Design FMEA Linkage

Potential Significant Characteristics transferred to Characteristics Matrix

x System
__ Sub System
__ Component:
Model Year/Vehicle (s):
Core Team:

Process Responsibi
Key Date:

Potential
Failure Mode and Effects Analysis
(Design FMEA)

Item / Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) Failure	Occur	Current Process Controls
Provide adequate Time to ½ amplitude	Time to ½ amp inadequate	•Poor handling quality (7)	7	CC	Inadequate Stiffness of transmission cover assembly	3	•Performance Testing •FEA – Transmission cover stiffness

•Inputs from Requirements & Specifications
•Inputs from QFD relationships

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

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

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

Output to Characteristics Matrix

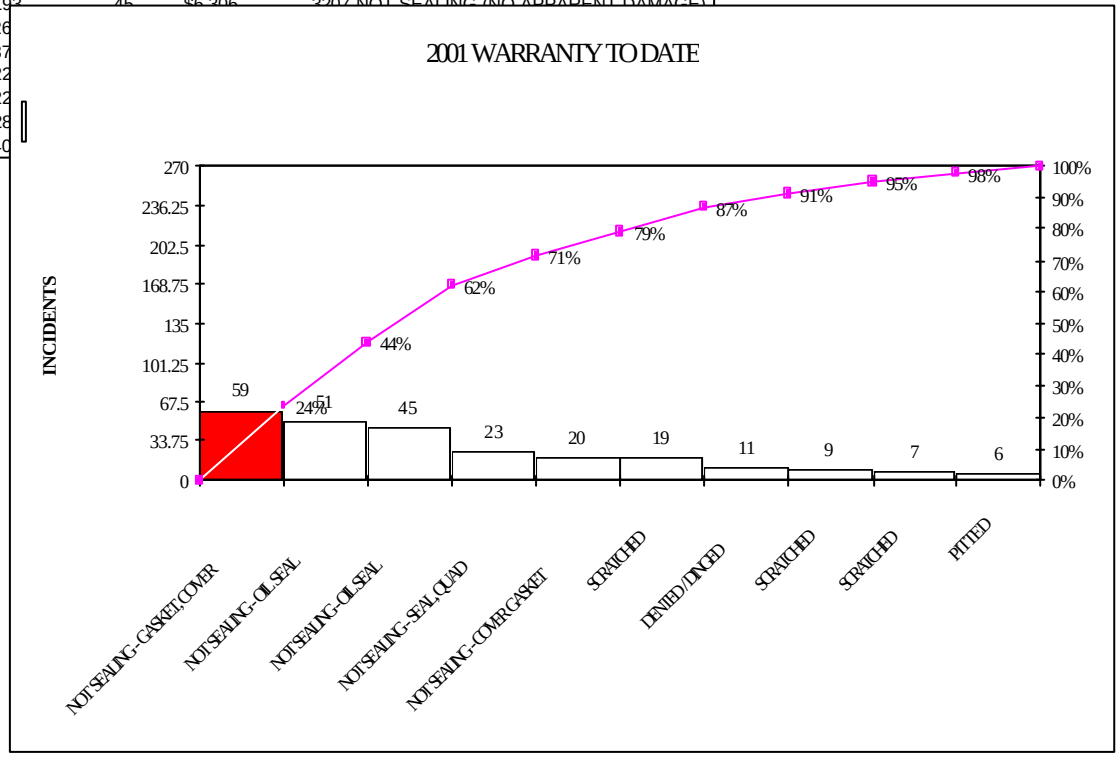
Detect
Planned tests
- Transfer to or from DV Plan
- evaluations
- builds
- bucks

Note: Must have written instructions.
Prevent
•Reduces Occurrence

DFMEA Inputs – Warranty Data

2001 - All Models
Top Parts & Conditions

Part #	Part Description	Total Part Incid	Total Part Cost	Condition Incidents	Condition Cost	Condition Code	Condition Description
60539-94	GASKET, PRIMARY COVER	69	$3,513	59	$2,984	3207	NOT SEALING (NO APPARENT DAMAGE)
12052	OIL SEAL	62	$9,230	51	$7,739	3207	NOT SEALING (NO APPARENT DAMAGE)
12066	OIL SEAL	59	$8,193	45	$6,306	3207	NOT SEALING (NO APPARENT DAMAGE)
25416-99A	SEAL, QUAD	33	$26				
60567-90A	PRIMARY COVER GASKET	29	$37				
60543-99	CHROME PRIMARY COVER	53	$15,22				
60543-99	CHROME PRIMARY COVER	53	$15,22				
60562-99	PRIMARY COVER, POLISHED	25	$6,28				
25414-99	POLISHED DERBY COVER	12	$40				



