Global Chassis Engineering

Go Further

CD3 2010MY Fusion VOQ Results

Gabe Lawless – EPAS OPD Product Engineer
Chris Hsi – Steering Campaign Prevent Supervisor
Guruveer Chawla – Steering Campaign Prevent Engineer

02 November 2016

Global Chassis Engineering

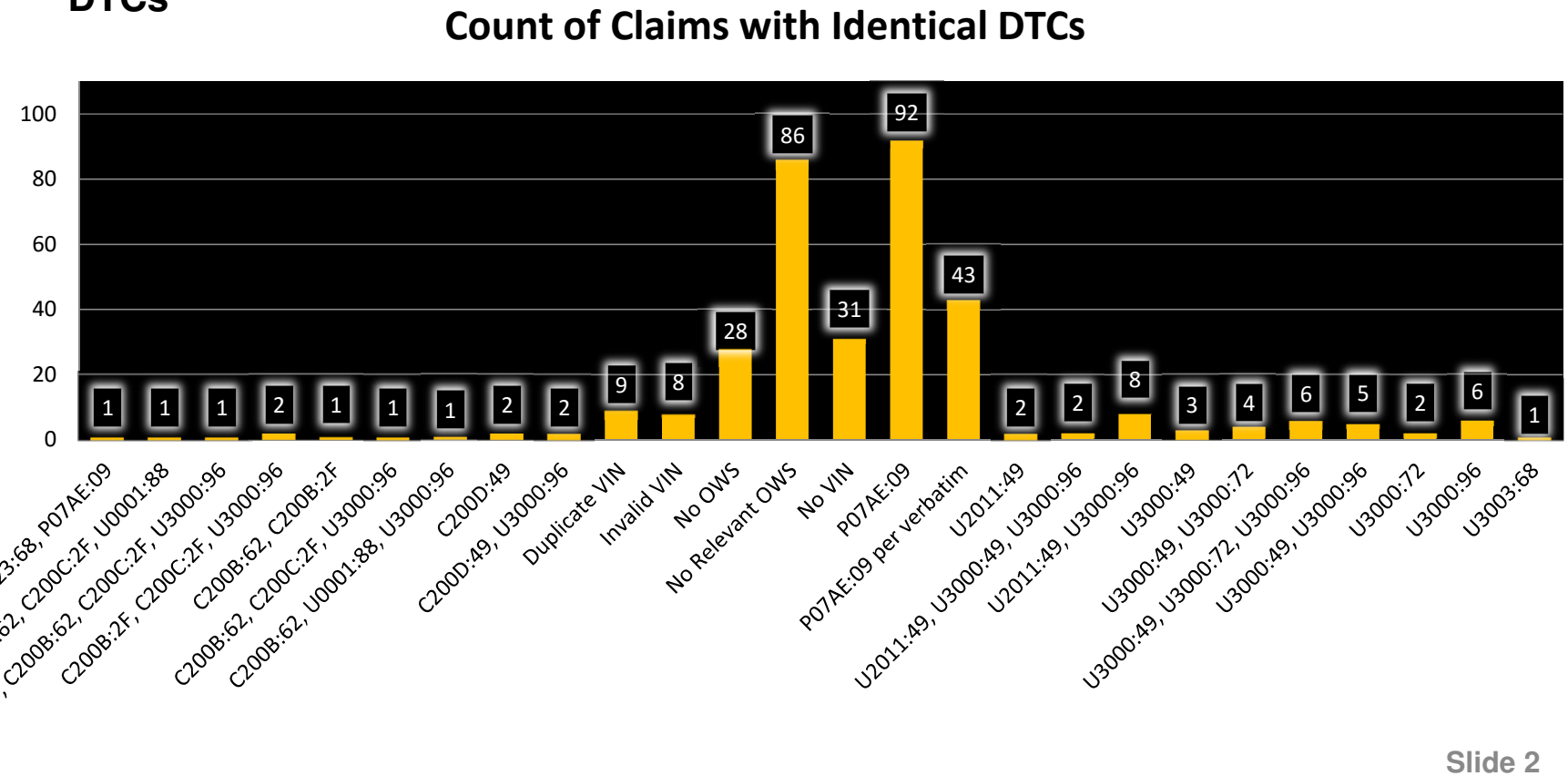
Background

Go Further

- MY2011 and MY2012 Fusions were a part of a recall regarding sudden loss of power steering assist while driving due to a process concern that caused an internal ribbon cable to fail
  - C200D:49 Ford DTC thrown internal to the PSCM
  - B9A TRW code caused the C200D:49 DTC to be thrown
- NTHSA is questioning whether or not 2010MY Fusions should also be included in the recall due to the 348 additional 2010MY Fusion EPAS complaints as shown in the VOQ data
- The following slides are objective details regarding the 348 additional EPAS complaints that occurred after 10/22/2014
- Because all of these claims fall outside of warranty, information regarding the root cause of the problem is unknown, but sometimes can be assumed based on the information available within One Warranty Solution (OWS) database, and customer comments

