

Database for Scientists: Dr. Prabhat Kumar Mandal

- 1) **Name** : Dr. Prabhat Kumar Mandal
 2) **ID No.** : Internal ID: 501, ERP ID: 9D34
 3) **Name of the Research Group** : Mining Methods and Design Simulation
 4) **Date of Birth** : 01/05/1968
 5) **Date of joining CSIR-CIMFR** : 10/05/1994
 6) **Present position** : Senior Principal Scientist Gr. IV (5)
 7) **Education Qualification:**

Degree/Diploma/Certificate	Subject(s)	Year	University/ Institute
B. E.	Mining Engineering	1993	Calcutta University / Bengal Engineering College, Shibpur (Presently IEST, Shibpur)
M. TECH.	Mining Engineering	1997	Indian Institute Of Technology (IIT), Kharagpur
Ph.D.	Mining Engineering	2010	Bengal Engineering And Science University, Shibpur (Presently IEST, Shibpur)

- 8) **Area of Research:** Rock Mechanics, Ground Control, Underground Mining Methods and Numerical Modelling.

- 9) **Professional carrier:**

Designation	Institution/company	From	To	Nature of work
Group – IV (1) Scientist 'B'	CSIR-CIMFR, Dhanbad	10-05-1994	09-05-1999	R&D work
Group – IV (2) Scientist 'C'	CSIR-CIMFR, Dhanbad	10-05-1999	09-05-2003	R&D work
Group – IV (3) Scientist 'E1'	CSIR-CIMFR, Dhanbad	10-05-2003	09-05-2007	R&D work
Group – IV (4) Principal Scientist	CSIR-CIMFR, Dhanbad	10-05-2007	09-05-2011	R&D work
Group – IV (5) Senior Principal	CSIR-CIMFR, Dhanbad	10-05-2011	Till date	R&D work

Scientist				
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10) Awards / Recognition:

Year	Name of Award/Honour	Name of Organisation
2012	Only Ph.D. thesis selected from India and nominated for Rocha Medal of ISRM	International Society Rock Mechanics (ISRM), Portugal in the year 2012.
2007-08	Hindustan Zinc Award	Institution of Engineers (India), Kolkata
2000-2001	CSIR Golden Jubilee – CMRI Whitaker Award	CMRI, Dhanbad
2001-02	Awards for Patents	CMRI, Dhanbad

11) List of Publication in SCI Journals with full details:

Total publications: 119 (Book: 1, Journals: 40, Seminars/symposia/conferences etc.: 78)

a) In SCI Journals

1. A. K. Singh, Rajendra Singh, J. Maiti, Rakesh Kumar, P. K. Mandal, 2011. Assessment of mining induced stress development over coal pillars during depillaring, *International Journal of Rock Mechanics & Mining Sciences, UK*, 48(2011): 805–818.
2. R. Singh, A. K. Singh, J. Maiti, P. K. Mandal, Rashmi Singh and R. Kumar, 2011. An observational approach for assessment of dynamic loading during underground coal pillar extraction, *International Journal of Rock Mechanics and Mining Sciences, UK*, 48(2011): 794-804.
3. R. Singh, P. K. Mandal, A.K. Singh, R. Kumar and A. Sinha. 2011. Coal pillar extraction at deep cover: with special reference to Indian coalfields, *International Journal of Coal Geology, The Netherlands*, 86(2-3): 276-288.
4. P. K. Mandal, R. Singh, J. Maiti, A. K. Singh, R. Kumar and A. Sinha, 2008. Underpinning-based simultaneous extraction of contiguous sections of a thick coal seam under weak and laminated parting, *International Journal of Rock Mechanics & Mining Sciences, UK*, 45(1):11-28.
5. R. Singh P. K. Mandal, J. Maiti, A. K. Singh, R. Kumar and A. K. Ghosh, 2008. Upshot of strata movement during underground mining of a thick coal seam below hilly terrain, *International Journal of Rock Mechanics & Mining Sciences, UK*, Vol. 45(1):29-46.
6. R. Singh, P. K. Mandal and A. K. Singh, R. Kumar and A. Sinha, 2007. Optimal underground extraction of coal at shallow cover beneath surface/subsurface objects: Indian practices, *Rock Mechanics and Rock Engineering, The Netherlands*, 41(3):421-444.
7. R. Singh, A. K. Singh and P. K. Mandal, 2002. Cuttability of coal seams with igneous intrusion, *Engineering Geology, an International Journal, The Netherlands*, 67(1&2):127-

137.

