

1. Name: RAKESH KUMAR

2. Date of Birth: 05.01.1974



3. Current Position and Address: PRINCIPAL SCIENTIST
(with E-mail & Phone no.) STRATA MECHANICS SECTION
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4. Educational qualifications: (Graduation and above)

Sl. No.	Degree/ Certificate	Year of Passing	University/ Institute	Subjects
I	B. E.	1996	Golden valley Institute of Technology, KGF	Mining
ii	M. Tech.	1999	Indian School of Mines Dhanbad	Open Cast Mining

5. Work experience

After my post-graduation from Indian School of Mines, Dhanbad, I joined CSIR-CIMFR (Scientist in 2004) and found myself comfortable in applying basic rock mechanics principles for improvement in practical mining conditions. I devoted last 15+ years of service at CSIR-CIMFR in different investigations related to more than 50 in-house and industry-sponsored projects, including two S&T projects of the Ministry of Coal, Govt. of India and one collaborative (international) S&T project. Details of different working posts/positions are given below in the table:

Designation	Institution/company	From	To	Nature of work
PGPT Trainee	BCCL, CIL	01.07.1996	10.04.1998	Bord & Pillar Mining
Project Assistant	CSIR- CIMFR	12.12.2000	31.01.2002	Instrumentation and Monitoring
Senior Research Fellow (Awarded by CSIR)	CSIR- CIMFR	01.02.2002	12.07.2004	R&D for efficient u/g coal mining
Scientist	CSIR-CIMFR	13.07.2004	12.07.2008	-do-
Senior Scientist	CSIR-CIMFR	13.07.2008	12.07.2012	-do-
Principal Scientist	CSIR-CIMFR	13.07.2012	till date	-do-

6. Area of specialization:

Thick seam mining and strata mechanics covering rock mechanics and mining methods, ground control, underground instrumentation and simulation of underground mining structures. Efficient Mining of deep seated Coal (Locked- up Coal in Thick Seams & Developed Pillars)

7. Honors/Awards received:

- Silver Medal of the Mining Geological & Metallurgical Institute of India in 2005-2006.

8. Fellowships/Scholarships:

- CSIR- Senior Research Fellowship (SRF) in 2002

9. No. of Research Publications:

- Papers in journals: Eighteen (Seven in foreign journals)
- In conference proceedings: Twenty seven (Nine in international conferences)
- Invited/key-note addresses:
- List of best 05 publications:

1. **R. Kumar**, A. K. Singh, A. K. Mishra, and R. Singh, 2015. Underground mining of thick coal seams. *International Journal of Mining Science and Technology*, 25(2015), pp. 885-896.
2. Singh, A. K., Singh, R., Maiti, J., Mandal, P. K., and **Kumar, R.**, 2011. Assessment of mining induced stress development over coal pillars during depillaring. *International Journal of Rock Mechanics and Mining Sciences*, UK., , 48: 805-818.
3. Singh, R., Mandal, P. K., Singh, A. K., **Kumar, Rakesh** and Sinha, Amalendu: Coal pillar extraction at deep cover: With special reference to Indian coalfields. *International Journal of Coal Geology*, UK, 2011, 86: 276-288.
4. Singh, R., Singh, A. K., Maiti, J., Mandal, P. K., Singh, Rashmi and **Kumar, R.**, 2011: An observational approach for assessment of dynamic loading during underground coal pillar extraction. *International Journal of Rock Mechanics and Mining Sciences*, UK., 45(1): 794-804.
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, No. 1, U.K., pp. 29-46.

10. Number of Books authored/edited:

11. (a) No. of Patents granted/applied for: Two

- I. "A model for rib/snook design in mechanised depillaring under moderate roof strata" by R. Singh, A. K. Singh, S. Ram, A. Kumar, R. Kumar and A. K. Singh: November 2015.

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- II. “Combined-Instrument-Approach (CIA) for analysis of underground instrumentation data.” by **R. Singh**, P. K. Mandal, A. K. Singh, R. Kumar, A. Sinha, May 2009.

(b) Technologies developed, Licensed and/or commercialized:

My research activities helped in studying response of rock-mass for a redistributed state of stress and strain situation of the underground coal mining with widely varying geo-mining conditions. I have worked for the development of mining methods like: “Cross development based underground extraction of a critically thick coal seam standing on pillars and the development made along the roof horizon” and optimized the safe and efficient extraction of thick coal seams. Development and application of a new process: known as “Combined instruments Approach” (CIA) for the strata mechanics proved to be an efficient method to improve safety of underground workings. Development of models for the design of rib and breaker-line support for CM based mechanised depillaring proved to be crucial for the efficiency of the mass production technology. My contributions to characterise rock-mass behaviour under changing stress conditions of mining proved to be significant for safe and efficient extraction of locked-up coal pillars.

12. Foreign visits:

Visited ASCR, Ostrava-Poruba, Czech Republic and Worked (including underground visit) for a joint research project under ASCR, Czech Republic - CSIR, India bilateral S&T Programme on “Rock mechanics investigations to meet challenges of strata control of deep underground coal mining.

13. Details of Professional memberships:

- | | |
|--|-------------|
| a. Mining, Geological and Metallurgical Institute of India | Life Member |
| b. National institute of Small Mines | Life Member |
| c. International Society for Rock Mechanics and Tunneling Technology | Member |

14 . Major contributions: (Max. 150 words)

My R&D efforts and management skill are well proven and found to be of immense importance for excellence of production, productivity, safety and conservation of our national coal reserves. I have completed different industry-sponsored projects as well as S&T projects of the Ministry of Coal, Govt. of India. I have received appreciation from the involved mining industry and also have considerable number of publications in the best rock-mechanics/mining engineering journals/seminars symposium. I have devoted last fifteen years of my services in different investigations related to more than 50 in-house and industry-sponsored projects, including two S&T projects of the Ministry of Coal, Govt. of India. I also initiated a collaborative R&D work with Institute of Geonics, the Czech Republic. Based on simple ideas and results of different field and laboratory investigations, my significant contributions are:

- Development of three (*one patented*) indigenous mining methods,
- Empirical model to estimate coal pillar loading under shallow mining conditions,
- Simulation and performance evaluation in field,
- Mechanisation and automation of underground instrumentation and monitoring,

- Design of different elements for Continuous Miner based mechanised depillaring and
- Safe and efficient underground mining of thick coal seams.

15. Technologies and Products/ Services

(i) Developed:

- Development of a mining method for final extraction of a critically thick coal seam standing on pillars and developed along the roof horizon.
- Development of an empirical relationship for estimation of amount and range of mining induced stress over the pillars/stooks/ribs around a depillaring face.
- Development of cable bolting based method of mining for extraction of thick and difficult coal seams
- Development of eco-friendly mining method for partial extraction of coal from locked-up pillars under various surface/ sub-surface constraints.
- Development of Combined Instrument Approach (CIA) for strata movement study.

(ii) Licensed:

(iii) Commercialized:

16. Designs and Prototype Developed:

17. Honours and awards won for technological contributions or sociological impact of R&D:

- Silver Medal of the Mining Geological & Metallurgical Institute of India in 2005-2006.

Signature