Dyno Nobel Improves Blasting Practices At Ridgeway

Project Summary

SOLVING THE PROBLEMS OF PRE-CHARGING SUBLEVEL CAVING RINGS AT RIDGEWAY

Dyno Nobel has modified pre-charging practices at Ridgeway Gold Mine to deliver enhanced safety, reliability and blast outcomes.

With production drill and blast practices critical to the success of the sublevel caving operation at Ridgeway, underground sublevel caving production ring pre-charging was introduced in 2001.

When Dyno Nobel started work on site, pre-charging practices required up to two rings to be loaded ahead of the ring to be blasted in each drawpoint.

The explosive sometimes remained in the up-holes for four weeks or more prior to blasting. During this 'sleep' time, it was subjected to repeated shock from the blasting of adjacent rings.

Working with Ridgeway staff, Dyno Nobel successfully resolved explosive performance problems in the pre-charging environment by introducing some very simple measures.

Extensive testing allowed Dyno Nobel to determine the most appropriate loading and sleep time criteria for the mine's pre-charging practices and improved the safety and efficiency of the operation.

Background

Ridgeway Gold Mine is an underground sublevel caving operation owned and managed by Newcrest Mining Ltd.

The mine is located near Orange in NSW. Gold and copper ore are extracted using a mechanized fleet and delivered to the surface through an underground crushing and conveying system.

Pre-charging in production blastholes has been an essential element of success at Ridgeway.

Project Goals

UNDERSTANDING THE EFFECT OF DRILL AND BLAST ACTIVITIES ON ORE RECOVERY

The major goal of the project was to understand the effects of pre-charging on explosive properties and blast performance.

Pre-charging, as practiced at the mine required the bulk emulsion explosive, detonator and primer to be installed in each blasthole in the ring, at least two rings back from the next ring to be blasted.

The effects of explosive sleep time and repeated shocks from blasting adjacent rings were identified as potential issues.

A series of trials successfully established the most appropriate loading and sleep time criteria for Ridgeway Mine's pre-charging practices.

The results of the trials helped to guide the development of the next generation of emulsion explosives for use in underground pre-charging operations.

DYNO
Dyno Nobel

Groundbreaking Performance

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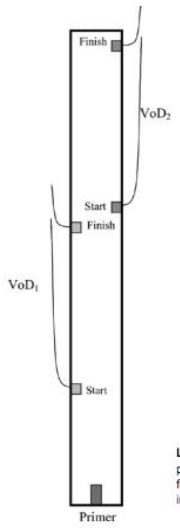
Technology Applied

MEASURING BLAST PERFORMANCE

Laboratory research was conducted by Dyno Nobel in conjunction with onsite trials at Ridgeway to determine the effects that both sleep time and repeated shocks has on product performance.



Left: Configuration of the point-to-point electrodes for the VoD measurements in the steel pipes.

A series of sleep time only VoD tests were performed at Dyno Nobel's test blasting facility in North America.

In addition, tests on VoD performance in blast rings at Ridgeway were conducted to determine the time at which emulsion performance declines when subjected to extended sleep times and blast shocks from normal mine production blasting.

It was decided to conduct trials of TITAN® 6100 at 1.1g/cc and 1.2g/cc densities to optimize the pre-charge ring blasting at the mine.

While this work was being conducted, it was decided to limit the time between pre-charging and firing the rings to less than four weeks and preferably less than three weeks.

Value Added

EXPLOSIVE RESULTS GAINED BY REDUCING 'SLEEP' TIME

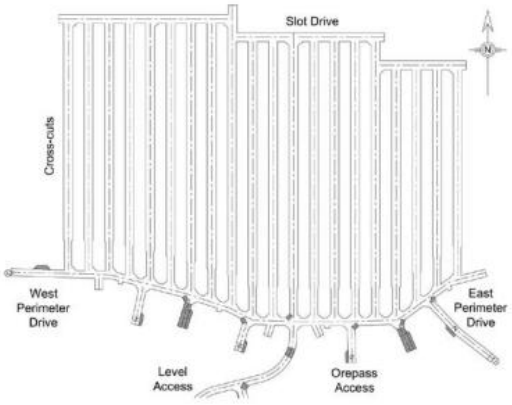
The results of the trials confirmed the need to load the precharged rings with a 1.2 g/cc density bulk emulsion and to limit sleep time to less than 28 days.

With these limits in place, the performance of the explosive in terms of fragmentation and hang-ups has improved significantly.

The change to 1.2g/cc emulsion explosive is providing greater explosive shock energy.

Importantly, the safety and efficiency of the sublevel caving operation at Ridgeway has been improved.

The improved pre-charging practices have realized direct cost savings as well.



Above: SLC level plan, Ridgeway Gold Mine.