



# Light Vehicle Penetration Protection System

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**bhpbilliton**  
resourcing the future

# The Problem

## Penetration of floor pan of LV

- Hazard across the mining industry.
- Commonly (mainly rock bolts) as a result of underground development through previously mined areas.
- Several events at Cannington.



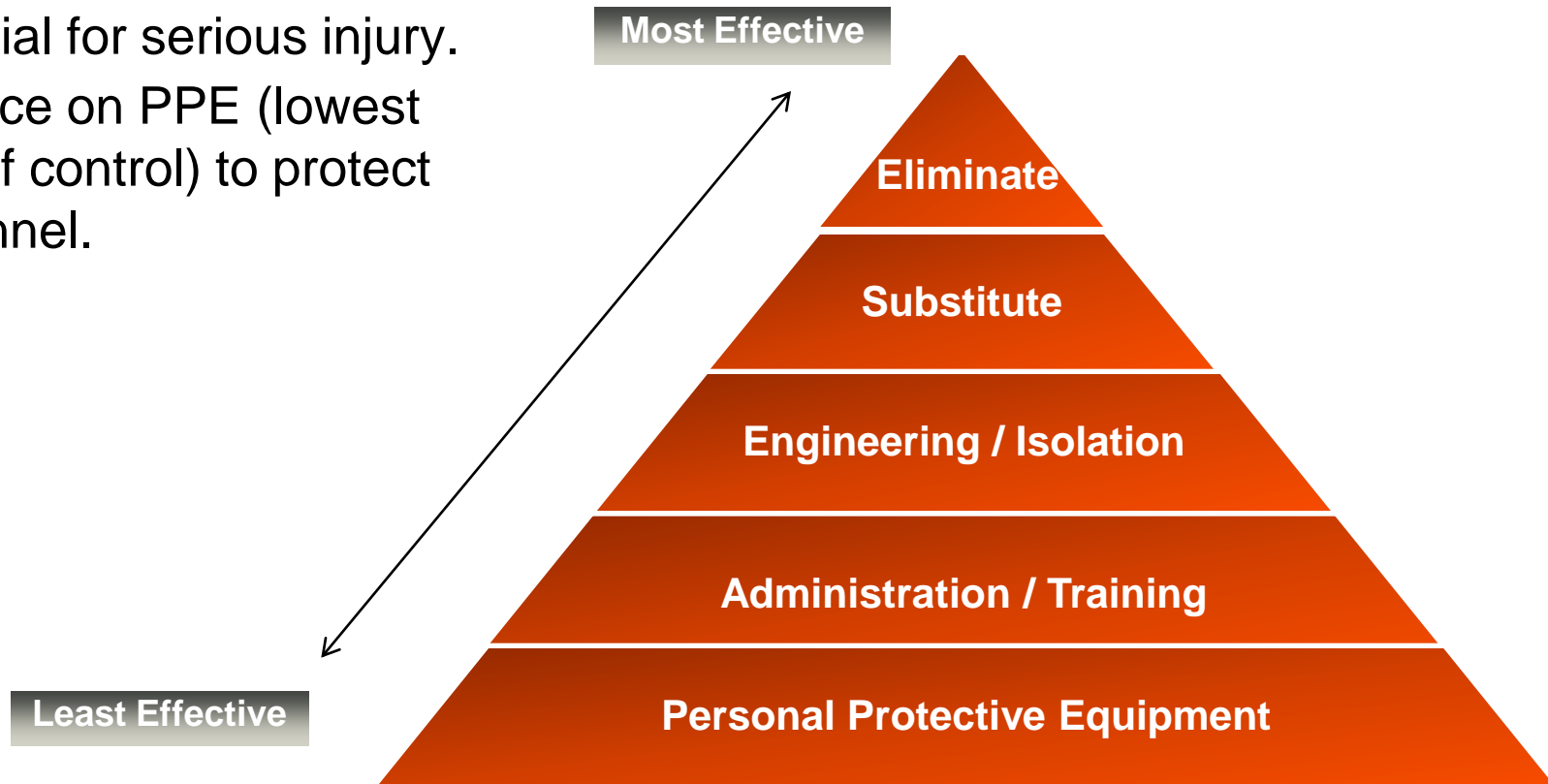
# The Problem

- This hazard is not confined to underground mining operations (any rigid object).



