Conveyor Belt Monitoring
Industry Journals
World Coal
January 2005

CBM – Check Your Belt!

Maximising the return on your assets

Conveyor Belt Monitoring (CBM) Australia

Paul Spiteri, examines how to carry out non-destructive condition monitoring on conveyor belts by using remote access technology.

In 1979, a number of mining companies identified an urgent need to better manage their steel cord conveyor belts. This was done firstly to determine belt condition at any given point in time, so that timely repairs could be undertaken, and secondly to predict the expected 'end of life' so that budget provisions could be made. Both of these issues were deemed extremely important due to the significantly high cost of the belt resulting in the potential for huge financial pressures placed on the conveyor operators where the life of the belt was shorter than expected and subsequently not budgeted for.

The mining companies concerned approached Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO) with a proposal for a research project for the development of a non-destructive condition monitoring system for steel cord conveyor belting. As a result, the CSIRO team, led by Professor Alex Harrison developed a magnetic flux leakage system called the 'conveyor belt monitor' (CBM). This succeeded in determining the condition of the internal steel carcass whilst the belt was in use for production purposes, which resulted in a technological breakthrough compared with other techniques used at the time.

Proven Technology

Since the original development and implementation of the CBM technique, thousands of steel cord conveyor belts have been examined around the world for the purpose of determining carcass and splice condition. As a result of these tests, the conveyor operators have obtained the information needed to cost effectively manage the belts, with early identification of premature belt wear helping to extend belt life.

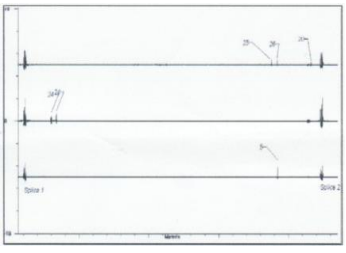
The recommended CBM program is based on the provision of a six-monthly or annual on-site service whereby a specially trained conveyor belt monitoring technician visits the conveyor site and physically performs the CBM test. This frequency is determined as the most acceptable for relatively new belting that is in good condition. However, as the belt ages or suffers damage, monitoring frequencies may need to be revised so that the condition of the belting remains known and anomalies can be inspected and repaired on short notice.

The results from these examinations have confirmed that the CBM technique is an extremely valuable tool for operators of steel cord conveyor belting in managing the associated costs. A typical example of the benefits from this approach was seen at a local coal mine where the conveyor belt life was extended. This was due to the discovery of damage to the edge cords caused by poor tracking and subsequent contact with the structure. The discovery resulted in a saving to the conveyor operator in both replacement costs of the belting and, more importantly, loss of production as the cause of the poor belt tracking was identified early and rectified.

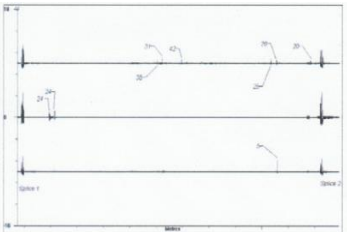
Responsive Approach

While it is widely recognised that the CBM system delivers exceptional results, there is still room for improvement due to the ever-increasing production requirements that result in increased belt speeds and overall heavier demands

CBM SCAN IMAGES



Parent belting showing left hand side of belt on the top trace. centre and right hand side of belt on the bottom trace. A small number of broken steel cord locations currently exist as can clearly be seen from the data.



Parent belting showing new edge cord events in the left edge. These events were detected within a 9 hour period from the trace shown in first image.

Partner of Choice

Extending The Safe Working Life Of All Conveyor Belting

on the conveyor belts and systems. This in turn has led to an overall decrease in maintenance downtime, which results in less opportunity to examine conveyor belts to detect early signs of wear and damage. As a result, a method of testing steel cord conveyor belt with higher frequency was needed but without the need to physically access the conveyor. These needs led to the development of an improved remote access system utilising the CBM technique.

As a result of this refinement to the original technology a new remote access system has been developed, called cbmRemote®.

