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

# ODI RESUME

Investigation: EA06-004
Prompted By: PE05-056
Date Opened: 03/09/2006 Date Closed: 03/08/2007
Principal Investigator: Stephen McHenry
Subject: Steering wheel and steering shaft bolts

Manufacturer: DaimlerChrysler Corporation
Products: 2004-06 Dodge Durango and 2005-06 Dodge Dakota
Population: 537,439

Problem Description: The steering wheel or steering shaft coupling bolts may be loose or missing resulting in a loss of steering control.

**FAILURE REPORT SUMMARY**

| | ODI | Manufacturer | Total |
|---|---|---|---|
| Complaints: | 2 | 21 | 23 |
| Crashes/Fires: | 1 | 1 | 1 |
| Injury Incidents: | 0 | 0 | 0 |
| # Injuries: | 0 | 0 | 0 |
| Fatality Incidents: | 0 | 0 | 0 |
| # Fatalities: | 0 | 0 | 0 |
| Other*: | 0 | 82 | 82 |

*Description of Other: warranty claims for loose or missing bolts.

Action: This engineering analysis has been closed.

Engineer: *Stephen McHenry* SM Date: *03/12/2007*
Div. Chief: *Jeffrey L. Quandt* Date: *03/12/2007*
Office Dir.: *Kathleen C. DeMeter* Date: *03/12/2007*

Summary: On March 9, 2006 ODI upgraded Preliminary Evaluation PE05-056 to Engineering Analysis EA06-004 to investigate allegations of loose or missing steering shaft coupling bolts and steering column retaining bolts in Model Year (MY) 2004 through 2006 Dodge Durango sport utility vehicles and MY 2005 through 2006 Dodge Dakota pickup trucks. Either condition could result in a loss of steering control.

Although ODI identified some quality issues in the manufacturing processes for the Dakota and Durango vehicles, the data do not indicate that a safety defect trend is present in either population. The failure rates are low for each condition and trend analyses indicate that problems with the subject bolts were isolated to a few units affected by assembly error that were detected either pre-sale or occurred early in vehicle service. Further use of agency resources in this matter does not appear to be warranted. The agency will continue to monitor complaints and other information relating to the alleged defect in the subject vehicles and will take further action in the future if warranted.

For more information see the attached closing report.

Faxed 3/12/07 SM

## ENGINEERING ANALYSIS CLOSING REPORT

**SUBJECT**: Loose or missing bolts for steering wheel or intermediate steering shaft

**EA No**: EA06-004

**DATE OPENED**: 03-March-2006 **DATE CLOSED: 08**-Mar-2007

**SUBJECT VEHICLES**: Model year (MY) 2004 through 2006 Dodge Durango and MY 2005 through 2006 Dodge Dakota vehicles manufactured for sale or lease in the United States

**SUBJECT COMPONENT**: All steering wheel and intermediate steering shaft coupling bolt assemblies manufactured for use on the subject vehicles

**ALLEGED DEFECT**: The steering wheel or intermediate steering shaft coupling bolts may be loose or missing resulting in a loss of steering control.

**BASIS:** The Office of Defects Investigation (ODI) opened a Preliminary Evaluation, PE05-056, on October 26, 2005, based on several field reports related to steering shaft looseness or separation due to loose or missing coupling bolts in MY 2004 and 2005 Dodge Durango sport utility vehicles and MY 2005 Dodge Dakota pickup trucks. PE05-056 was upgraded to an Engineering Analysis on March 3, 2006.

ODI's analysis of data collected during PE05-056 identified differences between the Dakota and Durango vehicles in both problem experience and causal factors. The vehicles are built at different assembly plants using different processes. EA06-004 was opened to assess the scope, frequency and possible safety consequences of the alleged defect in both vehicle lines.

The information received from DCC in response to the Information Request for EA06-004 was separated into four categories: MY 2005 to 2006 Dakota intermediate steering shaft coupling bolts; MY 2005 to 2006 Dakota steering wheel retaining bolts; MY 2004 to 2006 Durango intermediate steering shaft coupling bolts; and MY 2004 to 2006 Durango steering wheel retaining bolts. The analysis of each of these categories will be presented separately in order to clarify the results of the data analysis.

