A plan to reduce Heavy Vehicle fire risk

The National Heavy Vehicle Regulator (NHVR) recently convened a 'Fires round table meeting' of industry leaders to discuss the level of and causes of heavy vehicle fires. The trigger for this meeting was the petrol tanker fire that occurred on the Pacific Highway in Wollongong on the third of January 2019.

There is no national register of heavy vehicle fires. The industry relies upon the National Transport Insurance (NTI) report on serious-incident insurance claims as a guide to the non-impact fire-risk performance of the fleet. The 2019 NTI report was recently released. It is based upon the 2017-year claims. A large loss is defined as an insurance claim of $50k or more. There were 756 large-loss claims in the 2017-year data. The NTI report finds that about one in 400 heavy vehicles will have a large loss claim in any year, and that proportion has remained constant for the past five reports.

The bar graph shows the proportion of non-impact fire claims over the five NTI reports. There has been a reduction for the past two reports. Assuming the fire claims are about eight per cent, then the chance that a heavy vehicle insured by NTI will catch fire in the next year is about one in 5000.

The NTI assessment of fire causes is shown in the Table below. Fires due to electrical causes account for about 33 per cent of fires. Wheel-end fires also for about one third of fires. Fires due to fuel line, oil line, turbocharger and exhaust failures account for about 25 per cent. The remaining ~ 10 per cent of fires started on the trailer due to refrigeration unit failure and mechanical vibrations disturbing the load.

I presented at the National Heavy Vehicle Regulator (NHVR) round table meeting about the causes of heavy vehicle fires. I have developed a guide to reduce the risk of heavy vehicle fires substantially. The guide is directed to manufacturers, operators and drivers. It is presented in rank order:

1. Fires on main electrical cables

Manufacturers: Do not distribute the electrical system from the starter motor positive terminals.
Use plastic conduit with flame retardant properties.
Give routing of main cables priority.
Ensure main cables are in the middle of a cable bundle.
Use rubber block clamps rather than steel-spined clamps.
Install circuit breakers or maxifuses in the alternator, cabin supply and trailer supply cables at the battery-box end.
Only the battery-to-starter-motor cable is excluded from the need to have CB or fuse protection.
Operators: Add main electrical cable inspection to the A-service check list.

2. Exhaust Pipe Fires

Manufacturers: Keep combustible material at least 200 mm away from an exhaust pipe or turbocharger. Add a metal shield if this is impractical.
Orient oil lines, fuel lines and power steering lines so that failure at a fitting will not squirt oil onto the exhaust pipe.
Drivers: Look out for road debris that could lodge onto the exhaust pipe. Do not ignore burning smells around the engine compartment.
Operators: Air leaks from the air-intake pipes or intercooler will probably result in the engine controller over-fuelling the engine. The turbocharger will feel the extra heat. Measure the air intake turbo boost at each A-service. Repair as necessary.

3. Dragging Spring Brakes

Manufacturers: Mounting actuators or brake hoses below axle level is asking for road-strike damage. If this can't be avoided, install a shield.
Drivers: Stop soon after driving over road debris and check that it has not damaged the brake actuators or hoses.
Operators: Add air-brake-valve refurbishment to D-service checklist.
At each A-service visually inspect the air hoses at the spring brake actuators for signs of pending failure.

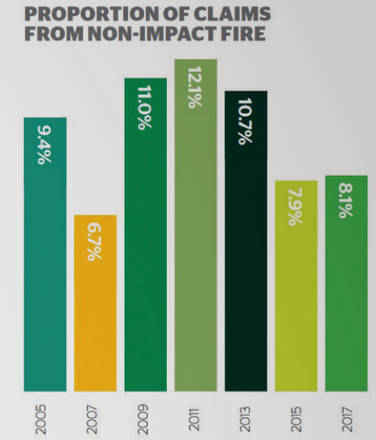
4. Tyre Fires

Drivers: Feel the temperature of each of the tyres when you stop for a break. Report flat tyres to the workshop manager by phone.
Take note of leaning vehicles. The air suspension hoses might have failed. Stop and investigate.
Operators: Have a clear tyre inflation pressure policy. Make someone responsible for checking the tyre inflation pressures once a day.

