Dr. Tushar Gupta

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Work Experience:

2020-Present: Assistant Professor, at National Institute of Technology Rourkela, Odisha

Teaching and research at the department of Mining Engineering. Taking Rock Slope Technology, Computer Applications in Mining, Geomechanics and other subjects for BTech, M Tech and PhD students. Research in the areas of advanced computational simulations, slope stability, blasting in mines, waste to wealth in mining and civil industries, critical mineral availability in industrial wastes, and polymeric chemical grouting.

2018-2019: Senior Manager Technical, at Geo Constech Pvt. Ltd, East of Kailash, New Delhi

Simulations, methodology development, and designing, for slope stabilisation, tunnel water ingress control, ground improvement, and structural support. R&D for polymeric ground improvement solutions and lab setup for rock mechanics and geotechnical testing.

2011-2014: Assistant Manager (Mining), at underground coal mines in Western Coalfields Limited, **Coal India Limited (CIL**).

Practical operational experience of all aspects of underground development (*Bord and Pillar*) and depillaring (*Splitting, Slicing, and Caving*) operations in coal mining.

Education:

2014-2018: Doctor of Philosophy (Ph.D.) in *Mining Engineering/Civil Engineering and Earth Sciences* under the dual PhD programme at **IITB-Monash Research Academy**, **Indian Institute of Technology, Bombay.**

Thesis Title: "*Fly ash utilisation in haul road construction in opencast coal mines: A geo-environmental and hydrogeological investigation*.", under the supervision of Prof. T. N. Singh from IIT Bombay, India; and Dr. Mohan Yellishetty from Monash University, Australia

2007-2011: Bachelor of Technology in *Mining Engineering*, from **Indian Institute of Technology (Banaras Hindu University), Varanasi**

Project: "*Sensitivity Analysis of Coal Rib Stability for Internal Mine Dump in Opencast Mine*", under the supervision of Dr. Rajesh Rai. IIT (BHU) Varanasi, India.

Research Highlights and Interests:

- **Core member** of the *Indo-Australian Abandoned Mines and Waste Sites reclamations Consortium*, comprising of top Indian and Australian institutions and industries, which are involved in remediation of waste lands due to Mining and other industrial activities.
- Recognised **recommendations to Australia Senate** about Current Perspective, Challenges and Opportunities for fly ash utilisation and pond reclamation in Australian scenario.
- **Synthesised** an economic, environmentally safe, and efficient haul road construction material using coal fly ash and polymeric additives, reinforcing the haul roads against mechanical and hydrological stresses (patent pending).
- **Developed a novel technique** for volume and density measurement of irregular solid samples by 'Sand Displacement Method', which is under consideration as a standard practice by ISRM.
- **Interested in areas** of *construction materials from industrial waste* line products, *haul road design* and construction in mines, natural and manmade *slope-stability* and stabilisation, *fly ash* and its pozzolanic nature, *polymeric fly ash* composites, physico-mechanical, *hydrological and environmental* aspects of industrial bi-product utilisation in mining and civil application, *numerical simulation* and *soft computing* techniques, *Polymeric grouting and ground stabilisation*.

Research Skills

- Proficient in **laboratory experimentation and analysis** relating to rock mechanics and engineering, geotechnical, and structural testing.
- Efficient in **engineering design and numerical simulation** software such as ANSYS, COMSOL, RS2, Slide, RS3, AutoCAD, and Photoshop.
- Trained in **operation of FEG-SEM** at Monash centre for electron Microscopy (MCEM), Monash University, Australia.
- Well versed in **soft computing statistical skills** such as Artificial Neural Networks (ANN), Adaptive neuro-fuzzy interface system (ANFIS) and Multi Variable Regression (MVR)

Awards and Memberships

- **Best paper award** at the 4th International Conference of Earth Sciences and Engineering (ICEE), at Padang, Indonesia (2017).
- **Best Three Minute thesis talk (3MTT)** at the Oskar night of IITB-Monash Research Academy (2017).
- **Best Poster Presentation** at the Oskar night of IITB-Monash Research Academy (2017).

