

INSTRUMENTATION FOR BLAST MONITORING IN UNDERGROUND MINES

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ABSTRACT

Rock fragmentation by blasting still remains the most common and cost-effective method of excavating hard rock in mining and tunneling operations. During blasting, the dynamic stresses induced by the detonation of the explosive, in addition to fragmenting the rock in the vicinity of the blast, may fracture the rock at considerable distances from the point of detonation of the explosive. The fractures can result in reduced mine safety, increased costs to support the opening, low productivity and perhaps high ore dilution. Besides the dynamic stresses produced in the rock, air blast overpressure pulses are generated and propagate through the network of underground mine openings. The waves, unable to spread out spherically or hemispherically like blast waves from surface blasting, are forced to propagate by reflection from the roof, ribs and floor down the drift. Blast wave focusing can occur and produce intense shock waves that could damage ventilation barriers such as cement block stoppings.

Monitoring the performance of an explosive and determining the response of the rock mass and support structures are important aspects of engineering and blast design. The instrumentation and methodology for monitoring a blast in an underground mine are discussed, and guidelines are provided for the assessment of blast efficiency and the control of blast damage.