8. A. K. Singh, R. Singh, M. Sarkar, P. K. Mandal and D. Sharma, 2002. Inclined slicing of a thick coal seam in ascending order – A case study, *The Canadian Mining and Metallurgical (CIM) Bulletin*, 95(1059):124-128.
9. R. Singh, P. K. Mandal, A. K. Singh and T. N. Singh, 2001. Cable-bolting-based semi-mechanised depillaring of a thick coal seam, *International Journal of Rock Mechanics & Mining Sciences*, UK, 38(2): 245-257.
10. T. N. Singh, B. K. Dubey and P. K. Mandal, 1999. A method for depillaring of thick seams standing on pillars with cable bolt support, *Journal of Scientific and Industrial Research*, Vol. 58, June, New Delhi, pp. 422-430.

b) Books/Monographs:

A. J. Das and P. K. Mandal, 2015. Underground extraction of Locked-Up coal: Numerical modelling based study, 1st Edition, LAP Lambert Academic Publishing, Germany, ISBN: 978-3-659-80250-8, 172 pages.

c) **Total Citation** : 154

12) Patents filed & granted (India & International)

Sl. No.	Title of the patent	Country	Application No	Patent No.	Names of other inventors
1	A novel method for underground extraction of coal from contiguous seams / sections	India	1120/DEL/2000	222430	T. N. Singh B. K Dubey A. K. Singh
2	A novel method of mining for underground extraction of coal from a critically thick coal seam standing on pillars and development made along the roof horizon	India	120/DEL/2002	215649	R. Singh A. K. Singh
3.	Wireless Strata Information System for Underground Openings	India	2993/DEL/2013		A. Kushwaha P. K. Mishra A. Sinha

13) Projects (More than 10 Lakhs) for last 10 years

A. Grant-in-Aid (GAP) /Network Projects

1. Mining method for final extraction of a critically thick coal seam standing on pillars and the development made along the roof horizon (funded by Ministry of Coal, Govt. of India).
2. Rock mechanics investigations to meet challenges of strata control of deep underground coal mining (under bilateral exchange programme in between CSIR, India and ACSR, the Czech Republic).
3. Development of tele-robotics and remote operation technology for underground coal mines (funded by Ministry of Coal, Govt. of India).
4. To find a methodology of safe liquidation in thick seams of Raniganj Coalfields: Design, development & show-casing demonstrative trials at Khottadih Colliery, ECL (funded by Coal India Limited R&D Board).
5. Development of a Technology for Optimal Extraction of Locked-up Coal from Underground Mines using Artificial Pillars (a CSIR network project).
6. Robotics and Micro Machines, (a CSIR network project), Task title: Development of a system for early detection of fire including real time monitoring of fire associated gases for underground coal mines.
7. Development of suitable design methodology for extraction of coal at greater depths (>300 m) for Indian geomining conditions (a CSIR network project), Task title: Establishment of a state-of-the-art rock mechanics laboratory and numerical modeling of longwall mining (LWM) method.

B. Sponsored (SSP) Projects

1. Scientific study for cavability aspect of massive Deccan trap roof formation and installation of suitable geotechnical instruments at Mauri Mine, Kanhan Area, WCL.
2. Strata behaviour study for the extraction of developed pillars in 124 LE panel of Churcha (RO) Mine, SECL with continuous miner deployment and support design.
3. Instrumentation plan and strata monitoring during extraction of pillars BG U-S panel using blasting gallery methods at 21 Incline Yellandu Area SCCL.
4. Assessment and Advice on "Strata behaviour during extraction of developed pillars in CMP-9A, 9B(1) and 9B(2) panels using CM Technology at VK7 Incline, SCCL.

