Remote, Redesigned Air Bag Special Study
Dynamic Science, Inc., Case Number (1998-079-009K)
1998 Oldsmobile Intrigue
California
February/1998

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16. Abstract

This remote investigation focused on the redesigned air bag system deployment of a 1998 Oldsmobile Intrigue 4-door sedan. This moderate injury crash occurred in February, 1998 in the morning. The weather was clear and the bituminous roadway was dry. The crash occurred on a two-way undivided roadway. The roadway contains five travel lanes; two eastbound lanes, two westbound lanes, and one center turn lane. The speed limit for this road is 64 kmph (40 mph). There are no traffic controls and the road is level at the area of impact. Vehicle 1, a 1990 Toyota Corolla station wagon driven by a 20 year old male, was traveling west in the right westbound travel lane at an unknown speed. The driver was preparing to change lanes from the right westbound travel lane into the left westbound travel lane. The front-right seat was occupied by an 18 year old male. The back-left seat was occupied by a 16 year old male. The back-center seat was occupied by two 13 year old females. The back-right seat was occupied by a female of an unknown age. It is unknown if any of the occupants of Vehicle 1 were restrained. Vehicle 2, a 1998 Oldsmobile Intrigue 4-door sedan (case vehicle) driven by a 33 year old male (190 cm/75 in, 98 kg/215 lbs), was traveling east in the right eastbound travel lane at a driver estimated speed of 56-64 kmph (35-40 mph). The driver was restrained by the available manual lap/shoulder restraint. The front-right seat was occupied by a 31 year old female (163 cm/64 in, 54 kg/120 lbs) who was restrained by the available manual lap/shoulder restraint. The back-center seat was occupied by a 3 year old female (91 cm/36 in, 15 kg/33 lbs) who was restrained in a forward facing “Kolcraft” child safety seat which was anchored by the available manual lap restraint. The driver of Vehicle 1 reported that he “changed lanes pretty fast” and “lost control” of the vehicle. Vehicle 1 crossed from the right westbound travel lane completely across the roadway and entered the path of Vehicle 2 in the right eastbound travel lane. The front plane of Vehicle 2 (12FLEE9) struck the front plane of Vehicle 1 (02FDEW3) in the right eastbound travel lane. Vehicle 2 then impacted the south curb (event 2) with its right-front wheel (02RFWN3) before coming to rest back in the original lane facing east (event 2). Vehicle 1 rotated counter-clockwise approximately 90 degrees after impact and came to rest straddling the two eastbound lanes facing southeast. A Delta V was calculated for event 1 for Vehicle 2, utilizing the Damage Only Algorithm of WinSMASH, as 29 kmph (18 mph). As a result of the first event frontal impact, the supplemental restraint system (driver’s and passenger’s frontal redesigned air bags) of the case vehicle deployed. All occupants of Vehicle 1 except the back-right occupant were transported by land to a trauma center for medical attention. The driver was hospitalized with serious injuries. The other occupants of Vehicle 1 were treated and released. The back-right occupant was not injured. All three occupants of the case vehicle were transported by land to a trauma center with non-incapacitating injuries. All three occupants were treated and released. Both vehicles were disabled due to damage sustained in the crash and were towed from the scene.

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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Oldsmobile Intrigue 4-door sedan. This moderate injury crash occurred in February, 1998 in the morning. The weather was clear and the bituminous roadway was dry. The crash occurred on a two-way undivided roadway. The roadway contains five travel lanes; two eastbound lanes, two westbound lanes, and one center turn lane. The speed limit for this road is 64 kmph (40 mph). There are no traffic controls and the road is level at the area of impact.

Figure 1. Exterior, Vehicle 1 (Toyota Corolla)

Vehicle 1, a 1990 Toyota Corolla station wagon driven by a 20 year old male, was traveling west in the right westbound travel lane at an unknown speed. The driver was preparing to change lanes from the right westbound travel lane into the left westbound travel lane. The front-right seat was occupied by an 18 year old male. The back-left seat was occupied by a 16 year old male. The back-center seat was occupied by two 13 year old females. The back-right seat was occupied by a female of an unknown age. It is unknown if any of the occupants of Vehicle 1 were restrained.

