News You Can Use! Helpful Information from Robert E. Stearns, ACTAR 661, Accident Reconstructionist

IN THIS ISSUE:
1. FORENSIC ANALYSIS OF SEAT BELTS
2. THE DOUBLE-EDGED SWORD OF CRASH TEST RESEARCH
3. THE RELATIONSHIP BETWEEN TIME AND IMPACT FORCE IN A COLLISION EVENT

• Need Help or Info on a Seat Belt Issue?

Robert Stearns is pleased to announce that the publishing company he owns and operates, Kinetic Energy Press, has just released publication of a new textbook on forensic seat belt analysis. Forensic Analysis of Seat Belts, by Donald Felicella, is now available at www.KineticEnergyPress.com. This is the one book you’ll use again and again to answer technical questions about seat belts and the forensic analysis of seat belt systems.

Topics covered in this reference include:
• Introduction and history of seat belts
• Function of seat belts in a collision
• Occupant kinematics
• Nomenclature of seat belt system parts
• Exterior vehicle documentation
• Interior vehicle documentation
• Inspection of the seat belt system
• Injury correlation
• Malfunctions, problems, and litigation claims
• Seat belt recalls and notices
One of the best features of this textbook is the abundance of crystal-clear photographs suitable for use in the courtroom as demonstrations of specific features and evidentiary points.

If you are involved in vehicular collision litigation and/or claim work, you’ll want this text as part of your information stockpile! For more information, please visit the website at [www.KineticEnergyPress.com](http://www.KineticEnergyPress.com).

**The Double-Edged Sword of Crash Test Research**

One of the hottest topics in crash-related litigation is the issue of injury causation in low speed crashes. Generally, the term “low speed” is meant to define a collision in which the impacted vehicle sustains a velocity change as a result of the collision of less than eight miles per hour. (Although many drop the velocity change value down to around five miles per hour!) The “big” question in such collisions, of course, is whether or not it is possible for a person to be injured in a low speed crash episode.

As an accident reconstructionist who has done considerable research on this issue (including service as a “crash test dummy” as a volunteer in actual crash tests), I have developed a personal philosophy that I believe is applicable and appropriate to the “Big” question: It is just as wrong to insist that injury is impossible in all low speed crash events as it is to maintain that all such crashes result in personal injury. Obviously, each event must be evaluated on the basis of its individual circumstances, evidence, and merits.

There are those working the defense side of this issue who will insist that injuries are simply not possible as a result of a low speed crash event. Justification for this belief tends to rest on the documented results of crash test research involving human volunteers subjected to low-speed, rear-end crash events. Proponents of this belief will point
to the fact that hundreds upon hundreds of crash test events simply failed to produce a single, verifiable instance of ANY volunteer subject actually sustaining a disabling injury as a result of experiencing a low-speed, rear-end impact.

On the other side of the issue, however, is the plaintiff’s camp, usually citing a paper published by Salem, Oregon chiropractic physician Mark Freeman. Dr. Freeman published his paper in a 1999 issue of *Spine*, throwing down the gauntlet in a scathing critique of the literature refuting whiplash syndrome. Since then, Dr. Freeman has gone on to other published works citing detailed medical proof of whiplash as a common result of low-speed, rear-end collisions.

Essentially, the argument advanced by Freeman, et al, is one based on epidemiological perspectives – that existing crash test research is all significantly flawed and too small in volume/numbers to be useful in prediction of injury causation for any individual involved in a real, low-speed crash event.

Anyone actually involved in litigation associated with a low-speed collision is well aware of how spirited the arguments can become on both sides of the issue. On the one hand, the plaintiff’s counsel will insist that it is both wrong and unethical to suggest that the results of crash tests could possibly be binding on any individual other than those involved in the crash tests, especially since the crash test models must have contained flaws in the ways they were conceived and conducted. On the other hand, the defense counsel will argue that all models are wrong to some degree; the question is how wrong do they have to be to not be useful? Furthermore, the defense counsel will forcefully note that it must be more than mere coincidence that ALL those varying crash test models, though “wrong,” still point to the same general conclusion – that people just don’t really get hurt in low-speed crash events.

Adding considerable fuel to the fire are a couple of recent research papers by Siegmund, King, Lawrence, Wheeler, Brault, et al, dealing with the clinical response of human subjects to rear-end automobile collisions and the head/neck kinematic response of humans in low-speed, rear-end collisions. Both plaintiff and defense bars favor these papers,
since support can be found in the research documented within these papers favoring BOTH sides of the injury causation issues.

