



Engineering Sciences Section – 2007

C4 Characterization of Seat Belt Webbing Loop Energy Absorption Properties

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After attending this presentation, attendees will have a list of modern vehicles that utilize energy absorption (EA) loops in their occupant restraint design. The attendee will also learn the force v. elongation and energy v. elongation properties for a sample of current belt designs.

This presentation will impact the forensic community and/or humanity by providing the forensic community heretofore unpublished energy absorption properties of EA loops. This will allow the forensic investigator to determine force levels applied to belts that incorporate these designs. It will also provide some insight into their behavior for those concerned with occupant kinematics and overall restraint effectiveness.

Proposition: A survey of late models vehicles will be conducted to determine which vehicles have webbing loops sewn into the lap belt portion of the restraint. Several belts will be tested to determine quasi-static elongation at known force and displacement.

Synopsis: A sample of belts from the above survey will be procured from the used market and tested. The test will be a quasi-static pull of the portion of the webbing that contains the loop. Force and displacement will be collected and presented as force v. elongation and energy v. elongation curves.

Summary/Conclusion: Reliable, repeatable testing of seat belt assemblies was performed to establish baseline data of force levels required to create known levels of seat belt deformation. This data will provide new information that can be used to determine occupant belt loads in motor vehicle crashes. Combination of this information with anticipated loads during various crash types (frontal, rollover, etc.) will allow other researchers to explore the safety implications of this type of energy management device.

Occupant Restraint, Seatbelt, Seatbelt Slack