CASE STUDY

TELFER GOLD MINE IMPROVES PRODUCTIVITY AND REDUCES EMISSIONS BY 7% WITH DIFFERENTIAL ENERGY®

PROJECT SUMMARY

DIFFERENTIAL ENERGY REDUCES EMISSIONS AND IMPROVES SAFETY AND PRODUCTIVITY AT GOLD MINE

The Telfer gold mine in Australia found that by implementing Dyno Nobel's DIFFERENTIAL ENERGY (ΔE) and TITAN® Bulk Emulsion, they were able to improve safety, productivity, fragmentation, and diggability while reducing carbon emissions and eliminating NOx incidents.

BACKGROUND

IMPLEMENTING ΔE TECHNOLOGY TO SOLVE CRITICAL CHALLENGES

Prior to this project, the Telfer gold mine was using an ammonium nitrate/emulsion blend and experienced occasional issues with fragmentation, oversize, and poor productivity from shovels. In addition, reduced sleep time associated with reactive ground limited the size of blasts, and some blast events had produced NOx. To solve these challenges, the mine worked with Dyno Nobel's DynoConsult team to organize a three-month trial of ΔE technology.

Dyno Nobel's technology strategy is focused on working in partnership with customers and innovating in ways that help them achieve their goals. To do this, Dyno Nobel focuses on solutions that:

- Improve the safety of mining and quarry operations
- Increase customers' sustainability by reducing environmental and social impacts
- Increase customer productivity and efficiency

AT A GLANCE

7% ESTIMATED REDUCTION IN EMISSIONS

13% IMPROVEMENT IN TRUCK FILL FACTORS

CHALLENGE

- Improve safety, productivity, fragmentation, and diggability while reducing emissions and eliminating NOx incidents

SOLUTION

- Conduct a three-month trial using ΔE and TITAN bulk emulsion

OUTCOME

- 7% estimated reduction in emissions
- 13% improvement in truck fill factors
- 0 NOx incidents

Figure 1: Dyno Nobel's DYNOBULK® delivery system

DYNO NOBEL

CASE STUDY

PROJECT GOALS

USE CONSISTENT PRODUCT PERFORMANCE TO IMPROVE SAFETY, PRODUCTIVITY, AND MORE

The primary goals of the trial were to:

- Improve safety with consistent product performance
- Improve fragmentation and diggability
- Improve productivity
- Lower greenhouse gas (GHG) emissions

PRODUCTS/ TECHNOLOGY & SERVICES USED

DELIVERY SYSTEMS

ΔE

BULK EXPLOSIVES

TITAN BULK EMULSION

TECHNOLOGY APPLIED

ΔE AND TITAN BULK EMULSION

ΔE is a proprietary explosives system that allows operations to ensure each rock segment receives the explosive energy needed for optimal fragmentation by varying the density of TITAN bulk emulsion throughout the borehole.

In relatively simple geological conditions, ΔE can maximize explosive energy at the bottom of the borehole and minimize energy density at the top. In more complex rock geologies, ΔE allows up to six explosive energy density profiles in a single borehole.

By matching the density of emulsion to the rock properties, operations are able to optimize their blast outcomes, prevent NOx emissions, reduce energy use and greenhouse gases, control vibration and noise levels, and increase productivity while reducing overall costs.

