



Mine Safety Nets in Coal Mines

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Mapping Exercise

- To quantify the extent of the various different support zones to go with the intended re-support strategy.



Fall of Ground Events

- Falls in the belt and travelling roads resulting in equipment damage escalated.
- Falls have occurred on both seams.
- The nature of the falls appear to be gravity induced time dependant failures on bedding planes.
- Backbye falls are between roofbolts with one exception where mechanical anchored roofbolts came out with the fall in an intersection. The anchor shell leaves were not recovered but rust encrustation was still visible on the expansion nut.

Conditions

Single Shaft Complex

± 14 kilometers from the shaft to furthest working sections

Main Travelling and Belt routes aged from 2 to 25 years

Re-support of problematic areas as they occur, mainly travelling routes

Wide spacing on systematic support compared to current design

Time dependant weathering of roof and pillar sides

Minimal pillar side support

Initially nets were considered as a hot spot solution rapidly installed onto existing roofbolts



Conditions

Skin failure on pillar sides and roof unpredictable

Failures not directly linked to age

Limited access in the belt roadway

Old expansion shell anchored roofbolts damaged
in some roof falls well below the design capacity

Different rock types exposed at the roof horizon

Total exposure approximately 60km



Conditions



Zero Harm



Our strategy of addressing hot spots was not working. To responsibly approach the Zero Harm goal the hierarchy of control was applied.

- Elimination was not achievable
- Separation was possible
 - Rapid deployment (2 year completion target)
 - Full cover of both pillar sides and roof in the high use zones
 - Installation crews dedicated solely to areal cover installation
 - Define the capacity of the separation barrier

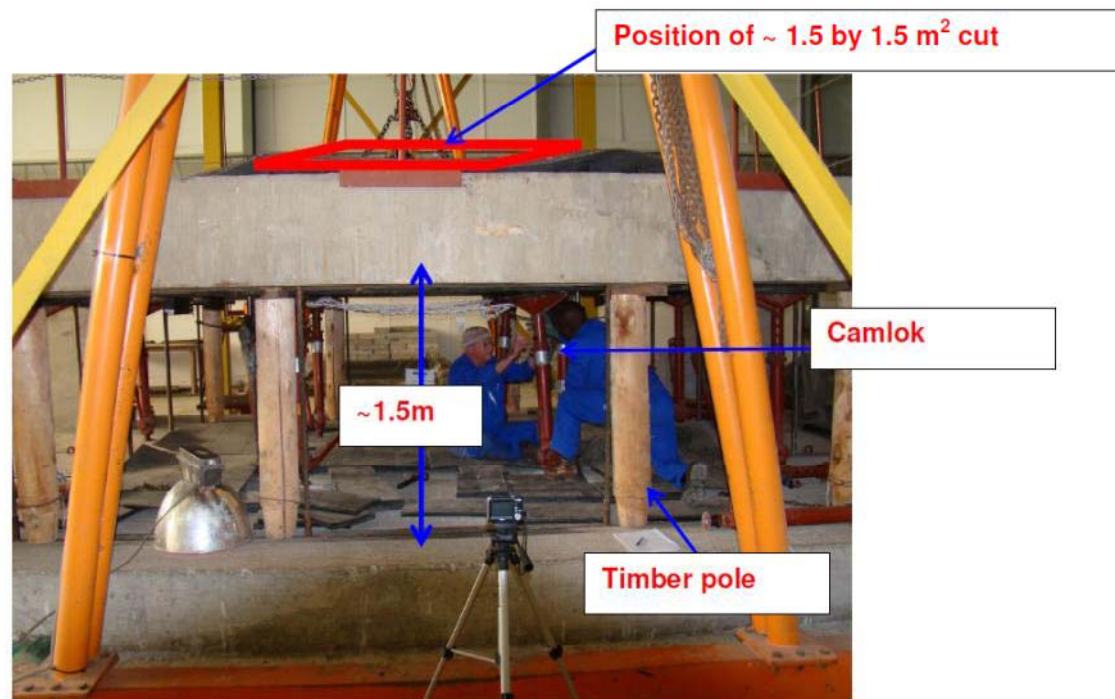
Choices for areal cover

- Thin Sprayed Liners – were previously trialed but were not satisfactory
- Conventional Mesh – difficult to maneuver in belt roads, potential handling risks
- Netting Products – in use on hard rock mines