Vehicle 2, a 1998 Oldsmobile Intrigue 4-door sedan (case vehicle) driven by a 33 year old male (190 cm/75 in, 98 kg/215 lbs), was traveling east in the right eastbound travel lane at a driver estimated speed of 56-64 kmph (35-40 mph). The driver was restrained by the available manual lap/shoulder restraint. The front-right seat was occupied by a 31 year old female (163 cm/64 in, 54 kg/120 lbs) who was restrained by the available manual lap/shoulder restraint. The back-center seat was occupied by a 3 year old female (91 cm/36 in, 15 kg/33 lbs) who was restrained in a forward facing “Kolcraft” child safety seat which was anchored by the available manual lap restraint.

Figure 2. Exterior, Vehicle 2 (Oldsmobile Intrigue)

Crash Events

The driver of Vehicle 1 reported that he "changed lanes pretty fast" and "lost control" of the vehicle. Vehicle 1 crossed from the right westbound travel lane completely across the roadway and entered the path of Vehicle 2 in the right eastbound travel lane. The front plane of Vehicle 2 (12FLEE9) struck the front plane of Vehicle 1 (02FDEW3) in the right eastbound travel lane (event 1). Vehicle 2 then impacted the south curb (event 2) with its right-front wheel (02RFWN3) before coming to rest back in the original lane facing east. Vehicle 1 rotated counter-clockwise approximately 90 degrees after impact and came to rest straddling the two eastbound lanes facing southeast.

Figure 3. Crash scene. Vehicle 2 approach path.

A Delta V was calculated for event 1 for Vehicle 2, utilizing the Damage Only Algorithm of WinSMASH, as 29 kmph (18 mph).

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

All occupants of Vehicle 1 except the back-right occupant were transported by land to a trauma center for medical attention. The driver was hospitalized with serious injuries. The other occupants of Vehicle 1 were treated and released. The back-right occupant was not injured. All three occupants of the case vehicle were transported by land to a trauma center with non-incapacitating injuries. All three occupants were treated and released.

Both vehicles were disabled due to damage sustained in the crash and were towed from the scene.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	29	18	34	21.1
Longitudinal	-28	-17.4	-17	-10.6
Lateral	5	3.1	-30	-18.6
Barrier speed	13	8.1	39	24.2

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Oldsmobile Intrigue
VIN	1G3WH52K6WF
CDC	12FLEE9[1]

Figure 4. Exterior, Vehicle 2 (1998 Oldsmobile Intrigue)

Figure 5. Exterior, Vehicle 2 (1998 Oldsmobile Intrigue)

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	125	15	5	1	0	0	0
	49.2	5.9	2	0.4	0	0	0

[1]SCI altered. Direct damage <16 inches

Interior of Case Vehicle

The interior of the Oldsmobile Intrigue sustained moderate damage from intrusion and occupant contact. There was substantial intrusion to the front-left section of the vehicle. The intruded values are reported in Table 4. There was occupant contact evidence present to the front-left door panel, left panel forward of the A-pillar, center instrument panel, and rearview mirror.

Table 4. Intrusions

Intruded Component	Location of Intrusion	Intruded Value cm/in.		Dominant Crush Direction
Side panel forward of the A-pillar	Front-left	28	11	Lateral
Door panel	Front-left	19	7.5	Lateral
Left instrument panel	Front-left	6	2.4	Lateral
Seat back support	Front-left	3	1.2	Lateral
Roof	Front-left	1	0.4	Vertical

This vehicle was equipped with bucket seats in the front left and front right seating positions. The front left seat was adjusted to the rear most track position. The front right seat was adjusted between the middle and rear most track positions. Both front seats were equipped with adjustable head restraints which were not damaged. The rear of the vehicle was equipped with bench seats in all three seating positions. The outboard seats were equipped with integral head restraints which were not damaged, while the center seat was not equipped with a head restraint system.

Case Vehicle Occupant Protection Systems

The Oldsmobile Intrigue 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.