# The Problem

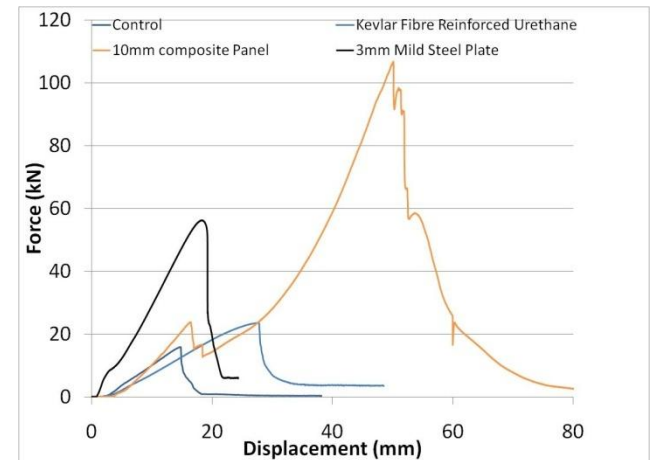
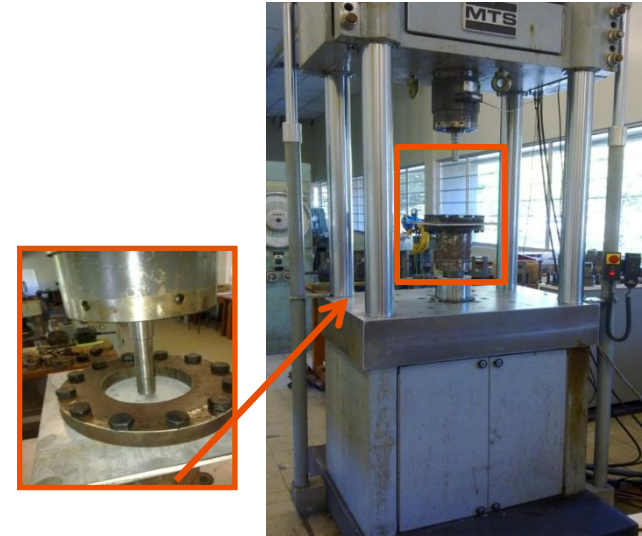
- Hundreds of reported events of rock bolts located in drives.
- Potential for serious injury.
- Reliance on PPE (lowest level of control) to protect personnel.



# The Solution

- Team of site personnel formed after significant incident.
- Determined elimination of foreign objects not feasible.
- Decision to research an engineering solution to reduce the consequence of a rock bolt impacting the floor pan of vehicle.

- No previous research into floor protection.
- Materials Selected for Testing:
  - Plate steel
  - High Density Polyethylene (HDPE)
  - Spray on Kevlar Reinforced Liner
  - Moulded Composite Panel (MCP).

