'Fit for purpose' tyre maintenance equipment and

management practises for non-earthmover mining vehicles

A study to improve tyre safety

ACARP 51036

Dr Tilman Rasche A/Executive Director Simtars

Acknowledgments

Thanks goes to ...

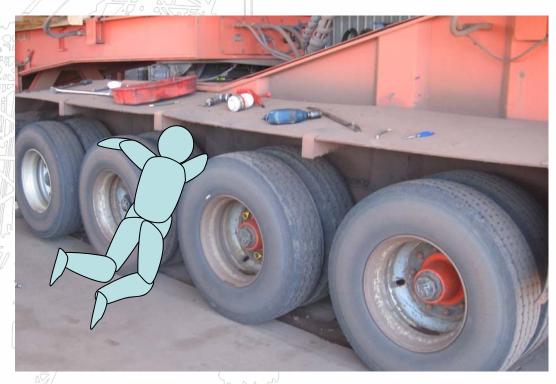
ACARP

Matthew Sheather - Rio Tinto - project monitor
Keith Smith - ACARP project administration
Anglo American Foxleigh and Capcoal mines
Peabody Burton mine
LCR, BIS and Toll contractor haulage personnel

Observations and thoughts only



Surface Haulage Operation Fatality – Qld December 2010



Zipper failure of outer radial tyre - while removing jack



Refer Safety Bulletin 118 for more detail











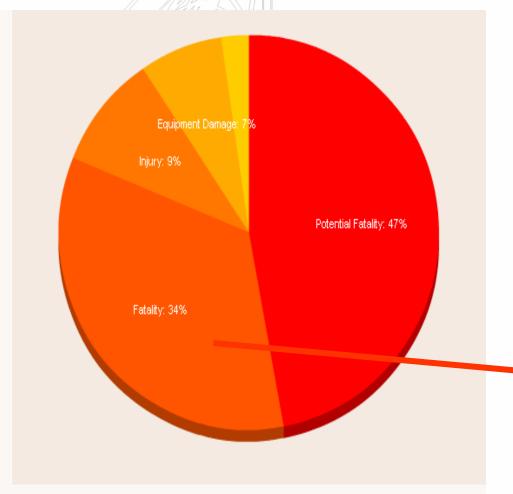
Maintain-ability????





Maintain-ability?

Tyregate



LTA = 'Less than adequate'.

Consequences

Root Contributing Causes

This graph shows the number of records with the specific RoorContributing Caus

Click on an element in the graph or in the legend to view the document less

LTA material testing/fatigue NDT

Heating of wheel assembly or wheel studs

LTA matching of assembly components.

LTA deflation practice.

LTA rim integrity

Uncontrolled handling of tyre (LTA grip).

No NDT schedule

Contact with Powerline

LTA positioning of crane operator.

LTA procedure

Seized or overheated brake, overheated elec

Confined working environment.

Incorrect jacking

LTA training /competency.

Overpressurisation of tyre or rim

Tyre environment - severe conditions causing

Failure of tyre or tube repair.

LTA / No support equipment other than jacks:

LTA chocking of vehicle

LTA communication between work teams.

LTA dismantling of 2 piece industrial rim.

LTA integrity tyrehandler

LTA tooling

Use of chemical tyre sealant/propellant/hot w

Abnormal operating conditions.

Non-earthmoving Equipment







What's the difference to <u>earthmoving</u> equipment?

In terms of tyre maintenance?

AS4457 does not include rims/wheels < 24" (600 mm) in outside diameter

Hmmmmm....

The hazards are the same!

Ergo ...the controls should be the same!



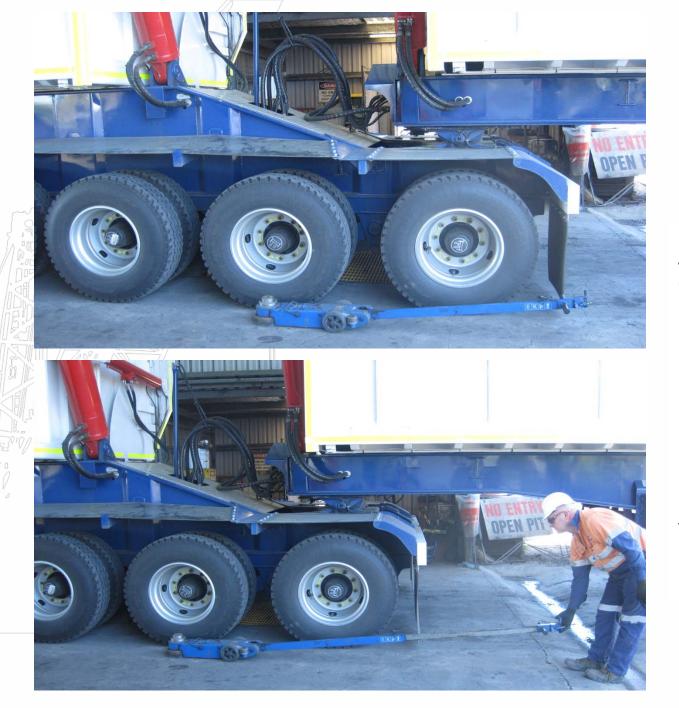
Structure of Analysis and Report Work Competent People controlled viron Safe **Production** Safe Fit For Work Purpose **Practices** Equipment Nertny Wheel imtars



