RESEARCH

MATERIAL HANDLING

Uncrushables

Detection of tramp metal in mined material

Challenge

Tramp metal such as bucket teeth, drill bits, bore crowns, tools and more, left in mined material and stock piles present a significant risk of blocking or damaging primary crushers. In addition, high-energy ejection of tramp metal - specifically Ground Engagement Tools (GET) - from crushers, pose a serious safety risk to the operations staff.

Providing a simple, reliable and cost-effective solution for the detection of tramp metal before it enters the crushing circuit can avoid a costly production delay and minimise safety risks.

Research

The patented uncrushables detection system incorporates a pulse induction metal detector fitted inside the bucket of a digging machine. Any tramp metal objects entering the bucket at the commencement of the dig/dump cycle will trigger an alarm to the cab operator. Diversion or quarantine of the load can then occur. This new technology encompasses an innovative combination of hardware and software to manage the challenge of detecting relatively small metal items using a detector that is itself embedded in a large steel bucket. Real-time detection notifications are fed to the cab operator who can take appropriate action to prevent dispatch of the payload to crushers or other equipment susceptible to damage or blockages. Variable sensitivity can be tuned for an object's target size, allowing for the removal of smaller metal items further down the process line and focussing on larger more obstructive uncrushables. The device's detection algorithm performs self calibration to accommodate a change in ore grade and type.

The ground-breaking tramp metal detection approach requires minimal sensing equipment at the bucket. Commercial versions will discreetly integrate the detector coil into the bucket design for optimum protection and minimal interference with the material flow during digging and dumping.

With a remote interface, varying levels of system control including detection sensitivity can be maintained via mine control rooms minimising on site tampering and human error.

SURFACE

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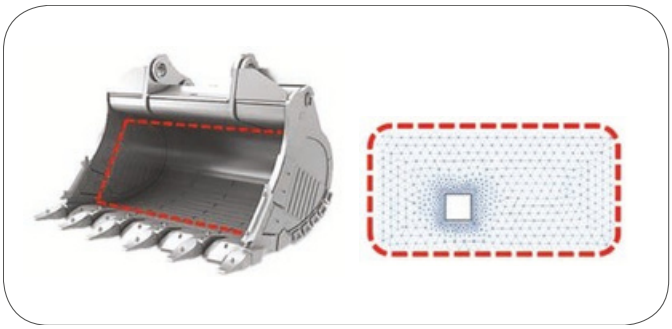
Benefits

- Improves staff safety by minimising high-energy GET ejections
- Increases safety as personnel are not required to enter the crusher to recover tramp metal.
- Minimises production delays and downtime due to crusher blockages and damage



Status

This technology is at an advanced state and numerous successful site trials have validated the technology. Pre-commercial prototypes have been deployed in iron ore, gold and copper mines located in South Africa, Brazil, Papua New Guinea and Australia. Current research focuses on deploy ability, robustness and optimisation.

Current prototypes are installed on Komatsu WA1200, CAT 992K, 993K and 994K operating on ROM stockpiles. Future work will develop solutions for face shovels, excavators and other earth moving equipment.

Mining3 is still seeking engagement with mines experiencing tramp metal issues for potential prototype implementation and validation test sites.

For more information contact:

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About Mining3

Mining3 is the world's leading research organisation, directed by its global mining industry members to develop and deliver transformational technology to improve productivity, sustainability and safety.

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