FMEA - Quick Reference Guide

ITEM:
Year:
Core Team:
Process Responsibility:
Key Date:

Potential
Failure Mode and Effects Analysis
(Green FMEA)

FMEA Number:
Page 1 of 1
Prepared by:
FMEA Date (orig.):

Process / Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) Failure	Occur	Current Process Controls: Prevent	Current Process Controls: Detect	Detec	R.P.N.	Recommended Action(s)	Responsibility & Target Completion Date	Actions Taken	Action Results: Sev	Action Results: Occ	Action Results: Det	Action Results: R.P.N.
OP#10 must assemble cross functional Team and Develop FMEA. •SAEJ 1739 Guidelines •APQP Specific Team Members Must provide an FMEA which determines process risk and addresses confirmed significant characteristic selection: Measurable: • Torque	FMEA not adequately performed;	• Product liability • Customer dissatisfaction • Reduced performance of system or component • Potential risk of injury • Reduce level of analysis of process • Inconsistent produc	10	CC	Inadequate FMEA development • Cross functional team not assembled • Facilitation not used • FMEA expertise is limited • Lack of adequate FMEA Training	5	• Mistake Proofing • Automatic Visual Systems • Proximity Switch	• APQP Checklist • FMEA Review Process • Management Review Process • Control Plan entries	5	250	Call an FMEA facilitator to reduce time required and improve quality of the FMEA pro	Process engineer team leader or project manager; ASAP	FMEA performed under the supervision and leadership of an expert/certified FMEA facilitator	10	1	2	20

- Verb-noun
- measurable is desirable
- objective
- subjective

Anti function for functional approach
- full
- partial
- intermittent
- excess function

Customer focus/experience
- end user
- assembler
- maker
- regulatory body
- environment

See Severity Chart on opposite side

Brainstorm causes
- man
- material
- method
- machine
- environment

Determine Root cause if CC

See Occurrence Chart on opposite side

Detect
Planned Evaluation Method to/from
- Control Plan
- Tools
- Mistake Proofing

Note: must have written Instruction

Prevent
- Reduce Occurrence

See Detection Chart on opposite side

Actions should:
- eliminate failure mode SEV=9/10
- eliminate causes on CC
- reduce occurrence
- improve evaluation "detection reduction last option"

- Name of team member to carry issue.
- Name of champion
- Date action desired completion

Brief action result description Date action taken

Recalculate RPN, after action has been taken
- occurrence
- detection

Note: severity will likely stay the same unless failure mode is eliminated

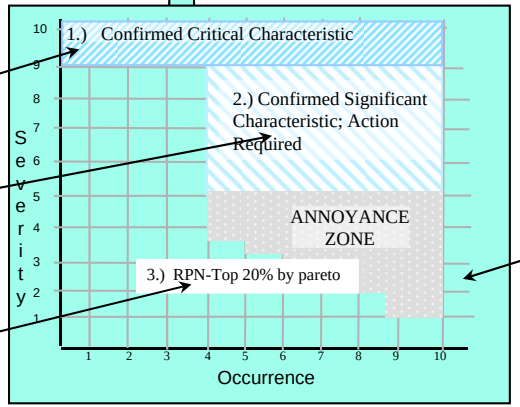
Actions are Required: (by Priority)

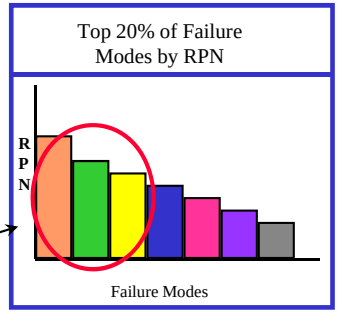
1.) Confirmed CC is a Critical Characteristic to be addressed on Control Plan)

2.) An SC is a confirmed Significant Characteristic to be addressed on Control Plan)

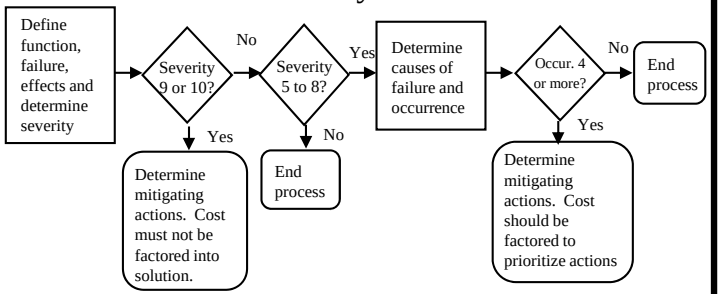
3.) For the top 20% Failure Modes / Causes (Pareto by RPN)

Critical & Significant Characteristics Action Guidelines





FMEA analysis flowchart



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Severity, Occurrence, and Detection Criteria for Process FMEA

