Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number (1998-74-805E)

1998 Honda Civic

Nebraska

November/1998

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16. Abstract

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Honda Civic four-door sedan. This two vehicle obtuse angle front to front crash occurred during the morning hours of a Fall day in November, 1998. This crash took place at a four-leg intersection in a business district. The concrete roadway surface was level and dry at the time of the crash. The south leg of the intersection consists of two northbound through lanes and one left turn only lane. There are two southbound travel lanes present. There is a raised, curbed center median which separates the north and southbound travel lanes. The north leg of the intersection also consists of two southbound lanes with a left turn lane. There are two northbound travel lanes and a raised, curbed median delineates the north and southbound travel lanes. The east/west legs of the intersection are private driveways which have enter/exit lanes for local stores. Curbing borders each leg of the intersection and the posted speed limit is 64 km/h (40 mph). There were no adverse weather conditions at the time of the crash. Vehicle 1, a 1998 Honda Civic four-door sedan, was driven by a 29 year-old-female (165 cm/65 in., 75 kg/165 lbs.) who was fully restrained by the available three-point lap and shoulder belt. Vehicle 1 was traveling westbound on the east leg of the intersection and the traffic signal was green as she initiated a left turn sequence. Vehicle 2 was being driven by a 21year-old-male (unknown restraint usage) and a 20 year-old-female occupied the front right seated position (unknown restraint usage). Driver 2 entered the intersection while the overhead traffic signal was in the red signal phase. The right front of Vehicle 2 (12FREE5) impacted the front, left of Vehicle 1 (11FYEW1) in an obtuse angle head-on impact configuration. The frontal impact was of sufficient force to deploy the redesigned air bags in Vehicle 1. The calculated Delta V for Vehicle 1 (Honda Civic) was 17 km/h (11 mph) with a longitudinal Delta V of -13 km/h (-8.1 mph) which falls at the lower end of the threshold required for air bag deployment. The Delta V for Vehicle 2 (Grand Am) was computed at 14 km/h (8.7 mph). Vehicle 1 rotated in a clockwise direction and was deflected in a counterclockwise direction before coming to rest. The 29 year-old-female driver of Vehicle 1 sustained a left parietal scalp contusion (AIS-1) and cervical neck strain due to impacting the left side window frame. She also sustained a right knee contusion (AIS-1) due to contacting the knee bolster. A local towing agency responded to the crash scene and subsequently removed the involved vehicles.

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Summary

This remote investigation was focused on the redesigned air bag system deployment of a 1998 Honda Civic four-door sedan. This two vehicle obtuse angle front to front crash occurred during the morning hours of a Fall day in November, 1998. This crash took place at a four-leg intersection in a business district. The concrete roadway surface was level and dry at the time of the crash. The south leg of the intersection consists of two northbound through lanes and one left turn only lane. There are two southbound travel lanes present. There is a raised, curbed center median which separates the north and southbound travel lanes. The north leg of the intersection also consists of two southbound lanes with a left turn lane. There are two northbound travel lanes and a raised, curbed median delineates the north and southbound travel lanes. The east/west legs of the intersection are private driveways which have enter/exit lanes for local stores. Curbing borders each leg of the intersection and the posted speed limit is 64 km/h (40 mph). There were no adverse weather conditions at the time of the crash.

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

Vehicle 1, a 1998 Honda Civic four-door sedan, was driven by a 29 year-old-female (165 cm/65 in., 75 kg/165 lbs.) who was fully restrained by the available three-point lap and shoulder belt. Vehicle 1 was traveling westbound on the east leg of the intersection and the traffic signal was green as she initiated a left turn sequence. Vehicle 2 was being driven by a 21year-old-male (unknown restraint usage) and a 20 year-old-female occupied the front right seated position (unknown restraint usage). Driver 2 entered the intersection while the overhead traffic signal was in the red signal phase.

Figure 2. Pre-impact travel path for Vehicle 2

Figure 3. Exterior, Vehicle 1 (Honda)

Crash Events

The right front of Vehicle 2 (12FREE5) impacted the front, left of Vehicle 1 (11FYEW1) in an obtuse angle head-on impact configuration. The frontal impact was of sufficient force to deploy the redesigned air bags in Vehicle 1. The calculated Delta V for Vehicle 1 (Honda Civic) was 17 km/h (11 mph) with a longitudinal Delta V of -13 km/h (-8 mph) which falls at the lower end of the threshold required for air bag deployment. The Delta V for Vehicle 2 (Grand Am) was computed at 14 km/h (9 mph)[1]. Vehicle 1 rotated in a clockwise direction and was deflected in a counterclockwise direction before coming to rest.

