In addition to this summary, this report includes the following forms:

Rating Criteria and Classifications
J1739 (2009)
Recommended Actions
Current Controls

Xfmea Report Sample – Design FMEA

This report was generated with ReliaSoft's Xfmea software in Microsoft Word. Similar reports can also be generated in Microsoft Excel. You can easily replace the Xfmea logo graphic with your own company logo. Within Word and Excel, reports can be edited/annotated, if necessary, and generated in PDF and/or HTML format for easy distribution.

This report includes:

- A summary of the rating criteria (Severity Scale, Occurrence Scale, Detection Scale) and classifications that were used in the analysis.
- The Design FMEA (DFMEA) spreadsheet report in the SAE J1739 reporting format.
- A summary list of the recommended actions identified during the analysis.
- A summary list of the current controls identified during the analysis.
- Some graphical charts that were generated in Xfmea's Plot Viewer and copy/pasted into the report document, along with chart legend information. These include:
  - Pareto (bar) chart of the cause RPNs, ranked by initial RPN.
  - Pie chart demonstrating the number of causes assigned to each available Occurrence rating.
  - Pie chart demonstrating the number of causes assigned to each available Detection rating.

The report is based on the sample analysis provided in the SAE J1739 guidelines, on page 37.

Severity Rating Scale

#	Description	Criteria 1
1	No Effect	No discernible effect.
2	Annoyance	Appearance or Audible Noise, vehicle operable, item does not conform. Defect noticed by discriminating customers (< 25%).
3	Annoyance	Appearance or Audible Noise, vehicle operable, item does not conform. Defect noticed by many customers (50%).
4	Annoyance	Appearance or Audible Noise, vehicle operable, item does not conform. Defect noticed by most customers (> 75%).
5	Degradation of Secondary Function	Degradation of secondary function (vehicle operable, but comfort / convenience functions at reduced level of performance).
6	Loss of Secondary Function	Loss of secondary function (vehicle operable, but comfort / convenience functions inoperable).
7	Degradation of Primary Function	Degradation of primary function (vehicle operable, but at reduced level of performance).
8	Loss of Primary Function	Loss of primary function (vehicle inoperable, does not affect safe vehicle operation).
9	Safety and/or Regulatory Compliance	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning.
10	Safety and/or Regulatory Compliance	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning.

Occurrence Rating Scale

#	Description	Criteria
1	Very Low	Failure is eliminated through preventative control.
2	Low	No observed failures associated with almost identical design or in design simulation and testing.
3	Low	Only isolated failures associated with almost identical design or in design simulation and testing.
4	Moderate	Isolated failures associated with similar design or in design simulation and testing.
5	Moderate	Occasional failures associated with similar designs or in design simulation and testing.
6	Moderate	Frequent failures associated with similar designs or in design simulation and testing.
7	High	Failure is uncertain with new design, new application, or change in duty cycle/operating conditions.
8	High	Failure is likely with new design, new application, or change in duty cycle/operating conditions.
9	High	Failure is inevitable with new design, new application, or change in duty cycle/operating conditions.
10	Very High	New technology/new design with no history.

Detection Rating Scale

#	Description	Criteria 1
1	Detection Not Applicable - Failure Prevention	Failure cause or failure mode cannot occur because it is fully prevented through design solutions (e.g. Proven design standard/best practice or common material, etc.).
2	Virtual Analysis - Correlated	Design analysis/detection controls have a strong detection capability. Virtual Analysis (e.g. CAE, FEA, etc.) is highly correlated with actual and/or expected operating conditions prior to design freeze.
3	Prior to Design Freeze	Product validation (reliability testing, development or validation tests) prior to design freeze using degradation testing (e.g. data trends, before/after values, etc.).
4	Prior to Design Freeze	Product validation (reliability testing, development or validation tests) prior to design freeze using test to failure (e.g. until leaks, yields, cracks, etc.).
5	Prior to Design Freeze	Product validation (reliability testing, development or validation tests) prior to design freeze using pass/fail testing (e.g. acceptance criteria for performance, function checks, etc.).
6	Post Design Freeze and Prior to Launch	Product verification/validation after design freeze and prior to launch with degradation testing (Sub-system or system testing after durability test e.g. Function check).