SEVERITY EVALUATION CRITERIA

EFFECT	CRITERIA: Severity of Effect			RNK
	This ranking results when a potential failure mode results in a final customer and/or a manufacturing/assembly plant defect. The final customer should always be considered first. If both occur, use the higher of the two severities.			
	Customer Effect	**Manufacturing/Assembly Effect**	**Environmental Effect**	
Hazardous-without warning	Very high severity ranking when a potential failure mode effects safe vehicle operation and/or involves noncompliance with government regulation without warning.	Or may endanger operator (machine or assembly) without warning.	Ecosystem structure and function are adversely affected. Impact is long lasting. Possible severe injuries or death to individuals, population is at risk.	10
Hazardous-with warning	Very high severity ranking when a potential failure mode effects safe vehicle operation and/or involves noncompliance with government regulation with warning.	Or may endanger operator (machine or assembly) with warning.	Ecosystem structure and function are adversely affected. Impact is long lasting. Possible severe injuries to individuals, population is not at risk.	9
Very High	Vehicle/item inoperable (loss of primary function)	Or 100% of product may have to be scrapped, or vehicle/item repaired in repair department with a repair time greater than one hour.	Ecosystem structure and function/environment are exposed but impact is intermittent. Ecosystem structural and functional integrity are intact. Possible injuries to individuals, population is not at risk.	8
High	Vehicle/item operable but at a reduced level of performance. Customer very dissatisfied.	Or product may have to be sorted and a portion (less than 100%) scrapped or vehicle/item repaired in repair department with a repair time between half an hour and an hour.		7
Moderate	Vehicle/item operable but Comfort/Convenience item(s) inoperable. Customer dissatisfied.	Or a portion (less than 100%) of the product may have to be scrapped with no sorting, or vehicle /item repaired in repair department with a repair time less than half an hour.	Ecosystem and function/environment are exposed but impact is temporary. Ecosystem structural and functional integrity are intact. Possible minor injuries to individuals, population is at risk.	6
Low	Vehicle/Item operable but Comfort/Convenience items operable at a reduced level of performance. Customer somewhat dissatisfied.	Or 100% of product may have to be reworked, or vehicle/item repaired off-line but does not go to repair department.		5
Very Low	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by most customers (greater than 75%).	Or the product may have to be sorted with no scrap, and a portion (less than 100%) reworked.	Ecosystem structure and function/environment are exposed but impact is temporary. Ecosystem structural and functional integrity are intact. No injuries to individuals, population is at risk.	4
Minor	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by 50% of customers.	Or a portion (less than 100%) of the product may have to be reworked with no scrap, on-line but out- of-station.		3
Very Minor	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by discriminating customers (less than 25%).	Or a portion (less than 100%) of the product may have to be reworked with no scrap, on-line but in-station.	Ecosystem structure and function are not exposed to stress, or expression of stress is not measurable or adverse.	2
None	No discernible effect.	Or slight inconvenience to operation or operator, or no effect.	Ecosystem structure and function are not exposed. Individuals and populations are not at risk.	1

SUGGESTED DETECTION EVALUATION CRITERIA

DETECTION	CRITERIA	A	B	C	SUGGESTED RANGE OF DETECTION METHODS	RNK.
Almost Impossible	Absolute certainty of Non - Detection			■	Cannot detect or is not checked.	10
Very Remote	Controls will probably not detect.			■	Control is achieved with indirect or random checks only.	9
Remote	Controls have poor chance of detection.			■	Control is achieved with visual inspection only.	8
Very Low	Controls have poor chance of detection.			■	Control is achieved with double visual inspection only.	7
Low	Controls may detect.		■	■	Control is achieved with charting methods, such as SPC (Statistical Process Control).	6
Moderate	Controls may detect.		■		Control is based on variable gauging after parts have left the station, OR Go/No Go gauging performed on 100% of the parts after parts have left the station.	5
Moderately High	Controls have a good chance to detect.	■	■		Error Detection in subsequent operations, OR gauging performed on set-up and first-place check (for set-up Causes only).	4
High	Controls have a good chance to detect.	■	■		Error Detection in-station, OR error Detection in subsequent operations by multiple layers of acceptance; supply, select, install, verify.Cannot accept discrepant part.	3
Very High	Controls almost certain to detect.	■	■		Error Detection in-station (automatic gauging with automatic stop feature). Cannot pass discrepant part.	2
Full	Controls certain to detect.	■			Discrepant parts cannot be made because item has been error proofed by progress/product design.	1

Inspection Types: A = Error Proofed; B = Gauging; C = Manual Inspection

***NOTE:** The ranking value of 1 is reserved for "Almost Certain."*

SUGGESTED OCCURRENCE EVALUATION CRITERIA

Probability of Failure	Likely Failure Rates Process	Likely Failure Rates Product	Ranking
Very High: Persistent failures	Once per week	≥ 100 per thousand pieces	10
		50 per thousand pieces	9
High: Frequent failures	Once per month	20 per thousand pieces	8
		10 per thousand pieces	7
Moderate: Occasional failures	Once per year	5 per thousand pieces	6
		2 per thousand pieces	5
		1 per thousand pieces	4
Low: Relatively few failures	Once in 5 years	0.5 per thousand pieces	3
		0.1 per thousand pieces	2
Remote: Failure is unlikely	Once in 10 years	≤ 0.01 per thousand pieces	1

***Note**: Zero (0) rankings for Severity, Occurrence or Detection are not allowed

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COST EVALUATION CRITERIA

Criteria	Ranking
> $500,000	5
$100,000 - $499,999	4
$25,000 - $99,999	3
$3,000 - $24,999	2
<$3,500	1

Recommended use for Cost Evaluation Criteria

All critical items (Severity 9 or 10) must have recommended actions assigned. Cost must not be utilized when determining action requirements.

Cost ranking should be used as a method to prioritize actions for significant items (Severity 5 – 8 with an Occurrence of 4 or greater), and as a means of determining if actions are feasible for non-special characteristics.

RPN THRESHOLD

There is no threshold value for RPNs. In other words, there is no value above which it is mandatory to take a Recommended Action or below which the team is automatically excused from an action.