Differential Energy Leads to Continuous Improvements

Project Summary

DIFFERENTIAL ENERGY WITH TITAN 1000ΔE LEADS TO CONTINUOUS IMPROVEMENTS

A surface molybdenum mine in the United States found that by switching to Differential Energy with TITAN® 1000ΔE, they were able to improve safety, air quality, productivity, fragmentation, and digability. This technology enabled the mine to redistribute the explosive energy in the borehole, putting energy where it was needed by varying the detonation pressure; while using a single truck to load both wet and dry holes.

Background

MULTIPLE POWDERS & MULTIPLE CHALLENGES

The mine agreed to a three month trial of Dyno Nobel's Differential Energy. Before the trial, the mine was loading dry holes with TITAN 1030 (30% Titan emulsion & 70% ANFO) and wet holes with TITAN XL 1000 (100% gassed emulsion).

Up to this point, fragmentation, oversize, and hard toes had all been occasional issues at the mine. In addition, some blast events had produced NO_X, limiting the size of their blast events.

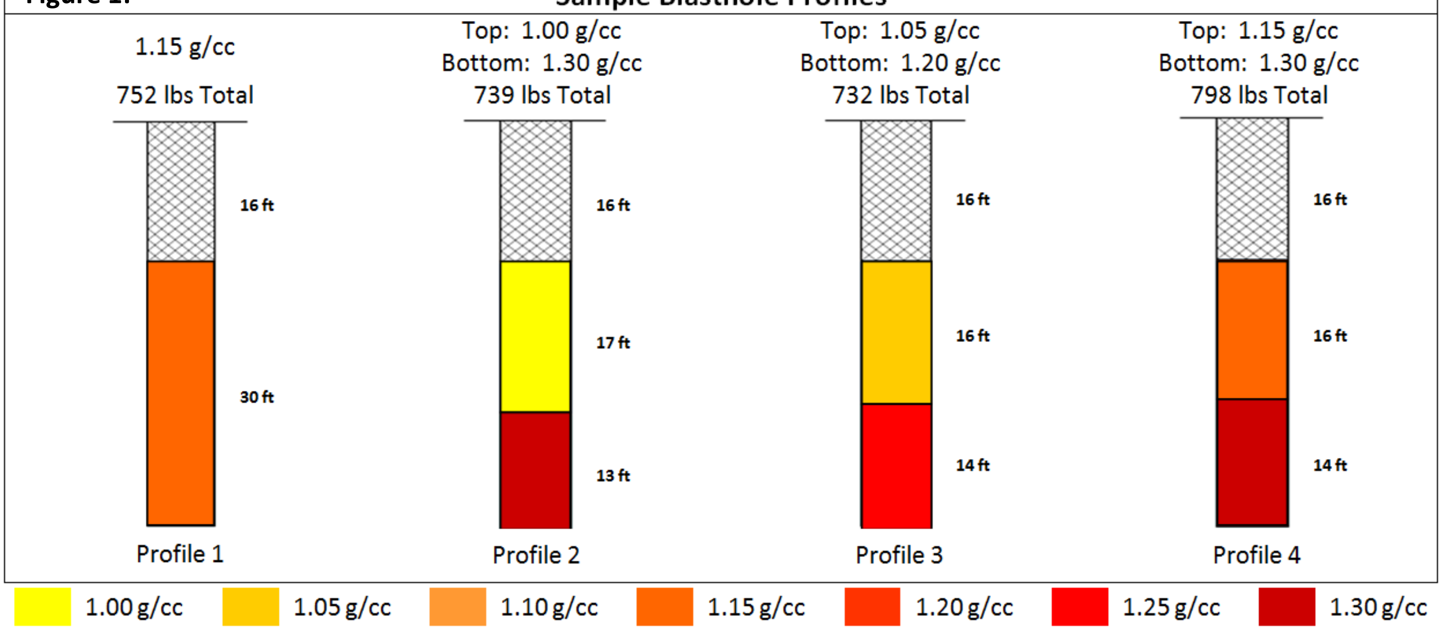
Project Goals

USE BLASTING TECHNOLOGY TO IMPROVE OPERATIONAL PERFORMANCE

The primary goals established for the trial were:

- Improve safety with consistent product performance
- Improve air quality by eliminating NO_X after blast fumes
- Improve productivity of the loading process, i.e. faster turnaround times of bulk truck

Figure 1: Sample Blasthole Profiles



Dyno Nobel

Groundbreaking Performance

Differential Energy Leads to Continuous Improvements

- Improve fragmentation and digability
- Lower the overall costs of operating mine & mill

Technology Applied

DIFFERENTIAL ENERGY: MULTIPLE DENSITIES & VARIABLE ENERGY

TITAN 1000ΔE emulsion together with the Dyno Nobel ΔE bulk truck technology, allows blasters to accurately vary the density and viscosity of chemically gassed emulsion as it is loaded into a borehole. This technology enables multiple densities of gassed emulsion to be loaded into the same hole.

This particular surface mine blasts in a variety geologies. As a result, the blast crew pushed TITAN 1000ΔE to density extremes in order to extract the greatest value from the technology. During the trial, the mine primarily loaded two different densities into their production holes. Figure 1 provides examples of the different density variations that were tried at the mine. Figure 2 shows the results of detonation velocity measurements for one of the examples.

Value Added

CONTINUED RECORD OF CONTINUOUS IMPROVEMENTS

The trial was extended to six months, over which time there were 109 blasts.

Safety- Previous to the trial, the mine had reported incidents of undetonated blasting agent in their muck piles. TITAN 1000ΔE proved to be a reliable and resilient product that provided dependable results. No undetonated blasting agent was found in the muck piles during the trial.

Air Quality - Since the trial, the number and severity of NO_X incidents have been significantly reduced. This has allowed the mine to consider revising their air quality permit to allow for larger blast events.

Productivity - The success and versatility of the Titan ΔE has allowed the mine to go from two bulk trucks to a single truck that can load both wet and dry holes. The Titan ΔE truck not only has a faster turn-around time than the blend truck, but it also has a larger capacity and can load more holes per cycle.

Fragmentation & Dig Ability - Oversize and floor grade problems were noticeably reduced during the trial period. There were no physical measurements of fragmentation and dig ability during the trial, but shovel operators and drill and blast management observed a noticeable improvement in dig times.