Classification Options

Abbreviation	Description
C	Critical
KI	Key Intermediate
KLd	Key Leading
KLg	Key Lagging
S	Significant
KPC	Key Product Characteristic

7	Post Design Freeze and Prior to Launch	Product verification/validation after design freeze and prior to launch with test to failure testing (Sub-system or system testing until failure occurs, testing of system interactions, etc.).	KCC	Key Control Characteristic
8	Post Design Freeze and Prior to Launch	Product verification/validation after design freeze and prior to launch with pass/fail testing (Sub-system or system testing with acceptance criteria e.g. Ride & handling, shipping evaluation, etc.).		
9	Difficult to Detect	Design analysis/detection controls have a weak detection capability; Virtual Analysis (e.g. CAE, FEA, etc.) is not correlated to expected actual operating conditions.		
10	Absolute Uncertainty	No current design control; Cannot detect or is not analyzed.		

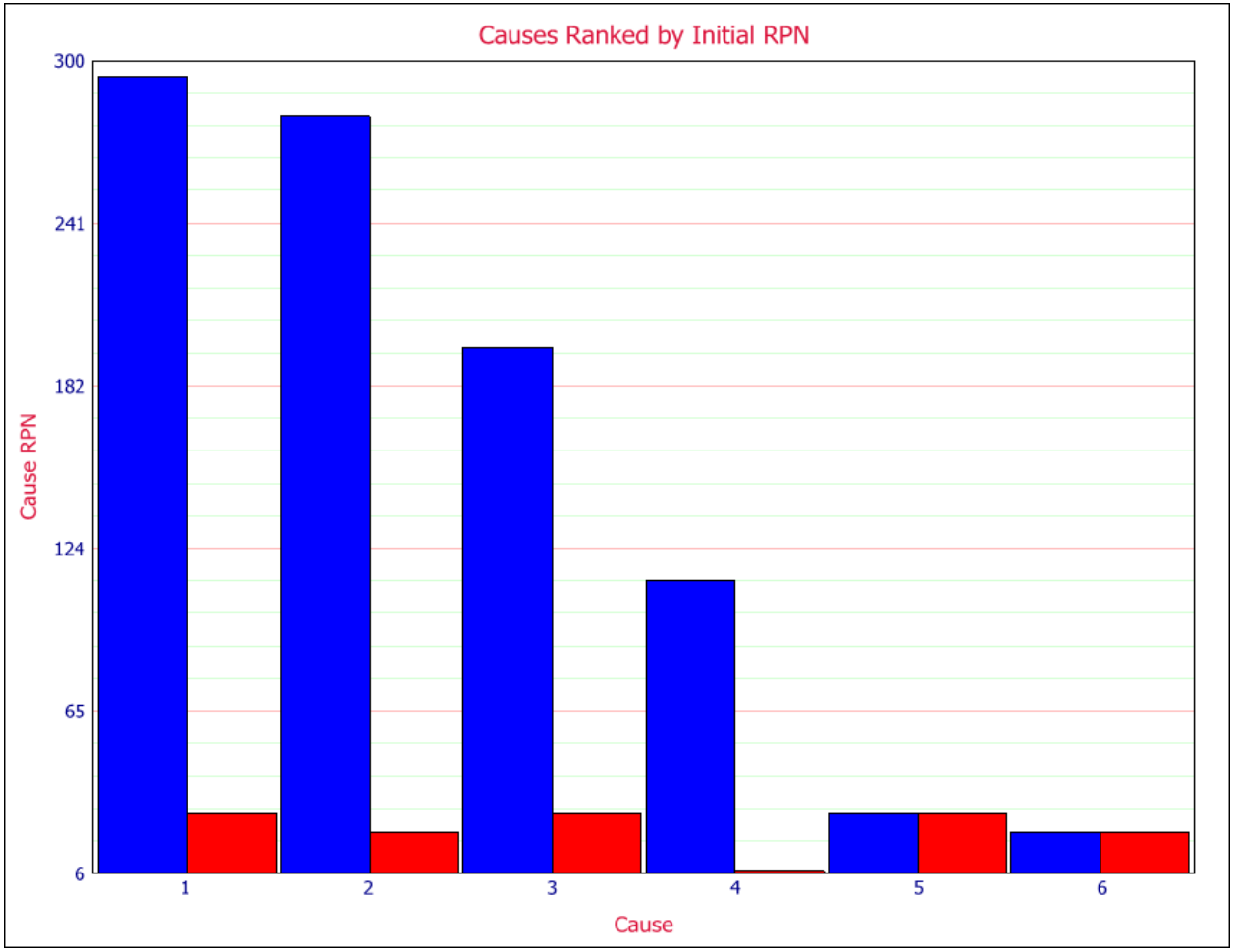
FAILURE MODE AND EFFECTS ANALYSIS
Front Door L.H

