IRTENZ

Technology 2000

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THE LOST WHEEL SAGA. WHERE ARE WE AT?

THE LOST WHEEL MYSTERY

WHEEL NUTS

1. Introduction

1.1 Way back in the 1960's – that's 40 years ago, it was not uncommon for semi-trailers to become uncoupled from tractor fifth wheels –or for trailers to lose the occasional road wheel.

1.2 With the advent of vehicle type approval and annual Government plating and testing – and maintenance "quality" licensing there was a significant step improvement in both product quality and maintenance standards if not overnight certainly by the mid 1970's – things had dramatically improved.

1.3 I could also mention that heavy goods vehicle driving license tests had been introduced that called upon drivers to be fully aware of their daily maintenance responsibilities.

1.4 One item that did not seem to improve at the same pace was wheel nut security and even legal court judges ruling in cases where wheels have become detached and injured people or property were persuaded that there was a "lost wheel mystery".

1.5 In 1984 IRTE set up a special research fund of $60,000 where $30,000 was underwritten by the UK Government's Department of Trade and Industry.

1.6 There were no less than 80 contributors including vehicle operating companies – like Bass and the Post Office – also O.E.M.S. like MAN and Volvo – IRTE centres and tyre and component manufacturers.

1.7 A few individuals such as Lamborne Racehorse Transport Co and the Institute of Automotive Engineers Assessors BOC – and Crane Fruehauf trailers gives one some sense of the extent of the interest.

1.8 Initiated primary research was undertaken with Exeter University who really were tasked with the job of finding why road wheels were lost hoping that this would help the secondary task of influencing work on designing a better system of wheel security.

1.9 This paper sets out to review what Exeter University discovered and report way back in 1984 and what has happened since and lastly where do we go from here.

THE 1984 EXETER UNIVERSITY REPORT

1. In 1979 when IRTE first investigations were initiated – defective maintenance was though to be the root cause.

   Cases of wheels coming off were attributed to wheel nuts just not being tightened sufficiently or over tightened – or the stud fractured when it was slack off because of corrosion and rust.

2. IRTE research showed that not one of the wheel stud failures had been the result of over tightening and nearly all had been fatigue failure.

3. The 1984 report indicated that at monitoring companies where wheel nuts were regularly and sytematically checked and O.E.M.'s tightening torques were observed whilst the number of incidents had been reduced the problem had not been totally cured.

4. On this evidence the report concluded that the shortcomings were then more with the manufacturer than the maintenance people.

5. When the wheels crack of fracture the inadequacies are even more starkly exposed.

6. Yet the operator has to endure the prosecution.

7. There remained three problems with commercial vehicle wheel assemblies –
   - 7.1 Wheel nuts coming loose
   - 7.2 Fatigue fracture of studs
   - 7.3 Fatigue cracking of the wheels

8. Since the report 7.2 and 7.3 have become if not a thing of the past – quite rare as wheel and spigot mounted wheels have improved – but there still remains some 2000 a year incidents of wheels coming off in the UK each year.

9. The recommendations made by IRTE in 1984 was –
   1. Tighter wheel nuts + 20% recommended by O.E.M.
   2. Avoid lubricants.
   3. Do not buy cheap nuts, bolts or wheels.
   4. Check pitch circles of studs in hubs and holes in wheels and beware ventilation holes – especially opposite stud holes.

10. Since that time it has become –
    - 10.1 Good practice with new equipment to ensure that there is no paint or contamination between the faces of the wheel and the mounted spigot.
    - 10.2 I recommend lubricating the stud threads with anti-corrosive fluid such as Shell ensi fluid – this helps increase the security torque and prevents seizure.

10.3 And introducing a system whereby the torque is checked some 100-150 miles if any wheel has been changed (yellow label).

11. IRTE offered a prize for anybody that could come up with a better design of wheel fixing –

12. Conclusion & Recommendation

12.1 The introduction of spigot mounted wheels and the 22m fine thread and the improved component quality i.e. metal specification has done much to alleviate the lost wheel mystery.

12.2 The problem has not gone away completely and operating companies need to sustain a secure wheel nut culture.

12.3 I recommend fixing recommended nut torque label over each wheel together with the recommended tyre pressure.

12.4 I recommend removing wheels on newly delivered vehicles to ensure no debris or paint has been left between the flange faces.

12.5 I recommend the use of a corrosion inhibitor such as Shell Ensis fluid when assembling the nut.

12.6 I recommend increasing the wheel nut torque to 20% over and above that recommended by the O.E.M. – but use common sense where recommended torque is already high.

12.7 I recommend simple plastic loose wheel nut indicated system.

12.8 In cases prone to constant loose nut problems by all means use disc loc.