

# **Productivity Optimization of Side Discharge Loader (SDL)**

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## **ABSTRACT**

Improvement in production and productivity has become an important aspect for today's coal industry especially in case of underground coal mines. The record of production and productivity of Indian underground coal mines over the years is dismal, to say the least. Mechanization in loading system has made possible major breakthroughs in underground coal mining technology. Side Discharge Loaders (SDL) is now used as a loading machine for intermediate mechanization in underground coal mining. To meet the production and productivity issues the SDL machine should be maintained effectively and efficiently to have maximum availability. Higher availability of machine shall enable optimum utilization thus increasing production and productivity of these capital intensive items.. This paper intends to identify and highlight the various factors and problems affecting performance of SDL machine. Further an attempt is made to calculate the percentage availability and utilization of SDL deployed in underground coal mines and analyzes the contributing factors to improve the overall efficiency. In addition, the problems of SDL application, breakdown and its management have also been identified and resolved in these studies to propose suitable measures for improving them.

## **INTRODUCTION**

Coal mining in India has a history of over 235 years. The industry currently occupies a covetable third place in world coal production after China and USA with a 10% share of total global coal production after the countries like China, USA and Australia are about 95, 33 and 20% respectively. India produces about 10% of coal from underground mines. At the time of nationalization (1971) of the coal industry, contributions of national coal production by underground and opencast mines were 77.45% and 22.55% respectively. By 2010-11, the share of coal production by different underground methods may be stated thus Bord and Pillar method - (34.10% conventional, SDL/LHD – 55.90% mechanized), Longwall – (conventional-0.60%, mechanized – 7.80%) and other methods – 1.60%. Of the total output of coal from underground mines, more than 90% of the coal is obtained by the Bord and Pillar method, the popular method of mining in followed in India and the rest by Longwall mining method. The Indian coal mining industry has witnessed a persistent decline in Underground coal production over the years with more emphasis on opencast mining

## **PRESENT STATUS**

Coal India Limited, because of its improved performance on an overall basis has got the Maharatna Status, however the performance of its underground mines has largely been unsatisfactory with a few exceptions in one or two subsidiary companies. Majority of its

underground mines are making losses. However, some of the underground mines of Eastern Coalfields Limited (ECL), Bharat Coking Coal Limited (BCCL) and Central Coalfields Limited (CCL) are not amenable to total mechanization due to geo-mining conditions that are not conducive to mechanization and a consequential sub optimal level of evacuation capacity. The overall coal production is below the target from underground mines of CIL. Relatively better performance in the SECL mines are observed because of the already existing Side Discharge Loaders and Load Haul Dumpers technology in most of the mines. Conditions are worst in BCCL and ECL mines where SDL and LHD with conveyor are yet to be introduced in most of the underground coal mines. Losses in underground mines is essentially due to lack of modernization, labour intensive technology, old and deepening mines with difficult geo-mining conditions and increasing cost of mining day by day. Further strengthening the need for introduction of mechanized coal getting methods capable of giving better production and productivity should be arrived at. While addressing production and productivity scenario for their substantial improvement, it is essential to keep in mind the better environmental with the present and eco-friendly status of this method, vis-a-vis, and Open Cast mining. This is further emphasized by the fact that the workable seams in most of the mines getting increasingly deeper and in a decade or so may go beyond the economic stripping limit notwithstanding the development in the reach and capacity of the open cast excavators. Environmental impact of opencast mining is a growing concern in view of expected green and clean mining. The minister of state (Independent Charge) for Coal informed the Lok Sabha recently that most of the mines of Coal India Limited are either fully mechanized or semimechanized. Giving details about the technology up gradation of the mines, the minister said, the thrust areas for the future may remain the Bord and Pillar method with higher degree of mechanization like continuous miners technology in conjunction with mechanized drilling and roof bolting system.

### **IMPROVEMENT OF EQUIPMENT UTILIZATION**

The production performance of mining equipment depends on its availability and utilization. Hence it is necessary to determine the percentage availability and utilization of machinery with an aim to improve the same. Different mines are following different terms and maintaining different information. The only common information in most of the mines is the working hours of SDL's. There is a need to develop proper feedback and to define terms, factors and indices relating to mining equipment. These would serve as management's tool in improving performance. These can also be used for inter-firm comparisons. To sum up, there is a necessity to lay down on systematic basic, well defined terms, factors and indices required for control and management of mining equipment. For assessment and analysis of the performance of equipment one must keep proper and up- to-date records regarding the following operational parameters. [3]

### **DISCUSSION**

The results of the analysis show that the unscheduled hours are very high since the equipment are scheduled only for six hours in a shifts, that also include maintenance hours in scheduled shift hours. The availability of the equipment is very low compared to total shift hours where as availability of the equipment on SSH basis is comparable with that of CIL standards, but there is a wide gap between availability and utilization of equipment. The percentage utilization of machinery is far below normal. The productivity of SDL is not upto the mark. Hence the management has to take steps to improve the equipment utilization. There is improper maintenance planning as reflected in the studies which affects availability of machine by frequent breakdowns. It can be also noted that there is lag between machine

repair hours and machine breakdown hours which indicate how efficiently the management is attending the faults. Machine unutilized hours is a major factor for low utilization when sum up with unscheduled hours which shows the job management efficiency. The production efficiency of machines is noticeable and satisfactory but overall efficiency is poor which suggests there is lack of team work.

## **CONCLUSION**

Availability and utilization study is a known method to measure performance of production equipment in manufacturing industries and adapted for mining industry in this paper. From the above studies various steps can be taken to improve availability and utilization of SDL machine so that its performance is better and productivity is more. Given the above measures if practiced, Bord and Pillar mining is certain to keep its “tryst with destiny” by playing its role towards meeting the energy requirement of the nation. The views expressed in this paper are solely of the author and not necessarily of the organizations, where the studies are undertaken.

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