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CASE STUDY ON PERFORMANCE OF DRAGLINE AT OCP MINES

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Abstract - *Draglines have been abundantly used in coal mining for decades, either as stripper or stripper and coal extractor. As this equipment possesses certain inherent advantages, which their rivals do not, they must be operated in a round-the-clock fashion for high productivity and low costs. This has resulted in major changes in overburden/inter burden excavation technology in surface coal mines from shovel mining to that of draglines. Most mines depend on the dragline 24 hours a day, 7 days a week. In many coal mines, it is the only primary stripping tool and the mine's output is totally dependent on the dragline's performance. For these reasons, dragline design requires emphasis placed on developing components with high levels of reliability and predictability so that repairs and replacement of components can be scheduled at times that will least affect the overall mining operation. Prior to deploying draglines in mines, various factors have to be considered for selection of suitable size. Different parameters are used to determine the production and productivity of draglines. In this thesis these points are discussed in detail.*

Key Words**:** *Drgline*

1.INTRODUCTION

Demand one energy is continuously increasing. Coal, which is the most homogeneously spread raw material throughout the earth's crust, is among the most demanded fossil fuels. A of scale extraction methods are highly mechanized and equipment with huge capacity are utilized. Draglines have been abundantly used in coal mining for decades, either as stripper or stripper and coal extractor. As this equipment possesses certain inherent advantages, which their rivals do not, they must be operated in a round-the-clock fashion for high productivity and low costs. Despite its colossal posture a dragline can be said to have a simple routine of work, whichiscomposedofthefollowingbasicprocedures:diggingandwalking.Amongthemwalkingisasteadyprocessonwhichtheminedesignteamhaslittlecontrol.Almostallwalking draglines take a step of approximately 2 m within a time period of strippanels,equippingaspecificunitwithoneoperator'sroomonthedesiredsideorwithtwo on both sides and the management's strategy in coal loading operation largely affect the frequency and the length of long deadheading periods, during which the unit is unproductive (Erdem et al.,2003).

1. Objective

- System of working of dragline and methods of working of dragline
- Draglines used in India
- Projection of annual output,
- Operating cost and cost per tons of coal exposed by dragline.
- Estimated cost/ton of coal exposed

1.2 Dragline mining in India

Indian mineral industry has contributed significantly to make the nation self-sufficient in coal. To meet the demand so thermal, cement and other users, the production trends in coal and lignite sectors have shown a remarkable increasing trend over last few years. While extracting the deep seated coal deposit and also to increase the present production capacity, the coal mines have been compelled to modernize the mining technology, particularly fields of blasting. Coal producers have already tried to open up big surface coalmines in various coalfields. This has further necessitated the importance of adopting better mining technology intheaboveminesbyapplyingscientificandeconomicapproacheswhileselectingthemining equipment and introducing the state-of-the-art technology. In this process it is important to adopt the blasting technology suitable for the mine as it affects the subsequent operations involved in the mining.

thefirstwalkingdraglinewascommissionedatKurashiain1961.Presently, thereareabout43 draglines deployed to remove overburden ranging in bucket capacities from 4 cu. m to about 29-30 cu. m. Coal India Limited (CIL) has now standardized the draglines in two sizes, which are10/70 and24/96 for their mines. Thee conomiclifeof draglines beenassumedbyCIL to be 27 years. Northern Coalfields Limited (NCL) is the only subsidiary company of CIL, where the entire coal production is mined by opencast mining method. Another unique feature of the company is that about 40 per cent of the large volume of excavation is done with the help of larger walking draglines.

