# Centralised Blasting Systems – An Approach to Safety, Functionality and Efficiency

## Project Summary

### IMPROVEMENTS IN BOTH PERSONNEL SAFETY AND MISFIRE RATES

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 and production blasting from a safe and controlled location underground or 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 is a reduction in the blast misfire rate. In the months following the implementation of BlastWeb, a comparison was made with their superseded radio based remote blasting system. In the six months prior to the implementation of BlastWeb, the mine recorded a misfire rate of 5.4%. In the following months, there were no misfires.

The implementation of Dyno Nobel's Centralised Blasting System supports both the safety of the mine employees during blasting and the elimination of misfires due to communication errors at firing time.

## Project Goals

### DIFFICULT AND TIME CONSUMING BLAST CLEARANCE PROCESS

The mine is developing multiple ore bodies over a vast area and across multiple levels. Blasts are initiated at the end of shift with multiple development headings and production 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.

To combat this, a radio based remote blasting system was introduced some years ago to eliminate risks involved with initiating blasts from an underground firing location. The change ensured the mine was able to only initiate blasts once the tag board was completely cleared and no personnel were left inside the blast zones.

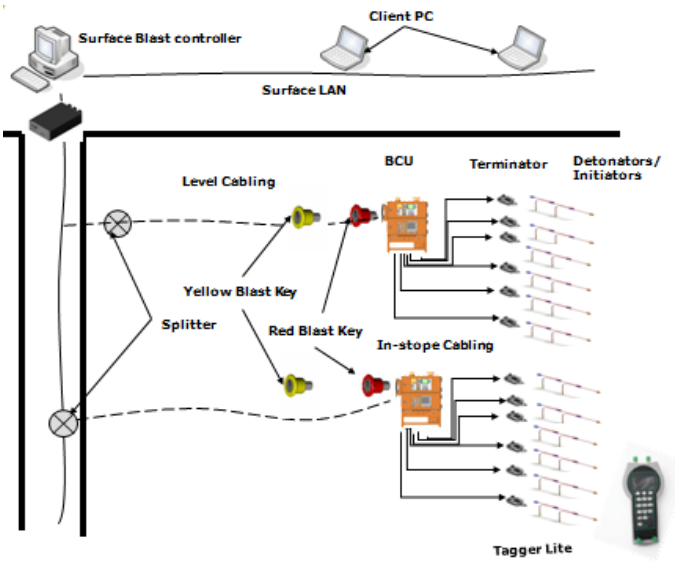
The system was fairly reliable, but without two-way communication, positive confirmation of initiation was impossible, particularly if multiple headings were initiated simultaneously. Poor radio frequency (RF) communication led to numerous misfired headings that consequently resulted in costly production delays. There were also areas without radio based remote blasting system RF reception that still had to be fired from underground using conventional methods, leaving personnel exposed to blasting activities.

## Project Goals

### IMPROVE SAFETY AND REDUCE MISFIRES

There were two main project goals being:

1. The ability to fire all blasts from a central location with the whole underground complex cleared of personnel
2. Minimise the rate of misfired blasts

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## Technology Applied

### BLASTWEB FACILITATES SAFE, CENTRALISED BLASTING FROM MINE CONTROL

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, as well as initiating electronic detonators that are used in more complex production 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 underground mining environment.

After the initial infrastructure planning phase; installation, commissioning and training was completed within a month. Each Blast Control Unit (BCU) has six channels that were terminated in different locations allowing close access to firing line connection points in nearby working areas. Each channel has the ability to initiate 50 headings using electronic detonators. Centralised Blasting operations were to be conducted from Mine Control via PC based software.

## Value Added

### BLASTWEB POSITIVELY IMPACTS BOTH THE MISFIRE RATE AND PERSONNEL SAFETY

The installation of BlastWeb allows the reliable remote initiation of development and production blasting from a safe and controlled location underground or 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.

As BlastWeb continuously scans the installation, this allows operators in Mine Control to progressively identify which areas are available for blasting end of shift. This transparency of when headings are connected assisted Mine Control is assessing blasting schedules in real time.

In the six months prior to the implementation of BlastWeb, an analysis of the blasting data showed that out of 961 blasts, 52 headings misfired, a 5.4% misfire rate. In the six months following the implementation of BlastWeb, out of 212 blasts fired with the system, there were no misfires. These headings were all fired as planned and on time from Mine Control. The results speak for themselves.

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 improve mine production.

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