

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

Rating Criteria and Classifications

AIAG Form A

Causes

Actions

Controls

Xfmea Report Sample – Process 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 Process FMEA (PFMEA) spreadsheet report in the AIAG Form A reporting format.
- A summary list of the potential causes of failure that were identified through the analysis, ranked by Initial Occurrence rating.
- A summary list of the recommended actions identified during the analysis.
- A summary list of the current controls identified during the analysis.

The report is based on the sample analysis provided in the AIAG FMEA-3 guidelines, on page 36.



RATING CRITERIA AND CLASSIFICATIONS

Date: 9/1/2015

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Severity Rating Scale				Occurrence Rating Scale			
#	Description	Criteria 1	Criteria 2	#	Description	Criteria	Criteria 2
1	No effect	No discernible effect.	No discernible effect.	1	Very Low	Failure is eliminated through preventative control.	
2	Annoyance	Appearance or Audible Noise, vehicle operable, item does not conform and noticed by discriminating customers (<25%).	Slight inconvenience to process, operation or operator.	2	Low	<=0.001 per thousand items/vehicles, 1 in 1,000,000	
3	Annoyance	Appearance or Audible Noise, vehicle operable, item does not conform and noticed by many customers (50%).	A portion of the production run may have to be reworked in-station before it is processed.	3	Low	0.01 per thousand items/vehicles, 1 in 100,000	
4	Annoyance	Appearance or Audible Noise, vehicle operable, item does not conform and noticed by most customers (>75%).	100% of the production run may have to be reworked in-station before it is processed.	4	Moderate	0.1 per thousand items/vehicles, 1 in 10,000	
5	Degradation of Secondary Function	Degradation of secondary function (vehicle operable, but comfort/convenience functions at reduced level of performance).	A portion of the production run may have to be reworked off line and accepted.	5	Moderate	0.5 per thousand items/vehicles, 1 in 2,000	
6	Loss of Secondary Function	Loss of secondary function (vehicle operable, but comfort/convenience functions inoperable).	100% of production run may have to be reworked off line and accepted.	6	Moderate	2 per thousand items/vehicles, 1 in 500	
7	Degradation of Primary Function	Degradation of primary function (vehicle operable, but at reduced level of performance).	A portion of the production run may have to be scrapped. Deviation from primary process including decreased line speed or added manpower.	7	High	10 per thousand items/vehicles. 1 in 100	
8	Loss of Primary Function	Loss of primary function (vehicle inoperable, does not affect safe vehicle operation).	100% of the production run may have to be scrapped. Line shutdown or stop ship.	8	High	20 per thousand items/vehicles, 1 in 50	
9	Failure to Meet Safety and/or Regulatory	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning.	May endanger operator (machine or assembly) with warning.	9	High	50 per thousand items/vehicles, 1 in 20	
10	Failure to Meet Safety and/or Regulatory	Potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning.	May endanger operator (machine or assembly) without warning.	10	Very High	=> 100 per thousand items/vehicles, => 1 in 10	
Detection Rating Scale				Classification Options			
#	Description	Criteria 1	Criteria 2	Abbreviation	Description		
1	Almost Certain	Error (Cause) prevention as a result of fixture design, machine design or part design. Discrepant parts cannot be made because item has been error-proofed by process/product design.	Detection not applicable; error prevention.	C	Critical		
2	Very High	Error (Cause) detection in-station by automated controls that will detect error and prevent discrepant part from being made.	Error detection and/or problem prevention.	KI	Key Intermediate		

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RATING CRITERIA AND CLASSIFICATIONS

