



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

ODI RESUME

Investigation: EA 17-003

Prompted by:

Date Opened: 09/01/2017

Investigator: Matthew Martens

Approver: Stephen Ridella

Subject: Engine Compartment Fire

Date Closed: 08/21/2018

Reviewer: Jeff Quandt

MANUFACTURER & PRODUCT INFORMATION

Manufacturer: SMART USA DISTRIBUTOR LLC

Products: 2008-2009 Smart Fortwo Coupe, Fortwo Cabrio

Population: 42,992

Problem Description: Non-crash fires originating in the engine compartment while driving or shortly after engine shutdown.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	20	16	33**
Crashes/Fires:	20	16	33**
Injury Incidents:	0	1	0
Fatality Incidents:	0	0	0
Other*:	2	0	2

***Description of Other:** Two vehicle inspections conducted without a prompting VOQ or MB Consumer Complaint.

**** Total eliminates duplicates received by ODI and manufacturer.**

ACTION / SUMMARY INFORMATION

Action: This Engineering Analysis is closed. Recall 18V-273.

Summary:

On April 30, 2018, Mercedes-Benz USA, LLC, (Mercedes-Benz) submitted a Defect Information Report (DIR) to NHTSA regarding a defect that could result in a vehicle fire starting from the engine compartment in 42,781 model year (MY) 2008 and 2009 Smart Fortwo cabrio and coupe vehicles (451 platform). According to Mercedes-Benz's DIR, "the rear insulation mat within the engine compartment might deform, deteriorate, loosen and over time, subsequently be able to contact hot components of the exhaust system. This could lead to an ignition of the insulation mat and possible fire in the engine compartment."

The US-specification exhaust system has an external catalytic converter packaged close to the insulation mat, where temperatures in the vicinity of the insulation mat reach high values. Over time, these temperatures can lead to a change in the insulation mat's material characteristics and ultimately allow the material to deform. Depending on the magnitude and the specific location of the deformation, the insulation mat could contact hot components of the exhaust system and ignite. Mercedes-Benz will replace the rear insulation mat on the affected vehicles with the improved mat first implemented in the United States in MY 2010 vehicles.

ODI's analysis of fire incident field data reported to NHTSA and Mercedes-Benz show an increasing trend of non-crash fires in the subject vehicles that begins after 4 years of service and accelerates after 7 years of service. The analysis shows that this trend is driven by fires occurring in the engine compartment. Forensic investigations of fires occurring in the past year identified the insulation mat as a likely or possible cause of most of the fires originating in the engine compartment. This investigation is closed based on Mercedes-Benz insulation mat recall. For more information about field data trends and fire investigations, see the closing resume in the document file for this investigation.

On December 16, 2016, the Office of Defects Investigation (ODI) opened Preliminary Evaluation PE16-016 to investigate eight complaint Vehicle Owner Questionnaires (VOQs) alleging incidents of engine compartment fire that occurred while driving or shortly after engine shutdown in model year (MY) 2008 through 2009 Smart Fortwo vehicles. The VOQs appeared to indicate an increasing trend, with all eight fires occurring since January 2015. The investigation was upgraded to an Engineering Analysis on November 20, 2017, based on ODI's analysis of incidents reported to NHTSA and Mercedes-Benz and non-crash vehicle fire claim data provided by the Highway Loss Data Institute (HLDI).¹ ODI identified 27 incidents of non-crash engine compartment fires in the subject vehicles, including 19 occurring since January 2015. The HLDI data provided independent verification that the subject vehicle non-crash fire rate was high relative to peers and displayed an increasing trend with vehicle age.

In a September 2017 report², the Highway Loss Data Institute provided an independent analysis of the non-crash fire claim data and made the following observations when comparing the subject vehicles with 2008-09 peer vehicles:³

“The 2008–09 Smart ForTwo microcar had a frequency of noncrash fire claims 179 percent higher than other comparable 2008–09 vehicles. Overall losses for these Smart ForTwo vehicles were 209 percent higher than other comparable 2008–09 vehicles. As seen in [Figure 1], when examining the impact of vehicle age, the frequency of noncrash fire claims for 2008–09 Smart ForTwo vehicles was higher than other comparable 2008–09 vehicles and increased with vehicle age.”

