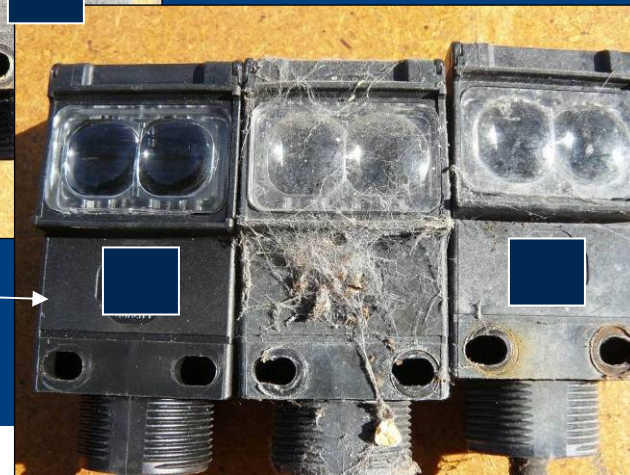
Testing of the photo electric sensors compared with new sensors



Row One sensors were 17.6% more degraded by dirt build up when compared to new sensors



Row Two sensors were identified post incident as being operational but were continually blocked by dirt



Row Three sensors were only 0.6% more degraded by dirt build up when compared to new

New sensor

Causal factors

- Functional Safety Design of the electrical control system.
 - PLC control system was not built to functional safety standards
 - PLC could not distinguish between a blocked sensor or a truck in position
 - PLC could not detect a fault or carry out periodic checks so that a fault was detected before the next demand placed upon the safety function.

Causal factors

- Inspection, Testing and Maintenance of the electrical control system
 - The photo electric sensors were not kept clean
- PLC Control system
 - The traffic light stop/go system indicated 'green' for OK
 - The bin door could open with a truck cabin underneath
- Final Barrier:
 - The road registered truck did not have a falling object protection system (FOPS). The final protection barrier, the roof canopy over the driver, failed to protect the driver.

Post Incident Actions

- Functional Safety assessment.
- Truck with FOPS cabin put in use
- Truck reverses under bin
- Cabin never goes under bin door
- PLC time out device installed
- Extra area lighting
- Hydraulic isolation devices added
- Remote control holders in truck cabin.
- New inspection and maintenance procedures
- New shift pre start documents
- Shift inspection and cleaning of safety critical components



Post incident loading by reversing of FOPS cabin truck under chute

Best practice

- Fit for purpose truck type selection to ensure cabin FOPS can withstand an unintended dynamic loading incident.
- Assess the functional safety integrity of bin control system to understand the system limitations
- Functional safety integrity includes appropriate inspection, testing and maintenance schemes for the control system.

Australian Standards

- AS 4024 -2006 (series) Safety of Machinery
- AS 61508-2006 (parts 0 to 7)
 - Functional safety of electrical/electronic/programmable electronic safety related systems
- AS 62061-2006 Safety of machinery
 - Functional safety of safety related electrical, electronic and programmable electronic control systems
- AS 2294.1-1997 Earth moving machinery
 - Protective structures – general

Industry and Investment NSW published resources on the web site

- Safety Alerts
 - Structural Bin Failure SA07-03
 - Truck Operator Fatality SA09-03
 - Rail Loading Bin Spill SA09-11
- Legislation Update LU 07-05 Provision of electrical mechanical safeguards with appropriate safety integrity
- Technical References
 - EES001 Electrical Engineering Management Plan
 - EES011 Technical principles for the design of electrical systems at NSW Mines
 - MDG 15 Guideline for mobile and transportable equipment for use in mines
 - MDG 15 Pre-publication draft amendments No 2