

AIAG & VDA FMEA Handbook

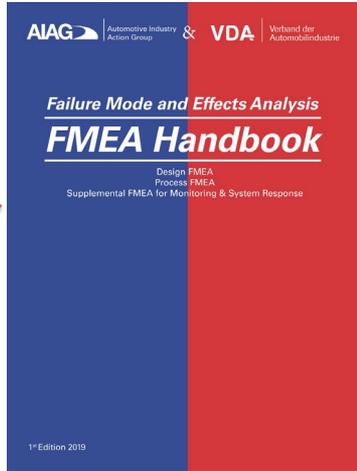
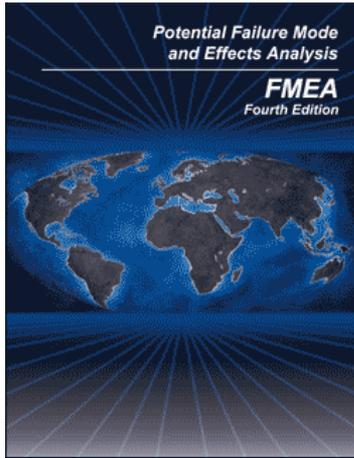
Sept 13, 2019

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Topics Covered

- Project Objectives
- Highlights of Major Changes
- The Benefits of Robust FMEAs
- OEM Deployment Plans & Timing
- Training Options
- Q & A

AIAG & VDA FMEA - Project Objective



Update to include:

- Best Practices
- Improved Examples
- Functional Safety

Provide consistent direction, guidance to all automotive suppliers

SURFACE VEHICLE STANDARD		SAE J1739 J43000
SAE International	Issued	2004-07
	Revised	2019-07
Supersedes J1739/J43000		
<p>(R) Potential Failure Mode and Effects Analysis in Design (DFMEA) Potential Failure Mode and Effects Analysis in Manufacturing and Assembly Processes (PFMEA)</p>		
<p>INTRODUCTION</p> <p>Widespread use of design and process FMEA is a benefit to consumers and manufacturers. The evolution of FMEA has taken place in the automotive industry since the late 1960s with emphasis on standard drafting criteria and form factors. By early 2000s, the FMEA methodology has grown and evolved in the general and adoption of statistical based models. Progress in general model structure or improved data model analysis and change in statistical data in use of Risk Rate Priority Number (RRPN). The document contains updated ranking rules and descriptions the core of 1998 Handbook on the primary focus in understanding procedure or activities ranking efforts. It also includes a Boundary Diagram and Process Flow Diagram concepts as use of those tools has increased. The action for Potential Failure Mode and Effects Analysis for Manufacturing Processes (PFMEA) is a core Design FMEA and has been revised. This FMEA is a form of Design FMEA. There are statistical tools, statistical process and control references in this aspect of FMEA. This document serves as a common starting point for the development of an effective DFMEA and PFMEA.</p> <p>FOREWORD</p> <p>The former Recommended Practice for Potential Failure Mode and Effects Analysis in Design (DFMEA) and Potential Failure Mode and Effects Analysis in Manufacturing and Assembly Processes (PFMEA) has been revised and approved as a Standard. As such, it contains requirements and recommendations for effective use of DFMEA and PFMEA as a preferred FMEA standard. This document was created by a consensus committee and represents best practices and guidance for the output from the workshop of OEM (Original Equipment Manufacturer) and their suppliers.</p> <p>1. SCOPE</p> <p>This FMEA Standard describes Potential Failure Mode and Effects Analysis in Design (DFMEA) and Potential Failure Mode and Effects Analysis in Manufacturing and Assembly Processes (PFMEA). It applies to the identification and mitigation of risk to providing operations, service, maintenance, safety, health, and workability. As a Standard, this document contains requirements, best practices, and recommendations, which are for the user. The FMEA objective. The FMEA process and documentation must comply with this Standard as well as any corporate policy concerning this Standard. Consistent criteria and agreement with the customer is necessary for decisions to be made to justify new work or changed methods (single customer or third party activities).</p>		

