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CRASHTALK

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GRC Welcomes Kevin Huberdeau, P.Eng.

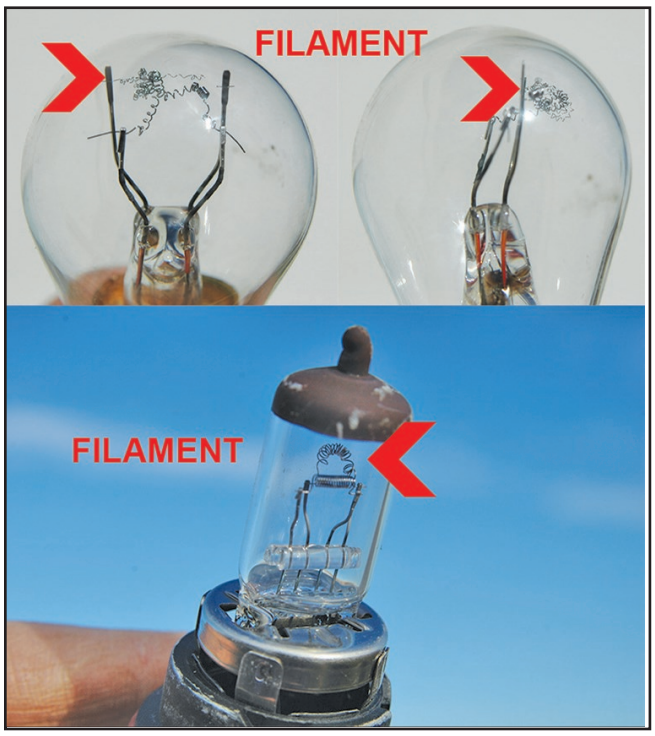
NEXT ISSUE: *THE LOW DOWN ON THE DOWNLOAD, CIRCA 2015*

Were the Lights ON or OFF?

By: Kevin Huberdeau, P.Eng., Senior Engineer

A common issue in the investigation of a motor vehicle accident is whether the signal lights, headlights, or brake lights were ON or OFF, at the time of the event.

Witnesses or other drivers may claim the opposing driver did not brake, or the vehicle did not have its signal light on, hence an avoidance maneuver could not be initiated.



Filament deformation

Headlights and taillights contain bulbs, which are typically a glass envelope containing an inert gas and a filament. Filaments are tightly coiled tungsten wires that run between two supporting posts, and can be straight or arched. The coils are tight and evenly spaced, and have a bright lustre appearance.

A bulb lamp may have one or two filaments. In two filament tail lamps, the smaller filament illuminates with the vehicle running light and the larger filament is for brighter lights (brake lights, turn signals, or a combination of both).

The concept for determining if the bulb was ON or OFF is relatively simple. When energized, the wire carries an electric current, causing the temperature to rise until the wire becomes incandescent, producing light. When not energized, the reverse is true. This then gives two conditions for judging an ON or OFF condition for the bulb filament.

Evidence of an incandescent filament can be significant. A hot filament is very ductile, and the coils will stretch, tangle, or even uncoil (normally called HOT SHOCK) when impacted. If the glass breaks, the hot filament becomes exposed to air, rapidly oxidizes and blackens. Oxidation of the metal filament can deposit material evidence on nearby surfaces (glass enclosure).

Even if the filament was off for a short period of time, evidence of filament coil deformation can be observed. This type of evidence can manifest in uneven coil spacing, and slight arching of the filament between the posts.

Tests have indicated that it takes approximately 30 milliseconds for a filament to rise to incandescence, however, the consistency of the deformation was found

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to be dependent on the bulb manufacturer, as some bulbs were more susceptible to deformation at lower levels of impact acceleration. When the lamp filament is de-energized, it was found that 1.5 seconds was the general threshold that filament deformation could be expected. Some sources have indicated a threshold as high as 4.0 seconds. Results of the testing have indicated that filament deformation can occur in flashing bulbs (such as signal lamps), regardless of the state of incandescence at the exact moment of impact.

The magnitude, location, and the direction of the impact force on the vehicle are significant in relation to observable filament deformation. However, an incandescent filament does not deform as a result of the overall vehicle specific acceleration pulse. The acceleration in the region where the bulb is located must be considered. If the bulb is located close to the area of deformation on the vehicle, it tends to experience the highest forces. Lamp bulbs in a substantially collapsed area of the vehicle tend to exhibit the best evidence of hot shock deformation.

The absence of hot shock doesn't mean that a lamp was OFF. The impact may be some distance from the bulb and may not have been great enough to stretch the filament (such as rear filaments in a frontal crash).

Tests have concluded that localized damage severity in the order of between 14 to 20 mph (22.5 to 32.0 km/h) need to be realized for the general onset of filament deformation in the bulb.

Nowadays, the use of LEDs (Light Emitting Diodes) and HIDs (High Intensity Discharge) for taillights and head lights is common. Methods to determine the ON or OFF condition of these types of lamps during a collision has not been developed.

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ANNOUNCEMENT

We are pleased to announce that Kevin Huberdeau, P.Eng., has joined Graham Ryan Consulting Ltd. Kevin has a Civil Engineering degree from the University of Alberta. He previously owned Independent Engineering Consultants Ltd. – a company he started in 1997. His focus was motor vehicle accident investigation and analysis. He specializes in using photogrammetry to reconstruct the three-dimensional damage profiles of vehicles. His Engineering expertise includes the knowledge to investigate bridge structural issues and roadway design issues. Kevin has been doing Accident Reconstruction for over 20 years and has testified as an expert in court on several occasions. He has therefore integrated well into our Engineering team.

Primarily forensic in nature, Kevin worked for Keith & Associates as a Forensic Engineer and at A.D. Williams Engineering Ltd. as a Forensic and Design Engineer. At A.D. Williams Engineering Ltd., he also participated in the design of commercial buildings and in the investigation of material component failures.

Kevin taught AutoCAD and 3DStudio at the Alberta School of Drafting for two years in the early 1990's. He is fluent with computer systems and different operating systems and is a PC computer gamer.

At Graham Ryan Consulting Ltd., we focus on accident reconstruction. Kevin is working integrally with our Engineering team in this regard. His background also gives him the expertise in several aspects of Civil Engineering, including structures and geotechnical aspects of highway design.

You can reach Kevin at kevin@grahamryan.com or at 780-425-1150 extension 227.

Recalls

- Some Chrysler 300s, Challengers, Chargers and Durangos for 2011 through 2014 have faulty alternators that may lead to a fire. T.C. #2014446

- GM has recalled about 29 million cars and trucks in 2014, a number greater than the company's combined US sales for the years 2004 through 2013.

Crash Corner

- In 1995 IIHS started conducting frontal crashes involving 40% frontal overlap at 40 mph (64 km/h). In 2012 IIHS started a new "small overlap" frontal test, involving 25% overlap at 40 mph (64 km/h). See IIHS.org for details.