

# **A Study On Application of Strategic Planning Models and operations Research Techniques in Opencast Mining**

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## **ABSTRACT**

Given areas of strength for the for coal, either as anticipated by Coal Vision 2025 or as detailed in the assessments of the Administrative Ministries of Coal Consuming Sectors, a critical need to improve coal supply from native sources is felt. Considering this, a coal creation plan has been conceived for a few 'Plan Periods' from now on. Past the all around rehearsed automated extraction of coal holds utilizing ordinary advances, new ways for taking advantage of CBM and in-situ gasification of coal from difficult to reach sources should be investigated. Coal India has set up an auxiliary called "Coal Videsh" to buy coal from worldwide sources to supplement the accessibility of more excellent coal of both coking and noncoking grades. The auxiliary's job is to accumulate data about mines in different nations and, by means of the acquisition of unfamiliar stock in coking coal properties, to set up for direct import to close the hole.

## **INTRODUCTION**

Foundation Mining is the world's second-most seasoned industry, behind agribusiness, which is the first and generally significant. That old culture was on the whole dependent on mined assets, as seen by names like Stone Age, Copper Age, Bronze Age, and Iron Age. These names precisely mirror the attitude of the period, which mirrors the developing intricacy of individuals' general public's association with metal extraction and use. Our progenitors participated in hard rock mining. Mining stayed a normal action for them to earn enough to pay the rent and backing their necessities. Since they had such a little fuel need, they got a large portion of their fuel from the world's rich woodlands. As time went, individuals were obliged to fulfill steadily expanding expectations for everyday comforts. As an outcome, interest for fuel was viewed as basic to mankind's endurance, and it kept on rising. To satisfy consistently expanding request, coal mining took on an assortment of structures. Being a parent, recovery, hunting and fishing, ranger service, farming, cultivation, and mining are the six fundamental wellsprings of abundance that nature offers because of man's endeavors. Mining is one of them, and it is a wellspring of oil and coal. They are currently significant crude minerals for use as fuel. The quick ascent of the oil business, as well as the revelation and ensuing progressions of gas powered motors, as well as the coming of power as a (elective structure) discretionary power source, brought about a reduction in the immediate utilization of coal as a wellspring of energy. Be that as it may, the following worldwide energy emergency of the 1970s, which originated from an oil ban, once again introduced coal as a central part in the worldwide picture. One more convincing motivation to help coal

utilization to a main concern is the world's diminishing oil supplies. Since coal keeps on having an edge over other energy sources, and on the grounds that coal stores are essentially more abundant and secure across the globe than contending energy sources, coal utilization stays at the very front. India is an oil-scant country.

### **OPERATIONAL SCENARIO**

Mining operations are broadly split into two categories: underground and opencast or surface mining.

Following the discovery, delineation, and evaluation of a deposit, the next stage is to choose a viable mining process for extracting minerals from Mine deposits that is physically, economically, and ecologically feasible.

Many variables influence the technique of mining that is chosen.

However, before deciding on a technique, safety and economics must be prioritised.

### **DRILLING**

of Holes With more efficient equipments coming to market in a steady flow and enhanced form technology registers a high pace in the drilling and breaking sectors. The first operation that falls in the line of unit operations conducted during the exploitation phase in surface mining is production drilling. It precedes blasting. It is associated with blasting as the two unit operations employed to break into pieces of the consolidated material in a rock form. The principles of drilling are concerned with energy employed for penetration of rocks. Usually, it is mechanical energy that goes with functional responses and interrelationship between drill systems and rocks. The utilization of mechanical energy for penetration of rocks primarily involves development of the drill system. However, emphasis is laid on efficiency and practical approach of the system in a specific working environment. The purpose of drilling is to create large or small diameter holes in the natural rock massif. Drilling of holes is a process consuming labour and high cost process, especially when drilling is done on hard rocks. All the mining operations are fully dependent on this first and basic operation of drilling. Further, drilling is a vital

### **LOADING**

By Shovels Shovels are used as loading machines. They are deployed to varying and extremely broad based ranges of loading work. They are designed to accommodate a wide range of working conditions. Sizes of shovels have increased incredibly to meet ever increasing requirements. There is no limitation observed on sizes of shovels and other loading machines. Availability of trucks to match mining shovels is a matter of great concern. It is an only major obstacle to increasing these capacities. Physical and economic considerations may operate as controlling factors in equipment size. operation to get better blast efficiency. Drilling activity needs to be meticulously planned keeping in view the following aspects:

### **TRANSPORTATION OF OB AND COAL**

From time to time, a mining engineer faces a need to conduct a study of haulage or transportation. It is to determine not only the most suitable method of hauling material, but also to determine most effective and economical means or equipment to use for operation of shifting materials. The rear dumpers are mostly used in transportation of OB and coal in opencast mining project. These units have the body that is mounted on a frame of a truck. Dumping is carried out by raising the box with a hydraulic hoist system. There are common types of trucks that are capable of handling all types of material, whether blasted, ripped or loose. These units cannot be used for any road, but for off highway service, since they exceed

legal width and weight limits. The OB or coal after being loaded into dumpers or trucks, are transported to dump-yards or coal handling plants for the purpose of dumping and crushing at respective destinations.

