

Case Study



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



Increased Profit

44% increase in direct loading



Dynamic Planning

Rapidly replan in minutes for maximized margin



Optimized Decision Making

Find the optimal answer to business-critical questions

Optimizing Complex Supply Chain Decisions For An Iron Ore Producer

THE CUSTOMER

The customer is an established miner producing direct shipping iron ore for the international market, with shipments in the tens of millions of tonnes per annum.

THE CHALLENGES

Every day the customer's planning team must determine how to best use the current stockpiles and future production outlook to meet their upcoming market demand. With stockpiling, processing, transportation, blending, product assembly, and vessel loading decisions to be made across their supply chain to deliver the correct iron ore lump and fines grade to customers.

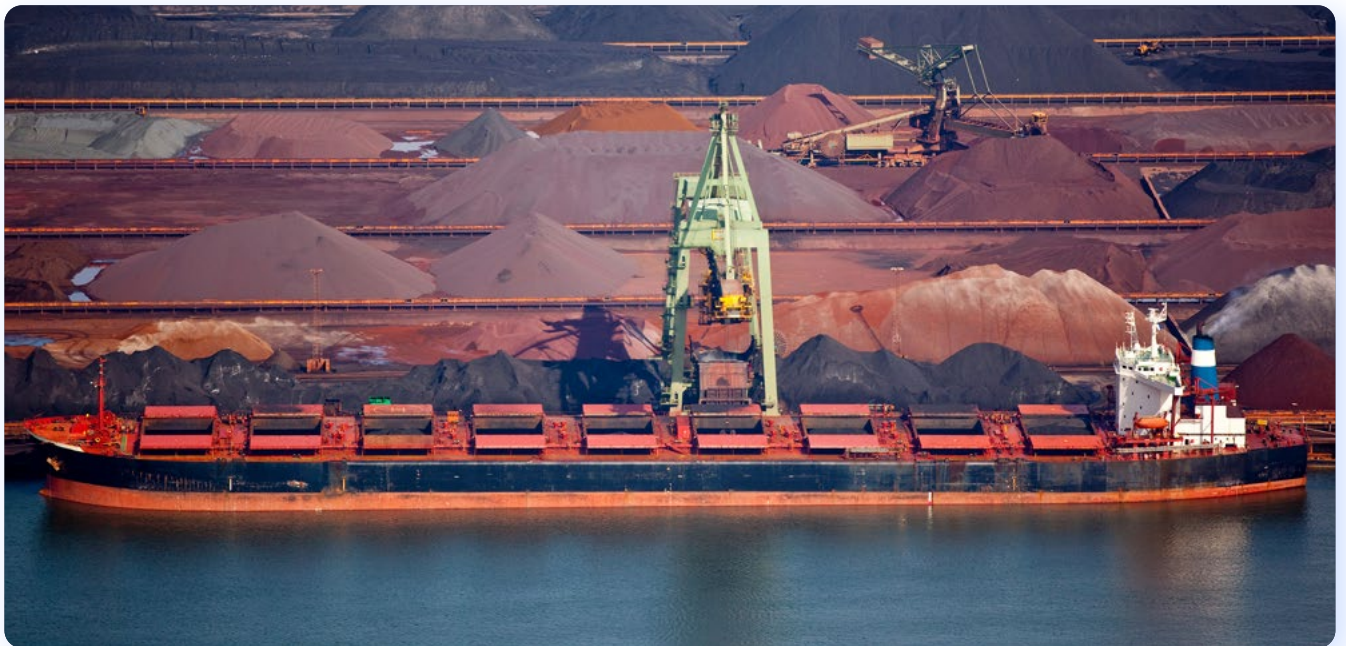
- **Complex stockpiling and blending requirements:** The operation has multiple ore source locations, resulting in the extraction of non-homogenous resources that require controlled blending to ensure product quality and consistency. Complex stockpiling operations are required at both the mine and the port. This presents a challenge to the operation as stockpiles must be accurately blended to meet the required quality for shipment. These decisions are crucial to the operation to ensure the timely delivery of on-specification product onto the vessels.
- **Inefficient planning and scheduling:** One of the key constraints in the supply chain is the efficient use of a multi-user rail network. Detailed train schedules must be created and forecasted two weeks in advance to be managed by a third-party rail haulage provider. The complicated nature of preparing stocks for timely rail transport makes the supply chain vulnerable to inefficiencies. One area identified for improvement was the direct loading of vessels. Direct loading involves linking the port in-load and out-load streams so material travels from a train directly to a ship. It relies on multiple aspects of the supply chain working seamlessly together to have the right material delivered to the port at the right time.

