

Why Good Mine Plans Still Fail: Understanding Operational Variability Beyond the Schedule

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ABSTRACT

Mine planning is commonly assessed through the quality of pit designs, production schedules and forecasted mining performance. Yet even technically robust plans frequently underperform during execution. While these deviations are often attributed to operational challenges, they are more commonly rooted in planning assumptions that fail to fully capture the variability of real mining environments.

Open pit mining operations are influenced by dynamic factors including equipment availability, haulage performance, weather conditions, material characteristics, geotechnical constraints and operational priorities. To support scheduling and forecasting, these variables are often simplified into fixed assumptions. Although necessary, this simplification can create a growing disconnect between planning expectations and operational reality, resulting in recurring production variances and reduced planning reliability.

This paper examines operational variability as an underutilised source of planning intelligence rather than merely a source of execution risk. Drawing from practical mine planning experience within a large scale open pit mining operation, the paper explores how systematic analysis of production reconciliation data can reveal weaknesses in planning assumptions, identify opportunities for schedule improvement and strengthen decision making processes within technical services teams. Particular attention is given to the interaction between scheduling assumptions, operational constraints and production outcomes.

The paper argues that production variance should not be viewed solely as a measure of operational performance, but as a feedback mechanism capable of improving future planning quality. By transforming operational variability into actionable planning knowledge, mining organisations can develop more resilient schedules, improve forecasting reliability and strengthen alignment between strategic objectives and field execution. Ultimately, the objective of mine planning is not simply to minimise variance, but to continuously improve the assumptions upon which planning decisions are made.