DEPARTMENT OF
MINING ENGINEERING

OCT 2021
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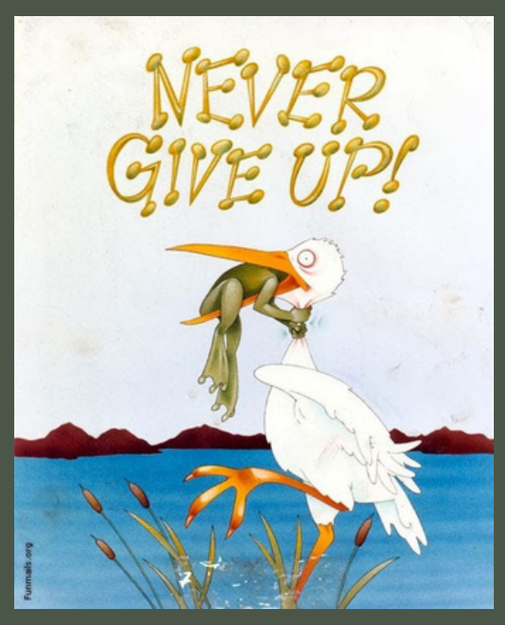
EMERALD

TECHNICAL MAGAZINE



DR. T. THIMMAIAH
INSTITUTE OF
TECHNOLOGY, K.G.F

VISIT :
WWW.DRTTIT.GVET.EDU.IN

About the Department

The Mining Engineering is one of the main branches of engineering situated amidst the century-old Kolar Gold Mines. Asia's largest mines, like Kudremukh Iron Ore and Neyveli Lignite, are situated at a distance less than 250 Kilometres. The Mining Engineering department has well-established labs and has an underground mine model, the only one of its kind in the State.

The department has a strong industry-institution interaction to enable exposure to the latest technological trends for students and teachers and to impart practical training at HGML, NMDC, etc.

National Institute of Rock Mechanics (NIRM) a research institute extends thefacility for the training of students in various project works. Recent additions to the laboratory include a sophisticated electronics survey station and electronic precision level. The department also has a computer laboratory for data processing.

Principal's Message

Dear Readers,

I am delighted to welcome you to the second edition of "Emerald" student's Technical Magazine, a new technical publication that showcases the latest developments and innovations in mining engineering. This magazine is an initiative of our Mining Engineering Department, which is one of the leading departments in our college and in our region.

I would like to congratulate and appreciate the efforts of Dr. Manas Mukhopadhyay, Head of the Department, and his editorial team for this magazine. They have done a commendable job in bringing out this issue during Covid 19 crisis. This issue features articles on topics such as mining practices, mineral production, mine environmental management. The magazine also highlights some of the achievements and activities of our students and faculty.

I hope you enjoy reading this magazine and find it informative and inspiring. I urge you to keep learning and exploring new horizons in your field. Mining engineering is a vital discipline that contributes to our national security and economic growth. You have a great opportunity and responsibility to make a positive impact on our society and our environment through your work.

Dr. Syed Ariff
Principal
Dr. T. Thimmaiah Institute of Technology, KGF

HOD's Message

Dear Readers,

I am delighted to welcome you to the latest issue of "Emerald" Technical Magazine, a student-led publication that showcases the latest developments and innovations in mining field. This magazine is a platform for our students, faculty, alumni and industry partners to share their insights, experiences and achievements in mining engineering.

In this issue, you will find articles on topics such as mining practices, mineral production, mine environmental management, mine design optimization and more. You will also learn about some of the exciting projects and activities that our department is involved in, such as research collaborations, student competitions and outreach programs.

I would like to thank the editorial team for their hard work and dedication in preparing this magazine despite of difficulties faced due to Covid 19. I would also like to thank all the authors who contributed their valuable content to this issue. Without their efforts, this magazine would not have been possible.

I hope you enjoy reading this magazine and find it informative and inspiring. I look forward to hearing your feedback and suggestions for future issues.

Sincerely,
Dr. Manas Mukhopadhyay
Head, Department of Mining Engineering

Chief Editor's Message

Dear Readers,

Welcome to the present issue of the "Emerald" Student Technical Magazine of Department of Mining Engineering, a publication dedicated to showcasing the latest research, innovations and achievements in the field of mining engineering. This magazine is created by and for students who are passionate about mining and its applications in various sectors of society. Our goal is to provide a platform for students to share their ideas, insights and experiences with their peers, professors and industry professionals. We hope that this magazine will inspire, inform and connect students who are interested in mining engineering and related disciplines.