Item	1.1.1 - Front Door L.H	DFMEA Number	1234
Model Year/Program(s)	201X/Lion 3dr/Wagon	Key Date	7/3/2015
DFMEA Owner (Design Resp.)	Body Engineering	Prepared By	A. Tate - X6412 - Body Engr
Core Team / Facilitator	T. Fender - Car Product Dev., C. Childers - Manufacturing, J. Ford - Assy Ops (Dalton, Fraser, Henley Assembly Plants)	Original Completion Date	6/29/2015
Support Team			

Name / Function	Potential Failure Mode	Potential Effect(s) of Failure	SEVi	Classification	Potential Cause(s) of Failure	OCCi	Current Design Controls (Prevention)	Current Design Controls (Detection)	DETi	RPNi	Recommended Actions	Responsibility & Planned Completion Date		Action Results: Actions Taken & Actual Completion Date	SEVr	OCCr	DETr	RPNr
Front Door L.H																		
- Ingress to and egress from vehicle. - Occupant protection from weather, noise, and side impact. - Support anchorage for door hardware including mirror, hinges, latch and window regulator. - Provide proper surface for appearance items - paint and soft trim.	Corroded interior low door panels	Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time. - Impaired function of interior door hardware.	7		Upper edge of protective wax application specified for inner door panels is too low.	6		Vehicle general durability test veh. T-118 T-109 T-301	7	294	Add laboratory accelerated corrosion testing	A. Tate Body Engrg	6/29/2015	Based on test results (Test No. 1481) upper edge spec raised 125mm. - 6/29/2015	7	2	2	28
					Insufficient wax thickness specified	4		Vehicle general durability testing - as above.	7	196	Add laboratory accelerated corrosion testing.	A. Tate Body Engrg	6/30/2015	Test results (Test No. 1481) show specified thickness is adequate. - 6/29/2015		2	2	28
											Conduct Design of Experiments (DOE) on wax thickness.	A. Tate Body Engrg	7/1/2015	DOE shows 25% variation in specified thickness is acceptable. - 7/1/2015				
					Inappropriate wax formulation specified.	2		Physical and Chem Lab test - Report No. 1265.	2	28						2	2	28
					Entrapped air prevents wax from entering corner/edge access.	5		Design aid investigation with nonfunctioning spray head.	8	280	Add team evaluation using production spray equipment and specified wax.	Body Engrg & Assy Ops	7/2/2015	Based on test, additional vent holes will be provided in affected areas. - 7/2/2015		1	3	21
					Wax application plugs door drain holes	3		Laboratory test using "worst case" wax application and hole size.	1	21						3	1	21
					Insufficient room between panels for spray head access.	4		Drawing evaluation of spray head access.	4	112	Add team evaluation using design aid buck and spray head.	Body Engrg & Assy Ops	7/2/2015	Evaluation showed adequate access. - 7/2/2015		1	1	7

