Calculating Impact Speed is an Important Element of Accident Reconstruction

MDE's engineers are often asked to reconstruct a vehicle's speed at impact. One tool we use to assist in calculating impact speed is the computer. The first computer programs for accident reconstruction were developed in the 1970's on mainframe computers. Federal funding and data from the National Highway Transportation Safety Administration (NHTSA) allowed for the refinement and adaptation of these sophisticated programs for use on PCs.

EDCRASH (TM) by Engineering Dynamics Corporation is one computer program we use for reconstruction of single and two-vehicle accidents. As data is entered into the program for processing, entries are tested for reasonableness; i.e., data is within the limitations of the laws of physics. Results are presented both graphically and numerically. A vehicle's impact velocity and change in velocity during collision can be calculated using data obtained from an engineer's inspection of the vehicle crush damage and characteristics of the accident scene.

By entering both vehicle damage details and accident site particulars, the program can calculate the speed of the vehicles prior to impact. In addition to this computer model, MDE's engineers confirm the findings with manual calculations. Determination of impact speed is often critical to the outcome of a client's case

A Case Study

On the afternoon of December 22, 1989, a malfunction in the controls of the Evergreen Point floating bridge on Lake Washington in Seattle caused the bridge span to begin to rise at the rate of one foot per second. The bridge is designed to be raised; however, this accidental raising occurred while traffic was traversing the bridge. By the time the span stopped moving, it had risen ten feet. Six cars had struck the vertical face of the span resulting in several injuries and the death of a woman.

Jack Winsor was retained as an accident reconstruction engineer and expert witness on behalf of a claimant suffering severe injuries to her head, feet, and legs. The Washington Department of Transportation (DOT) had admitted their liability, and the pending litigation was to show damages. DOT claimed that the impact occurred at an equivalent speed of less than 30 MPH and that the claimant's injuries (particularly her closed-head brain injury) were not consistent with the impact speed and force that DOT asserted.

Mr. Winsor needed to determine three values: the probable speed of the vehicle at impact, the probable equivalent speed during impact, and the probable sequence of events. Since the plaintiff's 1989 Chevrolet Cavalier did not stop immediately upon impact, but skidded nearly 100 feet on the bridge span after impacting the bridge and jumping up onto the deck, the equivalent impact speed determination was of critical importance to validate or invalidate the plaintiff's injury claim.

Through manual and computer-aided calculations, Mr. Winsor determined that the impact was equivalent to a crash into a fixed barrier at 41 MPH. This is equivalent to the car being dropped from a height of 53.5 feet. The vehicle occupant was thus subjected to a decelerating g-value of 35.6g—the force on her body was 35.6 times her weight.

To further strengthen his case, Mr. Winsor obtained a video tape of the NHTSA 35-MPH crash test of a 1989 Chevrolet Cavalier which clearly showed that the head of the belted-in anthropomorphic dummy struck the car's steering wheel with dramatic force. Mr. Winsor's expert witness testimony and accident reconstruction calculations contributed to a jury award to the plaintiff of $1.5 million.