



FIVE KEY STEPS TO OPTIMIZE YOUR SHORT TO MID-TERM TACTICAL MINE PLANS & PRODUCTION SCHEDULES

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ADOPTING ADVANCED SCHEDULING TOOLS

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INTRODUCTION

The traditional way to develop a mine is to maintain a laser-like focus on long-range production planning aimed at maximizing the value of an ore deposit over the life of the mine. However, the medium- and short-term production schedules required to turn that long-term plan into reality are arguably even more important.

Shorter-term production schedules must be agile enough to respond to a mine's day-to-day challenges while still aligning with the long-term Net Present Value target. For most mines, that requires the ability to address:

- ongoing data validation, accuracy, and availability issues
- dynamic operational changes, such as equipment breakdowns
- unexpected geotechnical events or personnel shortages
- conflicting cross-discipline objectives
- stakeholder communication challenges, and
- inherent unreliability in forecasting and planning for operating expenditures and revenues over the life of the mine.

The combination of Dassault Systèmes' **3DEXPERIENCE®** platform and the GEOVIA brand Tactical Mine Planning solution will help you optimize your mine plans and production schedules through five key steps:

1. Controlling your scheduling data
2. Adopting advanced scheduling tools
3. Switching to 4D simulation
4. De-bottlenecking your communications
5. Updating your financial model faster

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CONTROLLING YOUR SCHEDULING DATA

A production schedule requires hundreds if not thousands of inputs. The first challenge planning engineers face is how to manage, collect, collate, and update all pertinent data, including:

- scheduling parameters, such as production rates, capacities, and mill targets, and
- operational changes, such as equipment availability and grade control data.

Traditional manual data management methods, especially for large amounts of data, tend to be slow, increasing the risk that:

- data and assumptions may already be out of date by the time a production schedule is developed, and
- the production schedule may not be accurate or effective — a tiny decrease in tonnage, for example, would have a cascading effect on other inputs.

Moving scheduling data onto Dassault Systèmes' **3DEXPERIENCE®** platform enables mine planners to store, analyze, interpret, and use their data far more quickly than using traditional manual processes. This platform also provides greater security, with data being monitored 24/7, and ensures the latest data becomes the single source of truth, reducing the risk of using outdated or inaccurate data.

It also ensures the latest data becomes the **single source of truth**.



HOW THE 3DEXPERIENCE PLATFORM WORKS

The **3DEXPERIENCE®** platform provides a central repository where engineers can store production data along with any other pertinent data sources, structured or unstructured and in any format. This enables the creation of a unified data model, a comprehensive representation of all relevant data, that ensures:

- one data source will always speak to another so the mine has access to the entire data narrative, leading to better decision making
- all relevant data will be analyzed and considered, eliminating data silos and increasing data insights, and
- all data visualizations are available to the entire site.

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ADOPTING ADVANCED SCHEDULING TOOLS

Planning engineers are expected to understand the relationships between all the inputs and outputs at a mining operation. However, while they might intuitively understand the downstream effects of, say, increasing the production rate or raising the bench height, the nature of mining operations is often so complex it's difficult to predict what effect an increase in rate or height may actually have.

To develop the optimum production schedule, engineers must be able to create a model that allows them to change material movement inputs repeatedly and examine how each change affects the end results from pit to crusher.

GEOVIA Tactical Mine Planning creates tactical mine plans for surface, underground, and cave mines that ensure their strategic mine plans meet their life-of-mine goals.

Central to GEOVIA Tactical Mine Planning is an advanced scheduling tool that empowers engineers with the ability to produce virtually unlimited iterations of a production schedule. This tool, which uses heuristic blending algorithms, allows engineers to make changes, analyze the effects on material movements, and repeat the process. Comparing these iterations provides valuable insights into subtle but important changes, making the engineers feel capable and in control.



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SWITCHING TO 4D SIMULATION

Once a planning engineer has created two or three potential production schedules, the challenge becomes deciding which one will be resilient enough to cope with unexpected operational changes.

3D simulations have been used for years to create models that guide the mining sequence toward a target, such as the desired grade or stripping ratio. However, these models may not reflect other important mine-planning outcomes, such as stockpile balances, haulage resource allocations, or costs and revenues.

By linking a time schedule to outcomes, 4D (3D plus time) simulation enables planning engineers to expedite comparisons between thousands of potential “what if?” scheduling scenarios until they arrive at a robust schedule that’s optimized not only for material targets but also for external factors, including risks such as equipment breakdown or changes to grade-control requirements.

The result is a schedule that reduces operational variability and ensures higher compliance to the long-term plan, leading to reduced unit costs and wastage. This use of 4D simulation in GEOVIA Tactical Mine Planning instills a sense of confidence in the robustness of the chosen schedule, making the audience feel secure.

HOW 4D SIMULATION IMPROVES SCHEDULING

The 4D simulation tools available in GEOVIA Tactical Mine Planning gives planners more control than they have ever had before. For example, they can:

- define what “optimum” scheduling means
- “visualize” the true relationships between inputs and outputs, and compare them based on their own measurement of risk
- employ Short Interval Control (Short Term Plan with 7 days of 24hourintervals) to identify performance improvements, and
- collect and present the evidence they need to justify their choice of the “optimum” mine plan.

