service

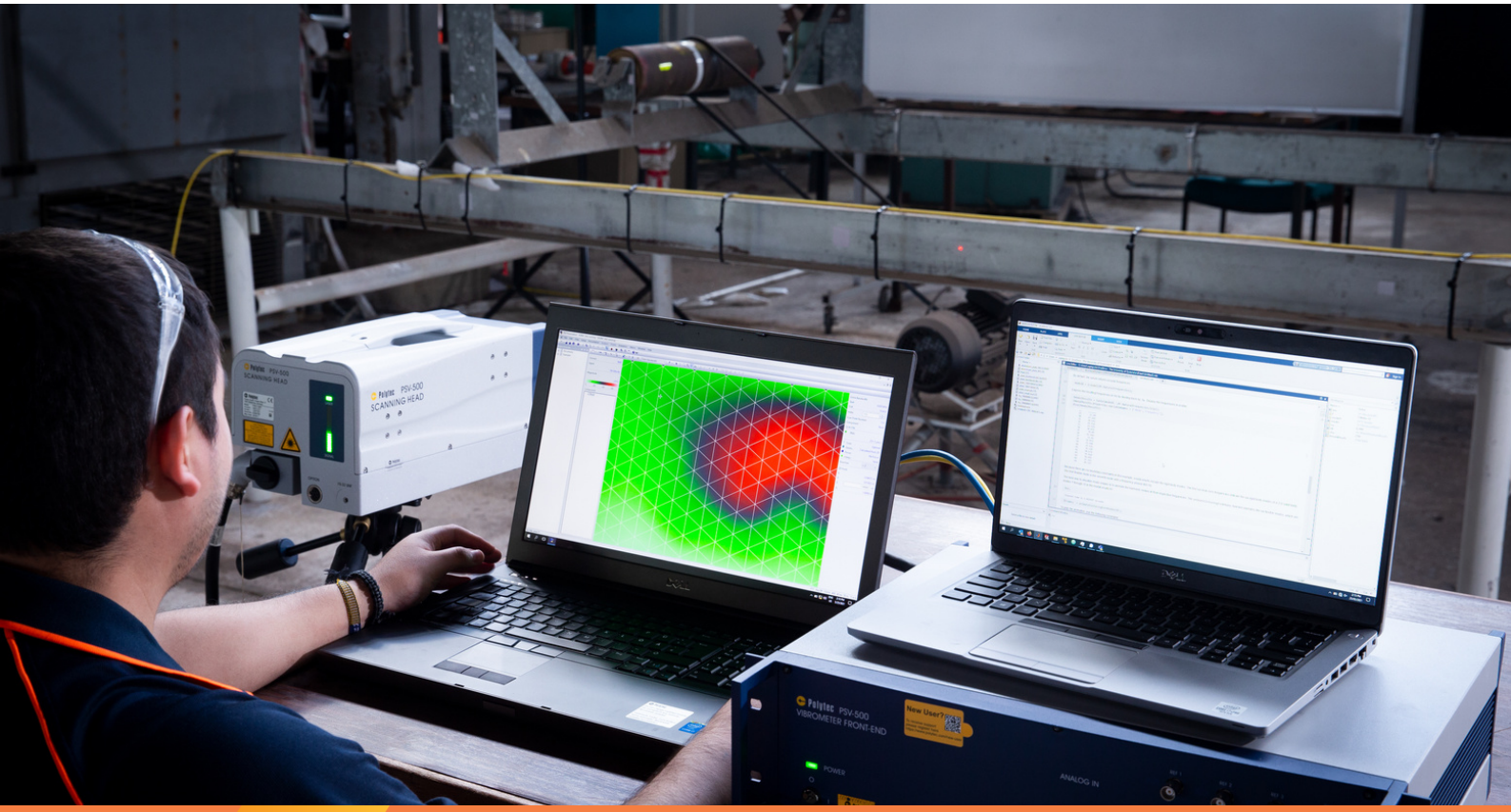
GROUND CONTROL

Remote Condition Monitoring

Challenge

The ability to increase the accuracy and effectiveness of monitoring the condition of mobile machinery has been a long-held vision of the mining industry. Traditional condition monitoring techniques of mobile machinery typically require the interruption of normal operations, often resulting in relatively long-time intervals during which the condition of critical components is unknown, leaving the opportunity for faults to rapidly deteriorate and potentially trigger catastrophic failures.

While in recent years the ever-increasing instrumentation of the plant in the form of on-board sensors has permitted more regular monitoring of some components, it still requires the software and hardware infrastructure to handle and process the data; for operations with dozens or hundreds of plants, this may result in the need for significant infrastructure, as well as increased maintenance costs for this array of on-board sensors and computers.
Laser doppler vibrometers are capable of collecting acoustic data from a target surface at a distance with great sensitivity and for a wide frequency response range. This technology has been implemented in the manufacturing industry for quality assurance, however, it may be able to be used in the mining industry to improve the current condition monitoring of mobile machinery.



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Research

The objective of this project is to develop remote sensing technology capable of monitoring the condition of mobile equipment during normal operations to improve its availability and extend component life.
Phase 1 of this project focused on establishing the feasibility of using laser vibrometers to collect acoustic signals for condition monitoring purposes. Several laboratory tests were carried out with encouraging results. The data analysis from the laboratory testing showed a marked difference in the spectra obtained from the two test units (a brand new and an old final drive unit) processed with Mining3's condition monitoring software suite.
Field testing was carried out using Mining3's CAT777B haul truck as the target. The results showed that the laser was able to collect acoustic signals that contained the expected fundamental frequencies and also that the acoustic signals collected are comparable to that recorded with the accelerometer onboard the truck.

Benefit

- Effective preventative maintenance will decrease events of unexpected failure during operations, improving safety for plant operators and maintenance crews.
- Regular and accurate condition monitoring of critical components will improve equipment availability.
- Efficient maintenance will extend component life and decrease maintenance costs.

Status

Phase 1 of the project achieved the following objectives:

- Established the feasibility of using laser vibrometers for condition monitoring purposes under laboratory conditions.
- Developed algorithms for processing and analysis of data collected by the laser vibrometer.
- Established suitable operational specifications for a remote-sensing station for field testing (next phase of development)

Phase 2 is expected to focus on field testing and validation of the technology at a mine site (workshop environment) or a third-party repair center. Mining3 is currently looking for partners for phase 2.

Partners

ACARP

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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