DFMEA Linkage to PFMEA

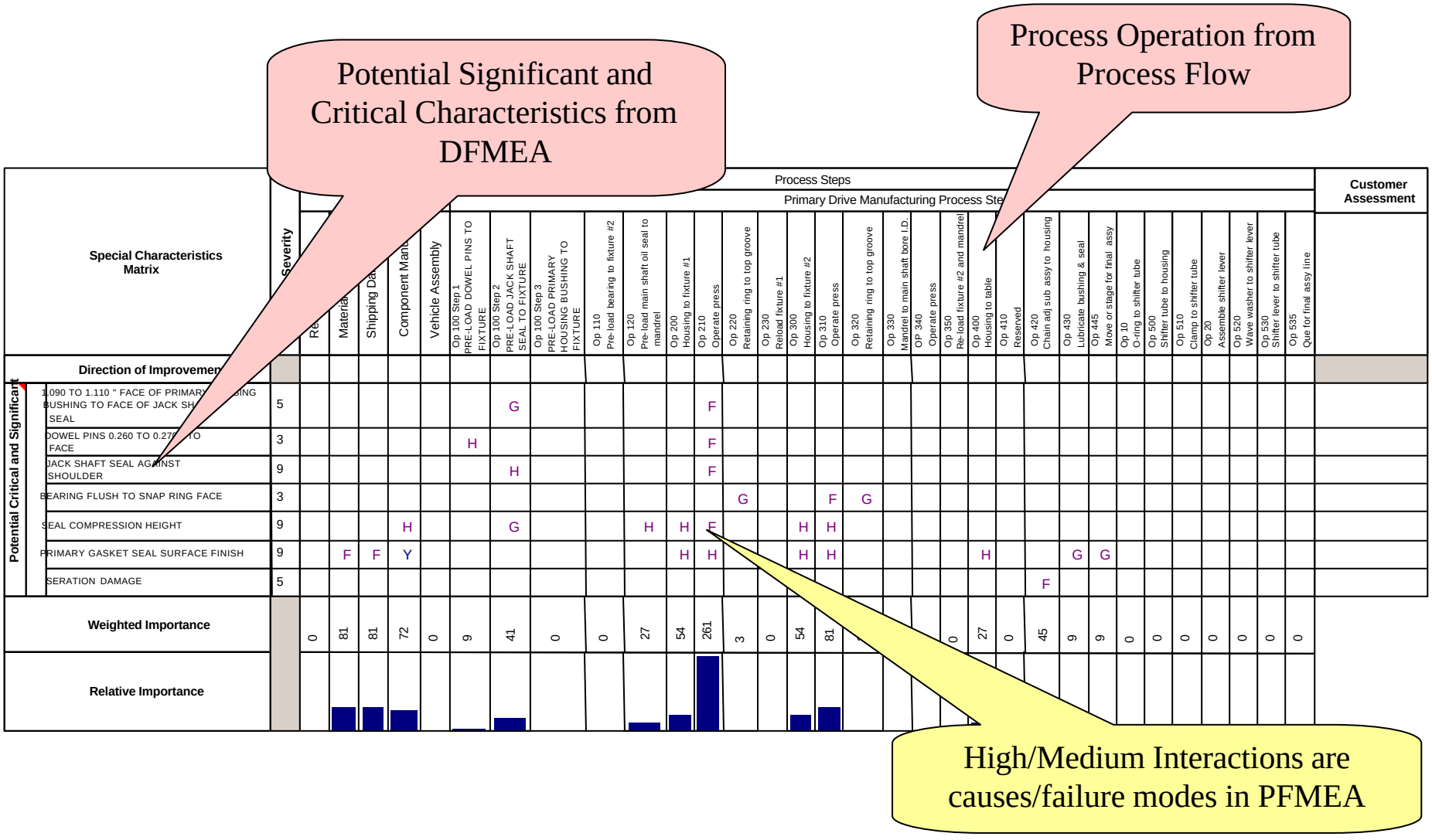
Characteristics Matrix Development

- Potential Significant Characteristics Are Typically Transferred from the DFMEA

- Characteristics are compared with the process steps to Identify potential causes of failure.