Netting Products

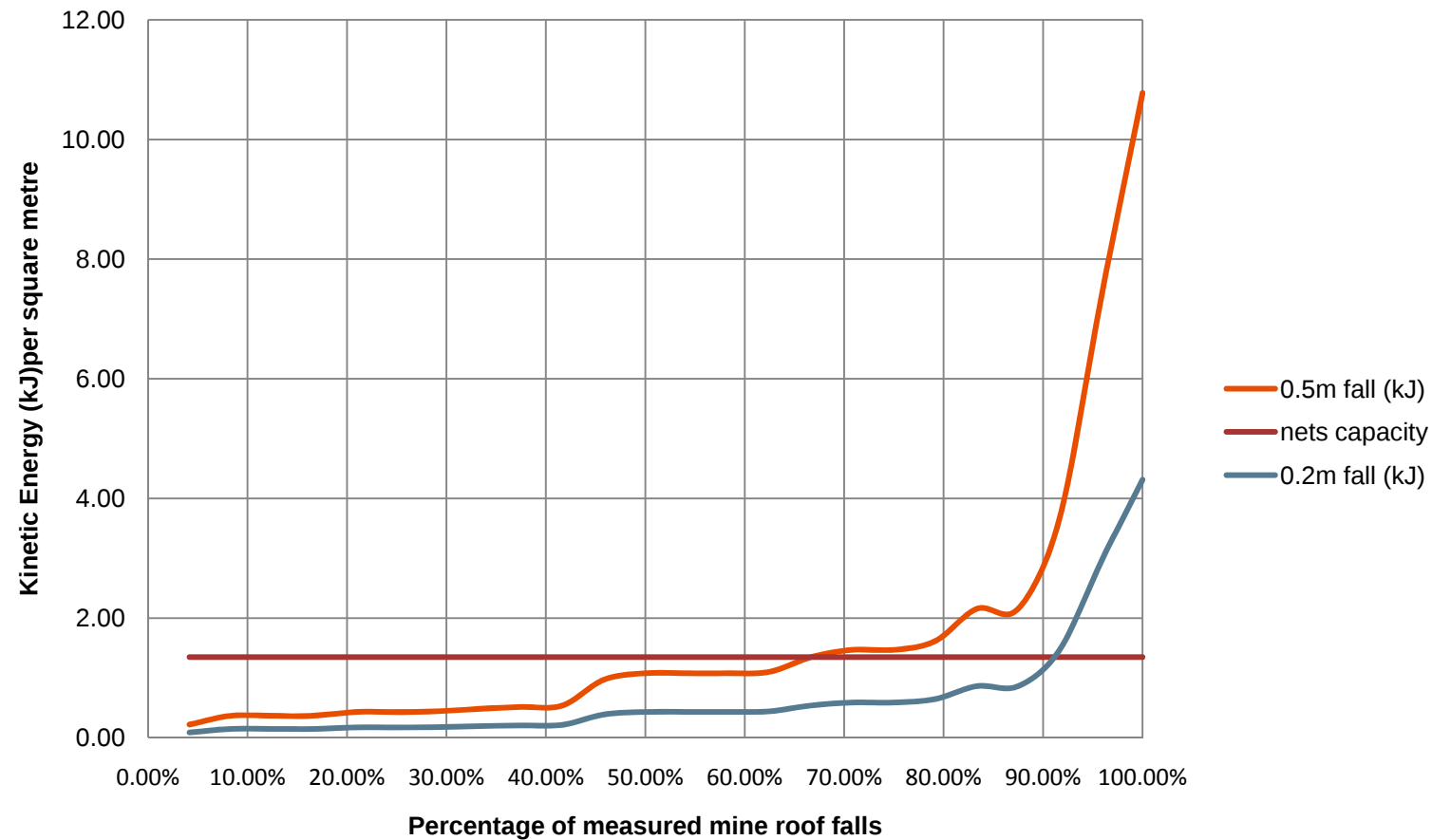
An introduction to netting products from Norsenet at the SANIRE year-end function in November 2008 enlightened the department to the possibility of using mine safety nets in coal mines.

Discussions lead to testing the capacities of various nets, as the amount of sag incurred by the net was not a problem, the normal data collected in the testing process had to be interpreted in a way that related to coal mining.



Back Analysis of Fall Data

Back Analysis of Khutala Backbye Falls



Choosing the Net

Choosing the net requires a balance of the following:

- Dimensions of fall material to be arrested (mesh size)
- Method of installation (bolted in or suspension)
- Required capacity (expected fall size from back analysis)
- Positioning of net in relation to potential fall (how close)
- Size of the net (ease of handling)



Our Design

Roof nets

- 100mm x 100mm diamond mesh
- 6mm HTPE braid with 10mm Danlines
- 10mm installation rings
- 9m x 24m net size
- 3.8m x 3m cells with diagonals
- 90% control of previous gravity falls from 0.2m



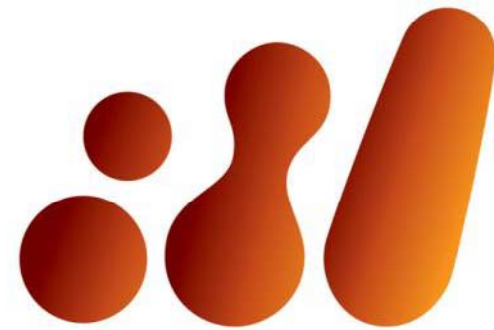
Pillar side Nets

- 100mm x 100mm diamond mesh
- 4mm HTPE braid with 10mm Danlines
- 3m x 10m net size
- 3m x 2m cells
- Control >1000kg deadweight loading per cell



Questions ?





bhpbilliton

resourcing the future