Case Study
Minimising Dilution and Improving Fragmentation in Long Hole Open Stoping
Junction Gold Mine, Australia

The Situation
To evaluate, through detailed investigations, the change from ANFO to bulk Subtek™ Velcro emulsion at WMC's St Ives Junction Gold Mine while highlighting any financial benefits created from the change.

Mining Issues
The joint project was defined by GBF, WMC and Orica. The key mining issues were to:

- Minimise variables during the project
- Consider mine geology and drill patterns when identifying an appropriate area of the mine for the study
- Compare blast performance and resource utilisation needs for both products
- Document current drill and blast practices
- Employ the optimal product which would maximise ore recovery and minimise stope dilution
- Monitor pre, during and post blast results for both products
- Complete an analysis of financial benefits for both products

Technical Solutions
The project included:

- An analysis of safety issues
- Comparison of explosive loading productivity
- A hole deviation survey to determine drilling standards (planned to actual) and eliminate deviation influences that may affect blast results
- Ground vibration monitoring of blasts (used to detect potential misfires and delineate rock attenuation).
- Confirmation of product performance from Velocity Of Detonation (VOD) monitoring
- Fragmentation analysis to delineate product performance
- Definition of dilution and ore loss through 3D Cavity
- Monitoring Surveys
- Recordings of comparative resource utilisation for both products
- Identification of financial benefits and constraints for both product systems

Results
The results from the study included data demonstrating product performance for both bulk Subtek™ Velcro emulsion and ANFO based products. The overall comparison of products has justified Orica's bulk emulsion product as being more suited to Junction's longhole opening stoping practices than the ANFO based products. This has been highlighted by results which included:

1. 56.9% dilution reduction for bulk Subtek™ Velcro emulsion vs ANFO based products
2. Improved fragmentation
3. Shorter re-entry times

4. A planned decrease in stand-off distance for bulk emulsion blasts. This suits the narrowing of Junction's orebodies

5. Less apparent brow and drive damage after firing with bulk Subtek™ Velcro emulsion vs ANFO based products

The financial rewards achieved as a consequence of the introduction of Orica's bulk emulsion product during the project have been:

1. A 5.5% reduction in longhole mining costs
2. Lower mining costs from less stope dilution
3. A reduction in drilling costs from expanded patterns
4. Removing the need for a second ANFO charge-up wagon

These savings are significant. Additional benefits from the utilisation of bulk Subtek™ Velcro emulsion include:

1. Less equipment and labour
2. Reduced charging times
3. Less magazine space for explosive product
4. Operational independence of Orica's underground truck

Acknowledgments

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