

Recovering Revenue Through Coal Loss Protection



Project Summary

BUILDING ECONOMIC VALUE

In February 2003, DynoConsult began an investigation into the mechanisms of coal loss during overburden blasting.

After two and half years, working in two large open pit coalmines in Australia – a systematic process was developed to understand the site specific mechanisms and geological conditions that promote coal loss.

A two-dimensional discrete element model was developed to simulate overburden bench blasting and calibrated to the site-specific parameters of the two participating mines.

It was found that the potential economic value generated from a reduction in coal losses far outweighed the cost of preventative measures.



Background

DYNO NOBEL WINS ACARP PROJECT

Open pit coal miners in Australia recognize that overburden blasting, specifically cast blasting increases the likelihood of coal damage and loss, leading to a negative economic impact on operations.

In December 2002 DynoConsult, the consulting arm of Dyno Nobel Explosives, was awarded the ACARP Project C11051 – Controlling Block Movement of Coal During Overburden Blasting.

The project was implemented at two large open pit coalmines in Australia – Goonyella Riverside Mine, BMA, QLD and Rix's Creek Mine, Bloomfield Collieries, NSW. The work produced included industry reviews, benchmarking, modeling, validation and final reporting to ACARP.

Project Goals

MINIMIZING COAL BLOCK MOVEMENT

The key objectives of the project were to identify the geological conditions and mechanisms that promote block movement of coal (coal loss) during overburden blasting and develop guidelines to minimize the movement.

Components of these objectives include:

- A review of historical information from mines that experience block movement of coal during overburden blasting
- Identify the predominant mechanisms and geological conditions that promote the movement
- Model the mechanisms and simulate block movement of coal for different geological conditions and blast designs
- Develop and implement improved drill and blast designs to reduce coal loss
- Develop guidelines for the industry to manage/control the movement

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Groundbreaking Performance

Recovering Revenue Through Coal Loss Protection



Technology Applied

DEVELOPING BETTER BLAST SOLUTIONS

During this project a two-dimensional discrete element numerical model based on the Particle Flow Code (PFC) of Itasca Consultancy Group, USA was developed to simulate overburden bench blasting in an open pit coal mining operation.

The model was calibrated to the site-specific parameters of the two participating mines and a number of simulations were conducted to develop improved drill and blast solutions to reduce coal loss.

Based on the model simulations and benchmarking results, a number of specific recommendations were implemented for each site to minimize coal loss during overburden blasting.

The following tools were used to monitor and quantify the coal losses:

- Laser profiling to measure front row burden distances
- Application of SiroVision technology for pre/post blast surveying and survey of targets used for burden movement monitoring
- Digital still photography for highwall mosaic development
- High speed digital photography to determine movement velocity profiles
- Mine survey techniques to develop coal models for recovery calculations

Value Added

MEASURABLE BOTTOM LINE BENEFITS

DynoConsult has developed a practical and systematic process to understand the site specific mechanisms and geological conditions that promote coal loss.

Understanding the mechanisms behind coal loss and coal damage has led to significant economic benefits for the two participating mines –Goonyella Riverside Mine, BMA, QLD and Rix's Creek Mine, Bloomfield Collieries, NSW.

At the Goonyella Riverside Mine the coal edge loss during the benchmark studies was around 1.5 per cent in R13N GLS strip. The improved drill and blast solutions during the validation phase have virtually eliminated the edge loss, increasing the coal yield from this strip by 22,500 tonnes per annum.

The value of the recovered coal is estimated at more than one million dollars per annum. At Rix's Creek, the coal loss in Arties 25 seam was reduced by 42 per cent compared to the benchmark trials.

Based on the production rates for Arties 25 seam, a coal recovery of this magnitude would increase production by some 42,000 tonnes per annum, yielding additional revenue of around two million dollars per annum.



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