An exceptional focus on the Coal Industry

SAMAY PARIBARTAN

Annual Issue

COAL

The Soul Of Indian Economy 2010-11
Sri Ashok Kumar Singh joined CMPDI, one of the subsidiaries of Coal India Limited as Chairman cum Managing Director on 1st January, 2008. Prior to this assignment Shri Singh was working as Director (Technical/Operation) with Central Coalfields Limited since October 2006. Sri Ashok Kumar Singh took over the additional charge of CMD of MCL from 1.9.2010. Sri Singh has a B.Tech in Mining Engineering from Indian School of Mines (ISM), Dhanbad with a Gold Medal and has been awarded with Pickering Medal by Mining, Geological and Metallurgical Institute of India (MGMI). He did Post Graduate Certificate (in 1976) and also Post Graduate Diploma courses in Longwall Mine Mechanisation (DISM) from ISM. He has hands-on experience of over three decades in coal mining sector, wherein, he has served in various capacities in production and planning and management in different subsidiaries of Coal India Ltd. viz. Bharat Coking Coal Limited, Central Coalfields Limited, Central Mine Planning and Design Institute Ltd. and Northern Coalfields Limited.

Two of his most remarkable expert domains are (i) From Concept to Commissioning of Coal Projects and (ii) CBM/CMM Excavation with Cutting Edge Technology. He has been conferred upon with National Mineral Award (2007) of Govt. of India for outstanding contribution in the field of mining technology. He represents India in the Technical Sub-Committee on Coal Mine Methane of M2M Partnership of USEPA as member as well as Co-chair and is also a member of Coal Mining Task Force (CMTF) constituted by Asia-Pacific Partnership on Clean Development and Climate (AAP); Indo-US Working Group; Executive Board & Academic Council of Indian Institute of Coal Management (IICM); Standing Scientific Research Committee(SSRC); R&D Board of CIL; Mining, Geological and Metallurgical Institute of India (MGMI); Board of Examination of Director General of Mines Safety (DGMS) and Indian Mine Manager’s Association (IMMA). He has a number of technical papers presented in Conferences/Symposia/Seminars as well as referred in standard journals. He has travelled widely to countries like USA, UK, Germany, France, Indonesia, Australia, etc. on various business missions.
A Miniratna company that helped its parent body to achieve Navaratna status which is now aspiring to be a Maharatna

— Arunanshu Das

Scaling new highs is nothing new to the Central Mine Planning & Design Institute Ltd. (CMPDI), but with the conferment of Mini Ratna it makes another big stride as a leading organization doing remarkable planning and design jobs in India’s mining sector. Currently this premier Institute is passing through boom time thanks to the innovative drive by its Chairman-cum-Managing Director, Mr. A.K. Singh. A look at its on-going consultation services is enough to confirm its enviable contribution to the country’s coal mining sector. In fact, its track record in the last three decades tells the story of its excellence. As of now CMPDI has creditably undertaken over 500 integrated coal exploration projects and that has helped in an overall growth of 341 per cent in national coal inventory as compared to the position in 1972. This indicates an increase of nearly 524 per cent in proven coal reserves. “It is a success story. CMPDI has played its role creditably. Currently under the leadership of Mr A.K. Singh the tradition of excellence continues creating strings of new record,” says a senior CMPDI executive.

A profile of CMPDI’s ongoing consultancy services presents a convincing picture of its performance. May it be geological services pertaining to exploration activity or planning and design and the related areas of engineering services and mineral preparation and utilization, CMPDI touches the centre and the periphery of the mining sector with a mastery design to get the best possible results. Its extensive work on resettlement and rehabilitation that has a direct bearing on environment has brought its instant recognition. In information technology and laboratory services that demands intensive studies on petrography and coal washery it has opened new vistas for further research. In surveying and remote sensing that pertains to geomatics and research related to coal/lignite it has introduced new technology that aids profitably the intricate task of preparation and evaluation of technical documents. CMPDI has received enviable ISO certificates for its quality management system. Its specialized services including ventilation and gas survey, controlled blasting and testing of explosives, mine support design, non-destructive testing, capacity assessment of mines and performance analysis of HEMM/UG equipment continue to receive expert appreciation.

