

Dyno Nobel Blast Design and DigiShot[®] Detonators Produce Excellent Results



Project Summary

MAJOR SLIP CAUSES EXCESSIVE BURDEN

Dyno Nobel provides shot service to this crushed stone quarry with bench heights ranging from 40 to 75 feet. The hole diameter used is 6.5" and patterns vary in the pit dependent on bench height. Products used are either TITAN[®] XL 1000 or a TITAN blend, depending on water conditions.

The geologic formation varies throughout the pit from a fairly good fragmenting 'blue' stone to a very hard to break 'green-white' formation. In addition, both formations are loosely jointed with numerous slips running in unpredictable directions. On this particular blast, a major slip caused excessive burden on the face of the blast. The major challenge at this operation is the close proximity and density of surrounding communities, so vibration and air over-pressure must be addressed in any blast design.

Technology Applied

3D LASER PROFILE, BORETRACK AND SHA HELP DETERMINE COURSE OF ACTION



The bench was laid out using a 3D laser profiler and it was determined that 20° holes would be necessary on the first row. The front row was backed up by a row of 10° holes, then a third row of vertical holes. A Boretrack survey was done on the 20° holes and they were found to be within 1° accuracy. The delay design was developed using Signature Hole Analysis and DigiShot[®] electronic detonators. In addition, the initiating hole was deck delayed to minimize the air-overpressure.

The front row of 20° holes was custom loaded using Dyno Nobel's formulas to reduce fly-rock and air-overpressure. Reduced column charges were utilized to compensate for reduced burdens up the blast hole. Stemming depths were determined using the drill log, hole observations and stemming conversion chart calculations were used to prevent stemming ejection and air-overpressure.

Results

VIBRATION, AIR-OVERPRESSURE AND FRAGMENTATION WERE ALL GOOD

The blast was successful with fragmentation being very good. The vibration and air-overpressure levels were below normal at the seismographs surrounding the pit.