

CASE STUDY

Taking the guesswork out of vessel routing with simulation-based scenarios

SOLO

Type
Vessels

Module
Simulation

The Client

Our client is a Tier-1 mining company with multiple mines and refineries operating around the globe. This project was for their Australian operation that mines, transports and refines bauxite, used in the production of aluminium.

The Challenge

The client manages a global supply chain which transports bauxite via vessel between domestic locations and from Australia to international customers. Every day, routes have to be assigned to approximately 50 vessels of different sizes to manage stock levels at domestic mines and refineries. Routes also have to take into account contractual requirements from individual customers.

Route allocation is complex and getting it wrong is costly. Over-allocation can result in queuing of vessels and demurrage fees. Under-allocation could cause delivery delays to a refinery amounting to millions in lost productivity.

The goal was to deliver a simulation tool configured to the client's specific planning challenges allowing scenario testing to determine better vessel and port operating methodologies.

About SOLO

SOLO is an online optimisation decision support toolkit that uses industrial mathematics to increase throughput, minimise demurrage, reduce pilot fatigue and assess network capacity.



The Benefits



Digital Twin

Powerful scenario planning capability



Data Driven

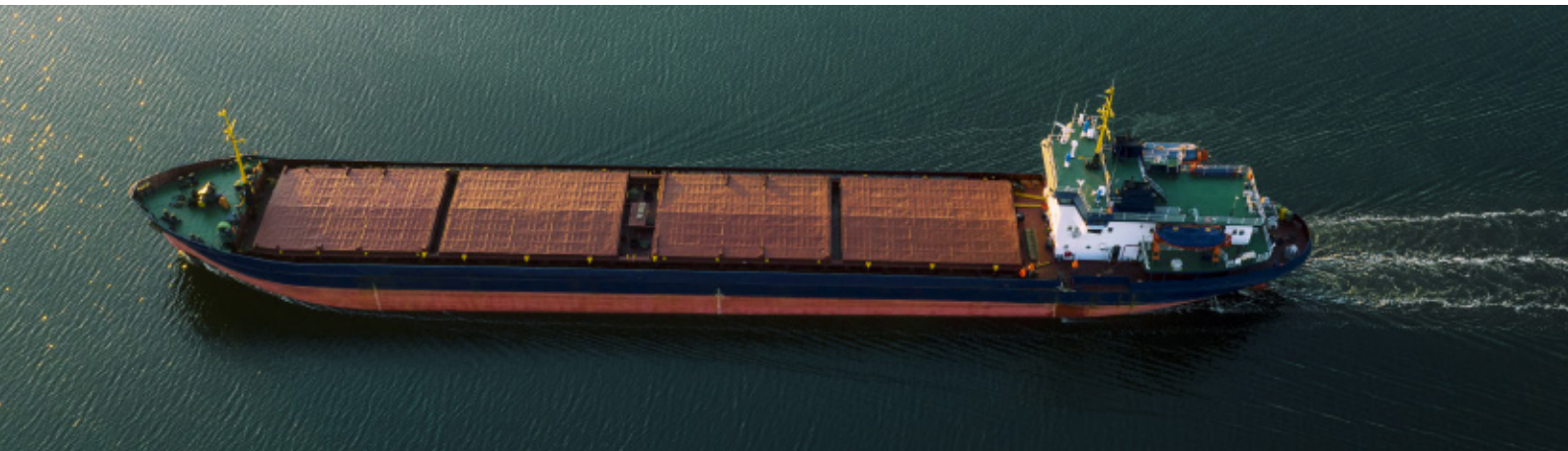
Easily collaborate and update system data



Rapid Delivery

Production ready in 3 months





The Solution

Before Polymathian, the client relied on historical data and hypotheses to make scheduling and allocation decisions. The only way to test these hypotheses was to apply them to the actual supply chain. In operations of this size, even a one percent reduction in throughput can result in a loss of millions of dollars, making this a risky (and costly) experiment.

The client commissioned Polymathian to deploy a material movement and vessel routing simulation tool. A digital twin of the customer operations was created to help the customer better understand how parts of the supply chain affect each other and identify ways to boost productivity.

The tool would allow the client to compare different scenarios as well as run replications of the same scenario, changing variables such as the size of vessels, costs and stockpile constraints. The efficacy of each scenario was based on how well it fulfilled the client's KPIs.

The Result

In less than three months, Polymathian had deployed their SOLO product - a web-based, user-friendly simulation tool that addressed the client's specific planning challenges. During this time, Polymathian worked closely with the client and spent the final week training users in its application. This allowed for a full handover of the tool with no further reliance on Polymathian to run simulations and find the best operating methodologies.

The Benefits

With full ownership of and control over their simulation tool, the client is now able to run as many scenarios as they like to optimise vessel routing between ports and stock levels at the mines, ports and refineries. Recently, when a major disruption occurred in the mines, the client ran numerous simulations and quickly gained insight on the impact the event would have downstream and on the system throughput.

Decision Support

- How will a reduction in vessel numbers or vessel tour time impact throughput?
- What are the advantages of using a voyage charter vessel instead of a time charter vessel?
- What changes can we make to resolve bottlenecks in the supply chain?
- What are the optimal vessels sizes and routes to meet cost and delivery KPIs?
- How will disruptions such as port shutdowns or maintenance timings impact throughput?
- If we could decrease average loading time what impact would that have on stockpiles and profitability?