

# A Golden Age for Optimisation in the Mining Industry

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## **ABSTRACT**

Mathematical Optimisation or Operations Research (OR) techniques have a long history of being used to improve performance, efficiency, and profitability in the mining industry, with work on strategic planning problems dating back to the 1960s. The number of potential applications of OR within mining is vast, including use in production planning, maintenance scheduling, mine design, and equipment utilisation. Additionally, the potential applications are ever increasing.

While in the past, computational tractability has significantly hindered progress in the field, a combination of affordable high-performance computing, and algorithmic advancements has made it a golden age for optimisation in the mining industry. Potential applications now span the entire planning spectrum and include; strategic, tactical, operation, and real-time optimisation.

This paper starts by outlining the recent advancements in Cloud Computing, Mathematical Programming, and Artificial Intelligence that have made many complex mining problems now solvable. Following this, the paper highlights a number of case studies including; real-time optimisation in underground mining, and strategic optimisation for surface mining, where these recent advancements have been used. Finally, the paper describes how the application of these technologies can be applied in the future to currently unsolved problems.