Drilling and Blasting Course for Mining and Quarrying: Blast Design and Vibration Control

18 – 22 January 2027
Paris - Right Bank business hotel



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Introduction:

Drilling and blasting course for mining and quarrying, covering blast design and vibration control, is a 1-week course for blast engineers, drill-and-blast contractor teams and technical services staff, ending with a Blast Design and Vibration Control Plan for a case quarry. Operations lose money and community goodwill when patterns ignore rock structure, powder factor drifts, boulders and flyrock appear and vibration complaints follow each shot. Nominees already design, charge or supervise bench blasts, and teaching is by modelling build on blast records and monitoring data. CoreConcept Training Center delivers this drilling and blasting course.

Course Objectives:

- Review rock mass structure, bench geometry and drilling accuracy data to set the inputs for a blast design
- Select bulk explosive type, charge configuration and powder factor to suit rock strength and water conditions
- Design burden, spacing, stemming and delay timing patterns that deliver a target fragmentation and muckpile shape
- Predict ground vibration and air overpressure from scaled distance records and set charge limits per delay
- Control flyrock, backbreak and overbreak through pattern changes, wall control design and exclusion zone setting
- Calculate drill and blast cost per tonne and prepare a Blast Design and Vibration Control Plan for a case quarry

Target Audience:

- Engineers responsible for designing bench blast patterns and charge plans at mines and quarries
- Drill and blast contractor supervisors accountable for hole layout, loading and firing execution
- Technical services staff who monitor vibration, fragmentation and blast performance records
- Production planners who depend on muckpile quality, digging rates and crusher feed size
- Environmental and community liaison staff who handle blast vibration and noise complaints

Course Outline:

Day 1: Drill and Blast Landscape, Rock Mass Inputs and Performance Audit

- Drill and Blast Cycle From Drilling to Muckpile Digging
- Bench Blast Geometry of Burden, Spacing, Subdrill and Stemming
- Rock Mass Structure and Strength Inputs for Blast Design
- Blasthole Drilling Accuracy and Hole Deviation Survey Review
- Current Drill and Blast Performance Gap Review Using Audit Checklist

Day 2: Explosives Selection, Powder Factor and Initiation Systems

- ANFO, Emulsion and Heavy ANFO Selection by Water Conditions
- Detonation Velocity and Energy Matching to Rock Impedance
- Powder Factor and Charge Weight Calculation per Hole
- Electric, Non-Electric and Electronic Detonator System Comparison
- Initiation Timing Design With Inter-Hole and Inter-Row Delays

Day 3: Blast Pattern Design, Fragmentation Prediction and Muckpile Control

- Burden and Spacing Pattern Design for Bench Blasts
- Stemming Length, Decking and Air Deck Charge Design
- Fragmentation Prediction Model Inputs and Size Distribution Curve
- Muckpile Shape, Throw and Digging Rate Assessment
- Drill Plan and Charge Sheet Preparation for Blast Execution

Day 4: Vibration, Air Overpressure, Flyrock and Overbreak Control

- Ground Vibration Prediction From Scaled Distance and Peak Particle Velocity
- Air Overpressure and Noise Control Using Stemming and Delays
- Flyrock Cause Analysis and Exclusion Zone Setting
- Overbreak, Backbreak and Presplit Wall Control Design
- Community Vibration Complaint Handling and Blast Record Evidence File

Day 5: Modelling Build of the Blast Design and Vibration Control Plan

- Case Quarry Rock Data and Blast Record Briefing
- Pattern, Charge and Initiation Design Applied to Case Bench
- Vibration Monitoring Data Check Against Predicted Scaled Distance Curve
- Cost per Tonne Model Across Drilling, Explosives and Loading
- Blast Design and Vibration Control Plan Completion

Skills You Will Gain:

- Blast Pattern Design
- Powder Factor Calculation
- Initiation Timing Design
- Fragmentation Analysis
- Vibration Prediction
- Flyrock Risk Assessment
- Wall Control Design
- Blast Cost Modelling

Why Attend This Course:

- Deliver a Blast Design and Vibration Control Plan to the quarry manager, mine technical services lead and drilling contractor as a reference for the next blast series
- Decide which pattern, charge and delay layout best balances fragmentation, vibration limits and cost per tonne for each bench
- Prevent boulders, flyrock and vibration complaints that stop loading, damage walls and strain relations with neighbouring communities
- Share charge sheets, vibration prediction curves and audit checklists with junior engineers, shotfirers and contractor crews

Conclusion:

Back at work, the participant presents the Blast Design and Vibration Control Plan to the quarry manager, technical services lead and drilling contractor, who use it to set pattern dimensions, charge limits per delay and monitoring points for the next blasts. Production planners use its fragmentation and cost per tonne results to judge crusher feed and loading rates. After the first blast series, the unit should review measured vibration, fragmentation, wall condition and complaint records against the plan, then update it.

Frequently Asked Questions FAQ:

What should participants know before a drilling and blasting course for mining and quarrying?

Participants should already design, load or supervise bench blasts and be comfortable with basic geometry and spreadsheet calculations. Bringing anonymised drill plans, blast records or vibration monitor readings from their own site helps during the modelling build.

How does a drilling and blasting course for mining and quarrying differ from a course on explosives storage or mine planning?

It teaches how to design and fire a blast: patterns, charges, timing, fragmentation and vibration. Storage courses cover magazines and security, while planning courses cover pit design and schedules, so neither trains participants to build a blast design.

Why does a drilling and blasting course for mining and quarrying cover powder factor?

Powder factor links explosive energy to rock volume. Too low leaves boulders and hard toes, while too high wastes explosive and raises vibration, flyrock and overbreak, so engineers tune it against fragmentation and cost per tonne.

What do participants take back from the drilling and blasting course for mining and quarrying?

Participants take back a Blast Design and Vibration Control Plan, plus charge sheet templates, a scaled distance vibration prediction sheet, a blast audit checklist and a cost per tonne model adaptable to their own bench blasts.