Without a sophisticated decision support system, planning for direct loading can be challenging, and valuable opportunities for enhancing supply chain efficiencies could be missed.

- **Siloed, inflexible planning system:** Previously, the customer coordinated its supply chain via multiple Excel spreadsheets, with separate workbooks for mine and production planning, rail planning and port planning. This siloed planning process caused a lack of visibility across the supply chain, resulting in potential loss of value.

Due to the nature of the operation, plans required revisions every day or two, depending on changes to the supply chain, such as variations in the order of vessels arriving at port. The incumbent process was inflexible and time-consuming to update, making it difficult to incorporate changes into existing plans. This meant that opportunities could not easily be exploited, and setbacks could not easily be planned around. For example, a disruption in the supply chain could lead to large stockpiles remaining at the mine, a potentially costly situation for the operation.

Furthermore, using the incumbent process, planners only had time to produce a single plan per day, with no way of knowing if the plan was optimal.



THE SOLUTION

BOLT, a supply chain optimization software, was deployed to provide decision support and modelling around key supply chain factors. These included processing, stockpiling, blending, material drying time, port in-loading and out-loading, and vessel scheduling. Additionally, BOLT provides insight into where value can be gained in a supply chain while honoring the complex financial costs and revenue models of the operation.

Two BOLT modules were deployed – Operational and Tactical, providing decision support on a modeling and weekly level respectively. Tactical planning ensures value destroying short term focused decisions are avoided and operational planning responds to the current system state.



OPTIMIZED BLENDING AND STOCKPILING

By utilizing BOLT's mathematical optimization algorithms, planners can now meet the complicated blending requirements and detailed stockpiling targets for the mine and port. After the BOLT implementation, blends are now significantly closer to product specification than they were when using the incumbent process. This has enabled the customer to produce plans that consider the required contracted tonnes without compromising on giving away too much high-grade material. BOLT also intelligently makes trade-off decisions with the offtake of stockpiles to maximize direct loading opportunities.

ENHANCED PLANNING AND SCHEDULING RESULTING IN IMPROVED DIRECT LOADING

BOLT ensured that the right material was available for rail transport to the port, substantially improving direct loading opportunities for the operation. With improved direct loading, dependence on port infrastructure is reduced, as the requirement to stockpile product at the port is minimized. Furthermore, improved direct loading increased ore tonnes to be more efficiently loaded onto vessels and sold, therefore maximizing profits. Using BOLT, the customer was able to increase direct loading opportunities by 44%.

ELIMINATING SILOS WITH INTEGRATED PLANNING

With the implementation of BOLT, all supply chain information is now available in a single interface. Separate, siloed plans for mine, port and rail planning are now integrated.

“While the incumbent process was time-consuming and unwieldy, BOLT's dynamic planning capabilities allow users to adapt rapidly when changes occur within the supply chain.”

While the incumbent process was time-consuming and unwieldy, BOLT's dynamic planning capabilities allow users to adapt rapidly when changes occur within the supply chain. Data can be modified, and new plans created within ten minutes, enabling the operation to quickly react and adapt to changing situations. Additionally, ‘What if?’ scenarios can be developed to better understand the impact of potential setbacks on the supply chain and to identify opportunities to leverage contract bonuses or avoid penalties.