That’s something unique about this mine planning and design institute. At a time when the coal sector is assuming greater responsibility for meeting the country’s energy needs CMPDI has geared up to contribute meaningfully to this vital sector. “The institute has a tradition to excel, and currently with Mr A.K. Singh at the helm its performance record shows a forward run that is arguably exemplary in India’s industry culture,” says a senior CMPDI executive.
The tabular presentation below gives a quick reference to its creditable services.

Profile of Current Consulting Services:

**Exploration**
- Geological services • Drilling (Coring & Non-Coring) including developmental drilling • Geotechnical studies • Geophysical surveys (surface & borehole) • Geochemical testing • Petrographic analysis • Coal quality assessment • Geological modelling • Coal/mineral resource evaluation

- Hydro-geological studies • CBM/CMM evaluation, exploration & testing

**Coal & Mineral preparation and utilization**
- Project planning for coal washing & mineral beneficiation • Detailed design • Consultancy & construction management

**Engineering Services**
- Civil & architecture services • Bulk handling plants, surface transport • Captive thermal power plants • Workshops and stores • Energy auditing • Third-party material inspection

**Planning & Design Environment**
- Perspective Planning • Master Plan of Coalfields • Underground mining services; (a) Feasibility studies and techno-economic evaluation (b) Preparation of project reports (c) Detailed design of vertical & inclined shafts (d) Mine ventilation & transport planning

**Open pit mining services**:
- (a) Feasibility studies and techno-economic evaluation (b) Project reports (c) Operational planning

**Environmental**
- Impact assessments & EMP • Resettlement & Rehabilitation studies • Environmental monitoring • Environmental Audit

**Information Technology**
- Internet & intranet services • GIS Based Land Information System • System design of GPS based OITDS

**Laboratory Services**
- Chemical • Petrography • Coal washery • Electronics • Environment

**Geomatics Specialist Services:**

**Surveying**
(a) Topographical survey-GPS-ETS-GIS (b) Alignment survey- roads, conveying systems (c) Mine correlation & excavation survey (d) Surface subsidence survey

**Remote Sensing :**
(a) Thematic mapping (land use, forest, soil, drainage, urban sprawl, sodic land) (b) Geological structural mapping (c) Thermal mapping/coal mine fire mapping (d) Siltation/pollution studies in river/reservoir

**Specialist Services**

- Ventilation and Gas Survey • Controlled Blasting and testing of explosives • Mine Support Design • Non-Destructive Testing • Capacity assessment of mines • Performance analysis of HEMM/UG equipment

**Quality Management System**
- ISO-9000 • ISO-14000 • ISO-17025

**Research and Development related to**
Coal/Lignite

Other Services
- Preparation of NIT/Bid document evaluation
- Preparation of norms/guidelines • Introduction of new technology

Coal Exploration

The last three decades have been eventful for India’s coal industry. The major contributions made by CMPDI during these years have been outstanding. During those decades of research and development and practical operation, CMPDI undertook major trend-setting integrated coal exploration projects in varying geological and terrain conditions and carried out over 92 lakh metres of drilling in coal blocks spread in seven states. As a result of its systematic detailed exploration of coal resources, national coal inventory has witnessed a quantum jump since nationalization. The figures below are self explanatory.

<table>
<thead>
<tr>
<th>Year</th>
<th>Proved</th>
<th>Indicated</th>
<th>Inferred</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>21</td>
<td>31</td>
<td>29</td>
<td>81</td>
</tr>
<tr>
<td>2010</td>
<td>110</td>
<td>131</td>
<td>36</td>
<td>277</td>
</tr>
</tbody>
</table>

The overall increase of 342 per cent in national coal inventory as compared to 1972 speaks volumes about the CMPDI’s commitment to ensure optimum utilization of the country’s coal reserves. An increase of nearly 524 per cent in proven reserves assures ample supply of this vital input to the energy sector.

