Date: 27th March 2018				FMEA team Members: Jack Farmer, Omar Mashaly			FMEA No.: 0001												
FMEA Owner: Jack Farmer							FMEA Revision Number: 1												
Product Name: Fuel filler pipe (L560T/S)							FMEA Last Revision Date: 27th March 2018												
Product Part No.: ASP5150																			
							Current Status									Revised Status			
Item No.	Part Number	Function or Process	Failure Mode	Effect of Failure	Cause of Failure	Current Control Measure	OCC	SEV	DET	RPN	Reccomended Action	Action By	Action Taken	OCC	SEV	DET	RPN
1	ASP5150	Addison 2 bend	Pipe not bent to specification	Pipe may not fit into jig, hence may not fit into vehicle	Addison 2 not correctly calibrated or worn/broken.	SOP is used to guide operators. Skills matrix is used to check operators' ability. 1st off & additional 4 checks in guage per shift.	9	2	5	90	Jig is to be kept in a controlled environment to ensure calibration and reliability, pipes are checked against jig more frequently (every pipe is tested).	JF, OM	Jig is kept in controlled metrology lab and digital depth guages are used to check parts are in tolerance. Data is collected and used to check for patterns which could indicate machine faults or problems with specific operators.	3	2	2	12
2	ASP5150	Addison 2 bend	Pipe splits	Pipe will not be water-tight, risk to vehicle passenger and ineffective as fuel filler	Incorrect settings or worn/broken tooling	SOP is used to guide operators. Skills matrix is used to check operators' ability. Visual check	6	1	1	6	Use light to check for hairline splits/cracks	JF, OM	Pipe is now illuminated with light and placed in a darkened box. Camera and PC can detect hairline cracks/splits	2	7	2	28
3	ASP5150	Addison 2 bend	Ripples on pipe	Unable to fit and weld parts in robot fixture. Unable to fit system on vehicle.	Incorrect settings or worn/broken tooling	SOP is used to guide operators. Skills matrix is used to check operators' ability. Double visual inspection.	8	2	9	144	Jig is to be kept in a controlled environment to ensure calibration and reliability, pipes are checked against jig more frequently (every pipe is tested).	JF, OM	Jig is kept in controlled metrology lab and double visual checks are used to determine if ripples are present. Data is collected and used to check for patterns which could indicate machine faults.	3	7	2	42
4	ASP5150	Addison 2 bend	Dimples next to pipe bend	Pipe may not fit into jig and hence onto vehicle, dimples can cause weakness in pipe increasing possibility of damage	Insufficent support on pipe during bend. Incorrect settings or worn/broken tooling	N/A	9	3	10	270	Jig is to be kept in a controlled environment to ensure calibration and reliability, pipes are checked against jig more frequently (every pipe is tested).	JF, OM	Jig is kept in controlled metrology lab and double visual checks are used to determine if dimples are present. Data is collected and used to check for patterns which could indicate machine faults.	3	3	2	18
5	ASP5150	Sawing	Pipe length cut too short	Too short will result in non-fitment with upper pipe and in vehicle.	Saw fixture tooling worn/broken. Incorrect set-up	SOP is used to guide operators. Skills matrix is used to check operators' ability. 1st off & additional 4 checks in guage per shift.	7	2	5	70	Every pipe is inspected using the jig to more effectively recognise tooling issues. Saw fixture can then be periodically repaired and calibrated.	JF, OM	Inspection on 100% of pipes. Data is collected to recognise patterns of failure indicating tooling issues.	2	7	2	28
6	ASP5150	Sawing	Pipe length cut too long	Too short will result in non-fitment with upper pipe and in vehicle.	Saw fixture tooling worn/broken. Incorrect set-up	SOP is used to guide operators. Skills matrix is used to check operators' ability. 1st off & additional 4 checks in guage per shift.	7	2	5	70	Every other pipe is inspected using the jig to more effectively recognise tooling issues. Saw fixture can then be periodically repaired and calibrated.	JF, OM	Inspection on 100% of pipes. Data is collected to recognise patterns of failure indicating tooling issues.	2	7	2	28
