



## ACARP matters because it boosts shovel productivity through semi-automation

Collisions between the dipper of electric mining shovels and their crawler tracks and the haul trucks they are loading are costing the Australian coal industry millions of dollars in maintenance costs and lost production. Scientists believed that semi-automating the shovels by overriding the operator's hoist and crowd joystick references was possible and would eliminate this issue. Over the past 10 years ACARP has funded a series of research projects known collectively as the Shovel Load Assist Project which, as part of the semi-automation process, have produced Track Shield, a collision detection and mitigation system developed with extensive shovel operator input. The product is now commercially available. The more complex swing and load components are nearing the end of phase two.

### Industry target

- Improve equipment productivity
- Reduce damage due to poor operator performance
- Predict equipment failure.

### Industry investment

- ACARP: \$5.3 million plus funding from P&H Mining Equipment, CRCMining and the University of Queensland
- More than seven projects since an initial scoping study in 2003.



Andrew Denman at the Bracalba Quarry where the SLAP project is being conducted.



# ACARP matters because it boosts shovel productivity through semi-automation

## Results

- Development of a collision detection and mitigation system that prevents the dipper on an electric mining shovel from striking the crawler. Track Shield has been commercialised by Joy Global P&H.
- Development of an automated loading framework, Autoload, that plans and executes the motions necessary for the shovel to swing to a truck, dump the load and return to truck.

## Return on investment

- Faster cycle time due to optimised dipper motion on swing carry and swing return – productivity improvement
- Elimination of impacts between truck and dipper and between shovel dipper and tracks – improved safety, increased availability, maintenance savings
- Consistently good material distribution in the tray resulting in improved haul truck tyre life and reduced haulage times – productivity improvement, maintenance savings
- Lower mechanical and electrical duty – improved availability, maintenance savings
- Improved operator performance by reducing operator fatigue, bringing poor operators up to the upper quartile and providing operators with more time to manage the dig face – improved safety, productivity improvement, maintenance savings.