In this issue, you will find articles on topics such as mining practices, mineral production, mine environmental management, mine design optimization and more. You will also learn about some of the exciting projects and activities that our department is involved in, such as research collaborations, student competitions and outreach programs.

We would like to thank all the contributors, reviewers and advisors who made this issue possible during one of the difficult phase in human kind, i.e., CoVid 19. We are grateful for your support and encouragement.

We invite you to join us in this exciting journey of exploring the world of mining engineering. If you have any feedback, suggestions or questions, please feel free to contact us at hod.min@drttit.edu.in. We look forward to hearing from you and seeing your contributions in future issues.

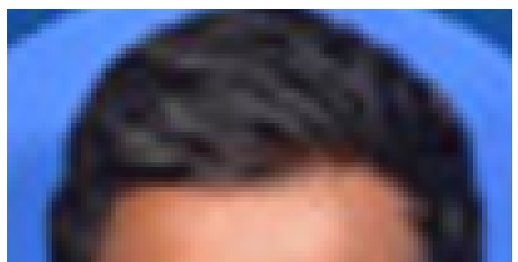
Dr. Manjunath A.
Chief Editor

Student Editorial Members

PURUSHOTHAMAN V
Head, Editorial Member
3rd Year Mining

Nithin M S
3rd Year Mining

Anshad
2nd Year Mining



Aurangazib A
4th Year Mining

Arun Kumar B K
4th Year Mining

CONTENTS

Technical Tips

RENOVATION OF DIESEL LHD TO BATTERY LHD FOR MINIMISING OPERATIONAL COST IN UNDERGROUND METAL MINING

by

- Prof. Vijaya Raghavan

In the realm of underground mining operations, the regular utilization of haulage vehicles is essential for the transportation of ore from subterranean loading points to the surface. Occasionally, the scenario arises where empty descending vehicles come to a halt in dedicated passing lanes, allowing heavier moving vehicles to overtake them. This strategic maneuver facilitates the smooth flow of traffic in a downhill direction. The effectiveness of a mine's haulage operations is significantly impacted by the quantity and strategic positioning of these passing bays. Our analysis, reveals a comparative study aimed at minimizing expenses related to the transition from diesel-powered Load-Haul-Dump (LHD) machines to their battery-powered counterparts.

Our findings indicate that the daily diesel costs amount to 53,562 Rupees, while the monthly expenditure reaches Rs 3,21,375, based on a 25-day work schedule. Extrapolating to an annual estimate, the diesel-powered LHDs incur costs of approximately Rs. 47,43,375.00 (Forty-seven lakh forty-three thousand three hundred seventy-five only). It is important to note that the initial investment for acquiring battery-powered LHDs may appear to be relatively high. Nevertheless, the operational costs associated with battery charging are quite reasonable, with the energy consumption for charging three 100-volt batteries amounting to 15 units per session at a unit cost of 16 Rupees. The charging process typically takes around 30 minutes, eliminating the need for battery replacements. Consequently, the annual expenses for battery charging are estimated at Rs. 3,27,600 (Three lakh twenty-seven thousand six hundred only).

A comprehensive comparison of operational expenses between the battery-powered LHDs and their diesel counterparts has been conducted, taking into account factors such as emissions, diesel-related costs, and charging expenditures. Our data highlights that transitioning to rechargeable LHDs can yield a substantial 90% reduction in operational costs.

Student Technical Paper

"BLAST FRAGMENTATION APPRAISAL-MEANS TO IMPROVE COST-EFFECTIVENESS IN MINES"

Navinprasath.G.S

Under the Guidance of Prof. Raja S.

Abstract

Fragmentation is a major concern of any blasting operation. Information on the degree and size distribution of fragments within a blasted rock mass is essential for efficient rock loading and crushing operations. Estimation of blast fragmentation is generally done by considering four basic variables, i.e. rock properties, explosive properties, drilling pattern and bench geometry. Apart, in reality, because of the non-uniform burden along with the bench height, the actual powder factor in the front row of holes could differ significantly from the one estimated assuming uniform burden. Ignoring this fact may result in a poor fit of the existing fragmentation models for the actual data. Drilling and blasting are seen as sub-systems of size reducing operations in mining. To have better design parameters for economical excavation of mineral production and fragmentation, the comminution and fragmentation operations need to be studied and optimized independently, as well as together, to create optimized use of energy and cost-effective operation. Thus, fragmentation is the basic concern in rock blasting and serves as the main measure of blasting effectiveness.

