Comparison of Fragmentation Results by Varying Time Between Top & Bottom Primers

Background

STUDY CONDUCTED TO FIND OPTIMAL DELAY TIMING FOR THIS GRANITE QUARRY

Dyno Nobel has been providing shot service to a granite crushed stone quarry in the Eastern U.S. utilizing TITAN SME and DigiShot® detonators.

This quarry was the subject of a timing study in 2016. Time between holes in a row was varied to arrive at the optimal delay timing. A second project has been undertaken to also study the effect on fragmentation by varying the timing between top and bottom primers.

The challenge on any study of this sort is control over the variables such as burden, spacing, powder factor, geology changes, etc. In this case, there was good control over the layout and loading to address these variables.

The bench that was chosen is 750 feet wide and in a consistent geology. That allows a large sampling area for best analysis.

Technology Applied

DYNOCONSULT EXPERTS WERE ABLE TO CONTROL VARIABLES AND ANALYZE RESULTS WITH FRAGMENTATION SOFTWARE

All blasts were laid out by Dyno Nobel personnel on the same burden and spacing. Elevation bench marks were utilized to ensure that holes were drilled to correct depths. The same product was used on all shots to maintain consistent powder factors. All front row holes were Boretracked and burden was measured with a 3D laser.

The timing between holes in a row and time between rows were kept consistent. The only variable was timing between top and bottom primers.

Cast was measured by use of markers placed on floor in front of blast. The muck pile fragmentation results were analyzed with fragmentation software.

Results

PRELIMINARY RESULTS ARE IN

Two blasts have been completed on this study thus far; one with both top and bottom timed at 0 ms apart and the second one timed with the top primer delayed 1 ms after the bottom primer. Although the fragmentation analysis is not yet completed, preliminary results indicate 70 feet more cast when the time between the two primers was 0 ms.

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