Seatbelt Systems and the 65 MPH Speed Limit: Inherent Failures at Higher Speeds

By Richard Alexander

Seatbelts save lives and those who know firsthand the risks of high speed automobile collisions always "buckle up." Rarely will you find highway patrol officers, ambulance drivers, emergency room doctors, or professional racing drivers not wearing a seat belt.

Despite the reliability of manual seatbelts, under Federal Motor Vehicle Safety Standard 208, automobile manufacturers have introduced passive restraints or so-called "automatic seatbelts."

With the 1995 increase in highway speeds from 55 to 65 mph, the severity of collisions will increase substantially and the reliability of passive systems will be tested, unfortunately on real subjects.

Even though the increased speeds appear nominal, the energy available in a crash increases in proportion to the square of the speed. For example the increased energy presented by a speed increase from 30 to 60 miles per hour is four times greater at the higher speed [30 x 30 v. 60 x 60 = 900 v. 3600]. At regular highway speeds an increase in speed by 15 mph from 55 to 70 mph represents a 50% increase in available energy.

Increased energy means that vehicles must now absorb more energy in crashes in order to allow for safe deceleration of passengers. Door latches and seat belt systems must remain secure despite higher levels of energy. Higher energy also results in more rollovers and there lies the real hazard. Understanding the dynamics of highway collisions and the less effective role of modern restraint systems at higher speeds is critical for an understanding of the limits of these systems.

Passive belt systems include door-mounted belts and motorized shoulder restraints that can induce a false sense of security in drivers and front seat passengers. Because of this serious deficiency they do not have the greater reliability of manual shoulder/lap belt systems.

General Motors Corporation has been a leader in offering door-mounted belts. The lap belt is secured to the lower door and the shoulder restraint is attached to the upper door. Upon opening, both belts move forward and away from the seat to allow entry and egress. When the door is closed, both are intended to hold the passenger in place for crash protection, providing the door is fully secured and the latches hold tight.

Door-mounted belts often contain excess slack and because they are loose they do not provided needed restraint. In an otherwise survivable collision, a loose belt can result in head contact with the windshield header or the roof, causing traumatic brain injury or spinal cord damage.

Motorized shoulder restraints require active latching of a lap belt which often is unsecured because of misplaced confidence in the role of the automatic shoulder belt. Testing of Japanese cars showed that drivers readily and routinely forget to latch the lap belt. On impact the occupant "submarines" the belt and the g load on the body is focused on the neck as it contacts the belt.

General Motors was surprised to find that when it conducted fuel system crash tests, required by the National Highway Safety and Traffic Administration, the results showed that GM type II or modified type III door latches will release in moderate to severe impacts and that doors will open. Once that happens occupants are freed from passive restraint systems and are ejected. This is especially critical in a rollover, where ejection routinely results in brain or spinal cord damage, amputations or death. The same is true in motorized shoulder restraint systems in which the absence of a lap belt and an open door is the cause for ejection. The best protection against injury in a rollover is to be securely belted inside the passenger compartment. Passive systems only work as well as the door latching system and do not provide the same level of protection as manually latched belts.

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Air bags can and will open unexpectedly, fail to open in a crash, cause skin burns and severely aggravate pre-existing hearing losses due to the discharge of the explosive charge that inflates the bag. Sensor switches are located aft of the front bumper in the frame itself and in the rear of the engine compartment's firewall, forward of the passenger compartment. Air bags inflators are designed to explode when two sensors are decelerated in the equivalent to a moderate [15 mph] crash into a wall, and the force emanates from within a 30Ü angle of center. As a result steering wheel and dash air bags will not deploy in every collision.

With the advent of chest level air bags preventing forward induced injuries to head, neck and chest, the need for lower leg and side protection has become evident. In addition, in cases where air bags have deployed, visible facial, head and chest injuries have now been replaced by delayed deceleration injuries which do not present until hours after the crash.

Passive seatbelt safety systems and air bags are subject to failure in readily foreseeable crashes and often times will fail due to factors beyond a driver's or passenger's control. Securely latched doors and the of use of lap belts in motorized shoulder restraint systems will result in increased safety. For the highest level of safety avoid passive systems and buckle up. ■