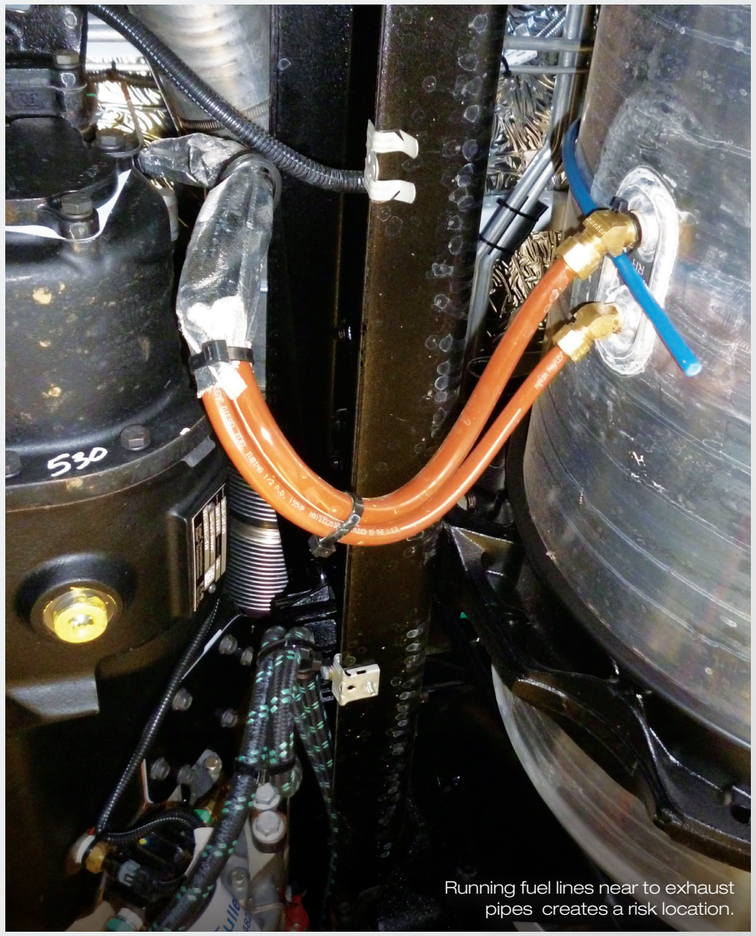
5. Wheel bearing failures

Operators: Introduce scheduled replacement of wheel bearings.
The 'replace-upon-failure' mentality is unacceptable.
Ensure that drivers report driving through water over the road.
Re-lubricate bearings every time a truck or trailer drives through water.
Ensure that trailer wheel ends are regularly serviced. Trailers often get forgotten.
At every service, lift each wheel and shake it. Investigate each case of rocking wheels.
Ensure that mechanics are trained to assess wheel bearing condition.
The difference between an optimum setting and a fire-risk setting is about six thousands of an inch!
Be very careful using offset wheel rims. The bearings might not like them!
Drivers: Touch the wheel hubs on the vehicle when you stop for a break. Wheel bearing problems cause heat and temperature! Report abnormally hot bearings by phone to the workshop manager.

PROPORTION OF NTI LARGE-LOSS CLAIMS	8%								
SUB-CLASSIFICATION		ENGINE / CABIN FIRES (ELECTRICAL)	ENGINE / CABIN FIRES (MECHANICAL)	WHEEL END FIRE (TYRE)	WHEEL END FIRE (DRAGGING BRAKE)	WHEEL END FIRE (UNKNOWN CAUSE)	WHEEL END FIRE (BEARING FAILURE)	TRAILER FRIDGE MOTOR FIRE	TRAILER LOAD CAUGHT FIRE
BREAKDOWN OF FIRE CAUSES		32%	25%	10%	10%	8%	5%	3%	7%



Courtesy: NTI


Running fuel lines near to exhaust pipes creates a risk location.

6. Fuel Line Failures

Manufacturers: Keep fuel lines at least 250 mm away from exhaust pipes.
Protect polyamide fuel lines with a wrap or conduit to prevent rubs against sharp edges.
Ensure that fuel lines are clamped / strapped every 300 or 400 mm.
Drivers: Do not ignore fuel leak puddles. The leak may become a spray onto the exhaust pipe.
Operators: Add inspection of fuel lines to the A-service checklist. Look for fuel lines (go and return) rubbing on metal corners. Tie-up drooping fuel lines.
Inspect fittings for signs of pending failure.
Keep the engine clean. Build-up of oil and glycol provides fuel for fire.

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ARTSA Heavy Vehicle Fires – Causes, Response and Avoidance – Conference.
Royal Randwick, Sydney
15 August 2019.
Program and Tickets:
www.arsta.com.au