

MineSuite

Fine-tuning Key Performance Indicators

South Australia's only coal mine, Leigh Creek Coalfield is 550 km north of Adelaide. The mine is owned and operated by NRG Flinders, a subsidiary of US-based NRG Energy.

The mine delivers 3.4 million tonnes of brown coal per year to the Northern Power Station at Port Augusta. To uncover this coal, 17 million cubic metres of waste is mined using terrace mining methods. The movement of overburden is under constant review to ensure that efficiency is maximised throughout the operation.

A project to improve the production rate of the primary overburden mining fleet was initiated in January 2004, and has shown promising results to date. The primary overburden fleet at Leigh Creek consists of a P&H 4100A electric rope shovel and Unit Rig 240 tonne haulers.

The project focused on closely monitoring the factors affecting the 4100A shovel production. In general, production is a combination of two factors:

- the ability of the machine, operator and production crew to attain the required dig rates when working; and
- total time that the shovel is actually working per shift.

Conventional collection and reporting of information for production equipment at Leigh Creek is via hand-written sheets from the mining crews, manually entered into a 'Prod Stats' database. Although this system is generally a good one, it is also open to data collection errors.

- Inaccuracy of booking times for events and downtime given that the minimum resolution manually recorded is 0.1 hrs (six minutes).
- Human error associated with incorrect data recording from the field or errors with manual data entry into the Prod Stats database.
- Inherent summarisation of data entered. An example is the calculation of production crib (lunch) breaks. Drivers and operators log start and finish times, with no account for actual production time lost due to travel to and from breaks and the time for the equipment to get back into normal production rates.

To improve the collection and reporting of key production data, the MineSuite Production Tracking System has been installed and is currently undergoing final commissioning. Several components of MineSuite have been used to collect the data required for the 4100A shovel production improvement project.



MineSuite hardware, including Graphical Touch Screen (above), Remote Processing Unit and low precision GPS, has been installed on the primary production equipment which consists of five digging units and 13 haulers. Data from the field is sent to base using a dual repeater 4800-baud radio system to make information available in real time, back in the office.

Historically, numerous KPIs are assessed for production statistics, but the production performance of the 4100A shovel and operators is measured by one major KPI:

Production rate BCM/hr - the cubic metres of material moved per hour that the shovel is operational.

During the first month of the project it was evident that the production crews at Leigh Creek could consistently achieve the required target dig rates for this shovel and that the real challenge was to maximise the total amount of time per 12-hour shift that the shovel was operating.

To achieve this aim, it was necessary to reduce total downtime associated with the scheduled operational delays, including start of shift pre-start checks, crib/smoko and end of shift shutdown.

To properly assess lost time associated with these shift breaks, new KPIs were established to represent actual loading times rather than summarised minutes lost. These new KPIs are measured by the actual clock time when the full haulers 'kick away' from the shovel. The time represents only the actual productive time for the shovel rather than including unproductive 'non-loading' time such as walking back from face, other travel, waiting on dozing or shutdown.

Targets were generated and communicated to each of the four production crews at Leigh Creek.

The MineSuite system was used on office PCs to replay previous shifts, allowing manual measurement of these kick away times.

Since only six readings are needed for any shift, the entire replay process takes generally less than five minutes, using the fast forward option (below) to quickly progress through the shift. The shift replay option can be repeated for every shift, generating KPI reports which are then fed back to the production crews, informing them of their attainment to target or otherwise.

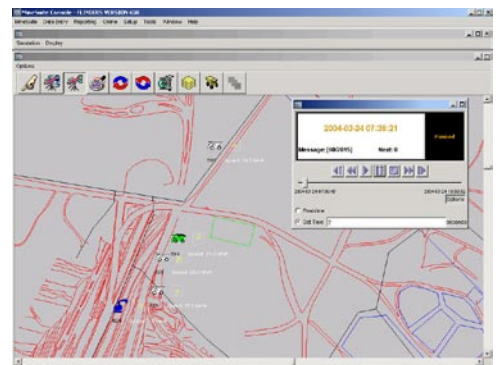
Over the three-month period from February to April, this has reduced the total minutes lost per shift due to breaks, from an average of 45 minutes down to 10 minutes. Saving 35 minutes is a substantial increase in available production time within the 12-hour shift.

Individual KPI values for the shift breaks provide valuable data on how each of the four production crews work their break changes, while also highlighting specific areas to focus on for further improvement.

This production improvement project will now be extended to the secondary production fleets; P&H 2800XP electric rope shovel, Hitachi EX3600 and Demag excavators, and LeTourneau L1400 front end loader, where similar improvements are expected.

Since it is impossible to observe all remote processes and equipment directly in a large open pit environment, supervision and management is based on KPI review. This project has shown that rolling up and summarising KPI values can in some cases, hide the components leading to those conventional measurements.

Scope exists to further examine these KPIs and fine tune them, in the same way as has been done with reporting of actual loading times. The use of MineSuite has allowed acquisition of data that would not normally be collected automatically on a continual basis.



Thanks to Michael Watson, Senior Mining Engineer NRG Flinders, Leigh Creek Coalfield

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