LASC TECHNOLOGY – BENEFITS TO INDUSTRY

1. Longwall Automation System (LAS) - Software quality improved to industry standards with new control strategies developed and tested.

Benefits: Concentrates on the production of robust software, which is the key to successful commercialisation of Landmark outcomes. The software has been extensively tested during production at two mines. In addition, limited implementation of automation systems has been conducted at a third mine providing access to the technology for another coal company and the third major equipment manufacturer. The commitment of these sites to be a part of Landmark continuation trials through the purchase of prototype hardware and software products has a great benefit for the project and industry at large.

2. Shearer Position Measurement System - Enhanced capacity INS-based system implemented with resolution suitable for real time horizon control and face straightening.

Benefits: Targeted resolution of 25 mm for horizon control and 50 mm for face straightening has enormous benefits to operations in terms of productivity, engineering performance of face equipment and dilution control. This is being achieved through development of a real-time survey function for the INS in a joint project involving CSIRO and Northrop Grumman in the U.S.

3. Horizon Control - Development and demonstration to production standard:

a. Enhanced horizon control compatible with OEMs' control systems
b. Optical marker band
c. Controlled traversing cut for a pre-determined path

Benefits: This outcome addresses the completion of a suite of horizon control outcomes achieved in the Landmark project. Component (a.) will result in fully Landmark-compliant robust interfaces on DBT, Joy and Eickhoff shearers.

The concept of optical marker band detection was proven in underground trials in the Landmark project. Component (b.) will form one of a suite of horizon control tools available for mines as inputs to the CUT model for shearer horizon control.

One of the most significant outcomes of the Landmark project was the demonstration of the use of infra-red cameras to follow face banding. The development of this outcome in component (c.) will allow an operator to "dial up" a face profile he wishes to cut with respect to either face banding or distance below roof stone.

The controlled traversing cut in component (d.) will allow an operator to set the cut paths of the shearer in 3D space. This has significant advantages to a site that is traversing a fault or that is working in a thick seam with no consistent marker band for horizon control.

4. Technology Development – Development of Landmark-compliant technologies for:

a. Gateroad convergence and shield pressure and convergence monitoring to production standard
b. Coal flow optimisation and void detection to prototype standard

Benefits: One of the work areas in the Landmark project was to examine outcomes involving production consistency. This was an issue that was addressed in automated systems having fewer personnel on the face to monitor face activity not directly involving extraction. A gateroad geotechnical monitoring system was prototyped with the use of multiple sensors that would give continuous monitoring of maingate convergence to an accuracy of about 10 mm. This allows a 24 hour response if excessive convergence occurs. Maingate falls typically cost mines 6 weeks loss of production per incident, excluding costs of equipment damage and safety exposure of the workforce. This tool will significantly reduce this risk.

An integrated system of shield pressure monitoring allows operators to adjust face operation and equipment to deal with exception issues in a timely manner to prevent face deterioration or to enable repair of hardware as required.

Monitoring and control systems developed for face automation also allow mine wide coal flow to be effectively monitored. Integration of face coal-flow information such as blockup detection with other outbye monitoring systems will improve production consistency from the face to the stockpile.

Effective void monitoring is a necessity to allow for a man-less face to be operated with confidence if there are geotechnical issues.

5. Information System - Developed and demonstrated production standard information system for:

a. Face management

b. Operator Interface

c. Data Management

d. Training Simulator

Benefits: The Landmark Information System is the link between the automation system and the rest of the mine enterprise. It provides an accurate 3D representation of the working face in real time that can be delivered at underground, surface or remote locations. In addition at any of these locations, control information can be input, a large range of exception reports can be accessed and historical information including the full historic 3D cut model may be accessed

Longwall automation brings many opportunities to operate the face in different ways that may be beneficial for face control and productivity. The face may be shaped in a

convex manner for control of cavities. The minimal use of face personnel may allow Bi-Di cutting where only Uni-Di was available because of dust issues etc. The information system is the tool by which these opportunities can be realised through the automation system.

An effective training simulator will allow Landmark outcomes to be realised through operators by allowing a safe training environment with minimal or no impact upon longwall production.

6. OEM Commitment – Secure ongoing commitment from participating OEMs to adopt Landmark Longwall Automation standards into their core products.

Benefits: The Landmark longwall automation products are not stand-alone. They must be integrated with existing and evolving systems produced by other mining OEMs. This work is essential to enable effective commercialisation of all other Landmark outcomes.