Analysis

- **Ford received a VOQ summary from NHTSA, which was filtered to find claims after PE14-030 (10/22/14) for 2010MY Fusion**
- **After filtering, there were 348 new claims, each claim was looked-up in OWS to find the DTC read-out at the dealership**
- **The Pareto below groups the number of VINs that had a particular grouping of DTCs**

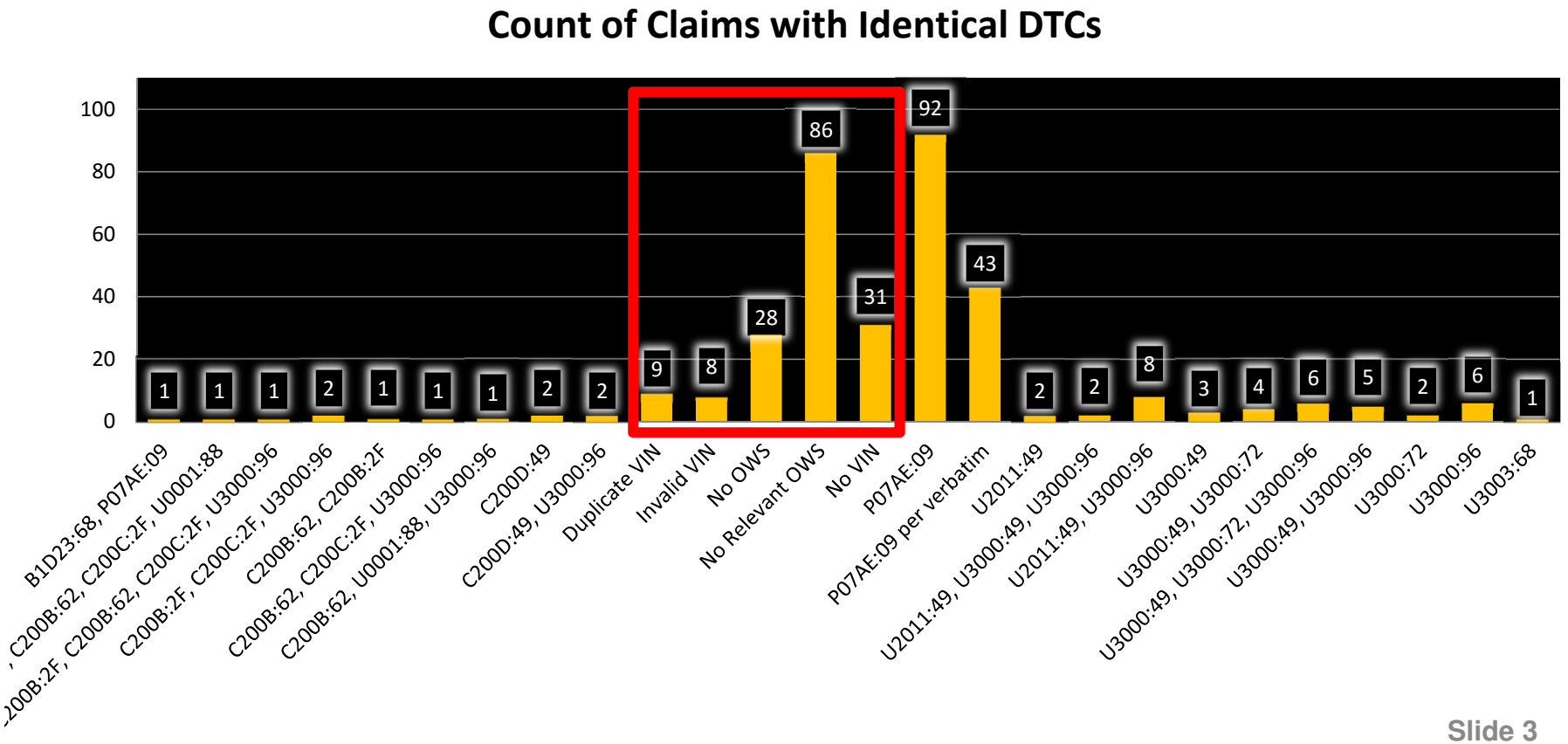


Global Chassis Engineering

Analysis cont'd

Go Further

- **Of the 348 claims, 162 had no information available. Reasons include:**
  - **Duplicate VIN listed (VIN listed twice in spreadsheet)**
  - **Invalid VIN listed (not 17 characters long)**
  - **No OWS information available**
  - **No Relevant OWS information available**
  - **No VIN listed**



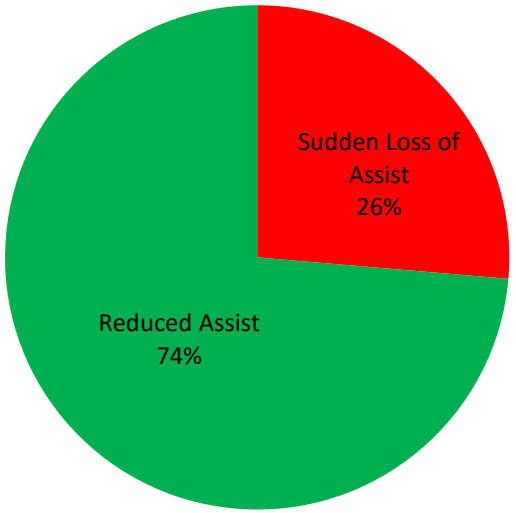
Global Chassis Engineering

Summary – Assist Reduction/Removal

Go Further

- **Of the 186 claims in which Ford was able to pull data from OWS:**
  - **74% (137) were reduced assist cases in which the customer would not experience manual steering while driving**
    - **Assist level defaults to 100 kph boost curve. If the fault is triggered while driving straight, or at 100 kph vehicle speed and greater, the customer would not initially feel the reduction in assist**
    - **At lower speeds while turning, the customer will experience a heavy steering feel**
    - **If data is extrapolated to the entire 348 population, 256 claims are predicted to be reduced assist cases**
  - **26% (49) were cases in which the customer would experience, worst case scenario, manual steering while driving**
    - **If data is extrapolated to the entire 348 population, 92 claims are predicted to be manual steering cases**
    - **The C200D:49 DTC, responsible for 2011-2012MY Fusion steering recall, only contributes to 2% of total MY2010 Fusion claims**