#	Recommended Action(s)	Target Completion Date	Responsibility	Actions Taken	Item	Potential Cause(s) / Mechanism(s) of Failure	Priority
1	Add laboratory accelerated corrosion testing	6/29/2015	A. Tate Body Engrg	Based on test results (Test No. 1481) upper edge spec raised 125mm.	Front Door L.H	Upper edge of protective wax application specified for inner door panels is too low.	Medium
2	Add laboratory accelerated corrosion testing.	6/30/2015	A. Tate Body Engrg	Test results (Test No. 1481) show specified thickness is adequate.	Front Door L.H	Insufficient wax thickness specified	Medium
3	Conduct Design of Experiments (DOE) on wax thickness.	7/1/2015	A. Tate Body Engrg	DOE shows 25% variation in specified thickness is acceptable.	Front Door L.H	Insufficient wax thickness specified	Medium
4	Add team evaluation using production spray equipment and specified wax.	7/2/2015	Body Engrg & Assy Ops	Based on test, additional vent holes will be provided in affected areas.	Front Door L.H	Entrapped air prevents wax from entering corner/edge access.	Medium
5	Add team evaluation using design aid buck and spray head.	7/2/2015	Body Engrg & Assy Ops	Evaluation showed adequate access.	Front Door L.H	Insufficient room between panels for spray head access.	Medium

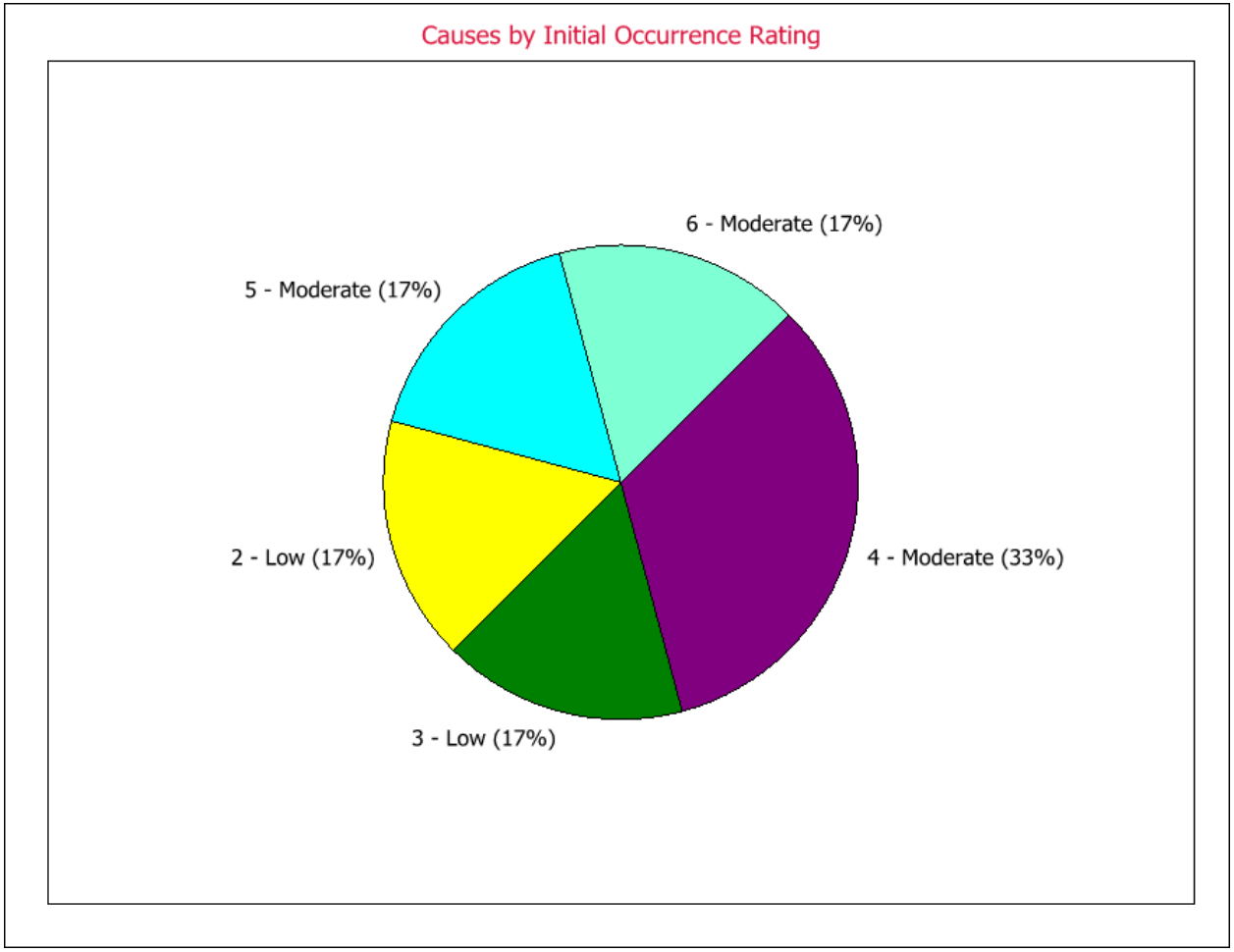
