Case Study
High Performance Throw Blasting
Stratford Mine, Gloucester

Site Profile

Henry Walker Eltin (HWE) are the mining contractors at Stratford mine, which is in an environmentally sensitive area near Gloucester, NSW. Normal blasting at Stratford is done in a ‘stand up’ or ‘box cut’ mode to suit the truck and shovel operations. Recently an opportunity to carry out a throw blast became available when changes in the pit geometry provided a suitable highwall blast. The objective was to maximise throw into the void in order to minimise excavation costs by reducing the amount of overburden to be moved. It was necessary that the best result be achieved while staying within the vibration and airblast limits at a neighbouring property and nearby township.

Both objectives were achieved through the application of Orica’s knowledge of blast design, modelling and i-kon™ electronic detonators.

The Situation

This section details how Orica and the customer At Stratford a high performance throw blast was designed to simultaneously maximise throw, taking into account the angled face and irregularities (Figure 1), and the need to minimise the risk of vibration or airblast exceedance as well as wall damage.

The i-kon™ system was the first choice for this blast because of its known benefits in cast blasting and environmental control. The i-kon™ system provides the blaster with much greater accuracy, control and the ability to produce more consistent results. It has been found to enhance blast throw and provide cleaner high walls.

Blasting Issues

This throw blast was different for several reasons, namely:

- The high level of trust by the customer who relied on Orica to do the right thing and take care of all the blasting related issues and risks.
- The blast face had not been presplit and had a number of irregularities.
- The front row to be drilled with average burdens of 10.5m, much larger than typical throw blast burdens.
- The need to produce clean back and end walls in the absence of pre-splitting, as the important western ramp would run directly around the blast edges.
- There was no echelon free face to fire from.
- The control of blast vibration and airblast was a major issue to a nearby residence and Stratford township.

Technical Solutions

In order to maximise throw efficiency given the inclined face a blasthole angle of 20° was used. Prior to the blast, a buffer of loose material was dozed over the face in front of the coal to minimise coal edge movement/loss (Figure 2). The blast was loaded with Fortan™ Coal 12 and Fortis™ Coal.
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Figure 2: Schematic view showing the model predicted contours of apparent blast energy concentration being channelled away from the monitoring position

Two timing designs were evaluated in a statistical vibration and airblast model that calculates the effective charge weight at various locations relative to the blast. This model was used to ensure that regions of higher apparent energy concentrations were not orientated in the directions of concern to Stratford (Figure 2). The model showed that the designs were effective in channeling energy away from both zones of concern to Stratford operations - i.e. the nearest residence to the east and the town of Stratford to the west. Further precautions were taken to initiate the blast from east to west, to allow screening by earlier firing holes in the direction of the residence.

For wall control at the back and western edges of the blast, further modifications of timing were made in both the back row and edge holes. A more conservative timing design was used in these areas, again to ensure wall control at the expense of some forward movement in these zones.

The blast design was formulated in ShotPlus™-i and downloaded directly to the i-kon™ loggers. The deployment of i-kon™ proceeded very smoothly and caused no delays to the loading or firing procedures. It was enthusiastically accepted by the HWE blast crew.

The Result

The blast was a spectacular success, producing an average throw to final spoil position of 37.5% across the blast (Figure 3), with a maximum throw of 45% in the central region. There was no environmental exceedance of permitted vibration or airblast levels. An average swell factor of 1.4 was achieved due to the availability of void in front and the muckpile fragmentation and profile. In addition, high speed filming showed that the coal edge had remained largely in place, indicating minimal coal loss. The results exceeded the expectations of HWE Stratford and a cost saving of more than $110,000 from this successful blast was achieved.

Figure 3: Blasted muckpile showing excellent surface fragmentation

Acknowledgements

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