D51 Left-of-Center Accident Reconstructions: A Case Study

Darren Franck, MSME, Advanced Engineering Associates, Inc, 4713 MacCorkle Avenue, SE, Charleston, WV 25304; and Harold Franck, MSEE, PE, Advanced Engineering Associates, Inc, 4713 MacCorkle Avenue, SE, Charleston, WV 25304*

After attending this presentation, attendees will understand the standard techniques used in reconstruction of left-of-center accidents on two-lane roads.

This presentation will impact the forensic science community by demonstrating the importance of a complete reconstruction of vehicular accidents when the at-fault party is in doubt.

This case study involves a frontal offset collision of a four-door sedan and a pick-up truck. Both vehicles contained one occupant and there were no independent witnesses to the accident. The accident occurred on a curved and sloping section of a two-lane asphalt road. The driver of the sedan was traveling downhill along a left-handed curve and was nearing the left turn into her neighborhood. The driver of the truck was traveling uphill and in the opposite direction. After colliding, the sedan was forced off the right side of the roadway and through a guardrail. The truck entered a yaw, rolled onto its passenger's side, and came to rest within the center of the roadway. The initial investigation revealed a gouge mark within the truck's lane of travel. Threats of criminal action against the driver of the sedan were made. Furthermore, the truck driver's insurance company proceeded to hire attorneys and accident reconstruction experts to bolster their case. Given the mounting evidence against their driver, the insurance carrier for the sedan was not willing to pay for their own expert. As such, the driver of the sedan was tasked with financing her own investigation.

Forensic experts became involved in the case shortly after the accident. Thus, the scene and vehicle evidence was maintained. The examination of the scene revealed a large body of evidence that seemed to refute the initial determination. This evidence included an initiation gouge near the white fog line of the sedan's lane of travel. Placing the impact point at this gouge mark indicates that the truck had crossed the center line. Damage to a utility box matched scrape marks along the passenger's side of the sedan. Moreover, initial momentum calculations seemed to confirm this hypothesis.

The opposing experts identified gouges and scrapes that crossed the center line. One of these gouges, which was located within the truck's lane of travel, was cited as the point of impact by the initial investigators; however, a closer examination revealed a similar gouge a few feet away. The two gouges exhibited curving features consistent with contact with rotating wheel rims. Moreover, the distance between the gouges matched the wheelbase of the truck. The truck examination revealed evidence of contact between the passenger's side wheel rims and the pavement. While the opposing parties attempted to attribute one of the two gouges to the collision, the physical evidence revealed that both gouges were produced during the post-impact phase of the truck.

Interrogation of the event data recorder provided the speed change magnitudes for each vehicle. Damage-based estimates for speed change were found to be consistent with this data. A detailed momentum analysis was performed based on the physical evidence, which demonstrated that the truck had crossed into the sedan's lane of travel prior to impact. This analysis yielded speed change magnitudes consistent with the crush analysis and event data. The computations indicate that the truck was exceeding the speed limit and traveling at three times the speed of the sedan. Given the disparity in speed and mass, the sedan was driven backwards from the point of impact to its rest position. The truck continued in its general direction after impact and eventually rolled onto its passenger side due to its post-impact yaw.

The opposing party maintained their view that the driver of the sedan was at fault. An alternative scenario was devised in an attempt to explain their position. This scenario placed the sedan within the truck's lane of travel at the point of impact. This impact was defined as the rim gouge located left of the center line. In order to maintain consistency with the established speed changes, the impact angles had to be adjusted for this alternate scenario. The approach angle for the truck was not probable given terrain bounding its side of the road. Moreover, this scenario failed to account for all the scene evidence, namely the rollover gouges, initiation gouge, and collateral damage to objects bounding the roadway.

Upon presenting the evidence in a written report, the opposing party decided to admit fault, which removed the specter of criminal action against the driver of the sedan. The successful results also permitted full financial compensation for this driver, who sustained significant injuries as a result of the accident. These results were only attainable by performing a complete reconstruction.

Left-of-Center, Conservation of Momentum, Rim Gouges