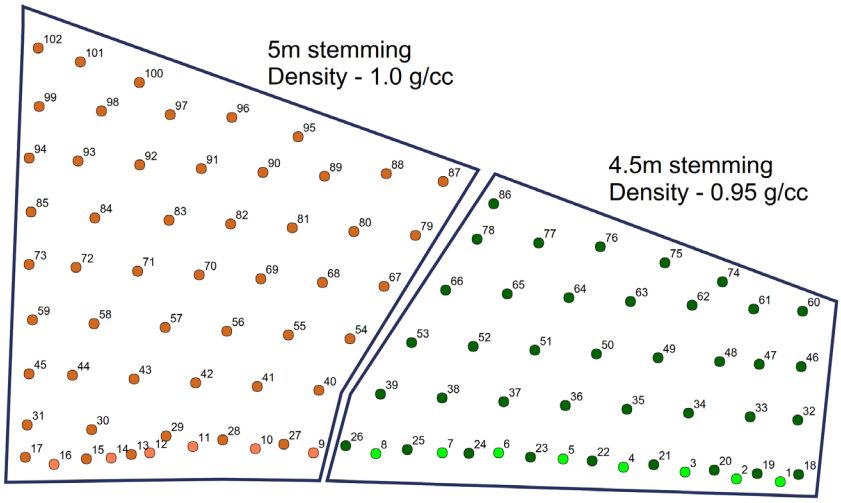

Figure 2: Variable explosive density using ΔE

DYNO NOBEL

CASE STUDY

VALUE ADDED

INCREASED PRODUCTIVITY, CONSISTENT PERFORMANCE, AND REDUCED EMISSIONS

ΔE technology enabled the mine to increase productivity and improve blasting outcomes by using a single product across different pits in both wet and dry ground conditions and with varying rock hardness and levels of reactivity.

Safety
By removing ammonium nitrate from the site and using only TITAN 1500 inhibited emulsion, the operation reduced the risk of loading the wrong product in Telfer's reactive ground while also reducing the amount of manual handling associated with traditional products. There were no NOx incidents reported following the introduction of ΔE on site.

Consistent Product Performance
Velocity of detonation measurements conducted during the trial showed that even at a lower density, TITAN 1500 emulsion fired at a faster rate than the previous emulsion product used on site.

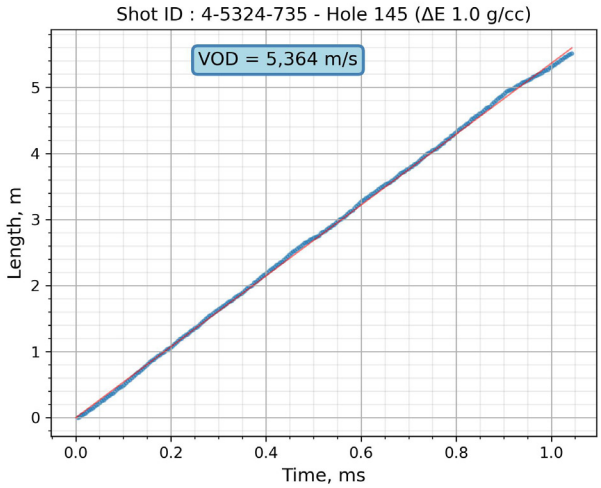

Figure 3: Velocity of detonation chart for TITAN emulsion

Fragmentation and Diggability
Measurements on the shots loaded with TITAN 1500 and ΔE technology showed improvements in dig performance without any adverse impact on fragmentation. Analysis conducted by the client showed up to 13% improvement in truck fill factors since the switch to ΔE. Significant uplift in productivity was observed in areas where reduced explosive density was used in softer rock types, showing the benefits of matching energy to ground conditions.

Improved Productivity
The success and versatility of the TITAN 1500 bulk emulsion has allowed the mine to eliminate the use of ammonium nitrate/emulsion blends and standardize the use of a single emulsion product, providing efficiencies in storage, handling, transport, and placement. Higher payloads on the DYNOBULK® MPU and faster load rates has also led to better on bench performance and reduced loading times.

Reduced Carbon Emissions
Data collected during the 2022 calendar year allowed DynoConsult to quantify and independently assure the reduction of greenhouse gases associated with the use of ΔE at the Telfer mine relative to the bulk emulsion blend that had previously been used on site. According to this limited assurance, emissions from ΔE were projected to be 7% lower compared to the previous emulsion blend had it continued to be used on site.

Note: (The GHG reduction was expected to be 25% using the standard formulation of ANFO for the 12 months prior to the switch to ΔE. However, it was discovered that 50% less diesel than the standard ANFO blend had been used for the 12 months prior to the use of ΔE at this site, which reduced the baseline GHG. Had the standard ANFO blend been used in the period before the switch to ΔE, the reduction in GHG would have been 25%. Calculations and assurances are available here.)