Safety bulletin

Mines

Mines Inspectorate

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Integrity testing of earthmover rims

Earthmover tyres, rims and wheel assemblies are safety critical items which must be maintained and used correctly to achieve levels of acceptable risk.

A 2004 investigation into several fatal accidents involving earthmover tyres and rims, both in Australia and in Australasia, highlighted some recurring oversights and contributing aspects, which were subsequently included in a revision of the Australian Standard for earthmover rims. Tyre-related issues are now published as Part 2.

> AS4457:1 2007 Earthmoving Machinery – Off the road wheels, rims and tyres – Maintenance and repair Part 1: Wheel assemblies and rim assemblies.
>
> AS4457:2 2008 Earthmoving Machinery – Off the road wheels, rims and tyres – Maintenance and repair Part 2: Tyres.

The disintegration of pressurised tyre and rim assemblies is often the main mechanism in fatal accidents involving tyre service personnel. This Safety bulletin revisits one of the key hazards — **earthmover rim fatigue that can lead to dangerous disintegration of the assembled rim**, and offers risk controls expected to be implemented.

There are several factors affecting rim integrity:

- **Hazard and Root Cause — Metal fatigue and deterioration of the rim assembly**: Earthmover rims undergo punishing dynamic loading cycles during their operation — these cause metal fatigue and general deterioration of the assembly. The combination of compromised rim integrity, through fatigue or damage of components, and failure to deflate the tyre prior to removing the assembly has led to several fatalities.
- **Expected Risk Control** — Implementation of a **reliable non-destructive testing regime to identify rim metal fatigue and other deterioration in rims and rim components**, and a strict deflation protocol, as detailed in AS4457:1 2007 must be incorporated into the sites SHMS.

  The history of rims and rim components currently in operation must be reliably established and compared with the OEM stipulated safe life. The integrity of rims and rim components that have exceeded their stipulated safe life must be established through appropriate testing regimes as a priority. Also, the maintenance management system ought to be brought to a stage where it can reliably and accurately track, report and alert on rim testing status.

- **Hazard and Root Cause** — **Mismatch and subsequent disintegration** of rim components has led to several deaths.
- **Risk Control** — **Clear and unique identification of rim components** must be achieved to minimise incorrect assembly of components that can lead to compromised rim integrity.
- **Hazard and Root Cause** — **Sprung (distorted) lockring earthmover rim assembly systems** must be checked by a competent person, as damaged, corroded, stretched or poorly fitted lockrings will contribute to poor rim and rim component integrity.
- **Risk Control** — Therefore, where practicable, intrinsically safer designs provided by some earthmover rim manufacturers should be used.

  Similarly, check the **integrity of light vehicle rim systems**, including sprung lockring systems and 'split rims' fitted to personnel carriers, site ambulances and other non-earthmoving equipment.

Adoption and incorporation of the above, implementation of the recommendations contained in AS4457 Part 1 and 2 into a mine's SHMS and, importantly, effective communication with all stakeholders are fundamental to achieving a safer workplace.

Mining operators, contractors, maintenance providers, manufacturers (OEM), designers and suppliers of tyres and rims must ensure that effective safety and health management systems (SHMS) and processes managed and maintained by competent personnel are in place to achieve safety in the area of tyre and rim management. This is required by mining legislation and supported by the recently revised Australian Standards.

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