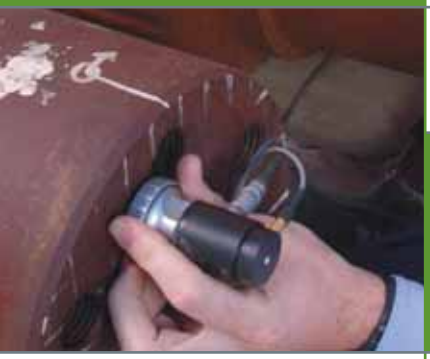
ACARP MATTERS



HIGH-TECH SOLUTION TO CATASTROPHIC SHAFT FAILURE IN MINING INDUSTRY

Advanced ultrasonic technology is being used across the Australian mining industry to reduce catastrophic shaft failure on major equipment, thereby reducing safety risks and potentially saving millions of dollars in unplanned downtime.

ShafTest™, a unique, advanced, ultrasonic flaw detection system for shaft condition monitoring, has been developed by CCI Pope with the help of funding from ACARP, the Australian coal industry's research program.

The successful commercialisation of ShafTest™ means that cracking in shafts can be identified far earlier than previously possible, vastly reducing the risk of catastrophic shaft failure. The technology is being used regularly to monitor shovels and draglines at major coal mining sites including Mt Thorley/Warkworth, Hunter Valley, Bulga and Bengalla in New South Wales, and Goonyella Riverside, Hail Creek, Coppabella and Moura in Queensland.

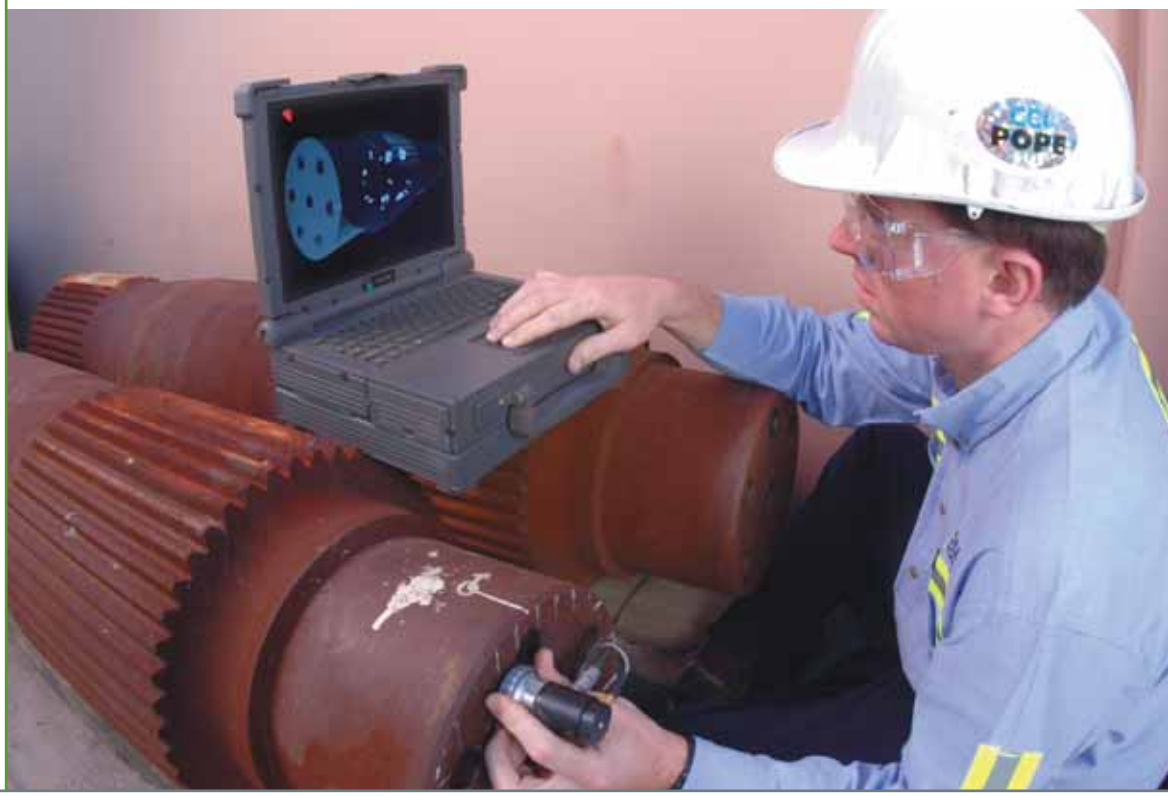
While originally developed for testing key shafts on shovels and draglines for the coal industry, the technology has proven easily transferable to coal port facilities, iron ore mines and the steel, aluminium and cement industries. For example, when a shiploader pulley shaft failed at Rio Tinto's Pilbara iron ore operations several years ago, 24-hour delays to shipping and production, along with maintenance work, cost the operations more than $3 million. Since the use of ShafTest™ was introduced on selected critical components, no such catastrophic failures have occurred.