Figure 4. Exterior, Vehicle 2

The 29 year-old-female driver of Vehicle 1 sustained a left parietal scalp contusion (AIS-1) and cervical neck strain due to impacting the left side window frame. She also sustained a right knee contusion (AIS-1) due to contacting the knee bolster. A local towing agency responded to the crash scene and subsequently removed the involved vehicles.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	17	10.6	14	8.7
Longitudinal	-13	-8.1	-14	-8.7
Lateral	11	6.8	-2	-1.2

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Honda Civic
VIN	JHGEJ6673WH
CDC	11FYEW1

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 Bumper	108	3	11	14	12	7	3
	42.5	1.2	4.3	5.5	4.7	2.8	1.2

[1] Calculated utilizing the Damage Only Mode of the WinSmash 1.2.1 program

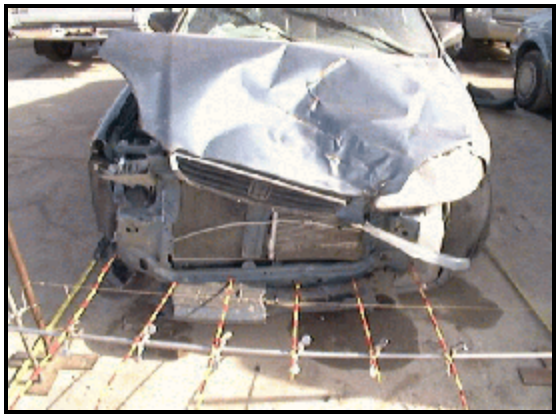


Figure 5. Front view of damage

Figure 6. Three-quarter view of frontal damage

Interior of Case Vehicle

The interior of the 1998 Honda Civic four-door sedan was undamaged as a result of the moderate frontal crash. The case vehicle maintained its integrity and there were no intruding components. The interior was void of any remarkable areas of occupant contact evidence. This vehicle is equipped with front bucket seats and adjustable head restraints. The front, left seat was at the middle track position. The second row was equipped with a bench seat with folding back(s). There were integral head restraints available at the rear seat, outboard positions.

Figure 7. Driver's front air bag

Case Vehicle Occupant Protection Systems

The 1998 Honda Civic four-door sedan was equipped with a redesigned air bag system. This system consists of a SRS unit (diagnostic module) which is centrally located in the center console, forward of the transmission selector lever[2]. 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, just below the tachometer.

Figure 8. Passenger front air bag

The drivers 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 tether straps and 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.

[2] Refer to the 1998-1999 Honda Civic Supplemental Restraint Systems and Wiring Mapping Views

The front, right passenger air bag is located on the instrument panel (top mount). The module deployment door is rectangular in shape 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.

Case Vehicle Occupant Demographics

	Occupant 1
Age/Sex:	29/Female
Seated Position:	Front, Left
Seat Type:	Bucket, cloth covered
Height (cm/in:):	165 64.96
Weight (kg/lbs).:	75 165.3
Pre-existing Medical Condition:	None Reported
Body Posture:	Sitting upright and facing forward
Hand Position:	Both hands on steering wheel rim at unknown o'clock positions
Foot Position:	Right foot on accelerator pedal and left foot on the floor
Restraint Usage:	Manual, lap and shoulder belt with the lap belt reportedly worn high across her stomach
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
Left, parietal scalp contusion	1	Left , front window frame
Right knee contusion	1	Knee bolster
Cervical neck strain	1	Left, front window frame

Occupant Kinematics

The 29 year-old-female driver of the 1998 Honda Civic was fully restrained and was wearing the available three-point manual lap and shoulder belt. She apparently was wearing the lap belt webbing high, extending across her stomach. She reported that both hands were on the steering wheel rim (unknown positions) and that her right foot was depressing the accelerator pedal.

