

CASE STUDY

Determining Optimal Production Capacity by Modelling the Greater Coal Network

RACE

Participant
Producer

Module
Planning

The Customer

The customer is a coal mining company which operates a mining complex in central Queensland.

The Challenges

The client was in the process of increasing their product output through a series of de-bottlenecking exercises for their underground operations. They were also planning upgrades to increase the capacity of their coal handling preparation plant (CHPP) and the efficiency of their train load-out (TLO).

The client's mines operate within a system where multiple producers share rail infrastructure and depend on the same haulage providers to transport coal from their TLOs to export terminals. Before investing heavily in infrastructure improvements, the client needed to be certain that the greater network would be able to handle expected increases in output.

Verifying the network's ability to handle increased output would require an in-depth understanding of their operations as well as external factors that could affect their ability to fulfil future contractual obligations. Any useful analysis would need to consider rail network and operator constraints, other producers in the system and export terminals at port.

About RACE

RACE is Polymathian's proprietary value chain optimisation tool designed to solve a range of complex rail-based value chain planning and scheduling problems.



The Value



Visibility

Accurate picture of present system capacity



Planning

Mathematically reliable estimates of future system capacities



ROI

Value of upgrades is demonstrated before CAPEX





The Solution

Polymathian used publicly available data, industry information, and the customer's extensive experience to model the complex system using RACE, our proprietary decision support tool for rail-based supply chains.

Multiple scenarios, such as different TLO configurations and impact of external factors, were then tested within this simulated system revealing the changes and upgrades that would pay off in the real world. By the end of the six-week project, a year's worth of cloud computation time had been used to analyse the client's operations under many alternative scenarios.

The Benefits

Reliable insights

Educated guesses and industry estimates have been quantified and verified using data-driven analysis.

Full system overview

The client has mathematically accurate insight into current and future capacities and constraints for their operations.

Strategic planning

The client can now identify which operational improvements will result in the highest long-term value.

Improved service levels

Contracts can consider the opportunities and limitations of the wider network for more reliable order fulfilment.

Decision support

- What TLO system is required to achieve target production volumes to maximise profits and ensure delivery on customer contracts?
- Given system capacity constraints, how can ROI be achieved if a second TLO is built?
- Which upgrades will reduce bottlenecks and achieve desired throughput?
- How will TLO performance be affected if network throughput ramps up?
- What are the optimal train load-out configurations, loop arrangements and recharge times?