CICA – Vic / Tas Branch
Crane Safety Bulletin
235
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Greetings all. Today's topic is about Tyre fires, pyrolysis and explosions.

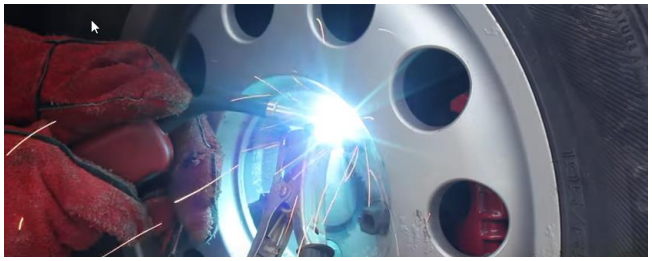
You may recall an earlier Bulletin 207 about High Voltage Electrical Hazards where I discussed the laws regarding no-go zones and the procedure if contact is made with electrical hazards. A lesser know consequence of the above event is Tyre Pyrolysis which is a danger that arises when combustion takes place inside the tyre with no external signs. Whenever excess heat is developed in, or applied to a tyre, it can initiate a process within the tyre known as pyrolysis i.e. 'the decomposition of a substance by heat'. This can cause a build-up of flammable gases and pressure within the tyre, which may ultimately rupture or explode.

Enormous amounts of energy can be released by a tyre explosion, often leading to significant equipment damage, serious injuries or fatalities. Google "exploding tyre" and you'll get the idea. Crane tyres are particularly dangerous due to their size, volume of compressed air and large amount of rubber (potential projectile mass).

The tyres above are undergoing a controlled test and have exploded and destroyed the steel safety cage around them. Note that these tyres are half the size of a crane tyre. The tyre below is only a truck tyre, but it's clear that the test dummy won't be used again.

The electrical arcing events described in Bulletin 207 have been known to cause tyre pyrolysis. Throw lightning strike into the mix also. Although it's rare, it still happens.

Welding of wheel rims, oxy-heating wheel nuts and overheating brakes are also known causes.



Trucks and other heavy vehicles are just as susceptible as cranes under these circumstances.

Pyrolysis related explosions are unpredictable and have been known to occur immediately, or up to 24 hours after initiation. An explosion can occur where no fire is visible, and the danger area can be up to 300 metres from the tyre. What this means is, there is an added risk due to the fact that the severity or consequence is extremely high, but the detectability and warnings are low to non-existent.

An alert issued by the Queensland Department of Natural Resources, Mines and Energy have established procedures to follow when personnel suspect there is danger of a tyre explosion, e.g. after a rubber tyred vehicle has contacted overhead powerlines. These procedures include:

1. Park the vehicle in an isolation zone, with a minimum 300 metre radius
2. Remove all personnel from the area, and do not allow anyone to re-enter the isolation zone for 24 hours
3. Alert fire-fighting services.

In addition to this, always make sure your brakes and drive train are inspected regularly and always follow the crane manufacturers guidelines regarding any use of excessive heat around rims with inflated tyres.

This hazard and the contributing circumstances must be recognised. The possibility of tyre pyrolysis and explosions must be considered in the development of health and safety management systems and procedures used by Crane and other heavy vehicle operators.

Stay Safe -CICA