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Machine learning at a gold-silver mine: a case study from the Ban Houayxai Gold-Silver Operation

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ABSTRACT

The Ban Houayxai Gold-Silver Operation is a producing asset for Australian-based copper and gold producer, PanAust Limited. The Operation lies within PanAust's 2,600 square-kilometre Phu Bia Contract Area in northern Laos. Commencing production in 2012, Ban Houayxai is operated by PanAust's Lao-registered Company, Phu Bia Mining. PanAust owns a 90 per cent interest in Phu Bia Mining. The Government of Laos owns the remaining 10 per cent.

In 2018 a machine learning algorithm was installed at the Operation to predict future metallurgical characteristics based on previous process plant performance. The algorithm was enabled by the integration of two years of 3D geological data with plant data to derive a formula that can be applied to block models, allowing both 'backward' reconciliation analysis and 'forward' predictions.

Data from approximately 10 million tonnes of ore was integrated and analysed in 12 hour batches over the two-year period. Unlike conventional mine-to-mill studies based on samples and test work, or tracking batches of ore with markers, machine learning based value chain optimisation uses large amounts of historical data to predict future plant performance. Proprietary data integration software creates a digital twin of the value chain enabling machine learning algorithms to continuously 'learn' from the geology and plant data to automatically update a prediction model.

An overview of this method to predict future metallurgical characteristics, its results, and recommendations on how to successfully implement machine learning algorithms are presented in this case study.