The Situation

Winstone Aggregates’ Hunua Quarry is New Zealand’s largest operating quarry. The quarry produces over one million cubic metres of crushed rock annually for the Auckland and North Island road and construction markets. The quarry sits nestled within the Hunua Gorge shielded from neighbours, only a one-hour drive from the Auckland Central Business District.

Mining Issues

Hunua’s impressive greywacke deposit is a mixed bag of hard and soft rock types with numerous faults (slippery backs) tracing throughout. The variable structure and geology coupled with the dominant faults has caused a number of issues with backbreak from blasting activities. Typically, where faults run perpendicular to blast faces, backbreak can be up to 10 metres due to blast energy travelling back along the ‘slippery backs’, causing access issues on the narrow haul roads through slumping and humps.

While numerous trials had been conducted to assist the Quarry Manager with backbreak, including down loading of blastholes, reduced blast size and variable timing, it was not until a trial with i-kon™ that the quarry saw real improvements in the management of blast related back break.

Technical Solutions

A trial with i-kon™ was conducted at Winstone’s Hunua Quarry where a blast with two major faults and a smaller one in the centre of the blast was the challenge that lay ahead. The width of the haul road was crucial, as any loss of the haul road through backbreak would result in the loss of access for haul trucks. Through the use of novel electronic timing, the blasting engineers designed the blast timing so as to ‘push energy’ into the faults, rather than along them, and thus reduce the effect of gases and explosive energy destroying the final walls. In effect, the idea was to ‘cut like a knife’ along the back of the blast, by using the initiation design to work with the fault orientation, rather than against them.

The Result

The trial was an outstanding success with no backbreak at all resulting in a fully maintained haul road. Upon firing, the piles of drill cuttings were noted at the back of the blast indicating where the original blastholes had been located. These are normally always lost, this being a significant success indicator of the trial. Plate 2 (right) shows the resulting final wall, and lack of backbreak.

Testimonial

Following the success of the trial, Winstone’s Hunua Quarry Operations Team Leader has recommended that all blasts in high-risk areas be fired with i-kon™ to ensure the integrity of the final wall.

Acknowledgements

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