Severity, Occurrence, and Detection Criteria for Design FMEA

SEVERITY EVALUATION CRITERIA

EFFECT	CRITERIA: Severity of Effect	RNK.
Hazardous - without warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation without warning	10
Hazardous - with warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulation with warning	9
Very High	Vehicle/item inoperable (loss of primary function).	8
High	Vehicle/item operable but at a reduced level of performance. Customer very dissatisfied.	7
Moderate	Vehicle/item operable but Comfort/Convenience item(s) inoperable. Customer dissatisfied.	6
Low	Vehicle/item operable but Comfort/Convenience item(s) operable at a reduced level of performance. Customer somewhat dissatisfied.	5
Very Low	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by most customers (greater than 75%).	4
Minor	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by 50% of customers.	3
Very Minor	Fit & Finish/Squeak & Rattle item does not conform. Defect noticed by discriminating customers (less than 25%).	2
None	No discernable effect.	1

SUGGESTED DETECTION EVALUATION CRITERIA

DETECTION	CRITERIA	RNK.
Absolute Uncertainty	Design Control will not and/or cannot detect a potential cause/ mechanism and subsequent failure mode; or there is no Design Control.	10
Very Remote	Very Remote chance the Design Control will detect a potential cause/mechanism and subsequent failure mode.	9
Remote	Remote chance the Design Control will detect a potential cause/ mechanism and subsequent failure mode.	8
Very Low	Very Low chance the Design Control will detect a potential cause/mechanism and subsequent failure mode.	7
Low	Low chance the Design Control will detect a potential cause/mechanism and subsequent failure mode.	6
Moderate	Moderate chance the Design Control will detect a potential cause/ mechanism and subsequent failure mode.	5
Moderately High	Moderately High chance the Design Control will detect a potential cause/mechanism and subsequent failure mode.	4
High	High chance the Design Control will detect a potential cause/ mechanism and subsequent failure mode.	3
Very High	Very High chance the Design Control will detect a potential cause/ mechanism and subsequent failure mode.	2
Almost Certain	Design Controls will almost certainly detect a potential cause/ mechanism and subsequent failure mode.	1

SUGGESTED OCCURRENCE EVALUATION CRITERIA

Probability of Failure	Likely Failure Rates Over Design Life	Ranking
Very High: Persistent failures	≥ 100 per thousand vehicles/items	10
	50 per thousand vehicles/items	9
High: Frequent failures	20 per thousand vehicles/items	8
	10 per thousand vehicles/items	7
Moderate: Occasional failures	5 per thousand vehicles/items	6
	2 per thousand vehicles/items	5
	1 per thousand vehicles/items	4
Low: Relatively few failures	0.5 per thousand vehicles/items	3
	0.1 per thousand vehicles/items	2
Remote: Failure is unlikely	≤ 0.01 per thousand vehicles/items	1

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

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.

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FMEA - Quick Reference Guide

___ System
___ Sub System
_x_ Component: Generic Decision
Model Year/Vehicle (s): 98.5
Core Team: M. Moore, M. Weber, D. Wojcik, L. Dawson

Potential
Failure Mode and Effects Analysis
(Design FMEA)

Design Responsibility: QAI, Inc.
Key Date: Engineering Rel. 2/3/98

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

Item / Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) Failure	Occur	Current Design Controls: Prevent	Current Design 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.
Must provide an FMEA which determines design risk and addresses potential significant and critical characteristic selection: Measurable: • Reduced RPN • Number of significant and critical characteristics. • Number of design actions.	FMEA not adequately performed; high risk remains	• Product liability • Customer dissatisfaction • Reduced performance of system or component • Potential risk of injury	10	YC	Inadequate FMEA development • Cross functional team not assembled • Facilitation not used • FMEA expertise is limited	5	•Mistake Proofing	•Design verification, planning and testing •Training	2	100	Call an FMEA facilitator to reduce time required and improve quality of the FMEA process	Design team leader or project manager; ASAP	FMEA performed under the supervision and leadership of an expert/certified FMEA facilitator	10	2	2	40

- 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 YC

Detect
Planned tests
- Transfer to or from DV Plan
- evaluations
- builds
- bucks

Note: Must have written instructions.
Prevent
•Reduces Occurrence

See Occurrence Chart on opposite side

See Detection Chart on opposite side

Actions should:
- eliminate failure mode SEV=9/10
- eliminate causes on YS
- reduce occurrence
- improve tests "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

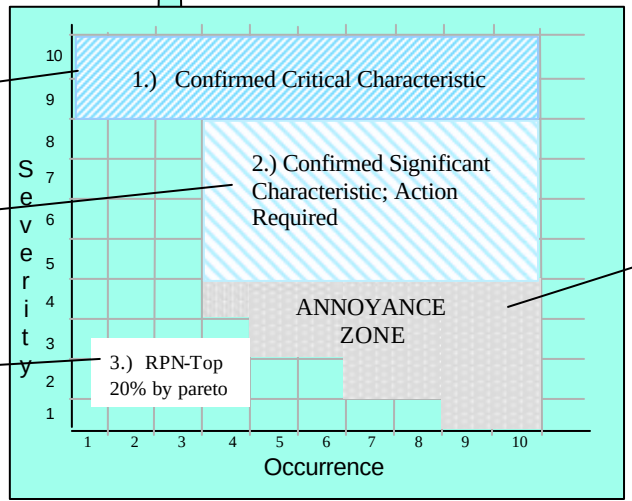
Actions are Required: (by Priority)

1.) When this exists (initiate Process FMEA to verify)

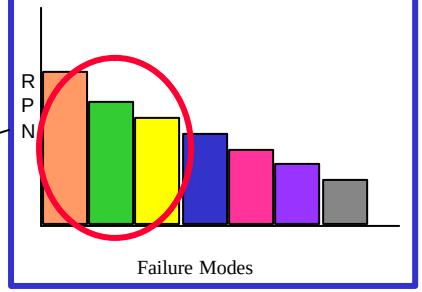
2.) When this exists (initiate Process FMEA to verify)

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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