

# THE SLOPE STABILITY RADAR ENABLES COAL MINES TO KEEP PEOPLE SAFE AND OPTIMISE PRODUCTIVITY

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The stability of open cut mine walls is a critical safety issue. However, it is difficult to identify the start of an instability event or to predict its progression from signs such as visible cracking, audible creaking or increased rilling of spoil. In addition, the temporary nature of highwalls and low-walls in strip mining means that traditional mitigation measures such as buttressing are not always feasible. Conservative approaches to wall stability can affect productivity, but liberal approaches could put people at risk. An accurate, robust and continuous monitoring system was needed to manage this safety and production risk.

ACARP's initial investment and associated industry engagement led to the resolution of this challenge.

## Industry target

- Keep people and equipment safe
- Ability to maintain production schedules
- Early warning of dangerous mine wall conditions
- Development of a remote monitoring system that continuously measures slope stability in all operating conditions
- Although originally targeting highwall mining, it was recognised that a remote monitoring system could also be used to monitor low-walls (spoil piles), in-pit benches, and general highwall stability.
- Radar and digital photography images are transferred from the radar site to the mine office via radio telemetry link
- Ability to display time-history of the movement of any selected points or regions on the slope
- Successful field trials at Moura, Drayton, Callide, Hunter Valley Operations, and Tarong mines
- Improved knowledge of the behaviour of rock slopes at Australian coal mines.

## ACARP industry investment

\$500,000 on 3 projects over 9 years

## Research results

- Commercialisation of the slope stability radar (SSR) system
  - Provides mine managers and geotechnical engineers with a comprehensive and continuous picture of slope movements, as movements develop, and over defined time intervals
  - Threshold alarms can be set at the radar site or mine office

## Return on investment

- Ability to keep people safe
- Mine managers can meet their statutory obligations to accurately assess the risk of slope failure in active pits
- Foundation for further technological innovation
  - GroundProbe now has three types of radar and two types of laser technologies that can address different mine site requirements, plus the technology is emerging for underground coal mines
- Industry confidence in the technology – it is used in most large open cut mines in Queensland and New South Wales.

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## Importance of ACARP

- Provided seed funding and industry engagement, initially with University of Queensland and then GroundProbe, to develop a proprietary, patented solution to a critical coal industry issue
- Access to the industry's technical experts in tier one mining companies (across multiple sites) and the industry's leading geotechnical engineering consultants enabled the researchers to understand what the key issues were and to develop a practical solution that addressed industry's overall requirements without the need for customisation for specific operating environments
- Provided further funding as different mines leased the SSR at the end of the ACARP project. This enabled the technology to be developed into a commercial product
- Led to the development of a new business – GroundProbe Pty Ltd – which is now servicing the Australian coal industry's mine wall monitoring needs on an ongoing basis. Today, GroundProbe has over 180 staff, is operating in more than 29 countries, has 11 business units and 12 support offices, and is now owned by Orica
- Application of SSR in Australia led to the technology being applied around the world and across different mining commodities.



GroundProbe slope stability radar (Photo courtesy of GroundProbe)