

Case Study

APEX optimizes the strategic, Life-of-Mine schedule for complex mining operations. It maximizes NPV considering mining tasks, resource consumption, and constraints.

**Faster Planning**

Evaluated 30 scenarios in four weeks.

**Maximize NPV**

Determined the optimal mill size and mineral inventory to maximize NPV.

**Minimize Risk**

Eliminated guesswork with a mathematically backed mine planning approach.

How an Innovative Methodology Transformed Strategic Decision-Making in a Greenfield Polymetallic Project.

THE CUSTOMER

A mining company undertaking an underground greenfield polymetallic project.

THE CHALLENGE

Traditionally, planning for underground mining operations has relied on manual and iterative processes. These processes typically involved established industry benchmarks, rough estimations, and extensive trial-and-error methods. Although these methods can be effective in some situations, they were inadequate for the customer's complex greenfield project, which lacked historical data and existing infrastructure to support critical decision making.

The customer's engineers needed to address multiple interconnected questions, such as:

- What is the optimal mill capacity?
- Which method of material movement—truck haulage, conveyor systems, or shafts—would be most effective?
- How should stopes be prioritized for extraction to maximize profitability?
- What is the optimal mineral inventory?

Without advanced analytical tools, reliably answering these questions was challenging. This complicated essential early-stage decisions, directly impacting the Life-of-Mine (LoM) plan and overall project financial viability.

THE SOLUTION

The client engaged Deswik to perform a strategic mine planning study using APEX, an advanced optimization tool specifically designed for underground mining. The goal was to develop an optimal LoM plan utilizing industrial mathematics.

Deswik consultants pioneered a novel, time-driven structured optimization approach, inspired by open-pit direct block scheduling principles. At the core of this methodology was APEX, which played a fundamental role in ranking ore tonnages from highest to lowest value while incorporating the time value of money to maximize Net Present Value (NPV).

The integration of APEX within this approach provided substantial advantages, including objective schedule validation, enhanced decision-making confidence, and a systematic framework for exploring multiple scenarios to identify optimal solutions.

The study evaluated 30 scheduling scenarios across four weeks, systematically analyzing combinations of five distinct mining inventories across six different mill throughput capacities (refer to Figure 1). Each scenario accounted for activity-specific costs per scheduling period, along with development constraints, mining rates, and operational limitations.

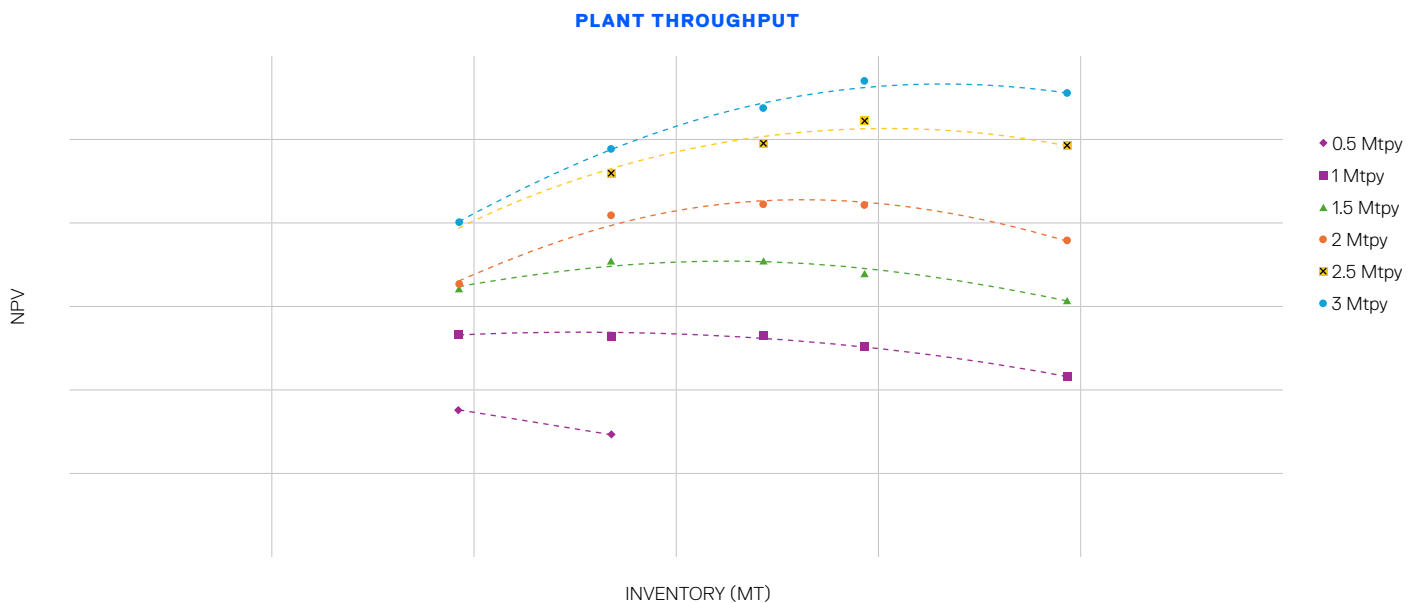


Figure 1. Results of evaluating the six different mill capacities

The Deswik team refined and validated these scenarios using traditional methods and Deswik.Sched, ensuring that mathematically optimized plans translated into real-world operational feasibility.

After analyzing the scenarios with trade-off curves, it was clear how variations in inventory influenced NPV under the constraints such as mill capacities, mining rates, and ore grades. Being able to determine the optimal mill throughput relative to investment requirements proved transformative for this greenfield project with clear, data-driven insights. APEX enabled quicker and more informed decisions to be made while reducing the risks associated with suboptimal choices.

THE BENEFITS

- **Maximized NPV:** Determined the optimal mill size and mineral inventory to achieve the highest financial returns
- **Faster Planning:** Reduced scenario processing time through rapid, mathematically validated scenario iterations.
- **Minimized Risk:** Data-driven decisions instead of relying on gut feel and manual guidance. Eliminated uncertainty with scenario testing and validation
- **Optimized Resources:** Prioritized high-value stopes, minimizing waste and costs.

“The Deswik team developed an innovative approach with APEX to find the best mineral inventory and mill size. I was impressed by how quickly they assessed different options and scenarios.” – Technical Services Manager



Learn how to optimize your underground strategic mine plans using Industrial Mathematics.

[SCHEDULE A DEMO](#)

