Site Profile

PT Newmont Nusa Tenggara (PTNNT) operates the Batu Hijau copper-gold open pit mine, located in the West Nusa Tenggara province of Indonesia. Batu Hijau is budgeted to produce 140 million pounds of copper and 140,000 ounces of gold in 2011. At the current levels of production, the mine is expected to continue operating until 2023.

External impacts to mining schedules over the last few years at Batu Hijau have resulted in the current mine plan showing extended periods of waste stripping in the future.

In order to accelerate waste stripping, and access Run of Mine ore sooner, PTNNT wanted to improve rates of vertical advance through improved blast sequencing and improved shovel productivity.

An efficient way to achieve this was to optimize current blasting practices.

The Situation

Previous blasting practices at Batu Hijau required sequential firing of production and trim shots to facilitate free face firing for all trim shots to minimize damage to pit walls. This resulted in P&H 4100 rope shovels operating at less than optimal productivity.

Firing the 40m wide trim shots in this fashion also resulted in poor fragmentation along the free face, and excessive delays as the shovels had to be moved for each blast.

PTNNT and Orica worked together to find a solution that allowed both production and trim blasts to be fired in a single blasting event. It was expected that this would:

- Reduce the number of blasts in each bench thereby reducing blasting delays;
- Increase the mining width available for each shovel, and;
- Ensure no increase to the amount of damage to final pit walls, measured by vibration and geotechnical analysis.

Technical Solutions

In order to combine production and trim blasts, advanced designs and initiation sequences, which would not be able to be delivered with conventional non-electric detonators, were employed using Orica’s i-kon™ electronic initiation system.

The i-kon™ system allows:

- Delay times to be assigned to individual blast holes, without having to consider the tie-in complexities that would usually accompany similar non-electric initiation sequences;
- Initiation sequences to be designed based on optimised burden relief and effective delay.

The i-kon™ system also integrates with Orica’s SHOTPlu®-i Pro blast design software which ensures an efficient blast design process that seamlessly flows into the tie-in design, both speeding up and ensuring the integrity of the design process.
Case Study
Combined Production and Trim Blasting
PT Newmont Nusa Tenggara, Batu Hijau, Indonesia

The Result

Before and after photos of the first i-kon™ blast, 31 January, 2011

Over a period of three months, commencing in early 2011, a total of 10 shots were fired using 2,272 i-kon™ electronic detonators. Data was collected and analysed by PTNNT and the following conclusions were made:

- Improved shovel sequencing;
- Blast delays of up to 1.5 hours per separate trim blast were eliminated. Theoretically resulting in an additional 90,000t of material excavated per shovel, per month;
- 16% improvement in dig rates;
- A 14% improvement in fragmentation at the P80 size fraction;
- A 69% reduction in blast vibration;
- All pre-splits fired during the project were successful. Half barrels were evident (a good indication of wall integrity and stability) and the design toe location was achieved.

Orica is now working together with PTNNT to deliver a Blast Quality Service. This service will ensure that the integrity of the blast design and implementation process at Batu Hijau is maintained, maximizing the benefit realized by PTNNT through the continuing use of i-kon™ electronic initiation system.

Testimonial

Jeff Mahon, Principal Adviser - Mining at NNT, made the following comments regarding how combining production and trim blasts has benefited Batu Hijau:

“The implementation of i-kon™ at Batu Hijau has greatly benefited the operation through the ability to combine production and trim shots. One of our big concerns early on, was the potential to further damage pit walls, however we have only seen the converse and improvements in wall quality have been evident since the commencement of the program. The combination of the production and trim shots has greatly reduced our blast delays, simplified our shovel sequencing and added to our fleet productivity. We will be looking for further benefits from i-kon™ in the future in relation to improved material fragmentation and mill throughput.”

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