Chapter 14

Failure Mode and Effect Analysis (FMEA)

Introduction

- Potential failure mode and effects analysis (FMEA) is a method that facilitates process improvement.
- Design FMEA (DFMEA): component, subsystem, and main system.
- Process FMEA (PFMEA): assembly, machines, gages, workstations, procurement, training of operators, and tests.
- Benefits:
  - Improved product functionality and robustness
  - Reduced warranty costs
  - Reduced day-to-day manufacturing problems
  - Improved safety of products and processes
  - Reduced business process problems

14.1 S^4/IEE Application Examples: Cause-and-Effect Matrix

- Transactional 30,000-foot-level metric: DSO reduction was chosen as an S^4/IEE project. The team used a cause-and-effect matrix to prioritize items from a cause-and-effect diagram. An FMEA was conducted of the process steps and/or highest categories from the cause-and-effect matrix.
- Manufacturing 30,000-foot-level metric (KPOV): An S^4/IEE project was to improve the capability/performance of a process that affected the diameter of a manufactured product (i.e., reduce the number of parts beyond the specification limits). The team used a cause-and-effect matrix to prioritize items from a cause-and-effect diagram. An FMEA was conducted of the process steps and/or highest categories from the cause-and-effect matrix.

14.1 S^4/IEE Application Examples: Cause-and-Effect Matrix

- Transactional and manufacturing 30,000-foot-level cycle time metric (a lean metric): An S^4/IEE project was to improve the time from order entry to fulfillment was measured. The team used a cause-and-effect matrix to prioritize items from a cause-and-effect diagram. An FMEA was conducted of the process steps and/or highest categories from the cause-and-effect matrix.
- Transactional and manufacturing 30,000-foot-level inventory metric or satellite-level TOC metric (a lean metric): An S^4/IEE project was to reduce inventory. The team used a cause-and-effect matrix to prioritize items from a cause-and-effect diagram. An FMEA was conducted of the process steps and/or highest categories from the cause-and-effect matrix.

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14.1 S^4/IEE Application Examples: Cause-and-Effect Matrix

- Manufacturing 30,000-foot-level quality metric: An S^4/IEE project was to reduce the number of defects in a printed circuit board manufacturing process. The team used a cause-and-effect matrix to prioritize items from a cause-and-effect diagram. An FMEA was conducted of the process steps and/or highest categories from the cause-and-effect matrix.
- Process DFSS: A team was to create a new call center. A process flow-chart of the planned call center process was created. An FMEA was conducted to assess risks for steps within this process and then create action plans to address identified issues.

14.1 S^4/IEE Application Examples: Cause-and-Effect Matrix

- Product DFSS: An S^4/IEE product DFSS project was to reduce the 30,000-foot-level metric of number of product phone calls generated for newly developed products. The team used a cause-and-effect matrix to prioritize items from a cause-and-effect diagram. An FMEA was conducted of the process steps when developing a product and/or highest categories from the cause-and-effect matrix. One process improvement idea for the development process was to establish a product design FMEA procedure.

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14.2 Implementation

Implementation Issues:

- Use as a living document with periodic review and updates.
- Conduct early enough in development cycle to
  - Design out potential failure modes by eliminating root causes
  - Reduce seriousness of failure mode if elimination is not possible.
  - Reduce occurrence of the failure mode.

14.2 Implementation

Implementation Procedure/Roadmap:

- Form FMEA Team (5~7, including outside suppliers).
- Teams work to identify potential failure modes for design functions or process requirements. (List 2~3 ways)
- List at least 1 effect of failure.
- For each failure mode, list 1 or more causes.
- For each cause, list at least 1 method of preventing cause
- Teams assign severity, occurrence, and likelihood of detection (SOD) values.
- Teams calculate a risk priority number (RPN), which is the product of SOD ratings.

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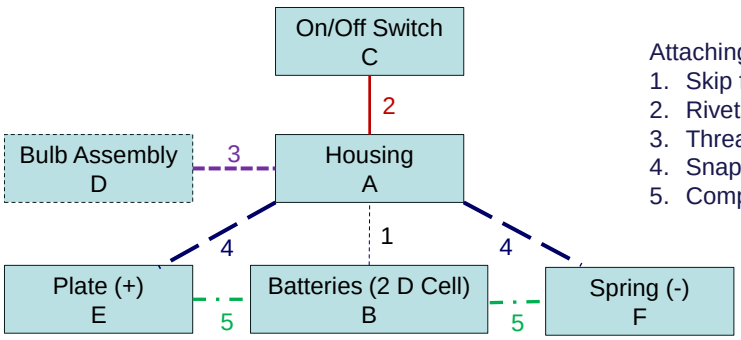
14.3 Implement of a Design FMEA

- A FMEA team should include representation from design, test, reliability, materials, service, and manuf./process.
- A design FMEA presumes the implementation of manuf./ assembly needs and design intents. (It doesn't need to include potential failure modes from manuf./assembly, but it does consider technical/physical limits of manuf process.)
- Design intent is expressed as a list of what the design is expected to do, and what is not.
- A block diagram shows the relationship among analysis items and establishes a logical order for analysis.

