Surface Blasting Design Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Surface Blasting Design Training Course is designed to equip mining, civil engineering, and quarry professionals with advanced competencies in drilling and blasting optimization, explosive engineering, fragmentation control, vibration reduction, and cost-efficient rock breaking strategies. The course integrates modern blast design software, geotechnical analysis, controlled blasting techniques, and safety-critical compliance frameworks to ensure high-performance outcomes in surface mining and large-scale excavation projects. Participants gain practical exposure to bench blasting, slope stabilization blasting, perimeter control blasting, and production blasting design principles aligned with global mining standards.

In today’s rapidly evolving mining and infrastructure sectors, the demand for precision blasting, AI-assisted blast modeling, environmental compliance, and digital mine-to-mill optimization is increasing significantly. This training focuses on real-world applications such as flyrock control, air overpressure management, blast-induced ground vibration monitoring, and fragmentation analysis using advanced simulation tools. The program bridges the gap between theory and field execution, enabling professionals to deliver safe, sustainable, cost-effective, and high-efficiency blasting operations across surface mines, quarries, and construction environments.

Programme Curriculum

Surface Blasting Design Training Course

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Course Duration

5 days

Course Objectives

1. Master advanced surface blast design optimization techniques
2. Understand drilling pattern configuration and burden-spacing calculations
3. Apply explosive energy distribution and detonation sequencing principles
4. Control ground vibration, airblast, and flyrock risk mitigation strategies
5. Implement AI-driven blast simulation and predictive modeling tools
6. Enhance fragmentation quality for mine-to-mill productivity improvement
7. Develop skills in geotechnical rock mass characterization for blasting
8. Optimize cost per ton in drilling and blasting operations
9. Ensure regulatory compliance and environmental blasting standards
10. Use digital blast monitoring and real-time data analytics systems
11. Improve slope stability through controlled contour blasting techniques
12. Integrate sustainable mining and eco-friendly blasting practices
13. Execute risk-based blast design and safety-critical decision making

Target Audience

1. Mining Engineers
2. Drilling and Blasting Supervisors
3. Civil Engineers in infrastructure and excavation projects
4. Geotechnical Engineers and Rock Mechanics Specialists
5. Mine Managers and Production Supervisors
6. Explosives Technicians and Shotfirers
7. HSE (Health, Safety & Environment) Officers in mining
8. Engineering students specializing in mining and civil disciplines

Course Modules

Module 1: Fundamentals of Surface Blasting Engineering

- Rock breaking mechanisms and explosive-rock interaction
- Types of surface blasting: bench, production, pre-split
- Energy transfer and detonation physics
- Drill hole geometry fundamentals
- Blast performance indicators
- **Case Study:** Open-pit iron ore mine improving fragmentation by redesigning bench blast geometry

Module 2: Drill Pattern Design & Burden Optimization

- Burden, spacing, and stemming calculations
- Drill pattern types
- Hole diameter and depth optimization
- Sub-drilling and overbreak control
- Bench height considerations
- **Case Study:** Quarry reducing oversize boulders by optimizing staggered drilling pattern

Module 3: Explosives Selection & Charging Techniques

- ANFO, emulsions, and bulk explosives selection
- Column loading and deck charging methods
- Detonation velocity matching
- Primer placement strategies
- Energy control techniques
- **Case Study:** Coal mine improving blast efficiency using deck charging to reduce vibration

Module 4: Blast Timing, Sequencing & Delay Design

- Delay timing principles and initiation systems
- Electronic detonators vs non-electric systems
- Row-by-row firing sequences
- Vibration control through timing optimization
- Advanced initiation design
- **Case Study:** Limestone quarry reducing flyrock incidents using electronic delay sequencing

Module 5: Fragmentation Control & Mine-to-Mill Optimization

- Fragmentation size distribution analysis
- Crushing and milling efficiency improvement
- Powder factor optimization
- Rock mass classification impact
- Digital fragmentation analysis tools
- **Case Study:** Gold mine increasing mill throughput by 18% through improved fragmentation design

Module 6: Environmental Impact & Blast Vibration Control

- Ground vibration measurement
- Air overpressure mitigation
- Flyrock prediction models
- Noise reduction strategies
- Regulatory compliance frameworks
- **Case Study:** Urban-edge quarry minimizing complaints using controlled blasting buffers

Module 7: Advanced Blast Monitoring & Digital Technologies

- Seismograph data interpretation
- Drone-based blast mapping
- AI-based blast prediction tools
- Real-time monitoring systems
- Digital twin modeling for mines

- **Case Study:** Copper mine improving safety using real-time vibration monitoring dashboards

Module 8: Safety, Risk Management & Compliance in Blasting

- Blast risk assessment methodologies
- Explosives handling safety protocols
- Emergency response planning
- Legal compliance and mining regulations
- Incident investigation techniques
- **Case Study:** Quarry eliminating blast-related incidents through revised risk assessment framework

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

Register Online Now

Email: info@fineskilltrainingcenter.com | Website: www.fineskilltrainingcenter.com