WHAT HAPPENS IF A TREAD DETACHES AFTER A TIRE DEFLATES?

By Mark W. Arndt

In the process of conducting left front tire rapid deflation tests an interesting and unexpected opportunity was presented when a deflated tire suddenly lost its tread. The opportunity allowed us to to directly compare, under identical conditions, the difference between a rapidly deflated front tire with and without tread detachment.

The overall test program was conducted to determine if disturbance responses due to a rapid deflation were measurably greater when a larger than specified sized tire was rapidly deflated. The tests involved a diesel 2002 Ford 4x4 F250[1] responding to a one-second duration air out. The comparison tires, with and without tread detachment, were an identical make and size,[2] purchased used and at least five years old and had 6/32 and 6.5/32 tread depth.

Tests were conducted in a straight line without throttle and open loop; they were perfectly suited for a direct side by side comparison. In other words, in sequential tests the same truck, except different but identical left front tires, was accelerated in a straight lane to 55 mph, the throttle was dropped, the steering wheel was locked and the left front tire was rapidly deflated. Several seconds of response with the hand wheel locked and no driver input was recorded; then the truck was braked and steered to a safe stop within the confines of the test facility. The truck and tire are shown at the end of the test without tread detachment, Photos 1 and 2, and with tread detachment, Photos 3 and 4.

Each test recorded the vehicle response with standard instruments, including recording of hand wheel torque.[3] The acceleration and gyroscopic measurements were made with an Inertial Measurement Unit (IMU) manufactured by Crossbow, model: IMU400CB-100. The test results were filtered with a phaseless, 6 HZ, 12-pole Butterworth filter. The side by side response can be seen in Figure 1, without tread detachment, and Figure 2, with tread detachment. A dashed line is superimposed onFigure 2 to indicate the time of tread detachment.

For these tests a recorded increase in responses occurred when the tread detached from the already flat tire. The increased truck responses were notable in the measured hand wheel torque, lateral acceleration and yaw rate.

Photo 1. Test truck following rapid air-out without tread detachment.

Photo 3. Test truck following rapid air-out with tread detachment.

Photo 2. Tire following rapid air-out without tread detachment.

Photo 4. Tire following rapid air-out

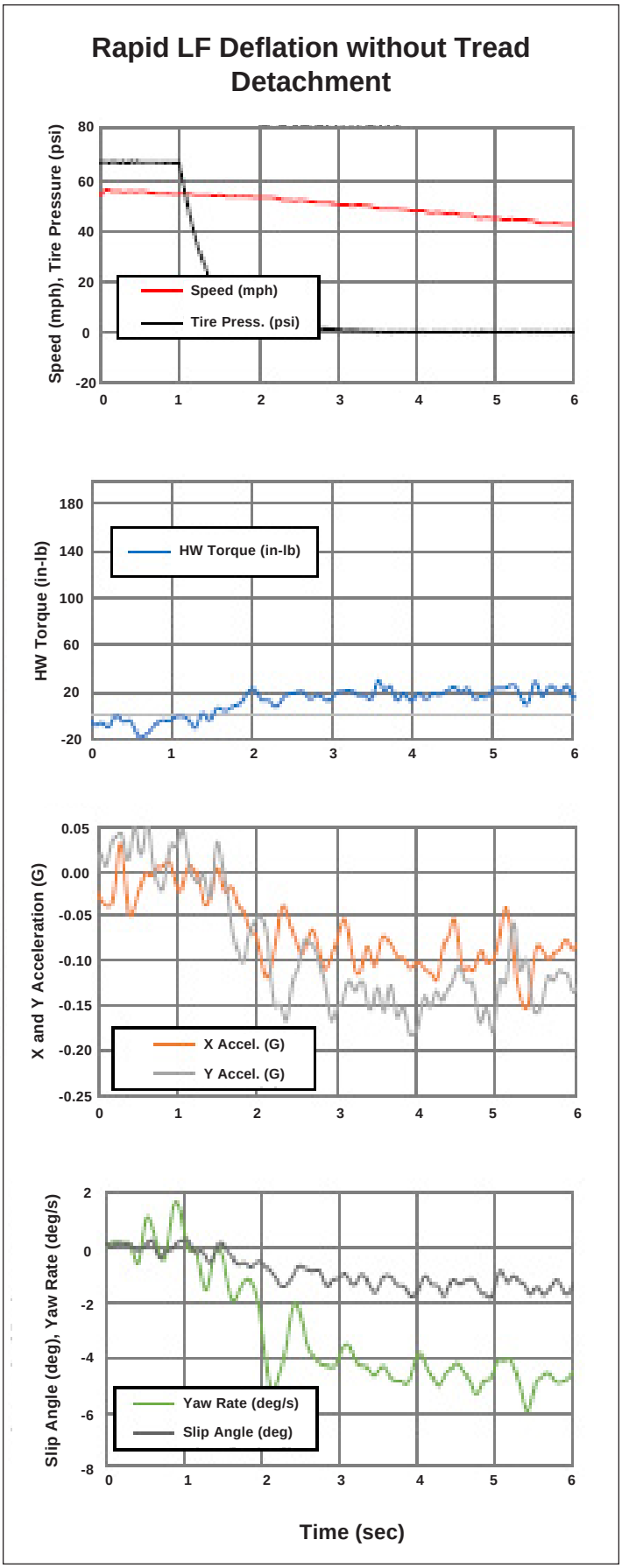

Figure 1. Response of truck following rapid air-out without tread detachment.

