DigiShot® Detonator Precision Improves Cast and Lowers Overburden Removal Costs for Large Scale Mining Operations

Project Summary

DIGISHOT® PRECISION IMPROVES EFFICIENCY OF CASTING OPERATIONS IN LARGE COAL MINES LEADING TO BIG SAVINGS

DigiShot electronic detonators were used to confirm that accurate delay timing provided by precision electronic detonators correlates to improved explosive performance and an associated increase in effective overburden cast.

The benefit of increased cast volumes is substantial cost savings from reduced re-handling, reduced dozer and dragline time and quicker exposure of coal for extraction. Results of cast blasts in large western U.S. coal mines have shown a significant increase in effective cast, resulting in cost savings that more than compensated for the cost of using a value-added electronic initiation system.

Background

EFFICIENT OVERBURDEN REMOVAL CRITICAL FOR COAL EXTRACTION

To increase coal mine productivity, cast blasting uses chemical energy to reduce the need for the mechanical energy to remove overburden on top of coal deposits. While this technique has been refined to maximize the amount of material moved by the blast, limitations in blasting technology have long been associated with limits in the amount of material cast from above the coal seam into the open pit. The inherent inaccuracies associated with any pyrotechnic delay system can result in errors in hole sequencing leading to added confinement, hole interruption and other factors that have traditionally limited further advances in cast efficiency.

Project Goals

PRECISE TIMING CAN IMPROVE EFFECTIVE CAST VOLUMES

Timing sequences resulting in maximized casts had been quantified previously. By exchanging traditional pyrotechnic detonators with the DigiShot system, expected benefits included precise hole-firing times, reduced cutoffs and better utilization of explosive energy. A more efficient cast is anticipated as a result of the better utilization of overburden explosive chemical energy in the blast.
DigiShot® Detonator Precision Improves Cast and Lowers Overburden Removal Costs for Large Scale Mining Operations

Technology Applied

DIGISHOT PLUS ALLOWS FOR LARGE BLASTS WITH ELECTRONIC PRECISION
The DigiShot Plus system allows for blasts utilizing up to 1800 detonators. As cast blasts gain efficiency with the size of the blast, the ability to maximize the blast size provides another means to improve overburden cast volumes.

Multiple priming is employed to insure complete column detonation. The capacity to initiate multiple priming units in each blast hole instantaneously provides added effectiveness to the overall blast event.

Additionally, the ability to recheck detonators right up to the firing time allows the blast crew to evaluate every hole prior to the blast event. Slumping of product can sometimes cause a loss of the detonator down-line, resulting in unfired boosters and detonators in the muck. Multiple priming insures that each hole has a means of detonating the explosive column as designed.

Value Added

PRECISION INITIATION LEADS TO BETTER EXPLOSIVE PERFORMANCE AND SIGNIFICANT GAINS IN CAST-BLASTING OPERATIONS
As with any operation in a coal mine, time is money. The quicker coal can be uncovered from the overburden, the faster it can be extracted and shipped to market. The use of cast blasting has been used for many years as the workhorse for overburden removal in large coal mines.

With the introduction of the DigiShot electronic initiation system, coal mines have a new tool for maximizing cast-blast efficiency.

Because of the long delays typically used for cast blasting, the electronic detonator provides assurance that holes fire in sequence; something that could not be guaranteed with a traditional pyrotechnic detonator. Instantaneously energizing all of the detonators eliminates potential cutoff problems that can negatively impact any blast event and create safety issues as well as environmental challenges around possible nitrates.

Large scale cast blasts provided enhanced effective cast results, reducing the percentage of material requiring re-handling by drag line or dozer push processes. The results speak for themselves: better casts, reduced costs and safer blasts.

Disclaimer   This case study is provided for informational purposes only. No representation or warranty is made or intended by DYNO NOBEL INC. / DYNO NOBEL ASIA PACIFIC PTY LIMITED or its affiliates as to the applicability of any procedures to any particular situation or circumstance or as to the completeness or accuracy of any information contained herein. User assumes sole responsibility for all results and consequences.

DigiShot® is a registered trademark of DetNet South Africa (Pty) Ltd

©2012 Dyno Nobel