Service fit for a KING

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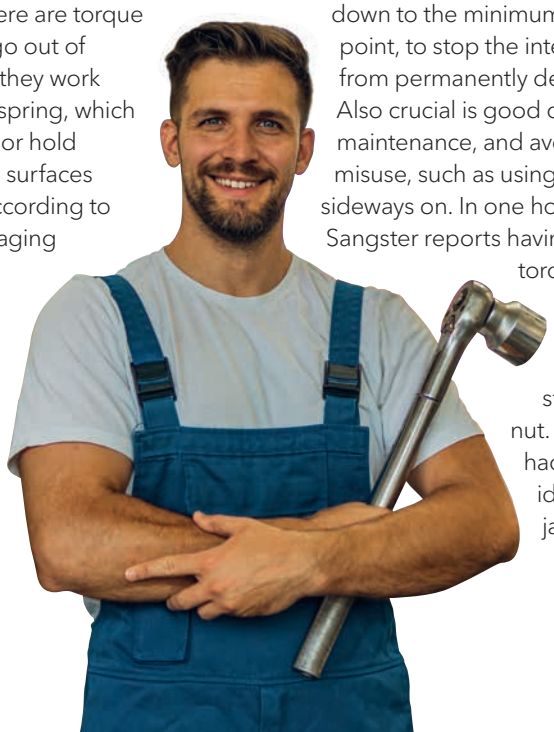
The torque wrench may be one of the most important tools in the workshop, as it keeps a vehicle's wheels on. But IRTE Workshop Accreditation guidance makes clear that such tools must be regularly calibrated to ensure that they remain accurate, reports Will Dalrymple

Overtightening a threaded stud will stretch it, distorting its shape and increasing the risk of fatigue cracking. Undertightening the connection means the fastener is not exerting sufficient clamping force, making the wheel wobble and fretting the threaded wheel studs.

Defending against this risk is the king of hand tools, the torque wrench, which applies the torque required, and indicates it to the user in some way. It allows technicians to apply the precise values specified by commercial vehicle OEMs. Like any precision tool, the performance of any of these torque devices can drift, and so they need regular checks and calibration to make sure they remain accurate.

In addition, the IRTE Workshop Accreditation scheme, which audits workshops for expected standards, looks for confirmation and logging of calibration processes ensuring they have been taking place and are up to date, points out IRTE's John Eastman.

Torque tools (there are torque screwdrivers, too) go out of tolerance because they work against an internal spring, which will tend to sprag – or hold a set – plus bearing surfaces wear down a bit, according to Ron Sangster, managing director, Advanced Witness Systems, a manufacturer of calibration machinery and instrumentation. (Sangster is also chairman of a BSi committee on torque standards.) His principal piece of advice to safeguard torque wrenches is to unwind the spring pressure after use, down to the minimum gradation point, to stop the internal spring from permanently deforming. Also crucial is good care and maintenance, and avoiding misuse, such as using it as a lever sideways on. In one horror story, Sangster reports having seen a torque wrench used to loosen a particularly stuck wheel nut. The operator had the bright idea of jamming the handle into position and then driving the truck back against it to loosen the bolt. The wrench ended up being as bent as a banana. (In such scenarios, incidentally, Sangster advises operators fit a torque-multiplying gearbox; that could provide a 5:1 mechanical advantage, provided that it is not a velocity-type gearbox.)



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He adds: "I've seen wrenches 30 or 40 years old which, treated properly, are still in calibration. A lot of these look corroded, but external corrosion doesn't mean that the internals are bad." Maintenance need only consist of an annual application of grease or oil to the pivot or actuator; that job is not usually part of the calibration process itself.

Turning to calibration frequency, only one of three axle OEMs contacted for this article specified how often

torque wrenches need calibration. BPW's maintenance instructions say: "Workshop torque wrenches must be calibrated ideally at six-monthly intervals, but certainly no later than annually."