  - Causes are transferred to the PFMEA

Characteristics Matrix - Linkage from DFMEA to PFMEA



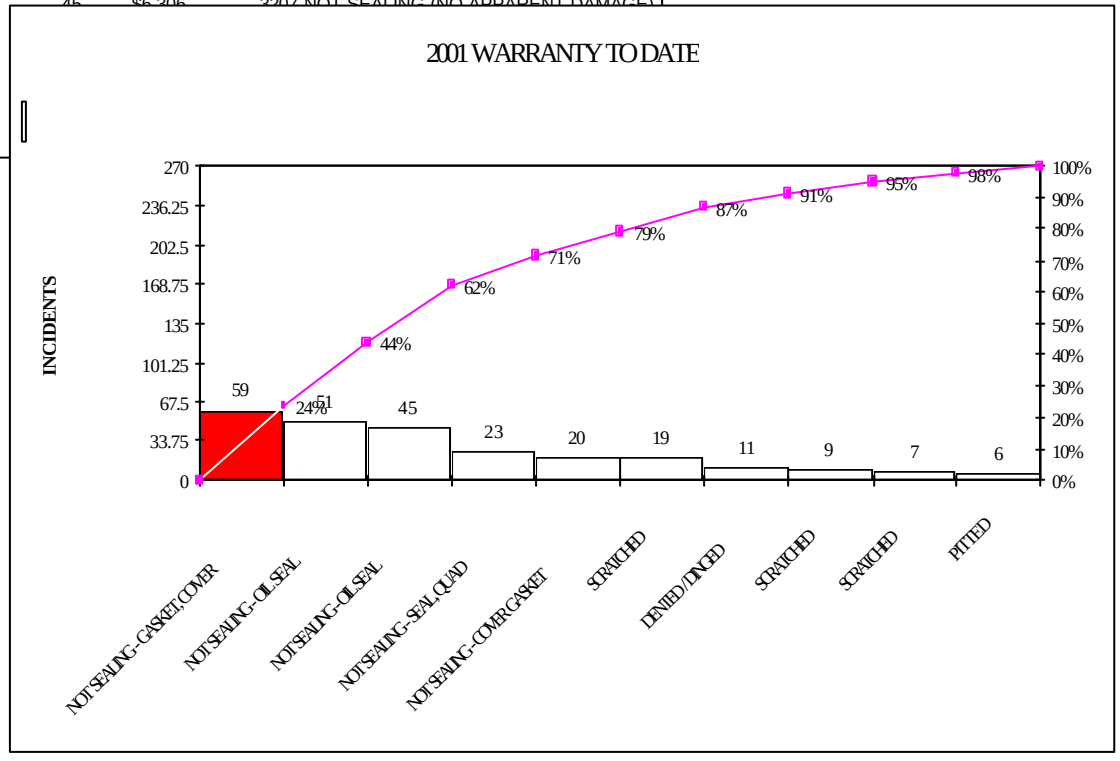
Failure Mode Development

- Developed Through Brainstorming
    - •PFMEA Team make-up is crucial for accurate Failure Mode Development
- Internal Failures
- External Failures
    - Warranty Data
- All Stakeholders Considered
    - Internal and External

PFMEA Inputs – Warranty Data

2001 - All Models
Top Parts & Conditions

Part #	Part Description	Total Part Incid	Total Part Cost	Condition Incidents	Condition Cost	Condition Code	Condition Description
60539-94	GASKET, PRIMARY COVER	69	$3,513	59	$2,984	3207	NOT SEALING (NO APPARENT DAMAGE)
12052	OIL SEAL	62	$9,230	51	$7,739	3207	NOT SEALING (NO APPARENT DAMAGE)
12066	OIL SEAL	59	$8,193	45	$6,306	3207	NOT SEALING (NO APPARENT DAMAGE)
25416-99A	SEAL, QUAD	33	$261				
60567-90A	PRIMARY COVER GASKET	29	$377				
60543-99	CHROME PRIMARY COVER	53	$15,227				
60543-99	CHROME PRIMARY COVER	53	$15,227				
60562-99	PRIMARY COVER, POLISHED	25	$6,289				
25414-99	POLISHED DERBY COVER	12	$404				



Potential Cause Development

- Developed Through Brainstorming
- Information gathered from surrogate problem resolution activities (Corrective Action Reports)
- Manufacturing operators provide the best input to Root Cause Analysis
- A tour of the manufacturing area may identify several possible causes of failure

Process FMEA Linkage

ITEM: Primary Drive Housing Assembly
Model Year/Vehicle (s):
Core Team:

Process Responsibility:
Key Date:

Potential
Failure Mode and Effects Analysis
(Process FMEA)

Process / Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) Failure	Occur	Current Process Controls
Op 120 Assemble Transmission Cover	Case not properly assembled - torque inadequate	•Poor handling quality (7) -T to ½ amp inadequate	7	CC	Torque tool malfunction	3	•Weekly calibration •Daily quality audits

•Inputs from process flow

•Anti function
•Warranty Data
•From Characteristics Matrix

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

Brainstorm causes
- man
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Recommended Actions

- Actions are mandatory for ALL failure modes resulting in a Severity of 9 or 10
- Actions recommended for any severity of 5 or higher with an occurrence of 4 or higher
- Actions recommended for any failure modes resulting in a high RPN regardless of Severity X Occurrence combination
- Actions center around reduction of occurrence
  - Improving detection is only used as a temporary measure

PFMEA Selection