Case Study

Mine to Market Value Chain

DESWIK BOLT

Value chain optimization software to increase profit, reduce costs and maximize efficiency.

Automation

Converted days of manual planning to minutes.

Accessibility

Reporting available to a broader audience of stakeholders.

Compliance

Significant improvements to plan adherence.

How BOLT helped one of the world's largest coal mines to automate their manual planning processes.

THE CUSTOMER

The customer operates a large coal mine in Australia that produces coking coal and assembles multiple products on site before railing to port.

THE CHALLENGE

The customer was constrained by their unique mine operation, which requires that products produced by the plant each day be on-spec due to stockpile limitations. Unlike other mining operations, which allow product to be blended to specification further down the supply chain, this mine requires on-spec product ready to be loaded at the train load out.

Based on the product specifications, the customer required an automated solution that would prescribe the best set point for the CHPP and produce a precise plan to tell the trucking fleet how much each feed source is required.

The CHPP at this mine site used a wash matrix, meaning that one block could be washed at several different set points. A typical CHPP might have 3-5 points, but this one had 15+ options.

Additionally, the customer was attempting to solve this complex mining and production problem with a manual spreadsheet-based solution. The incumbent spreadsheet system relied heavily on domain knowledge, was error-prone, and time-consuming.

THE SOLUTION

BOLT, Deswik's supply chain optimization software, was deployed to automate the customer's daily material movements and processing decisions. BOLT produced detailed plans for the trucking fleet to ensure the proper coal grade ratios were delivered daily to the CHPP. With this project, the team demonstrated BOLT's breadth of modeling, extending from the flow of materials to vehicle availability and scheduling.

Key Insights

BOLT Model

BOLT modeled site attributes to create representative relationships among the site's everchanging system, constraints, and rules. Focusing on the ash yield curve, prior to BOLT, the previous spreadsheet-based system did not represent the exact characteristics of how a yield curve trade-off normally operates. BOLT was able to fine-tune these interpolation processes and provide a solution that eliminated the opportunity to introduce system-based errors.

BOLT also improved our customer's planning processes by expanding access to information. Visualizations were created and simplified; new charts, more readable graphs, and frameworks for importing files and running calculations to fill in the gaps. The system now enables those not versed in technical spreadsheet-based reporting to read reports and draw conclusions.

Dealing with system constraints:

The Industrial Mathematics team focused on modeling the system constraints to provide the customer with the most practical solution.