Draglines are used in all the mines of NCL except in Jhingurda, KakriandGorbi.Insingareenicolleriescompanyltddraglinesareuse dinocpIand ocp III in the ramagundamarea

2. Classification of draglines

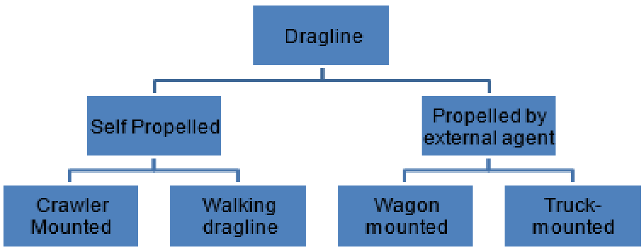

Table -1: Sample Table format

In a typical cycle of excavation, the bucket is positioned above the material to be excavated. The bucket is then lowered and the dragrope is then drawn so that the bucket is dragged along the surface of the material. The bucket is then lifted by using the hoist rope. A swing operation is then performed to move the bucket to the place where the material is to be dumped. The dragrope is then released causing the bucket to tilt and empty. This is called a dump operation.

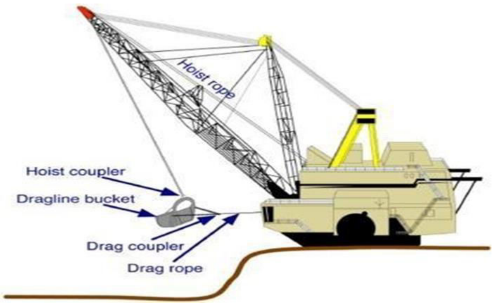

Fig.1: Line diagram of dragline

The stripping cycle of dragline begins with the dragline cutting a trench, referred to as thereunto, alongthenewlyformedhighwall.Thedistancefromthepreviouskeycutposition to the new position is referred to as the dig out length. The key cut is made to maintain the panelwidthanduniformhighwall.Withoutakeycut,thepanelwidthwouldnarrowwitheach subsequent dig out, because the dragline could not control the bucket digging against an open face. The dragline deposits the key cut material in the bottom of the mined-out pit off the coal and against the previous spoil pile. More stable spoil from the key cut may be placed in the very bottom next to previous spoil to form the buck wall which provides a more stable spoil slope that can be steepened if deemed necessary.

When the key cut has been completed, the dragline is moved to new position to complete excavation of the dig out. This is known as the production cut, and the material is

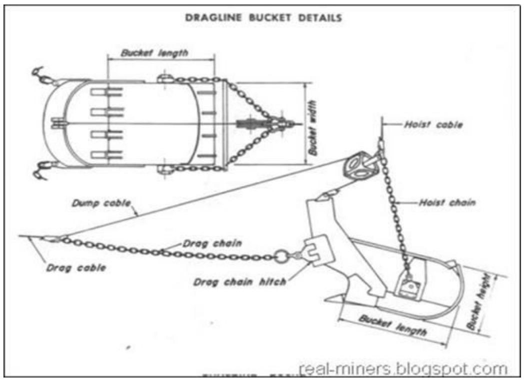

Fig.2: dragline bucket details

Simple side casting method

This is the simplest form of strip mining, which involves excavation of the overburden inaseriesofparallelstrips. Thestripsareworkedinaseriesofblocks.The0/Bfromeachstrip is dumped into the void left by the previous strip after the coal mineral has been mined. It is customary to start the excavation of each block by digging a wedge-shaped key cut with the dragline standing in line with the new high wall. From this position, the machine can most easily dig a neat and competent high wall. The nearest high wall is affected by starting the out with the dragline in line with the crest and moving it as the out gets deeper, ending with the machine in line with the toe of the new high wall. By this means, the slope angle of the new high wall can be closely con rolled. The width of each strip is usually designed so that the material from the key cut can be thrown into the previous cut without the need for **rehandle.**

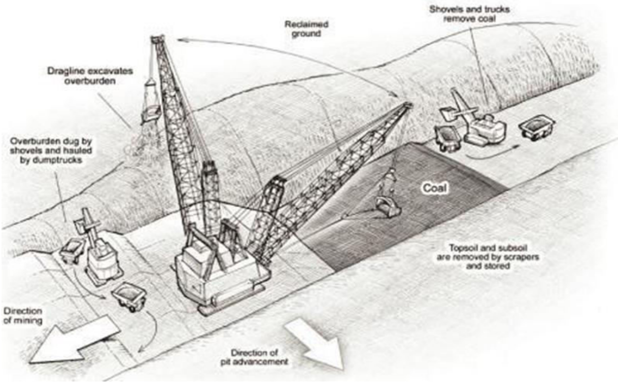

Fig.3: Simple sidecasting method

To obtain maximum reach, it is necessary to work the machine as close as possible to the high wall crest. In addition to the obvious risks to very expensive equipment, this practice. reducesthedegreeofblastingwhichcanbeemployed. Inordertopreserveasatisfactoryedge from which to work, several mines 'buffer shoot' two or three strips ahead of the dragline. Buffershootingisundoubtedlylessefficientthanshootingtoafreeface andnoadvantagecan be taken of the material cast by the shot.

