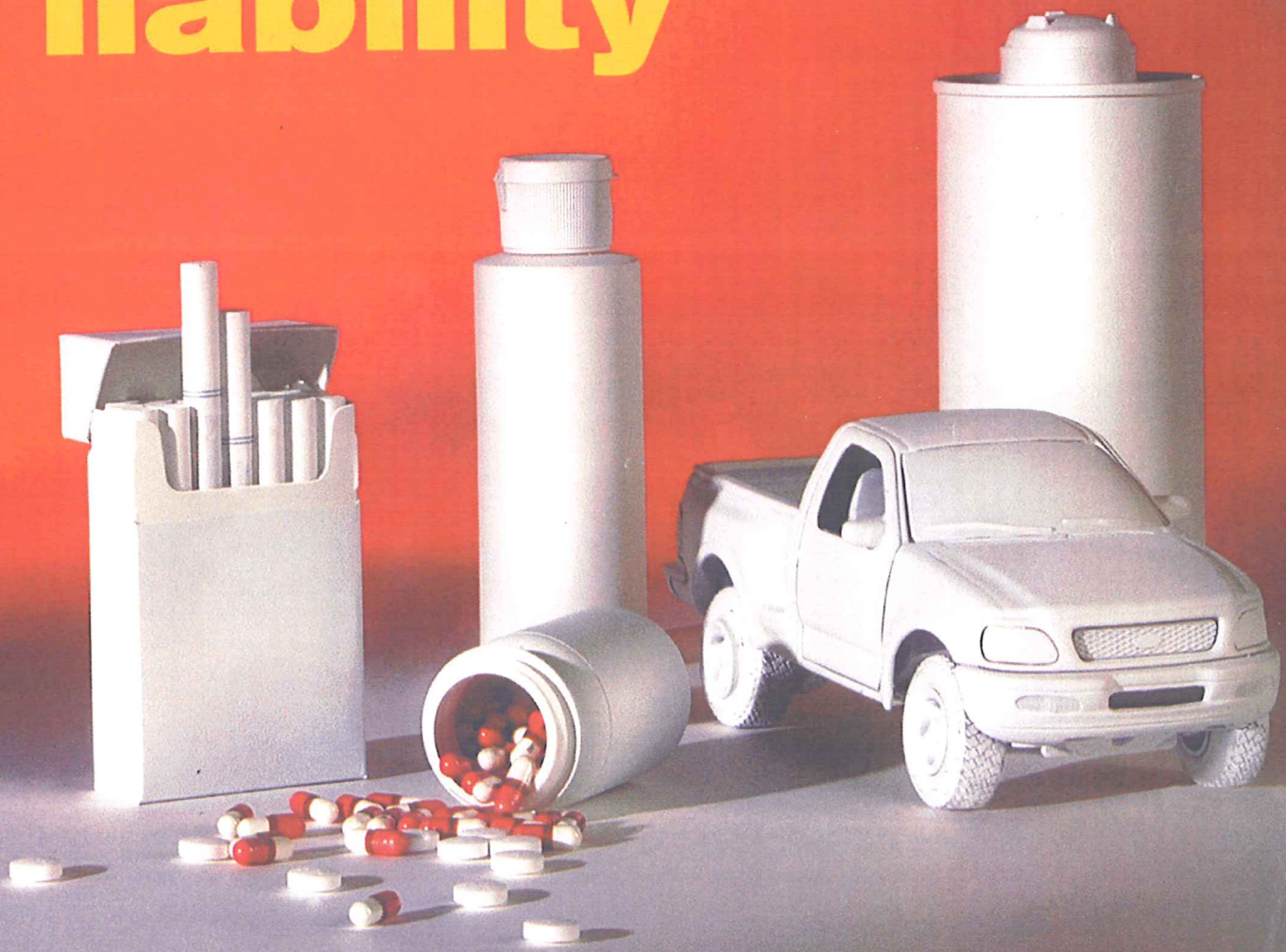
TRIAL

JOURNAL OF THE ASSOCIATION OF TRIAL LAWYERS OF AMERICA
NOVEMBER 2004

Products liability



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Ford's dangerous door-latch defects

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In a crash, a passenger's chance of survival is greatly improved if he or she remains in the vehicle. Ford documents show that the company knew about a dangerous defect in its door latches but chose to ignore it.

Every day, millions of Americans ride in Ford vehicles that have been designed and manufactured with door-latch systems that may be defective. Unknowingly, these consumers subject themselves to the risk of serious injury from full or partial ejection when their vehicles are involved in accidents.