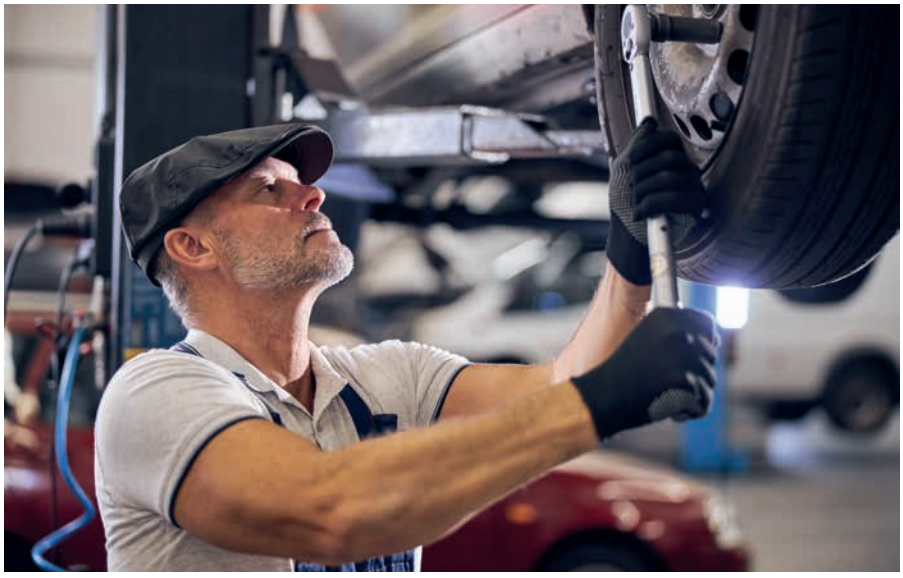
Recalibration times should also take into consideration the number of times a torque wrench is used; the more often it is used, the more frequent should be calibration checks. The opposite also applies, but users should keep in mind that the spring remains continuously under tension – which is a good reason for winding down, Eastman adds.

In absence of manufacturer guidance, calibration standard ISO 6789:2017 offers only one absolute rule: a maximum interval of 24 months.

For safety's sake, checking and (re-) calibrating of a torque tool is usually carried out by an accredited calibration laboratory or service. Technical accreditation body UKAS lists a total of 27 accredited laboratories for hand torque (tools). It audits these companies according to ISO 17025, the organisation standard for all calibration and testing organisations. That ensures that the companies use the right people and have the right processes in place to prove that they are following the standards. Sangster argues that it may give them an edge over companies that offer torque wrench calibrations without true traceability.

The way that calibrations are carried out changed a few years ago with the publication of ISO 6789:2017, to deal with what Sangster calls the poorly understood matter of measurement uncertainty. Often conflated with measurement error – which is a deviation from the expected torque – uncertainty means something entirely different: how believable the tool's measurement is. Then he poses a question: "Which is better: a tool with low error but high uncertainty, or high error but low uncertainty? The latter, because if a tool produces a believable error, it can be compensated for. But you can't compensate for uncertainty. That sets the limit of how much information your torque tool provides." The standard goes on to define seven types of uncertainty, and proposes testing programmes to overcome that.

The bottom line is the standard makes the test protocol complex and long-winded. Automatic testing machines, such as AWS's, help reduce the physical and recordkeeping strain of this work. TE



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BOLTING DO'S AND DON'TS

- "Use of the torque wrench on its own is no guarantee on wheel loss prevention. Preparation of all mating surfaces and wheel nut and stud condition play an equal part" – John Eastman
- "The wheel nuts must be able to run down the wheel bolt threads freely and by hand. Air spanners may be used only to run the nuts down the threads but NOT to tighten the nuts" – BPW maintenance instructions
- "When the torque wrench is applied, the wheel nut MUST be seen to rotate against the wheel face PRIOR to the torque wrench clicking off" – BPW maintenance instructions
- Stop tightening immediately once the torque wrench actuates. "The whole point of torqueing a bolt is to take it just into the yield point so that it clamps the load. You are clamping the wheel to the hub at a greater working pressure than would be seen by the wheel in use" – Ron Sangster
- "Methods will vary from one workshop to another but a common one is to torque tighten the wheel nuts and then to allow the vehicle to stand for 30 minutes and re-torque the nuts after the standing time" – BPW maintenance guide. (Sangster explains that any bolted connection will settle down after 20 minutes. During that time, tension crushes the high points on the thread. That slightly changes the length of the connection, and so reduces the force, according to Hooke's law).
- "The undoing force is no indication of the torque originally required to put on a wheel nut" – Ron Sangster
- "Every six months, check all wheel nuts, irrespective of whether the wheel has moved or not" – Volvo wheel torque procedure
- See also IRTE's wheel security best practice guide, available for download via *soe.org.uk*