CASE STUDY

DYNOCONSULT® PROVIDES CUTTING-EDGE VIBRATION PREDICTION

PROJECT SUMMARY

A quarry with close neighbors turns to DynoConsult for high-accuracy vibration prediction.

BACKGROUND

QUARRY OPERATOR SEEKS QUALITY VIBRATION PREDICTION

Close neighbors and strict regulatory requirements led a quarry operator to seek out cutting-edge vibration prediction methods. With neighbors just 300 feet away from blasting, this is a highly sensitive quarry with challenging community relationships.

The quarry decided to take a proactive approach with the community when a blast is forecast to have relatively high vibration levels. State law requires vibrations to be confined by the United States Bureau of Mines Z-curve, but the site maintained limits much lower than the regulations. The quarry faced extremely strict regulatory limits and became concerned whether they could continue operations. As a result, they looked to their full-time, on-site Dyno Nobel blasting consultant responsible for all blasting design to provide high-accuracy vibration estimates and control for each blast on site.

PROJECT GOALS

VIBRATION PREDICTIONS AND COMPLIANCE

The goal for this project was to provide the operator with cutting-edge, accurate vibration predictions for each shot. This would allow the operator to take a proactive approach with community relations and make wiser, data-driven blasting decisions.

AT A GLANCE

68% OF PPV ESTIMATES WITHIN 0.076 IN/S OF ACTUAL PPV

96% OF PPV ESTIMATES WITHIN 0.15 IN/S OF ACTUAL PPV

IMPROVED COMMUNITY RELATIONS

CHALLENGE

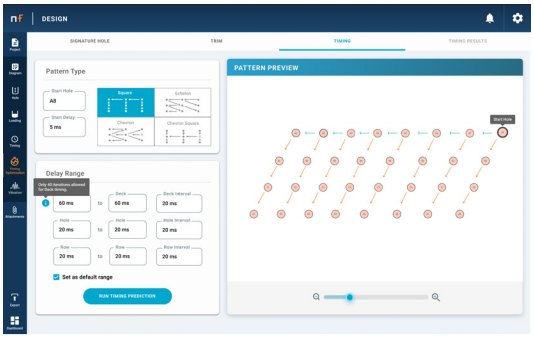
- Estimate and control vibration at a site with close neighbors

SOLUTION

- Use Dyno Nobel's software suite to accurately predict vibration levels

OUTCOME

- 96% of PPV estimates within 0.15 in/s of actual PPV
- Fewer community complaints



Vibration Timing Optimization Tool

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Neighbors just 300 feet from blasting

PRODUCTS/ TECHNOLOGY & SERVICES USED

- DYNOCONSULT
- TITAN BULK EMULSION
- DIGISHOT ELECTRONIC INITIATION
- BOOSTERS
- ADVANCED VIBRATION PREDICTION TOOL
- VIBRATION TIMING OPTIMIZATION TOOL

TECHNOLOGY APPLIED

VIBRATION TIMING OPTIMIZATION AND ADVANCED VIBRATION PREDICTION

Since 2020, DynoConsult has used a combination of the Vibration Timing Optimization Tool, Advanced Vibration Prediction Tool, and statistical analysis to predict vibration levels at this quarry. All initial blasts and close proximity blasts are analyzed and timed using Dyno Nobel's software programs.

Representative signature holes are the basis of prediction in the software. The Vibration Timing Optimization Tool refines the blast timing scenario options to the lowest vibration predictions. The Advanced Vibration Prediction Tool is then used to finalize the timing scenario selection for the blast and to estimate the vibration levels at neighboring seismographs. As blasting continues, the data is recorded and used to assist in statistically estimating predictions for less sensitive areas and blasts in succession in the same benches.

In addition to Dyno Nobel's software, DigiShot® electronic detonators and TITAN® SD Emulsion with TROJAN® SPARTAN® SR boosters are used in every shot.

