

Failure Mode and Effect Analysis (FMEA) – An Overview

Choose QI Macros ► Fill in The Blank Templates ►► Failure Modes & Effects Analysis

1. Refer to RBPM. Construct process maps to illustrate the operation, working relationships, and process requirements.
2. In the boxes labeled “Process Function,” list each individual process step or operation identified in your RBPM.
3. In the boxes labeled “Potential Failure Mode,” for each individual process step, list all potential failure modes (things that could go wrong) within a function or between operational handoffs.
4. In the boxes labeled “Potential Failure Effects” (symptoms), for each potential failure mode, define the possible effects of that failure and the consequences on the immediate process step and down stream functions or end users.
5. In the boxes labeled SEV (Severity), enter – for each effect – a number (1-10) indicating the severity of the effect on the immediate process step and down stream functions or end users. (refer to FMEA table on the page following)
6. In the boxes labeled “Potential Cause(s),” list – for each failure – possible causes of the failure. Describe how the failure could occur in terms of what can be corrected or controlled. (refer to cause and effect diagramming)
7. In the boxes labeled “Occur” (probability of occurrence), for each separate failure, enter a number (1-10) indicating the probability of the failure occurring. (refer to FMEA table on the following page)
8. In the boxes labeled “Current Process Controls,” for each separate failure mode, describe the formal process controls that are in place to detect or prevent failure.
9. In the boxes labeled “Detect,” for each separate failure mode, enter a number (1-10) indicating how likely the controls in place will detect a given failure before the work product leaves the process step.
10. In the boxes labeled “RPN” (risk priority number), for each separate failure mode, calculate the risk priority number. $RPN = SEV \times OCC \times DET$ (1-1000). The higher the RPN the greater focus and attention should be paid to that particular failure mode.
11. In the boxes labeled “Recommended Action(s),” determine counter measures for each failure mode. Determine other compensating provisions or corrective designs for each failure mode.
12. In the boxes labeled “Responsibility & Target Completion Date,” assign and name the individual or workgroup accountable for the counter measure and the target completion date.
13. Identify the effects of the corrective actions, identify the severity, occurrence and detectability risks after the corrective action and calculate the “after” RPN.

FMEA – An Example

Item/Process	Insert here	Process Responsibility:	Insert here	EMEA Number	Insert # here	<i>Example From Six Sigma Simplified*</i>											
Subsystem	sub	Key Date:	1/1/2004	Page	1 of 1												
Model Years	2004-			Prepared by:	who												
Core Team:	who			EMEA Date	1/1/2003	Action Results											
Process Function; Part	Potential Failure Mode	Potential Effect(s) of Failure	S E V	C L A S S	Potential Cause(s) / Mechanism(s) of Failure	O C C U R	Current Process Controls Prevention	Current Process Controls Detection	D E T E C T	R. P. N.	Recommended Action(s)	Responsibility & Target Completion Date	Actions Taken	S E V	O C C U R	D E T E C T	R. P. N.
Requirements																	
1. Simple process/part description, number, and its purpose	Describe how product or process could potentially fail.	What the internal or external customer might notice or experience: noise, impaired function.			Describe how the failure could occur described in terms of what can be corrected or controlled: improper action.		Process methods and controls to prevent failure.	Process methods and controls to detect failure.			Changes to reduce severity, occurrence, and detection ratings.	Name of organization or individual and target completion date	Actions and actual completion date				0
Part: Front Door LH # HBHX-0000-A	Corroded Interior lower door panels	Deteriorated life of door leading to:	7		Upper edge of protective wax application specified for inner door panels	6		Vehicle General Durability Test Veh, T118	7	294	Add Laboratory accelerated corrosion testing	A. Tate-body Engineering Corrosion testing	Based on test results, upper edge spec raised 125mm	7	2	2	28
		Unsatisfactory appearance due to rust through point over time	7		Insufficient wax thickness specified	4		Vehicle General Durability Testing	7	196	Conduct DOE on wax thickness	A. Tate	Thickness is adequate	7	2	2	28
		Impaired Function of Interior door hardware	7		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 Engineering	Evaluation showed adequate access	7	1	1	7

Severity of Effect:	Occurrence Rating	Detection:
1. None	1. Remote <.01/1000	1. Very High
2. Very Minor	2. Low - 0.1/1000	2. Very High
3. Minor	3. Low - 0.5/1000	3. High
4. Very Low	4. Moderate - 1/1000	4. Moderately High
5. Low	5. Moderate - 2/1000	Moderate
6. Moderate	6. Moderate - 5/1000	6. Low
7. High	7. High - 10/1000	7. Very Low
8. Very High	8. High - 20/1000	8. Remote
9. Hazardous with warning	9. Very High 50/1000	9. Very Remote
10. Hazardous w/o warning	10. Very High >100/1000	10. Almost Impossible