CASE STUDY

CONVERSION FROM TRADITIONAL INITIATION TO MODERN INITIATION

PROJECT SUMMARY

QUARRIES EXPERIENCE THE MANY ADVANTAGES OF CONVERTING FROM TRADITIONAL INITIATION TO MODERN INITIATION

Inconsistent breakage & complaints from vibration off the blast events motivate two Indiana limestone quarry customers to convert from detonating cord and slider cast boosters to DigiShot® electronics and Spartan® cast boosters.

Over a two month period, four blasts were initiated at the one quarry and three at the second quarry. Both quarries have similar face heights of 85 ft. & use a 5.5-inch borehole. The drill pattern was a 14 x 16, which was expanded from the start by one foot in both the burden and the spacing and new delay timing was drawn up for the blast events.

BACKGROUND

CHALLENGING BLAST CONDITIONS

Annual yearly stone production for these quarries is between 500,000 to 600,000 tons.

Blast induced ground vibration concerns from nearby residential houses that have encroached to within 1000 feet of the permit boundaries. In addition, geological structure such as joint plans and weak shale seams create area for explosive energy to be directed aware for rock fragmentation and rock displacement. These challenging blasting conditions make pre-blast vibration predictions difficult with the inherent inaccuracies of pyrotechnic based nonelectric delay timing (surface and in the hole).

The customer challenge was to provide more consistent rock breakage and displacement from the blasts along with reducing the ground vibration readings. The implementation of more accurate and more precise

delay timing ensured overall production costs remained level. Providing consistent rock fragmentation and muck displacement reduces pit operations cost balanced even with the additional cost associated with advanced initiation systems.

PROJECT GOALS

SEVERAL GOALS CAN BE ACHIEVED AT ONCE WITH MODERN INITIATION

Project goals included more consistent breakage, less drop ball material to handle and break up, reduced vibrations from the blast events, as well as expand the blast patterns and increase number of holes in the blasts.

TECHNOLOGY APPLIED

Faces were profiled using a 2-D profiler to determine front row burden helping ensure proper explosives confinement & reducing the risk of a fly- rock incident.

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CASE STUDY

VALUE ADDED

FROM THE BREAKAGE IN THE BLASTS TO THE LOWER VIBRATION READINGS, DIGISHOT HAS MADE A DIFFERENCE

With the drill pattern expanded by 13%, rock breakage is more consistent with almost no secondary breakage or drop ball material. Blasted material was easier for the loader operators to dig with improved bucket fills. Blast sizes have increased from less than 20 holes to around 30 holes while vibration levels were reduced from 0.6 to 0.7 ips down to 0.3 to 0.35 ips.

With the more consistent breakage, the quarries are able to set their crushers when they start running the blasts and leave them at that setting as the entire blast is mucked. Before DigiShot was used, they would have to adjust the crusher speeds to the area of the blast as it was mucked losing valuable crushing time and non-optimal results.

The superintendant mentioned he can't put a actual dollar amount on the saving, but some of the areas where he had seen improvements are: more loads going to the crusher per shift, less wear on the loaders (easier digging), crushers operating more efficient with less stops for oversize plugs and bridging, fewer blast events due to larger blast size per event, and lower vibrations creating less complaining from people around the quarries. Implementing a new initiation system technology at this quarry customer provided to financially beneficial.

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