14.3 Implement of a Design FMEA: Relational Block Diagram Example



Attaching Method:
1. Skip fit
2. Rivets
3. Thread
4. Snap fit
5. Compressive fit

14.3 Implement of a Design FMEA: Relational Block Diagram Example

Potential Failure Mode and Effect Analysis																	
FMEA Type (Design or Process)			Project Name/Description:									Date (Orig.):					
Responsibility:			Prepared by:									Date (Rev.):					
Core Team:												Date (Key):					
Design FMEA (Item/Function) Process FMEA (Function/ Requirements)	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Controls Prevention	Current Controls Detection	Detec	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Taken	Sev	Occur	Detec	RPN

14.4 Design FMEA Tabular Entries

- Header Information. Documents the system/subsystem/ component (under project name/description) and supplies other information about when and who created the FMEA.

_____ System
__x__ Subsystem
_____ Component 01.03 / Body Closures
Model Year(s) / Vehicle(s) 199X / Lion 4 door / Wagon

Design Responsibility Body Engineering
Key Date 9X 03 01 ER

14.4 Design FMEA Tabular Entries

- Item/Function. Contains the name and number of the item to be analyzed.
- Includes a concise, exact, and easy-to-understand explanation of a function of the item task or response that is analyzed to see whether it meets the intent of the design.
- Includes information regarding the temperature, pressure, and other pertinent system operating conditions.
- When there is more than one function, it lists each function separately, with different potential failure modes.

Item Function
Front door L.H. H8HX-0000-A • Ingress to and egress from vehicle • Occupant protection from weather, noise, and side impact • Support anchorage for door hardware including mirror, hinges, latch and window regulator • Provide proper surface for appearance items • Paint and soft trim

14.4 Design FMEA Tabular Entries

- Potential Failure Mode. Describes ways a design might fail to perform its intended function. May include the cause of a potential failure mode in a higher-level subsystem or process step.
- May also be the effect of a failure in a lower-level component or process step.
- Contains, for each Item/ function, a list of potential failure modes given the assumption that the failure might occur.
- Consideration is given to problems that could arise only under certain operation conditions.
- Descriptions are in physical/technical terms, not symptoms.

Potential Failure Mode
Corroded interior lower door panels

14.4 Design FMEA Tabular Entries

- Potential Effect(s) of Failure. Describes the effects of the failure mode on the function from an internal or external customer point of view.
- Highlights safety or noncompliance with regulation issues.
- Expressed in terms of the specific system, subsystem, or component hierarchical relationship that is analyzed.
- Includes failure effects such as intermittent operation, lost computer data, and poor performance.

Potential Effect(s) of Failure
Deteriorated life of door leading to: • Unsatisfactory appearance due to rust through paint over time • Impaired function of interior door hardware

14.4 Design FMEA Tabular Entries

- Severity. Assesses the seriousness of the effect of the potential failure mode to the next component, subsystem, or system.
- Design change usually strives to reduce severity levels.
- Estimation is typically based on a 1 to 10 scale where the team agrees to a specific evaluation criteria for
- each ranking value. Table 14.2 shows example evaluation criteria for the automotive industry.

14.4 Design FMEA Tabular Entries Table 14.2

Severity Evaluation Criterion Example for Design FMEA		
Effect	**Criteria: Severity of Effect**	**Ranking**
Hazardous w/o warning	Very high severity ranking when a potential failure mode affects safe vehicle operation and/or involves noncompliance with government regulations 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 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 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 discernible effect.	1

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14.4 Design FMEA Tabular Entries

- Classification. Includes optional information such as critical characteristics requiring additional process controls.
- An appropriate character or symbol in this column indicates the need for an entry in the recommended action column and special process controls within the process FMEA.

