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Skill Development Programme

Improving Mine Efficiency & Safety with Advanced Blasting Technologies

Dates: TBC

Course Objectives

The pandemic of 'COVID-19' has made mining personals realize the importance of digital technology. mining processes upstream and downstream are related with blasting. With application of digitization and better understanding of Process, blasting results can be used for the improvement of operations. greater control over fragmentation, muck piles, excavation and dilution are just the beginning. There are also benefits of lower vibration and safe blast configurations that eliminate expensive downtime and Social Issues. This course has been designed for blasting personnel to optimize operations in modern mines. To record and analyze all these parameters, digital tools can be of great help. A number of digital technologies are now available and affordable within the mining industry's reach. Through technological innovations & application of "consumer" technologies like devices, cameras, motion sensors, and positioning drones etc., key aspects of mining could be transformed. Topics will cover a variety of themes: modern theory, products, accessories, design, and control of adverse impacts and achievement of targeted results. Course will include use of software and App.

Blast Design for Desired Fragmentation

- Rock Fragmentation Process, Role of Discontinuities, Geology and In-Situ Stresses.
- Measurement of Fragmentation by Image Analysis Technology.
- Fragmentation Prediction, Control, Throw and Muckpile Diggability

Explosives & Initiating Systems

- Selection of Explosives and Initiation System
- Design to Avoid Malfunction, Hot Hole Blasting,
- Effect of Delay Sequence and Influence on Fragmentation and Diggability.

Drilling Operations

- Selecting and Evaluating drilling equipment, Drill Performance Monitor
- Effects of Blast-hole Deviation on Drilling and Muck-pile and Loading cost
- Mine Efficiency with Digital drill and Blast data, Predicting the Penetration Rate
- Measurement While Drilling, GPS Applications, Automation in Drilling

Open Pit Blasting Operations and Management

- Blast Design and Patterns.
- Practical blast Execution, Large Scale Blasting, Dilution Control
- Predicted and Actual Blast Results.
- Design According to Site Specific Problems

Downstream Effects of Blasting

- Effect of Powder Factor and its Relevance.
- Impact of Blast Design Parameters on Mine Economics and Costing
- Energy Consumption in Downstream Operations.

Managing Environmental Impact of Blasting

- Blast Design to Minimize Complaints due to Ground Vibrations and Airblast.
- Blasting Close to Structures.
- Flyrock Prediction and Control.
- Dust & Fines Generation Control and Assessment of Pollutants Resulting from Blasting

Technological Innovations & Application

- Instrumentation: Ground Vibration and Air Blast Monitors, Laser profilers, Fragmentation Image Analysis Systems, drones in drilling and blasting, Automation in Drilling and Charging.
- Performance Evaluation of Drilling and Blasting Operations.
- Application of Drone in Blasting, Data Analytics and Artificial Intelligence Applications.

Case Studies would be presented. Quizzes, Assignments and allowing participants to practice the following software with actual field data

- **Blast Designer(BLADES)**
- **Blast Information Management System(BIMS)**
- **Drill Information Management System(DRIMS)**
- **Predictors** - Flyrock, Air and Ground Vibration, Fragmentation
- Blast Designing on **3-D** platform
- Smart Blasting App and Smart Drilling App
- Fragmentation Image Analysis Software

Who Should Participate?

This Course is ideal for mining personnel involved in Drilling and Blasting activities, both in the Underground and Surface Mining environments, as well as personnel from explosives companies, suppliers of explosives products, senior management and consultants to the mining industry. This Course can be of great helping hand to all levels of mining personals i.e., from Foreman to General Manager, looking to expand their skill sets. It will be a milestone for companies looking towards Digitization, Application of Data Analytics and Artificial Intelligence in their mines.

Course Director

Dr. Sushil Bhandari obtained BE (Mining) from Jodhpur University, M.Sc. degree in Mining Engineering from Banaras Hindu University and Ph.D. from University of New South Wales (Australia). He remained Professor and Head of the Department of Mining Engineering in Jai Narain Vyas University, Jodhpur. He has 40 years long experience in teaching. He has published over 100 papers and his book Engineering Rock Blasting Operations is used by students. He is recipient of National Mineral Award 2001, of Government of India for his contribution to mining technology.

Course Presenters:

- Y Prof. Sushil Bhandari (formerly Professor and Head, Mining Engineering JNV University, Jodhpur)
- Y Prof. P.K. Rajmany (former Head Rock Mechanics HZL, Vedanta)
- Y Sanjay Purohit (Head, Mining Technology at MineExcellence),

Course Structure

Part-1 (3-Days)	Power point, video, case studies presentations on different topics. Hands-on Practice of Drilling and Blasting Software. Participants will also be given 1-month free access to MineExcellence software.
Part-2 (2-Days) (Optional)	Option of Hands-on practice of Drilling and Blasting digital platform and/or mine visit to practically demonstrate the concepts.

REGISTRATION FEE:

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