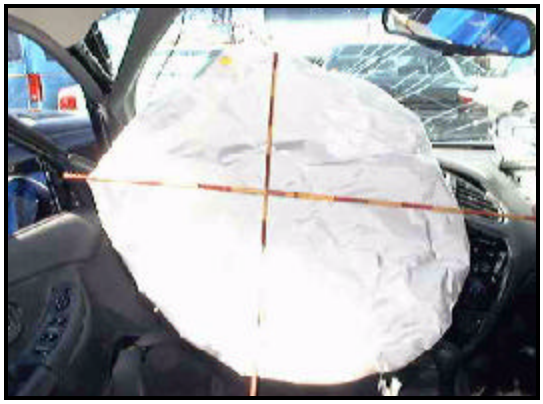

Figure 6. Driver's frontal air bag.

The front left air bag was housed in the steering wheel hub and was concealed by symmetrical I-configuration cover flaps which were not damaged. The circular air bag was equipped with two tether straps and two vent ports. Contact evidence consisting of a small scuff was found on the front of the bag. The bag was not damaged in the crash.

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

Case Vehicle Occupant Demographics

Table 5. Case Vehicle Occupant(s) Demographics

	Occupant 1	Occupant 2	Occupant 3
Age/Sex:	33/Male	31/Female	3/Female
Seated Position:	Front left	Front right	Back center
Seat Type:	Bucket - cloth covered	Bucket - cloth covered	Bench - cloth covered
Height (cm/in:):	190 75	163 64	91 36
Weight (kg/lbs).:	98 215	54 120	15 33
Pre-existing Medical Condition:	None noted	None noted	None noted
Body Posture:	Normal - upright in seat, facing forward	Normal - upright in seat, facing forward	Seated in a forward facing child safety seat
Hand Position:	On steering wheel	On lap	Unknown
Foot Position:	On floor or foot controls	On floor	Unknown
Restraint Usage:	Manual lap & shoulder restraint	Manual lap & shoulder restraint	Forward facing child safety seat anchored by the manual lap restraint
Air bag:	Deployed redesigned air bag system	Deployed redesigned air bag system	None

Occupant Injuries

Table 6. Case Vehicle Occupant(s) Injuries

Occupant #	Injury	Injury Severity (AIS)	Injury Mechanism
1	Unconscious <1 hour	2	Air bag
1	Cervical strain	1	Impact forces
1	Lumbar strain	1	Impact forces
1	Thorax skin contusion	1	Shoulder belt
1	Minor facial skin laceration	1	Air bag
2	Abdominal skin contusion	1	Lap belt
2	Abdominal skin abrasion	1	Lap belt
2	Thorax skin contusion	1	Shoulder belt
3	Facial skin abrasion	1	Unknown source

Occupant Kinematics

The driver of the Oldsmobile Intrigue 4-door sedan was seated in a normal upright posture in the front left position of the vehicle. He was wearing the manual lap/shoulder restraint. The front right passenger was also seated in a normal upright posture and was wearing the manual lap/shoulder restraint. The back center passenger was seated in a forward facing child safety seat which was anchored by the manual lap restraint. Seat belt usage was determined through visual inspection by the researcher, interview and injury data, and observations by the investigating police officer at the scene of the crash. The driver appears to have steered to the right prior to impact in an attempt to avoid Vehicle 1.

Figure 7. Driver's frontal air bag contact (scuff).

At impact, the occupants reacted to the 350 degree principle direction of force by moving forward and slightly left. As the restraints locked, further forward movement of the occupants was prevented. The driver contacted the deploying front left air bag-causing the loss of consciousness and facial skin laceration. Impact with the locked shoulder belt caused the thorax skin contusion. It appears that the cervical and lumbar strains were caused by impact forces rather than contact with a component of the vehicle's interior. The front right passenger also impacted the locked shoulder belt-causing the thorax skin contusion. Impact with the locked lap belt caused the abdominal skin contusion and abrasion. The back center occupant sustained a facial skin abrasion from an unknown source. All three occupants of Vehicle 2 were transported by land from the scene to a trauma center where they were treated and released.

Scene Diagram