

Rapid Lesson Sharing

Event Type: Overtightening Lug Nuts

Why Do Engine Duals Keep Coming Off? Could it be: OVERTIGHTENING?

During the past 8 years, the Wildland Fire Lessons Learned Center (LCC) has received numerous reports of dual wheels coming off engines. This RLS provides links to the reports and provides insight from an equipment expert from the USFS National Technology and Development Program.

Loose Lug Nut Reports

2020

[Type 6 Engine Rear Dual Loss RLS](#)

[Engine Duals Come Off RLS](#)

[Type 6 Lugs Sheared Off](#)

[Lug Nuts Loosening](#)

2019

[Two Rocky Mountain Region Engine Lug Nut Incidents RLS](#)

2017

[Mile 0 Rx Fire](#)

[Long Valley Fire](#)

[Type 6 Engine Wheel Stud Malfunction RLS](#)

2016

[Type 6 Engine Wheel Torque Malfunction RLS](#)

2011

[Engine 2423 Lessons Learned Review](#)



"While driving their engine down Interstate 40, the operator suddenly feels a change in driving characteristics as one of their passenger-side rear duals suddenly passes them!"

From the 2016 [Type 6 Engine Wheel Torque Malfunction RLS](#).

The February 2020 incident ([Engine Duals Come Off RLS](#)) involved both driver-side duals come off while driving down the highway at 45 mph. In this instance the lugs had been checked regularly—including two hours prior to this mishap.

During post-mishap research it was discovered that certain lug nuts may have a tendency to wear out due to overtightening.



The Driver's-side rear dual wheels separated from the Engine and traveled across the roadway striking the right front of a passenger vehicle heading north on Hwy 395.

From the 2011 [Engine 2423 Lessons Learned Review](#).

Simple Fix - Don't Overtighten.

Please see page 2 for important updated information on lug nut overtightening from the National Technology and Development Program in San Dimas, California.

Are You Overtightening Your Lug Nuts? ***How It Happens – and the Potentially Hazardous Results***

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The lugs from Engine 631 from the [Engine Duals Come Off RLS](#).

The issue of overtightening lug nuts is not limited to Ford vehicles.

When a lug nut is overtightened, it causes the shaft to stretch and elongate. After each successive overtightening, it then takes more torque to “tighten” the lug—causing further damage. This causes a repetitive overtightening cycle that causes the lug(s) to fail by shearing, bending, or simply rattling loose. The lugs in the photos indicate significant stretching. [See photo on left.]

The wear on the inside and outside wheel drums is a clear indicator of the issue. It should be one of the items that all operators look for. The drums should not have any play between the holes in the drum and the lug shaft. Once play develops from the overtightening cycle, it will cause wheels to continually loosen and damage the drum holes.

It only takes one incident of overtightening to damage a lug. After it is damaged, even if an operator consistently uses a torque wrench, the lug is still damaged and prone to failure.

The Common Factors that Initiate the Failure Sequence:

1. Field tire repairs from mobile vendors using impact wrenches instead of calibrated, pneumatic torque wrenches or not using the proper torque setting,
2. Tire repair shops using impact wrenches instead of calibrated, pneumatic torque wrenches or not using the proper torque setting,
3. Field use of lug wrenches and breaker bars to tighten lug nuts instead of a long-handle tire torque wrench.



*The inner dual (top photo) and outer dual show the **wallowed-out rim holes**. Look for such wear—it can indicate that the lugs have been overtightened and are damaged.*



Have the Right Tools

“To mitigate this issue, we have purchased a torque wrench to keep on the engine and have started torquing the lug nuts to the specification found in the owner’s manual every Tuesday during our weekly engine inspection.” [2020 SAFENET](#)

Supervisors

Ensure your staff are enabled to purchase needed equipment.

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