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14.4 Design FMEA Tabular Entries

- Potential Causes(s) of Failure. Indicates a design weakness that causes the potential failure mode.
- Contains a concise, clear, and comprehensive list of all root causes (not symptoms) of failure.
- Includes causes such as incorrect algorithm, hardness, porosity, and incorrect material specified.
- Includes failure mechanisms such as fatigue, wear, and corrosion.

Sev	Class	Potential Cause(s) / Mechanism(s) of Failure
7		Upper edge of protective wax application specified for inner door panels is too low
		Insufficient wax thickness specified
		Inappropriate wax formulation specified
		Entrapped air prevents wax from entering corner / edge access
		Wax application plugs door drain holes
		Insufficient room between panels for spray head access

14.4 Design FMEA Tabular Entries

- Occurrence. Estimates the likelihood that a specific cause will occur.
- Consideration of historical data of components/subsystems similar to the new design helps determine the ranking value.
- Teams need to agree on an evaluation criterion, where possible failure rates are anticipated values during design life. Table 14.3 shows example occurrence criteria.

14.4 Design FMEA Tabular Entries Table 14.3

Occurrence Evaluation Criterion Example for Design FMEA

Probability of Failure	Possible Failure Rates	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	≤0.010 per thousand vehicles/items	1

14.4 Design FMEA Tabular Entries

- Current Design Controls. Lists activities such as design verification tests, design reviews, DOEs, and tolerance analysis that ensure adequacy of design control for the failure mode.
- In an update to their booklet, AIAG (2001) changed this from a one-column category to a two-column category, where one column is for prevention, while the other column is for detection.

Current Design Controls Detection
Vehicle general durability test vah. T-118 T-109 T-301
Vehicle general durability testing (as above)
Physical and Chem Lab test: Report No. 1265
Design aid investigation with nonfunctioning spray head
Laboratory test using "worst-case" wax application and hole size
Drawing evaluation of spray head access

14.4 Design FMEA Tabular Entries

- Detection. Assessment of the ability of the current design control to detect the subsequent failure mode or potential cause of design weakness before releasing to production.
- Table 14.4 shows example detection criteria.

14.4 Design FMEA Tabular Entries Table 14.4

Detection	Criteria: Likelihood of Detection by Design Control	Ranking
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 control will almost certainly detect a potential cause/mechanism and subsequent failure mode.	1

14.4 Design FMEA Tabular Entries

- Risk Priority Number (RPN). Product of severity, occurrence, and detection rankings. The ranking of RPN prioritizes design concerns; however, problems with a low RPN still deserve special attention if the severity ranking is high.

14.4 Design FMEA Tabular Entries

- Recommended Action(s). This entry proposes actions intended to lower the occurrence, severity, and/or detection rankings of the highest RPN failure modes.
- Example actions include DOE, design revision, and test plan revision.
- "None" indicates that there are no recommended actions.

Recommended Action(s)
Add laboratory accelerated corrosion testing
Add laboratory accelerated corrosion testing Conduct design of experiments (DOE) on wax thickness
None
Add team evaluation using production spray equipment and specified wax
None
Add team evaluation using design aid buck and spray head

14.4 Design FMEA Tabular Entries

- Responsibility for Recommended Action. Documents the organization and individual responsible for recommended action and target completion date.

Responsibility and Target Completion Date
A Tate-Body Engineering 8X 09 30
Combine w/test for wax upper edge verification A Tate body engineering 9X 01 15
Body engineering and assembly operations 8X 11 15
Body engineering and assembly operations

14.4 Design FMEA Tabular Entries

- Actions Taken. Describes implementation of recommended action and effective date.
- Resulting RPN. Contains the recalculated RPN resulting from corrective actions that affected previous severity, occurrence, and detection rankings. Blanks indicate no action taken.

Actions Taken
Based on test results (test no. 1481) upper edge spec raised 125 mm
Test results (test no. 1481) show specified thickness is adequate. DOE shows 25% variation in specified thickness is acceptable.
Based on test, three additional vent holes provided in affected areas
Evaluation showed adequate access

14.5 Development of a Process FMEA

- A FMEA team should include representation from design, manuf./process, quality, reliability, tooling, and operators.
- A process FMEA presumes the product meets the design intents. (It doesn't need to include potential failure modes, causes, and mechanism from design.)
- A flow chart identifies the characteristics of the product/ process associated with each operation.
-

14.5 Development of a Process FMEA

Potential
Failure Mode and Effect Analysis

FMEA Type (Design or Process)	Project Name/Description:	Date (Orig.):
Responsibility:	Prepared by:	Date (Rev.):
Core Team:		Date (Key):

Design FMEA (Item/Function) Process FMEA (Function/ Requirements)	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Controls Prevention	Current Controls Detection	Detec	RPN	Recommended Actions	Responsibility & Target Completion Date	Action Taken	Sev	Occur	Detec	RPN

14.6 Process FMEA Tabular Entries

- Header Information. Documents the process description and supplies other information about when and who created the FMEA.

