# AIAG & VDA FMEA Handbook

April 4, 2019

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Automotive Industry Action Group

# Agenda

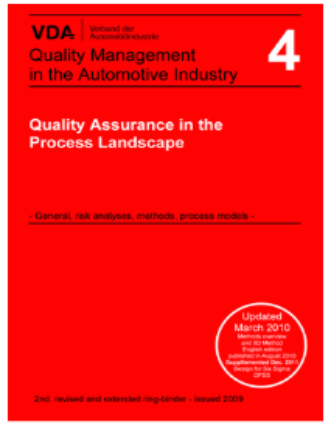
- Current Development Status
- Project Objective
- Leveraging the new FMEA Handbook
- Examples of major changes and their benefits
- Q & A

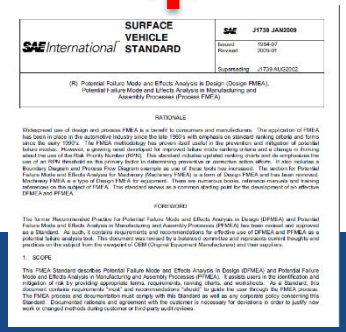
# Current Development Status

- Final Draft in Approval Process
  - AIAG QSC: April 2, 2019
  - VDA QMA: May 8, 2019
  - Both approvals required to release the document
- Release of Handbook – June 2019
  - Launch events in Germany and U.S.
- Availability of Training – Q3 2019
  - Each Association updating training courses

# AIAG VDA FMEA - Project Objective






Provide consistent direction, guidance to all automotive suppliers

Update to include:
- Best Practices
- Improved Examples
- Functional Safety



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# Importance of New Methods and Tools

- Effective FMEA risk identification - never been more critical
  - Rapid growth in component/system interactions
  - Increasingly specialized technologies
  - No change in legal obligations of producers
- Effective FMEA includes:
  - Cross-functional team contributions
  - Carefully identified system boundaries
  - Thorough documentation of risks and actions

# Leveraging the AIAG & VDA FMEA Handbook

- The Essential Link Between COQ and FMEA
  - You will need FMEA to make sure COQ / COPQ improvement targets are met;
  - You will need COQ / COPQ actual performance on similar products and processes to make sure the FMEA risk evaluation of the new product and/or process is realistic;
  - Not acceptable reduction in Cost of Poor Quality (COPQ) means FMEA was not effective

# Examples of Major Changes and Benefits

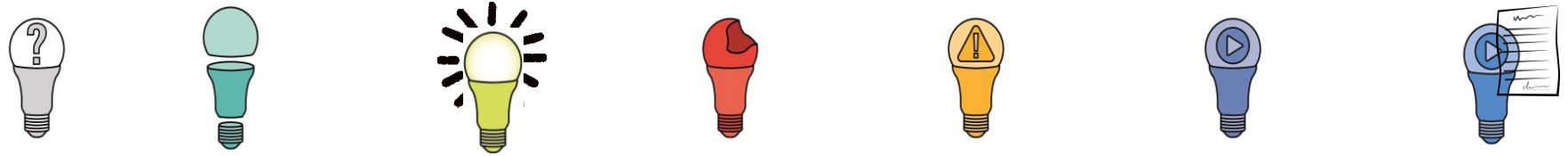
- 7 Step Approach
- Supplemental FMEA – MSR
- New Severity, Occurrence, Detection Tables
- PFMEA Failure Analysis
- Action Priority (AP) Tables

More Structured Approach – Leverages Lessons Learned – Prevention Driven

# AIAG &VDA FMEA - 7 Step Approach

**Seven Step Approach**

| System Analysis | | | Failure Analysis and Risk Mitigation | | | Risk Communication |
|---|---|---|---|---|---|---|
| 1st Step | 2nd Step | 3rd Step | 4th Step | 5th Step | 6th Step | 7th Step |
| Planning & Preparation | Structure Analysis | Function Analysis | Failure Analysis | Risk Analysis | Optimization | Results Documentation |



Applies to DFMEA, Supplemental FMEA – MSR, and PFMEA

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# Supplemental FMEA - MSR

- FMEA MSR = Monitoring and System Response
  - Supplemental approach for Design FMEA
  - Addresses Risk Analysis of “Mechatronic Systems”
    - Not previously addressed in AIAG 4th Edition FMEA
  - Describes linkages between Design FMEA and Functional Safety (ISO 26262) concepts and analyses
  - Unique Frequency (F) and Monitoring (M) Rating Tables

# New PFMEA Severity Table

| Process General Evaluation Criteria Severity (S) | | | | | |
|---|---|---|---|---|---|
| Potential Failure Effects rated according to the criteria below. | | | | | Blank until filled in by user |
| **S** | **Effect** | **Impact to Your Plant** | **Impact to Ship-to Plant (when known)** | **Impact to End User (when known)** | **Corporate or Product Line Examples** |