- **Recipient of grant** under Vice-Chancellor's International Inter-Campus Mobility Scheme at Monash University (2017).
- **Member** of Southern African Institute of Mining and Metallurgy **(SAIMM**), Australasian Institute of Mining and Metallurgy (**AusIMM)**, Canadian Institute of Mining, Metallurgy and Petroleum (**CIM**), and Indian Society for Rock Mechanics and Tunnelling Technology (**ISRMTT**), Institution of Engineers India (**IEI**)
- **Executive Committee** member in **ISRMTT** Bombay chapter.
- **Recipient of grant** under the Australian Alumni Grant Scheme **(AAGS) 2022** for research in Geospatial mapping of critical minerals from Industrial Wastes

Sponsored R&D Projects

- *Estimation and geospatial mapping of Critical Minerals extraction potential from Indian industrial wastes like fly ash, mine tailings, red mud, and slags.*, under Australian Alumni Grant Scheme 2022, Australian Consulate, 2022-2024, **Dr. Tushar Gupta (Active)**
- *Investigation, Development, and Optimisation of a Comprehensive Blast Design for the desired fragmentation rock parameters, rock quality, explosive parameters and initiation method*, under SERB, Department of Science and Technology, India. 2021-2023, Prof. Manoj Mishra, **Dr. Tushar Gupta (Active)**
- *Development of a sustainable material using chromite mine overburden and other industrial wastes for stowing or backfilling of underground mines in Sukinda Valley, Odisha*, under Satyabhama, Ministry of Mines, India, 2022-2024, Prof. H. B. Sahu, **Dr. Tushar Gupta (Active)**

Consultancy Projects

- *Scientific study for possibility of accommodation of Fly Ash with overburden in GP-III open cast coal Mine, 2022-23,* **Dr. Tushar Gupta**. (Active)
- *Scientific study on the Physico-Mechanical characterisation of Coal and In-seam Dirt Bands of coal seams/Mines of MCL from 25 locations, 2022-23,* **Dr. Tushar Gupta**, Prof. H. B. Sahu. (Active)
- *Analysis, Prevention and Control of slope failure in Putulpani Quarry of Gandhamardan Block B Iron Ore Mines,* 2021-2022, **Dr. Tushar Gupta**, Prof. H. B. Sahu, Prof. Equeenuddin. (Active)
- *DPM Survey and Monitoring at TMPL UCIL Mine*, 2021-2022, Dr. F. Sarkar, **Dr. Tushar Gupta** *(Active)*
- *Preparation of Surface Runoff management along with rainwater harvesting and ground water recharge including design of drainage structures pertaining to Rengalbeda (NE) Iron ore*, 2021-2022, **Dr. Tushar Gupta,** Prof. H. B. Sahu, Prof. Equeenuddin. (Active)

- *Physical quantity verification of different minerals at different working mines of Odisha Mining Corporation and establishment of conversion factor, OMC, 2021-22,* Prof. H. B. Sahu, **Dr. Tushar Gupta**, Prof. Equeenuddin. (Active)
- *Blast Vibration study at Guruda Block Manganese Mines of M/s Serajuddin & Co, 2020-21*, **Dr. Tushar Gupta**, Prof. M. K. Mishra *(Completed)*
- *Slope Stability Analysis for Proposed Pit Slope at Guruda Block Manganese Mines, M/s Serajuddin & Co, 2020-21,* **Dr. Tushar Gupta,** Prof. H. B. Sahu *(Completed)*
- *Scientific study of Control blasting and Scientific study of Pit and Dump Slope Stability at GPIIICL, Dholnara, 2020-21,* **Dr. Tushar Gupta**, Prof. M. K. Mishra *(Completed)*
- *Assessment of Environmental damage due to illegal mining and preparation of the restitution and restoration plan at Kendrapara District, 2020-21,* Prof. H. B. Sahu, **Dr. Tushar Gupta** *(Completed)*
- *Subsidence study(prediction model) for the proposed Takli Jena Bellora OCP and U/ G coal mine, 2020-21,* Dr. F. Sarkar, **Dr. Tushar Gupta***(Completed)*