Reduced Assist	137	74%
Sudden Loss of Assist	49	26%



Global Chassis Engineering

Part Number Summary

Go Further

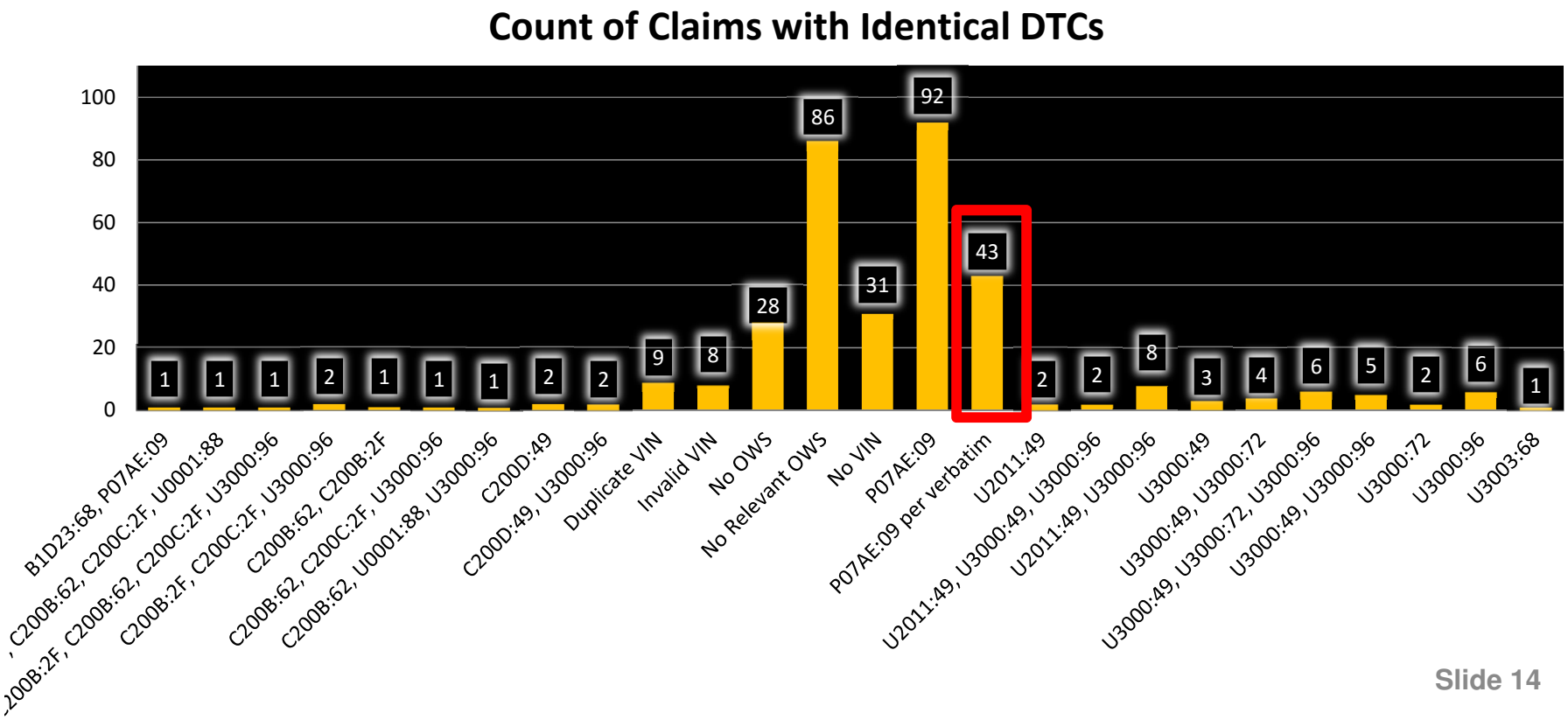
Date Incorporated into Vehicle Production	Model and Model Year	Original		Modified		Production Ship Date	Component Service Ship Date
		Ford Eng. P/N	Ford Eng. "Short Gear" P/N & FSCD P/N	Ford Eng. P/N	Ford Eng. "Short Gear" P/N & FSCD P/N		
J1	2010 Fusion/Milan	AE5C-3200-BH	AE5C-3504-BA	AE5C-3200-BJ	AE5C-3504-BA AE5Z-3504-B	Nov-08	Feb-09
J2	2010 Fusion/Milan	AE5C-3200-BJ	AE5C-3504-BA AE5Z-3504-B	AE5C-3200-BK	AE5C-3504-BA AE5Z-3504-B	Apr-09	Jun-09
J2	2010 Fusion/Milan	AE5C-3200-BK	AE5C-3504-BA AE5Z-3504-B	AE5C-3200-CA	AE5C-3504-BB AE5Z-3504-BE	Jul-09	Oct-09
2011 J2	2011 Fusion/Milan/MKZ Hybrid	AE5C-3200-CD	AE5C-3504-BD	AE5C-3200-CE	AE5C-3504-BE AE5Z-3504-CE	---	---
2011 J2 RC	2011 Fusion/Milan/MKZ Hybrid	AE5C-3200-CF	AE5C-3504-BF	AE5C-3200-CG	AE5C-3504-BG AE5Z-3504-CE	Jan-11	Mar-11
2012 RC	2012 Fusion/Milan/MKZ Hybrid	AE5C-3200-CH	AE5C-3504-BH AE5Z-3504-CE	AE5C-3200-DA	AE5C-3504-CA AE5Z-3504-CE	Mar-12	Mar-12
Service	2010 - 2012 Fusion/Milan/MkZ Hybrid	AE5C-3200-DA	AE5C-3504-CA AE5Z-3504-CE	AE5C-3200-DA	AE5C-3504-CB AE5Z-3504-DE	N/A	Mar-15

Global Chassis Engineering

Backup Slides - Assumptions

Go Further

- **For 2010MY Fusion with production gears, the ONLY DTC that can cause the IPC to display "SERVICE POWER STEERING" or "SERVICE POWER STEERING NOW" in the message center is P07AE:09. Newer service gears (P/N AE5Z-3504-CF and beyond) contain the C200D:49 software fix that allows the PSCM to provide assist for the remainder of the drive cycle. For these gears, C200D:49 can also cause the IPC to display the message above.**
- **The data below assumes that when the customer saw the IPC display "SERVICE POWER STEERING" the DTC that flagged this message is P07AE:09, and is titled "P07AE:09 per verbatim" in the Pareto below.**

