Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number (1998-82-803G)

1998 Honda Civic

Washington

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16. Abstract

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Honda Civic two-door hatchback. This two vehicle crash occurred during a summer weekday afternoon in July, 1998. This crash took place within a busy, urban four-leg intersection and the bituminous roadway surface was dry and free of defects. The north/south leg of the intersection consists of four level southbound travel lanes and three northbound travel lanes. A left turn lane exists for each leg of the north/southbound roadway. The west leg of the intersection is a level, undivided three lane roadway which consists of one eastbound through lane, a left turn lane and a westbound travel lane. The west leg enters the north/southbound roadway at a 48 degree angle. The east leg of the intersection is a an undivided five lane roadway. An overhead traffic signal regulates the traffic flow and was operating properly at the time of the crash. The entire intersection is bordered by curbing and the posted speed limit is 56 km/h (35 mph). Vehicle 1, a 1989 Ford Ranger pickup truck, was being driven by a 33 year-old-male and it is unknown whether he was restrained at the time of the crash. Driver 1 was traveling southbound in lane three and entered the intersection while overhead traffic signal was in the red signal phase. Vehicle 2, a 1998 Honda Civic two-door hatchback, was being driven by a 43 year-old-male (173 cm/ 68 in., 68 kg/ 150 lbs.) who was fully restrained by the available three-point manual lap and shoulder belt. Driver 2 was in lane 1 of the three-lane roadway and had entered the intersection while the overhead traffic signal was in the green signal phase. Driver 2 was intending to turn left when the front of Vehicle 2 impacted the right fender area of Vehicle 1 (vehicle was not inspected). The calculated delta V for Vehicle 2 (Honda) was 14.4 km/h (8.9 mph) with a longitudinal delta V of -12.5 (-7.8 mph) which is at the lower end of the threshold necessary for air bag deployment. The calculated delta V for Vehicle 1 (Ford Ranger) was 11.6 km/h (7.2 mph). Vehicle 1 was deflected slightly to the right and came to rest facing south. Vehicle 2 rotated clockwise and came to rest facing in an easterly direction. The fully restrained driver of Vehicle 2 (1998 Honda Civic) sustained an abrasion (AIS-1) to the ventral aspect of his right forearm from the deploying air bag. It is unknown whether the driver of Vehicle 1 (Ford ranger) was injured in the crash. A local towing agency removed both of the involved vehicle's from the crash location.

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Summary

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Honda Civic two-door hatchback. This two vehicle crash occurred during a summer weekday afternoon in July, 1998. This crash took place within a busy, urban four-leg intersection and the bituminous roadway surface was dry and free of defects. The north/south leg of the intersection consists of four level southbound travel lanes and three northbound travel lanes. A left turn lane exists for each leg of the north/southbound roadway. The west leg of the intersection is a level, undivided three lane roadway which consists of one eastbound through lane, a left turn lane and a westbound travel lane. The west leg enters the north/southbound roadway at a 48 degree angle. The east leg of the intersection is a an undivided five lane roadway. An overhead traffic signal regulates the traffic flow and was operating properly at the time of the crash. The entire intersection is bordered by curbing and the posted speed limit is 56 km/h (35 mph).

Vehicle 1, a 1989 Ford Ranger pickup truck, was being driven by a 33 year-old-male and it is unknown whether he was restrained at the time of the crash. Driver 1 was traveling southbound in lane three and entered the intersection while overhead traffic signal was in the red signal phase.

Vehicle 2, a 1998 Honda Civic two-door hatchback, was being driven by a 43 year-old-male (173 cm/ 68 in., 68 kg/ 150 lbs.) who was fully restrained by the available three-point manual lap and shoulder belt. Driver 2 was in lane 1 of the three-lane roadway and had entered the intersection while the overhead traffic signal was in the green signal phase.

Figure 1. Pre-impact trajectory of Vehicle 1 and area of impact

Figure 2. Pre-impact trajectory of Vehicle 2 (1998 Honda Civic)

Crash Events

Driver 2 was intending to turn left when the front of Vehicle 2 (01FDEW2)[1] impacted the right fender area of Vehicle 1 (vehicle was not inspected). The calculated delta V for Vehicle 2 (Honda) was 14.4 km/h (8.9 mph) with a longitudinal delta V of -12.5 (-7.8 mph) which is at the lower end of the threshold necessary for air bag deployment. The calculated delta V for Vehicle 1 (Ford Ranger) was 11.6 km/h (7.2 mph)[2]. Vehicle 1 was deflected slightly to the right and came to rest facing south. Vehicle 2 rotated clockwise and came to rest facing in an easterly direction.

