

CASE STUDY

Delivering Insights and Value utilising FRAGTrack™ Crusher

Drury Quarry, New Zealand

Site Profile

Drury Quarry is located 35 kilometers south of Auckland CBD and is one of the largest quarries in New Zealand. Operated by Stevenson Aggregates, Drury Quarry produces approximately 3Mt of aggregate per annum. Auckland faces ever increasing demand for aggregate products putting pressure on quarries to increase production rates.

Drury Quarry has been in operation since 1939 and is committed to sustainability and operational efficiencies using technological innovation.



Figure 1 - Drury Quarry Aerial View

The Situation

Stevenson Aggregates identified fragmentation and blasting performance as a critical project to improve crusher throughput and reduce carbon footprint.

Irregularities of scalping yield resulted in human intervention with the crusher feed by blending various rock quality and blasts. Crusher throughput was also varied, with evidence provided by crushing analytics.

Another point of interest was insights into the crusher wear and tear by identifying whether rock type and sizing of particles affect the amount of wear and maintenance required for the plant.

Previous post-blast fragmentation analysis had been completed in-pit using manual sampling and time-consuming methods which were not long-term sustainable. What was required was an automated, safe, and efficient system that could generate meaningful information in near real time.

Technical Solutions

In response to Stevenson Aggregates requirements, Orica proposed to implement FRAGTrack™ Crusher.

FRAGTrack™ Crusher technology is designed to be installed at the primary crusher feed to measure and provide particle size distribution (PSD) of fragmentation on the truck during tipping. Orica's FRAGTrack™ Crusher uses advanced machine vision technologies to enable autonomous triggering, processing, and analysis without interfering with the haulage operation.

Smart trigger settings ensure that only true samples are recorded. Every image is processed and uploaded to the FRAGTrack™ website, where they can be viewed and accessed anywhere at any time. This allows a direct feedback loop to managers and engineers for assessing blast fragmentation performance.

The PSD can also be correlated to the crusher throughput analytics to measure production rates, blockages, and amount of primary crushing vs secondary crushing. This in turn, can relate to the amount of wear on components in the crusher at various stages throughout the process.



Figure 2 - FRAGTrack™ Lightweight F60 Camera and F50 Processing Unit mounted at Drury



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The Result

Since the installation of FRAGTrack™ Crusher in May, Drury Quarry has had access to more than 5,000 fragmentation images and PSD data. The unbiased data set has generated insights which include:

- Matching blast PSD to crusher performance metrics through time stamped samples.
- A large percentage of blasted rock bypassed the primary crusher and went straight to the secondary feed.
- Calibration of fragmentation prediction model to optimise blast design.
- Pattern expansion to generate more coarse rock fragments and less fines.



Figure 3 - FRAGTrack™ captures a sample during tipping operation.

Compared to the previous manual method utilised on site, FRAGTrack™ has saved over 800 hours of manual processing, which are now dedicated to the analysis of the data and correlation to processing plant data. Additionally, FRAGTrack™ has allowed Drury to develop an accurate and unbiased PSD baseline for the optimum range of sizes to maximise crusher performance and reduce scalp yield.

Enabled by the real-time access to the full PSD curve, Drury has worked on stabilising the variability in both crusher throughput and scalping yield. By managing the scalp yield at the crusher, we are able reconfigure and adapt the plant setup to respond better to the feed source material which leads to improved productivity and overall considerable financial benefits.

The ability to automatically trace PSD data of material between 40-65mm directly fed to the scalp yield highlighted opportunities for improvement through blasting design optimisation.

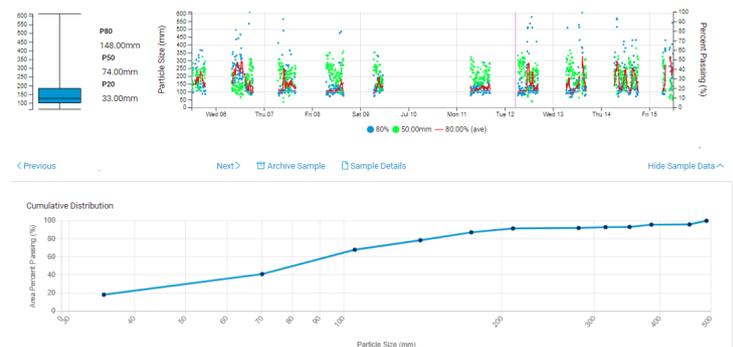


Figure 4 – Real PSD curve from FRAGTrack™ web including scalp size detected

The next step was to see the impact of fragmentation on the crusher. Initial reviews provided by the Stevenson team are encouraging as fragmentation directly influences the power consumption and throughput measured. This baseline correlation sets the grounds to start implementing the Drill and Blast optimisation that will enable a reduction in MW/ton of power consumption at the crushing circuit. These comprehensive data driven decisions enabled by FRAGTrack™ provide a critical piece that helps Drury reduce variables from the operation while maximising their aggregate product.

FRAGTrack™ Crusher has been adopted for continued use by Drury Quarry to reduce their overall cost per ton of aggregate, provide critical data for specific D&B optimisation and overall reduce carbon footprint as the demand for aggregate production in the region continues to rise.



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Testimonial

“Having a partner like Orica is great for us. We love our supply partners coming to us so that we can continue to innovate, improving our processes and deliver a quality product to our customers in a more sustainable way”.

Kurt Hine, General Manager Aggregates, Stevenson Aggregates.

“FRAGTrack™ is allowing us to obtain information that we've never typically had what we're getting out of it so far is, huge information to understand our rock better and our resource this is actually data that we can feedback and analyse and that's pretty revolutionary”.

Daniel Topp, Stevenson Aggregates Performance Manager.

Acknowledgements

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Author: Aaron Graham

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