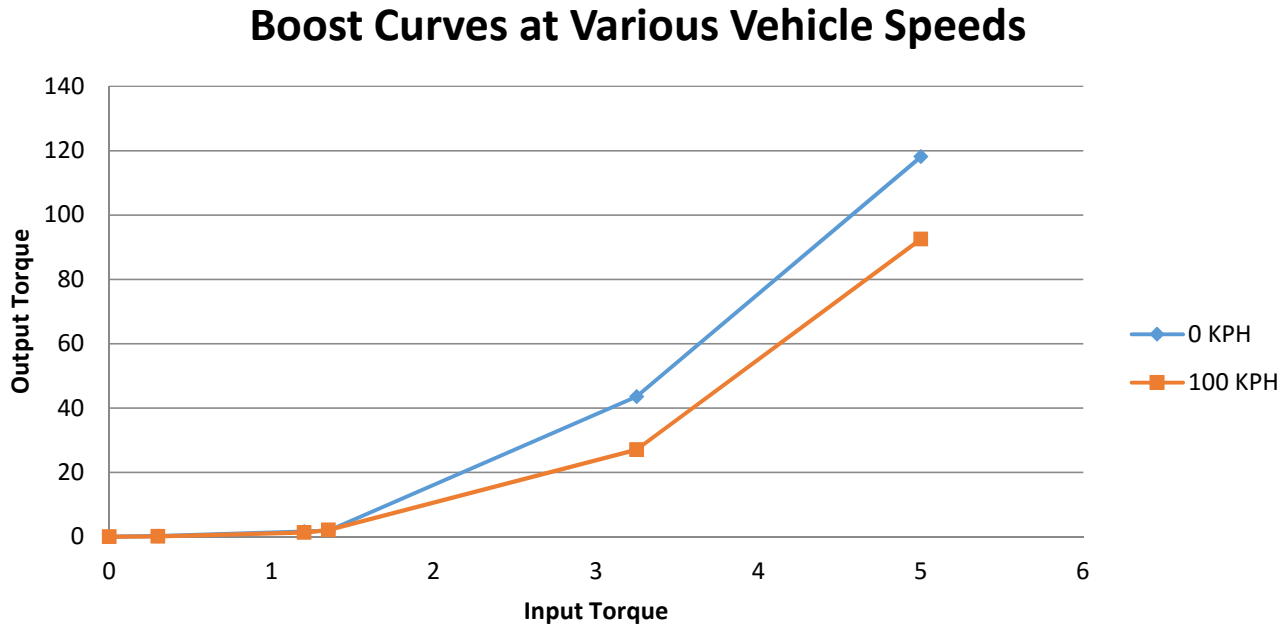


Backup Slides – Boost Curves

- The amount of assist that is removed when the "default vehicle speed boost curve" is used depends on the input torque of the driver, and the current vehicle speed that the vehicle is operating.
- Below plot compares the boost curve at 100 kph (default vehicle speed) to that of parking maneuvers

**One parameter from 2010 Fusion calibration file was not readily available for boost curve calculation. This parameter was used from a different vehicle line (MKC). Boost curves are approximate and give a general understanding of operation (+/- 5% accuracy).

		Input Torque [Nm]			
		0	0.30	3.25	5.00
Motor Output Torque [Nm]	0 KPH	0	0.2	43.6	118.1
	100 KPH	0	0.1	27.1	92.5
	Tq Diff.	0	0.1	16.5	25.6
	% Difference	0	48%	38%	22%



Backup Slides – Ramp Out Rates

Assist ramp out rate for:

1. **Sudden loss of assist events (e.g. U3000:49 internal failure)**
    1. There is no ramp-out of assist, it is instantaneous.

    More details:
    1. Faults occurring during run time / normal operation
        1. The system reacts within 20ms upon the fault condition being diagnosed until the relay is opened (this is not a ramp down over time, just time to react to fault)
    2. Faults occurring during power up
        1. This is a lack of assist as the system will never enter normal operation (i.e. system never has assist)

2. **Reduced assist events (P07AE:09)**
    1. This is a friction fault and the system ramps to the assist level for 100kph vehicle speed
    2. The ramp rate is 20 kph/sec from current vehicle speed to 100 kph (i.e if vehicle speed is currently 40 kph, ramps to 100 kph in 3 seconds).