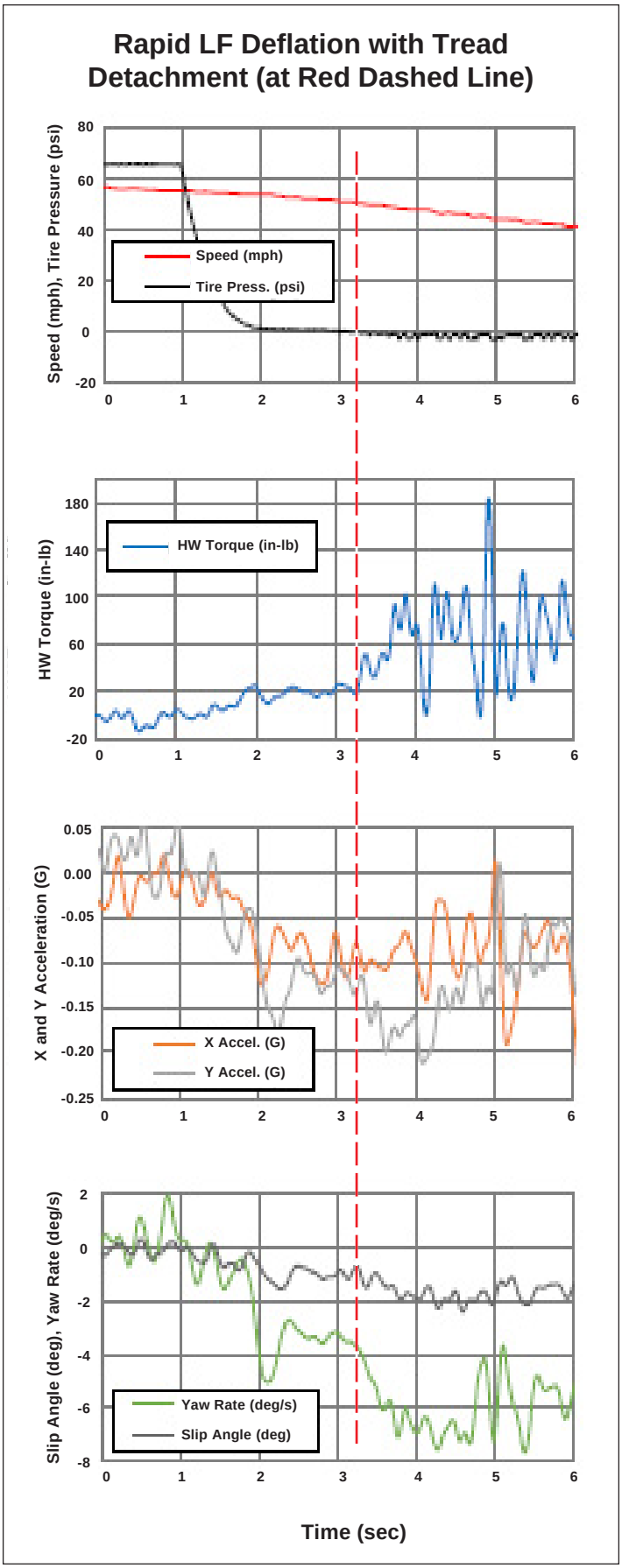

Figure 2. Response of truck following rapid air-out with tread detachment. Dashed red line represent point of tread detachment.

The difference in responses is of interest to an analyst not necessary because of the magnitude of the responses, but as a point in understanding that not all rapid deflations, nor all tread detachments, are equal. Depending upon the specifics of the tire disablement, how the vehicle was disturbed, measured by yaw rate and lateral acceleration, was different. And, how the driver might sense the event, measured by vehicle disturbance and hand wheel torque, was different.

FOOTNOTES

1) The 2002 F250 was equipped with a hydraulic hydroboost brake/steering assist system and the first generation pitman arm and torsion bar. The scrub radius was 128 mm.

2) Durango Radial A/T, LT285/75R16D mounted to OEM 16X7 steel rims.

3) See Table 1 of SAE J266 Steady State Directional Control Test Procedures for Passenger Cars and Light Trucks for a list of stndard instrumentation, typical operating ranges and recommended maximum error.

ABOUT THE AUTHOR

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APPLE PATENTS TECHNOLOGY TO DISABLE SMARTPHONES IN CARS

Apple has patented a system to stop drivers using smartphones behind the wheel.

Future iPhone owners could be forcibly halted from using their handsets behind the wheel of a moving vehicle, a new Apple patent indicates.

The Cupertino-based company has been granted intellectual property rights for a system that automatically detects when a user is driving and then locks out smartphone features such as texting.

Apple's request was filed back in 2008, but the US Patent and Trademark Office only published information on the technology yesterday (22 April 2014).

According to the document, the system will combine a sensor that detects whether the smartphone is "in motion beyond a predetermined threshold level", as well as a so-called 'scenery analyser' that works out whereabouts in the car the device is located.

Should it be located outside of a "safe operating area of a vehicle" based on photo and video data, a lock-out mechanism will automatically disable one or more of the handset's functions, the patent says.

In March, Apple introduced a new iPhone feature called CarPlay with the rollout of iOS 7.1. Compatible with select cars launching this year, the system allows drivers to use their smartphones on the road by dictating to Siri.

A long list of vehicle manufacturers have signed up to support CarPlay in the future, including Ferrari, Mercedes-Benz, Volvo, BMW, Ford, Jaguar Land Rover, Nissan, Peugeot and Toyota.

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CORRECTION

The Visual Statement full spread and full page advertisements that appeared in the March/April 2014 issue used incorrect and obsolete ad-copies. On the following pages and on page 38 are much better samples of their current product.

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