

## TRUCK WHEEL SEPARATIONS CAN BE DEADLY

**David F. Welker, P.E.**

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A couple of summers ago I was travelling north on I-5, about 30 miles north of Portland. It was summertime, mid-day and midweek, and traffic was sparse.

I-5 in this location is three lanes each way. I was driving in the center lane, positioned about 100 feet behind a tractor/trailer combination that was in the right lane. Another passenger car was following behind the truck another 100 feet further back.

Some motion at the right rear area of the trailer caught my attention and I noticed that the outer wheel/tire on the rear/rear axle had separated from the trailer and was matching speed with the tandem a short distance to the right.

I slowed immediately as did the vehicle behind me in the right lane. The loose wheel gradually lost speed, but proceeded to cross the entire northbound roadway (in front of me), enter the median, and travel along in contact with the cable barrier in the center of the median. It came to rest a quarter mile later, slowed by the friction produced by sliding along the cable. Luckily, this particular runaway wheel did not cause an accident or injuries.

The truck driver had no idea that anything was wrong, even as I pulled alongside him, gesturing down, and back. Probably figured me for just another fool in a 4-wheeler.

In spite of the apparent lack of damage caused by this incident it is important to note that truck wheel separations have resulted in numerous fatalities in the Province of Ontario, Canada since 1995. Because of public concern, and by concluding that the wheel separations were the result of sub-standard maintenance practices, the Province of Ontario enacted severe penalties in an effort to reduce the problem. Despite the new measures and a significant effort from industry to improve wheel maintenance practices, wheel separations continue to occur in Ontario at a rate of seven reported incidents per month.



### **Truck Wheel Designs**

Truck wheel design has improved dramatically in the past thirty years. Spoke wheels (wobblers) used to be the common component on trucks and trailers. Disc wheels that were lighter and more maintenance-friendly gradually replaced these. The first design of disc wheels, now known as the “**stud-piloted**” design was an unwieldy arrangement in which two nuts were used to fasten the two disc wheels to the hub at each bolt hole. An inner cap nut fastened the inner wheel while the outer nut secured the outer wheel. This was an

improvement over the spoke wheel design in that it avoided the shimming required to make the spokes run true (thus the “wobbler” moniker).

In the early 80’s Motor Wheel introduced the “**hub piloted**” design, whereby both inner and outer wheels are secured by one common nut, at each bolt hole. This simplified design decreased maintenance time and got rid of the somewhat expensive inner cap nut and “ball-seat” machinings on the wheels. The “stud –piloted” design can still be found but it is being phased out.

Both disc wheel configurations have their drawbacks. The “stud –piloted” configuration is dependent upon both nuts to be torqued to spec. The most common failure of this concept occurs when the inner cap nut is not adequately tightened. The whole assembly is then loose.

On the other hand, while the “stud-piloted” configuration only has one nut that replaces two, it is critical for the torque to be correct. When all the nuts come off, then both wheels can go careening down the highway. For this reason, I suspect the trailer cited at the beginning of this article was equipped with “stud-piloted” wheels.

### ***Always Check Maintenance Records***

A single truck tire/wheel assembly can weigh in excess of 200 pounds. At 70 mph, this can be deadly. Truck drivers are responsible for checking the torque on their truck wheels at regular intervals, and within 50-100 miles after service has taken place. If an accident occurs, your initial research should always take you to the maintenance records. That is where your answers just might be.

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### **About The Author:**



[David F. Welker, P.E.](#) is a Mechanical Engineering with over forty years of engineering experience. Prior to joining Consulting Engineers & Scientists, Mr. Welker was employed as a design engineer at Ford Light Truck Division, Trailmobile and Freightliner Corporation. In addition to his trucking experience, Mr. Welker worked in the design of heavy underground vehicles for the mining industry. He also worked in the converting machine industry where he investigated and evaluated field failures, specifically including fasteners. At CESI, Mr. Welker evaluates truck, semi-trailer and heavy vehicle accidents, including accident reconstruction and component failures. Contact Mr. Welker at 610-296-2250 or [dwelker@ces-experts.com](mailto:dwelker@ces-experts.com)

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