Trolley jack

– difficulty
with
placement
under the
vehicle







Extendable
trolley jack,
reduced issues
with safely
placing the jack
under the
vehicle (creates
distance to hazard ...
pressure, gravity..)



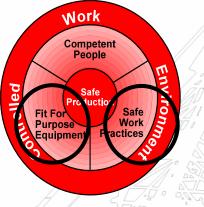


The axle is raised off the ground by supporting the bogey chassis.

Note: this should only be done if the OEM nominates the chassis as a safe lifting/support point.

Design improvement?









Planned & 'regulated' disposal – avoids reintroduction of potentially damaged tyres





Manual Task – Tyre Handling Dolleys





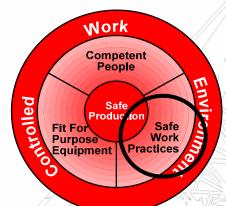
Branding = Opportunity to quantify...



Operational history

- Safety
- Life
- Costs
- Performance





Branding = opportunity to quantify...









FFP tooling





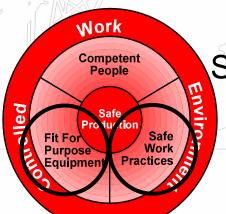




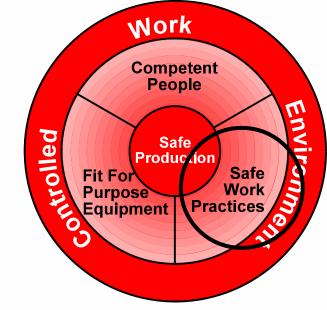
Different attachment systems – different controls



Seek intrinsically safer alternative

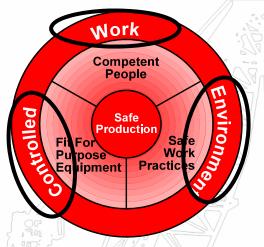






Inflation pressures – should they be tyre/brand specific?



