Remote, Redesigned Air Bag Special Study
Dynamic Science, Inc., Case Number (1998-049-806G)
1998 Ford Mustang
Texas
August, 1998

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16. Abstract

This remote investigation focused on the redesigned air bag system deployment of a 1998 Ford Mustang 2-door coupe. This minor injury crash occurred in August, 1998 in the afternoon. The weather was clear and the bituminous roadway was dry. The crash occurred on a three lane, divided, interstate highway. The two-way roadway is comprised of three northbound travel lanes and three southbound travel lanes separated by a concrete barrier. There are paved shoulders on both the inside and outside road edges. The speed limit for this road is 97 kmph (60 mph). There are no traffic controls for this road. The road was level at the area of impact. Vehicle 1, a 1998 Ford Mustang 2-door coupe (case vehicle) driven by a 38 year old female (170 cm/67 in, 59 kg/130 lbs), was traveling south, in the southbound left lane, negotiating a leftward curve in the roadway at a driver estimated speed of 89-97 kmph (55-60 mph). The driver was restrained by the available manual lap/shoulder restraint. The front right seat was occupied by an 8 year old male (152 cm/60 in, 45 kg/99 lbs) who was restrained by the available manual lap/shoulder restraint. The driver reported that there was slowed traffic in the lane ahead of her. The driver reacted to the slowed traffic by applying the brakes (with lock-up). The driver then lost control and Vehicle 1 exited the left road edge, crossed the paved shoulder, and struck the concrete barrier (01FDEW2) with the front plane. A Delta V was calculated, utilizing WinSMASH, as 21 kmph (13 mph). The longitudinal Delta V was calculated as -16 kmph (-10 mph). The supplemental restraint system (driver's and passenger's side redesigned air bags) of the case vehicle deployed at this time. Vehicle 1 crossed back over all three travel lanes and came to rest in the right paved shoulder facing south. The driver of Vehicle 1 (case occupant 01) sustained minor injuries in the crash consisting of upper extremity contusions and 1st degree burns; maximum AIS equal to AIS-1. The front right passenger (case occupant 02) sustained minor injuries in the crash consisting of abrasions and contusions to his face and neck; maximum AIS equal to AIS-1. Both case occupants received on-scene treatment from paramedics but were not transported to a medical facility.

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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Ford Mustang 2-door coupe. This minor injury crash occurred in August, 1998 in the afternoon. The weather was clear and the bituminous roadway was dry. The crash occurred on a three lane, divided, interstate highway. The two-way roadway is comprised of three northbound travel lanes and three southbound travel lanes separated by a concrete barrier. There are paved shoulders on both the inside and outside road edges. The speed limit for this road is 97 kmph (60 mph). There are no traffic controls for this road. The road was level at the area of impact.

Figure 1. Exterior, Vehicle 1 (Ford Mustang)

Vehicle 1, a 1998 Ford Mustang 2-door coupe (case vehicle) driven by a 38 year old female (170 cm/67 in, 59 kg/130 lbs), was traveling south, in the southbound left lane, negotiating a leftward curve in the roadway at a driver estimated speed of 89-97 kmph (55-60 mph). The driver was restrained by the available manual lap/shoulder restraint. The front right seat was occupied by an 8 year old male (152 cm/60 in, 45 kg/99 lbs) who was restrained by the available manual lap/shoulder restraint.

Crash Events

The driver reported that there was slowed traffic in the lane ahead of her. The driver reacted to the slowed traffic by applying the brakes (with lock-up). The driver then lost control and Vehicle 1 exited the left road edge, crossed the paved shoulder, and struck the concrete barrier (01FDEW2) with the front plane.

A Delta V was calculated, utilizing WinSMASH, as 21 kmph (13 mph). The longitudinal Delta V was calculated as -16 kmph (-10 mph). The supplemental restraint system (driver's and passenger's side redesigned air bags) of the case vehicle deployed at this time.

After impact, Vehicle 1 crossed back over all three travel lanes and came to rest in the right paved shoulder facing south.

The driver of Vehicle 1 (case occupant 01) sustained minor injuries in the crash consisting of upper extremity contusions and 1st degree burns; maximum AIS equal to AIS-1. The front right passenger (case occupant 02) sustained minor injuries in the crash consisting of abrasions and contusions to his face and neck; maximum AIS equal to AIS-1. Both case occupants received on-scene treatment from paramedics but were not transported to a medical facility.