Mine Planning

In addition to building a dependable inventory CMPDI has prepared over 950 mining project reports with individual project capacity up to 35 million tons per year (MTY). Services provided by CMPDI have facilitated CIL and its subsidiaries to achieve a sustained growth in coal production from 79 MTY in 1974-75 to over 431 MTY in 2009-10.

Planning services for opencast mining projects along with supporting CHPs, workshops, power supply system, environment management planning have helped in production growth from 20.8 MTY to over 388 MTY representing an increase in the contribution of opencast output from 20 per cent to 90 per cent in CIL’s total coal production. Planning and design services provided to the coal industry have ensured resource conservation, optimization of costs and improvement in safety standards.

Singh’s record book:

The medals, certificates and appreciations received by CMPDI reflect its excellent work culture and team spirit. “Behind this excellence one can’t fail to see the benign leadership of Mr. A.K. Singh. The CMD who takes pride in doing the best has really produced the best results,” says a senior executive with a satisfying smile.

- CMPDI was conferred the status of ‘Mini Ratna’ during 2009-10 • It was adjudged the ‘Best performing Subsidiary Company of CIL for the year 2008-09 as per MoU rating. • It crossed the barrier of 4 lakh metre of drilling metrage in a year during 2009-10 • It has achieved a new record in the field of exploration. CMPDI along with various agencies under its supervision has carried out about 5.24 lakh metres of drilling during 2009-10 which is an all time high achievement registering a growth of 58 per cent over previous year by adopting a multi pronged strategy viz. induction of new drills/high capacity drills, replacement of old drills, opening of new camps, entering MoU with MECL and engaging government and private agencies for exploration • CMPDI recorded its highest turnover of Rs.457 crores in comparison to Rs.330 crores achieved last year registering a
growth of about 39 per cent. It has earned an estimated profit (before tax) of Rs.16.68 crore during the current financial year as compared to the profit of Rs. 6.74 crores in the last year registering a growth of about 148 per cent • It completed land reclamation monitoring of 49 opencast projects of CIL, based on the satellite data of the year 2009. In addition, land reclamation monitoring of balance 12 opencast projects based on the satellite data of the year 2008 were also completed • Exploration Capacity Expansion: CMPDI has increased the capacity of exploration, both through departmental resources and through outsourcing • CMPDI has successfully executed a critical assignment of setting up the central line alignment in the naval ships with Gyromat 3000 in the Mazgaon Dock of Indian Navy on ‘no profit no loss basis’ • Interconnection of all Regional Institutes (RIs) with HQ, Ranchi established through MPLS system • MOU with MECL: For meeting the enhanced coal exploration programme, an MoU was signed on 6 January 2009 between CMPDI and MECL and exploration work involving 3.10 lakh metre of drilling in 7 blocks has been awarded to MECL for taking up drilling at the rate of one lakh metre/annum • The Board of CMPDI approved major projects/schemes like augmentation of drilling capacity from 2 lakh to 4 lakh metres/year (Rs.108 crores), Construction of office buildings for Regional Institute-VII, Bhubaneswar (Rs.8.06 crores), enhancement of capacity for coal core testing at headquarters, RI-V and RI-VII (Rs.9.09 crores), establishment of environment laboratory at Nagpur, Bilaspur and Bhubaneswar (Rs.7.50 crores) and outsourcing of drilling of 7.29 lakh metre in 18 blocks at an estimated cost of Rs.352.02 crore have been sanctioned • CMPDI has successfully implemented the UNDP/GEF/GDF-funded CBM/CMM recovery and utilisation demonstration project at Moonidih mine of BCCL which has proved efficacy of CMM production in Indian geo-mining condition. Methane based power generated through 2x250 kW generators is being supplied to Moonidih Mine Colony • Establishment of CBM/CMM Clearing house: A CMM/CBM clearing house has been established at CMPDI, Ranchi under the aegis of Ministry of Coal and US EPA on 17 November 2008. The clearing house will function as the nodal agency for collection and sharing of information on CMM/CBM related data of the country and help in the commercial development of CMM projects in India by public/private participation, technological collaboration and bringing financial investment opportunities • Rashtrakshasha Award: “Deshkaal Sampada”, the in-house Hindi magazine of CMPDI, was awarded the ‘Saraswat-Samarcha Samman’ on 14 September 2008 at Allahabad by Hindi Sahitya Sammelan.
Considering the vast and untapped resources in the coal sector, India has reasons to be confident that its mining potential is enough to meet its consumption needs. Mr A.K. Singh, CMD, Central Mine Planning & Design Institute (CMPDI), feels that this potential when tapped optimally will open up new avenues in the coal sector. In an exclusive interaction with this magazine Mr Singh discussed several issues providing insights on the various aspects of coal mining and the role of CMPDI is playing for a faster growth in the coal sector. “The prospects are excellent despite a number of challenges. Our major challenges involve working in remote and difficult terrains, and other unapproachable areas especially during the monsoon season. Moreover, mining changes the land use pattern of an area. Thus, we have to be more conscious about environment preservation and bringing the land back to its original state. Further, CMPDI is faced with the challenge of retaining its expertise. Previously, the pay scales were low and private mine operators comparatively offered attractive remuneration, so there was a sort of exodus from CMPDI. Although the attrition rate has decreased after the revision of pay scale, it still exists,” Mr. Singh said.

