



# SAFETY ALERT

Doc No: SA-0073



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| <b>Machine</b> | <b>Longwall Shearer / Roof Support (Shields)</b> | <b>Area</b> | <b>Shearer Initiated Shield Control - SRB serial tracking</b> |
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| <b>Approved By</b>   |             | <b>Date:</b> |              |
| <b>Distribution:</b> |             |              |              |
| All End Users        |             |              |              |

Shearer initiated shield control, termed **SRB (Shearer Running Batch)** in the Bucyrus PM4 and PMC-R shield control systems, allows the automatic advancing of shields relative to the position of the shearing machine as it traverses the longwall face.

When used in conjunction with the Bucyrus EL series shearer, the primary method of transmitting face position to the shield control system is by what is termed **SERIAL TRACKING**, whereby the shearer face position is passed to the shield control system via a data communications link.

## INCIDENT

A recent incident occurred in an underground longwall operation where the failure of the position sensor mechanical drive on an EL series shearer caused the incorrect transmission of face position to the shield control system.

SRB operations were inactive while the shearing machine completed a face end cutting sequence. On initiation of SRB, the actual shearer position was 10 shields behind the communicated position and the shields commenced their advance sequence based on this communicated position (10 shields forward of the expected start point). The first shield to advance did so behind the shearer lead drum. SRB was promptly cancelled by an operator, avoiding collision with the shearer lead cutting drum by subsequent shields advancing.



## CIRCUMSTANCES

- SRB initiation relies on the sensed shearer position to establish control zones, safety zones and the shield advance sequence.
- The shearer position sensor mechanical drive failed to an intermittent state, allowing a variation between the actual and sensed shearer position.
- The variation between actual and sensed shearer position occurred when SRB operations were inactive. The Shield control system does not monitor spurious shearer position input when SRB is inactive.
- The variation between actual and sensed shearer position was not identified prior to SRB initiation.
  - The communicated shearer position is identified face wide on every shield control unit, displaying the shield number located at the centre line of the shearer.
  - The shield located at the centre line of the shearer is also identified by continuous illumination of the red jumbo LED
  - SRB initiation is restricted to a set number of shields located about centre of the shearer. Flashing “L” key (PMC-R) or “I” key (PM4) on the shield control units identify this initiation zone
  - The SRB initiation zone was set to 8, defining 8 shields either side of the shearer centre (17 total) for SRB initiation. The red jumbo LED identifying shearer centre would have been illuminated 10 shields in advance of actual position and the initiation zone, signified by flashing keys on the shield control units, would have been between 2 and 19 shields forward of actual shearer centre position.
- The shearer position sensor mechanical drive failure is suspected to have been a consequence of long term arduous cutting conditions. A failure of this nature has not been recorded to date.



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## RECOMMENDATIONS

The following preventative measures are recommended to be applied by operations to mitigate the potential for reoccurrence.

- Ensure operating personnel are informed about how the shearer position is indicated on the Bucyrus shield control systems (face wide display of shield number on each shield control unit / jumbo LED display on shield at shearer centre line / initiation zone illuminated by flashing keys).
- Modify routine maintenance programs to include periodic examination of the shearer position encoder assembly internal and external mounting security.
- Should spurious shearer position be evident (lost shearer position, shearer position jumping, shearer position out of calibration to haulage control zones), examine the shearer position encoder assembly for mounting security and signs of excess wear or damage in the mechanical drive components.
- Should site operational risk assessment allow, consider limiting the SRB initiation zone. The number of shields in this initiation zone is a high level password protected parameter, set from 0 – 10. If set to 0 then only the shield identified at shearer centre can initiate SRB. If set to 10, then 10 shields either side of centre can initiate SRB (21 total). A lesser number of shields in the SRB initiation zone could aid in the identification of a change in the actual versus displayed shearer position prior to SRB initiation.
- Consider other circumstances that may result in the actual shearer position being different to that communicated prior to SRB initiation. For example accessing the shearer position sensor calibration and zero point parameters.
- Consider the impact on using a Bucyrus EL series shearer in conjunction with other shield control systems in relation to incorrect transmission of shearer position.
- Consider the impact of using alternate longwall shearing machines in conjunction with Bucyrus shield control systems in relation to incorrect transmission of shearer position.