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3	High	Failure Mode detection in-station by automated controls that will detect discrepant part and automatically lock part in station to prevent further processing.	Problem detection at source.	KLd	Key Leading
4	Moderately High	Failure Mode detection post-processing by automated controls that will detect discrepant part and lock part to prevent further processing.	Problem detection post processing.	KLg	Key Lagging
5	Moderate	Failure Mode or Error (Cause) detection in-station by operator through use of variable gauging or by automated controls in-station that will detect discrepant part and notify operator. Gauging performed on setup and first-piece check (setup-causes only).	Problem detection at source.	S	Significant
6	Low	Failure Mode detection post-processing by operator through use of variable gauging or in-station by operator through use of attribute gauging (go/no-go, manual torque check/clicker wrench, etc.).	Problem detection post processing.		
7	Very Low	Failure Mode detection in-station by operator through visual/tactile/audible means or post-processing through use of attribute gauging (go/no-go, manual torque check/clicker wrench, etc.).	Problem detection at source.		
8	Remote	Failure Mode detection post-processing by operator through visual/tactile/audible means.	Problem detection post processing.		
9	Very Remote	Failure Mode and/or Error (Cause) is not easily detected (e.g., random audits).	Not likely to detect at any stage.		
10	Almost Impossible	No current process control; Cannot detect or is not analyzed.	No detection opportunity.		

**POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
Front Door L.H.**

FMEA Number 1450
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Prepared By J. Ford - X6521 - Assy Ops
FMEA Date (Orig.) 7/1/2015 (Rev) 7/15/2015

FMEA Type Component
Item 1.1.1 - Front Door L.H. Process Responsibility Body Engineering
Model Year(s)/Vehicle(s) 201X/Lion 4dr/Wagon Key Date 7/22/2015
Core Team A. Tate - Body Engrg, J. Smith - OC, R. James - Production, J. Jones - Maintenance

Name / Function Requirements	Potential Failure Mode	Potential Effect(s) of Failure	SEVr	Classification	Potential Cause(s) of Failure	OCCI	Current Process Controls (Prevention)	Current Process Controls (Detection)	DETI	RPNi	Recommended Action(s)	Responsibility & Planned Completion Date	Action Results				
													Actions Taken & Actual Completion Date	SEVr	OCCI	DETr	RPNr
Front Door L.H.																	
Op. 70 Manual application of wax inside door/ cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	7		Manually inserted spray head not inserted far enough	8		Visual check each hour - 1/shift for film thickness (depth meter) and coverage.	5	280	Add positive depth stop to sprayer.	Mfg. Engrg - 7/8/2015	Stop added, sprayer checked on line. - 7/8/2015	7	2	5	70
									Automate spraying.	Mfg. Engrg - 7/10/2015	Rejected due to complexity of different doors on same line. - 7/10/2015						
					Spray head clogged- Viscosity too high- Temperature too low- Pressure too low.	5	Test spray pattern at start-up and after idle periods, and preventive maintenance program to clean heads.	Visual check each hour - 1/shift for film thickness (depth meter) and coverage.	5	175	Use Design of Experiments (DOE) on viscosity vs. temperature vs. pressure.	Mfg. Engrg - 7/13/2015	Temp and press limits were determined and limit controls have been installed - control charts show process is in control Cpk = 1.85. - 7/13/2015		1	5	35
					Spray head deformed due to impact	2	Preventive maintenance program to maintain heads.	Visual check each hour - 1/shift for film thickness (depth meter) and coverage.	5	70					2	5	70
					Spray time insufficient	8		Operator instructions and lot sampling (10 doors/shift) to check for coverage of critical areas.	7	392	Install spray timer.	Maintenance - 7/14/2015	Automatic spray timer installed - operator starts spray, timer controls shut-off - control charts show process is in control Cpk = 2.05. - 7/14/2015		1	7	49



CAUSES

Date: 9/1/2015

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Cause ID	Cause #	Potential Cause(s) of Failure	Classification	OCCi	OCCr	DETi	DETr	RPNi	RPNr	% Reduction in Cause RPN	Last Updated By	Last Updated	Name	Function	Potential Failure Mode	Potential Effect(s) of Failure
1	1.1.1.1	Manually inserted spray head not inserted far enough		8	2	5	5	280	70	75	Reliability Engineer	9/1/2015 12:54 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware
2	1.1.1.2	Spray head clogged - Viscosity too high - Temperature too low - Pressure too low.		5	1	5	5	175	35	80	Reliability Engineer	9/1/2015 12:54 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware
3	1.1.1.3	Spray head deformed due to impact		2	2	5	5	70	70	0	Reliability Engineer	9/1/2015 12:55 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware
4	1.1.1.4	Spray time insufficient		8	1	7	7	392	49	87.5	Reliability Engineer	9/1/2015 12:55 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware



ACTIONS

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Action ID	Action #	Recommended Action(s)	Responsibility	Planned Completion Date	Actual Completion Date	Actions Taken	Last Updated By	Last Updated	Name	Function	Potential Failure Mode	Potential Effect(s) of Failure	Potential Cause(s) of Failure	RPNi	RPNr
1	1.1.1.1.1	Add positive depth stop to sprayer.	Mfg. Engrg	7/8/2015	7/8/2015	Stop added, sprayer checked on line.	Reliability Engineer	9/1/2015 12:45 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Manually inserted spray head not inserted far enough	280	70
2	1.1.1.1.2	Automate spraying.	Mfg. Engrg	7/10/2015	7/10/2015	Rejected due to complexity of different doors on same line.	Reliability Engineer	9/1/2015 12:46 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Manually inserted spray head not inserted far enough	280	70
3	1.1.1.2.1	Use Design of Experiments (DOE) on viscosity vs. temperature vs. pressure.	Mfg. Engrg	7/13/2015	7/13/2015	Temp and press limits were determined and limit controls have been installed - control charts show process is in control Cpk = 1.85.	Reliability Engineer	9/1/2015 12:47 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray head clogged - Viscosity too high - Temperature too low - Pressure too low.	175	35
4	1.1.1.4.1	Install spray timer.	Maintenance	7/14/2015	7/14/2015	Automatic spray timer installed - operator starts spray, timer controls shut-off - control charts show process is in control Cpk = 2.05.	Reliability Engineer	9/1/2015 12:47 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray time insufficient	392	49



CONTROLS

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Control ID	Control #	Current Process Controls	Control Type	Last Updated By	Last Updated	Name	Function	Potential Failure Mode	Potential Effect(s) of Failure	Potential Cause(s) of Failure	RPNi	RPNr
1	1.1.1.1.1	Visual check each hour - 1/shift for film thickness (depth meter) and coverage.	Detection	Reliability Engineer	9/1/2015 12:48 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Manually inserted spray head not inserted far enough	280	70
2	1.1.1.2.1	Test spray pattern at start-up and after idle periods, and preventive maintenance program to clean heads.	Prevention	Reliability Engineer	9/1/2015 12:48 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray head clogged - Viscosity too high - Temperature too low - Pressure too low.	175	35
1	1.1.1.2.2	Visual check each hour - 1/shift for film thickness (depth meter) and coverage.	Detection	Reliability Engineer	9/1/2015 12:48 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray head clogged - Viscosity too high - Temperature too low - Pressure too low.	175	35
3	1.1.1.3.1	Preventive maintenance program to maintain heads.	Prevention	Reliability Engineer	9/1/2015 12:48 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray head deformed due to impact	70	70

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CONTROLS

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1	1.1.1.3.2	Visual check each hour - 1/shift for film thickness (depth meter) and coverage.	Detection	Reliability Engineer	9/1/2015 12:48 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray head deformed due to impact	70	70
4	1.1.1.4.1	Operator instructions and lot sampling (10 doors/shift) to check for coverage of critical areas.	Detection	Reliability Engineer	9/1/2015 12:48 PM	Front Door L.H.	Op. 70 Manual application of wax inside door/cover inner door, lower surfaces with wax to specification thickness.	Insufficient wax coverage over specified surface	Allows integrity breach of inner door panel. Corroded interior lower door panels. Deteriorated life of door leading to: - Unsatisfactory appearance due to rust through paint over time - Impaired function of interior door hardware	Spray time insufficient	392	49