“Despite its huge potential the contribution of mining to the overall GDP has been less, and if India has to grow at 9-10 per cent, then mining has to contribute in a bigger scale. While scope of growth is huge, land acquisition has to be done in an effective manner taking the local people into confidence. This can be done by having a liberal compensation and land acquisition policy in place”, observed Mr. Singh.

“While the challenges remain in some form or the other, we strive to ensure efficient and safe mining. Our expertise and services in the fields of geospatial technology, mineral exploration, mine planning, coal preparation and utilization, environmental management, information and communication technology, mining electronics and infrastructure planning, are aimed at achieving this end,” he said while elaborating CMPDI’s mission, scope, challenges, and targets for mine planning and development. Mr. Singh gave detailed account of his organisation which has been reproduced verbatim here.

**Motto and Mission**

The philosophy of CMPDI in relation to corporate governance is to ensure transparency and activities conforming fully to social laws, regulations and corporate guidelines. Its mission is to provide total
consultancy in coal and mineral exploration, mining, engineering and allied fields. As the premier consultant body in India and a leading one in the international arena, its target is to be the market leader in an expanding natural resources sector and allied professional activities.

Realizing the potential of geospatial technology in the natural resources sector, CMPDI established a geomatics division way back in 1989. That year India launched its first remote sensing satellite (IRS-1A). CMPDI offers geospatial technology services ranging from topographical survey, mineral exploration, land use/vegetation cover mapping, water resource survey, land reclamation and monitoring, excavation, measurement, pre-mining baseline data generation for environmental management, monitoring of opencast operation, slope stability, infrastructure planning, coal mine fire mapping, locating the sites for TPS and coal washery and siltation in reservoir/river.

Geospatial technology is closely associated with all the three stages of mining:

(1) Pre-mining (2) Actual mining, and (3) Post mining.

During the mining stage, excavation measurement of OB, slope stability monitoring in open pit mines is based on terrestrial LiDAR. Monitoring of mining operation is done using GPS technology and underground correlation survey in underground (UG) mines based on Gyromat 3000. This is done to ensure safety of men and machinery in the mines. At the post-mining stage, land reclamation and mine closure and monitoring of opencast projects are undertaken by CMPDI using high resolution satellite data on an annual basis till the lifetime of the mine. This is done to ensure proper land reclamation and mine closure in the mined out land projects of Coal India Ltd. to minimise the impact of mining on land and environment. Remote sensing data is very useful in generating the pre-mining database with respect to land, water, drainage, vegetation cover, terrain, settlement, infrastructure etc. present in the core and buffer zone of the mining projects before mining is undertaken. Land use/cover database of all the coalfields are updated regularly at an interval of 3 to 5 years to assess the impact of coal mining on vegetation cover and land and environment. Land reclamation and monitoring of all the opencast coal mining projects have been taken up by CMPDI using geospatial technology to assess the impact of mining on land and environment. CIL has earmarked Rs. 117.26 crore for this project.