FMEA Type (Design or Process): Process	Project Name / Desc
Responsibility: Paula Hinkel	
Core Team: Sam Smith, Harry Adams, Hilton Dean, Harry Hawkins, Sue Watkins	
Project Name / Description: Cheetah / Change surface finish of part	
	Prepared By: Paula Hinkel
Date (Orig.): 4 / 14	
Date (Rev.): 6 / 15	
Date (Key):	

14.6 Process FMEA Tabular Entries

- Process Function/Requirements from a Process FMEA. Contains a simple description of the process or operation analyzed.
- Example processes include assembly, soldering, and drilling.
- Concisely indicates the purpose of the analyzed process or operation.
- When numeric assembly operations exist with differing potential failure modes, the operations may be listed as separate processes.

Design FMEA (Item / Function) Process FMEA (Function / Requirements)
Solder dipping
Marking

14.6 Process FMEA Tabular Entries

- Potential Failure Mode. Describes how the process could potentially fail to conform to process requirements and/or design intent at a specific operation.
- Contains for each operation or item/function a list of each potential failure mode in terms of the component, subsystem, system, or process characteristic.
- Teams should assume the correctness of incoming parts and materials.
- Items considered are previous problems and new issues foreseen by brainstorming.

Potential Failure Mode
Excessive solder / solder wire protrusion
Interlock base damage
Delamination of interlock base
Oxidization of golden plating pins
Marking permanency test

14.6 Process FMEA Tabular Entries

- Potential Effect(s) of Failure. Describes the effects of the failure mode on the function from an internal or external customer point of view.
- Considers what the customer experiences or the ramifications of this failure mode either from the end-user point of view or from subsequent operation steps.
- Example end-user effects are poor performance, intermittent failure, and poor appearance. Example subsequent operation effects are “does not fit," “cannot mount," and “fails to open.”

Potential Effect(s) of Failure	Sev
Short to shield cover	9
Visual defects	7
	7
Visual defects	7
	7
Contact problem / no signal	8
Legible marking / customer unsatisfaction	6
	6
	6

14.6 Process FMEA Tabular Entries

- Severity. Assesses the seriousness of the effect of the potential failure mode to the customer.
- Estimation is typically based on a 1 to 10 scale where the team agrees to a specific evaluation criterion for each ranking value.
- Table 14.6 shows example evaluation criterion for the automotive industry.

14.6 Process FMEA Tabular Entries Table 14.6

Severity Evaluation Criterion Example for Process FMEA

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.

Effect	Customer Effect	Manufacturing/Assembly Effect	Ranking
Hazardous w/o warning	Very high severity ranking when a potential failure mode affects 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 affects 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 a half-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 a half-hour.	6
Low	Vehicle/item operable but comfort/convenience item(s) operable at reduced level of performance.	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 and finish/squeak and 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 and finish/squeak and 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 and finish/squeak and 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

14.6 Process FMEA Tabular Entries

- Classification. Includes optional information that classifies special process characteristics that may require additional process controls.
- Applies when government regulations, safety, and engineering specification concerns exist for the product and/or process.
- An appropriate character or symbol in this column indicates the need for an entry in the recommended action column to address special controls in the control plan.

14.6 Process FMEA Tabular Entries

- Potential Causes(s) of Failure. Describes how failure could occur in terms of a correctable or controllable item.
- Contains a concise, descriptive, and comprehensive list of all root causes (not symptoms) of failure.
- The resolution of some causes directly affects the failure mode.
- In other situations a DOE determines the major and most easily controlled root causes.
- Includes causes such human error, improper cure time, and missing part.

Potential Cause(s) / Mechanism(s) of Failure	c u r
Flux wire termination	6
Long solder time	8
High temp	8
See interlock base damage	8
Moisture in interlock base	5
Not being cleaned in time	7
Marking ink	4
Curing	5
Smooth marking surface	8

14.6 Process FMEA Tabular Entries

- Occurrence. Estimates the frequency of occurrence of failure without consideration of detecting measures.
- Gives the number of anticipated failures during the process execution.
- Consideration of statistical data from similar processes improves the accuracy of ranking values.
- Alternative subjective assessments use descriptive words to describe rankings.
- Table 14.7 shows example occurrence criteria.