Hence in this paper aimed to discuss the blast fragmentation appraisal in mines.

Student Technical Paper

"Application of Virtual Reality (VR) in Underground mine Training and Safety Education"

MADHALAI TITUS A
Under the Guidance of rof. John Gladious

Abstract

Internet technology and virtual reality technology are now being combined to provide an intuitive, multi-dimensional information system which can simultaneously display any information that can be collected and stored by a computer. Physical information is directly displayed as 3-dimensional objects in the mine model. Numerical and text information is dynamically linked to these objects and accessed by "clicking" on them. In recent years, mixed reality (MR) technologies and devices have experienced remarkable improvements. Primarily, head mounted displays (HMDs), offering different virtual reality (VR) experiences, are becoming increasingly popular in various domains such as private gaming, industrial training, and academic teaching and learning. VR has already proven to be effective in rising interest, improving skills acquisition and learning in diverse fields of study.

All the data can be integrated in real time into one information system with a 3-D graphical interface and user-friendly controls. This interface will facilitate easy access to and integration of everything from real-time gas monitoring data and vehicle location to exploration drill cores, all within one application. Operators will use one simple intuitive interface which will manage information from the myriad of computer packages with different data structures, interfaces, languages and operating systems. VR simulation system for underground mining project will enable users to get all-around perspective and real–time activity interaction in a virtual mine. At the main time, it has a positive meaning for virtual mining design, mine safety education and training, mining technology projects demonstration, mine production visualization management, disaster simulation and inversion. In this paper we will be discussing the recent development of Virtual Reality (VR) in Under Ground mines regarding development and safety training.

Student Technical Paper

"SLOPE FAILURE MECHANISM AND MONITORING TECHNIQUES"

Vinith Kumar P.V.

Under the Guidance of Dr. Manjunath A

Abstract

Opencast mining operations involve huge quantities of overburden removal, dumping and backfilling in excavated areas. A substantial increase in the rate of accumulation of waste dumps in recent years has resulted in greater height of the dump for minimum ground cover area and also given rise to danger of dump failures. Further, steeper open-pit slopes are prone to failure. These failures lead to loss of valuable human life and damage to mining machinery. There is a need for continuous monitoring of dump and pit slopes, as well as for providing early warning before the occurrence of slope failure. Different technologies have been developed for slope monitoring. After studying the features and limitations of existing slope monitoring systems, it determined that there is a need to provide a reliable slope stability monitoring and prediction system by using a solar power-based long-range wireless sensor network for continuous monitoring of different prevailing parameters of slope stability. An accurate prediction of slope failure using a multiparameters-based prediction model is required for giving warning per the danger levels of impending slope stability. Considering the requirement, a slope failure monitoring and prediction system has been developed by the authors, using a wireless sensor network for the continuous monitoring of slope failure and to provide early warnings. The chapter describes details of slope stability mechanism, parameters affecting slope failure and triggering aspects, monitoring systems, prediction software, and laboratory experiments for calibrating geo-sensors and field installation of the developed system.

Student Achievements

Golden Valley Educational Trust

Dr.T.Thimmaiah Institute of Technology

Affiliated to Visvesvaraya Technological University , Belagavi
Oorgaum Post KGF 563120

Certificate of Achievement

This is to Certify, that

ARUN KUMAR B K

of Dr. TTIT, KGF from the Department of Mining

has participated in the "Dr. TTIT Virtual Expo - 2021" organized by *Dr. T. Thimmaiah Research & Innovation Council in association with* Institution's Innovation Council, Dr TTIT, K.G.F held on 04th August 2021 for their Project Titled Development of real time monitoring system to detect dust pollution in opencast mine .

Prof. Ruckmani Divakaran
Dean - Academics

Dr. H. G. Shenoy
President IIC & Vice-Principal

Dr. Syed Ariff
Principal

Arun Kumar B K, Shivananda, M G Chandu and Ganesh D of 8th Semester has won the First price in Dr.TTIT Virtual Expo 2021 conducted by Dr.TTIT Institution's Innovation Council on 4th August 2021 for the project titled "Development of real time monitoring system to detect dust pollution in opencast mine".