C. Consultancy (CNP) Projects

1. Advice for safe working of continuous miner depillaring panel of No. 1 seam at GDK-11A Incline mine Ramagundem Area-1, SCCL through underground instrumentation and monitoring.
2. Advice for safe working of CM depillaring panel B3 of no. 1 seam at GDK-11 incline

mine, RG-I area, SCCL.

3. Design of suitable method of depillaring including widening and heightening of existing galleries for working of panel B4 of no. 1 seam at GDK-11 incline mine, RG-I area, SCCL along with underground instrumentation and monitoring during extraction of the panel.
4. Scientific investigation and advice for feasibility of the proposed Ring Road alignment over coal bearing areas around Dhanbad.
5. Instrumentation and monitoring in 3 seam of BG-4, BG-5 and BG-6 panels and in 4 seam SS-1 sand stowing panel during extraction at Vakilpalli Mine, RG II Area, SCCL.
6. Scientific study for method of working and sequence of extraction of existing developed and virgin section of HR seam at Hirakhand Bundiya Mine, Orient Area, MCL.
7. Geotechnical monitoring of U/G workings stability at Rampura Agucha Mine, HZL and Audit of RA U/G Mine for "Ground Control Management Plan" at HZL.
8. Design of Extraction Pattern for Developed Pillars of Panel CMP-8 in King Seam lying below Caved Goaf of Top Seam using CM Technology at VK-7 Incline, Kothagudem Area, SCCL.
9. Scientific study for designing a suitable method for systematic liquidation of already developed contiguous working and further development of Orient Colliery Mine No. 3, Orient Area, MCL.
10. Scientific study for design of continuous miner panels in No. 2 seam and Salarjung seam of Shantikhani mine, Mandamari Area, SCCL.
11. Scientific study for designing method of extraction, support system and strata monitoring during extraction in the proposed BG U and S panels at 21 Incline, Yellandu Area, SCCL.
12. Scientific study for feasibility of extraction of developed pillars in the proposed in the CMP-9 panel [sub-panels CMP-9A(1) and CMP-9A(2)] in King seam using CM Technology at VK-7 Incline, SCCL.
13. Scientific study to examine the feasibility of extraction of coal in 1 seam and 2 seam below Bhupalpalli village having surface structure and residential buildings and give the suitable method of extraction, support design at KTK 2 Incline, Bhupalpalli area, SCCL.
14. Advice for extraction of developed pillars by the Continuous Miner in the proposed CM Sub Panels-14, 15 & 16 in R-VII Seam of Sarpi Project, SSPur Colliery, Bankola Area, ECL.
15. Scientific study for "Review of Ground Control Management Plan", of Rampura Agucha Mines of M/S Hindustan Zinc Limited, Rajasthan, India.
16. Scientific Study for auditing of "Ground Control Management Plan" of Kayad Mine

M/S Hindustan Zinc Limited, Rajasthan, India.

17. Scientific study for depillaring of panels with hydraulic sand stowing using LHD/SDL/Manual loading in XVI seam at Digwadih colliery, Tata Steel.

14) Significant contribution and achievement

I feel proud to work in this institute where research is going on in the diversified field of mining. I have got chance to work for development and application of new mining technologies and innovative techniques for optimal extraction of coal from thick, contiguous and difficult coal seams resulting increase in production, productivity, conservation and safety of the mine. It is also a major thrust area of the institute and obviously need of the day for the coal mining industry. Under my leadership, a number of underground mining technologies for extraction of thick, difficult and contiguous coal seams have been developed and practised successfully in underground coal mines. I contributed significantly for excellence of the coal mining industry in the country through contribution for development of different new mining technologies like cable bolting based depillaring method for thick seams, underpinning based depillaring method for thick and contiguous seams/sections under weak and laminated partings, wide stall method for partial extraction of coal seams lock-up under surface/sub-surface features and staggered development based depillaring of thick seam in a single lift by blasting gallery method. These technologies were adopted at different collieries under different geo-mining conditions. I have played active role in designing of a number of continuous miner faces in India for mechanised extraction of coal seams from underground mines. My contribution in the coal mining industry may help a bit to meet the energy security of the country. About one of our developed methods and practiced by industry to extract locked-up coal, Chief General Manager, Chirimiri Area, SECL writes: "...In addition to safety and productivity, coal valued Rs. 133,56,93,000/- has been extracted and coal valued Rs. 33,10,00,000/- are likely to be extracted in future....". The Chief Editor of the International Journal of Rock Mechanics writes about one of our papers: "It is exactly the type of paper that we like to publish in the Journal because the work is of high quality and....."

