Project Summary

POTENTIAL FRAGMENTATION STUDIED

This gold mine in Canada employs long hole blast patterns in a narrow seam underground operation. Fragmentation from the blasting is always a concern as it has a major impact on the downstream processes. In addition, the fragmentation plays a role in the recovery and dilution of the ore.

The results of fragmentation modeling were expected to determine the fragmentation distribution from 4ft x 4ft square and 4ft x 3ft staggered patterns in basalt. The stated intent of the modeling was to determine the potential fragmentation distribution that will result from the specific blast designs when loaded with either ANFO, DYNO® SL, or TITAN® 7000 RU.

Technology Applied

FRAGMENTATION MODEL DEVELOPED

A fragmentation model developed in-house by Dyno Nobel was employed to model the fragmentation that would result from changes in the various blast design parameters. The fragmentation model employs four different algorithms depending on the exact circumstances to be modeled.

Results

MODEL RESULTS

1. For the parameters examined, the delay time had the greatest impact on the fragmentation followed by the blast hole pattern.

2. Delay times of 25 ms and 100 ms were considered in this analysis. The 25 ms delay time provided finer fragmentation in all the scenarios when compared to a delay time of 100 ms.

3. The 4x3 staggered blast hole pattern produced finer and more uniform fragmentation than the 4x4 square blast hole pattern.

4. There was minimal difference in the fragmentation distribution for the three explosives examined within a given blast hole pattern. However, the finest fragmentation was achieved with DYNO SL.

5. The tighter the joint spacing, the finer the overall fragmentation.

Next Steps

CONTINUED REFINEMENT NEEDED

Additional fragmentation modeling can be employed to continue the refinement for the basalt, but also for the other geologic formations. Continued analysis will lead to the optimized blast design for this operation.