THE BENEFITS

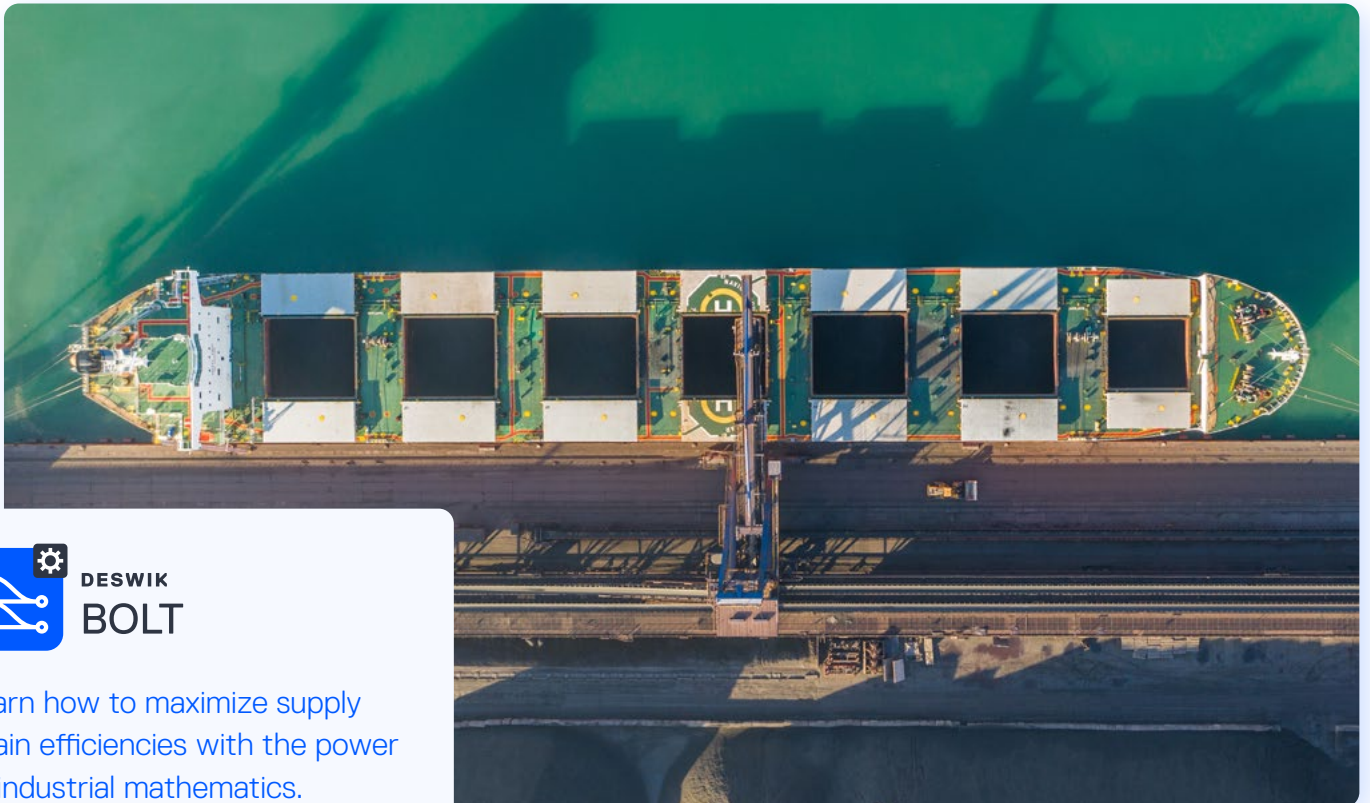
Optimized blending and stockpiling: Blends are significantly closer to product specification than they would be using a manual plan, and complex stockpiling questions are answered.

- **Increased network capacity:** Optimized supply chain plans allow materials to be transported with increased efficiency.
- **Automated processes:** Plans can be modified in a fraction of the time required to modify a manual plan, while producing superior results.
- **Centralized planning data:** All information is included in one place, providing visibility across the entire supply chain.
- **Plan multiple time horizons:** BOLT's Operational and Tactical modules provide decision support on a shift and weekly timeframe.

DECISION SUPPORT

BOLT helps to answer business critical questions such as:

- What is the optimal course of action to take if there is a change in the supply chain?
- What is the best way to load material onto vessels that have not arrived at port in the expected order?
- What tonnage of which products should be sold and when?
- How and when should material be processed?
- How and when should material be stockpiled and blended?
- Will it be profitable to attempt to exploit a bonus or penalty of a contract?



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

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