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Dragline Extended bench method

Whereoverburdendepthorthepanelwidthexceedsthelimitatwhicht hedraglinecan sidecast the burden from the coal, a bridge of burden can be formed between the bank and the spoil which effectively extends the reach of the dragline. The bridge extends the bench on which the dragline is operating. The bridge is formed by material falling down the spoil bank or by direct placement with the dragline. To remove the bridge material from the top of coal, it must berehandled.

Extended bench systems are adaptable to many configurations of pit geometry. In this method the dragline forms its working bench by chopping material from above the bench and forming the bridge, then moving onto the bridge to remove it from top of coal. The primary dragline strips overburden and spoils it into the previously excavated panel. This material is leveled,eitherbytractor-dozersorthesecondarydragline,toformthebenchforthesecondary dragline.Thesecondarydraglinefirststripsmaterialnearthehighwall ,thenmovesontothe

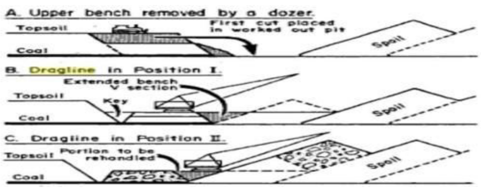

Fig.4: Positions in extended bench method

3. CONCLUSIONS

- Factors affecting the production and cost of coal exposed by dragline are:-
- Increased no. of idle hours due to non-availability of blasted muck pile, ability and performance
- Increased breakdown time
- Increased breakdown and maintenance costs
- Dozing takes more time for stability of ground for working operations Scope for improvement
- Increasing the Dragline Productivity through Maximizing Cast by using blasting techniques like ion system of blasting.
- Better preventive maintenance schedule to reduce the breakdown time and breakdown costs.

REFERENCES

1. ErdemB, PaşamehmetoğluA.G,―DraglineCycleTimeAnalysis-CaseStudy‖,lä"
2. International Mining Congress and Exhibition of Turkey-IMCET, 2003, ISBN 975-395605-3.
3. RaiP,YadavU,KumarA,―ProductivityAnalysisofDraglinesOperatinginHorizontaland Vertical Tandem Mode of Operation in a Coal Mine—A Case Study‖, Geotech Geol Eng, 2011,29:493-504.
4. Kishore N, Pankaj D, ―Estimation of operating cost of dragline in various modes of operation‖, The Indian Mining and Engineering journal,2010.
5. RaiP,―Performanceassessmentofdraglinesopencastmine‖,Indianjournalof
6. engineering and material sciences, 11: 493-498.
7. Kishore N, Dewangan P, Dhekne P.Y, ―Method of drawing balancing diagram‖,The
8. Indian Mining and Engineering journal, 2012, pp. 18-21.
9. Satyamurthy M, ―Dragline deployment in opencast mines‖, Minetech Volume10No.1,
10. pp 13-15.
11. Seymour C.A, ―Dragline stripping extended benchmethod‖.
12. viii.Mishra G.B. Surface Mining, Geominetech Publications, 2007, PP.439-452.
13. ReddyVR,&DharBB,―DraglineperformanceinopenpitIndiancoalmines‖,ProcsInt Conf on Mine Planning and Equipment Selection, 1988, Balkema Pub, Rotterdam, The Netherlands.
14. Rai V K, ―Balancing diagram—a basic planning tool for dragline operation‖, In: Proceedings of the national seminar on emerging technology in surface mines and environmental challenges, 1997, Mangalore, India, pp85–89.