

1 | Use Case Title: MineCo Crusher Optimization

2 | Use Case Overview

(≤100 words) Provide a brief description of the use case and the system that your autonomous AI will improve.

- MineCo mines precious metals from ore.
- The first and roughest stage of ore processing is crushing the ore, in this case with a gyratory crusher
- Operators manually control supervisory settings for the gyratory crusher.
- The particle size and hardness entering the crusher and the crusher itself, particularly the condition of the liner, vary with an unknown random distribution. This makes it very difficult to control the crusher well.
- The objective of this EAP project is to train a brain(s) to provide supervisory control settings for the underground gyratory crushers at the MineCo South site that maximize the throughput of fragmented ore.

3 | Use Case Value

(≤100 words) Explain the value of improving the performance of this system.

A 5% improvement in throughput generates a predicted ROI of \$10M / year at the mine site in question.

4 | Current Methods

Select and explain the current methods used to control or optimize the system

	Method Check all that apply	Description
<input checked="" type="checkbox"/>	Human Operator / Engineer	Supervisory Control: The fixed plant team currently gaps the crushers once every 24 hours. This leads to sub-optimal results and is time intensive.
<input type="checkbox"/>	Expert System	

<input checked="" type="checkbox"/>	Control Theory (PID, MPC)	Low-Level Control: The advance process control system utilizes both PID and MPC control systems.
<input type="checkbox"/>	Optimization Techniques	
<input type="checkbox"/>	Other	

5 | Limitations of current methods

Select and explain the limitations of current methods

	Limitation Check all that apply	Description
<input checked="" type="checkbox"/>	Ability to control well across scenarios / conditions	Human operators find it difficult to manage the changing particle size distribution and the changing hardness distribution of the incoming ore.
<input type="checkbox"/>	Multiple or changing optimization goals	
<input checked="" type="checkbox"/>	Human Operator / Engineer Limitations May include <ul style="list-style-type: none"> · Difficulty managing many variables and dimensions · Difficulty adapting to changing conditions · Large performance discrepancy between novice and expert operators · Inconsistency across expert operators 	Difficulty adapting to changing conditions: Human operators find it difficult to manage the changing particle size distribution and the changing hardness distribution of the incoming ore. Large performance discrepancy between novice and expert operators: Expert operators gain expertise over many years.
<input checked="" type="checkbox"/>	Uncertainty in the measurement of the inputs or the process make it difficult to control or optimize.	
<input type="checkbox"/>	Time to develop control or optimization system is prohibitive	