



D10 Tow Hitch Failure

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The goal of this presentation is to introduce attendees to fundamental testing principles to validate or refute an alleged tow hitch failure. The analysis will include calculations and 3D animations of the possible events.

This presentation will impact the forensic science community by describing analytical methods that can be used to evaluate potential events in an alleged tow hitch failure.

On a rainy afternoon that also included strong wind gusts, a boat owner hitched his boat and trailer at a marina complex that performed maintenance on the boat. Personnel at the marina attached the boat-laden trailer to the owner's tow vehicle. The boat owner was cautioned against towing the unit due to the prevailing weather. Eleven miles from the marina, after driving at highway speeds over various roadway surfaces replete with construction activities, various turns and stops, the boat and trailer allegedly became uncoupled. This resulted in the driver losing control, damages to the tow vehicle and boat/trailer combination, and injuries to the driver. These injuries are alleged to be either new injuries to spinal column-based soft tissue or reinjury of such tissue from prior accidents. The loss of control allegation was attributed to improper coupling of the tow vehicle and boat/trailer, categorically implying that the receiver on the trailer was simply placed atop the tow ball on the tow vehicle's hitch. A forensic engineer opined that the physical evidence was consistent with this allegation.

To evaluate the allegation, several basic investigative protocols were employed. The tow ball and hitch were inspected in addition to the receiver located on the boat trailer. An analysis was performed to calculate the forces necessary to cause hitch failure. Analyses were also performed to determine the forces associated with the observed damage on the tow vehicle and the trailer. Additional analyses were performed with an exemplar tow combination. The accident site was extensively photographed to locate physical marks and identify them with accident scene photographs taken by the claimant. The accident was reconstructed and 3D animations were developed to demonstrate the alleged accident scenario as compared to the possible scenario developed from the evidence and supported by established physical laws.

Review and analysis of the physical evidence disproved the opinions of the opposing expert. Damage to the ball on the hitch attributed to loss of control by the opposing expert was shown to be in the wrong position. Other damage attributed to the failure of the ball was instead shown to be attributable to normal wear. The failure of the trailer was shown to be due to material corrosion at a weak location on the trailer. Review of the photographs taken by the claimant conclusively proved that his allegations regarding the cause of the accident were untrue. Testing revealed that if the allegation of the improper coupling of the tow vehicle to the trailer/boat combination had occurred, the unit would have become uncoupled at a speed change of less than five miles per hour and the drive to the accident location was impossible. In fact, the vehicle, boat, and trailer, if coupled as alleged, could not have exited the garage at the marina without having become uncoupled. The accident was proven to have been caused by fishtailing of the unit on wet roads and high winds and that the accident was staged to place blame on the marina.

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