U.S. Department of Transportation
National Highway Traffic Safety Administration

ODI RESUME

Investigation: EA 03-010
Prompted By: PE03-002
Date Opened: 07/02/2003 Date Closed: 06/23/2004
Principal Investigator: Michael Lee
Subject: Frontal Air Bag Non-deployment In Crash

Manufacturer: Ford Motor Company
Products: 2000-2001 Ford Taurus and Mercury Sable
Population: 895,936

Problem Description: Frontal air bags may not deploy in certain severe frontal crashes.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	1	1	2
Crashes/Fires:	1	1	2
Injury Incidents:	1	0	1
# Injuries:	1	0	1
Fatality Incidents:	1	1	2
# Fatalities:	1	1	2
Other*:	59	366	425

*Description of Other: See attached summary report.

Action: This Engineering Analysis has been closed.

Engineer: *Michael Lee* MJL Date: *06/23/2004*
Div. Chief: *Thomas Z. Cooper* Date: *06/23/2004*
Office Dir.: *Kathleen C. DeMeter* Date: *06/23/2004*

Summary: This investigation identified a total of 427 reports alleging non-deployment of the frontal air bags. Of the 427 reports, two incidents (fatal crashes) have been identified as severe frontal crashes in which the frontal air bags did not deploy. A defect trend has not been identified at this time. Further use of agency resources does not appear to be warranted. Accordingly, this investigation is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The agency will take further action if warranted by the circumstances.

See attached summary report.

6/28/04

SUMMARY REPORT

An Engineering Analysis was conducted concerning alleged failure of the frontal air bags in model year (MY) 2000 and 2001 Ford Taurus and Mercury Sable vehicles to deploy in frontal crashes.

DESCRIPTION OF COMPONENT OR VEHICLE SYSTEM: The MY 2000 and 2001 Ford Taurus and Mercury Sable vehicles were the first vehicles produced by Ford to be equipped with Ford's "Personal Safety System." The system is generally referred to as an advanced restraint (or air bag) system or an advanced occupant protection system. It consists of dual-stage driver and front passenger frontal air bags and seat belt pretensioners designed to protect the front seat occupants during a frontal crash.

The deployment of one or more of the restraints depends on the severity of the crash, whether seat belts are buckled or unbuckled, and driver's seat track position (for this purpose, the vehicle contains front seat belt sensors and a driver seat track position sensor). The air bag deployment threshold for belted occupants is higher than that for unbelted occupants. The seat belt pretensioner is designed to deploy independently of the air bags and at a lower deployment threshold than the first stage air bag for unbelted occupants.

A control device for firing the air bags and pretensioners, the Restraint Control Module (RCM), is located in the center tunnel under the instrument panel. It contains a crash sensor, microprocessor, capacitors, and electronic memory. A front crash sensor is located in the front of the radiator on the upper radiator support on the centerline of the vehicle. The RCM processes data from its crash sensor and the front crash sensor to evaluate the crash pulse and to determine whether to deploy the air bags, the pretensioners, or both.

THE ALLEGED DEFECT: The frontal air bags may not deploy in certain severe frontal crashes.

CORRESPONDENCE:

NHTSA to MFR	MFR to NHTSA	MFR to NHTSA Confidential	Items Confidential
1/30/03	3/24/03	3/31/03	Appendices F and G
		6/6/03	Appendices H, J and O
		6/12/03	Entire Response
9/2/03	10/22/03	10/24/03	Appendices C-1, D1-3, G and I

STATUS: The table below shows the reported problem experience for alleged failure of the frontal air bags to deploy in MY 2000 and 2001 Ford Taurus and Mercury Sable vehicles in frontal or near-frontal crashes.

Reports*	2
Lawsuits	2
Crashes	2
Injury Crashes	1
Injuries	1
Fatal Crashes	2
Fatalities	2
Other Reports**	425
Total	427

*Air bag non-deployment in severe frontal or severe near-frontal crash.

