

Safety Management In Coal Mining Industrial Output Transporting System (Haul Roads, Benches Heights, Widths And Slope) For Effective Production

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Abstract– Productivity improvement is the very important factor for a firm to survive and to achieve breakthroughs the work carried out deals with enhancing productivity in a manufacturing industry with Safety Management in Coal Mining Industrial Output Transporting System for Effective Production. In production department there is some unwanted work process is done which is taking extra time, extra effort as well as increasing the cost of product and worker affected some unwanted fatigue, so the industry not able to improve productivity. Thus the purpose of this work is to propose improvement area in the industry so that industry can increase their productivity by analyzing the problem associated with it. Identified problems were solved by using method principles improvement was achieved by reducing cycle time of product carrying from safe way of working techniques to direct on trolley instead of pallet to proceed in the coal industry

Key Words - safety management, safety methods, safety techniques, safety equipments is part of study in effective production analysis. In an open cast mine.

I. INTRODUCTION

The mining technology marching towards a very faster space in this modern age but the trucks/dumpers remains the primary means of transportation of coal in the Indian coal mines. Statistically it has been seen that slope failure or bench failure is the second main reason of accident after the ground fall in the Indian underground coal mines. Out of the total accidents the total open cast coal mines, the average percentage of fatal and serious bodily accidents due to the slope failures or benches are 23% and 11% resp. Out of these figures 20% of the accidents occurred due to the slope failure of opencast benches, failure like sliding of rock mass, 19% due to uncontrolled movements of faults, 17% due to development of tension cracks, 14% potential unstable rock design, 10% weakly bonded and steeply Deeping rock mass and 12% due to unsafe practices. Presently

of the total coal production from the opencast mining comes under by benching system of haul road maintainability. Therefore it is most important for proper safety management in opencast benches workings (including the development faces). This report concentrates only the safety system of some of the effects of dynamic loads on opencast benches.

- Design of slope is an exercise to optimize the stability with respect to economy. If we increase the stability slope angle will decrease and cost of removal of α will increase and if we decrease the stability by increasing slope angle cost of removal of α will reduce. Dynamic load increases the slope angle or reduces the stability hence in designing the slope dynamic load is given due importance.
- Thus dynamic load may be due to moving mass on the bench surface in term of HEMM or may be developed due to blasting or seismic effect in the hilly or mountainous terrain, etc.
- Our work will be focused only with slope in the opencast mines where dynamic load is either due to moving mass in terms of HEMM or vibrations/shocks generated due to blasting. However in this project we will study as follows.

Therefore in order to manage proper safety in an opencast mining, the proper study and analysis of slope failure can be considered in regards for effective production of output which will balance or maintain proper output transportation system (roads).

II- FACTORS FOR SLOPE FAILURE

- Slope failures of different types are affected by the following factors:
- (a) Slope Geometry

slope geometry is the important factor which affects the slope stability.

The basic geometrical slope design parameters are bench height, overall slope angle and area of failure surfaces

Stability of slope decreases with increases in height and slope angle.

Generally overall slope angle of 45 degree is considered to be safe by DGMS

(b) Geological structure

The main geological structure which affect the stability of the slopes in the open pit mines are:

1. Amount and direction of dip
2. Intra-formational shear zones
3. Joints and discontinuities
4. Faults

(c) Lithology

The rock materials forming large pit slope determines the rock mass strength modified by discontinuities ,folding ,faulting, old working and weathering.

(d) Ground water

It causes the following

1. Alters the cohesion and frictional parameters
2. Reduce the normal effective stress

(e) Mining Method and Equipment

Basically there are four methods of advance in opencast mines.

They are:

- 1.Strick cut- advancing down the dip
- 2.strike cut – advancing up the dip
- 3.Dip cut –along the strike
- 4.Open pit working

(f) Dynamic forces

Vibration , Blasting and shear stresses effects are increased momentarily as a result dynamic acceleration of material and thus increases the stability problem in the slope face

Blasting is a primary factor governing the maximum achievable bench face angles. The effects of careless or poorly designed blasting can be very significant for bench stability. Besides blast damage and back-break which both reduce the bench face angle, vibration from blasting could potentially cause failure of the rock mass

(g) Cohesion

Cohesion is the characteristics property of a soil or rock that measures how well it resists being deformed or broken by gravity force.

slopes which having rocks /soil with less cohesion tend to be less stable.

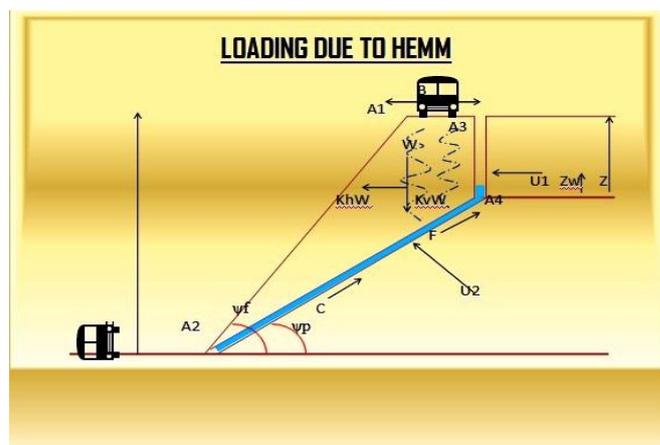
III- SOURCES OF LOADINGS

Static loading

- (a) W=weight of the sliding block
- (b) U= upliftment force
- (c) V= force exerted by the water column

Dynamic loading

- (a) due to HEMM
- (b) due to blasting
- (C) due to seismic activity like earthquake



IV- METHODOLOGY

Open cast mining industry is considered as one of the toughest and hazardous jobs by huge investment and by proper safety planning techniques. The miners have to work in severe work condition in narrow openings with substantial heat and humidity, heavy noise and vibration, poor illumination, airborne dust and noxious gases. These hazards pose a serious problem of managing safety and health risks to mine workers. As a result, accidents/injuries are prevalent across all in opencast mining. Several factors such as mining methods, benches width and heights dynamic loads of movable hemmm, geological disturbances, excessive horizontal stress, size of mine, undulating floor, seasonal variations and conditions of mine roof and floor contribute to these accidents/injuries. Identification of these factors may play an important role in accident mitigation. Further, different workers face differential risks due to their different job occupations. Attempt should me made for clustering the mine workers with their differential risk contours. Accident data analysis, if used properly, can well address these areas which ultimately lead towards achieving better safety standards in mines. The study includes consideration of injury details and discussions with mine management for identifying these specific problem areas to improve the mine safety performance. Risk has two components such as (1) probability -

how likely is it to occur, and (2) consequences-what happens if it does occur? In this study, the risk in terms of frequency rate for occupation, cause, and occupation-cause group combined, body Parts injured, and body parts-cause group combined was computed. The consequences of the various risk factors were measured in terms of man days lost per injury. The various occupation groups considered for the study of benching and benches stability with respect to slope. Therefore it is necessary to manage proper safety plan with respect to study of dynamic loads effects and maintainability of slope angle .

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