

Hold on tight

Keeping wheels on commercial vehicles is in everyone's best interest: technicians, operators, regulators, the road-going general public. Yet this long-standing problem is still with us, since loose wheels continue to be discovered, and on occasion come off. IRTE's new guide can help

What causes wheel loss? IRTE council chairman John Eastman tells a story about attending

a commercial vehicle wheel loss public inquiry as an expert witness. The incident related to a vehicle that had suffered a blow-out. Following a roadside repair and a short journey, the wheels came off. Fortunately, in that low-speed incident no-one was injured.

The blow-out had been on a rear near-side twin-wheel arrangement. Eastman recalls: "Because the tyre depths were different, the tyre technician attending had put the wheel with the new tyre on the inside, and the inside wheel to the outside, introducing different mating surfaces, which, if not properly prepared, creates a problem.

"There was hardly any damage to the wheels, but the wheel nuts had run off and the studs were broken. Checking the paperwork revealed that the wheel nuts had been torqued incorrectly; the manufacturer's torque setting had been greatly exceeded. In addition, the mating surfaces, not having been prepared, prevented good clamping between the wheels and hub. This led to the wheels loosening and leaving the vehicle.

"I went there as an expert witness and concluded that the driver had carried out his checks at the start of the day, and the repairs and fitment process after the puncture had resulted in the wheel loss."

The moral of that story, says Eastman,

is simple: "Awareness and procedure has got to be considered at all times in inspection, preparation, wheel securing and re-torque, as well as fitting the correct components."

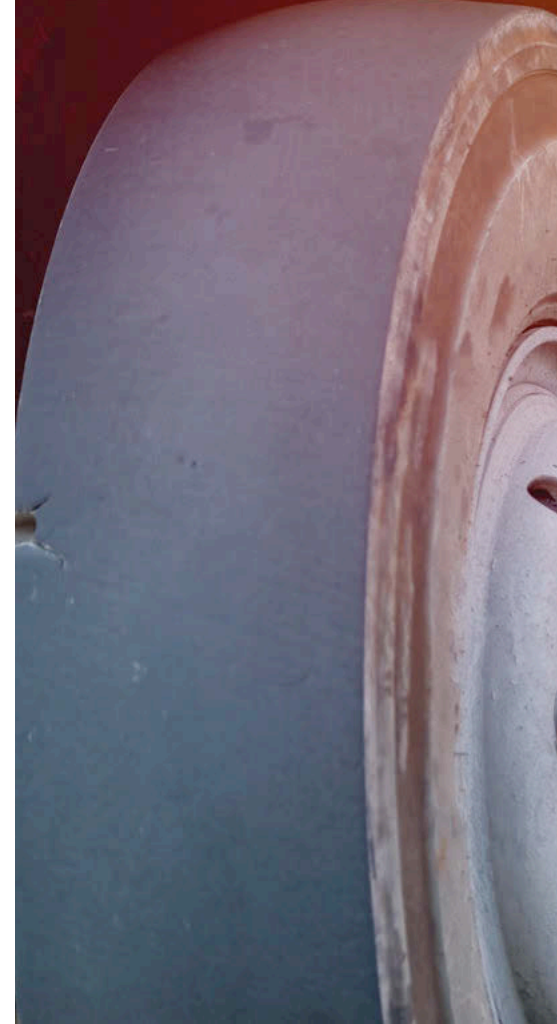
In order to ensure that best practice keeps up with progress, IRTE has revised its best practice guide on wheel security: see box on opposite page.

Eastman points out the fact that there are different wheel fixings (as described in the guide), and fitting the wrong fixings to the wrong wheels is just asking for trouble. "You cannot just do straightforward swap-over of wheels and fixings unless they are compatible."

Summing up, he reflects: "It's about making all involved with the maintenance of wheels more aware of the risks involved; if it's not done properly, the wheels can and will come off, or suffer a great deal of damage, or possibly cause a fatality."