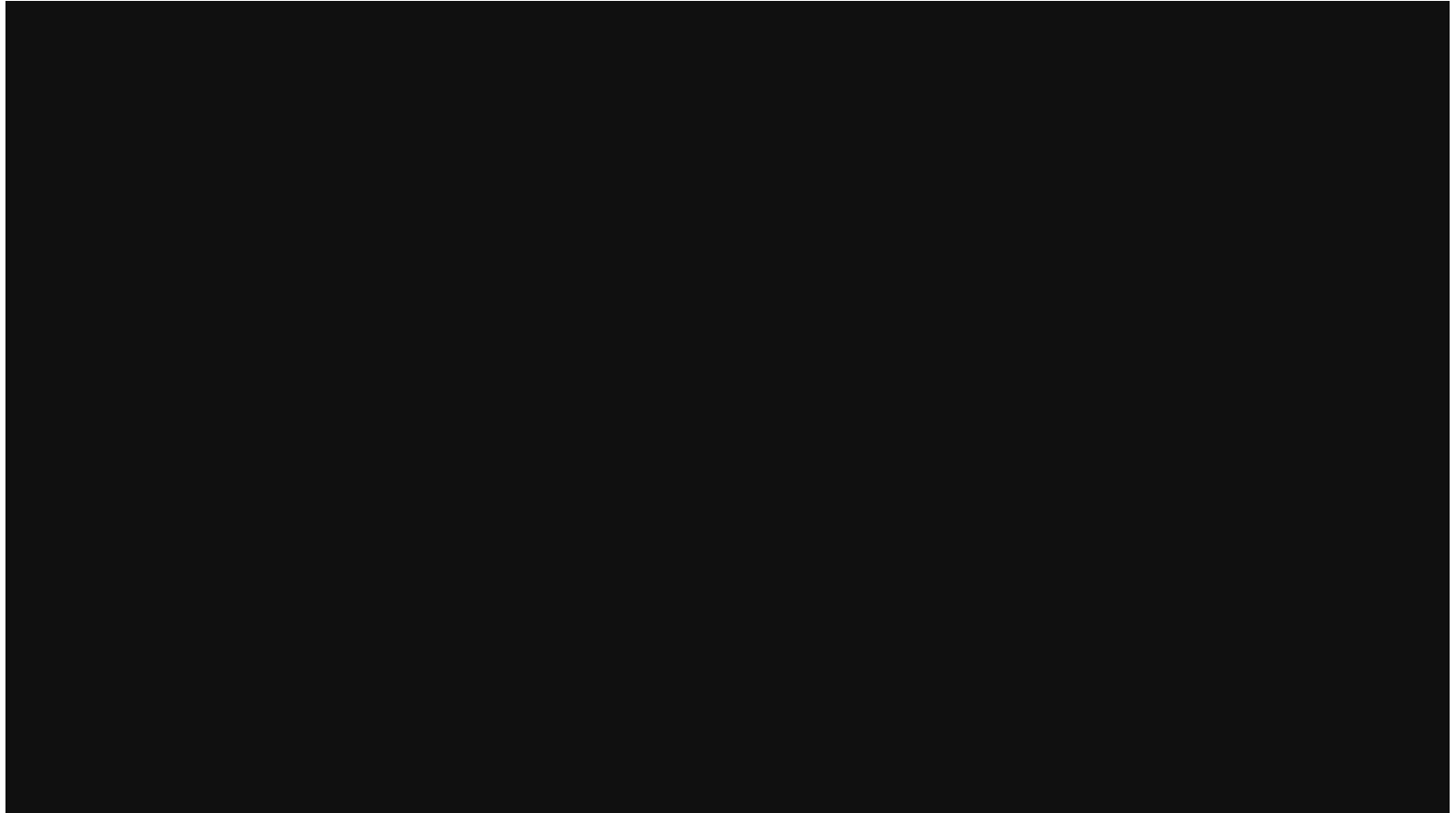


# The Solution

- Initial testing deemed the Moulded Composite Panel (MCP) most effective.
- Additional high speed testing completed on a combination MCP thicknesses and combinations.
- Tested at maximum speeds and 90 degree angle of impact (worst case scenario).