Importance of New Methods and Tools

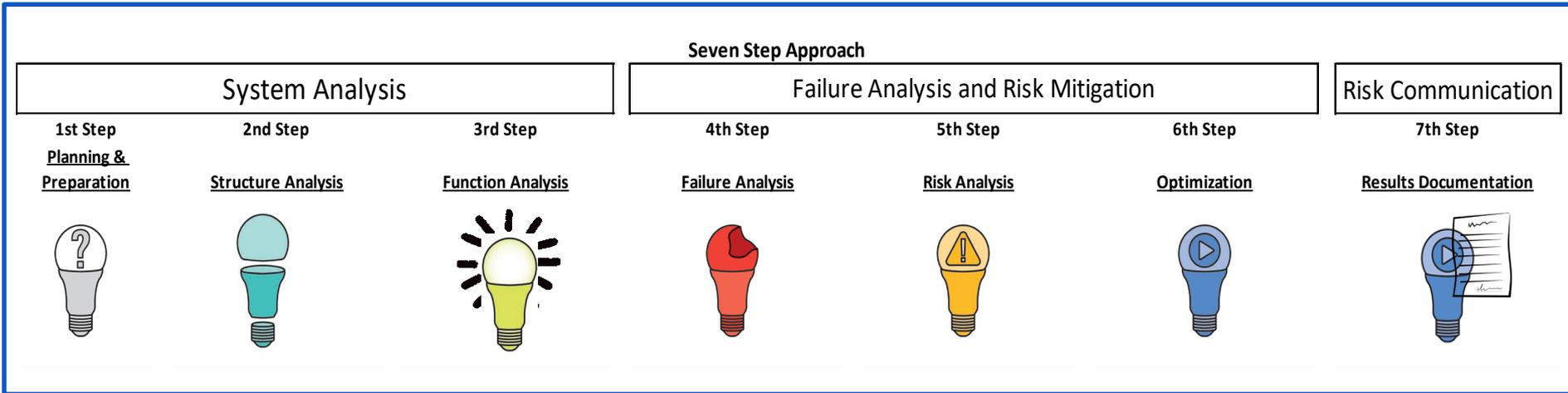
- Effective FMEA risk identification - never been more critical
 - Rapid growth in component/system interactions
 - Increasingly specialized technologies
 - No change in legal obligations of producers
- Effective FMEA includes:
 - Cross-functional team contributions
 - Carefully identified system boundaries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

Highlights of Major Changes

- 7 Step Approach
- New Severity, Occurrence, Detection Tables
- Action Priority (AP) Tables
- Form Sheets and Report Views
- Supplemental FMEA – MSR

More Structured Approach – Leverages Lessons Learned – Prevention Driven

AIAG & VDA FMEA - 7 Step Approach



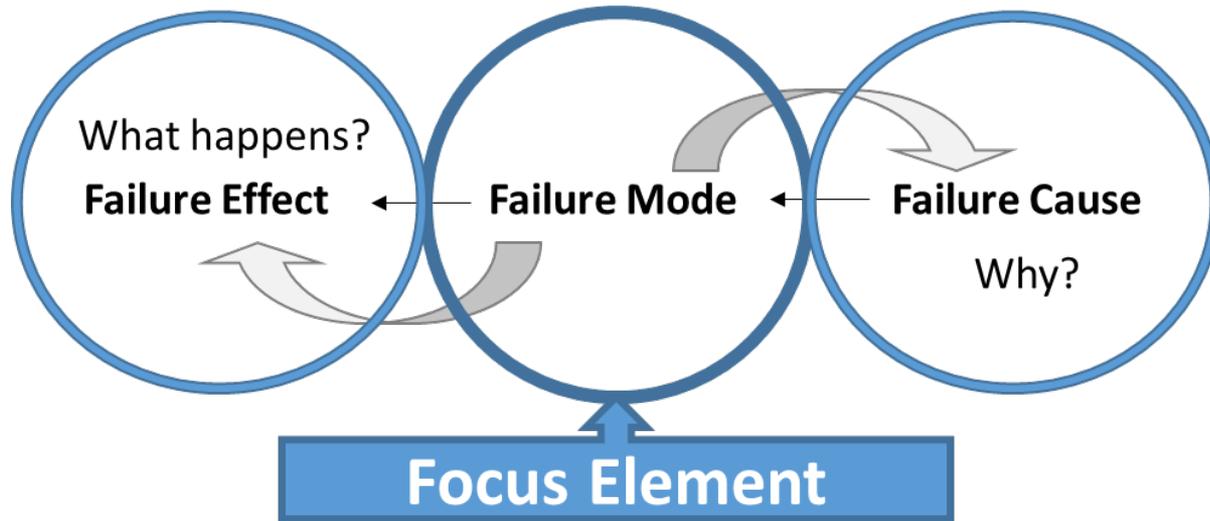
Applies to DFMEA, Supplemental FMEA – MSR, and PFMEA

