Optimal Maintenance Scheduling via Mathematical Programming

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Maintenance activities are inevitable and costly in asset-intensive industries, and conducting maintenance may require the whole system, or sub-units of the system, to be shut down temporally. These disruptions need to be scheduled well in advance as they significantly influence the performance of operations in an integrated mining site. The whole system can be considered as an interconnected network. Due to complex inter-relationships within the system, disruptions of any unit's operation will impact upstream/downstream product flow, and correspondingly affect stock, throughput and satisfaction of market demands, which make maintenance scheduling problems even more challenging to tackle. In this presentation, I will present the research progress on the shutdown planning optimization project regarding mathematical models for supporting the decision making on shutdown timings, finding a new efficient way to explore the relationships between maintenance and performance of the whole system. Moreover, since the models are usually difficult to solve for large-scale data sets, I will use several decomposition methods and new algorithms to accelerate computational speed. Finally, I will give a future research plan with a thesis completion timeline. Presented for Milestone 2