She responded to the 11 o'clock direction of force by moving forward and to the left. She loaded the applied lap and shoulder belt webbing which prohibited extended movement of her upper and lower torso. The driver's right knee contacted the hard plastic knee bolster which resulted in a contusion (AIS-1). As the vehicle rotated in a clockwise direction, the left side of her scalp impacted the left window frame area. This contact was not confirmed by occupant contact evidence, but resulted in a left parietal scalp contusion (AIS-1) and a cervical strain (AIS-1). She rebounded back into the seat back support and remained in her respective seated position.

Figure 9. Driver's seated position

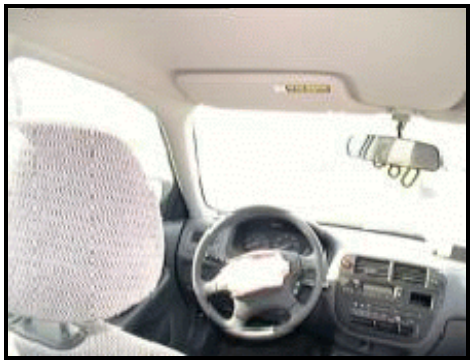
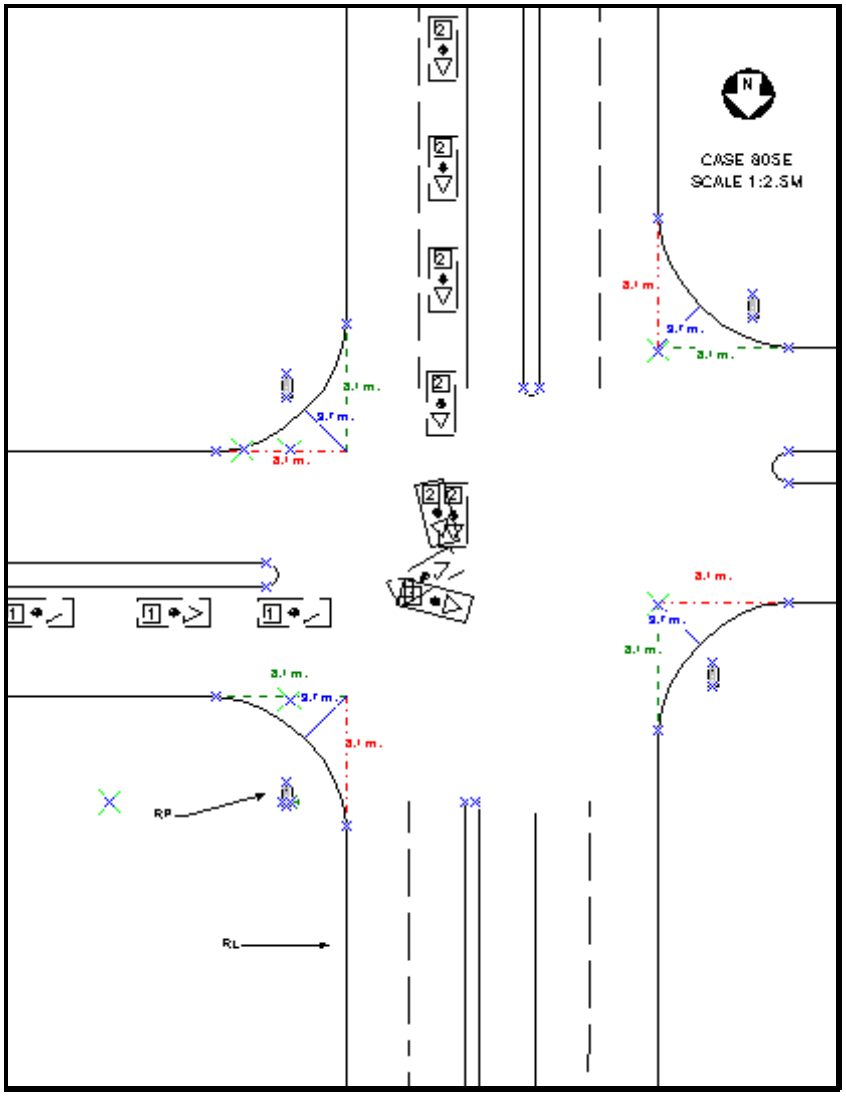


Figure 10. Overview of driver's seated position

Scene Diagram



Component/Wiring Locations

Index: With Front Passenger's Airbag