## **CONCLUSION**

The outcome of the research work presented in this dissertation may lead us to draw certain conclusions. They may be summarized as follows: i) The planning of an opencast mining project is preceded by collection of required information and data as regards to geological, financial, manpower, HEMM and other related matters as they prevail under the existing conditions. A careful attention has to be paid while collecting and compiling the information in an usable form. Accuracy of the data is the first requisite for realistic planning. Hence, they need to be collected and verified with personal verification on the site as well as with available records. ii) The operations that involve charging and blasting occur with high probability, whereas other preliminary processes such as drilling and loading occur with low probability. In order to maximize the probability of the overall operation a proper mix of operations based on Markov Chain, covering working state and non-working state need to be adopted. iii) The charging and blasting times need to be reduced to bring down the idle time that may occur with the costly HEMM when the method is employed at mining operations. A problem of this kind may be resolved with mechanized loading of SMS. iv) There occur several associated problems with multifold increase in explosive consumption. Significant technological developments may be adopted in the direction of the usage of explosives. It may help to overcome them to some extent. Optimum and proper design of blast hole geometry, viz. bench height, burden, spacing, borehole dia, average charge/hole and total charge in a round are the remedies suggested to apply with proper use of explosives. It helps to reduce associated problems and results in suitable fragmentation of the blasted muck.

## **REFERENCES**

1. Publication of papers : Published 23 papers in National and International Conferences, Seminars, Journals, etc. A few publications are mentioned below: a. Brahma, K.C. and Kumar, Ashok. (1999): "Multi Variate Linear Regression Model –
2. A Case Study in Opencast Mine Blasting" [Proc. of the Second International Conference on Operations and Quantitative Management (ICOQM), Jan. 3-6, Ahmedabad, India, Tata Mc Graw Hill Publishing Company, New Delhi] pp.472- 477. b.
3. Kumar, Ashok and Brahma, K.C. (1999): "Finite Source and Multiple Server - An application in Mining", Proc. of the Second International Conference on Operations and Quantitative Management (ICOQM), Jan. 3-6, Ahmedabad, India, Tata Mc Graw Hill Publishing Company, New Delhi, pp.451-455. 10. 4 c. Bandopadhyaya,
4. A.K., Brahma, K.C. and Kumar, Ashok. (1999): "Operation Research Techniques for Optimal Planning and Allocation of Coal –
5. A case study in Mining" National Seminar by MGMI, on SCUIM'99 at MCL, Sambalpur, 6th February, 1999, pp. 71-75. d. Bandopadhyaya, A.K. and Brahma, K.C (2000): "A new horizon in Coal Mining Industry", Proc. of International Seminar on Quality, Productivity & Environmental Concern of the Indian Coal Industry in the new Millennium organised by Indian Mine Managers Association, Bhubaneswar, 22-23rd Jan. 2000, pp.76-80. e. Bandopadhyaya,
6. A.K and Brahma K.C (2001): "Environment friendly mining of coal at Lakhanpur OCP, MCL, National Seminar on Environmental Issues and Waste Management in Mining and Allied Industries, Feb., 23&24, REC, Rourkela, pp.110-115. f.

7. Brahma, K.C and Bandopadhyaya, A.K .(2001): "Blast free mining of coal at Lakhanpur Opencast Project of MCL" IMMA National Seminar Mining Vision-2010, 7-8 July, MCL(HQ), Burla, Sambalpur, pp.9-11. g. Bandopadhyaya, A.K and Brahma, K.C (2001): "Surface miners at Lakhanpur Opencast Project –
8. A revolution in opencast coal mining technology", Proc. of the Tenth International Symposium on Mine Planning and Equipment Selection, New Delhi, Nov.,19-21, 2001 Oxford & IBH Publishing Co. Pvt. Ltd., pp.287-293. h. Venukumar, N and Brahma, K.C (2003): "Some aspects of Petri nets and its application in Mining" MEAI-Seminar on Recent Trends in Mine Mechanisation Exploration to Mine Closure, 21-22, November, Puri.