The tool has proven so successful that CCI Pope recently made its first royalty payment to ACARP. Xstrata Coal Equipment Manager and ACARP Open Cut Committee member Tony Egan said the investment ACARP made six years ago is now flowing back through royalties and being re-invested in developing new technologies.

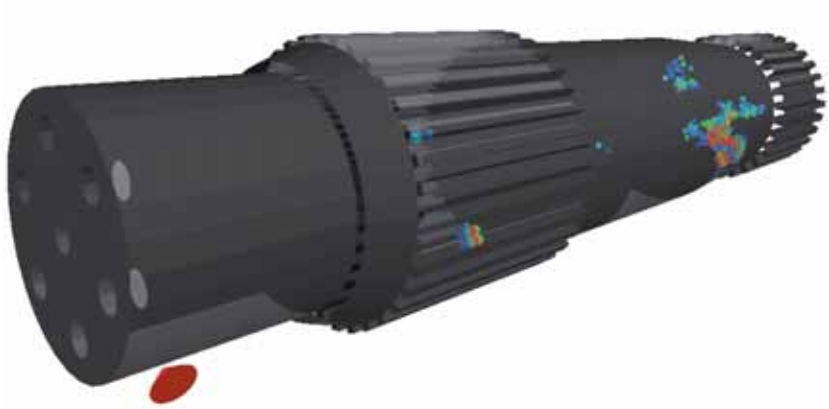
Tony said the development and commercialisation of the shaft testing tool demonstrated that the Australian coal industry was one of the nation's leading investors in high-level, sophisticated research for a highly technical industry.

"The Australian coal industry is a technical leader and this tool is a first-class example of what the collaborative efforts of the Australian coal mining industry, researchers, manufacturers and technical specialists are achieving through ACARP projects," he said.

"Equipment reliability is critical to the industry, even more so in the current environment where production pressures are enormous. We will continue to fund research projects whose outcomes help drive improvements not only in production efficiency, but in environmental management and health and safety."



A CCI Pope technician verifies the presence of spline cracking detected by ShafTest™ in the final drive shafts of a mining shovel.



This 3D model – the output of ShafTest™ – confirms the presence of spline cracking defects (multi-coloured patches) in the final drive shafts of a mining shovel.

HOW IT WORKS

Because all shafts will eventually fail, monitoring their condition and predicting when this failure will occur will improve maintenance planning and budgeting.

In the past only a few highly skilled and experienced ultrasonic inspectors could confidently assess the structural integrity of a complex shaft by examining it in-situ from one end. Now, the new system can verify the condition of a complex shaft without relying as heavily on individual operators' skill and experience.

The new tool collects a three-dimensional signature of a drive shaft and a visualisation of the defects within that shaft. The testing only requires access to the ends of the shaft and the results can be fully analysed away from the test shaft — minimising access and downtime of equipment. It enables maintenance teams to access a cross-sectional view of the shaft at any depth to provide a clear image of any cracks. The information can be stored for later retrieval and analysis. The cross-section views, taken over time, can be compared and trended and the crack monitored.

The results are reported in a meaningful graphical format which enables maintenance teams to easily understand the results and make the right decision regarding what maintenance action should be taken. The platform for the system is a rugged portable industrial computer.

THE BACKGROUND

The ACARP-funded project commenced in 1999 when it was recognised that the existing Shaftest ultrasonic tool could still fail to identify shaft cracking due to its inherent limitations. The project's goal was to further increase the predictability of shaft condition monitoring by adding advanced features. The project team from CCI Pope focused on developing the following functionality:

- a feature to build a three-dimensional model of the shaft and then visualise the defect information within the model
- an artificial intelligence discriminator that distinguishes real defects and suppresses misleading artefacts
- a tool that automatically identifies changes in shaft condition in comparison to prior surveys
- a tool to quantify the size of a crack, based on the collected ultrasound data.

PROJECT SNAPSHOT

The CCI Pope project team, with the help of funding from ACARP, has developed a unique, advanced, ultrasonic flaw detection system for shaft condition monitoring.

The technology reduces catastrophic failure on major mining equipment, thereby reducing safety risks and unplanned downtime. It has also proven to be transferable across other industries.

Successful commercialisation of ShafTest™ has resulted in royalty payments to ACARP.

ACARP
Australian Coal Association Research Program

ACARP
PO Box 7148 Riverside Centre
Qld 4001 Australia

Phone 07 3229 7661
Email anne@acarp.com.au

www.acarp.com.au

August 2007