14.6 Process FMEA Tabular Entries Table 14.7

Occurrence Evaluation Criterion Example for Process FMEA

Probability of Failure	Possible 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	≤0.010 per thousand pieces	1

14.6 Process FMEA Tabular Entries

- Current Design Controls. Describes controls that can prevent failure mode from occurring or detect occurrence of the failure mode.
- Process controls includes control methods such as SPC and poka-yoke (fixture error proofing) at the subject or subsequent operations.
- The preferred method of control is prevention or reduction in the frequency of the cause/ mechanism to the failure model effect.
- The next preferred method of control is detection of the cause/mechanism, which leads to corrective actions.
- The least preferred method of control is detection of the failure mode.

Current Controls	t e c
100% inspection	3
Automatic solder tool	3
Automatic solder tool / SPC	3
Automatic solder tool / SPC	3
No	7
Clean in 30 minutes after solder dip	5
SPC	2
UV energy and SPC	3
None	6

14.6 Process FMEA Tabular Entries

- Detection. Assesses the probability of detecting a potential cause/mechanism from process weakness or the subsequent failure mode before the part/component leaves the manufacturing operation.
- Ranking values consider the probability of detection when failure occurs.
- Table 14.8 shows example detection evaluation criteria.

14.6 Process FMEA Tabular Entries Table 14.8

Detection	Criteria	Insp Type	Suggestion Range of Detection Methods	Rank
Almost impossible	Absolute certainty of nondetection.	C	Cannot detect or is not checked.	10
Very remote	Controls will probably not detect.	C	Control is achieved with indirect or random checks only.	9
Remote	Controls have poor chance of detection.	C	Control is achieved with visual inspection only.	8
Very low	Controls have poor chance of detection.	C	Control is achieved with double visual inspection only.	7
Low	Controls may detect.	B C	Control is achieved with charting methods, such as SPC.	6
Moderate	Controls may detect.	B	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.	A B	Error detection in subsequent operations, OR gauging performed on setup and first-piece check (for setup causes only).	4
High	Controls have a good chance to detect.	A B	Error detection in-station, or error detection in subsequent operations by multiple layers of acceptance: supply, select, install, verify. Cannot accept discrepant pan.	3
Very high	Controls almost certain to detect.	A B	Error detection in-station (automatic gauging with automatic stop feature). Cannot pass discrepant part.	2
Almost certain	Controls certain to detect.	A	Discrepant parts cannot be made because item has been error-proofed by processl product design.	1

14.6 Process FMEA Tabular Entries

- Risk Priority Number (RPN). Product of severity, occurrence, and detection rankings.
- The ranking of RPN prioritizes design concerns; however, problems with a low RPN still deserve special attention if the severity ranking is high.

14.6 Process FMEA Tabular Entries

- Recommended Action(s). This entry is proposed actions intended to lower the occurrence, severity, and/or detection rankings of the highest RPN failure modes.
- Teams should focus on activities that lead to the prevention of defects (i.e., occurrence ranking reduction) rather than improvement of detection methodologies (i.e., detection ranking reduction).
- Teams should implement corrective action to identified potential failure modes where the effect is a hazard to manufacturing/assembly personnel.
- Severity reduction requires a revision in the design and/or process.

Recommended Actions
Automation / DOE / 100% chk with go / no go gage
Automation / DOE / define visual criteria
Automation / DOE
Automation / DOE
Inform supplier to control molding cond.
Improve quality of plating define criteria with customer
None
None
Rough surface

14.6 Process FMEA Tabular Entries

- Responsibility for Recommended Action. Documents the organization and individual responsible for recommended action and target completion date.

Responsibility and Target Completion Date
Sam Smith 6/4
Harry Adams 5/15
Hilton Dean 5/15
Sue Watkins 5/15
Harry Hawkins 5/15
Sam Smith 5/15
Sam Smith 5/15

14.6 Process FMEA Tabular Entries

- Actions Taken. Actions Taken. Describes implementation of recommended action and effective date.
- Resulting RPN. Resulting RPN. Contains the recalculated RPN resulting from corrective actions that affected previous severity, occurrence, and detection rankings. Blanks indicate no action taken.

Actions Taken	Sev	Occur	Detec	RPN
Done	9	4	2	72
Done	7	4	2	56
Done	7	4	2	56
Done	7	4	2	56
Done	7	2	7	98
Done	8	2	5	80
Change interlock texture surface	6	3	6	108