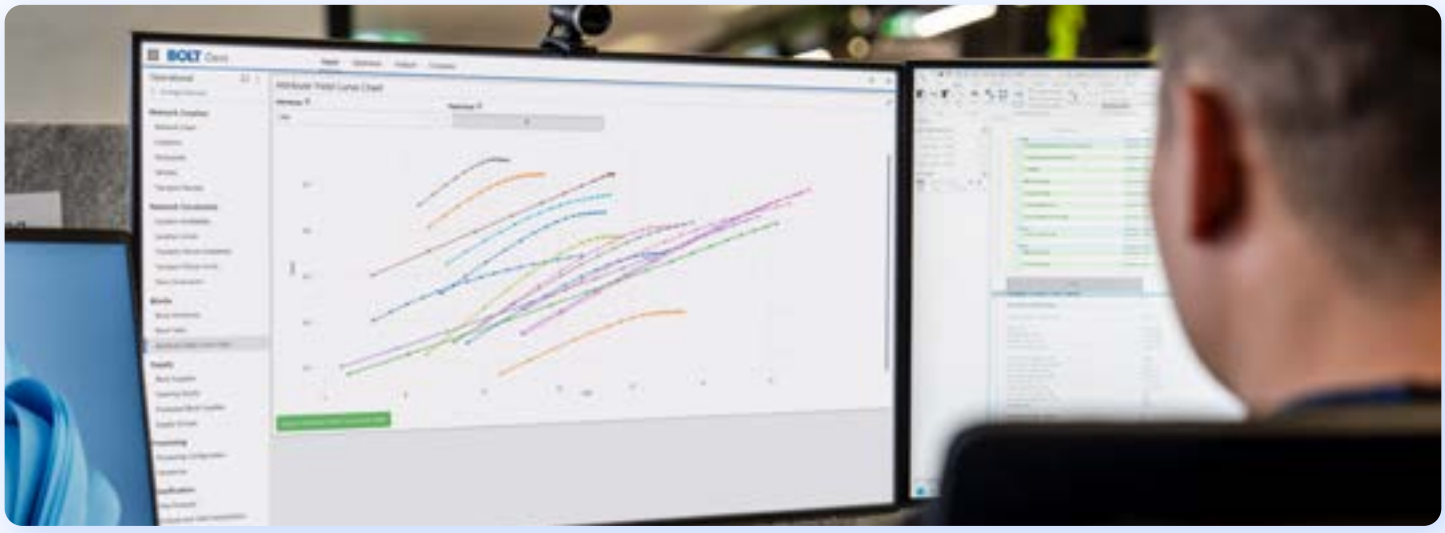
- **On-site assembly:** BOLT was constrained to blending a single on-spec product from the plant each day.
- **Set points:** Ash yield curves were modelled as a set-point matrix. BOLT selected the best set point to wash at each day. The planning process had to account for on-spec products to be made with one daily operating model for the plant.
- **Wash campaigns:** BOLT was incentivized to produce longer wash campaigns to minimise product switches to increase efficiency.
- **Loader operators:** BOLT ensures loaders have simple, repeatable instructions on what material to feed the plant.

BOLT Modelling Outcomes

BOLT's operational and tactical capabilities were used to forecast planning processes daily for 3 months into the future and weekly for 16 months into the future. We configured the Operational and Tactical modules, solving the same problem.

One major limitation of the customer's spreadsheet planning method was forecasting haulage requirements. BOLT provided a diagnostic chart showing how many tonnes should be moved and where. BOLT factored in truck cycle times with future mining supply to forecast future truck requirements.

BOLT factored in the customer's product stockpile size and incentivized as much flexibility in stockpiling as possible, accommodating changing mine plans and products. The model also informs the customer when to rotate from production of one product to another.



Customer Adoption

The planning team ran scenarios throughout the process, allowing for a prompt validation of the planning process and a swift deployment on-site. By using BOLT, the planning process was ten times faster than the customer's previous system. This time reduction benefitted the customer by allowing planners to run scenarios to analyze how planning decisions impact the system. Scenarios enable the planners to tweak the plan to see if they improve system throughput. By the end of the project, the customer had a centralized planning tool that could produce optimal schedules three months into the future at the click of a button.

10x

faster than the previous method

THE BENEFITS

- **Digitalization:** The customer now operates a cloud-based planning system, replacing the previous spreadsheet-based planning, allowing users to verify that the processes and inputs are correct.
- **Constraint-based planning:** The model acknowledges the system constraints, what is possible, what isn't and where there is flexibility and develops plans accordingly.
- **Accessibility:** The system is now accessible to those not versed in technical spreadsheet-based reporting to access reports and draw conclusions.
- **Executive dashboard:** The executive dashboard provides a high-level snapshot of forecasted expectations over the following months.
- **Strategic insight:** The model allows seamless optimizations 16 months into the future.
- **Time reallocation:** BOLT produces plans 10x faster than the previous method, which allows the planning team to use their time to test strategic scenarios to refine their plans further.

DESWIK
BOLT

Learn how to maximize supply chain efficiencies with the power of industrial mathematics.

SCHEDULE A DEMO

DECISION SUPPORT

BOLT helped to answer business critical questions such as:

- How many trucks are needed in the fleet to match future production?
- What material should be fed to the plant?
- At which set point should the plant operate?
- When should product changes occur?
- Does the mine schedule provide enough material to keep the plant operating?