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An Insight on Salvaging Methodology and Installation of Long wall Machinery

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Abstract

In India, lot of coal reserves exist up to 300m depth, are more amenable for extraction by opencast mining. Bulk production is possible with Opencast mining, with low gestation period, more safety and high percentage of extraction compared to underground methods. Hence coal operators are inclined towards opencast mining methods. India is the third largest coal producer in the world and is producing nearly 89% of coal from opencast mining and 11% from underground mining (2014-15)[1]. In India, the gap between the demand and indigenous availability of coal has been rising. Presently, coal imports are about 99 Million tonnes. The import requirement is projected to be 265 Mt by 2016-17. This gap is likely to widen further beyond XII Plan period leading to requirement of hefty imports. This unacceptable gap can be limited only by an all out effort by domestic coal producers [1]. With depletion of shallow reserves, the future emphasis has to be on faster exploration and underground mining. This calls for meticulous identification of coal blocks suitable for high mechanisation and introduction of state-of-the-art technology from overseas, in addition to possible semi mechanisation of the existing mines.

Large scale mechanisation shall be sustained by expanding the service base of Equipment manufactures with supplementation of indigenous spares and parts manufacturing in line with 'Make in India policy'. These high capital intensive systems will not be viable unless global operating standards are achieved in equipment maintenance and utilisation. This demands highly skilled and motivated work force. Suitable planning and systems are to be developed for skill development and for adopting best management practices However, as shallow seated seams are exhausting at rapid pace and to meet the future requirement there is an urgent need for development and implementation of bulk production technologies for deep-seated deposits in the depth range of 300m to 600m by underground methods. Coal production at higher rates from underground, particularly at depths more than 300m, is possible with “Longwall Mining Technology”, which is a proven technology worldwide[1]. Accordingly, one high capacity longwall project with an annual capacity of 2.817 MTPA has been commissioned with state of art equipment at Adriyala Longwall Project (ALP). After seeing the performance of Adriyala Longwall Project, SCCL is planning to introduce few more longwalls in near future.

INTRODUCTION

To meet the increasing demand of coal from power sector and to regulate opencast projects, SCCL envisaged the opening up of deep shaft blocks for large-scale production. At present the existing pithead of NTPC, 2600 MW thermal power station, Ramagundam is being supplied by three opencast projects of SCCL (10.20Mt) out of its total requirement of 12.50Mt. In the long run, over a period of ten years, the reserves in the above mines are

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depleting and opening up of 2.817Mt capacity Adriyala Longwall project along with other deep shaft projects in Ramagundam will help to fulfil the coal supply to retain the pithead nature of NTPC Ramagundam power station. Mean while SCCL started construction of 2X600MW plant and will be put in to commercial operations by May- 2016. Further, NTPC is enhancing its capacity by setting up 2X800MW thermal plant in near future. Accordingly, SCCL planned bulk production Longwall Project for the first time in India at Adriyala mine in Godavarikhani to extract the coal reserves lying below 350m depth. This project lies at a distance of 65 KM from Karimnagar and 225 KM from Hyderabad

The following new technologies have been introduced at the project for the first time:

- Punch entry (Direct access to coal from Opencast highwall)
- 11 KV power transmission to UG (for less voltage drop)
- Pre tensioned Cable bolting (For effective roof support)
- Automation systems (For sequence control/less manual intervention)
- 400 KW high capacity fan (To supply more air with high water gauge)
- Diesel transport vehicles (FBL) (For flexible, speedy & safe equipment transportation)
- Floor Concreting in underground (For Diesel vehicle movement with heavy equipment)
- VFD controlled un-manned Belt conveyor system (For soft starts and power conservation)
- Mine cruiser (for faster and safe transport of men)
- Air chilling plant (To create comfortable environment conditions)

CONSTRUCTION OF HIGH CAPACITY LONGWALL

Exploration: A total of 95 bore holes have been drilled with the density of about 25 boreholes per sq.km for delineation of Adriyala Longwall block. Coring was done in 19 bore holes and quality of the coal seams was obtained from 61 bore holes. Geo- engineering data is generated from 12 bore holes and Geo- Physical logging was carried out in 44 bore holes using analogue model series-III logging system M/s Mount Sopris Instruments Ltd, USA and digital logging system of M/s Robertson Geo logging of UK.

