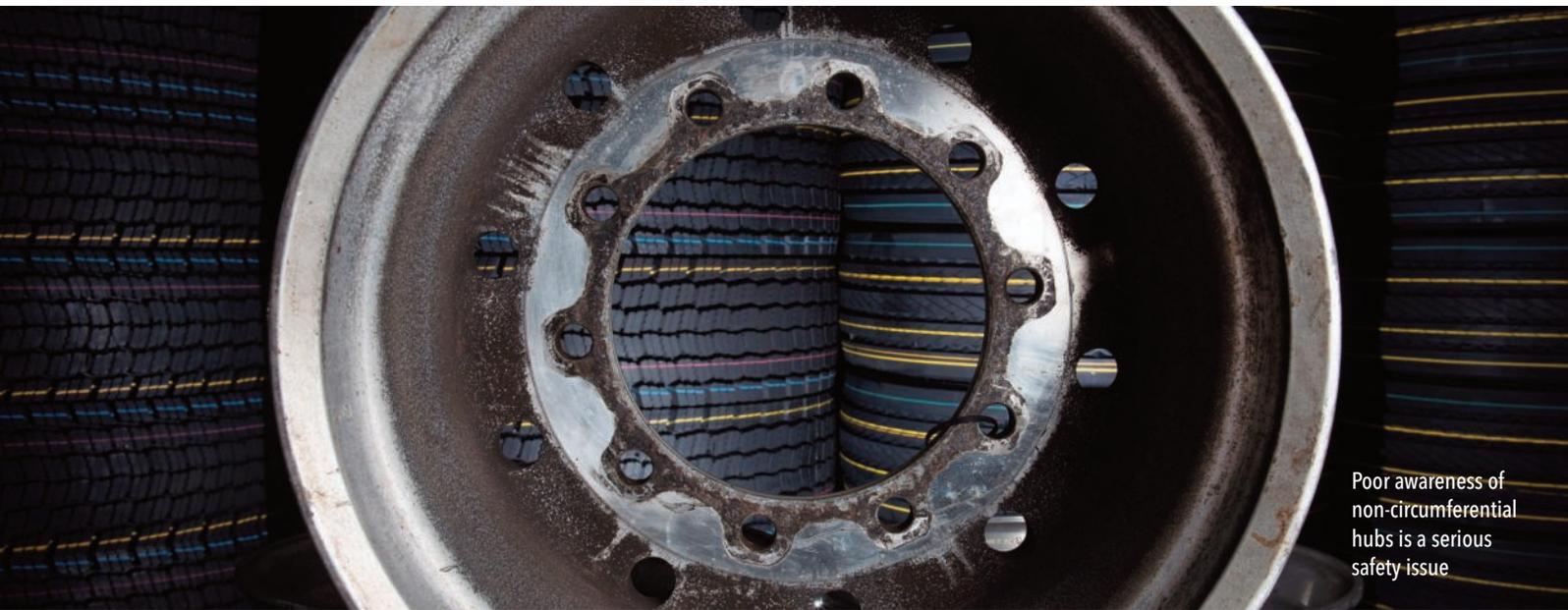


Careless torque

Almost two decades have passed since the DfT published its 'Careless torque costs lives' advice on how to crack wheel security issues - yet the problem persists. Brian Tingham examines current thinking



Poor awareness of non-circumferential hubs is a serious safety issue

It seems little short of incredible that, in 2015, DVSA inspectors are still seeing loose wheel nuts and stretched studs at roadside inspections - findings that lead to lengthy maintenance examinations and visits to the traffic commissioners. Worse, the emergency services are still being called to accidents caused by wheel detachments. Most result in damage, but some lead to injuries and a few to fatalities. Then the outcome for all concerned is devastating - and that may well include the truck driver, the operator, its management team and its workshop people.

Why does it happen? The trite response might be that, if we knew that, it wouldn't. But we do know. As TRL's

2006 report for the DfT (Department for Transport) 'Heavy vehicle wheel detachment: frequency of occurrence, current best practice and potential solutions' concluded: "The causes [of wheel nut loosening] are now well understood."

Paraphrasing, the study states that the clamping load/force (of wheel to hub) is critical, and this must be sufficiently high "to withstand all applied forces, despite any effects of joint relaxation, variation in the torque-to-clamp ratio, or relaxation due to temperature". It also makes the obvious point that this clamping force must not be so great as to exceed the studs' yield point.

Crucially, though, the report went on to assert that current wheel fixing

designs are capable of achieving those requirements, but only if "joint relaxation is accounted for, with re-torquing, and all components are in good condition". Just as important: "The factor of safety [afforded] means that considerable maintenance of the joint is required to maintain its effectiveness..."