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

Table 1. Delta V

	Case Vehicle	
	km/h	mph
Total	21	13
Longitudinal	-16	-10
Lateral	-13	-8
Barrier speed	21	13

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Ford Mustang
VIN	1FAFP4045WF
CDC	01FDEW2

Figure 2. Exterior, Vehicle 1 (1998 Ford Mustang 2-door coupe)

Figure 3. Exterior, Vehicle 1 (1998 Ford Mustang 2-door coupe)

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	139	32	27	29	18	8	2
	54.7	12.6	10.6	11.4	7.1	3.1	0.8

Interior of Case Vehicle

The interior of the Ford Mustang sustained minor damage from occupant contact. There were no areas of intrusion into the passenger compartment. There was occupant contact evidence to both frontal air bags and the front right seat belt.

The case vehicle was equipped with bucket seats with folding backs in the front left and the front right seating positions. The front left seat was adjusted between the front and middle track positions. The front right seat was also adjusted between the front and middle track positions. Both front seats were equipped with adjustable head restraints which were not damaged in the crash. The second row of the vehicle was equipped with bench seats with folding backs for both the back left and back right seating positions. There was no back center seating position. Both seats were equipped with integral head restraints which were not damaged in the crash.

Figure 4. Interior, case vehicle. Passenger's side air bag.

Case Vehicle Occupant Protection Systems

The Ford Mustang 2-door coupe 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.

The front left air bag was housed in the steering wheel hub and was concealed by asymmetrical H-configuration cover flaps. The circular air bag was equipped with two tethers and two vent ports. Contact evidence consisting of what appeared to be blood was found on the bag. The air bag was not damaged.

The front right air bag was housed in the top-instrument panel position and was concealed by asymmetrical H-configuration cover flaps. The rectangular air bag was not equipped with tethers nor vent ports. Contact evidence consisting of what appeared to be blood was found on the bag. The air bag was not damaged.

Figure 5. Interior, case vehicle. Driver's side air bag.

Figure 6. Interior, case vehicle. Driver's side air bag.

Case Vehicle Occupant Demographics

Table 4. Case Vehicle Occupant(s) Demographics

	Occupant 1	Occupant 2
Age/Sex:	38/Female	8/Male
Seated Position:	Front left	Front right
Seat Type:	Bucket with folding back - cloth covered	Bucket with folding back - cloth covered
Height (cm/in:):	170 67	152 60
Weight (kg/lbs).:	59 130	45 99
Pre-existing Medical Condition:	None noted	None noted
Body Posture:	Normal, upright facing forward	Normal, upright facing forward
Hand Position:	Both on steering wheel	L - holding soda can R - unknown
Foot Position:	On floor or foot controls	"Dangling off of seat"
Restraint Usage:	Manual lap & shoulder restraint	Manual lap & shoulder restraint
Air bag:	Deployed redesigned air bag system	Deployed redesigned air bag system

Occupant Injuries

Table 5. Case Vehicle Occupant(s) Injuries

Occupant #	Injury	Injury Severity (AIS)	Injury Mechanism
1	Left forearm skin contusion	1	Driver air bag
1	Right hand 1st degree burn	1	Driver air bag
2	Facial skin contusion	1	Passenger air bag
2	Facial abrasion	1	Passenger air bag
2	Neck abrasion	1	Passenger air bag

Occupant Kinematics

The driver and passenger of the Ford Mustang 2-door coupe were seated in normal upright postures in the front left and front right positions of the vehicle. Both occupants were wearing the manual lap/shoulder restraints. Belt usage was determined based on visual inspection by the researcher, observations by the investigating officer at the scene of the crash, and the lack of prominent frontal contact evidence in the vehicle. Prior to the impact, the driver applied the brakes (with lock-up) to avoid the slowed vehicles. Most likely, this force was enough to propel the occupants forward, loading the lap/shoulder restraints.

At impact, the locked lap/shoulder restraints prevented the occupants from moving far enough forward to contact the vehicle's interior. The driver appears to have engaged the deploying front left air bag-causing the forearm contusion. The driver's right index and middle fingers sustained 1st degree burns from contact with the hot gases escaping through the right side air bag vent port. The passenger also appears to have engaged the deploying front right air bag-causing the facial abrasion and contusion, and also the neck abrasion.