Punch Entries: The unique feature of the project is that the main entries are planned through the adjacent rise side open cast mine. Aplatform of about 200mx150m is prepared adjacent to highwall at No.1 Seam floor (120m depth from surface). The high wall was dressed at proposed locations of Punch Entries in No.1 Seam then RCC blocks of 5.5mx3.6m x1m dimensions were spread on the floor from high wall for a length of 15m. The gap between highwall and blocks was covered to prevent fall of loose boulders from highwall. The highwall was stabilized with cable bolting and cement injection along the periphery of the proposed Punch Entry. Then four Punch entries of size 5.50mx3.60m were driven in top section of No. 1 Seam for a length of 1.80kms at 1 in 5 gradient using road headers, as shown in Fig.1 (a) &(b). Initially, goal post supporting was done for 20m distance from entry of drivage in addition to roof bolting. These are the main entries for the project and planned for man riding system, trunk belts, diesel vehicles roadway and haulage system one in each punch entry

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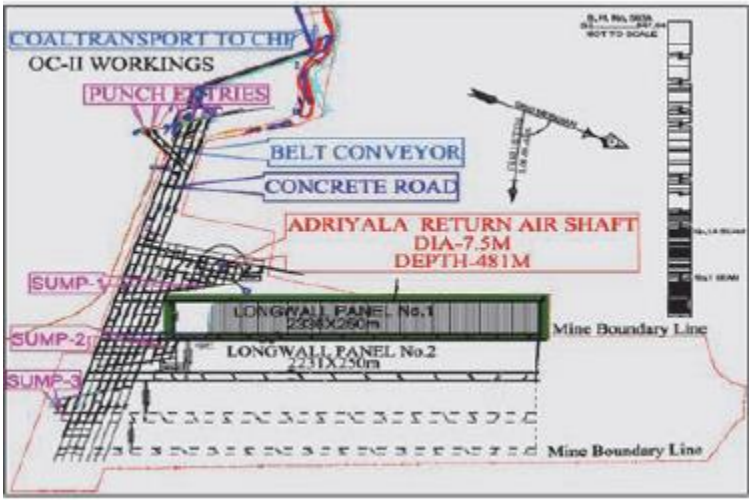
Fig. 1. (a) & (b) Punch entries layout and one of the Punch entries

Mine Development

The drivage of Trunk road ways (5.50mx3.60m) and Gate road ways (5.20mx3.60m) was made using twin bolters mounted Road Headers (DOSCO, LH 1400 Model). 25Kms of drivage was made during last five years using 05 no's of Road headers. The gate roadways are supported with 2.4m, Ø22mm shear pin bolts with full column resin grout and rigid wire mesh. Secondary supporting was done in gate road ways with 6.1m long pre-tensioned cable bolts to take care of longwall abutments ahead of face. The installation face widened to 8 m and could be successfully supported by adopting pre-tensioned cable bolts, for the first time without erecting vertical support. The details of underground workings are shown in Fig.2.



CONCLUSION

Longwall mining is done successfully in all major coal producing countries even indifficult conditionslike highly gassy, hard roof and steeply inclined Seams.It is proved beyond doubt that Longwall as an Underground Mining method is successful in India also where it was introduced with proper spirit. The suitable underground Geological blocks need to be identified for introduction of high capacity longwalls on large scale with the help of Global operators. CIL, SCCL and private operators who are allotted coal blocks for underground coal mining must plan to introduce as many longwall faces as possible and LTCC for thick Seams in the blocks which are feasible for bulk production.

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