In case you are not familiar with the engineering and medical “language” scattered throughout these two technical research papers, let me boil down the essential facts for you:

- The research was top-notch, in that great steps were taken to make the crash tests as valid as possible in terms of making certain that the volunteers in the “target” cars were truly taken by surprise when impact occurred.
- All volunteers were subjected to comprehensive medical exams before and after each crash test event, including MRI scans of the head and cervical spine.
- Volunteers were exposed to velocity changes of 4km/h and 8km/h (approximately 2.5mph and 5mph).
- Results showed that approximately 29% and 38% of the test subjects exposed to the 4km/h and 8km/h speed changes, respectively, experienced whiplash symptoms primarily consisting of cervical symptoms and headaches.
- The results also showed that the median duration of symptoms was longer for women than for men, but were nonetheless described as “short duration,” lasting less than 24 hours. In fact, the study results noted that “few persons would be expected to seek medical treatment beyond an initial consultation for symptoms of such short duration.”

So what do I mean by stating that crash test research is a double-edged sword? First, I believe it is clear that the testing performed has documented the fact that a mechanism of injury is clearly possible in a low-speed collision event. This is why it is so critical to evaluate all possible factors in a collision under scrutiny before issuing an opinion about injury causation. Such factors include age, gender, physical condition of the person undergoing the crash-related velocity change; vehicle factors such as seat design, headrest design and placement; and other variables such as pre-existing injury and the physical position of the person at the time of impact.
Second, I believe it is also clear that the available crash testing results
do point to a compelling degree that the majority of people experiencing
low-speed crash events will suffer no harm from their experience. The
minority that do sustain whiplash symptoms will, based on the crash
testing history available, see a resolution of their physical symptoms
within a fairly short span of time, barring some unusual condition or
circumstances that take them outside the statistical norm.

All of this, of course, points to the need for a thorough investigation
and reconstruction of all low-speed collisions associated with bodily
injury claims. Only then can the “double-edged sword of crash test
research” be evaluated in such a manner that discovery of “what really
happened” is possible.

For further information, see:

1. Clinical Response of Human Subjects to Rear-End Automobile
2. Head/Neck Kinematic Response of Human Subjects in Low-Speed
   Rear-End Collisions, Siegmund, King, Lawrence, Brault, et al, SAE
   Paper 973341.
3. A Review and Methodologic Critique of the Literature Refuting
   Whiplash Syndrome, Freeman, Croft, et al; SPINE, Vol. 24,
   Number 1, 1999.
4. Point of View – Whiplash: Heading for a Higher Ground, Robert
   Ferrari, MD; SPINE, Vol. 24, Number 1, 1999.

• The Relationship Between Time and Impact Force in
  a Collision Event

One of the most important facts in effective accident reconstruction is
evaluation of the time element involved in the actual momentum exchange
within the collision. There is a mathematical relationship between time
and impact force that can be summed up as a “law” of physics: When
time is short, impact force is large. When time is long, impact force is
reduced.
This is a relatively simple concept to grasp and understand. All of us know what it is to go from 60mph down to 0mph as a result of applying the brakes in a vehicle we drive. Although we are accomplishing a 60mph velocity change (with a momentum exchange of 9838 pound-seconds of momentum in a car weighing 3600 pounds), we are uninjured due to the long period of time over which the change occurs.

If, however, we accomplish the same velocity change by quickly stopping as a result of striking a concrete bridge pillar, common sense tells us that the sudden stop will be extremely dangerous. And rightly so – the short time involved in this case of about 100 milliseconds will mean that our 3600-pound car will actually impact the bridge pillar with a force of over 98 thousand pounds! Not much chance of survival here!

This concept can have a dramatic influence on injury factors in low-speed collisions. The typical bumper-to-bumper collision is concluded in 100 to 120 milliseconds. However, some low-speed accidents take much longer, especially where one of the vehicles “submarines” by sliding underneath the bumper of the car it is striking. Increasing the time interval for the collision to only 160 milliseconds can make a BIG difference in impact force – it means that an experienced 4mph velocity change drops from being a 1.8 ‘g’ impact down to a crash no more forceful than the normal force of gravity. Conversely, a low-speed impact into a hard, unyielding object can have greater injury potential than a typical, low-speed “fender bender.”

One more reason to make certain your collision event is thoroughly investigated and reconstructed!

THANKS FOR READING!
MORE “NEWS YOU CAN USE” COMING YOUR WAY SOON IN FUTURE ISSUES!