Case Study

MineralDNA optimises mineral processing

Mineral processing supported by machine learning and explainable AI

XDNA
A Downer Company

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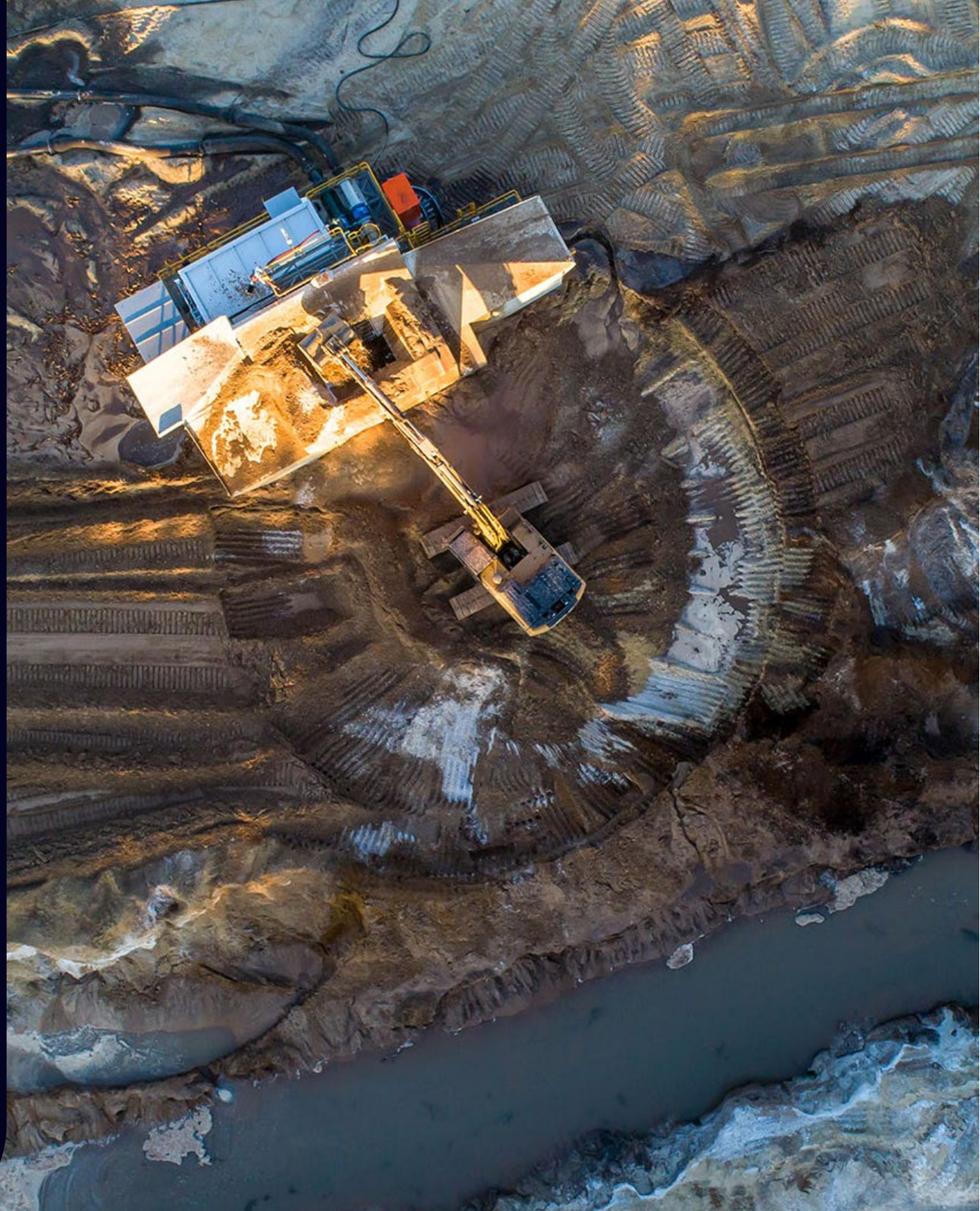
Delivering mineral processing solutions worldwide requires an optimal combination of plant and technology to extract valuable commodities.

