

Ralph's Accident Reconstruction Newsletter

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resolve or investigate is the apparent non-linearity of crush coefficients into zones of delta-v which are significantly higher than those normally tested. As most of you probably know already, the crush damage to a vehicle is based on the work done to it, which is a product of a force applied over a crush distance, the source of which is kinetic energy, which energy is a product of one-half the mass times the velocity squared. In simple terms, the amount of crush is a measure of the change in velocity experienced by a vehicle during a the contact phase of a collision (delta-v). Most crash tests are conducted in the 30 to 35 mph realm, a few in the 40 mph realm. Most collisions occur such that the values of delta-v (the nearly instantaneous change in velocity experienced by each vehicle during the contact phase of the collision) are usually at or below 45 mph, even though the actual speeds of the vehicles may have been quite higher. (Usually, some kinetic energy is dissipated in pre-impact skidding, a large portion is lost to collision damage, and whatever remains appears as post-impact travel.) Limited testing has shown that crush coefficients determined for crashes in the delta-v range of around 35 mph may not be accurate for crashes in which the delta-v was substantially higher. In other words, where the delta-v is determined to be 50 mph or more, a crush-based speed evaluation may be providing calculations which are incorrect for one or both vehicles; basically, these crashes appear to fall outside the realm of the model on which the CRASH3 algorithm is based, biased for lower delta-v's. The greater the increase above a delta-v of about 45 mph, the greater the likelihood of significant error. There has been so little testing in that realm of delta-v that only a general trend has been observed; it is unlikely that we will ever have, for instance, 60-mph or 75-mph crush coefficients for cars and light trucks like we now have for speeds near 35 mph. But, for those vehicles with EDRs, the on-board data recorders may help clarify the extent of the error where a very-high-speed delta-v has occurred.

I am sorry I had no relevant photographs or diagrams to include with this newsletter. I realize that boring material is made less boring when interspersed with graphics of some type. But I had nothing topical to include with this newsletter, and I didn't want to insult you with a randomly chosen photograph or chart.

Thank you for reading my latest newsletter. Please call whenever you need accident-reconstruction, component-failure-evaluation, or other services I offer.

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