GOLDEN VALLEY EDUCATIONAL TRUST

Dr. T. THIMMAIAH INSTITUTE OF TECHNOLOGY

Oorgaum, KGF - 563 120.
Affiliated to Visvesvaraya Technological University Belagavi
Approved By AICTE Govt. of India New Delhi | ISO 21001: 2018 Certified

ICRTTEAS 2021

Best Paper Award Certificate

*This is to certify that paper titled "**Detecting system of Air Pollution , vibrations, Temperature and Shares live data**", authored by **Mr. Shivananda, Mr. Arun Kumar B.K, Mr. Guntamadugu Chandu, Dr. Manjunath A & Mr. Ganesh D** has been chosen as one of the Best Papers in **Mining Engineering** track, presented in the 3rd International Conference on Recent Trends in Technology, Engineering and Applied Science - ICRTTEAS 2021 held virtually on 19th and 20th July 2021.*

Dr. Palaniswamy K M
Convener

Prof. Ruckmani Divakaran
General Chair

Dr. H.G. Shenoy
Vice Principal

Dr. Syed Ariff
Principal

CertificateID:
ICRTTEAS2021/B1019

Dr. T.T.I.T, KGF had organized 3rd International Conference on Recent Trends in Technology, Engineering and Applied Science – ICRTTEAS 2021 on 19th and 20th July 2021 virtually. An opportunity was provided for B. E students to present their project/research papers in this conference. Arun Kumar B K, Shivananda, M G Chandu and Ganesh D of 8th Semester received best paper award for the paper titled "Detecting system of air pollution, vibrations, temperature and shares live data".

Student Achievements

VTU Rank Holders 2017-21 Batch

1st Rank

GOLD MEDAL

AURANGAZIB A

3rd Rank

ARUN KUMAR B K

4th Rank

DUNAKA GANESH

5th Rank

SHEIKSULAIMANSATE A

7th Rank

SREEPATH R C

8th Rank

SRINIVAS K

9th Rank

SAKTHIVEL D

10th Rank

KRISHNARAJ S

Faculty Achievements

Dr Vijaya Raghavan, has successfully completed his Ph. D from NITK, Surathkal for thesis titled “Experimental investigation on assessment and prediction of specific energy in rock cutting” on July, 2021.

Department Event

Webinar
on
"**Plethora of Mineral Processing**"
during
23rd June, 2021

Department organized webinar on "Plethora of Mineral Processing", on 23rd June 2021. Dr. P. Sharath Kumar, Asst. Professor, Department of Minerals Processing, VSKUPG centre, Sandur, Karnataka was the resource person for this webinar. Around 60 Mining students have attended this webinar.

Department Event

Webinar
on
"**Digital Mining – Vision 2030**"
during
16th July, 2021

Department organized webinar on "Digital Mining – Vision 2030", on 16th July, 2021. Mr. K. Sridhar Reddy, Project Manager, Steel Makers Zimbabwe Pvt. Ltd, Zimbabwe was the resource person for this webinar. Around 50 Mining students have attended this webinar.

Mining News

1. Bain & Company published an article on how mining companies around the world reacted quickly to the disruptions caused by COVID-19. The article highlights how many mines were able to continue operating with fewer people onsite, and even those that had to shut down are now ramping up production to previous levels while enforcing safety protocols.
2. McKinsey & Company published an article on the impact of the COVID-19 crisis on the mining sector. The article explores how the crisis is affecting demand for commodities, supply chains, and operating models. It also provides insights into how analyzing past crisis periods can help us understand the ramifications of the COVID-19 pandemic.
3. Article on CNBC highlights that how India's industrial production, including mining, contracted by 55.5% in April 2020 compared to the same period a year earlier

Department Vision

"To excel in education, training and leadership skills to prepare the students for sustainable development of mining industries."

Department Mission

1. To provide a conducive environment in which students think, learn, conduct, innovate and apply.
2. To impart quality education for meeting the needs of the mining engineering profession and society, and achieve excellence through creative teaching learning and research.
3.To inculcate the spirit of sustainable development and conservation of natural resources through the advancement of technology in the exploration and production of minerals with due regard to health, safety and environment.

PEOs

1.Graduates shall have the ability to solve complex problems of mining by the application of sound engineering principles in their professional careers.

2. Graduates shall have the spirit of teamwork and inculcate the habit of lifelong learning for achieving professional excellence.

3. Graduates shall have in-depth knowledge in the entire value chain of the profession starting from exploration to beneficiation of mineral deposits in a coordinated manner.