#	Current Design Controls	Control Type	Item	Name (Function)	Potential Failure Mode	Potential Effect(s) of Failure	Potential Cause(s)/Mechanism(s) of Failure
1	Vehicle general durability test veh. T-118 T-109 T-301	Detection	Front Door L.H	- Ingress to and egress from vehicle.-- Occupan...	Corroded interior low door panels	Deteriorated life of door leading to:-- Unsatis...	Upper edge of protective wax application specif...
2	Vehicle general durability testing - as above.	Detection	Front Door L.H	- Ingress to and egress from vehicle.-- Occupan...	Corroded interior low door panels	Deteriorated life of door leading to:-- Unsatis...	Insufficient wax thickness specified
3	Physical and Chem Lab test - Report No. 1265.	Detection	Front Door L.H	- Ingress to and egress from vehicle.-- Occupan...	Corroded interior low door panels	Deteriorated life of door leading to:-- Unsatis...	Inappropriate wax formulation specified.
4	Design aid investigation with nonfunctioning spray head.	Detection	Front Door L.H	- Ingress to and egress from vehicle.-- Occupan...	Corroded interior low door panels	Deteriorated life of door leading to:-- Unsatis...	Entrapped air prevents wax from entering corner...
5	Laboratory test using "worst case" wax application and hole size.	Detection	Front Door L.H	- Ingress to and egress from vehicle.-- Occupan...	Corroded interior low door panels	Deteriorated life of door leading to:-- Unsatis...	Wax application plugs door drain holes
6	Drawing evaluation of spray head access.	Detection	Front Door L.H	- Ingress to and egress from vehicle.-- Occupan...	Corroded interior low door panels	Deteriorated life of door leading to:-- Unsatis...	Insufficient room between panels for spray head...