This article focuses primarily on the door-latch defects in Ford trucks and SUVs, but the automaker uses the same latch system in many other vehicles as well.

Typically, the fact pattern in door-latch cases involves a rollover or a side-impact crash, a door that opens during the event, a full or partial ejection, and a serious injury or death. The ejected occupant is often presumed unbelted; however, this is not always the case, and belted occupants can be partially ejected in these accidents.

Partially ejected occupants usually suffer the same fate as fully ejected occupants. Testing by Ford's experts demonstrates how a belted dummy can be partially ejected in a rollover test.[1]

It is a fundamental principle of sound automotive design that doors should stay closed during car accidents. Automakers have known for years that door design is a critical aspect of vehicle engineering and that doors are an integral part of the automobile restraint system. Internal Ford documents confirm that an occupant is four times as likely to die or suffer serious injury if ejected from a vehicle.[2] If the door opens in an accident, the occupant is 30 times as likely to be ejected.[3]

Vehicle manufacturers often cite seat belts as the panacea to avoid harm in all crashes, but internal documents contradict this assertion and show that the key to injury avoidance—at least in rollovers—is to avoid ejection.[4] If you stay in the vehicle during a rollover, belted or not, the chance of serious injury is drastically reduced.[5]

The problems with Ford door-latching systems fall into three general categories. Each has related subcategories, so it is important to consult with an expert in a door-failure case.

Crashworthiness

In most accidents, the vehicle sustains a certain amount of body damage, referred to as "crush." The body and doors should be designed to absorb crush, and the doors should stay closed.

Many Ford doors, such as those of the F-150 pickup, do not do so: They may open when a moderate amount of crush occurs because the structure of the vehicle fails to protect the latches, which are made primarily of plastic. The latch in the F-Series pickup is known as the D-21, and it was first used in the 1992 F-150. Its predecessor, known as the "corporate latch," was made mostly of steel components. The integrity of the plastic door latch has been successfully challenged in lawsuits.[6]

Excessive crush may be the result of poor vehicle design as opposed to accident severity. Evidence of this is seen in

the 1999-2001 F-150, which was designed without a steel support under the center of the roof (the B-pillar) to provide appropriate structural integrity.

Ford's current advertisements tout the "good" crashworthiness rating that the Insurance Institute for Highway Safety gave the 2004 F-150. However, the institute gave the 1997-2003 models a "poor" rating because of "massive occupant compartment deformation" in a 40 mph frontal offset crash test.[7]

The vehicle's crashworthiness is also compromised by the use of mastic or glue, instead of structural welds, in many of the body and roof joints. In addition, Ford uses cold-rolled steel, which is not as strong as either high-strength steel or boron steel, in parts of the roof structure. This combination of design elements yields unacceptable levels of vehicle crush.

One example of poor crashworthiness in the F-150 pickup is found in a seam of sealant that lies between the outer skin and the inner frame of the door. The sealant is intended to keep out water, which causes corrosion. Ford claims that the sealant is a structural adhesive, but a stronger design would incorporate structural welds that would match the strength of the skin, causing the skin to tear rather than to separate from the door frame.

The seam is critical because it controls the distance from the outside handle to the latch. If the skin separates intact, the handle can move, and even a half-inch displacement toward the latch can cause it to release.[8]

Door-latch linkage

The component that connects the latch and the handle is the door-latch linkage, and automakers generally use two types: rods and cables. Cables are considered much safer, because rods are subject to compression or foreshortening during an accident.

For instance, in a side-impact collision, an outside rod may be pushed inward and could open the latch. Likewise, in a rollover, force may be applied to the door when the vehicle strikes the ground or rolls over a hard surface. Because linkage is used for both the outer and inner door handles, the door latch can also be activated when the occupant moves against the interior rod linkage. The safest vehicle designs use cables on the inside and outside.

Before 1992, most Ford vehicles used rod linkage for both the outside and inside door handles. Since then, Ford has used various combinations of rods and cables in different vehicles.