Disaster management

Accidents in opencast mines caused by failure of OB dump and slope stability are being monitored using geospatial technology. LiDAR technology is very useful for rapid and accurate measurement of the dump slopes in mining projects, so that remedial action, if required, can be initiated to prevent dump failure. It is possible to monitor ground subsidence regularly using microwave remote sensing data to
take precautionary measures. Gyromat- (3000) is being used in correlation survey for precise plotting of underground working in order to prevent mine accidents/disasters caused by inundation from surface or underground water logged patches. Coal mine fires are affecting the Jharia coalfield, which is the prime source of coking coal in our country. CMPDI has procured Deadalus Thermal Scanner and is using the same for fire mapping in collaboration with NRSC, Hyderabad.

The spatial resolution of the scanner had 1.00m capacity. The scanner has outlived its life. In India, there are no airborne thermal scanners available at present. Aster satellite has thermal infra-red band but with a spatial resolution is 100m which is not useful for detailed fire mapping. ISRO should consider putting a high resolution thermal infra-red band in its next generation satellite for mapping of coal mine fires, forest fires, hot springs etc.

**Spatial data infrastructure (SDI)**

CMPDI has taken an initiative for creating a geospatial database for coal resources of the country called ICRIS (Integrated Coal Resources Information System). This project is funded by the Ministry of Coal. Under this project, all the data related to coal resources like location of coalfields, coal blocks, coal reserves, coal quality, etc. will be generated and uploaded on the website of CIL, CMPDI and MoC. ICRIS will provide comprehensive information about the coal resources of India. CMPDI has also generated database for land use, vegetation cover, wasteland, mining area, water bodies, drainage etc. for all the major coalfields based on satellite data on GIS platform to assess the impact of coal mining on land environment on a regional scale.

**Alternative mineral/energy sources**

Apart from coal, CMPDI is actively involved in exploring alternative energy sources such as coal bed methane (CBM). Assessment of CBM in Singrauli and Korba coalfield is under progress. Coal bed methane is a greenhouse gas, associated with coal which gets liberated in the atmosphere during mining. CBM can be utilised for generating energy and reducing greenhouse gas emission. The data dossier consisting of preliminary information about the occurrence of CBM was prepared by CMPDI for open bidding of the CBM blocks for exploration and exploitation of the CBM. This is highly acclaimed by international experts. CMPDI is the nodal agency for CBM resources in India. A CBM clearing house has been established at CMPDI in association with the United States Environmental Protection Agency (USEPA) to provide information related to CBM resources of the county. We are committed to bring clean coal technology in India, especially under ground coal gasification (UCG) in collaboration with International agencies for exploiting energy from coal deposits which are difficult to mine.

**Scheme of action**

CMPDI has worked out its strategy to reach this goal. The steps include:

1. Providing consultancy support in coal and mineral exploration including geological, geophysical, hydrological, remote sensing and environmental data generation.
2. Improving quality of exploration and feasibility reports providing higher level of confidence of geological assessment for optimum mine planning.
3. Optimizing generation of internal resources by improving productivity, preventing wastage and mobilizing adequate external resources to meet investment need.
4. Project planning and designing for coal mines, Coal beneficiation and Utilization Plants, etc.
5. Thrust on effectiveness of all S&T and R&D Schemes.
6. Assimilating and disseminating technological information through information networks etc.

CMPDI continues to offer vital services in the mining sector. They include geological, planning, design, engineering and several other services.