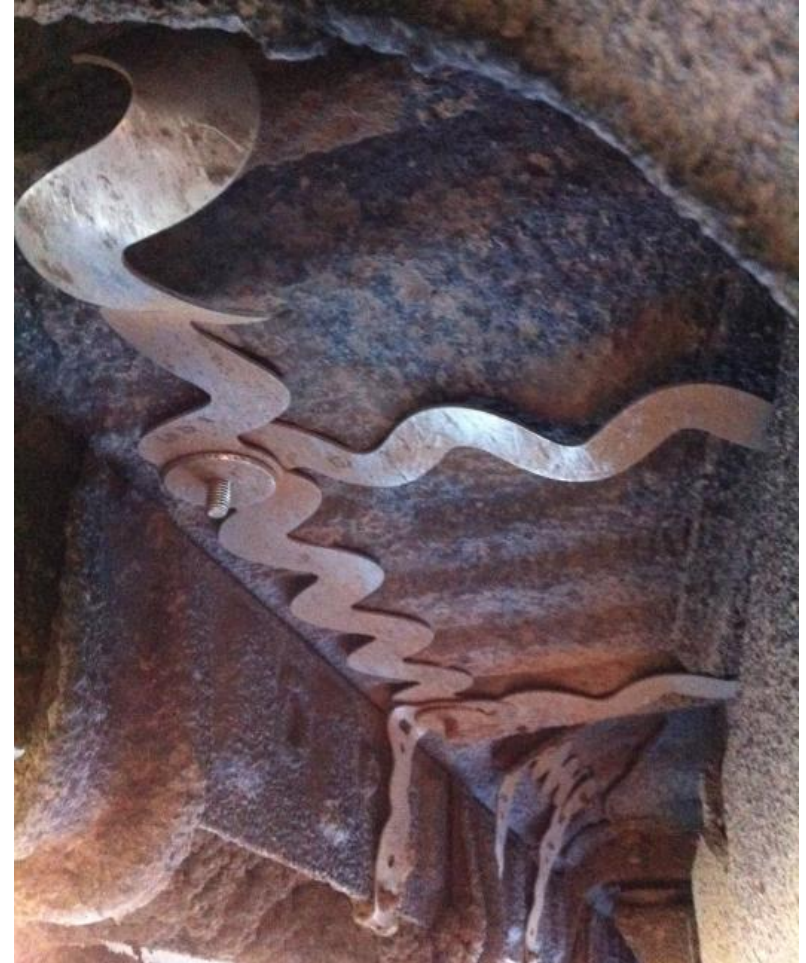
# The Solution





# The Solution - Summary

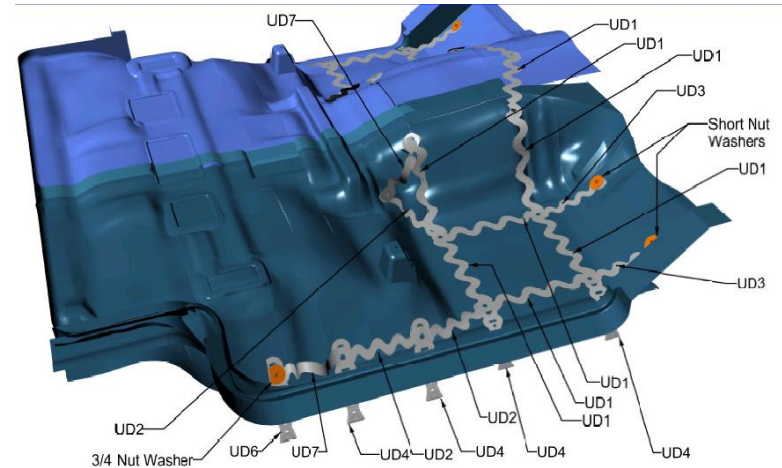
- Internal resources and external testing facility for initial research.
- Moulded composite panel.
- Manufacturer engaged through one of Cannington's key contractors.
- Panels installed on three vehicles making the LV floor pans effectively impenetrable.
- All new light vehicles will be fitted with panels.
- 24mm diameter unsharpened rock bolt will buckle before penetration.



- High severity risk eliminated for all personnel travelling in LVs.
- Investment of \$235,000 to develop innovation and supply and install the panels.
- Composite panels outlast lifetime of vehicle and can be transferred to another vehicle.

- Industry-wide problem.
- Adaptable to anywhere there is risk of rigid objects impaling a vehicle:
  - Surface mining
  - UG mining
  - Construction
  - Agriculture.

- Simple design to reduce a common hazard.
- No other examples of similar ideas being implemented in mining industry.
- Initiative to protect workmates and make for a safer work place.



# Discussion and Questions