The company has studied the merits of both types of door-latch systems. As early as 1966, Ford examined the injury-producing potential of its door panels in side impacts. This involved swinging a dummy on a pendulum into the door from inside the vehicle. In one of these tests, the dummy's impact caused the door to unlatch and open. Analysis revealed that the dummy's torso had intruded into the door panel and pushed the rod outward, triggering the latch.[9]

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In a formal analysis of rods versus cables in September 1994, Ford determined that the cable's main advantage is "improved barrier performance" and its main disadvantage is "higher variable cost."[10] An analysis that accompanied the study recognized the failure mode of "door opens in crash due to door foreshortening."[11] When comparing the two types of linkage, Ford's researchers noted that the rod system withstood no more than 12 millimeters of door foreshortening, while the cables were generally unaffected by door foreshortening and bending.[12]

Many door-opening events have occurred in tests and real-world crashes of Ford pickups. One infamous example was a crash test performed by Transport Canada in August 1997 on a 1997 F-150 under Canadian Motor Vehicle Safety Standard 301, which determines fuel-system integrity. When the vehicle was hit from the driver's side, the passenger door opened.

Transport Canada notified Ford,[13] which turned the issue over to its Critical Concerns Review Group to study a potential safety defect involving, among other things, the door-latch assembly. Ford's recommendation was to conduct a 20 mph side-impact test of a pickup truck with the production fuel system and passenger door removed so as not to create any "embarrassing information."[14]

While this investigation continued, other door failures occurred in side-impact testing. They involved both F-Series and Expedition vehicles.

One example was a failure in 1998 sled-impact testing using the right-hand door of an F-150 pickup. The product engineer noted that the door latch opened during the test; the safety project manager ordered the engineer to "assure a closure to those type of notes" and to watch a videotape by Ford general counsel titled "Document Creation and Management."[15]

A related failure occurs when there is vertical loading on the frame—common in rollovers where a downward force is applied to the vehicle. Failures of this type involve the movement of the "fish mouth"—the opening in the latch that the door striker (a steel post attached to the door frame) contacts when the door is pushed closed.

Failures of the D-21 latch have occurred because the fish mouth expands when vertical force is applied to it, causing the striker to slip out of its grasp and the door to open. If the fish mouth ex-

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pands to twice its original size, the external latch-release lever need travel only half as far to open the latch.[16]

Defects in door-handle springs

The investigation that resulted from the Canadian crash test was eventually rolled into a separate one involving inadvertent door openings in several Ford internal crash tests. This investigation revealed a manufacturing defect involving the spring in the outside handle of more than 4 million Ford vehicles:

- Light Duty F-Series 1997-2000
- Crew Cab Light Duty F-Series 2000
- 1997-2000 Expedition
- 1997-2000 Lincoln Navigator
- 1997-2000 Lincoln Blackwood

The defect resulted from what Ford alleges was a transcription error on the drawings it had submitted to Donnelly Corp., the outside manufacturer of the door-handle spring. A weak spring—one that will not keep the handle closed in many accident scenarios—was used in these vehicles.

Federal Motor Vehicle Safety Standard (FMVSS) 206 governs the spring tension level: It requires that door-latch springs be able to withstand 30 g of force, which means the door should not open inadvertently at or below this force level.[17] This standard is not consistent with real-world accident forces. In fact, Ford engineer Jim Salmon has testified that since accelerations near the handle can be as high as 300 g, FMVSS 206 is not adequate for keeping vehicle doors closed in real-world crashes.[18]

In its testing, Ford discovered that with the weak spring, the doors would not stay closed even at 30 g—and many opened at half this force level.

Documents from March 2000 indicate that test data showed failures for the door handles on both sides of the F-150.[19] Ford developed a temporary solution to the problem: bending the springs in production vehicles to create additional tension.[20]

The company's investigation showed that the forces necessary to open the handle on the outside were below the values in the product specifications. A separate investigation conducted by Donnelly, the handle supplier, showed that the installed handle-spring torque was consistently below Ford's design specifications.[21]

Ford determined that these handles were not in compliance with FMVSS 206 and that the practical result of the error in spring selection was that the door may open in a crash.[22] Ford engineers recommended that the company launch a recall campaign to fix the defective handles for model years 1997-2000. The company assigned the safety recall a number as of March 23, 2000, and created an action plan.[23]

The ultimate fix for the problem involved the design and manufacture of stronger springs and the installation of

a counterweight as an added safety measure to keep the door shut.[24] This extra weight makes the handle more difficult to activate and increases the force required to open the door. The cost of using a stronger spring and installing the counterweight was estimated at 57 cents per door for the F-150 and 99 cents per door for the Expedition.[25] More than 4 million vehicles were affected, and more than half were F-150 pickups.[26]

Ford, recognizing the need for a real-world design specification, required door-hardware systems to resist side-impact acceleration loading of approximately 400 g, effective with the 2002 model year.[27] This policy change clearly recognized the inadequacy of the old 30 g standard. Current models were to receive the counterweight, and vehicles on the road would be fixed in the recall.