AIAG & VDA FMEA – 7 Step Approach

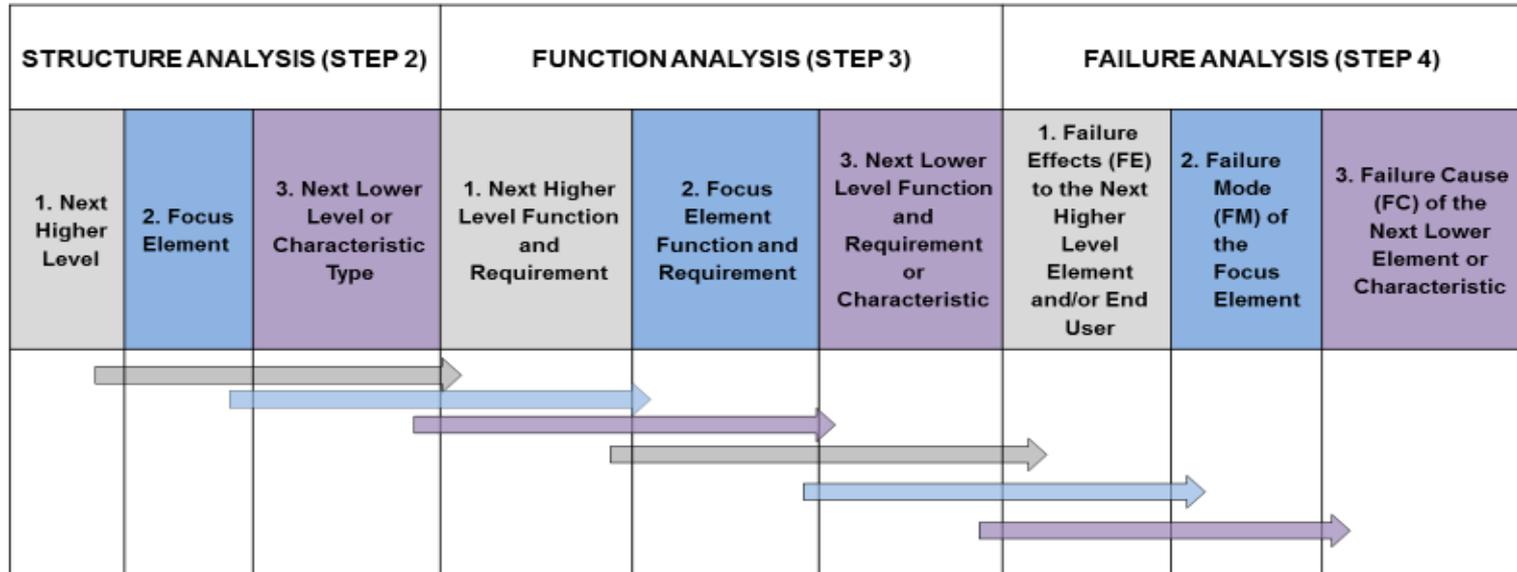
- Step 1 – Planning and Preparation
 - Definition of 5T's
 - InIntent, Timing, Team, Task, Tools
 - Question raised during Stakeholder Review
 - The new methodology can be executed with either spreadsheets or FMEA Software
 - No recommendation or mandate to use specialized software
 - Handbook supports both:
 - Spreadsheets – Form Sheets
 - FMEA Software – Report Views

