Hatch Mining Simulation: A modern mining concept

HATCH

Simulation in mining

Today, you face complex challenges. You need to evaluate mine layouts, develop predictive life-of-mine plans, and think through operational logistics. Large capital outlays are needed to bring mines into production—and keep them there. Processes for doing that vary significantly.

Simulation can help you find the answers. It provides an upfront method for validating and optimizing systems to achieve the outputs you need.

Our professionals have a world of experience serving both greenfield and brownfield sites. We have advanced technologies that improve mine planning and scheduling, ultimately shifting from steady-state to dynamic-rate assumptions.

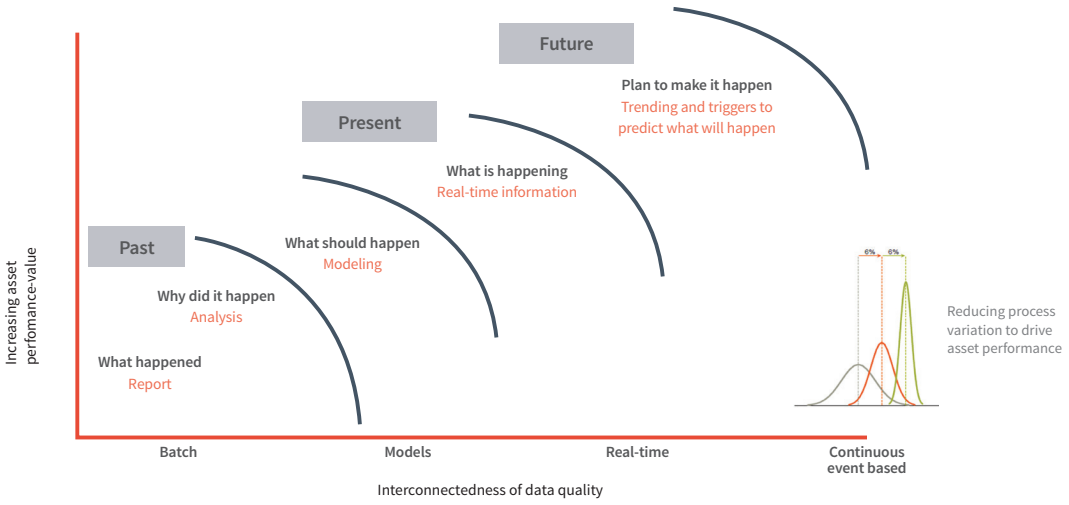
The right tool can make all the difference. The Hatch Mining Simulation (HMS) system helps accurately predict mine schedule and productive capacities.

HMS can be used to:

- Validate key assumptions in the mine plan, such as development and production rates
- Test alternative mining methods, operational methodologies, and applications
- Facilitate crew and equipment fleet sizing at various stages in the life of the mine
- Enable equipment evaluation and selection
- Identify system bottlenecks and provide alternatives
- Examine the entire system, from rock face to plant
- Ultimately feed the mine plan and schedules back to the mine planners and designers, and aid in CAPEX and OPEX calculations.

Vision for integrating data and simulation

High-quality, real-time data drives asset performance



Inherent variability is always a factor in predicting the productive capacity of the underground mine. The HMS tool uses the Arena commercial software package. This accurately models the proposed plan over the life of the mine to capture and understand the impact of:

- Task variability
- Equipment and crew availability
- Time-based constraints, such as drilling and blasting
- Shared resources and workfaces
- Throughput lower and upper limits
- Buffer zones like silos, passes, remucks, and stockpiles.

By capturing these realistic constraints, the HMS tool determines the following with statistical confidence:

- Development of advance rates
- Production tonnage rates
- Productivity factors.

Project experience

Mine operational support

Northern Canada

To identify underground bottlenecks and test options for boosting mining rates, this company turned to our mining productivity experts. The HMS tool identified crew, skills, and equipment constraints in operations. Ultimately, it tested options and found ways to bring about step changes in production. Once the preferred options were selected, we ran an ore-handling-infrastructure simulation from the material source to the surface, allowing for debottlenecking the systems. This produced a robust plan to achieve the target tonnages, a 26% increase over the current operation.

KGHM Victoria greenfield mine planning

Ontario, Canada

One of the challenges in greenfield mine planning is to determine whether the selected mining methods and development profiles can meet the required schedule. Using the HMS tool to validate the proposed mine plan and schedule, the project team determined the mine was not capable of sustaining the target tonnages. The model identified the major constraint, which was an insufficient amount of one type of equipment. By increasing the fleet, 23% more total hours were logged on that type of equipment, which alleviated the 200-tonne-per-day shortfall. The new equipment, which would be shared across the mine site, not only solved the problem but allowed a significant increase in the mining rate to be realized.