A mining operation in Kenya uses mineral separation technology and processes delivered by Mineral Technologies (A Downer Company) coupled with an advanced machine learning solution provided by xDNA. MineralDNA is an exciting AI solution based on Mineral Technologies' deep metallurgical knowledge and advanced analytical expertise.

The solution has potential to be used across a variety of processing plants, augmenting Mineral Technologies' industry leading physical products with AI based service offering to drive digitally driven revenue growth.

At a glance

- A shift for Mineral Technologies to digitally driven revenue lines.
- AI-infused solution that improves process control consistency.
- Explainable AI for decision making assurance.
- Centrally managed on the cloud with low latency edge execution.
- Self-service analytics capability for extracting further value.

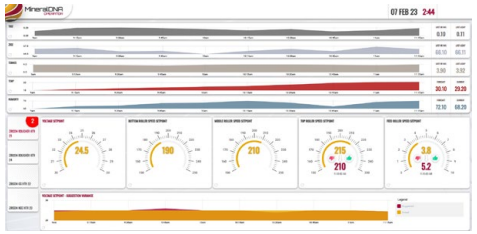


Problem

High tension rollers (HTRs) separate conducting minerals from a non-conducting feed. This is a vital stage in the mineral sand's separation process. At the Kwale operation, there are 4 HTRs and each has several operating set points. This creates a high level of complexity given the number of variables that have to be set for aspects like voltage and roller speed.

HTRs are typically monitored by plant operators, and operating parameters are adjusted based on their skill and experience. Given the number of set points for the HTRs, over time, the variances introduced by different operators at different times resulted in inconsistencies between shifts and in final mineral recovery grades.

There was a need for an "AI Operator", a machine learning model that can process real-time sensor data and provide setup recommendations to optimise machine performance and in turn, product yield.



Solution

MineralDNA uses the power of the Neuroverse data value platform to transform plant telemetry into a useable decision-making tool. The solution feeds process control and environmental data from HTR operations to several machine learning models to determine optimal setpoints. The model was trained on the Neuroverse platform and offers an assessment of suggested HTR parameters at any time and day. Each prediction is provided to the operator, who can approve or reject the suggestion through a simple interface control panel. This decision making is also logged for continuous improvement and refinement.

A supervisor dashboard offers valuable insights into the performance metrics for the shift in real time. It helps supervisors understand compliance and track variances via a visual dashboard.

Given the remote location of many processing plants, network communication can be sporadic. The value of MineralDNA is that the core insights are still operational without cloud connectivity. The model is trained in the cloud, but the machine learning recommendations are executed locally onsite (leveraging an Edge computing model), offering reliability regardless of location.

Outcome

Accessing rich data within a machine learning tool like MineralDNA is expected to help mining companies improve mineral separation, reduce tailings (so the valuable product isn't lost) and optimise energy consumption. From an operator point of view, the program supports workers with the decision-making skills to accelerate their processing time. It reduces variances between shifts, workers and overall performance. For new plants, it will assist with training new workers and assessing different conditions and variables.

A significant achievement with MineralDNA is its ability to offer explainable AI. For every prediction it makes, a detailed assessment or explanation is provided for what contributed to that prediction. There could be hundreds of inputs of data to each prediction, so the system provides a ranking of influential inputs, allowing the supervisor to validate the model's decisions. This develops a level of trust in the workings of MineralDNA, while any rejected predictions are fed back into the model for further machine learning.

Whilst things are progressing well in Kwale, the full potential for Mineral Technologies is to offer the "AI Operator" as an integrated service option with their physical product offer. Using digital and data to drive increased value for Mineral Technologies and their clients.

About xDNA

xDNA fuses practical operational knowledge with world class data science to improve outcomes. This intersection of emerging technology and the “human extraordinary” is what sets us apart and allows us to bring value to Downer, its clients and partners.

A key focus for our business is to step change the DNA of an organisation’s value chain from product development through operations and service. There is immense value to be unlocked by data and digital and we take a pragmatic and value driven approach. Digital tech offers more than just operational improvement, it offers new products, services and ultimately a higher value customer experience.

To find out how we can help transform the DNA of your front-line please contact hello@xdna.com.au.

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