Remote, Redesigned Air Bag Special Study
Dynamic Science, Inc., Case Number (1998-081-804G)
1998 Toyota Camry
Washington
November/1998

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16. Abstract

This remote investigation focused on the redesigned air bag system deployment of a 1998 Toyota Camry 4-door sedan. This minor injury crash occurred in November, 1998 in the morning. It was raining at the time of the crash and the bituminous roadway was wet. The crash occurred on a two lane, undivided, north/south, residential street. The speed limit for this road is 56 kmph (35 mph). There are no traffic controls at this section of the roadway. There was a >2% northbound downhill grade at this location. Vehicle 1, a 1998 Toyota Camry 4-door sedan (case vehicle) driven by a 15 year old female (152 cm/60 in, 49 kg/108 lbs), was traveling south in the southbound travel lane at a driver estimated speed of 80 kmph (50 mph) approaching a sharp leftward curve in the roadway. The front right seat was occupied by a 15 year old female (165 cm/65 in, 51 kg/113 lbs). Both front seat occupants were restrained by the lap portion only of the manual lap and shoulder restraints. They both had placed the shoulder portion of the restraint system behind their backs. The back left seat was occupied by an unrestrained 15 year old female (165 cm/65 in, 59 kg/130 lbs). The back right seat was occupied by an unrestrained 15 year old female (158 cm/62 in, 57 kg/125 lbs). The driver of Vehicle 1 attempted to negotiate the curve in the roadway at an unsafe speed and the vehicle departed the right roadside where the front plane (12FDEW1) struck a concrete wall (event 1). Vehicle 1 then continued through the wall and came to rest after striking a tree (event 2) with its front plane (12FR999). Vehicle 1 came to rest up against the struck tree facing northwest. A Delta V could not be calculated due to overlapping damage which is beyond the scope of WinSMASH reconstruction. As a result of the first event impact with the wall, the supplemental restraint system (driver's and passenger's frontal redesigned air bags) of the case vehicle deployed. None of the occupants were reported by police as being injured and none were transported from the scene for medical attention. An interview with the driver revealed that both front seat occupants had sustained minor injuries in the crash which did not require medical attention. Vehicle 1 was disabled due to damage sustained in the crash and was towed from the scene.

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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Toyota Camry 4-door sedan. This minor injury crash occurred in November, 1998 in the morning. It was raining at the time of the crash and the bituminous roadway was wet. The crash occurred on a two lane, undivided, north/south, residential street. The speed limit for this road is 56 kmph (35 mph). There are no traffic controls at this section of the roadway. There was a >2% northbound downhill grade at this location.

The case vehicle, a 1998 Toyota Camry 4-door sedan (case vehicle) driven by a 15 year old female (152 cm/60 in, 49 kg/108 lbs), was traveling south in the southbound travel lane at a driver estimated speed of 80 kmph (50 mph) approaching a sharp leftward curve in the roadway. The front right seat was occupied by a 15 year old female (165 cm/65 in, 51 kg/113 lbs). Both front seat occupants were restrained by the lap portion only of the manual lap and shoulder restraints. They both had placed the shoulder portion of the restraint system behind their backs. The back left seat was occupied by an unrestrained 15 year old female (165 cm/65 in, 59 kg/130 lbs). The back right seat was occupied by an unrestrained 15 year old female (158 cm/62 in, 57 kg/125 lbs).

Figure 1. Exterior, case vehicle (1998 Toyota Camry).

Figure 2. Crash scene. Case vehicle approach path.

Crash Events

The driver of the case vehicle attempted to negotiate the curve in the roadway at an unsafe speed and the vehicle departed the right roadside where the front plane (12FDEW1) struck a concrete wall (event 1). Vehicle 1 then continued through the wall and came to rest after striking a tree (event 2) with its front plane (12FR999). Vehicle 1 came to rest up against the struck tree facing northwest.

Figure 3. Crash scene. Point of impact with wall (event 1).

A Delta V could not be calculated due to overlapping damage which is beyond the scope of WinSMASH reconstruction.

As a result of the first event impact with the wall, the supplemental restraint system (driver's and passenger's frontal redesigned air bags) of the case vehicle deployed.

None of the occupants were reported by police as being injured and none were transported from the scene for medical attention. An interview with the driver revealed that both front seat occupants had sustained minor injuries in the crash which did not require medical attention.

Vehicle 1 was disabled due to damage sustained in the crash and was towed from the scene.

Table 1. Delta V

	Case Vehicle	
	km/h	mph
Total	Unknown	Unknown
Longitudinal	Unknown	Unknown
Lateral	Unknown	Unknown

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Toyota Camry
VIN	JT2BG22K2W0
CDC	12FDEW1 (event 1) 12FR999 (event 2)

Figure 4. Exterior, case vehicle (1998 Toyota Camry).