Glencore Raglan Mine brownfield expansion

Québec, Canada

To plan the new mine at the existing Raglan complex, the team relied heavily on the HMS tool. It tested the feasibility of the proposed mine plan and schedule, to help the proposed crew, shifts, and equipment-fleet confidently achieve the target tonnages. The tool effectively debottlenecked crews and shifts to conform to the cycle of the mine development and production, with up to a 32% improvement in development advance rates over the schedule.

Hatch helped Glencore achieve advance rate targets by avoiding a 32% shortfall at the Raglan Mine

The technology

Dynamic simulation is an effective way to mimic the kind of operations you might expect over the life of a mine.

The Hatch Mining Simulation model breaks down each mining method into individual steps with all the associated task times, crews, and equipment added. The series of tasks, constraints, and activities are then replicated over the life of the mine, factoring in possible variations in task times and the availability of equipment

Realistic constraints are added. Blasting times and crew shifts are defined. The whole mine schedule is adjusted again to reflect the new scenario each time a different method is applied to a mine development or a production profile.

HMS has been developed in Arena, a general-purpose dynamic simulation tool. Using an MS Excel interface, it can be easily tied to your existing mine plans for seamless data transfers.

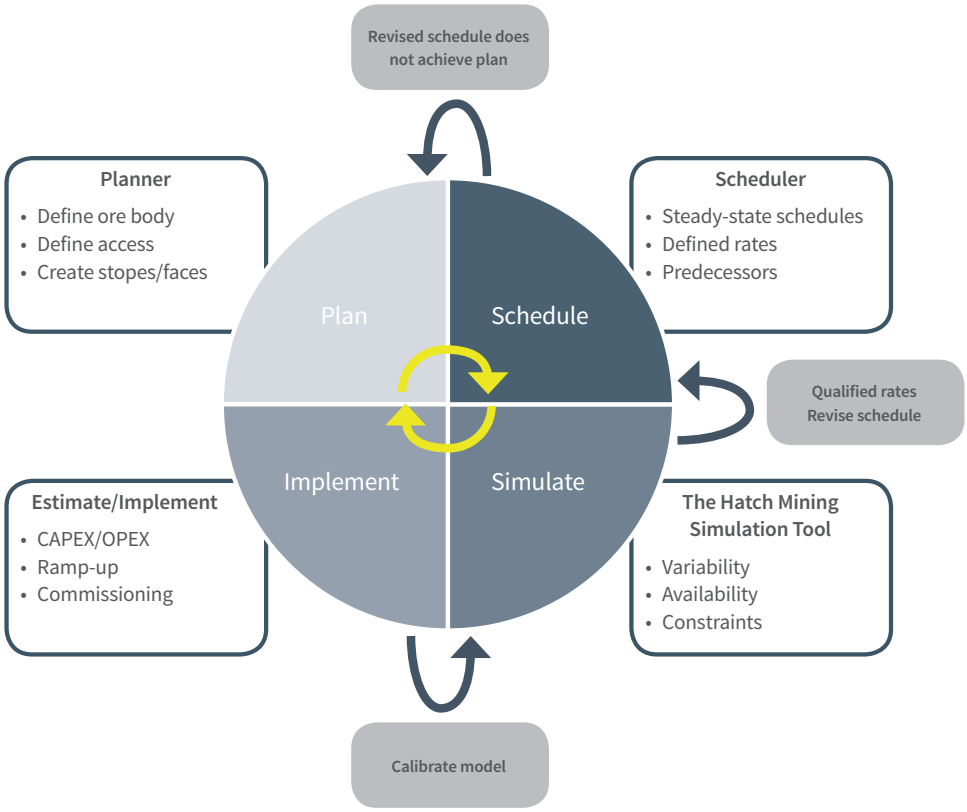
The team can complete big data analysis to generate understanding and meaning to underground bottlenecks and provide visibility and confidence in options to alleviate bottlenecks, reduce variability and unlock the mining entitlement.