The cbmRemote system technology utilises permanently installed CBM belt monitoring devices that incorporate transducers. These are connected to a dedicated industrial computer loaded with purpose- built software. This is then connected to a telephone system via a standard or GSM modem allowing communication to even the most remote location. The monitoring equipment has been designed to be robust and reliable in operation as this is critical to its effective operation. Most mine sites tend to be isolated and difficult to access.

State Of The Art

As a result of the cbmRemote system, a CBM technician can perform a steel cord carcass condition examination via the telephone from anywhere in the world. This provides a huge advantage, ensuring that the expert belt monitoring technicians can have immediate access at any time as opposed to waiting for the technician to be made available at pre-designated schedules.

The system offers the following benefits:

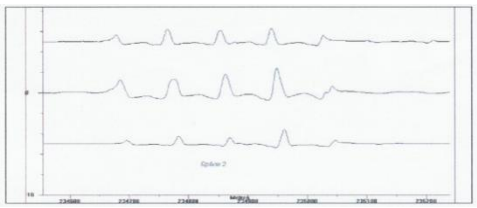
- The condition of the belt carcass and splices can be monitored on a very regular basis. CBM have some clients who have their belts examined on a daily basis whist they have known faults that cannot be removed from the belting until a suitable maintenance window.
- Upon identification, carcass and/or splice anomalies can be inspected by on-site personnel who are familiar with the belting and can make judgement as to when the anomaly should / can be removed.
- Emergency examinations can be performed at very short notice.
- Cost effective regular monitoring, which would otherwise be difficult to perform via site visit methods.
- A full carcass condition examination can be performed without the requirement for downtime.
- More than 20 conveyors electing to use this method of conveyor belt condition monitoring.
- The system's 'by exception' reports are generated immediately following an examination. These reports are then faxed or emailed directly to the conveyor operator. The physical location of any anomalies detected are noted in the report so that they can be visually inspected by the client directly or their nominated belting contractor.
- The conveyor operator can carry out normal duties safe in the knowledge that someone is looking after their steel cord belts.

Conclusion

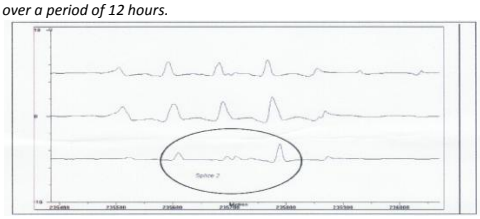
The cbmRemote system will detect steel cord carcass damage. This includes cord breaks, corrosion and general physical damage to the cords within the parent belting and splice damage involving impact or mishaps causing breaks and / or corrosion.

This monitoring frequency can only be achieved by using a system such as the chmRemote. It is impractical to perform 'onsite' condition monitoring at intervals where trends can be seen and early intervention can prevent serious and costly damage to the belt, as well as significant loss of production through unplanned downtime.

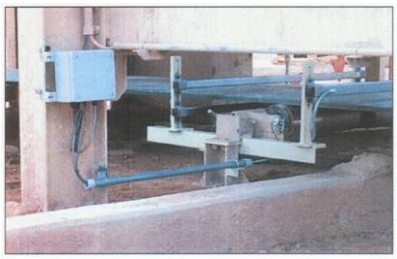
CBM SPLICE SIGNATURES



A splice signature, showing damage that has occurred to a splice. These signatures were recorded from the same splice over a period of 12 hours.



The splice in question has suffered impact damage to the right hand side. This damage was later confirmed to be an edge cord on the right hand side of the belting having been pulled out. The subsequent investigation indicated that the edge of the belt had come into contact with the conveyor structure. This contact caused the edge cord to be damaged, creating a leading cord end. The cord end was then picked up by the structure and pulled from the belt.



Typical cbmRemote \ hardware installation /

➢ CONTACT
For details about this service, please contact CBM
By phone: +61 2 9979 6644
By e-mail: info@cbmi.com.au