I have taken leading role for formulation and submission of a number of R&D projects networking/collaborating with different CSIR laboratories and other institutes which have long impact on industry when successfully implemented. I have observed that the technological advancement in many branches of engineering and industries is quite rapid. However, in case of Indian underground coal mining industry, the progress is not so visible as expected and still mine management is forced to use the conventional mining methods/systems except a few. An effort has been made to introduce remote operation technology in underground coal mines through a Grant-in-Aid Project from Ministry of Coal titled "Development of tele-robotics and remote operation technology for underground coal mines" as a Project Leader. Through my effort as Nodal Officer/Project Leader, the institute has received a prestigious and challenging 12th Five Year Plan Project "Development of a technology for optimal extraction of locked-up coal from underground mines using artificial pillars acronymed as DeCoalArt". If a suitable technology is developed under this project, then around 3000 million tons of locked-up coal can be extracted. I am also associated as Project Leader/Task Leader of another two 12th Five Year Plan Projects. My R&D efforts and

organizational skill to lead a team resulted successful completion of more than 80 R&D, in-house, industry-sponsored projects and consultancy projects. I have taken active role for starting and successful running of AcSIR Courses at CSIR-CIMFR, Dhanbad. I received CSIR Golden Jubilee-CMRI Whitaker Award, Silver Medal of the MGMI award, Hindustan Zinc Award of Institution of Engineers (India) and appreciations from the industry, academicians and foreign experts. I have more than 100 research papers to my credit published in various national and international journals, seminars, symposia and workshops volumes besides a number of patents including one book. My R&D effort and its contribution made in the thrust area of rock mechanics for underground exploitation of thick, contiguous and difficult coal seams and consistently good academic and professional career has, probably, enhance the prestige of the laboratory.

15) PhD supervisions: Ongoing- 01

Name of student: Raja S.

University: Indian School of Mines, Dhanbad

Topic of PhD Thesis: Investigation and simulation of bumps for improved strata management during underground extraction of coal

Subject: Mining Engineering

Screenshot from Google Scholar for Citation

The screenshot displays the Google Scholar profile of Prabhat Kumar Mandal. The profile includes a photo, name, affiliation (CSIR-Central Institute of Mining and Fuel Research), and a list of publications. The publications table is as follows:

Title	Cited by	Year
Cable boting based semi mechanised depillaring of a thick coal seam	27	2001
Assessment of mining induced stress development over coal pillars during depillaring	24	2011
Upslosh of strata movement during underground mining of a thick coal seam below hilly terrain	16	2008
Cuttability of coal seams with igneous intrusions	15	2002
Undermining-based simultaneous extraction of contiguous sections of a thick coal seam under weak and laminated parting	14	2000
An observational approach for assessment of dynamic loading during underground coal pillar extraction	12	2011
Coal pillar extraction at deep cover. With special reference to Indian coalfields	12	2011
Optimal underground extraction of coal at shallow cover beneath surface/subsurface objects: Indian practices	8	2008
Stability of Pillars during underground extraction of thick coal soam in single III-+case situations	4	2007
Role of instrumentation and instruments to study the strata behaviour during depillaring operation	4	1998

On the right side of the profile, the 'Citation indices' section shows:

Citation indices	All	Since 2011
Citations	154	120
Hindex	8	7
i10-index	7	6

Below the citation indices is a bar chart showing the number of citations per year from 2000 to 2016. The chart shows a peak in citations around 2011-2012.

The 'Co-authors' section lists: J. Mali, PK Mishra (Principal Scientist), Manoj Namdeo Bagde, Harshil Agrawal, and Rakish Kumar.