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DE-BOTTLENECKING YOUR COMMUNICATIONS

The ultimate goal of a production schedule is to answer the question, “Which blocks do I mine, and when?”

Some teams will require that answer in spreadsheet form, while others will need graphs or graphical plots. As a result, planning engineers must be able to:

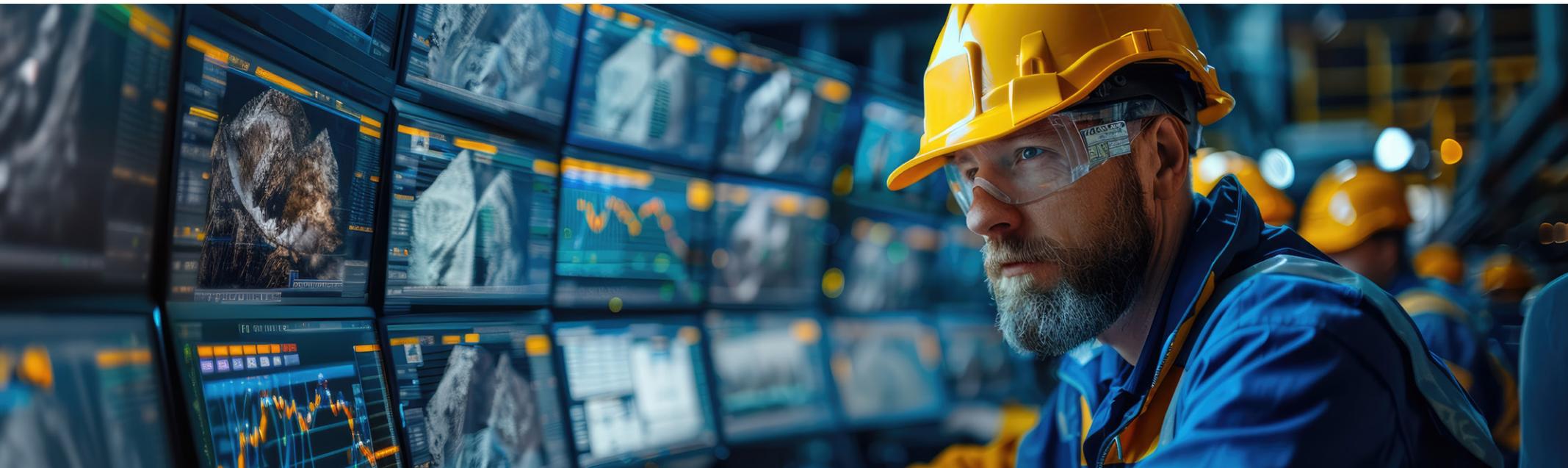
- translate the schedule easily and accurately into a variety of formats, and
- communicate it — in real-time when necessary — in the appropriate format for each audience.

Dassault Systèmes’ **3DEXPERIENCE®** platform ensures publishing a production schedule does not become a bottleneck in the planning

process, while also fosters seamless cross-discipline collaboration.

Planning engineers can define who receives specific information and what level of detail required for each stakeholder, ensuring the right information reached the right people, including:

- practical dig plans for production supervisors to deliver to production operators
- grade and material data required by process plant teams
- graphs and charts showing the period-by-period volume, tonnes, and grades of material movements for mine engineers, and
- high-level reports for mine management and corporate stakeholders.



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UPDATING YOUR FINANCIAL MODEL FASTER

Once the final production schedule is set and the mining sequence is defined, it's time for the planning engineer to prepare the financial model. This model will typically show the selected mining sequence in terms of its economic value, on a period-by-period basis, to both:

- KPIs derived from the production sequence, such as tonnes and grades, and
- cost and revenue.

However, mining is not a predictable process and information and assumptions can change frequently. That means planning engineers must be able to generate rapid updates to schedules and models whenever they need to, preferably without having to make manual adjustments to Gantt charts or spreadsheets.

On the **3DEXPERIENCE®** platform, when planners receive new data relevant to the financial model, they can validate that data, generate an up-to-date financial model (without losing the old one to ensure traceability and auditability), and share it with designated stakeholders — **all within a matter of minutes.**

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By its very nature, a long-term strategic mine plan can be affected by a variety of internal and external forces, including new findings about the orebody, technical advancements, and changes in the economy or market.

Production schedules must be able to provide calculated, short- to medium-term responses to these forces, in order to help the mine continue to meet the overall goals of its long-term mine plan.

GEOVIA Tactical Mine Planning helps mining companies produce robust, reliable, and updatable shorter-term production schedules that meet capacity and material quality targets and other important mine-planning outcomes, such as costs and revenues.

To learn more, contact GEOVIA.info@3ds.com.



Our 3DEXPERIENCE® platform powers our brand applications, serving 12 industries, and provides a rich portfolio of industry solution experiences.

Dassault Systèmes is a catalyst for human progress. We provide business and people with collaborative virtual environments to imagine sustainable innovations. By creating virtual twin experiences of the real world with our 3DEXPERIENCE platform and applications, our customers can redefine the creation, production and life-cycle-management processes of their offer and thus have a meaningful impact to make the world more sustainable. The beauty of the Experience Economy is that it is a human-centered economy for the benefit of all – consumers, patients and citizens.

Dassault Systèmes brings value to more than 300,000 customers of all sizes, in all industries, in more than 150 countries. For more information, visit www.3ds.com.



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