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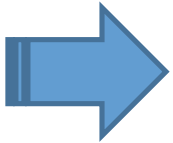
Issue with Severity 10/9

"Without warning" – "with warning"



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10 – Safe operation defects

9 – Noncompliance with regulations

# New PFMEA Occurrence Table

| Occurrence Potential (O) for the Process | | | | |
|---|---|---|---|---|
| Potential Failure Causes rated according to the criteria below. Consider Prevention Controls when determining the best Occurrence estimate. Occurrence is a predictive qualitative rating made at the time of evaluation and may not reflect the actual occurrence. The occurrence rating number is a relative rating within the scope of the FMEA (process being evaluated). For Prevention Controls with multiple Occurrence Ratings, use the rating that best reflects the robustness of the control. | | | | Blank until filled in by user |
| **O** | **Prediction of Failure Cause Occurring** | **Type of Control** | **Prevention Controls** | **Corporate or Product Line Examples** |

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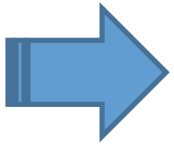
Rating based on defects/thousand, set for high volume production rates



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Rating based on robustness of prevention controls, can be applied to any production rate

# New PFMEA Detection Table

| Detection Potential (D) for the Validation of the Process Design | | | | |
|---|---|---|---|---|
| Detection Controls rated according to the Detection Method Maturity and Opportunity for Detection. | | | | Blank until filled in by user |
| **D** | **Ability to Detect** | **Detection Method Maturity** | **Opportunity for Detection** | **Corporate or Product Line Examples** |

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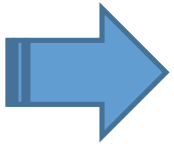
Rating based on “Opportunity for Detection” and “Likelihood of Detection” by Process Controls



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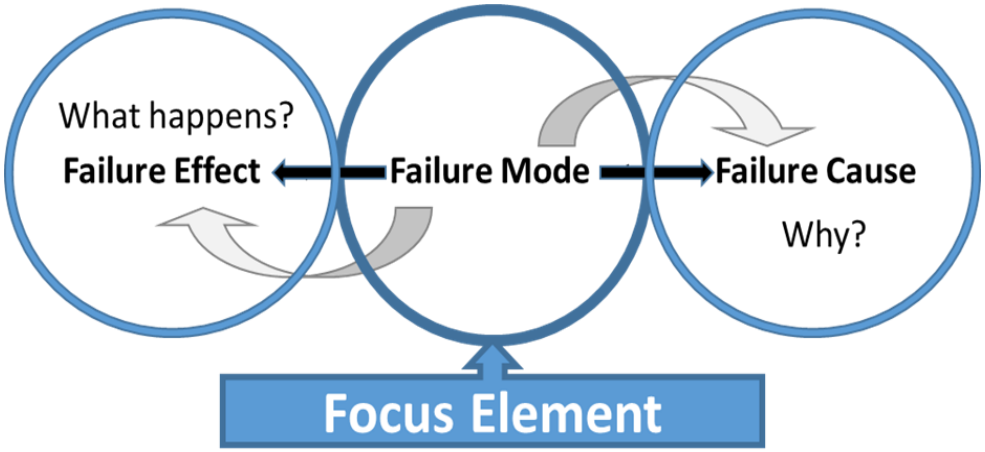
Rating based on “Maturity of Detection Method” and “Opportunity of Detection”

More stringent ratings, requires control of rejected product to prevent outflow

# Failure Analysis (Step 4) – Process FMEA




Failure Chain Model

## Addition of 4M

- For each Failure Mode (FM) consider these categories as sources of Failure Cause (FC)
  - **M**an
  - **M**achine
  - **M**aterial
  - Environ**M**ent

# Action Priority (AP) Table

| Action Priority (AP) for DFMEA and PFMEA | | | | | | | |
|---|---|---|---|---|---|---|---|
| Action Priority is based on combinations of Severity, Occurrence, and Detection ratings in order to prioritize actions for risk reduction. | | | | | | | Blank until filled in by user |
| Effect | S | Prediction of Failure Cause Occurring | O | Ability to Detect | D | ACTION PRIORITY (AP) | Comments |

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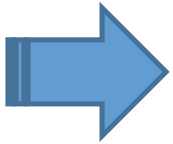
RPN = S x O x D

All three weighted equally



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S, O, D considered at the same time, while weighting

Severity highest, then Occurrence, then Detection

Determines Priority of Action = H, M, L

# Adoption / Deployment Timing

- Expect “rolling change” not immediate changeover
  - No expectation for “rework” of existing FMEAs
  - Handbook recommends utilizing for updates to “Family” FMEAs
- Possible sequence for transition
  1. Allow several months for OEM and supplier training
  2. Acceptance of new methods, rating tables, forms on supplier FMEAs
  3. Then shift to requirement for new products or processes
- Expect timing for adoption / deployment from OEM’s to be communicated at AIAG Quality Summit in October, 2019


Thank You!
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