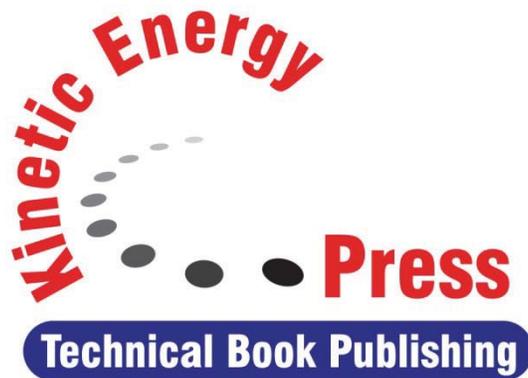


FORENSIC ANALYSIS OF SEAT BELTS

Donald J. Felicella, ACTAR

Kinetic Energy Press



Rocklin, California

Copyright 2012, All Rights Reserved

ISBN 978-0-9716634-2-8

Introduction

Forensic: To be used in, or suitable to courts of judicature

Analysis: An examination of component parts.

The seat belt is one of the greatest additions to motor vehicle safety. It has saved tens of thousands of lives over the years and has, in many cases, enabled the occupants of vehicles that have been involved in collisions to “walk away” from situations that would have otherwise ended their lives. In 2010 there were 5,419,000 reported motor vehicle collisions which caused 1,542,000 injuries and resulted in 32,788 traffic fatalities in the United States. Overall seat belt usage has increased over the years, most of the occupants killed in passenger vehicles were not using the seat belt system.

The function of the seat belt system is simple: it helps restrain the occupant and increase the time for “ride down”, making the collision forces less severe on the human body. Yet this function is a simple answer to a complex situation when taking into account the difference that milliseconds can make during a collision. For the most part, this function is performed by a simple pendulum and ratchet mechanism.

A question that is frequently asked in criminal and civil litigation cases involving traffic crashes is whether or not an occupant was utilizing the seat belt system at the time of the collision. The basis for these questions can be of a civil nature, and the answers may be contributing factors in settlements, or of a criminal nature, as to efficiently correlate injuries and be able to place a defendant behind the wheel as the operator in a vehicular homicide case.

The task of determining occupant-seating positions during a collision can require a multifaceted approach. Analysis of occupant kinematics, injury correlation, and seat belt use can all play a vital role in placing a person in a seating position. Each of these elements will have their own facets needing to be examined, documented, and interpreted in order for the investigator to place all the pieces of the collision puzzle together.

When faced with the task of reconstructing a collision, the investigator should have an established methodology to follow. The first step should be to define the questions to be answered, or to set the parameters of their analysis. Typically, in most collision reconstruction cases there will be numerous issues to address, like the speed of the vehicle at impact, status of lamps at the time of the collision, causation factors, and seat belt use. Each of these should be approached with the same methodology: define the question, gather the facts, analyze the data, and form a conclusion based on accepted scientific principles.

Having an established routine or standard protocol when inspecting a vehicle, such as an inspection checklist or form, will allow the investigator to provide a consistent evaluation and be less likely to overlook evidence. Performing a thorough and methodical post collision inspection and accurate documentation of the seat belt system can yield evidence that will assist the investigator in a proper determination of seat belt use. Likewise, due to the broad range of training and experience of collision investigators, the potential exists for inaccuracies in determining seat belt use.

The investigation can be broken down into three components:

- Inspection and documentation of the exterior of the vehicle
- Inspection and documentation of the interior of the vehicle
- Inspection of the seat belt system.

While the focus of this book is dedicated to the inspection and documentation of the seat belt system, it is necessary to discuss interior and exterior vehicle factors in order to assist the investigator in establishing a better foundation for his or her case. For this reason, this book provides instruction on correct assessment of exterior and interior vehicle factors as necessary and useful components of seat belt forensic analysis.

There will be times the seat belt system will not meet the occupant's expectancy and will fail to properly restrain the occupant. As with any type of mechanical device, the seat belt system is susceptible to failure.

The purpose of this book is to provide a better understanding of the fundamentals of restraining an occupant during the collision and to assist in the technical and scientific analysis of determining if a seat belt was in use at the time of a collision. This information will provide the foundation for the investigator to present findings and conclusions more precisely to a judge or jury.