## MY 2005 to 2006 Dakota Intermediate Steering Shaft Coupling Bolts

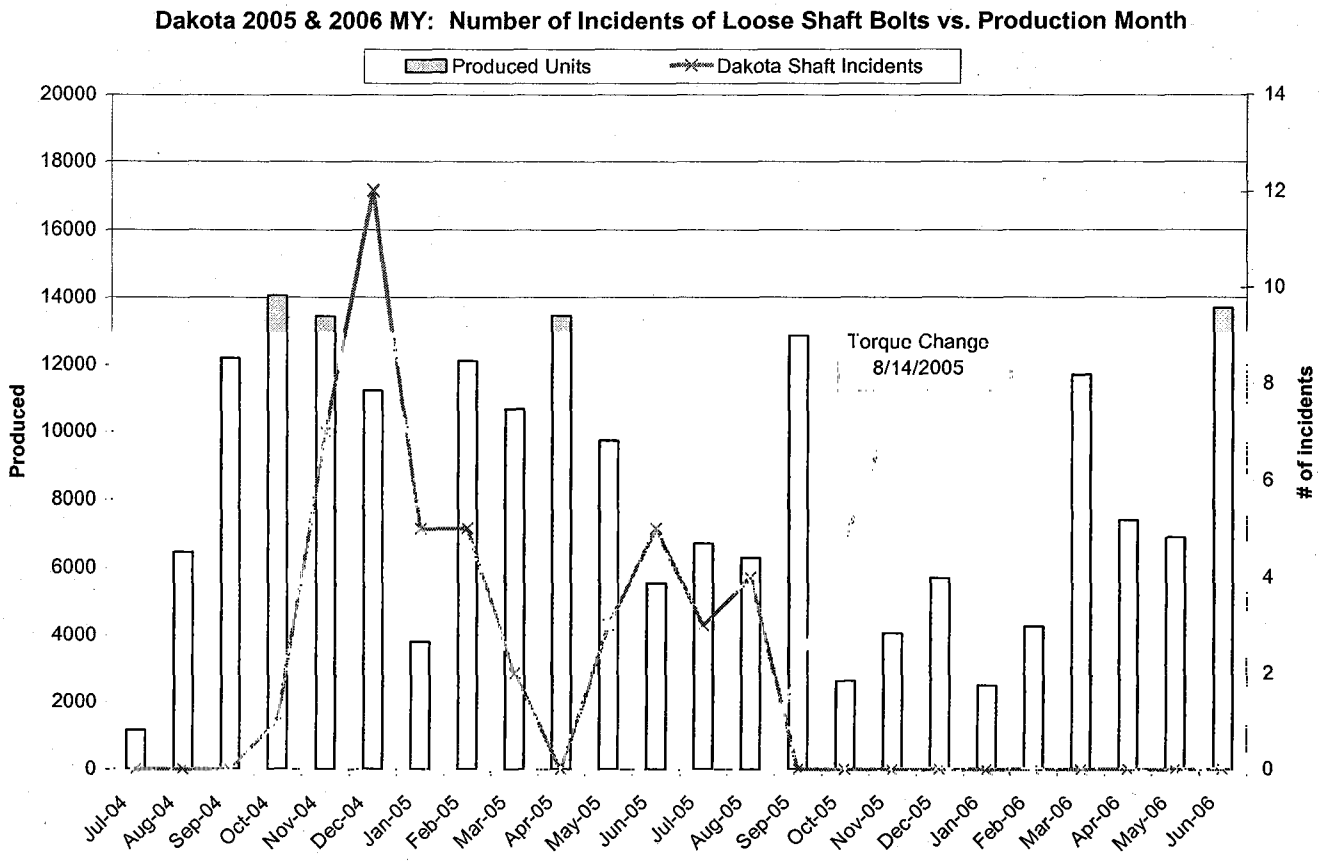
The total population for MY 2005 and 2006 Dodge Dakotas is 199,058 vehicles (MY 2005 113,846; MY 2006 85,212). Of that population, there were a total of 47 alleged incidents of an intermediate steering shaft coupling bolt being loose or missing. The summary is presented in the following table:

| | Bolts Reported Loose | Bolts Reported Missing | Resultant Loss of Control | Crashes |
|---|---|---|---|---|
| Field Reports | 2 | 2 | 0 | 0 |
| Owner Complaints | 0 | 1 | 1 | 0 |
| Warranty Claims | 42 | 0 | 0 | 0 |
| VOQs | 0 | 0 | 0 | 0 |

Of the 3 incidents where a coupling bolt was reported as missing, 2 were discovered during vehicle pre-delivery inspection by the dealership. The third instance, and the only reported loss of control, occurred on a vehicle in a parking lot where the owner described the steering wheel as spinning freely while making a turn. This vehicle had 1,449 miles of service when the incident occurred. In each of the other cases, the owners reported hearing a clunking noise or feeling looseness in the steering prior to having a loose bolt repaired.

