

## QUEENSLAND MINING INDUSTRY HEALTH AND SAFETY INNOVATION AWARDS 2008

### 9020 Intermediate Assembly Upgrade Rio Tinto Coal Australia ~ Hail Creek Mine

#### THE PROBLEM OR INITIATIVE:

Hail Creek Mine owns and operates two P&H 9020 Draglines, which are used in pre-strip operations throughout the mine. Both draglines operate on a 24/ 7 basis and are the mine's most significant items of equipment.

One of the key operating components of the 9020 dragline is the intermediate hoist rope sheave assembly. The assembly component is located half way up the dragline boom, which is almost 100 metres in length. This sheave houses a 'cassette', which guides and controls the hoist ropes towards the end of the dragline boom.

The original cassette, which was designed and applied for use on 9020 draglines, lacked strength and reliability, which regularly resulted in severe cracking around the centre shaft support transition. Additionally, bobbin rollers frequently failed due to inherent design problems leading to rope wear and flange cracking.

Design issues with the cassette have created a requirement to conduct frequent maintenance and repairs on cracks, along with rope and bobbin roller replacements. Given the location of components and height of the dragline, the repair work requires maintenance personnel to work from a crane-supported man box, which can sit up to 70 metres above ground level. This working at heights issue, combined with undertaking hot work and manual handling in awkward positions, can pose a significant safety risk for maintenance personnel working on the job.

Intermediate  
Hoist Rope  
Sheave  
Assembly



## THE SOLUTION:

After undertaking a series of Job Hazard Analyses, some elements of the maintenance task remained high risk, even after standard controls were implemented. This prompted a project team to be formed to identify mitigation measures that had the potential to reduce the risks associated with the task.

The project team, lead by Scott Verrall, Field Maintenance Superintendent at Hail Creek Mine, included:

- Ian Meads - Supervisor, Field Maintenance
- Chris Scraggs - Maintainer & Equipment Champion
- Dave Hollard - Maintainer & Equipment Champion
- P & H Minepro Services personnel

Constraints for the design basis of the rope containment device significantly reduced options for redesign. The function of the bobbin roller was to be maintained and as such any alternate design needed to fulfil the current design intention.

Working in consultation with P & H Minepro, the project team determined that an engineering control aimed at eliminating or significantly reducing the frequency of the high risk task was the most suitable solution to the problem.

The project involved designing a cassette that increased the material thickness and supported the intermediate sheave, as well as replacing the bobbins by using a single poly sleeved cylindrical roller to prevent wear and tear.

This cassette redesign and bobbin replacement now significantly decreases (and virtually eliminates) the requirement for maintenance personnel to undertake repairs between planned shutdowns.

This has reduced the need to access the cassette and bobbin rollers, which in turn reduces the risks associated with the task. These risks initially identified included:

- Working at heights using a man box supported by a 200 tonne crane
- Hot work whilst working at heights
- Manual handling – working in awkward positions to access the cassette and rollers
- Slips, trips and falls associated with grease and rope lubrication present in the area

The introduction of cylindrical rollers was initially trialled on one of two operating draglines at Hail Creek Mine, after which successful commissioning then enabled installation to proceed on Hail Creek's second P&H 9020 dragline.

A change management plan was completed in association with the installation of the new design, which determined that no new or additional hazards were being introduced by the innovation.

An additional outcome of the project has been the reduced downtime required to maintain the machine, which provides a significant cost saving for the business.

The photos below show both the previous cassette and bobbin roller, as well as the replacement cassette and new poly sleeved cylindrical roller.



*Previous cassette and bobbin roller arrangement above and below*







***New cassette and poly sleeved roller arrangement above and below***



**BENEFITS / EFFECTS:**

The new and improved design reduces and essentially eliminates the need to access the cassette to repair cracking, which reduces exposure to the risks associated with working at heights, hot work, slips, trips and falls, and working in awkward positions.

The replacement of bobbin rollers with single sleeved cylindrical rollers also reduces manual handling and working at heights risks as maintenance personnel are now no longer required to access the area outside the handrails with harnesses and lanyards to perform the task.

As well as reducing these significant safety risks, this innovation also reduces unscheduled downtime on the machine. This saving has been estimated at 560,000bcm's per annum, with additional maintenance cost savings of \$230,000 per annum.

**TRANSFERABILITY ACROSS INDUSTRY:**

This design innovation has the ability to be transferred across the mining industry to all dragline fleets.

**INNOVATION:**

This alternative design has utilised innovative thinking to develop a simple product that has minimised complexity and the number of moving parts on the machine.

This dragline improvement project reduces downtime, saves costs and significantly decreases the inherent risks associated with maintenance personnel conducting hot and awkward work at heights.