**This category includes reports of air bag non-deployment in any (severity) frontal or near-frontal crash. Some of the ODI complaints and manufacturer complaints were added together without eliminating possible duplicate reports made both to ODI and manufacturer. In addition, information examined by the agency regarding these incidents, including reported crash severity, injury information and available photographic material, indicates that they did not involve crash conditions that were similar to those involved in the alleged defect (i.e., high-speed/severe frontal collision). No fatalities are reported in this category.

VEHICLE POPULATION:

Model Year	Model	Population
2000	Taurus	350,785
2000	Sable	93,482
2001	Taurus	352,662
2001	Sable	99,007
Total	Taurus/Sable	895,936

SERVICE BULLETINS: None.

DESIGN, MATERIAL, AND/OR PRODUCTION MODIFICATIONS: None.

MANUFACTURER'S EVALUATION OF THE ALLEGED DEFECT: Regarding the report of the fatal crash involving a MY 2000 Ford Taurus that prompted opening the Preliminary Evaluation that was upgraded to this Engineering Analysis (discussed in the next section), Ford stated:

> "A thorough review of the crash, the vehicle and its crash data recorder by Ford and the agency's Special Crash Investigation did not establish why the air bag did not deploy in this unique crash. We believe that this is an isolated and unique incident and we are unaware of similar cases."

In its October 22, 2003 response to ODI's September 2, 2003 Information Request letter, Ford concludes:

> "The Personal Safety System was designed to provide a high level of occupant protection to the front seat occupants during higher severity impacts. The system is designed to predict the severity of the impact and appropriately deploys supplemental restraints according to occupant status. Non-deployment of an air bag is not an indication of a defect in the system; it simply indicates that the Personal Safety System determined that additional supplemental restraint was not required to provide an adequate level of occupant protection.
>
> "The available real world data for the entire population of 2000 and 2001 Taurus and Sable vehicles, and the work of the Special Crash Investigation unit, clearly demonstrate that these vehicles are reliably providing a high level of occupant protection for our customers and that these vehicles do not contain a defect in the supplemental restraint air bag system, nor do they represent an unreasonable risk to motor vehicle safety."

ODI ANALYSIS: The Preliminary Evaluation (PE03-002) preceding this Engineering Analysis was opened based on one report of a frontal air bag non-deployment in a severe and fatal crash involving a MY 2000 Taurus in April 2000. This incident is described in NHTSA's Special Crash Investigation (SCI) report number CA00-020. The Taurus impacted head-on with a concrete bridge rail shaped like a narrow trapezoid and the frontal air bags did not deploy. The maximum vehicle crush was 37 inches along the centerline of the vehicle. SCI calculated a longitudinal delta-V of 43 mph during impact. The driver and front passenger were wearing their seat belts and their seat belt pretensioners deployed. The driver sustained fatal head injuries and the front passenger sustained multiple lower extremity fractures and several other injuries.

Ford cannot explain why the air bags failed to deploy in the fatal crash. Ford stated that the vehicle's Restraint Control Module (RCM) did not contain any fault codes and that the RCM recorded erroneous crash data (deceleration and delta-V) because the vehicle's battery, which is the RCM's power source for crash data recording, was destroyed during the crash. Ford also stated that the front crash sensor was destroyed during the crash. While ODI believes that the frontal air bags in the subject vehicle should have deployed,

the cause of the failure in this instance is unknown and cannot be determined from the available data.

In response to ODI's investigation, Ford has identified 367 reports (any severity, frontal and near-frontal crashes) of air bag non-deployment on MY 2000 and 2001 Taurus and Sable vehicles. In addition, ODI has identified 60 reports of air bag non-deployment in the NHTSA complaint database. ODI has reviewed the available information from these reports. ODI's review included an evaluation of the vehicle damage, object impacted, level of occupant injury, reported travel speed, and any other information available that would assist in determining crash severity and whether the air bag should have deployed.

