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**	
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.	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.	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.	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.	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.	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.	2
None	No discernible effect.	Or slight inconvenience to operation or operator, or no effect.	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
Very High	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	Ranking
Very High: Persistent failures	≥ 100 per thousand pieces	10
	50 per thousand pieces	9
High: Frequent failures	20 per thousand pieces	8
	10 per thousand pieces	7
Moderate: Occasional failures	5 per thousand pieces	6
	2 per thousand pieces	5
	1 per thousand pieces	4
Low: Relatively few failures	0.5 per thousand pieces	3
	0.1 per thousand pieces	2
Remote: Failure is unlikely	≤ 0.01 per thousand pieces	1

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.

Quality Associates International, Incorporated
(313) 565 - 6266
US (888) FOR - FMEA
CDN (877) 609-0999
AUS (03) 9585 - 6423
www.quality-one.com

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

FMEA - Quick Reference Guide

ITEM:

Model Year/Vehicle (s):

Core Team: M. Moore, M. Weber, D. Wojcik, L. Dawson

Process Responsibility:

Key Date:

Potential Failure Mode and Effects Analysis (Process FMEA)

FMEA Number:
Page 1 of 1
Prepared by: Lee Dawson
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 product/ high return rate	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 process	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

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

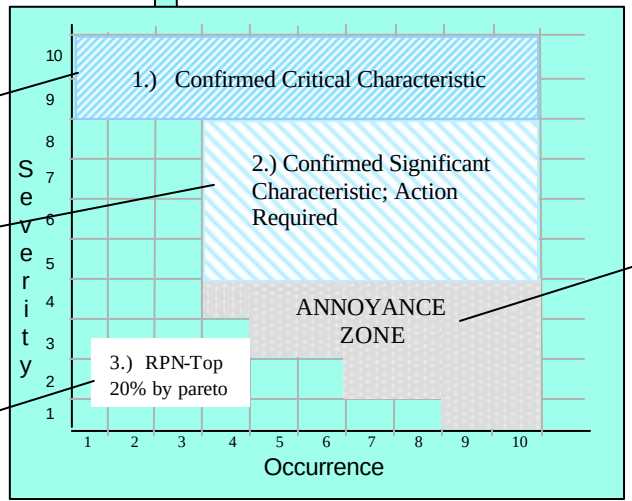
Actions are Required: (by Priority)

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

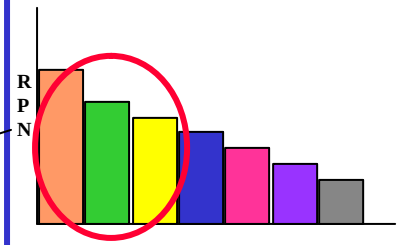
2.) An SC is a confirmed Significant Characteristic to be addressed on Control Plan)

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

Critical & Significant Characteristics Action Guidelines



Top 20% of Failure Modes by RPN



FMEA EXPRESS™

- ***Complete FMEAs more quickly***
- ***Address high-risk potential failure modes first***
- ***Use a cross-functional FMEA team approach***

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