C45   Identifying Fault in a Fatal Pedestrian Impact

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The goal of this presentation is to describe an iterative process that can be used in conjunction with a MADYMO simulation program to reconstruct a pedestrian impact when particular information about the accident has been provided.

The presentation will impact the forensic science community by identifying a verified method for determining the configuration and location of a vehicle-to-pedestrian impact.

This presentation identifies and demonstrates a method for determining fault in a fatal pedestrian impact. A mathematical dynamic modeling (MADYMO) simulation was utilized to reconstruct the accident and determine whether the pedestrian was at fault by being in the lane of travel or whether the driver of a pickup was at fault and contacted the pedestrian.

The conditions of the roadway and factors involved in the accident allowed for a verified method in determining the point of impact and, thus, fault for this accident was determined.

This accident occurred when the driver's side mirror of a pickup made contact with the top of the pedestrian's head. When the impact occurred, the pickup was traveling at a speed of approximately 70 mph on a straight portion of a flat interstate highway. The approximate speed of the pickup was verified by multiple witnesses traveling behind the pickup. According to statements recorded at the accident scene by the investigation police officers, the driver of the pickup was distracted and did not see the impending impact. At the moment of impact, witnesses described the pedestrian as being in process of bending over at the edge of the roadway attempting to pick something up off the ground. Following the impact, the investigating officers found the pedestrian lying on the roadway shoulder along with multiple pieces of the side mirror. The pedestrian's point of rest was measured and photographed. Due to the severe nature of the head injury sustained by the pedestrian, death was immediate and no attempt was made to resuscitate or provide aid to the pedestrian. Blood spatter was documented on the shoulder of the roadway, in the lane of travel, and in the area surrounding the pedestrian's head. Based on the blood stains in the lane of travel, the investigating officers concluded that the pedestrian was at fault by being in the lane of travel when the impact occurred.

The MADYMO simulation was conducted with various critical factors incorporated to provide the most accurate results. The pickup and the pedestrian were modeled independently within the program. Multiple measurements of the pickup and its' side mirror were recorded. Since the side mirror was the only portion of the pickup that was contacted and the mirror properties were critical to the analysis, an exemplar side mirror was purchased for accurate data. The shape and contours of the contacting surface of the side mirror was modeled within the program. The mirror was tested to determine the force required to adjust the mirror angle. The pedestrian was modeled within the simulation to be the same approximate height and weight. Additional measures were taken in the modeling of the neck to represent human neck response in compression.

Once the vehicle and the pedestrian were independently modeled within the simulation program, an iterative approach was taken to determine the position of the pedestrian relative to the roadway. The configuration of the pedestrian relative to the vehicle and location of the impact were adjusted until the final resting point of the simulated pedestrian matched the final resting position of the actual pedestrian as documented at the scene. This revealed the point of impact to be in the region of the roadway shoulder and outside the lane of travel. As a check, the impact location was hypothetically assumed to be inside the lane of travel, where the investigating officers concluded the impact occurred. Under this hypothesis, the final simulated resting position did not match that documented at the scene. Thus, the driver of the pickup was found to be at fault for the fatal accident. Because the final resting position of the actual pedestrian was well-documented, the location of the impact relative to the roadway was able to be accurately reconstructed.

In conclusion, when the final resting position of the struck pedestrian is thoroughly documented, this method presented can be utilized to reconstruct the accident determine the configuration and location of the impact.

Pedestrian, Fatality, MADYMO