Non-Impact Fire

Trucking Operations #011 – NTARC in-depth series

Fire might not be the first risk that comes to mind when you think about operating trucks, however non-impact fires (10%) caused a greater proportion of NTI's customers large losses (>$50k) in 2019 than fatigue (9.6%).

This guide looks at some of the common elements of truck fires and what strategies can be put in place to reduce the risk of your truck(s) catching fire.

Two problem areas and then the rest

Four out of every five truck fires (78.9%) come from two main areas; the engine bay/cabin and wheel ends. This guide focuses on helping Fleet owners and managers understand these causes and proposes strategies to address these areas..

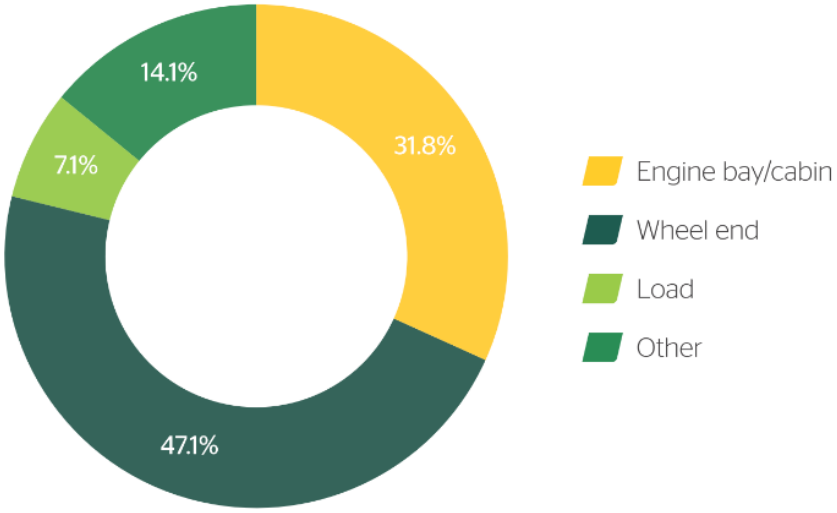

Figure 1 - Distribution of fire losses by cause.

PROBLEM AREA 1 - Engine Bay/Cabin Fires

Engine bay/cabin fires can in turn be broken into two main categories;

1. fires resulting from electrical short-circuits/overheating, and
2. fires resulting from mechanical causes such as fluid leaks and component failures.

Electrical fires

55% of engine bay fires (or 17% of all fires) are caused by some form of electrical issue. While a small proportion are the result of the failure of aftermarket accessories or bad low-current wiring practices, most come from the two or three main high current wiring circuits:

1. The starter motor power feed
2. The alternator charging feed
3. The main cabin power feed

What sets these cables apart, is that they are sized to carry very high electrical current and they are unfused. Truck manufacturers generally pay a high level attention to the routing, protection and support of these cables and this is reflected in the small numbers of fires on new trucks.

Figure 2 - A bolt that had rubbed through a power cable with the copper cable still welded to the head.

As trucks are used, serviced, repaired and modified, the level of care and attention paid to these cables may not be sufficient. For example, a battery box might be relocated for operational reasons and in order to re-use the existing starter motor power cable, it ends up being run unsupported across the edge of the battery box, allowing it to rub and eventually short-circuit, causing a fire.

Ensure anyone working on your trucks knows that these cables are a high risk item and need special care and attention. Abrasion/mechanical protection needs to be in good condition, all routing and cable restraint needs to be well-planned and executed.

Mechanical fires

The remainder of engine bay fires come from ignitable sources. Almost every truck on the market is turbocharged and this means that there is a ready source of ignition (the turbochargers exhaust housing) for any fluids which may leak in the engine bay. This risk is further compounded by the fact that nearly every fluid used in trucks if flammable and that engine cooling fans ensure any leaks are spread around the engine bay and any resulting fire is fed a ready supply of fresh air.

Figure 3 - A turbocharger after an engine bay mechanical fire.

This means that any engine bay fluid leak needs to be taken seriously. The bus industry's experience with fire following the adoption of engines with EGR emission technology provides the key learning here. Engine bay cleanliness should be cornerstone of your strategy to prevent engine bay mechanical fires. **Identify and resolve leaks as soon as possible and ensure engine bays are subject to regularly cleaning.**

PROBLEM AREA 2 - Wheel End Fires

The other focal point for truck and trailer fires are wheel ends, with nearly half of NTI's non-impact fires starting here. There are three fire initiation pathways at the wheel end;

1. Tyres – an under-inflated tyre can progressively overheat, eventually reaching the point where it will spontaneously combust. Once alight, tyres are extremely difficult to extinguish.
2. Brakes – if a fault causes the brakes on the truck or trailer to drag, they can eventually create enough heat that they cause adjacent components (tyres, wheel bearing grease, hoses) to catch fire.
3. Wheel bearings – when a wheel bearing seizes but is forced to rotate by the combination driving down the road, it can instead spin the bearing race against the end of the axle. This causes a rapid build-up of heat which can in turn cause the wheel bearing grease and ultimately the entire wheel end to catch fire.

Figure 4 - The remains of a tyre fire

In terms of strategies to reduce the risk, firstly ensure your staff understand the hazard that wheel end issues create. They'll be more engaged than if they're simply ordered to check components without understanding why.

Encourage drivers to undertake both pre-start checks and also to walk around the vehicle when stopping, check for elevated wheel end temperatures using the back of a hand or a non-contact thermometer.

SPECIAL MENTION PROBLEM AREA - Refrigeration and Load Fires.

There are a few other potential causes for non-impact fires that are deserving of attention. Firstly refrigeration units can create a fire risk, as with engine bay mechanical fires the best defence against this appears to be maintaining cleanliness so that any leaks are addressed immediately. Secondly some loads create a risk of instantaneously combustion, such as hay which has been bailed while too damp.

Ensure your staff are familiar with any risks unique to the load they're carrying and are trained in how they are meant to prevent these incidents and respond if they do occur.