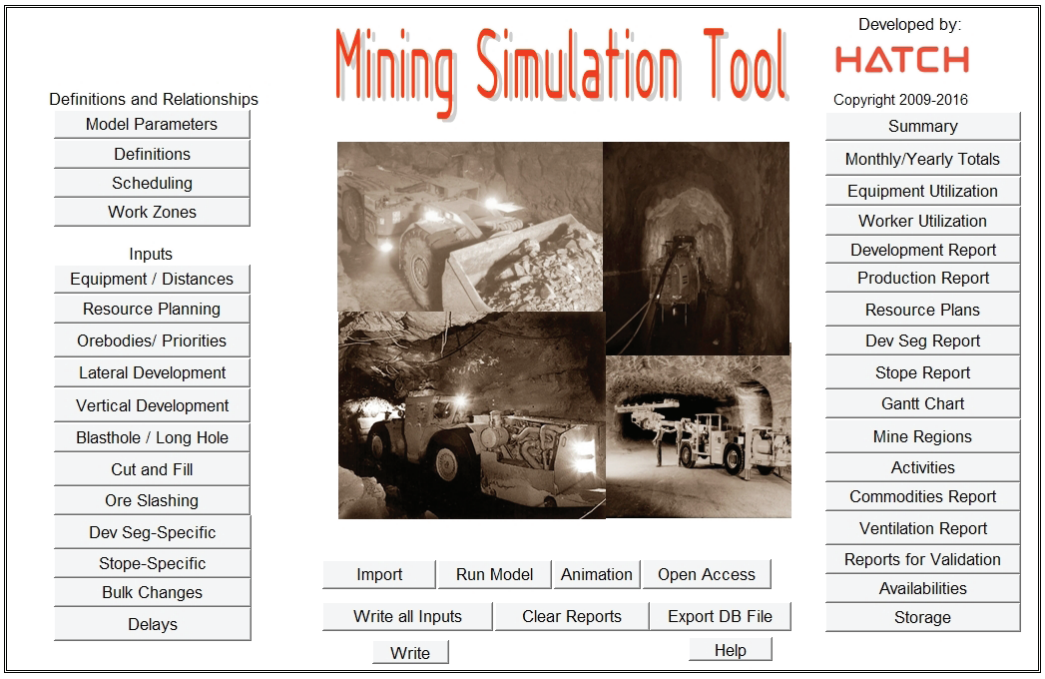
The approach

A successful mining business needs realistic mine plans, CAPEX, and OPEX for both greenfield and brownfield mine sites. The Hatch Mining Simulation tool can be incorporated into the mine planning process to do exactly that.

The tool offers links with other mine planning and scheduling softwares and facilitates transfers between the various systems. By making it a part of the overall approach, mine planners, schedulers, and simulation experts can work collaboratively. It's an iterative approach that offers seamless solutions.

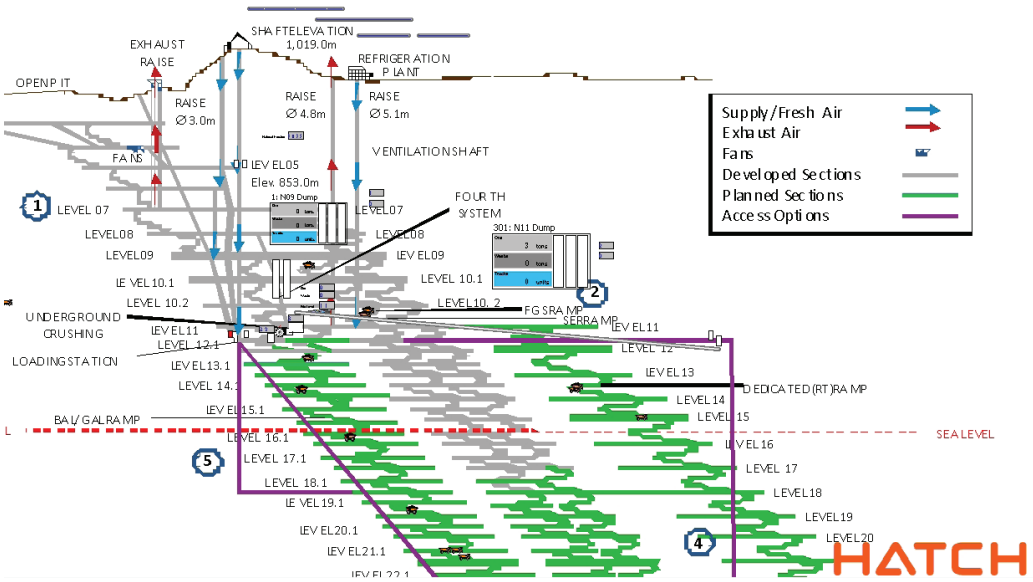
As part of the mine planning process, simulation lets you verify development and production rates, ultimately confirming that the schedule and mine plan are feasible before implementation. If they're not, the HMS tool points out the location of the bottlenecks, driving the required changes back to the initial plan prior to implementation.





Hatch Mining Simulation tool screenshot showing the interface and some of the key features.

Underground mine trade-off study – dynamic simulation



Once mining rates are established, they feed realistic tonnages into complex logistics models to confirm the end-to-end picture

About Hatch

Whatever our clients envision, our engineers can design and build. With over six decades of business and technical experience in the mining, energy, and infrastructure sectors, we know your business and understand that your challenges are changing rapidly.

We respond quickly with solutions that are smarter, more efficient, and innovative. We draw upon our 9,000 staff with experience in over 150 countries to challenge the status quo and create positive change for our clients, our employees, and the communities we serve.

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