ODI's analysis of non-crash vehicle fires reported to NHTSA and Mercedes-Benz identified 59 incidents, including 33 involving engine compartment fires. Similar to HLDI's analysis, the ODI analysis also shows incident frequency increasing with vehicle age, with that trend driven primarily by fires originating in the engine compartment (Figures 2 and 3). NHTSA and Mercedes-Benz participated in 10 joint non-crash vehicle fire investigations during PE16-016 and EA17-003, including 7 involving engine compartment fires. The insulation mat was identified as the likely or possible cause of six of the engine compartment fires investigated. Figures 4 through 6 show evidence of the insulation sagging condition and burned insulation in one of the non-crash engine compartment fires inspected as part of the joint investigations.

Analysis of field data indicates an age-related problem in the engine compartment. Fire cause and origin investigation results indicate that the insulation mat is likely the primary contributor to the high fire rates and increasing fire trends in the subject vehicles. This investigation is closed based on Mercedes-Benz recall.

The following VOQs are associated with EA17-003: 10676359, 10780222, 10790017, 10820891, 10872656, 10916505, 10924311, 10924637, 10939504, 10944676, 10945296, 10993895, 11011100, 11011565, 11042163, 11083936, 11091576, 11093718, 11093725, 11096694

¹ HLDI collects and analyzes insurance claim data from companies representing over 80 percent of the market for private passenger vehicle insurance in the United States.

² Highway Loss Data Institute bulletin, “Noncrash fire insurance losses for the 2008–09 Smart ForTwo,” Vol. 34, No. 27: September 2017.

³ HLDI's analysis included 105 non-crash fire claims in the subject 2008-2009 Smart Fortwo vehicles. The HLDI data does not code claims by area of origin.

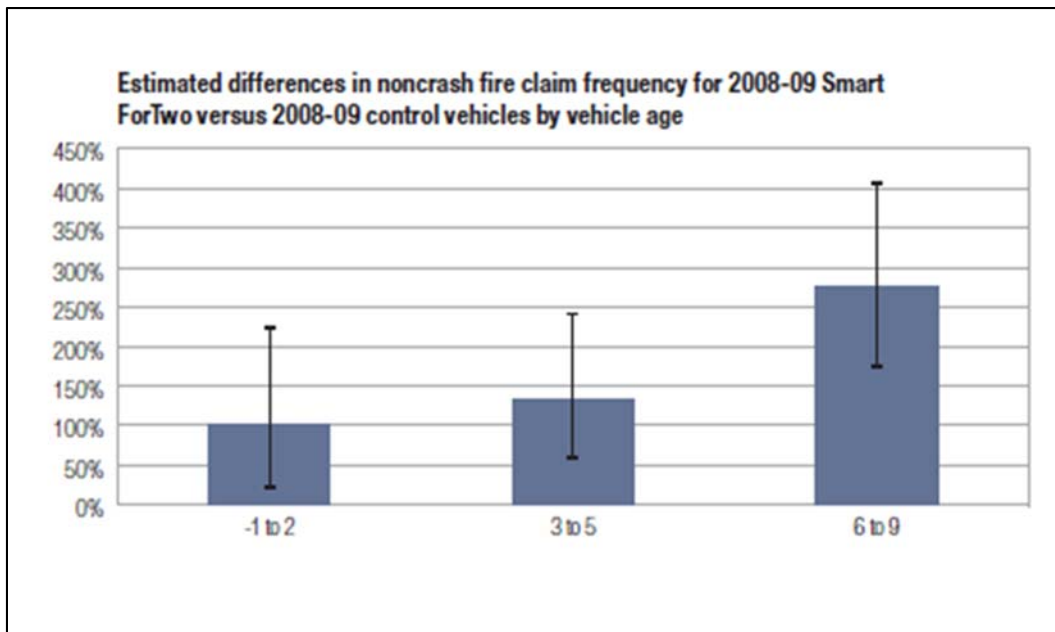


Figure 1. Estimated differences in non-crash fire claim frequency for MY 2008-09 Smart Fortwo vehicles versus MY 2008-09 control vehicles by vehicle age (calculated by subtracting model year from the calendar year of the claim), Highway Loss Data Institute analysis.

