

EVALUATION OF EXPLOSIVES USING GROUND VIBRATION CRITERION

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
BACHELOR OF TECHNOLOGY

IN

MINING ENGINEERING

BY

SANJIB KUMAR PRDHAN

And

ASHRIT DAS



**DEPARTMENT OF MINING ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA, ORISSA - 769008
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**UNDER GUIDANCE OF
Dr. MANOJ KU. MISHRA**



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CERTIFICATE

This is to certify that the thesis entitled, "Evaluation of Explosives using ground vibration criterion" submitted by Sri Ashrit Das and Sri Sanjib Kumar Pradhan in partial fulfillment of the requirements for the award of Bachelor of Technology Degree in Mining Engineering at the National Institute of Technology, Rourkela (Deemed University) is an authentic work carried out by him under my supervision and guidance. To the best of my knowledge, the matter embodied in the thesis has not been submitted to any other University/ Institute for the award of any Degree or Diploma.

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Date:

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ABSTRACT

Recent times have experienced an increase in infrastructure and mineral resource developments. As a result, mining activities have also increased to supply the needed mineral. Blasting has been the main technique for loosening insitu rock before use. Consequently there is a growing concern of the effects of blasting activities on the environment. These effects are normally nuisances to the neighboring residence as they come in the form of: dust, toxic gases, noise, fly rocks and ground vibration. Of the set of nuisances the one that is of most concern is ground vibrations which can cause damage to structures. In most cases worldwide, after blasting activities there are the usual complaints about damage to residence, and less mining activities which is also a focus of the thesis. A study was conducted to evaluate the effect of heavy blasting in open-pit coal mines on the stability of adjoining under ground coal mine workings.

There have been researches on the subject of ground vibrations to help refute some of these complaints. The works of Lewis Oriard and Charles Dowding are the foundation on which standards and regulations are built as guides to assist blasters in the prevention of creating unnecessary nuisances. Most countries have developed their own regulations with respect to blasting and parameters are set according to the geological conditions. This is of importance as the rock structures determine the transmission of the peak particle velocity. However, most countries in the west adopt standards similar to ones put forward by the United States Bureau of Mines. It my opinion that a whole scale adoption should not take place as the criteria used may not be suitable for other countries' geological conditions.

For this thesis the aim was to identify a vibration level that will not cause damage to structures close to a mining area and increase production by effective blasting. Based on the literature review it was revealed that there are a number of parameters that needed to be considered. These ranges: construction material, age of structures, distance from structures, geology of the location, type and quantities of explosives and the blast design. There was also the review of standards to building threshold with respect to the level of ground vibration.

The case study with its main focus on evaluation of explosive using ground vibration criterion which will not result in any form of damage to the structures. However, having established a PPV limit using the USBM that appears reasonable there is the need for criteria similar to those of the USBM using blasting and geological conditions.

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