Unfortunately for consumers, Ford's investigation also found that such a recall would cost $527 million.[28] Ford killed the recall and found that the vehicles with the defective spring could be shown to comply with FMVSS 206 by using a test from the 1960s that is based on an inertia-force level even lower than 30 g. The company used frame-acceleration data from a series of side-impact collisions involving 1960 Plymouth four-door sedans. Ford used these tests—which did not produce acceleration data over 18 g—to create a force and simulate its effect on the F-150 door latch/linkage system.[29]

In other words, the company applied a test that its vehicle could not fail. As a result, millions of vehicles with the defective spring remain on the road.

Ford door-latch systems often fail because of defects in crashworthiness, door linkages, and manufacturing. Appropriate design and manufacturing standards can be used to prevent needless occupant ejection and resulting injury. Until this happens, litigation in this area will continue. ■

Notes

1. EXPONENT, FAILURE ANALYSIS OF DOLLY ROLLOVER CRASH TEST OF 2000 FORD F-150 XLT 7700 (44.9 mph) (2002).

2. Interoffice Memorandum from E.S. Grush, Safety Research Engineer, Ford Motor Co., A Study of Some Rollover Accidents (Sept. 25, 1969) (this and other cited industry documents on file with authors).

3. Interoffice Memorandum from R. W. Hultzan, Ford Motor Co., Evaluation of Occupant Ejection Rates and Door Openings in Passenger Cars (Nov. 1980).

4. Interoffice Memorandum from Ford Automotive Safety Research Office to H.G. Brilmyer, Ford Motor Co., Safety Engineering Evaluation (May 23, 1969).

5. *Id.*

6. *See* Alaniz v. Ford Motor Co., No. DC-01-195 (Tex., Duval County Dist. Ct. Dec. 13, 2002).

7. INS. INST. FOR HIGHWAY SAFETY, IIHS CRASHWORTHINESS EVALUATIONS (Nov. 11, 2002).

8. *See* Andrew N. Gilberg, Professional Engineer's Report on the Ford F-150 Door Failure Investigation (Jan. 23, 2004), at 13, Seliner v. Ford Motor Co., No. 2002-30454 (Tex., Harris County Dist. Ct. Apr. 2004).

9. *Id.*

10. W. CLARKE & M. AYUB, HARDWARE SYS. TECH., RODS VS. CABLES: DOOR HARDWARE SYSTEMS (1994).

11. *Id.*

12. *Id.*

13. Memorandum from Ferdinand Trauttmansdorff, Transport Canada, to Trevor Williams, Ford Motor Co. of Canada (Aug. 11, 1997).

14. E-mail from Jim Mark, Supervisor, FMVSS Certification and Prototype Build, Vehicle Safety and CAE-AVT, to Alan Taub, Manager, AVT-Vehicle Safety and CAE Department (Jan. 25, 1998).

15. E-mail from John Uray, Product Engineer, Light Truck Engineering, to Mona Abdelall, Ford Project Safety Manager (May 11, 1998).

16. Gilberg, *supra* note 8, at 18-19.

17. 49 C.F.R. §571.206 (2004).

18. *See* Deposition of James Salmon (Jan. 10, 2000), at 17-20, 185-188, Phipps v. Ford Motor Co.

19. E-mail from Terry Bekins, Donnelly Corp., to Terry Dingman (and others) (Mar. 3, 2000).

20. *Id.*

21. Bharat B. Malhotra, Ford Motor Co., Engineering Investigation of PN96 /P225 Outside Door Handles (Mar. 6, 2000).

22. *Id.*

23. E-mail from Kelly Zubieta, FCSO Recall/ONP Coordinator, Ford Motor Co., to Bharat Malhotra, Ford Motor Co., regarding Safety Recall 00S08 (Mar. 30, 2000).

24. E-mail from Dave Schroen, Ford Motor Co., to Paul Tummonds, regarding PN/UN Outside Door Handles (Apr. 19, 2000).

25. Ford Motor Co., PN96/ P225/UN93 Outside Door Handle—Meet Latest Safety Guidelines Standards (May 24, 2000) (Excel spreadsheet).

26. E-mail from Rob Sabo, Ford Motor Co., to Tad Siedlecki, regarding production volumes for PN96, P225, Expedition, Navigator (Oct. 13, 2000).

27. 1997-2001 MY F-Series/Expedition/Navigator/SuperCrew Outside Door Handles (Oct. 16, 2000).

28. *Id.*

29. Gilberg, *supra* note 8.