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

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.

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

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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

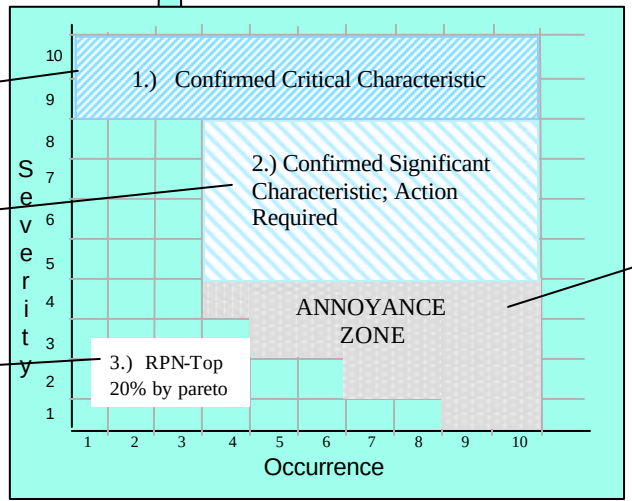
Actions are Required: (by Priority)

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

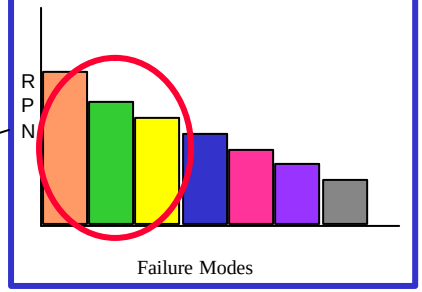
2.) When this exists (initiate Process FMEA to verify)

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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