

PhotoSeis™
an advanced method for
vibration analysis and control

Mr. John L. Floyd, Blast Dynamics/Vibra-Tech Engineers, Inc.
Mr. Daniel B. Conn, Kesco A.E.T.

Abstract

PhotoSeis™ is a blast analysis method that combines the advanced technologies of high speed motion picture photography and digital seismology. When fracturing rock with the use of explosive energy, the human eye cannot detect the details of the process due to its short duration. An extended time base is required to accurately quantify the response of the rock mass to the detonation process. This time base is provided by the use of high speed motion picture cameras. The control of ground vibrations and airblast is an important consideration when developing efficient blast designs. High vibration and airblast levels can be an indication of improper design, inaccurate detonators, or adverse geology. Since many factors can elevate airblast and ground vibration, a greater understanding of the site specific response to the blast design is needed that is beyond the scope of simple seismographic recordings. By synchronizing the photographic record provided by the high speed motion picture cameras with the airblast and vibration information from digital seismological monitoring, the PhotoSeis™ technique can be of great assistance in controlling airblast and vibration and optimizing the use of explosive energy for rock fragmentation.

To evaluate the PhotoSeis™ method for use as a blast analysis tool, we conducted a series of rigidly controlled field tests at several different locations. A much better understanding of the site specific fragmentation process was acquired from the analysis of the information provided by the technique. We were able to quantify the role of delay element accuracy and confinement in the production of ground vibration and airblast. By using the technique to evaluate timing configurations for frequency modification, it was possible to achieve the best modification for the particular site.

PhotoSeis™ is a valuable tool that can be used to assist operations with airblast and vibration control. At the same time, site-specific blast designs can be developed that will increase overall productivity.