REVIEW OF ARTIFICIAL INTELLIGENCE USE IN HIGH PRESSURE ACID LEACH (HPAL)

By

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ABSTRACT

Application of artificial intelligence (AI) techniques to optimize the High Pressure Acid Leach (HPAL) autoclave operation at the Ambatovy facility was evaluated by Sherritt Technologies in coordination with NTWIST.

Historical operating data obtained from Ambatovy HPAL was used to develop models to predict autoclave discharge parameters based on operating conditions and ore mineralogy. A second set of models (AI model) were developed based on the prediction models, economic data and operating constraints for the Ambatovy operation to identify optimal autoclave sulphuric acid and steam dosages to maximize potential profit from the HPAL circuit.

For the six-month evaluation period, the AI model identified operating conditions that increased potential profit in approximately 42% of the total operating hours; even with the limited operating data available to build and train the models. The AI models were also able to identify operating parameters to bring adverse operating conditions to within their target limits in approximately 17% of the total operating hours. Further refinement of the model parameters, through increasing the size of the training data set and optimizing the AI model's search parameters is expected to improve the model's ability to identify optimal operating conditions leading to further increases in profit and process stability.

In addition to the economic benefit, the use of AI has the potential to improve the overall operation of a facility through providing tools to assist with training and improving process stability, process optimization and troubleshooting.

Keywords: High Pressure Acid Leach, Artificial Intelligence, Laterites, Nickel Extraction, Cobalt Extraction, Acid Consumption, Process Optimization