The subject Dakota vehicles were assembled at the Warren Truck Assembly Plant in Warren, Michigan, where DCC also produced Dodge Ram pickup trucks. The initial MY 2005 Dakota dynamic torque specification for the intermediate shaft to steering column coupling bolt was 28 ft-lbs, the same as the Dodge Ram being built on the same assembly line. The common torque level passed all robustness tests performed by DCC. However on August 14, 2005, the torque level was raised to 43 ft-lbs for the MY 2006 Dakota to correct a noise concern in the shaft and bearing assembly. A review of the alleged defect claims indicated that all but two involved vehicles were built prior to August 14, 2005. The two vehicles built after that date were built on August 25, 2005.

The following graph shows the number of reported incidents by the month the vehicle was built against the number of Dakotas built for that month. There have been no reports of loose or missing bolts in vehicles produced after the torque increase change in August of 2005.




ODI analyzed the 121,314 units built before the production line torque change to determine likelihood of further failures. There are 2 reported instances of a bolt missing and only 1 reported loss of control, which both occurred at relatively low mileages. The complaint failure rate for loose or missing coupling bolts for units built before the torque change is 4.1 per 100,000 units (5 complaints / 121,3114); the warranty claim rate is less than 0.1 percent (42 claims in 113,846 vehicles) for loose or missing bolts in MY 2005 Dakota vehicles. Furthermore, Weibull analysis of the data shows a declining early-life failure trend.

## MY 2005 to 2006 Dakota Steering Wheel Retaining Bolts

There were two alleged incidents of problems with the bolt holding the steering wheel to the steering column on the MY 2005 through 2006 Dodge Dakota vehicles. Both claims involved MY 2005 vehicles, one built in December 2004 and the other in March 2005. Both incidents were identified in warranty claim data. One incident was reported at 123 miles in service, the notation on the warranty claim stating "tightened loose bolt that holds wheel to column." The second incident occurred at 2 miles in service and was discovered during the pre-delivery inspection by the dealer where it was noted that the "steering wheel bolt came out." There have been no reported incidents since July of 2005. There are no complaints to calculate a complaint failure rate.

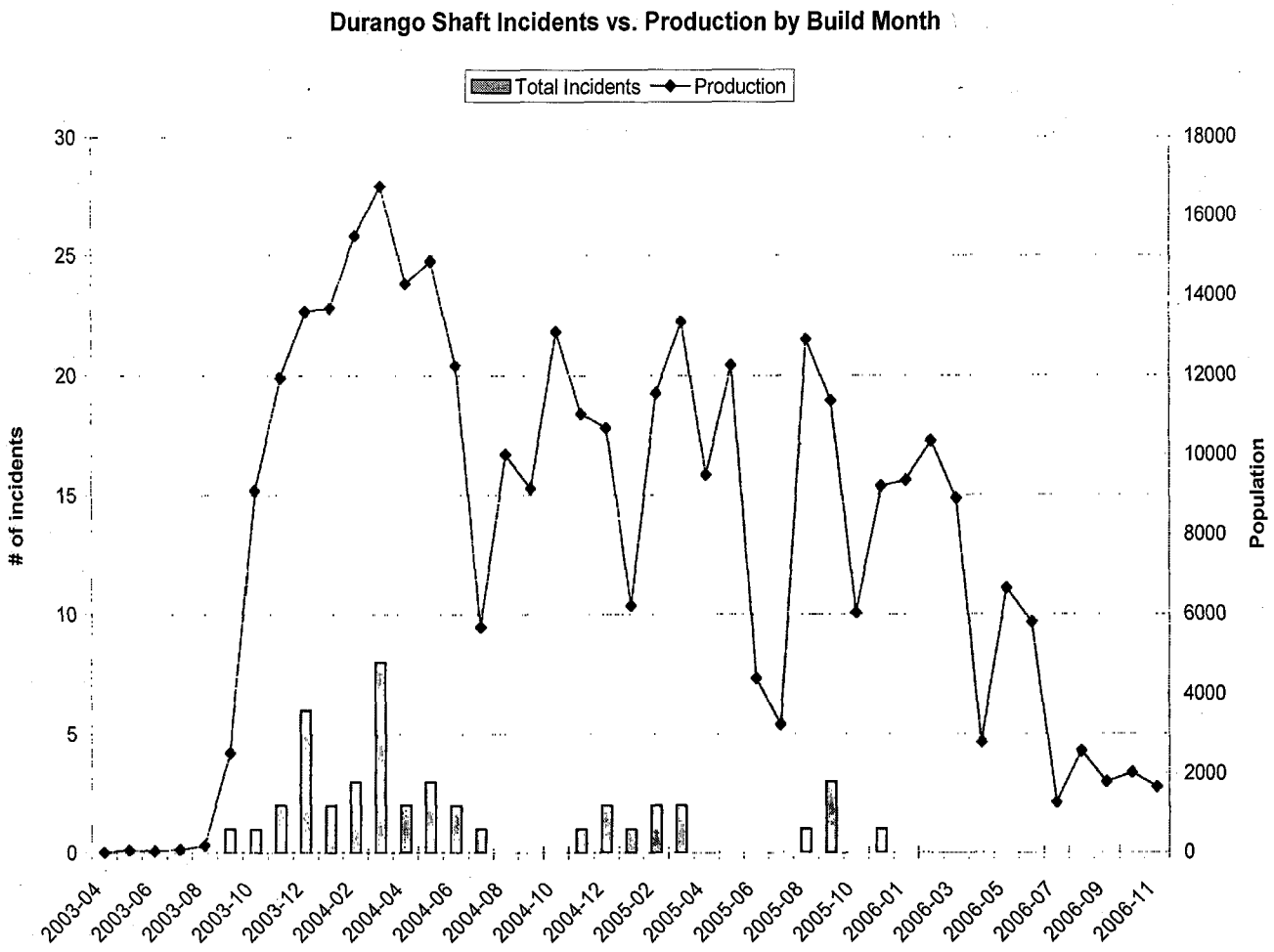
## MY 2004 to 2006 Durango Intermediate Steering Shaft Coupling Bolts

