

Formula 1

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Formula 2

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Formula 3

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Related Content

Title	Type	Slug
Emergency Response Planning for Blasting Incidents	lesson	blasting-emergency-response-planning
Blast Design Excel Template v4.2	resource	blast-design-excel-template
Drill Rig Maintenance Inspection Checklist	resource	drill-rig-maintenance-checklist
Rock Mass Rating (RMR) Field Survey Sheet	resource	rmr-field-survey-sheet
Drilling Energy Benchmarking Dashboard (Power BI)	resource	drilling-energy-dashboard

Detailed Explanation

Mine planning and scheduling constitute the strategic and tactical backbone of modern mining operations. Long-term planning (typically 5–20 years) focuses on pit design, reserve estimation, infrastructure development, and life-of-mine (LOM) sequencing using block models, Lerchs-Grossmann

(LG) pit optimization, and discounted cash flow analysis. Medium-term planning (1–5 years) refines production targets by orebody zonation, blending requirements, equipment fleet allocation, and maintenance windows—often employing pushback sequencing and NPV scheduling. Short-term scheduling (days to months) translates plans into executable work orders, incorporating real-time constraints such as equipment availability, grade control feedback, geotechnical stability, and shift logistics using mixed-integer programming (MIP), heuristic algorithms, or simulation-based optimization. Integration across time horizons is critical; misalignment between strategic reserves and tactical schedules can lead to grade deviation, cost overruns, or premature pit closure. Digital enablers—including GIS, 3D geological modeling (e.g., Leapfrog, Vulcan), and scheduling software (e.g., Deswik, MineSight, XPAC)—are now central to collaborative, data-driven planning cycles aligned with ESG (Environmental, Social, Governance) imperatives and digital twin initiatives.

Key Components

#	Component
1	Geological Resource Modeling
2	Pit Optimization & Pushback Design
3	Production Scheduling (Short/Medium/Long-Term)

Applications

#	Application
1	Life-of-Mine Financial Forecasting
2	Ore-Waste Blending and Grade Control
3	Equipment Fleet and Labor Resource Allocation

Related Concepts

#	Concept
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1	Reserve Estimation
2	Geostatistics
3	Digital Twin in Mining

Tags

mining engineering, operations optimization, resource management