

Reducing Hazards to Tyre Changing Employees **(grab image from p8:'wheel closeup' from pdf)**

Choice of Rim Design delivers ...

The mining industry worldwide has over the last few decades become increasingly dependant on a number of key mining technologies, particularly in the area of material movement by rubber tyred equipment such as trucks and loaders. As such, much of the equipment and some key components including tyres and rim components have become physically larger and often more sophisticated requiring additional skills and activities to maintain the highest levels of safety, output, reliability and cost performance.

While improvements in mine productivity and financial return can often simply be achieved through the design of proportionally larger equipment, they as an often-overlooked consequence and byproduct can also create proportionally larger hazards in the area of pit management and maintenance. One such hazard to tyre servicemen and maintenance people alike is the manual handling of wheel and rim parts during wheel maintenance.

Recent reports¹ by the QLD department of Natural Resources and Mines have shown that manual handling injuries have not only steadily increased over the last 3 years, but now lead the injury classification by contributing to more than 50% to the overall injury makeup at QLD mines sites.

This project exemplifies the proactive and successful approach taken by both BMA and Klinge & Co to effectively address rim and tyre manual handling risks arising through the delivery of 9 new Komatsu 930E Haulage trucks at their Goonyella Riverside operation in January 2002.

The specific issue resolved by the team was the potentially high risk of suffering a manual handling injury through the repeated handling, installation and inspection process of 57 wheel nuts per wheel, other wheel components and tools.

The reduction in the associated manual handling risk was achieved through a pre-delivery risk assessment, evaluation of suitable alternatives, selection and implementation of a risk optimal strategy. The solution chosen by the team is particularly noteworthy as it resulted in the adoption of a new style of rim designed to completely eliminate (!) the need for any manual handling of wheel nuts etc. once the rim had been installed.

As validated by the analysis to be presented at this conference, this project resulted primarily in the creation of a safer and less hazardous work environment for both tyre service men and maintenance staff through the elimination of the manual handling of wheel nuts and tool.

However this project also delivered other tangible benefits such improvement of overall safety through the selection and implementation of an inherently safer design (ie the double gutter rim), and improvement to machine productivity through reduced tyre maintenance down time by 40%.

¹ Safety Performance and Health Report 1 July 2001- 30 June 2002, QLD Government Natural Resources and Mines, Fig 11, various



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Reducing Hazards to Tyre Changing Employees

*A Case Study in Safer
Tyre Change Options*

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Traditional Method



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Most common areas of damage are shoulder and elbow



- Tyre Change involved removal of 57 studs per wheel (342 per truck)
- Manual handling of heavy, vibrating and noisy wheel nut removing equipment
- Extremely hot area around wheel motor – real potential for burns
- Exposure of personnel to known hazards

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Sustained Injuries



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- Tyre Changing on Mobile equipment is viewed as potentially hazardous
- Muscular Skeletal injuries relate to tools utilised to facilitate tyre/wheel changes
- On a “Worldwide” basis – these types of injuries are common
- Goonyella Riverside has not been immune

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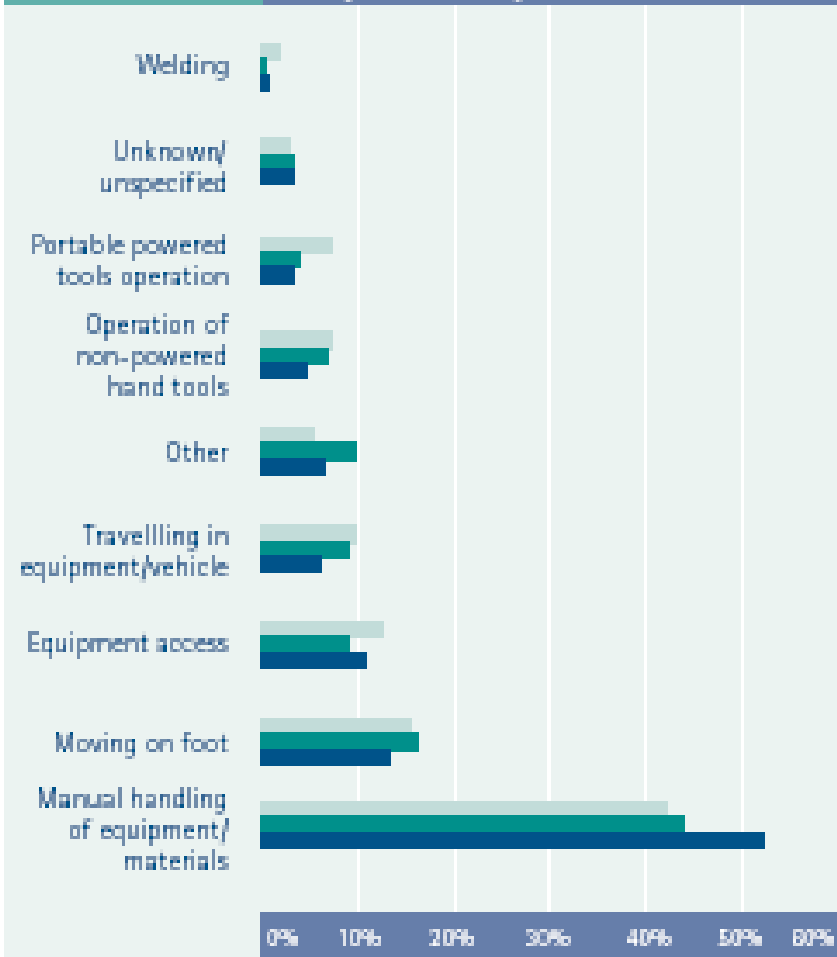