DCC produced 338,381 MY 2004 through 2006 Dodge Durango vehicles. ODI's analysis has identified a total of 44 incidents where an intermediate steering shaft coupling bolt was alleged to be loose or missing. A summary of these is presented in the following table:

| | Bolts Reported Loose | Bolts Reported Missing | Resultant Loss of Control | Crashes |
|---|---|---|---|---|
| Field Reports | 7 | 2 | 0 | 0 |
| Owner Complaints | 0 | 2 | 2 | 0 |
| Warranty Claims | 25 | 7 | 0 | 0 |
| VOQs | 0 | 1 | 1 | 1 |

DCC produced the subject Dodge Durango vehicles at the Newark Assembly Plant in Newark, Delaware. Unlike the manufacturing process for the Dakota, which revealed a specific process change that corresponded to the field experience with loose or missing subject bolts, there were no similar changes in the Durango manufacturing process.

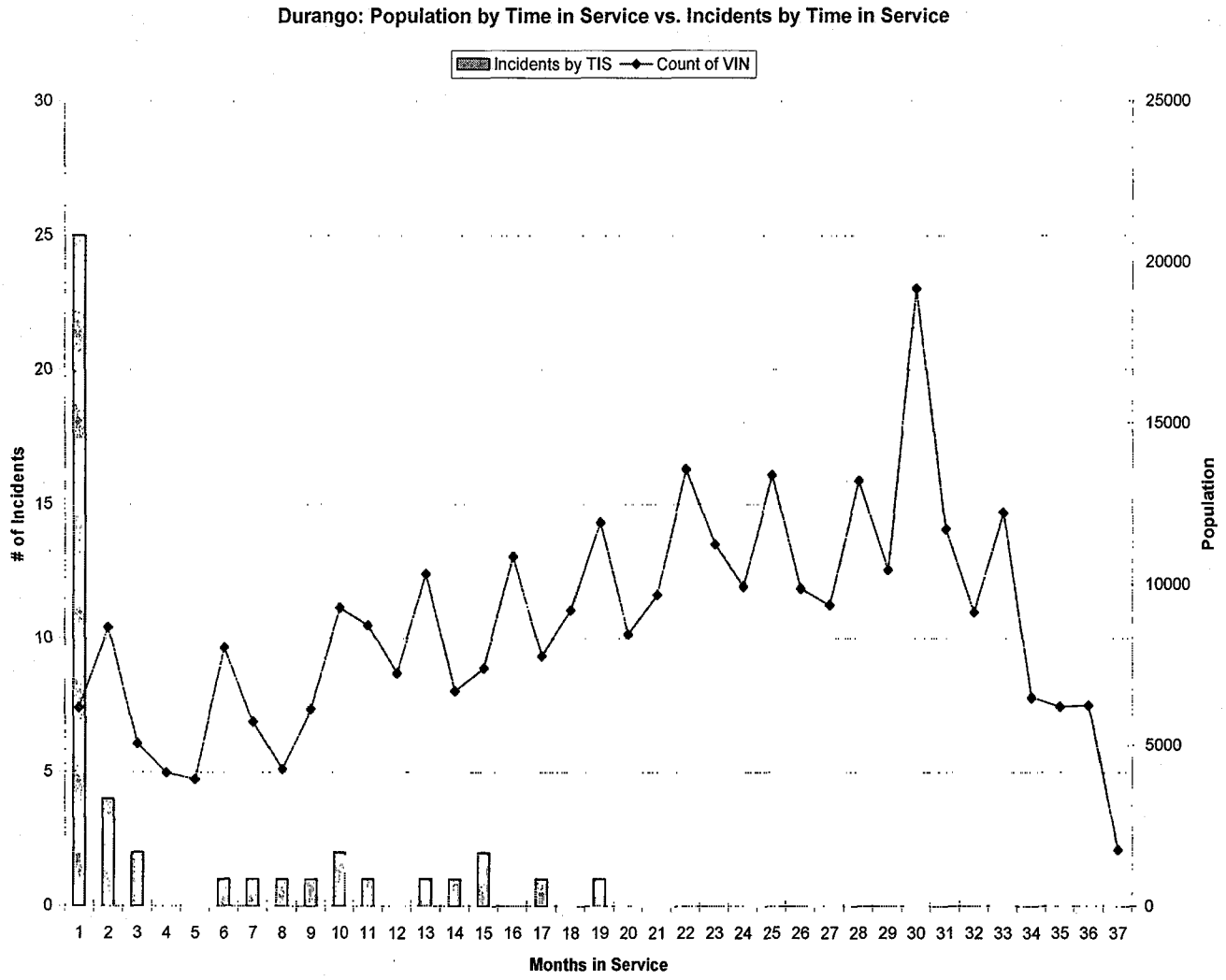
The following chart shows the problem experience associated with the subject Durango vehicles by production month:




There are two reported loss of control incidents, one of which resulted in a crash. That Durango was built in June 2004 and sold in July 2004. Six weeks after purchasing the vehicle, the owner was in the process of making a slow speed left hand turn when the steering stopped responding and the vehicle ended up in a ditch. There were no injuries.

In the other loss of control event the owner was backing out of a driveway when the steering wheel stopped responding. This occurred while moving slowly in a parking lot.

The following chart shows the time-in-service before an event for the Durango intermediate shaft bolt incidents plotted against the fleet service life as of December 4, 2006. The chart indicates that the bulk of the population has moved past the average time in service for an incident to occur.




ODI analyzed the data to determine the likelihood of future failures in MY 2004 through 2006 Dodge Durango vehicles. The failure rate for the Durango intermediate shaft coupling bolts being loose or missing is 3.5 per 100,000 units (9 field reports, 2 complaints to DCC and 1 complaint to NHTSA). The warranty claim rate is 0.01 percent (32 claims in 338,381 vehicles). Weibull analysis of this data indicates that the problem is an early life failure issue and further failures are unlikely.

## MY 2004 to 2006 Durango Steering Wheel Retaining Bolts

ODI's analysis identified a total of 11 incidents of loose steering wheel retaining bolts in MY 2004 through 2006 Durango vehicles. A summary of these incidents is presented in the following table:

| | Bolts Reported Loose | Bolts Reported Missing | Resultant Loss of Control | Crashes |
|---|---|---|---|---|
| Field Reports | 5 | 0 | 1 | 0 |
| Owner Complaints | 0 | 0 | 0 | 0 |
| Warranty Claims | 6 | 0 | 0 | 0 |
| VOQs | 0 | 0 | 0 | 0 |

The average time-in-service for a vehicle with a reported incident was 2.9 months. There were four reports alleging steering wheel separation. Examination of one of these incidents indicates that the steering wheel to steering column alignment notch was not seated when the retaining bolt was being tightened, giving a false positive torque validation to the assembly technician. All four of these incidents were discovered and corrected during pre-delivery inspection by the dealer.

ODI performed a predictive failure analysis to assess the potential for future incidents of loose or stripped bolts. The failure rate for the Durango loose steering wheel retaining bolts is 1.5 per 100,000 units Weibull analysis indicates that the problem is an early life failure issue. The failure rate for the Durango loose steering wheel retaining bolts is 1.5 per 100,000 units. There are only six related warranty claims.

Based on the above analyses, the data do not appear to indicate that a safety defect trend exists in either the subject Dakota or Durango vehicles at this time. Accordingly, this investigation is closed. Given these circumstances, further use of agency resources in this matter does not appear to be warranted. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The agency will continue to monitor complaints and other information relating to the alleged defect in the subject vehicles and take further action in the future if warranted.