

CASE STUDY

DYNOCONSULT® CUTS QUARRY'S VIBRATIONS IN HALF FOR SIGNIFICANT COST SAVINGS

BACKGROUND

BLASTING IN PROXIMITY TO NEIGHBORS

An eastern US quarry has neighbors close in proximity to their operation. As mining continued, blasting got progressively closer to their neighbors, with the region of the pit they were advancing within 550 feet of one residence. A recent blast in this area had a peak particle velocity (PPV) of 0.6167, which was higher than the operation wanted. When looking at the United States Bureau of Mines Z-curve, the PPV for this shot did not reach the curve but was closer than desired.

PROJECT GOALS

VIBRATION REDUCTION

The quarry's goal for this project was to drastically decrease their blast vibrations as they approached their neighbors. The customer contacted Dyno Nobel and requested their technical support and expertise to bring vibrations to a level far below the Z-curve.

TECHNOLOGY APPLIED

VIBRATION TIMING OPTIMIZATION TOOLS

Dyno Nobel sent the DynoConsult team to provide technical support to address the customer's vibration concerns. Dyno Nobel's Vibration Timing Optimization Tool, a proprietary software solution that utilizes signature hole input and analysis to determine the best optimized timing schemes to minimize ground vibrations in both frequency and peak particle velocity (PPV), was chosen as an effective tool in addressing the quarry's vibration concerns.

First, DynoConsult and the local blast services team captured data from a signature hole on the bench in question. A portable seismograph was set up at the quarry's closest neighbor for additional vibration data. DynoConsult then input the signature hole data and the next shot's specifications into the Vibration Timing Optimization Tool. The software analyzed the vibration waveforms and determined the timing scenarios that would best mitigate the vibrations. Finally, the optimized timing scenario was provided to the blasters and used in the next shot.

AT A GLANCE



50% REDUCTION IN VIBRATION LEVELS



10% DECREASE IN LABOR COSTS



8% SAVED ON EXPLOSIVE COSTS



12% REDUCTION IN DRILLING COSTS

CHALLENGE

- Reduce blast vibration as a quarry approached their neighbors

SOLUTION

- Use the Vibration Timing Optimization Tool to drastically reduce blast vibration

OUTCOME

- 49.68% reduction in vibration levels
- 12% reduction in drilling costs

CASE STUDY

VALUE ADDED

49.68% REDUCTION IN VIBRATION

DynoConsult drastically decreased the vibration readings in this sensitive blasting area. The last blast on the bench prior to Dyno Nobel's involvement in the project had a PPV reading of 0.6167 in/s at the closest seismograph. The DynoConsult optimized timing on the shot next to it resulted in a PPV reading of 0.3103 in/s at the same seismograph. This is a 49.68% decrease, or approximately half of the original PPV reading.

Additionally, the signature hole reading used in the initial analysis prior to blast optimization had a PPV of 0.255 in/s. With a final PPV reading of 0.3103 in/sec, the Vibration Timing Optimization Tool's analysis provided a timing selection that decreased the vibration reading for an entire shot to a level close to the reading of the single signature hole firing.

The optimized timing lowered the vibration readings without decking the shot. By not decking the shot, the quarry saved approximately 8% on explosive products and 10% on labor costs. The quarry did not have to drill the tighter pattern required for decked holes, which saved approximately 12% on drilling costs.

The quarry was very pleased with the results and has requested that DynoConsult's timing optimization services continue for shots in the sensitive area of the pit.

PRODUCTS/ TECHNOLOGY & SERVICES USED



DYNOCONSULT



VIBRATION TIMING
OPTIMIZATION TOOL

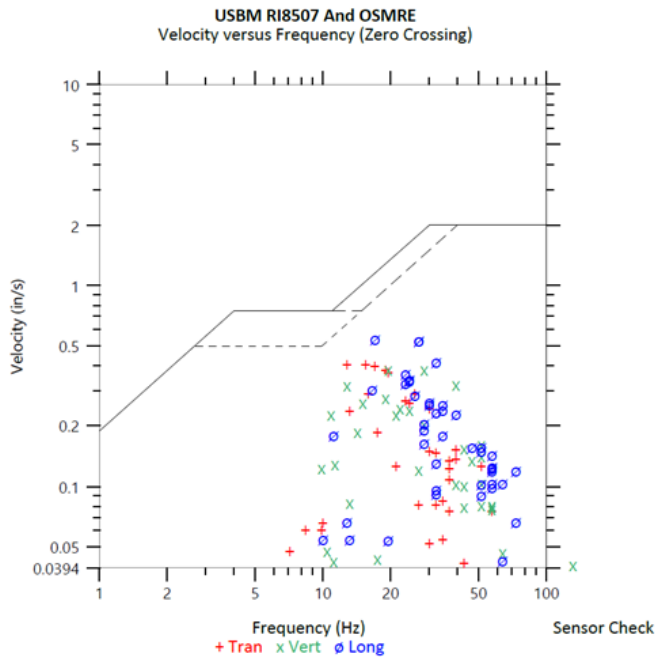


Fig 1. Shot performed prior to DynoConsult's support

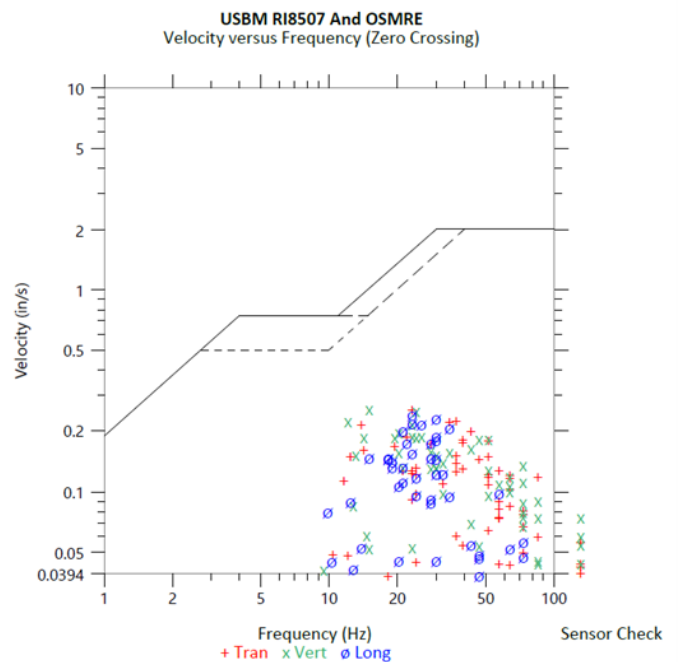


Fig 2. Shot with DynoConsult's optimized timing

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