Figure 5. Exterior, case vehicle (1998 Toyota Camry).

Table 3. Crush Measurements

Plane of Impact	Field L cm/in.	C1 cm/in.	C2 cm/in.	C3 cm/in.	C4 cm/in.	C5 cm/in.	C6 cm/in.
Bumper	147	0	8	7	15	20	25
	57.9	0	3.1	2.8	5.9	7.9	9.8

Interior of Case Vehicle

The interior of the Toyota Camry sustained no damage from occupant contact. There were no areas of intrusion into the passenger compartment. Although there was no physical evidence present of occupant contact, it is presumed that both frontal occupants contacted the deploying air bags.

The case vehicle was equipped with bucket seats with adjustable head rests which were not damaged in the front left and front right seating positions. The front left seat was adjusted between the middle and rear most track positions. The front right seat was adjusted between the forward most and middle track positions. The rear of the vehicle was equipped with bench seats which were not adjustable.

Case Vehicle Occupant Protection Systems

The Toyota Camry 4-door sedan was equipped with a redesigned air bag system which consisted of front left and front right air bag modules which housed air bags and depowered inflator units.

Figure 6. Interior, case vehicle. Supplemental restraint system (frontal air bags).

The front left air bag was housed in the steering wheel hub and was concealed by H-configuration cover flaps which were not damaged in the crash. The circular air bag was equipped with two vent ports and an unknown number of tether straps. No contact evidence was found on the air bag and the bag was not damaged.

The front right air bag was housed in the top-instrument panel position and was concealed by a single rectangular cover flap which was not damaged in the crash. The rectangular air bag was not equipped with vent ports or tether straps. No contact evidence was found on the air bag and the bag was not damaged.

Case Vehicle Occupant Demographics

Table 4. Case Vehicle Occupant(s) Demographics

	Occupant 1	Occupant 2	Occupant 3	Occupant 4
Age/Sex:	15/Female	15/Female	15/Female	15/Female
Seated Position:	Front left	Front right	Back left	Back right
Seat Type:	Bucket - cloth covered	Bucket - cloth covered	Bench - cloth covered	Bench - cloth covered
Height (cm/in:):	152 60	165 65	165 65	158 62
Weight (kg/lbs).:	49 108	51 113	59 130	57 125
Pre-existing Medical Condition:	None noted	None noted	None noted	None noted
Body Posture:	Normal - upright in seat facing forward	Normal - upright in seat facing forward	Normal - upright in seat facing forward	Normal - upright in seat facing forward
Hand Position:	Both on steering wheel	Bracing with one or both hands	Unknown	Unknown
Foot Position:	On floor or foot controls	On floor	On floor	On floor
Restraint Usage:	Lap portion only of the lap and shoulder restraint	Lap portion only of the lap and shoulder restraint	None used	None used
Air bag:	Deployed redesigned air bag system	Deployed redesigned air bag system	None	None

Occupant Injuries

Table 5. Case Vehicle Occupant(s) Injuries

Occupant #	Injury	Injury Severity (AIS)	Injury Mechanism
1	Left knee skin contusion	1	Knee bolster
1	Left shin skin contusion	1	Knee bolster
1	Right forearm skin contusion	1	Driver's frontal air bag
2	Left knee skin contusion	1	Right instrument panel

Occupant Kinematics

The driver of the Toyota Camry was seated in a normal upright posture in the front left position of the vehicle. The front right passenger was also seated in a normal upright posture. Both frontal occupants were wearing the lap portion only of the lap and shoulder restraint system. They both had placed the shoulder portion of the restraint system behind their backs. The front right passenger was reported to have braced with one or both hands on a surface in front of her. The back left and back right occupants were seated in normal upright postures and were unrestrained. Seat belt usage was determined through visual inspection by the researcher, observations by the investigating police officer at the scene of the crash, and statements by the driver. Prior to impact, the driver applied the brakes (without lock-up) and steered to the left in an attempt to avoid the collision.

Figure 7. Interior, case vehicle. Front right seating position.

At impact, the occupants reacted to the 12 o'clock direction of force by moving forward. The unrestrained back seat occupants impacted the front seat backs with their upper torsos. The seats provided enough of a cushioning effect that they were not injured. The front seat occupants' lower torsos were restrained, but their upper torsos were allowed to move forward due to the misuse of the lap and shoulder restraint. The driver's right forearm was contacted by the deploying frontal air bag-causing the forearm skin contusion. Her left leg came into contact with the knee bolster-causing the shin and knee skin contusions. The front right passenger's left knee contacted the right instrument panel-causing the knee skin contusion. None of the occupants received any medical attention for their injuries.

Scene Diagram