Figure 3. Exterior view of Vehicle 2 showing frontal damage

The fully restrained driver of Vehicle 2 (1998 Honda Civic) sustained an abrasion (AIS-1) to the ventral aspect of his right forearm from the deploying air bag. It is unknown whether the driver of Vehicle 1 (Ford ranger) was injured in the crash. A local towing agency removed both of the involved vehicles from the crash location.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	11.6	7.2	14.4	8.9
Longitudinal	-11.2	-7	-12.5	-7.8
Lateral	-3.0	-1.9	7.2	4.5

Figure 5. Frontal view of Vehicle 2

Figure 4. Frontal three-quarter view of Vehicle 2

[1]SCI revised CDC

[2] Calculated utilizing the Missing Vehicle Algorithm of the WinSmash 1.2.1 program

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Honda Civic
VIN	2HGEJ6445WH
CDC	01FDEW2

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.
Front	158	5	8	6	4	3	5
	62.2	2	3.1	2.4	1.6	1.2	2

Interior of Case Vehicle

The interior of the 1998 Honda Civic two-door hatchback sustained minor interior damage that was isolated to a cracked windshield. The laminated windshield was damaged as a result of the passenger air bag deployment. The interior was void of any remarkable areas of occupant contact evidence. This vehicle is equipped with two frontal bucket seats with folding backs and adjustable head restraints. The seat row consists of a bench seat with folding backs. There are no head restraints available for the rear bench seat. The front left seat was adjusted at the middle seat track position. There was no intrusion to the Honda Civic and the vehicle maintained its integrity.

Case Vehicle Occupant Protection Systems

The 1998 Honda Civic two-door hatchback was equipped with redesigned air bag systems. This system consists of a SRS unit (diagnostic module) which is centrally located in the center console, forward of the transmission selector lever. The frontal air bag sensor is incorporated within the centrally located SRS unit. The SRS indicator light is located in the lower left instrumentation cluster, immediately below the tachometer.

Figure 6. View showing deployed driver's air bag

The driver's air bag is housed in the steering wheel hub and encases the nylon air bag unit. The double, horizontal module cover flaps are asymmetric in design and opened at their designated tear points. The circular air bag is 63 cm (24.8 in.) in diameter and is equipped with two exhaust vent port holes. The vent ports are located at the 11 and 1 o'clock positions respectively. The rigid plastic knee bolster was undamaged and did not reveal any detectable occupant contacts.

The front, right passenger air bag is located on the instrument panel (top mount). The module deployment door is rectangular in design and is equipped with double horizontal cover flaps that are symmetrical in design (23 cm wide x 5 cm in height). Upon deployment, the encased air bag fully deployed. The non-tethered air bag was undamaged and was equipped with two vent port holes which are at the 9 and 3 o'clock positions. Upon deployment, the front passenger air bag contacted and broke the laminated windshield.

Figure 7. View showing deployed front right passenger's air bag

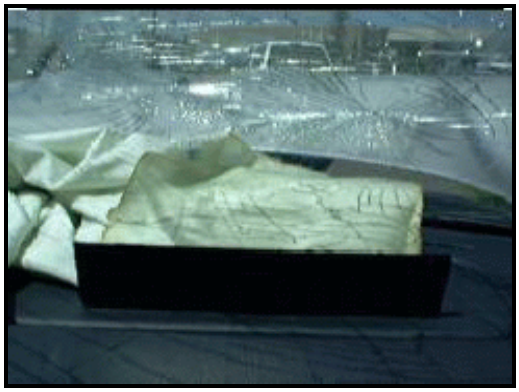

Figure 8. View showing damaged windshield due to passenger air bag deployment

Case Vehicle Occupant Demographics

	Occupant 1	
Age/Sex:	43/Male	
Seated Position:	Front, Left	
Seat Type:	Bucket with folding back(s)	
Height (cm/in:):	173	68
Weight (kg/lbs).:	68	150
Pre-existing Medical Condition:	None Reported	
Body Posture:	Upright, facing forward	
Hand Position:	Both hands on steering wheel rim, unknown exact position	
Foot Position:	Right foot on accelerator pedal and left foot on floor	
Restraint Usage:	Three-point manual lap and shoulder belt used in a proper and correct fashion	
Air bag:	Driver's air bag deployed as a result of the frontal impact	

Occupant Injuries

Table 4. Injuries

Injury	Injury Severity (AIS)	Injury Mechanism
Right inner forearm abrasion	1	Driver's air bag

Occupant Kinematics

Figure 9. Front, three-quarter view showing driver's position

The 43 year-old-male driver of the 1998 Honda Civic was restrained by the available three-point manual lap and shoulder belt. He responded to the 1 o'clock principle direction of force by moving forward and to his right The interior was void of occupant contact evidence and there is no evidence to suggest that his knees contacted the knee bolster. He loaded the applied lap belt which held his lower torso in place while the applied shoulder belt webbing prohibited extended movement of his upper torso. His right forearm was contacted by the deploying driver's air bag which resulted in an abrasion (AIS-1) to the ventral aspect of the forearm. The driver reported that his nose was numb as a result of his facial interaction with the driver's air bag. He was maintained in his respective seated position and did not require any medical attention

Scene Diagram