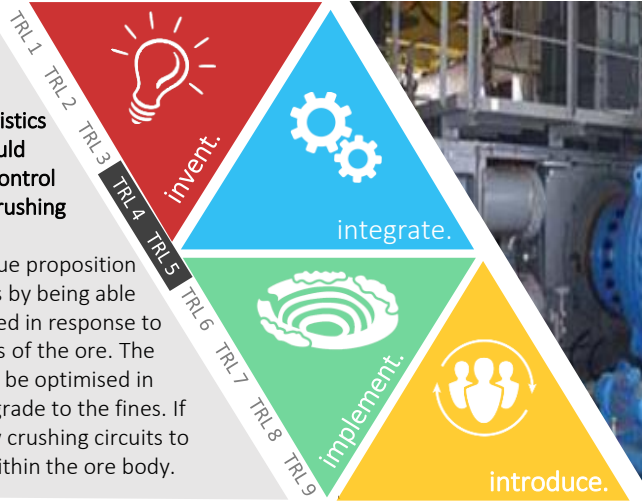


Distributed acoustic sensing for non-tumbling ore mills

PROJECT P2-013

Distributed Acoustic Sensing (DAS) provides a means of analysing and interpreting the breakage characteristics of particles. The DAS technology could therefore be used to quantify and control selective breakage of ore within a crushing device.

This project would increase the value proposition of a selective comminution process by being able to adjust the crushing energy applied in response to recordable breakage characteristics of the ore. The energy applied to each particle can be optimised in order to maximise deportment of grade to the fines. If successful, this project would allow crushing circuits to better respond to heterogeneity within the ore body.



Research collaboration

Mining3 has expertise in material characterisation and sensing technologies.

It has developed systems and technologies for in-situ rock mass characterisation and undertaken numerous field testing programs for evaluation and development.

The initial phase of this project investigates and plans the construction of a detailed development pathway. It aims to clearly identify relevant technologies, conceptualise system solutions, and determine testing and validation opportunities.

Future work, including site-based activities, will likely require integration of industry partners (technology/product suppliers) to support testing and validation programs.

Background & aims

The project's primary challenge is to determine whether distributed acoustic sensing (DAS) using fibre optics is a useful tool for determining time-of-flight and impact locations and concentrations on experimental machines.

A further challenge is to determine whether DAS can be used as a feedback device for controlling and optimising performance of non-tumbling crushing mills.

There are two primary objectives of the proposed research:

1. To determine the extent to which distributed fibre optic acoustic sensing is able to be used to measure rock fragmentation characteristics within the body of next generation selective ore crushing machines currently under development by CRC ORE.
2. To determine whether distributed fibre optic acoustic sensing can be used as a permanent measuring device for the control and performance optimisation of next generation ore crushing machines and to take the device to a TRL4 level of development

Focus on outcomes

- The initial trials are a proof of concept and take the research to TRL3. This is to demonstrate that the acoustics are able to distinguish between different ore types and differentiate the mode of breakage.
- The second part is the algorithmic feasibility which takes the research to TRL4, the stage before a field trial of the technology. This is to demonstrate that any development of data analysis and control algorithms are sufficient to control the machine in order to optimise breakage.

Program Coordinator: Paul Revell, CRC ORE
Project Leader: Erik Isokangas, Mining3
Timing: January 2020 – January 2021
Participants: Mining3, CRC ORE

Image: Gekko VSI