Through Seam Blasting

Project Summary

IMPROVING MINING EFFICIENCY

During mid 2012, a coal mine approached Dyno Nobel for assistance in applying the blasting technique of “Through Seam Blasting”. Through seam blasting improves mining efficiency by making it possible to blast through one or more coal seams during a single blast event. This is beneficial when coal seams are steeply dipping and enables blasts to be designed to a workable grade below the coal seam.

With the use of precision timing, the mine was able to recover coal in a pit that had been dormant for 15 years due to the challenge of steeply dipping coal seams.

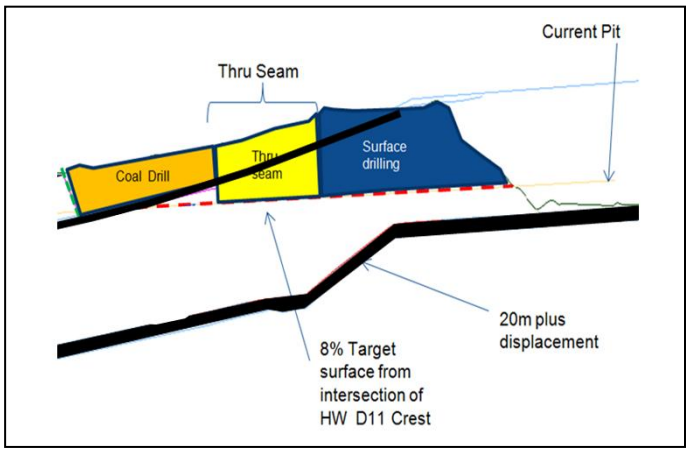
The result was minimal coal loss combined with improved mining efficiency.

Background

GEOLOGY RESTRICTS MINING IN PIT

The mine had a pit which had not been mined for many years due to steeply dipping seams caused by a fault running sub parallel to the pit. The surface left behind after mining the last seam averaged 18%. As a result, this pit has not recently been mined due to concerns over coal loss if nonelectric initiation systems were utilised. The use of electronic detonators provided the initiation flexibility to mine this area again, with minimal coal loss. Due to the steep grade, the area had to be terraced so as to create access for drilling and blasting.

Terraces established for drill and blast



Cross section of pit

Project Goals

RECOMMENCE MINING IN A CHALLENGING DORMANT PIT

The objectives of using the blasting technique of through seam blasting were to:

- Increase mining efficiency.
- Improve dig rates above the coal seam.
- Maintain acceptable dig rates below the coal seam.
- Minimise coal disturbance and dilution/loss.

Technology Applied

THROUGH SEAM BLASTING TECHNIQUE

When blasting to coal it is crucial to know the exact location of the coal seam. As through seam blasting has explosive decks either side of the coal seam an even higher level of confidence in the coal seam model is required. Gamma logging was conducted after drilling to precisely determine the location of the coal seam. Additional information was also obtained from drillers who logged the depth of coal as they intercepted it while drilling.

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Groundbreaking Performance

Through Seam Blasting

Whilst knowing the location of the coal seam is critical, the accurate placement of the explosive decks around coal seams is equally important. Load sheets that are easily understood by shot firers, along with careful loading practices, were applied to achieve the desired blast outcome.

DIGISHOT® PLUS PROVIDES THE REQUIRED TIMING FLEXIBILITY

The DigiShot Plus electronic platform provided the timing flexibility required for this project. It is capable of initiating blasts up to 9,600 detonators with a blast duration of 20s in 1ms increments.

Utilising this flexibility, the through seam blast was initiated as two distinctly different blasts. The overburden above the coal seam was initiated first with a flat centre lift chevron. The overburden below the coal seam was then initiated using a different initiation sequence at a predetermined interval after the first blast. This initiation design allowed the blast above the coal seam time to initiate and settle thus confining the coal and minimising movement and dilution while the overburden below the seam was blasted.

Top of coal after overburden removed

Value Added

THROUGH SEAM BLASTING MADE IT POSSIBLE TO RECOVER COAL FROM A PIT THAT HAD NOT BEEN MINED FOR MANY YEARS

Through seam blasting has resulted in improved mining efficiency at this mine – which should translate to a real economic benefit. It has provided a blasting option to allow mining in a pit that has steeply dipping coal seams due to faulting.

The value to the mine is:

- Minimal coal loss of a coal seam that was unable to be efficiently blasted due to the limitations of pyrotechnic detonators.
- Increased mining efficiency as a result of being able to blast to an appropriate design RL below the coal seam.
- Reducing operational costs as a result of improving mining efficiency.
- Increased dig rates for overburden mining above the coal seam.

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