Centralised Blasting – Increasing Production by Eliminating Downtime Before and During Blasting

Project Summary

CENTRALISED BLASTING IMPROVES BOTH SAFETY AND PRODUCTION

This underground mine was employing conventional methods for the initiation of multiple blasts, but found the end of shift firing requirements to be time consuming and inefficient. There were also concerns about employee safety when blasts had to be fired from underground. In order to address these issues, the mine was seeking a reliable, remote initiation system that would ensure the safety of its workforce by having the underground workings clear of personnel prior to firing.

After speaking with Dyno Nobel, the mine decided to implement BlastWeb®, a centralised blasting system that is specifically designed for use in underground mining operations. BlastWeb allows reliable remote initiation of development, production and stope blasting from a safe and controlled location on the surface. The blast areas can be completely evacuated as no-one is required to be underground for the blasting.

In addition to the obvious safety benefits, the other main benefit of the system at this mine is a reduction in the re-entry time. After the implementation of BlastWeb, a comparison was made of the blast completion times before and after its introduction. It was determined that centralised blasting reduced the blast completion time, on average, by 10 minutes.

The implementation of Dyno Nobel's Centralised Blasting System supports both the safety of the mine employees during blasting and an increase in production time.

Background

DIFFICULT AND TIME CONSUMING BLAST CLEARANCE PROCESS

At this mine, blasts are generally initiated at the end of shift with multiple development headings, production and stope blasts fired across various levels and areas of the mine. With a multitude of personnel working over this vast area, blast clearances can be difficult and time consuming.

The existing blast practices dictated that blast headings could only to be connected to firing lines once a blast area was completely cleared of personnel. This practice can lead to production delays as digging units need to be stood down early enough for the shotfirer to connect all blast headings safely prior to end of shift.

Once the tag board was cleared, the shot crew would start initiating the blasts, firing all work areas independently, as they retreat up the decline.

This practice was time consuming with the added risk of leaving personnel in the line of fire during blast time.

Project Goals

IMPROVE BOTH MINE SAFETY AND PRODUCTIVITY

There were two main project goals being:

1. The ability to fire all blasts from the portal with the whole underground complex cleared of personnel.
2. To reduce the average mine re-entry time, thereby increasing production time.

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Technology Applied

BLASTWEB FACILITATES SAFE, CENTRALISED BLASTING FROM THE PORTAL

The basis of the BlastWeb system is to enable firing of all underground blasts from a safe, central location, nominally on the surface. The system supports easy initiation of NONEL ® detonators to fire development headings and production blasts, as well as initiating electronic detonators that are used in more complex blasts.

To guarantee robust communication, Ethernet was chosen as the primary communication medium, rather than conventional modems or RF Leaky Feeder. To ensure a robust installation, the blast equipment was permanently installed, powered directly from mains with battery backup capability. This utilisation of permanently installed equipment eliminated blast delays as the nature of portable equipment makes them more susceptible to damage during transport or failures due to poorly maintained batteries. Primary fire lines were specified to withstand normal abuse in the underground mining environment.

After the initial infrastructure planning phase; installation, commissioning and training was completed within a month. Four Blast Control Units (BCUs) were installed to cover all working areas with terminators spread across the mine, allowing close access to firing line connection points in nearby working areas. Centralised Blasting operations were to be conducted from portal via Surface Blast Controller.

Value Added

BLASTWEB MAKES BLASTING EASIER

The installation of BlastWeb allows the reliable remote initiation of development, production and stope blasting from a safe and controlled location on the surface. The blast areas can now be evacuated, as no-one is required to be underground for the blasting. This has obvious safety benefits for site personnel.

The system is easy to use with a shallow learning curve, which in turn supports blast crew acceptance. Within weeks, the shot crews were capable of operating the system without any supervision.

BlastWeb continuously scans the installation allowing detonators to be connected to the firing line once the individual blasts are completed, up to two hours before end of shift. The risk of high voltage being accidentally applied to the firing line is engineered out by routing the blast voltage through the blast key which is only inserted into the BCU on retreat from the blast area. This feature allows mining to safely continue in areas where blasts have already been connected to firing lines, without delaying the blast cycle at end of shift or impacting on production. Site procedures were updated to enable shot crew to connect blasts prior to completely clearing the area.

The two-way communication afforded by the BlastWeb system ensures transparency at firing time. This provides the ability to positively communicate with all blast areas prior to blasting, as well as receive confirmation of initiation once the firing sequence is completed.

Since the introduction of the permanently installed BCUs, re-entry time has been reduced on average by 10 minutes.

Using centralised blasting equipment capable of reliably initiating both NONEL and electronic detonators has opened the door for continued blast optimisation work to further improve blasting practices and potentially provide even greater financial benefits to the mine.

The system is also designed to reduce the risk of misfires which can be a serious safety risk in an underground mine environment.

Overall a great result for the mine.

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