So there you have it: regular inspection and proper maintenance procedures that absolutely include re-torquing, but also surface cleaning and, by inference, appropriate stud lubrication, are key to wheel security. It sounds simple enough, but the plain fact that detachments and near misses still occur (including many involving movement indicators in place) says something is going wrong.

Wheels and hubs will have to be routinely assessed for fitness for purpose when the UK amends national legislation - which must happen by 20 June 2018

IRTE wheel security guide

The IRTE, ATS, FTA and SITA UK best practice guide on wheel security, launched late in 2009, is as relevant today as it was when first published. And with an introduction that reads: "When wheels become detached from a moving vehicle, they can accelerate up to around 150km/h ... reaching a height of 50m before colliding with other vehicles or road users at an equivalent force of 10 tonnes", fleet managers are left in no doubt as to the importance of getting this right.

The guide draws on TRL's 2006 evidence and cites the same issues around maintaining the

clamping force (compression of the wheel, hub and drum together). It agrees that failed or worn studs are the primary causes of incidents (45% and 23% respectively). Key reasons it says, are: settlement; insufficient torquing; over-torquing; and incorrect lubrication of threads and interfaces, leading to friction losses.

As for the mechanisms of detachment, the IRTE guide suggests that, once there are stud problems, the wheel starts moving relative to the hub, which results

in side loadings and loosening of the nuts. That leads to elongated stud holes, fatigue failure of the studs, fretting fatigue cracks and ultimately catastrophic failure.

The IRTE guide also advises that, although nut movement ought to be easy to identify, settlement is more difficult to detect. And it states that 19% of wheel-fixing problems reported by DVSA from roadside checks involve trucks fitted with nut movement indicators or similar devices. Be warned.



How can that be? For the most part, yet again, depressingly little seems to have changed since TRL's 2006 report. It made the point that there are several good practice guides (including the IRTE's own publication - see panel above), but that while there is plenty of commonality between them, there is also divergence. That manifests itself particularly in terms of "torque levels and the issue of lubrication, where there is no standard approach". And none has been forthcoming, largely because of variations in detail design.

No surprise then that, although the vast majority of operators and their workshops now have formal policies and procedures for wheel fixings and their maintenance, they don't always precisely match the truck, axle, hub or wheel manufacturer's recommendations. No data is available, but the anecdotal evidence is clear - and this problem is amplified as trucks age and non-OEM parts are acquired, especially at breakdowns, when the pressure is on to get vehicles back on the road.

Equally, though, just as in 2006, too many drivers do not seem to understand what good practice looks like, and fail even to complete their mandatory daily walk-around checks. Sadly, even fewer understand why this

matters - which is worrying, given TRL's additional finding that "those drivers or operators who better understood and adhered to [these] requirements reported a lower incidence of wheel-fixing problems".

Talking of 'understanding', there is today another factor blamed for some wheel failures: that of incorrect hub and wheel combinations (resulting from the now readily available variety) causing early metal fatigue. John Ellis, managing director of Motor Wheel Service Distribution (MWSD), insists that poor awareness even of the existence of non-circumferential hubs (star and spider - some OEM) is a serious safety issue.

ROADWORTHINESS PACKAGE

Europe agrees, and hence its classification of commercial vehicle wheels as 'safety critical', which was enshrined in European law in the EU Roadworthiness Package in May 2014. That package comprises three European directives, the most relevant of which concern periodic roadworthiness testing and roadside inspection. The upshot is that wheels and hubs will have to be assessed for fitness for purpose as part of both those encounters when the UK amends national legislation - which must happen by 20 June 2018.

As yet, however, there is no date, and the DfT's report 'Heavy Vehicle Wheel Fatigue Study', earlier this year, is unlikely to speed up change. Its survey, sent to 11,000 members of the IRTE, FTA (Freight Transport Association) and RHA (Road Haulage Association), finds no proof that wheel life is shortened by variable shaped hubs.

Ellis counters that less than 1% (107) of operators responded to the survey, and that limiting it to members of organisations that promulgate best practice "skewed the results". He also argues that, since knowledge of hub variants is so poor, how would anyone be aware of the issue of early fatigue caused by incorrect wheels on non-EUWA (Association of European Wheel Manufacturers) approved hubs.

Further, he points to wheels giant Maxion's literature, which explains that EUWA members have tested wheels with star shaped hubs and, although they pass relevant tests, reduced fatigue life was experienced.

Either way, MWSD is calling for the DfT to adopt the EU Roadworthiness Package without delay. In the meantime, ATS Euromaster, Bus Eireann, Pirelli, Stagecoach and TruckForce are among big names working with the firm to improve wheel safety. [TE](#)