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CASE STUDY

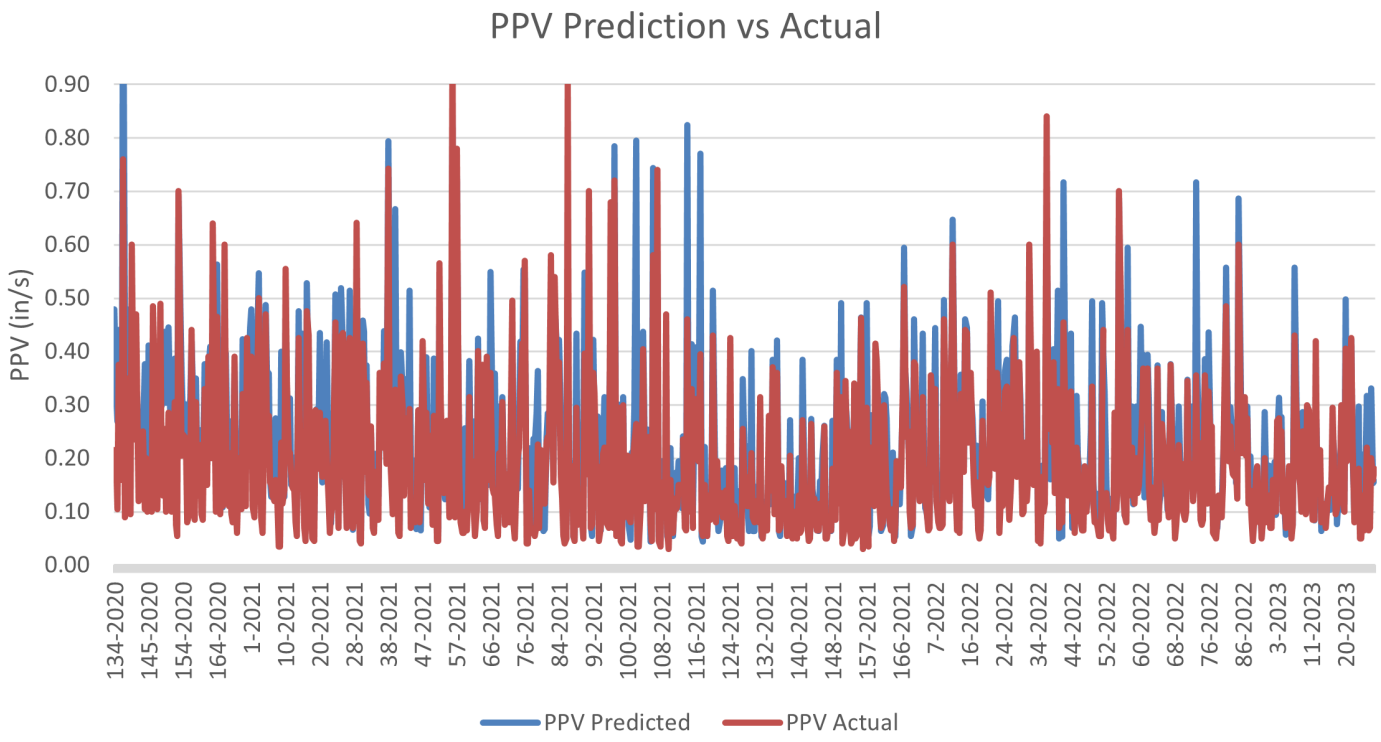
VALUE ADDED

ACCURATE PREDICTIONS AND FEWER COMPLAINTS

The blast estimates provided by DynoConsult proved to be high-quality and assisted in maintaining blast compliance and neighbor relations. DynoConsult also used the vibration predictions to adjust blast design, hole diameter, decking, bench splitting, and shot size limiting in sensitive areas of the pit.

Of the shots completed in the past three years, the average difference between the predicted vibration and the actual vibration was 0.035 in/s with a standard deviation of 0.076 in/s. 68% of the estimates were within 0.076 in/s and 96% were within 0.15 in/s of the actual blast vibrations. 74% of the estimates were conservative and were slightly greater than the actual blast vibrations.

Since Dyno Nobel began these services in 2020, the blast vibrations have remained well within the regulatory compliance limits for the site. Blasting-related complaints from the neighbors via phone call and town meetings decreased. The quarry operator was pleased with the results and determined that DynoConsult's technical services were a critical piece of their blasting operations.



Comparison of predicted PPV and actual PPV

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