UNDERGROUND CASE STUDY

Electronic Detonator System Assists with Improving Stope Productivity

PROJECT SUMMARY

AN UNDERGROUND MINE WITH COMPLEX MINERALISATION

The underground mine has two access declines with portals located in the open pit walls and is being progressively developed to simultaneously explore and exploit multiple orebodies. It is currently developed to a depth of approximately 700m below the land surface.

Due to the complex nature of mineralisation, original underground ore production was derived from narrow and highly selective open stopes, which proved to be slow and expensive. The low ore grades, loss of blasted ore and need for permanent pillars reduced the resource yield per metre of development.

In addition, the process of selective mining of the complex orebody was proving to be, at times unpredictable, making it difficult to produce an accurate mine schedule. It was also susceptible to production delays and had high operating costs. It was clear that the mine needed to do things differently.

PROJECT GOALS

IMPROVE PRODUCTIVITY AND REDUCE MINING COSTS

The project goal was simple: Improve productivity and reduce mining costs. This would in turn lead to a reduction of the operating costs.

Mining of small narrow stopes was:

- resulting in lower productivity;
- more susceptible to production delays;
- resource intensive, requiring an increased level of engineering input and support to maximise recovery from these small stopes.

For the mine to consistently achieve the required production targets it was necessary to increase the size of open stopes and extract multiple mineralised zones at once. Such a change involved a rethink of the drill and blast practices that were being used for the narrow small stopes.

TECHNOLOGY APPLIED

ELECTRONIC INITIATION SYSTEM FACILITATES THE BLASTING OF LARGER STOPES

The requirement to accurately control the blast initiation sequence and eliminate the potential for misfires due to cut-offs meant it was necessary for the mine to move to an electronic initiation system.

Accordingly, Dyno Nobel's electronic initiation system was implemented to facilitate the blasting of larger stopes.

The system is a state-of-the-art electronic initiation system that enables the user to design and implement complex blast designs with ease. The user-friendly system is fully programmable, secure and reliable.

It provides the operator with a firing window of up to 20,000ms in millisecond increments with millisecond accuracy. Flexible timing, a total burning front and longer available delays mean larger and more complex blasts can be fired, as was the customer's requirement.

Loading electronic detonators in production charging.

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VALUE ADDED

LARGER STOPES RESULT IN IMPROVED SAFETY, HIGH PRODUCTIVITY AND LOWER OPERATING COSTS

The electronic initiation system has allowed the customer to move towards larger longhole open stopes.

In one orebody, these have consistently produced excellent results, with minor overbreak and underbreak, high productivity, and mineral recovery in excess of initial expectations.

These results have meant a reduction of the total cost which has lowered the economic cut-off grades required, increasing the proportion of in situ mineral resources which can be economically extracted.

The mine has been able to design blast timing to utilise dynamic void creation, where the required void is progressively formed during the blast, rather than available from the outset.

Dyno Nobel's electronic detonator system has given the mine the ability to mass fire stopes over multiple levels allowing the mine to deliver:

- increased broken ore stocks and improved fragmentation, resulting in an increase in production rates;
- Improved efficiencies in the production cycle leading to a significant reduction in mining costs;
- Improved mining efficiencies through superior conventional / tele-remote bogging ratios (up to 85% of blasted ore has been extracted via conventional methods from some stopes);
- Reduced exposure of personnel to hazards.

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