D15 Determination of Driver Identity: Effective Scientific Investigation, Comparison and Contrast of Forensic Evidence, and Its Spoliation in Various Cases

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After attending this presentation, attendees will better understand the wide range of forensic investigation and analysis techniques employed to identify motor vehicle operators. These techniques include 3D land surveying, accurate measurement of vehicle 3D motion, determination of all significant points of vehicle impact to objects and the ground, photogrammetric analysis to allow accurate replication of vehicle position and trajectory, correct interpretation of vehicle crush and crashworthiness performance relative to occupant ejection, trace evidence recovery, and human factors testing.

This presentation will impact the forensic science community by demonstrating an effective scientific methodology utilized to investigate complex rollovers or other crashes with multiple ejections, both with and without seat belt restraints. Examples provided will illustrate how this methodology can be used to overcome the difficulties faced by forensic investigators studying cases in which driver identification is ostensibly unclear. These difficulties include: lack of witnesses, passage of time, destruction of the subject vehicle (accidental or intentional) or other pertinent physical evidence, gross misinterpretation of facts and evidence by others, and obstruction by insurance companies, tow yards, and police agencies. This presentation will benefit forensic practitioners in engineering sciences, criminalistics, vehicle safety, accident investigation, jurisprudence, and pathology.

Determination of vehicle driver identity during collisions or rollovers with vehicle occupant ejection presents unique challenges in accident reconstruction. Police or insurance company investigations are often inadequate, resulting in failure to observe, measure, and document important facts and physical evidence pertinent to driver identification. This leads to misinterpretation and incorrect conclusions; however, the demand to assign driver identity in a crash with severe or fatal injury serves as a significant motivation to reach rapid and correct conclusions, especially in criminal prosecutions. In several cases, insurance company investigators, police, prosecuting attorneys, emergency services personnel, tow truck operators, wrecking yards, vehicle occupant relatives, auto manufacturers, or other authorities have unwittingly and sometimes intentionally removed or altered critical evidence at crash sites, within vehicles, or even destroyed the subject vehicle before a comprehensive analysis was conducted by a qualified and objective investigator. Destruction of evidence may also occur at the hand of a driver who seeks to avoid responsibility for a serious or fatal crash. All of these corrupting factors can negatively influence a forensic investigation to determine driver identity.

Several cases involving severe vehicle rollovers or collisions with all occupants ejected, usually with one or more killed, and no witnesses will be presented. All of these crashes were examined with adequate time and equipment to properly identify and measure the available facts and forensic evidence and to conduct driving tests pertinent to human factors, visibility, road conditions, and vehicle handling characteristics through the last known path of the subject vehicle. Comparison of current conditions with crash scene photographs and measurements is critical because government agencies have occasionally altered roadways, guardrails, or signage after such a crash. These comparisons also require photogrammetric analysis of 3D land surveys to allow accurate replication of vehicle and occupant positions and trajectories, verification of police measurements and other reported data, determination of all significant points of vehicle impact to fixed objects and various types of ground surfaces, location of all deposited glass and vehicle wreckage components, and vaulting velocity and trajectory of vehicles and ejected occupants. When vehicles are available, analysis of occupant loading of seats, belts, and vehicle interior structures, along with identification and correct interpretation of vehicle damage and witness marks and transfers of fabric, skin, hair, etc., are also conducted.

On occasion, such investigations may not occur until years after the crash. This means that important data may be obscured during the intervening time, and such data may be exposed only by: descending cliffs or climbing trees; electronic metal detection for objects covered by soil or foliage; excavation of vehicle parts and glass fragments from swamps, roadside ditches, culverts, and crop fields; and recovering clothing, personal effects, and hair and other body parts from vehicle interiors and crash sites.

Accurate and thorough forensic examination of evidence at the crash site and subject vehicle are critically important. This analysis includes spatial vehicle-occupant position, determinations using exemplar vehicles and components, review of maintenance and repair records of guardrails and other roadside appliances, procurement and analysis of paint samples, obtaining maps and photographs of body injury sites, video, newspaper, and television reports of the accident, and obtaining all available reliable facts from witnesses and first responders, as well as human factors testing and the application of vehicle crashworthiness knowledge. These are the key elements that comprise a thorough forensic investigation that has the best chance of correctly identifying the motor vehicle operator. In several instances, vehicle safety defects were evident and became crucial factors in determining restraint use and failure, manner of ejection, ejection portal and timing, and pre-crash occupant locations. This includes failures of seat belts, seats, door latches, roof structures, tires, axles, and other vehicle components or safety systems.

Driver Identity, Vehicle Occupant Ejection, Pickup Truck Rollover

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