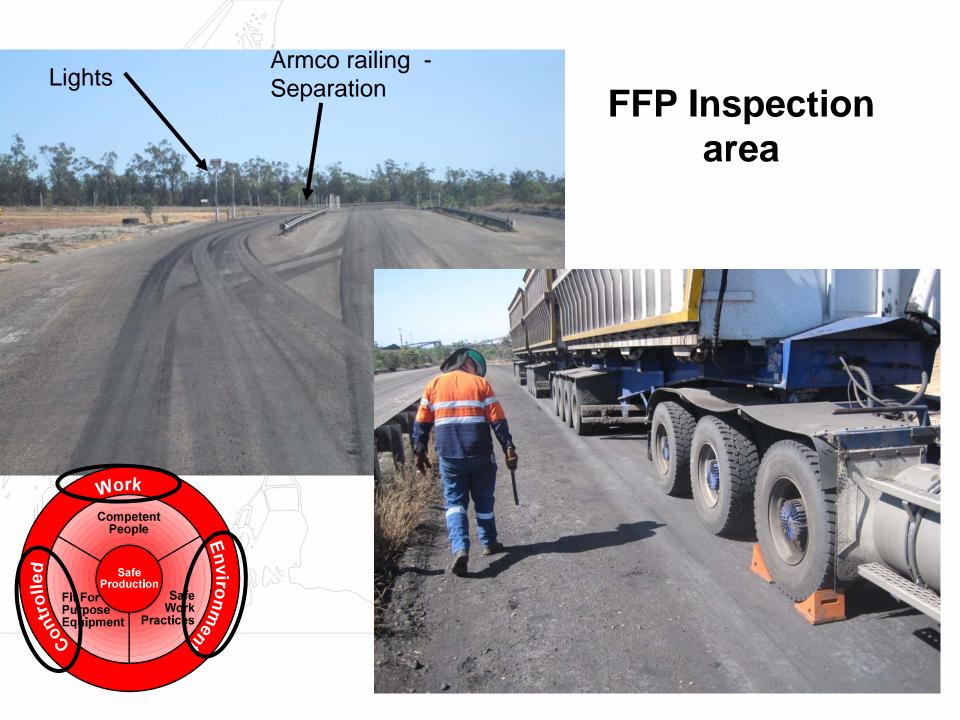


FFP Dumpstation

Reduced opportunity for tyre damage







Dedicated FFP Maintenance Area





Safe Inflation







Work

Competent People

FFP Inflation tools





Work

Competent People

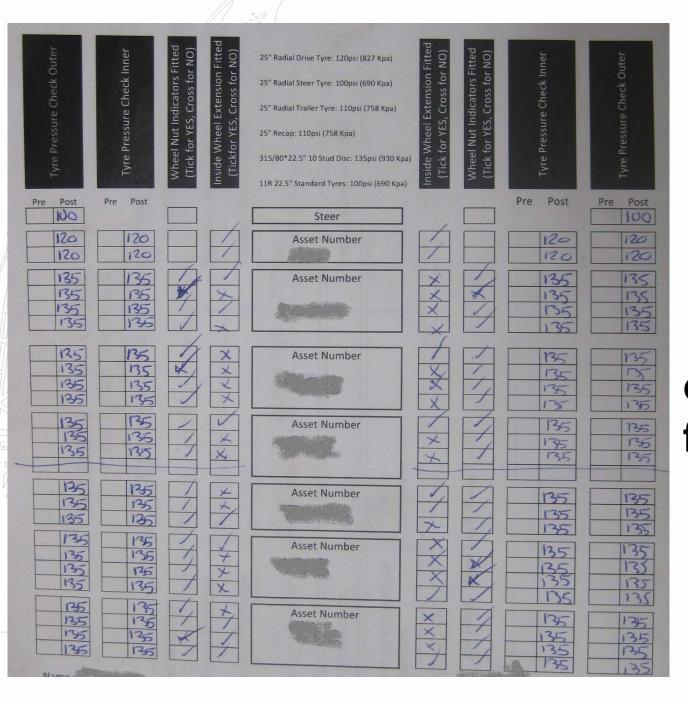
Master Pressure Gauge



Requires calibration!

Use to check handheld gauges (document!)





Pressure recording – opportunity for analysis



Accessibility to Valve stems



Plus remote pressure sensing...



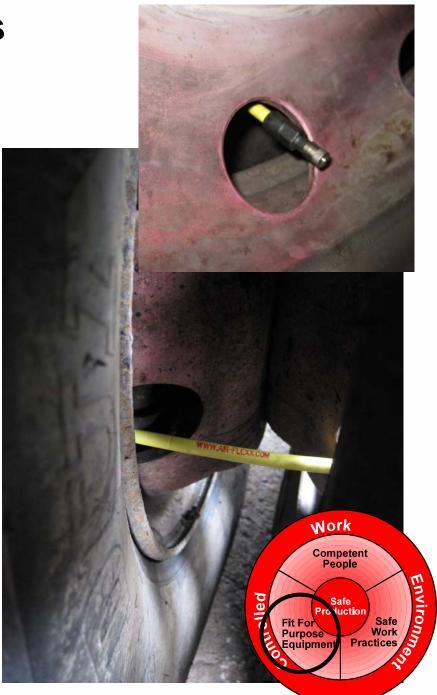




Accessibility to valve stems

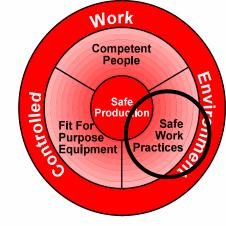






'Smarts'





Traffic Management

_

Tyre Management

Safe Production!



Conclusions

Frontline applications non-earthmoving type equipment ~ 50%

Typical management of tyres, rims and wheels focussed around earthmover type tyres, rims and wheels – bias towards AS4457:2007-Part 1

There is no Australian or international standard providing guidance (operational or maintenance) for rims and wheels of less than 24" (600mm) nominal diameter

Non-earth moving equipment <u>design</u> - production focussed with less thought put into the maintainability of the equipment

Tyre maintenance relies heavily on standard type of tooling despite the increased frequency and therefore exposure to typical tyre maintenance hazards including considerable manual task hazards

Need to look at tool designs - jacking

Recommend own (new?) standard, or expansion of AS4457

Report available through ACARP

Checklist at end covering main findings of study