Working backward from a loose nut or a loose wheel, in a recovery situation, may not be so easy, since parts of the wheel, including hub, studs, nuts, wheel and tyre, can affect other parts, as they work together as a system. For example, major flat spots on tyres can cause imbalances. If the wheel had not been centred properly on the hub, it can wear the hub lugs, send shocks through the wheel and loosen the nuts, causing damage and eventually wheel loss.

"Was the wheel loose? Was the hub worn? Was the wheel not fitted properly? Had the studs stretched and the wheel gradually loosened because of the extra



length? It's not easy to diagnose what caused the final failure," states Colin Woodcock, an escalation technician at Scania dealer TruckEast, who works in vehicle recovery.

But there are tell-tale signs of loose nuts, even if one doesn't use wheel nut indicators. Rob Vasey, TruckEast general manager, points to lines of moisture coming out of a nut that leave a spider's web of rust above and below a loose nut. Also, when tapped with a small hammer, a loose nut sounds different to one done up properly. "We rely on drivers doing their daily checks," he says.

Agreeing implicitly is Eastman, who places an element of blame on drivers for wheel loss. "As DVSA will tell you, apart from headlights, the biggest problem is lost wheels or loose wheels. And that's where drivers have not carried out their pre-use checks. There are a number of things on the market to help them do that, and they still don't check them: physically or visually."

AT BREAKING POINT

As Eastman saw at the PI, wheel studs can, and do, stretch, causing a loss of clamping force and poor wheel fit, and often break due to overtightening. As



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beefy as these specialised steel bolts are, they act like an elastic band, explains Gary Broadfield, director of Wheely-Safe. "If that band weakens or doesn't retain its elasticity, you won't get the frictional holding force on the back of the wheel nut." A tensile fracture - a break - is caused either by poor metallurgy of the stud in the first place, or over-torquing, or repeated torquing beyond the elastic point, he states.

Wheel studs, if treated well, should last the life of the vehicle, maintains Roger Thorpe, engineering manager of axle and hub manufacturer BPW. "We've got vehicles in big fleets that have been running for 10 or 12 years; some of the refrigerated trailers that they keep longer than ordinary curtainsiders, and we don't see issues with them."

He says that the biggest cause of wheel stud failure is overstretching. "It's quite easy to overtighten a wheel stud, and a lot of people do it." The biggest culprit is air impact guns, he says.

According to Eastman, the solution is, again, simple: only use a low-pressure air gun or preferably manual tools to run up the wheel nuts, and only tighten them manually with a torque wrench to the manufacturer's specifications (which,

to make things more complicated, differ from manufacturer to manufacturer). It is also advisable to lightly lubricate the threads, unless directed not to by the manufacturer.

Woodcock says that he has seen stretched studs first-hand: their profile thins in the middle like an hourglass, and are slightly longer. Thorpe at BPW says that stretching will take off "a couple thou" from the diameter. That is equivalent to 0.05mm, so invisible to the naked eye. "You'd have to measure it, and measure it in the right place," he states, but adds that this is a service that BPW offers for customers.

Can technicians really tell if a stud is stretched by eye, asks a sceptical Alex Deremez, MD of Checkpoint Safety. "Often people use a wheel nut to check, and say, 'Well, the nut is going



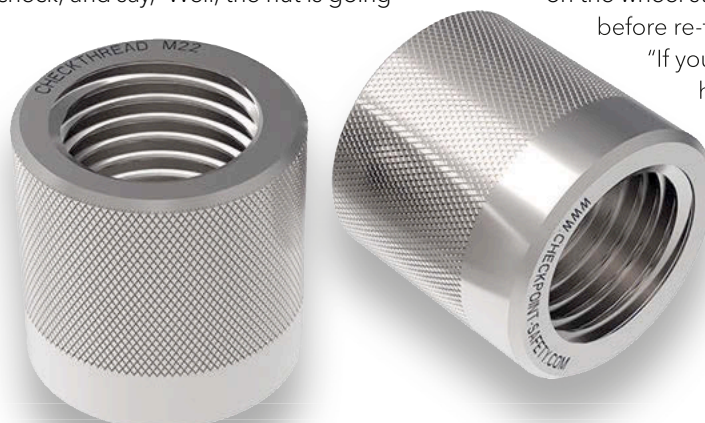
WHEEL SECURITY, RHA/IRTE BEST PRACTICE GUIDE, EDITION 4, FEB 2020

The 26-page guide has a similar format to the previous edition, published in 2015, but includes new technology and regulatory updates. Sections include:

- Responsibilities for wheel security
- Why do wheel fixings loosen?
- Types of wheel fixings
- Driver checks and responsibilities
- Maintenance of wheels and fixings
- Wheel fitting/tightening procedure
- Wheel re-torque procedure
- Devices for preventing wheel loss
- Annual test requirements for CV wheels and components
- Enforcement action - defective wheels and components

down the stud fine.' But if it's the same nut that you used on the stud, maybe that's been damaged too." Instead, he recommends the Checkthread tool (pictured below) to identify stretched studs without even taking them off of the hub. Resembling a standard wheel nut, the device's internal threads have been machined to fit several standard wheel stud sizes. It is meant to be put on the wheel studs manually before re-fitting a wheel.

"If you find it really hard to screw the tester down on to the stud, that's likely to be due to stretch," says Deremez.



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John Eastman



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Torque wrenches of course indicate when users have applied enough turning force through a noise, or the visible deflection of a bar. Technicians and others must not defeat this simple feedback process through poor practice. Adds Eastman: “I’ve seen drivers, and I’ve even seen technicians, tighten up with a torque wrench, and it clicks to say that they’ve reached the set measurement. Then they just take it half an inch further. That is not what should be done. The torque wrench tells you where it’s going to clamp at its greatest efficiency.”

In addition to not deliberately exceeding the wrench’s pre-set torque,

users should have wrenches calibrated (and listed on a calibration register). He further recommends that they be kept away from drivers. “Leave it to the people that know what they’re doing. That’s my view, unless the driver has been trained to the correct procedure. And generally engineering technicians tend to follow that rule: get the right people to do the job.”

Included in this category are those that have passed the irtec accreditation scheme for commercial vehicles, or those who have passed the tyretec accreditation scheme for tyre fitters. Eastman says: “That’s the licence that the tyre industry has agreed is the

correct method. It’s like irtec; there’s a competence test to make sure that people understand what they are doing, and it’s aimed at tyre technicians. They should be aware of the correct procedure.” He also recommends that organisations undergo the Workshop Accreditation scheme, which includes health and safety in the audit and specifically refers to wheel security and tool calibration.

The last item on Eastman’s wheel safety checklist is to ensure that torque is checked after 30 minutes or 50 miles. After initial tightening, the stud relaxes and a retorque procedure ensures the correct clamping force is applied.

Woodcock at Scania is also adamant about the importance of the retorque. “Even by the side of the road, when you have jobs waiting, you have to do this. Back in the day, when there was no procedure, five years or more ago, you had wheels coming off all the time. But after a 30-minute retorque, you very rarely see them loosening.”

To reduce that operational inconvenience, Eastman offers this tip: insist by contract to the service provider that in any road-side attendance resulting in wheel work, the attending technician only retorques the wheelnuts after putting tools away and completing paperwork. “This should go some way to correct procedure on all wheel attendances,” he observes. **TE**

STANDARD PROCEDURE

On finding a loose nut or loose wheel, Scania’s standard procedure involves checking for wear on the hub locator lugs with feeler gauges. Says escalation technician Colin Woodcock: “Normally once there is a loose wheel, they will chatter around, and wobble, and wear

the lugs away first. That’s mainly steel wheels, although it can happen with aluminium. If you find wear, that’s a workshop job, for a new wheel hub and studs.”

So long as there is no damage to the locator lugs, the next thing is to check the studs, and their tightness of fit in the hub. If they

don’t appear to be elongated, and tighten up firmly under a torque wrench, then the wheel can be put back into service, after replacing of the studs and nuts, and a proper retorque. Then all of the other wheels should be checked.

Changing all 10 studs and nuts

in a single wheel takes about an hour and a half, including jacking up, and the bill would be £180 plus labour, according to Vasey.

“We have one customer that changes its studs periodically as part of the maintenance schedule – every 400,000 miles. I don’t think that’s a bad idea.”