Figure 7. Interior, case vehicle. Driver's side air bag contact evidence.

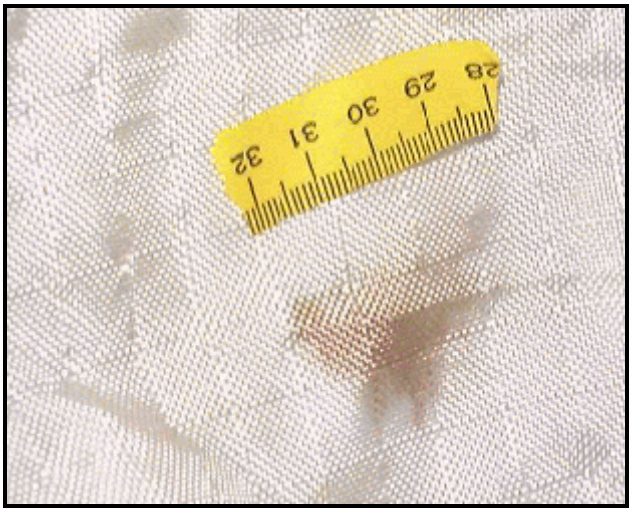
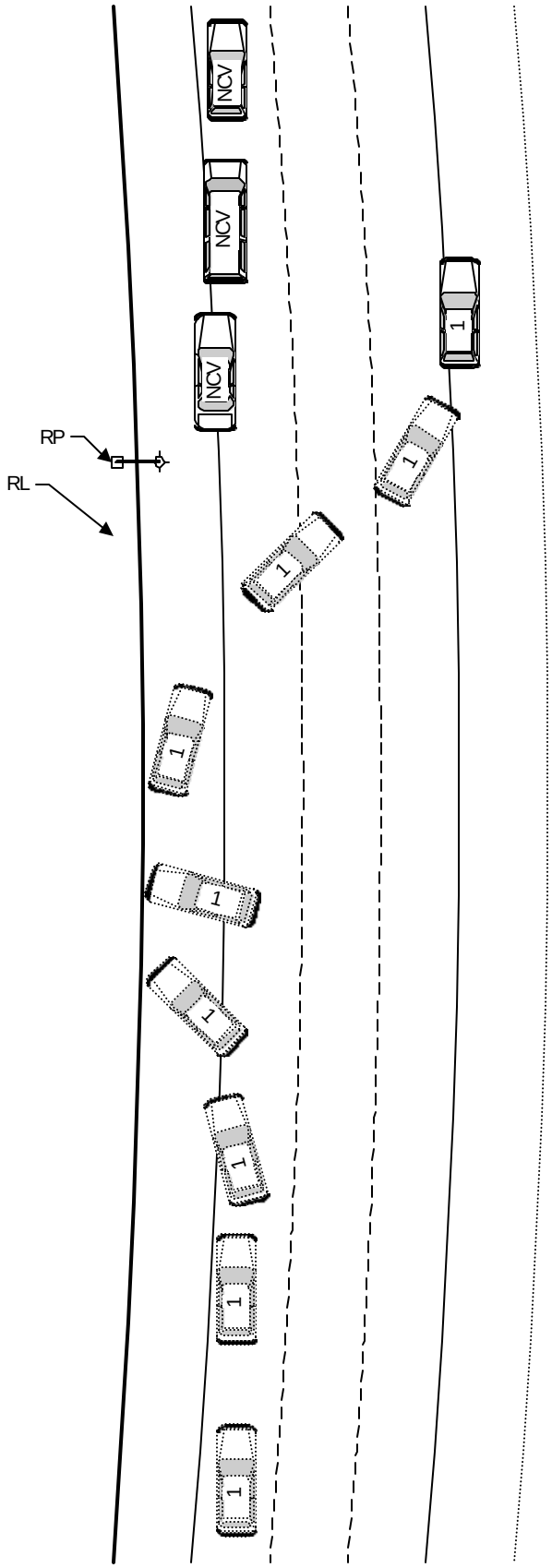


Figure 8. Interior, case vehicle. Passenger's side air bag contact evidence.

Scene Diagram



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806G
1 Cm = 2.5 M
Dry, Level Asphalt
cf=.60