



Safety Alert

Fatality - Hot Work on Wheel Assemblies

Background

A contractor was killed by an explosion after he had carried out grinding on a rim which had a tyre fitted. The tyre was inflated. The most likely explanation for the explosion and subsequent fatality was that following the heat build up due to the grinding, pyrolysis¹ occurred inside the fitted tyre and rim assembly, filling the assembly cavity with explosive gases which triggered a violent explosion.

A number of tyre and mechanical servicemen have sustained serious or fatal injuries after applying heat to tyre and wheel/rim assemblies, e.g. using oxy-acetylene equipment to loosen wheel studs/nuts or arc welding to repair wheel/rim cracks. Fatalities and injuries are also reported where 'hot work' was performed in close proximity to tyre and rim assemblies, for instance wheel motors, hubs, main frames and other mechanical components.

It is important to note that explosion of the gases can in some cases be delayed for considerable time after the application of heat has stopped i.e. minutes to hours.

Prevention

1. **Never apply heat to any fitted wheel/rim assemblies**, i.e. rims fitted with tyres.
2. Before any heat is applied – welding, cutting, grinding, **ensure that the tyre is fully deflated and completely removed from the wheel/rim.**
3. **WARNING: Deflation of the tyre without removing it from the rim will not adequately safeguard against the assembly exploding.** If heat is applied, pyrolysis can occur inside the fitted assembly, fill the assembly cavity with explosive gases and cause a violent explosion.
4. Any repairs to rims should only be carried out by experienced and competent personnel using established industry Standards i.e. 'AS 4457 – Earth-moving machinery – Off-highway rims and wheels - Maintenance and Repair', and safe work procedures as the integrity of the rim may otherwise be affected.
5. Operationally, rim service hours should be accurately tracked and a NDT (non destructive testing) regime be implemented to ensure ongoing safety, integrity and serviceability.

Following the above actions should prevent a recurrence of similar incidents.

"Eliminate All Unsafe Acts"

Tilman Rasche, Manager – Global Risk & Business Improvement

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For further information on this particular fatality, please refer to www.msha.gov/FATALS/2006/FAB06c37.asp

¹ *Pyrolysis* is the decomposition/breakdown of tyre rubber from heat. This breakdown process is reported to start when rubber reaches a temperature of ~250 degC, with auto ignition and subsequent explosion of the breakdown products reported to take place above 400 degC. (ref Tyre Fires and Explosions - Causes and Prevention, J Torlach & B Johnston, Dept of Mine WA, 1990)

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