Research Guidance

- **PhD:** 2 active research scholars
- **PG:** 1 active students, 4 completed
- **UG:** 4 active students, 3 completed

Publications and Communications

Journal Articles

- **Tushar Gupta**, M. Yellishetty, T.N. Singh, **2017**, *Measurement of Bulk volume and Density of Irregular Solid Samples by Sand Displacement Method*, Rock Mechanics and Rock Engineering 50 (3), 639-645 (*Under consideration for ISRM suggested method*)
- N. Sirdesai, **Tushar Gupta,** PG Ranjith, T. N. Singh, **2018**, *Studying the acoustic emission response of an Indian monumental sandstone under varying temperatures and strains*, Construction & Building Materials 168, 346-361
- **Tushar Gupta**, T. N. Singh, **2018**, *Geo-hydrological stability analysis of fly ash stabilised overburden dump slopes in opencast coal mines using finite element analysis*, International Journal on Advanced Science, Engineering and Information Technology, 8(2), 405-410
- **Tushar Gupta**, R Rai, A Jaiswal, BK Shrivastva, **2014**, *Sensitivity Analysis of Coal Rib Stability for Internal Mine Dump in Opencast Mine by Finite Element Modelling*, Geotechnical and Geological Engineering 32 (3), 705-712
- R Rai, S Kalita, **Tushar Gupta**, BK Shrivastva, **2012**, *Sensitivity analysis of internal dragline dump stability: Finite element analysis*, Geotechnical and Geological Engineering 30 (6), 1397-1404

- V. Srinivasan, **Tushar Gupta**, Tariq Ansari, T. N. Singh, **2020**, *An Experimental Study on Rock Damage and Rock Stress Memory with the implications for Kaiser Effect measurements in a Metamorphic Rock,* Bulletin of Engineering Geology and the Environment, *79*, pp 4335–4348
- V. Srinivasan, A. Tripathy, **Tushar Gupta**, T. N. Singh, **2020**, *An investigation on the influence of thermal damage on the physical, mechanical, and acoustic behaviour of Indian Gondwana Shale,* Rock Mechanics and Rock Engineering, 53, 2865–2885
- **Tushar Gupta**, M. Yellishetty, T. N. Singh, **2021,** *Physico-mechanical properties of fly ash based composite: Influence of lime content and curing time, Under Review*
- **Tushar Gupta**, **2020**, *Sinkage control of North-West corner of Kolkata High Court by consolidation grouting and stabilisation using Drucstone chemical grout: A Case Study,* Journal of Building Pathology and Rehabilitation, 5, 27
- T. Werner, P. Bach, M. Yellishetty, F. Amirpoorsaeed, S Walsh, A Miller, M Roach, A Schnapp, P Solly, Y Tan, C Lewis, E Hudson, K Heberling, T Richards, H C Chia, M Truong, **Tushar Gupta**, X Wu **2020,** *A Geospatial Database for Effective Mine Rehabilitation in Australia*, Minerals, 10, 745.
- Verma, Harshal, Arunava Ray, Rajesh Rai, **Tushar Gupta**, and Neeraj Mehta. **2021** "Ground improvement using chemical methods: A review." Heliyon :e07678, Vol 7, Issue 7.
- Kaustuv Ray, **Tushar Gupta** and Falguni Sarkar, 2023, *Sensitivity analysis and prediction of diesel particulate matter emissions in Indian underground metalliferous mines using regression and machine learning algorithms,* Measurement, Vol 213, 112742

