BENGALLA

CASE STUDY

Maximising profit by automating and optimising coal supply chain systems

BOLT
by Polymathian

The Customer

The Bengalla Mining Company is a joint venture ownership with Wesfarmers, New Hope Group, Mitsui and Taipower. It operates an open cut coal mine, using a dragline, truck and excavator method for extraction.

After being washed and prepared for sale, the coal is loaded onto trains for transportation 130km to the port of Newcastle where it is shipped to international customers. The Bengalla mine is approved for an extraction limit of fifteen million tonnes per year of run of mine coal.

Business Function
Coal supply chain

Planning Function
Strategic and tactical

Product
BOLT - bolt.polymathian.com

BOLT was able to automate and optimise Bengalla's planning processes, as a result it has improved profit margins by 10%.

The Problem

The planning team are required to produce a six month, twelve month Annual Operating Plan (AOP) and a five year marketing strategy plan every year. These plans cover the entire supply chain from the lip of the pit to the port for eleven million tonnes of coal per year. For each plan, the team had to consider:

- Mine Plan (what will be mined, when, tonnes and qualities)
- Wash Decisions (configuration, qualities and output tonnes of processed coal)
- Bypass (identifying opportunities to sell coal without processing)
- Maintenance (down time and reduced operating capacity of parts of the network)
- Stockpiling (how much of which coals to store for how long)
- Vessel schedules (ETA and demurrage)

- How to best sell uncommitted coal into the market
- Contract quality constraints and bonus/penalties
- Blending (how much of each coal should be loaded onto which vessel)

Previously, the planning team were generating each plan manually out of Excel spreadsheets, often taking a week to produce a single plan. When modelled as a mathematical program, a problem of this nature has millions of variables which all need to be simultaneously solved.

Given the large complexity of trying to optimise and operate the supply chain, it was near impossible for a human to produce the optimal plan manually within a useful amount of time. For example it was difficult to finely control the blending specifications of coal to meet the contracted demand, regardless of

opportunities to improve margins by bypassing more coal.

Furthermore, if the team were interested in investigating multiple scenarios or if they were forced to update information or respond to disruptions, it meant they had to spend hours or days to rework the plan.

Manual planning processes making it time consuming and error prone

No guarantee of optimality with manually generated plans

Knowledge and expertise only held with a few key team members

The Solution

Polymathian deployed BOLT, a cloud based supply chain optimisation decision support tool, to automate, optimise and centralise the planning process. This tool successfully replaced the countless spreadsheets and manual planning processes that once plagued the planning team. Polymathian configured BOLT for Bengalla's supply chain, encompassing the network from the lip of the pit to the port. It is able to solve Bengalla's planning problem in a matter of minutes which allows the planners to run many different scenarios to ensure the mine is operating as profitably as possible. This prompt solve time also affords the luxury of being able to respond immediately to unplanned disruptions without compromising the solution. Specifically, BOLT was able to help Bengalla by:

- blending the mine's resources to meet contract specifications, avoid penalties and take advantage of bonuses
- sell uncommitted coal into the market most profitably (better aligning supply with demand)
- choosing how coals should be processed, determining their qualities and yields
- increasing total production tonnes by identifying bypass opportunities and blending this coal into demands
- blending parcels of high sulphur coal into cargoes that previously would not have been considered, leading to improved coal turn over times and reduced stockout occurrences

The Benefits

BOLT was able to increase profit margins for Bengalla by 10%, by managing the network and resources more intelligently. BOLT also drastically improved planning processes with the latest in Polymathian's secure cloud services.

Utilising a robust user access permission system, data custodians are now able to directly contribute to the planning process by uploading their data directly as it is made available. Multiple planners can now produce plans in parallel (six months, twelve months, five years) while all ensuring they are working with the same information. The planners are able to easily disseminate the finalised plans to the relevant stakeholders through charts, reports and published BOLT scenarios which other users are able to view.

BOLT is also the only product on the market that is capable of solving the entire supply chain simultaneously.

10%
improved profit margins

Automated planning processes from hours to a few minutes
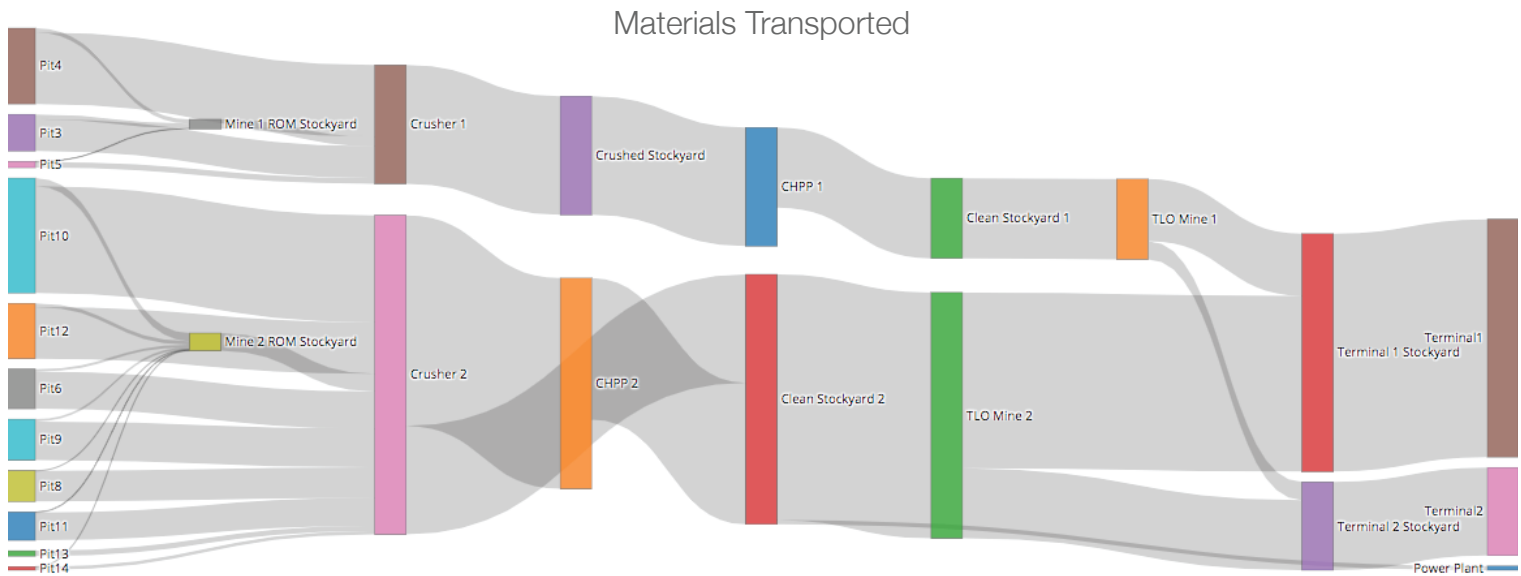
Improved supply chain efficiency with guaranteed optimality

Materials Transported

Figure 1. Sample sankey diagram of material transported through the supply chain.

Design to delivery: 13 weeks

Scoping	Configuration	Implementation	Training
1 week	4 weeks	6 weeks	2 weeks