

Signature Hole Analysis & DigiShot® Plus Reduce Blasting Complaints



Project Summary

MATCHING DELAY FIRING TIMES TO THE LOCAL GEOLOGY ELIMINATES NEIGHBOR COMPLAINTS WHILE IMPROVING PRODUCTIVITY

At this Powder River Basin coal mine, pit development was moving blasting operations closer to an adjacent community. Blast event complaints and concerns over blast effects threatened to cause this western coal mine to have to look at radical changes to their blasting program.

Signature Hole Analysis (SHA) was used to determine optimal delay firing times for the local geology to minimize blast induced ground vibration. DigiShot® Plus programmable electronic detonators ensured the desired delay timing is achieved for each blast event. Since the implementation of SHA, complaints from the neighboring community have disappeared.

The effectiveness of the SHA process with precision electronic detonators was confirmed when the mine reverted back to traditional nonelectric delays for a month. The blast related neighbor complaints returned for about a three week period until alternative timing sequences and electronic initiation was re-introduced, at which time complaints from neighboring property owners ceased immediately.

Background

INCREASING COMPLAINTS AND CONCERNS OVER COST CREATED A CHALLENGE FOR DYNO NOBEL

As blasting operations advanced closer to nearby residents of this western coal mining community, the mine staff came to Dyno Nobel to provide a solution that would reduce the blast related community ground



digishot[®] plus
electronic initiation system

vibration effects footprint and minimize or eliminate complaints that were increasing the risk of possible litigation or regulatory restrictions to blasting operations.

With concerns over cost, the solution could not result in an increase in overall drilling and blasting costs to the mine. This is a common customer request, however, many mining operations find it difficult to place an actual value on time and effort related to handling blast related complaints.

Project Goals

REDUCING OVERPRESSURE AND VIBRATION EFFECTS ON THE COMMUNITY WHILE INCREASING PRODUCTIVITY

While minimizing community impact was the primary goal at this mine, controlling mine production costs required a more complex solution. Any increase in blasting expenses with the use of electronic initiation had to be offset by improvements in productivity and efficiency that would offset any potential mine production cost impact.

By using Signature Hole Analysis, it was planned that no changes would have to be made to the basic blast plan, minimizing the need for wholesale changes that would involve the engineers, drilling crew and blast crew. The solution was designed to be simple with only introducing DigiShot Plus and taking advantage of SHA software to

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Groundbreaking Performance

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determine better blast initiation delay times both along each row and between the rows.

Technology Applied

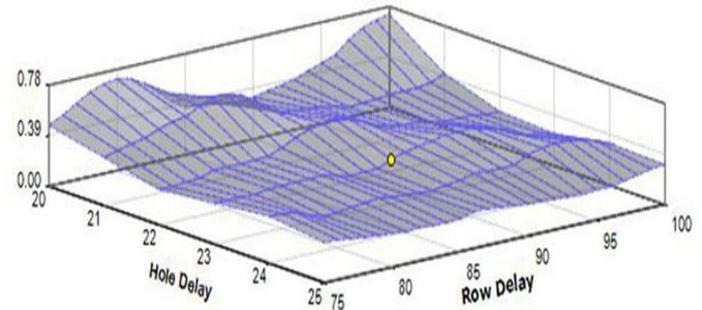
SIGNATURE HOLE ANALYSIS DETERMINED OPTIMUM FIRING TIMES TO ACHIEVE VIBRATION GOALS. DIGISHOT PLUS DETONATORS ENSURED EVERY BLAST WAS A SUCCESS

In order to determine firing times that would create active wave cancellation in the blast, the Alpha-Blast waveform analysis tool was used to develop a new blast timing plan. New initiation sequences were identified that would work with the characteristics of the local geology to effectively minimize hole to hole vibration.

The identification of optimum delay intervals can only be effective in vibration control if the desired firing times can be achieved with every hole, in every shot. The precision of the DigiShot Plus electronic detonator ensures that destructive cancellation of transient vibration energy is achieved between every hole in the shot, resulting in minimum vibration at nearby residences.

Value Added

DELAY SEQUENCES MODELED FROM TEST HOLES RESULTED IN REDUCED VIBRATION AND AN ELIMINATION OF COMPLAINTS WHEN PUT INTO PRACTICE. DIGISHOT PLUS PRECISION PROVIDES FOR BETTER DIGGABILITY, FLOOR CONTROL AND OVERALL PRODUCTION GAINS



Using data from single hole test blasts, and electronic detonators, optimum delay intervals were determined that allowed the blast team to make significant reductions in vibration and overpressure. With the DigiShot Plus system, the transition to electronic detonators was made easily, allowing the mine to continue blasting operations without any delays or confusion.

Immediately upon changing to new delay timing solutions and incorporating the DigiShot Plus electronic initiation system, complaints from the community ceased completely. The only complaints received by this operation since these changes were made occurred when the mine utilized standard pyrotechnic detonators already in inventory.

In addition to meeting the goal of reduced community perception of blasting activities, this mine has realized improved diggability and floor control, resulting in production gains more than offsetting any additional costs associated with the implementation of the DigiShot Plus initiation system.



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