Conference Proceedings

- **Tushar Gupta**, M. Yellishetty, T. N. Singh, **2017**, *Geo-hydrological stability analysis of fly ash layered overburden dump slopes in opencast coal mines using finite element and limit equilibrium analysis*, 4th ICEE (International Conference on Earth sciences and engineering), Padang, Indonesia, Aug-Sep 2017 ***(****Best paper Award)*
- L Sharma, **Tushar Gupta**, V Srinivasan, T. N. Singh, **2017**, *An experimental Study on Effect of Joints and Infillings on the Dynamic Wave Velocities,* 7th INDOROCK '17 (Indian Rock Conference), New Delhi, India, Oct 2017
- **Tushar Gupta**, V Srinivasan, T. N. Singh, **2017**, *Utilization of Coal Washery Rejects and Fly ash for dump stabilisation*, International Seminar on Management of Mine Waste with Value Addition, MEAI-2017, Ahmedabad, India, Jun 2017
- **Tushar Gupta**, M. Yellishetty, T.N. Singh, **2015**, *Optimization of ash content in overburden dumps: A numerical approach*, MPES '15(Mine planning and Equipment Selection), SAIMM, Johannesburg, South Africa, Nov 2015

- P. K. Singh, **Tushar Gupta**, NN Sirdesai, T.N. Singh, R Trivedi, **2015**, *Stability Analysis for Optimum exploitation of Limestone of Sheopura Kesarpura Mine*, 21st MEMC '15 (Mines Environment and Mineral Conservation), IBM, Hyderabad, India, Jan 2015
- **Tushar Gupta**, SP Pradhan, TN Singh, **2014**, *A Critical Study on Feasibility of Fly Ash Utilization in Overburden Dumps of Opencast Coal Mines*, SDMinER'14 (Seminar on Sustainable Development in Mineral & Earth Resources), IMEJ, New Delhi, India, June 2014
- **Tushar Gupta**, M. Jamal, M. Yellishetty, T.N. Singh, **2018**, *Sensitivity analysis of mechanical and geometrical properties of fly ash stabilized overburden dumps using mathematical simulations*, 27th International Symposium on Mine Planning and Eqipment Selection, MPES-2018, Santiago, Chile, Nov-2018
- **Tushar Gupta**, Rizwan Ahmed, **2019**, *Controlling water incursion in Parsik tunnel in Mumbai using chemical grouting of DrucHyd 2C*, Tunnelling Asia' 2019 – International Conference on Underground Facilities for Better Environment and Safety : Issues & Challenges, Mumbai, 27-28 February 2019,
- Kaustuv Ray, **Tushar Gupta**, Falguni Sarkar, **2022**, *Modelling Diesel particulate matter (DPM) dispersion in underground metalliferous mines*, Challenges in Safety and Environmental Management in Mines, CSEMM -2022, NIT Rourkela, 17-19 Jun 2022
- Jajneswar Biswal, **Tushar Gupta**, and Himanshu Bhushan Sahu, **2023**, *Design and optimization of mine slope using the Limit Equilibrium Method – A Case Study*, Conference cum Exhibition on Redefining Indian Mining Sector (CERIMS) 2023. Oct 2023,
- Poulami Konar, and **Tushar Gupta**, **2023**, *Utilization Of Stabilized Mine Tailing by Using Jute Fibres as a Subgrade in Flexible Pavement Design*, International Conference on Sustainable and Innovative Mining Practices (ICSIMP-2023), Nov 2023,
- Poulami Konar, Rishav Raj, and **Tushar Gupta**, **2023**, *Stabilization of weak soil by using Coal Mine Overburden Waste*, International Conference on Safe, Smart and Sustainable Mining (3SM), Dec 2023

Book Chapter

- **Tushar Gupta**, T. N. Singh, Dhananjay Verma, **2019,** *Dump Slope Stability*, Landslides: Theory, Practice and Modelling. Advances in Natural and Technological Hazards Research, Vol 50. Springer, Cham (Available Online)

Patent

Tushar Gupta, M. Yellishetty, and T.N. Singh, **2024**, *Load Bearing Materials from Pozzolanic Ash.* Indian Patents No. 493729