ODI's review did not identify a trend of air bag non-deployment in moderate to severe frontal crashes. For most of the frontal crashes, the available information, including the level of injuries reported, indicates that the crash was not very severe.

Many allegations of air bag non-deployment are the result of an expectation by the operator or occupant that the air bag should have deployed in a crash. In some of the reports evaluated by ODI, it appears that the impacts were low speed or the direction of impact may not have met the criteria for the air bag sensing system to command a deployment. In other reports, the information was insufficient to allow ODI to make an assessment of whether deployment should or should not have occurred.

During this investigation, Ford provided two other reports of air bag non-deployment fatal crashes of Taurus/Sable vehicles. The first involved a MY 2001 Sable traveling at very high speed that rear-ended a stopped flat bed truck. While the air bags did not deploy, according to Ford, the driver's seat belt pretensioner deployed. The driver sustained massive blunt force trauma to his head and chest and massive internal trauma. The Sable sustained significant deformation on the hood and the left front quarter panel. The left side of the passenger compartment sustained significant intrusion deformation. However, the impact damage does not appear to show any significant deformation on the bumper and lower front structure, indicating an under-ride condition. An under-ride impact increases the possibility of a delayed deployment or non-deployment of air bag when compared to an impact with a solid flat barrier because the front of the subject vehicle slides under the higher-riding flat bed truck, resulting in deformation to the soft structural material above the vehicle sub-frame, which creates a longer crash pulse.

In the second incident, the complaint stated that the driver died from head injuries and the air bag did not deploy in a MY 2000 Taurus. Details of this crash were obtained from NHTSA's Fatality Analysis Reporting System (FARS) database. According to FARS, the Taurus impacted another vehicle while changing lanes to pass it. The location of impact on the Taurus was 2 o'clock (almost side impact) and on the other vehicle was 7 o'clock. The estimated closing speed was 23 mph. Based on the available information, the longitudinal delta-V of this crash appears to be below the design threshold for deploying the air bag in the subject vehicles. ODI believes this is a less-than-severe non-frontal crash and it is not counted among the 425 "Other Reports" listed above in the Status section of this report.

In April 2004, ODI received a report of an air bag non-deployment fatal crash of a MY 2003 Taurus (not included in this investigation) from a plaintiff's attorney. The Taurus impacted a large utility pole head-on at very high speed. The estimated impact speed is 50 mph. Based on the crash scene photographs of the subject vehicle, it appears that the driver was wearing a seat belt and the seat belt pretensioner did not deploy and the air bags did not deploy. The vehicle sustained significant deformation on the left front of the vehicle. The left side of the passenger compartment sustained significant intrusion deformation. The steering column/wheel was severely pushed upward. Ford has advised ODI that the MY 2003 Taurus does not have the same air bag system design as the subject vehicles (MY 2000-01).

FARS contains a variety of data including whether or not the air bag deployed in the crash. ODI has reviewed the FARS database for fatal frontal crashes involving Taurus/Sable vehicles and several other mid-size passenger cars. ODI's review found that there are fatal crashes in which the air bag did, as well as did not, deploy in the subject vehicles. This is also true for other make and model vehicles. Some of the fatal crashes for subject and other model vehicles (with and without air bag deployment) were tree or pole crashes, a type of crash similar to the bridge rail crash discussed earlier. ODI's review of FARS has not identified any problem trend involving the subject vehicles when compared with other vehicles.

Under NHTSA's research program on advanced occupant protection systems, SCI investigated 50 crashes of Taurus/Sable vehicles during 2000 and 2001. ODI's review of these crashes has not identified any trend of air bag non-deployment in moderate to severe frontal crashes.

CONCLUSION: A defect trend has not been identified at this time. Further use of agency resources does not appear to be warranted. Accordingly, this investigation is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The agency will monitor future reports to its complaint database and take further action if warranted by the circumstances.