7	ASP5150	Be-burr	Pipe not de-burred	Non-fitment with upper pipe. Potential for leaks.	Missed operation.	SOP is used to guide operators. Skills matrix is used to check operators' ability.	8	4	7	224	Visual inspection immediately after process to check if deburr has taken place. If missed step can go back to deburr.	JF, OM	Double visual inspection on 100% of pipes. Data is collected to recognise if certain operators tend to miss operations. Visual inspection so operations less likely to be missed.	1	7	9	63
8	ASP5150	Be-burr	Pipe uneven de-burred	Non-fitment with upper pipe. Potential for leaks.	Worn tooling.	Double visual inspection on 100% of parts.	8	4	9	288	100% double visual inspection immediately after process. Be-burr problems are recorded to determine if tooling is becoming worn (increased rate of failure). De-burr machine runs on a set timer to each part is deburred equally.	JF, OM	Double visual inspection on 100% of pipes. Data is collected to recognise failure increases that could indicate tooling issues. De-burr runs for a set time to ensure all parts are deburred for an equal amount of time.	2	5	9	90
9	ASP5150	End forming	Pipe not endformed	H&S concern. Non fitment with upper pipe.	Missed operation.	SOP is used to guide operators. Skills matrix is used to check operators' ability.	9	1	3	27	100% of parts double visual inspected to ensure enform is present. Parts are held on rack by the end form so this clearly indicates if a part is end formed (if it hangs on rack).	JF, OM	Double visual inspection on 100% of parts. Rack acts as test for if end form is present.	1	8	9	72
10	ASP5150	End forming	Pipe end form undersized	H&S concern. Non fitment with upper pipe.	Incorrect settings or worn/broken tooling.	SOP and skills matrix.	9	3	3	81	100% of parts are jig tested. Jig will show if end form is correct size and in tolerance. Readings are taken using digital depth guage which are collected to check for patterns indicating tooling problems.	JF, OM	Every part jig tested. Jig uses digital guages so that data can be automatically collected which can be used to notice tooling errors.	3	7	2	42
11	ASP5150	End forming	Pipe end form oversized	H&S concern. Non fitment with upper pipe.	Incorrect settings or worn/broken tooling.	SOP and skills matrix.	5	3	4	60	100% of parts are jig tested Jig will show if end form is correct size and in tolerance. Readings are taken using digital depth guage which are collected to check for patterns indicating tooling problems.	JF, OM	Every part jig tested. Jig uses digital guages so that data can be automatically collected which can be used to notice tooling errors.	3	7	2	42
12	ASP5150	End forming	Formed surfaces with scoring	Non fitment of anti-siphon valve. Possible leak - poor seal on fitment of hose.	Worn/broken tooling	SOP is used to guide operators. Skills matrix is used to check operators' ability. 100% double visual inspection.	9	3	9	243	100% of parts are jig tested. Jig will show if end form is correct size and in tolerance. Readings are taken using digital depth guage which are collected to check for patterns indicating tooling problems.	JF, OM	Every part jig tested. Jig uses digital guages so that data can be automatically collected which can be used to notice tooling errors.	3	4	2	24

Occurrence	
Rating	Frequency of Occurrence
1. Remote	< 1 : 1,500,000
2. Very low	1 : 150,000
3. Low	1 : 15,000
4. Moderate	1 : 2,000
5. Moderate	1 : 400
6. Moderate	1 : 80
7. High	1 : 20
8. High	1 : 8
9. Very High	1 : 3
10. Very High	1: 2

Severity		
Rating	Effect of Severity	Who the Severity Effects
1	No Effect	-
2	very minor	Discerning
3	minor	Average customers
4	very low	most customers
5	low	product functions, minor feature have reduced performance
6	moderate	as 5, but all minor features fail
7	high	as 6, but reduced performance
8	very high	product inoperable loss of primary function
9	hazardous	Injury to people
10	hazardous	no warning!

Detection	
Rating	Likelihood of Detection
1	Almost certain (process in
2	Very High
3	High
4	Moderatly high
5	Moderatly high
6	Low
7	Very low
8	Remote
9	Very remote
10	Absolute uncertainty

Note : 9-10 requirers immediate action

Note; Visual inspection minimum rating - 9