



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
Administration**

## ODI RESUME

Investigation: PE08-070

Date Opened: 12/09/2008

Date Closed: 04/15/09

Principal Investigator: D. Scott Yon

Subject: Steel Wheel Fracture

Manufacturer: Ford Motor Company

Products: 2004 – 2006 Ford Expedition Special Service Vehicles (SSV)

Population: 8,251

Problem Description: A fracture (crack) of the steel wheel rim could cause a rapid air loss resulting in a loss of control and a crash.

### FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	5	21	25
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
# Injuries:	0	0	0
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	0	37	37

\*Description of Other: Warranty claims (including non-responsive) for subject wheel replacements.

Action: This Preliminary Evaluation has been closed.

Engineer: D. Scott Yon

Div. Chief: Jeffrey Quandt

Office Dir.: Kathleen C. DeMeter

Date: 04/15/2009

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Summary: Ford "Special Service Vehicle" (SSV) expeditions use a steel full face wheel design similar to that investigated in PE03009, RQ04007, EA04034 (Crown Victoria police interceptor) and PE03026 (GM pickups and SUVs). A total of 8,251 SSVs (2.2% of total production) were produced within model years 2004-2006 and sold primarily for use by State, Federal, and Municipal law enforcement (LE) agencies. Ford stipulates that the subject vehicles are not suitable for high speed or pursuit operations and also identified a 2004 National Institute for Justice Vehicle Evaluation report which also acknowledges this limitation.

The full face wheel is fabricated from two pieces: a stamped outer wheel disc and a formed rim. The two pieces, which together comprise the outer bead seat, are joined together with a circumferential weld. A cyclic bending moment occurs in the outer bead seat area as the wheel rotates, resulting in fatigue stresses in the weld's heat affected zone that can lead to fracturing (cracking) of the rim material. Because the failure occurs under the outboard tire bead, air leakage may not readily occur when the rim cracks, dependent on how well the bead seals on the rim. If multiple cracks grow undetected and suddenly join into a single large crack, the wheel's structure can become compromised leading to rapid air loss. A rapid air loss, especially at higher speed, may lead to a crash.

Ford responded to ODI's January 5, 2009 Information Request (IR) on February 24. Ford's response acknowledges a number of wheel fractures on the SSVs. However, based on its assessment of the pertinent factors, it concludes that the condition does not represent an unreasonable risk to safety. The lack of reports of rapid air loss, no alleged crashes, and their assessment that a cracked wheel can be detected through slow, repeated air loss or vibration, were the bases for Ford's conclusion. Ford discusses the results of a study it performed on wheels returned from field use, design revisions it made to the subject wheel, and the outcome of durability testing it conducted on the old and new wheel designs.

The counts shown above include a duplicate ODI and Ford report; the Ford counts are unique vehicles alleging wheel fracture(s). Some warranty claims involved more than one wheel replacement. Although the subject vehicles have been in service for a longer period of time than vehicles investigated in the previous investigations of two-piece wheel fracture, ODI did not identify any allegations of crashes, rapid air loss events due to wheel fractures or allegations of effects on vehicle control or stability, as were the cases in past investigations where safety recalls were conducted to replace affected wheels. The agency agrees that the SSVs is not suitable for pursuit or high speed usage, reducing the potential for crashes or loss of control incidents to be caused by the alleged defect.

Ford implemented a 'shot peening' process in June 2006 which reduced the wheel's surface stress and significantly improved its durability, and ODI is unaware of any failures of shot peened wheels (Service Part Number 711Z-1015-B). Ford's testing showed a slightly reduced durability for the non-shot peened wheels when 'LT' instead of Ford approved 'P' metric type tires are used.

A safety-related defect has not been identified at this time and 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 further circumstances.