
Departmental Seminar

Seminar Title	: Advances In Design Of Safe Practices For Protection Of Surface Structures Due To Blast Induced Ground Vibrations Around Opencast Mine Sites
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Venue	: Seminar Room, Department of Mining Engineering
Date and Time	: 25 Feb 2025 (4:30 PM)
Abstract	: This paper presents overview of scientific studies related to blasting investigations since 1988 by the author as Scholar of IIT-BHU-Varanasi, scientist of CSIR-CIMFR, NIRM-Ministry of Mines, and Professor of NIT Rourkela through various industry oriented trans-disciplinary research activities over 38 years to improve safety in mines. Various innovative attempts were made for application of Information and Communications Technologies (ICT) through about 130 industry/Ministry sponsored projects for development of new concepts, designs and implementation in the field of opencast and underground mines in India including blasting investigations and Technology Exchange Programs/Workshops etc for dissipation of safe blasting methodologies in various industries such as coal mines of M/s Coal India Limited, Iron ore Mines of M/s TATA Steel, NMDC Ltd etc, Explosives manufacturers - Gulf Oil Corporation Limited, etc. Various numerical and empirical models have been used for prediction of ground vibrations and design of safe blasting systems in various countries. However, applicability of these models need further validation with site specific conditions. Blasting is a major operation in mining activity. It is the most convenient method for fragmenting the hard strata for removal of coal and mineral. In spite of the emergence of many blast free technology including surface miner, vibro-ripper, etc blasting still dominates over them due to its cost effectiveness and productivity. Large opencast mines across India uses tons of explosives annually for removal of over burden material. Use of large volume of explosives with improper blast geometry, delay sequence, selection of drills etc may lead to environmental hazard in terms of ground vibration leading to damage of many civil and earthen structures. Blast wave propagation along a rock stratum has a damaging impact on the structures built across it when there is resonance of blast wave frequency with that of natural frequency of the structure concerned. Ground movement can be ascertained by measuring the ground displacement, velocity or acceleration by the geophones or seismographs. DGMS, the mine safety watch dog of India has laid down guidelines suggesting limiting criteria of Peak Particle Velocity based on the dominating frequency ranges for various civil structures. This paper also discussed the mechanism of blast wave propagation in a mine stratum with the use of numerical modelling software in continuum approach.