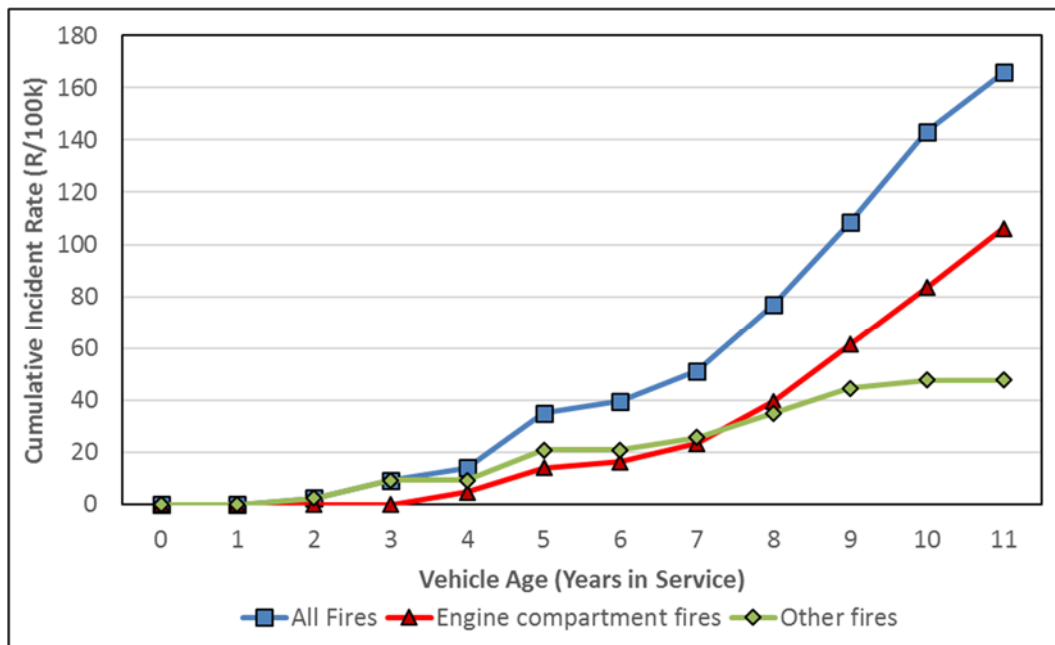


Figure 2. ODI analysis of fire trends in the subject vehicles by vehicle age and area of fire origin, NHTSA VOQs and Mercedes field data.

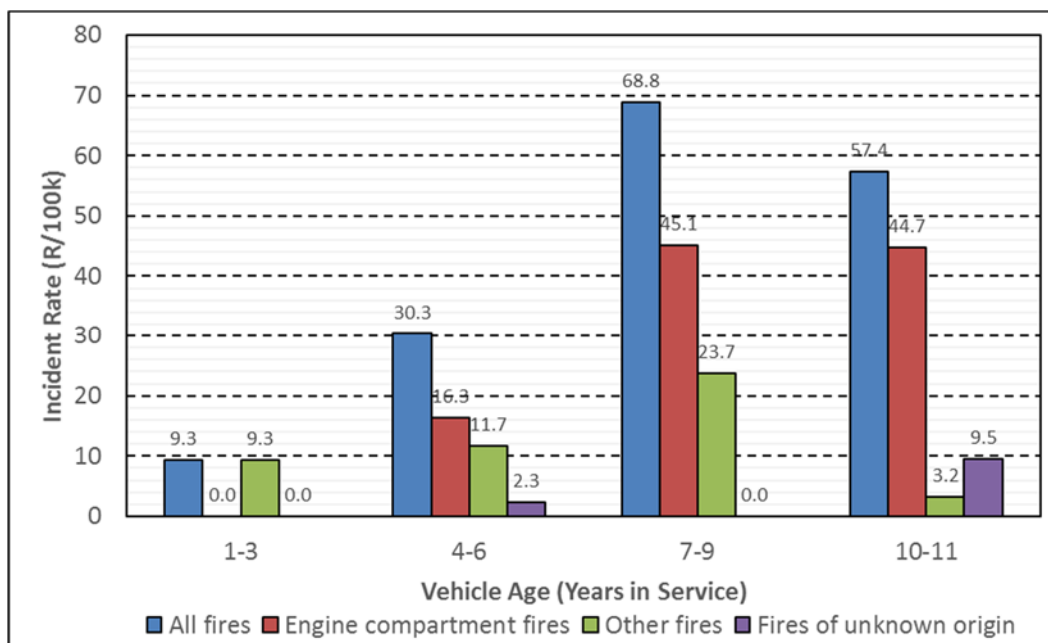


Figure 3. ODI analysis of fire frequencies in the subject vehicles by vehicle age and area of fire origin, NHTSA VOQs and Mercedes field data.



Figure 4. Engine compartment of a 2008 Smart Fortwo involved in a minor non-crash engine compartment fire investigated as part of joint NHTSA – Mercedes-Benz inspections.



Figure 5. Insulation sagging in 2008 Smart Fortwo involved in non-crash engine compartment fire.



Figure 6. Burned insulation in 2008 Smart Fortwo involved in non-crash engine compartment fire.