



C13 Forensic Engineering Analysis of Passenger Vehicle A-Pillar Impact With Tractor-Trailer: Theoretical Approach and Full Scale Crash Tests

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After attending this presentation, attendees will be shown differing objectives in theoretical and practical analysis.

This presentation will impact the forensic community and/or humanity by providing greater understanding of the analytical processes.

This analyzes a passenger vehicle impact with a Kenworth 3 axle pulling a 28 foot Freight Hauler trailer near Northern New Jersey, USA and the resulting possible closed head injury.

A Kenworth 3 axle pulling a 28 foot Freight Hauler trailer was traveling into a down hill curve at approximately 20-25 mph when the traffic in front was observed and the Kenworth had stopped. The passenger vehicle proceeded up the hill into the same curve. As the tractor-trailer braked hard, the driver felt the trailer and the towed forklift behind the trailer sliding out into the opposing lane. As the trailer slid into the opposing lane the passenger vehicle struck the trailer. The A-Pillar of the passenger vehicle was directly impacted by the flat bed of the trailer intruding into the passenger compartment.

The driver of the passenger vehicle initially reported striking her head without losing consciousness. The patient self extricated. On the scene, the emergency medical technicians computed the Glasgow Coma Scale as 15. Emergency department diagnostic studies were all negative including: plain film cervical spine and right shoulder as well as Head CT. The patient was discharged home in six hours with the following diagnoses: Blunt Head Injury, Cervical Strain Post MVA and Right Shoulder Injury. The driver of the passenger vehicle is claiming a brain injury in the incident.

The objective of the full scale crash test approach is to quantify the amount of acceleration sustained at the center of gravity of the brain and statistically determine the probability of a brain injury.

The A-Pillar was directly impacted by the flat bed of the trailer. This caused the A-Pillar tripod including the roof to fail. The amount of static intrusion may be estimated from photogrammetry. The elastic deformation can be calculated from the observed plastic deformation and by adding the dynamic elastic deformation to the static deformation the total dynamic intrusion can be evaluated.

The objective of the theoretical approach is to quantify the amount of dynamic intrusion sustained in the subject incident based upon the crash test datum and the static photogrammetric measurements.

A-Pillar, Head/Brain Injury, Tractor-Trailer