Database: C:\Xfmea Demo.rsr10
Project: Design FMEA

Selected Items:
1.1.1 - Front Door L.H

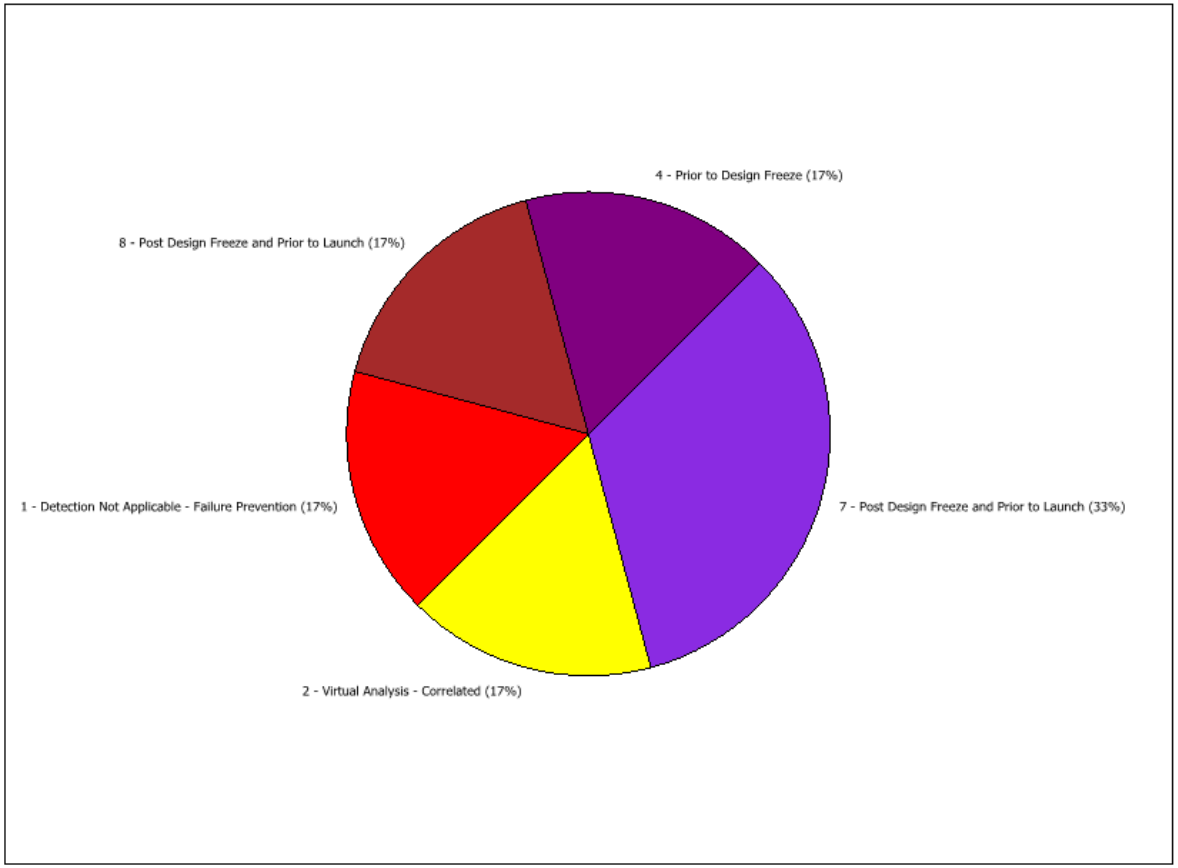
Causes Ranked by Initial RPN (1 - 6)
1: RPNi = 294, RPNr = 28 - Upper edge of protective wax application specified for inner door panels is too low. (Item: 1.1.1 - Front Door L.H)
2: RPNi = 280, RPNr = 21 - Entrapped air prevents wax from entering corner/edge access. (Item: 1.1.1 - Front Door L.H)
3: RPNi = 196, RPNr = 28 - Insufficient wax thickness specified (Item: 1.1.1 - Front Door L.H)
4: RPNi = 112, RPNr = 7 - Insufficient room between panels for spray head access. (Item: 1.1.1 - Front Door L.H)
5: RPNi = 28, RPNr = 28 - Inappropriate wax formulation specified. (Item: 1.1.1 - Front Door L.H)
6: RPNi = 21, RPNr = 21 - Wax application plugs door drain holes (Item: 1.1.1 - Front Door L.H)



Database: C:\Xfmea Demo.rsr10
Project: Design FMEA

Selected Items:
1.1.1 - Front Door L.H

Causes by Initial Occurrence Rating
Not Assigned: Qty 0 (0%)
1 - Very Low: Qty 0 (0%)
2 - Low: Qty 1 (16.67%)
3 - Low: Qty 1 (16.67%)
4 - Moderate: Qty 2 (33.33%)
5 - Moderate: Qty 1 (16.67%)
6 - Moderate: Qty 1 (16.67%)
7 - High: Qty 0 (0%)
8 - High: Qty 0 (0%)
9 - High: Qty 0 (0%)
10 - Very High: Qty 0 (0%)



Database: C:\Xfmea Demo.rsr10
Project: Design FMEA

Selected Items:
1.1.1 - Front Door L.H

Causes by Initial Detection Rating
Not Assigned: Qty 0 (0%)
1 - Detection Not Applicable - Failure Prevention: Qty 1 (16.67%)
2 - Virtual Analysis - Correlated: Qty 1 (16.67%)
3 - Prior to Design Freeze: Qty 0 (0%)
4 - Prior to Design Freeze: Qty 1 (16.67%)
5 - Prior to Design Freeze: Qty 0 (0%)
6 - Post Design Freeze and Prior to Launch: Qty 0 (0%)
7 - Post Design Freeze and Prior to Launch: Qty 2 (33.33%)
8 - Post Design Freeze and Prior to Launch: Qty 1 (16.67%)
9 - Difficult to Detect: Qty 0 (0%)
10 - Absolute Uncertainty: Qty 0 (0%)