

Step Change Results in Significant Value Added Solution



Summary

CUSTOMIZED MULTILEVEL APPROACH

The intent of this project was to work closely with the customer to see if benefits could be derived and blasting costs reduced through the introduction and implementation of some of the TITAN® technologies proposed for this mining complex.

Background

DEWATERING AND OTHER ISSUES WERE A CHALLENGE

This particular mine has been in operation for many years and has traditionally used augured emulsion/ANFO blends only. Wet holes were dewatered and loaded with the same blend that would normally be used for dry hole applications. The benefit of this is that the mine was able to utilize one pattern for both wet and dry holes. Patterns do vary from bench to bench, based on the different geological formations found throughout the pit.

The mine drills 16" holes and it's not uncommon for blast holes to be loaded and slept for several weeks at a time.

Water can be a problem in certain areas of the mine making dewatering next to impossible. Several attempts have been made in past years to pump emulsion blends in an effort to solve the dewatering and NOx problems associated with auguring product into wet or partially wet holes.

In the mid 2010 time period, traditional gassed emulsions were tested unsuccessfully. Most of the holes loaded with this product and technology failed to perform properly because the stemming material used by the mine sank into the emulsion column causing the down lines to either sink into the bore hole or to break depending on the amount of slumpage that occurred.



Project Goals

PROJECT GOALS INCLUDED REDUCING SLUMPING, NO_x AND OVERALL COSTS WHILE MAINTAINING LOAD RATES

Because the mine had such a bad experience with gassed emulsions, the first series of tests were designed to demonstrate it had the capacity and capability of preventing the stemming material from migrating through the loaded emulsion column. An initial pattern was drilled and 10 holes on the end of the pattern were loaded with TITAN XL1000. The holes were slept for several days and each hole was monitored for slumpage during this time period.

The outcome was positive in that none of the holes slumped at all. Members of the blast crew indicated that this product seemed to resist slumpage better than the incumbent product. This pattern was shot successfully providing the initial confidence the mine operator needed in order to progress the testing program.

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Next, a series of patterns were partially loaded with TITAN XL 1000 with the intent of comparing a number of items side by side including:

1. Visual ground breakage
2. Hole slumpage
3. NOx emissions
4. Loading rates
5. Cost Reduction

Initial results were positive so over several months, entire patterns were loaded and shot using TITAN XL1000.

The results of the testing showed the visual ground breakage was very similar, the holes did not slump and actually were much better than holes loaded with the 50/50 blend, NOx was eliminated entirely, and production rates were equal. Although the trucks held less product, the delivery rate was 60% faster and the turnaround back at the plant took less than half the time it takes to turn the blend trucks. A substantial cost reduction was achieved because equal or better performance was achieved even with a reduction in total pounds being loaded into the ground.

Several months lapsed as equipment was located and configured to meet the needs of the customer and when this was completed the site was converted 100% to the TITAN technology.

Technology Applied

TITAN XL – DIFFERENTIAL ENERGY

A significant number of patterns were loaded and shot over several months after the new trucks arrived. The shots looked very good from the surface, but as time went on complaints started coming from some of the shovel operators working in certain areas of the pit about hard digging in the toe area of the shots. Based on this feedback, it was determined that DIFFERENTIAL ENERGY might provide a better solution to solve the toe issues that had been reported and observed in about 30% of the shots.



DIFFERENTIAL ENERGY technology allowed the operators to adjust the explosive energy in each hole based on the geology.

After DIFFERENTIAL ENERGY was deployed the hard toe issue went away. A three segment loading scheme was introduced providing a toe explosives density of 1.28 g/cc with much lighter densities in the upper portions of the holes depending on the geological formations being blasted.

Value Added

SIGNIFICANT VALUE ADDED FOR THE CUSTOMER

The value added to the customer included:

1. The volume of explosives loaded into the bore hole was reduced up to 9.2% as the process transitioned from using heavy ANFO blends to Titan XL 1000 to DIFFERENTIAL ENERGY.
2. Powder factors were reduced 13.5% in many areas of the pit while still achieving excellent dig rates and crusher throughput.
3. Post Blast NOx fumes have been completely eliminated.
4. Trucks were specifically built to accommodate the loading rates required to maintain production.