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Figure 11

Classification of injury

■ 1999-00 (541)
 ■ 2000-01 (449)
 ■ 2001-02 (403)
 Categories in ascending order of 2001-02 results



- Qld Mines and quarries Safety Performance and health report 2001-02

- Manual Handling injuries have steadily increased over last 3 years - to more than 50%, and is the direct result of manual handling

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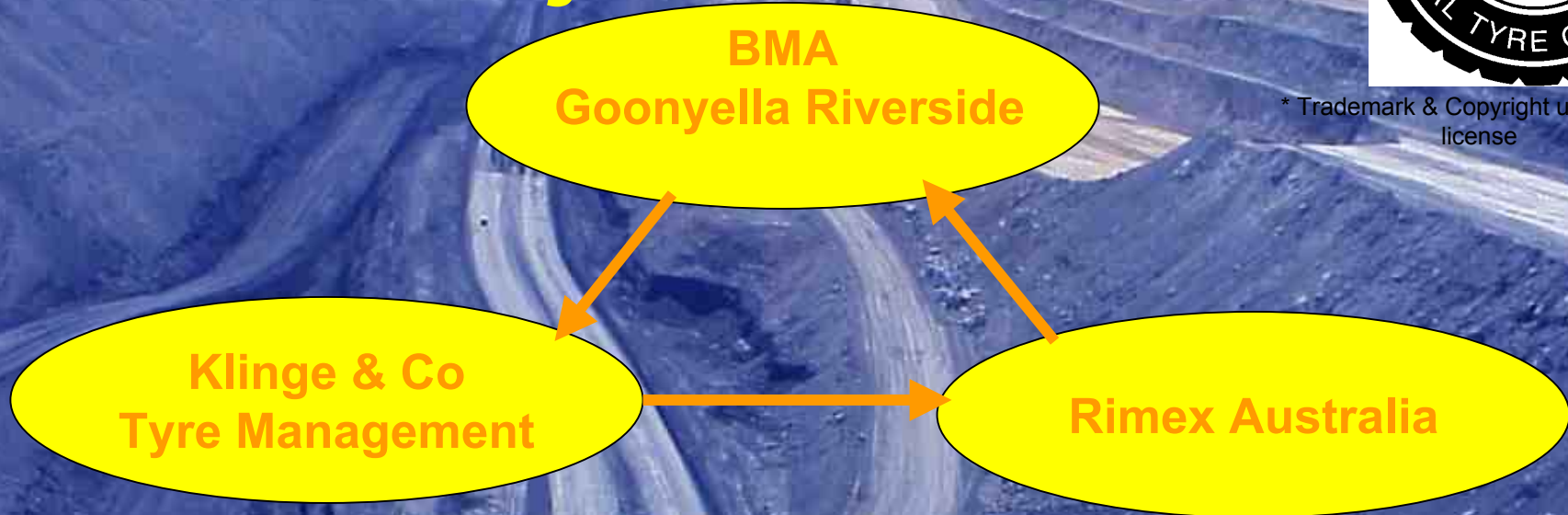
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Project Committee



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Objective: Key Safety Design Principal was Reduced

- 1. Manual Handling
- 2. Vibration
- 3. Noise Impacts

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Engineering the Solution



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- Double Gutter wheels had never been done on all positions before
- Concept involved significant rim redesign work to suit truck requirements
- Pre requisites were; Standardisation and uniformity in components

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Introduction of Komatsu 930E Fleet



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- February 2002 Komatsu 930E fleet introduced
- All wheel positions on fleet fitted with Rimex TSR Double Gutter Wheels

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Process in Action



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- No wheel nuts have been removed for a tyre change since introduction of fleet
- No Hydraulic bead breaking tool required to be used while truck in for tyre change
- Nil exposure to hazards involving nut removing equipment for BMA Goonyella Riverside personnel
- Safe & Efficient tyre changes are now the norm

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Safety Lock System



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- Lock Rings are held together with a strong easy to install retainer
- Added safety benefit is in case of tyre run flat – wheel assembly remains in tact

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Flow on Benefits



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- Significant reduction in tyre maintenance times realised
- Reduced tyre change times, converts into productivity gains

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Goonyella Riverside Mine Comparison Dual Tyre Change



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Dual Wheel Tyre Change	Min Standard Wheel	Min DG Wheel
Task	Min Standard Wheel	Min DG Wheel
Jacking & Stand Dual Wheels	10	10
Deflation Dual Tyres	20	40
Loosen Outer Nuts Using Torque Tool	45	0
Rattle & Remove Outer Nuts	15	0
Remove Outside Wheel	10	10
Loosen Inner Nuts Using Torque Tool	30	0
Rattle & Remove Inner Nuts	10	0
Remove Inside Wheel	10	10
Clean & Inspect Hub / Rim	5	20
Install Inside Wheel / Tyre	5	20
Install Nuts & Rattle up	15	0
Tension Up Inner Nuts	30	0
Install Outer Wheel / Tyre	5	20
Install Nuts & Rattle Up	15	0
Tension Up Outer nuts	45	0
Inflate Dual Tyres	30	30
Total Tyre Change Time	5 Hours	2.9 Hours

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Safe and Efficient Results



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We at BMA Goonyella Riverside and Klinge & Co are proud of the innovation relating to the safer changing of Earthmover Tyres on the Komatsu 930E trucks

The concept was team driven, the results are there to be shared by all

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