NEWCREST MINING LIMITED

CASE STUDY

Using optimisation and simulation to maximise mine productivity

The Customer

Newcrest is one of the world's largest gold mining companies with operations in Australia, Papua New Guinea and Indonesia. Newcrest owns and operates the Cadia Valley underground block cave gold mine in New South Wales, Australia. This site produces roughly 600,000 ounces of gold and 62,000 tonnes of copper a year.

Demonstrated a 10% improvement to mine productivity by combining optimisation and simulation algorithms

Business Function

Block caving

Planning Function

Real-time

Product

Optimisation and simulation

The Problem

Underground mines, in particular block caves, are valuable assets that can be used for decades after their initial development. As a mine operator, it is critical that the productivity of these assets remain as high as possible, to maximise its value and lifespan.

Newcrest had found that their Load Haul Dump (LHD) loaders had become the operational bottleneck of their mine, resulting in a decrease in potential mining productivity and efficiency due to congestion and under-utilisation of the materials handling system. Through engaging with Polymathian, it was identified that a block-cave specific real-time LHD dispatch tool had the potential to alleviate these issues. Before building such a system, it was important to show that it would outperform the existing manually generated planning processes.

The Solution

After consulting Newcrest and understanding their caving systems, Polymathian developed an optimisation tool that was able to orchestrate and dispatch the fleet of LHD loaders based on a real-time cave state. The solution minimised congestion, matched the underground materials handling system capability all while conforming to geotechnical constraints.

Polymathian then built a detailed discrete event simulation tool that could simulate a real-time cave state over a 24 hour period. Simulations were run using both the optimisation tool and the output of the existing manual planning process for dispatch decisions. These simulations were able to robustly test the dynamic variability of the day to day operations against both processes, proving what value the real-time optimisation tool would bring.

The Benefits

The simulations demonstrated the potential for a 10% improvement in mine productivity, which provided enough justification to proceed with configuring and deploying a fully integrated real-time dispatching tool. The tool has since evolved into the world's most advanced underground mining optimisation tool, called ORB, which has provided a 20% increase in mine productivity.

- Simulations demonstrated 10% improvement to mine productivity
- Rapid development to prove real-time dispatch tools' efficacy
- Powered by a combination of optimisation and simulation algorithms

Design to delivery: 11 weeks

Scoping	Development	Simulations	Analysis
1 week	4 weeks	4 weeks	2 weeks

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