

Delta V

The first issue of the *Journal of Whiplash and Related Disorders* contained papers from some of the leading researchers in the field. The paper carrying the same name as this newsletter was of great interest to me and therefore I am sharing it with you.

In this investigation, the authors analyze the engineering mechanics of auto collisions when there is little or no crush to either vehicle. They demonstrate that in a no damage impact, the target vehicle can obtain a delta-V of 10 mph or greater, which is well above the injury producing threshold. The authors also dispel the myth that a no vehicular damage impact results in a less than a 5mph delta-V to the target vehicle. They note that the literature that refutes the whiplash injury in low speed accidents is “scientifically and methodologically flawed which renders many of the literature conclusions invalid”.

“Many authors, researchers and testifying experts in the field of accident reconstruction and biomechanics utilize the concept of delta-v to assess the injury producing potential of a crash”. “Delta-V is the change in velocity that a vehicle undergoes in an accident, and is intimately related to the vehicle accelerations (decelerations) in a crash.”

“However, in low to moderate delta-V collisions with zero or minimal crush damage to the vehicles, delta-V is often erroneously calculated. An incorrect determination of delta-V can then ultimately affect an opinion on injury causation.” These authors present a method to determine vehicle delta-V’s and the impact speed of the striking vehicle in car to car collision where there is little or no vehicle crush damage.

The authors state that when using the EDCRASH computer program “the analysis emphasizes that in low speed accidents, which are essentially elastic in nature with little or no energy dissipated by crush, neglecting the vehicle restitution phase of the collision results in serious underestimates to the vehicle delta-V and the injury producing potential of the accident”.

The authors note that depending on the weight ratio of the vehicles and the bumper design, in no damage collision, the struck vehicle’s delta-V “can be in excess of 10mph without any permanent crush damage to either vehicle”. They state that “It is totally incorrect, and a myth, if a Reconstructionist or Biomechanist concludes that no damage means that the delta-V must be less than 5 mph.

Summary Points

- The apparent standard used to assess injury producing potential of crash is the concept of Delta-V
- The Delta-v is often assessed by using the EDCRASH computer system

- The EDCRASH program is flawed in zero or minimal crush damage collisions.
- The EDCRASH system can underestimate Delta-V by 100% suggesting that the actual Delta-V was twice that assessed by the program
- This underestimate of actual Delta-V suggests that the actual Delta-V is often well into the injury producing range despite the zero or minimal crush.
- Vehicle Delta-V can be 10 mph or greater in zero to minimal crush collisions.
- The basic flaw in the EDCRASH assessment is that zero or minimal crush damage collisions are elastic resulting in no energy being dissipated by the crush, even though the bumpers do compress and rebound in the restitution phase.
- Neglecting the elasticity of the bumper systems results in very serious underestimation of Delta-V in low speed collisions.
- Many accident reconstruction and biomechanical experts are unfamiliar with proper analysis when zero crush occurs.
- Vehicle damage cannot be properly assessed by looking at vehicle photographs.
- Literature that proclaims that one cannot sustain whiplash injury in low speed accidents is scientifically and methodologically flawed and invalid.

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