AIAG & VDA FMEA – 7 Step Approach

- Step 4 – Failure Analysis



AIAG & VDA FMEA – 7 Step Approach



The new process and methodology guides the practitioner to align information between steps to ensure accuracy and completeness of the FMEA

AIAG & VDA FMEA – 7 Step Approach

- Step 6 – Optimization
 - Identify and assign actions to reduce risk
 - Commitment to take specific, measurable, and achievable actions
 - Lower likelihood of Occurrence
 - Increase robustness of Detection
 - Keeps track of original S, O, D values
 - Collaboration between the FMEA team, management, customers and suppliers

New Severity, Occurrence, and Detection Tables

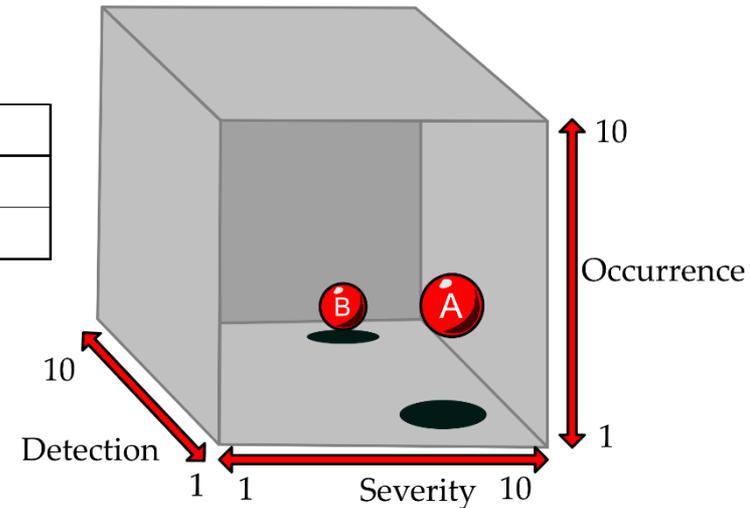
- New Severity, Occurrence and Detection Tables
 - DFMEA, PFMEA, FMEA – MSR
- Severity (of Effect) Table
 - Rated from Very High (10) to Very Low (1)
- Occurrence (Prediction of Failure Cause Occurring) Table
 - Rated from Extremely High (10) to Extremely Low (1)
 - Alternate Occurrence Tables
 - Incidents per Thousand Items/Vehicles
 - Time Based Failure Prediction Values
- Detection (Ability to Detect) Table
 - Rated from Very Low (10) to Very High (1)

Action Priority Replaces RPN

- Risk Priority Number (RPN):
 - The product of Severity x Occurrence x Detection
 - Weights each factor equally.

	Severity	Occurrence	Detection	RPN
Scenario A	8	5	2	80
Scenario B	5	2	8	80

RPN is insufficient to differentiate between all possible SOD combinations where RPN = 80



Action Priority (AP) Tables

- Action Priority
 - Severity, Occurrence, and Detection considered at the same time, while weighting Severity highest, then Occurrence, then Detection
 - All 1000 points are codified into a single table
 - Determines “Priority of Action”
 - Rated as High, Medium, or Low

Form Sheets and Report Views

- Appendix A includes:
 - “Standard” and “Alternate” Form Sheets
 - DFMEA, PFMEA, and FMEA - MSR
 - Software “Views” – Potential Report Layouts
 - DFMEA, PFMEA, and FMEA - MSR
- Appendix B includes:
 - “Hints” on how the form sheet would look when updated following examples from the Handbook

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
 - Severity Table common with DFMEA
 - Unique Frequency (F), Monitoring (M) and Action Priority (AP) Rating Tables

The Essential Link Between COQ and FMEA

- Leverage FMEA to Improve Cost of Quality Results
 - You can leverage a robust FMEA to make sure COQ / COPQ improvement targets are met;
 - You will need actual COQ / COPQ results on similar products or processes to make sure the FMEA risk evaluation of the new product or process is realistic

Adoption / Deployment Timing

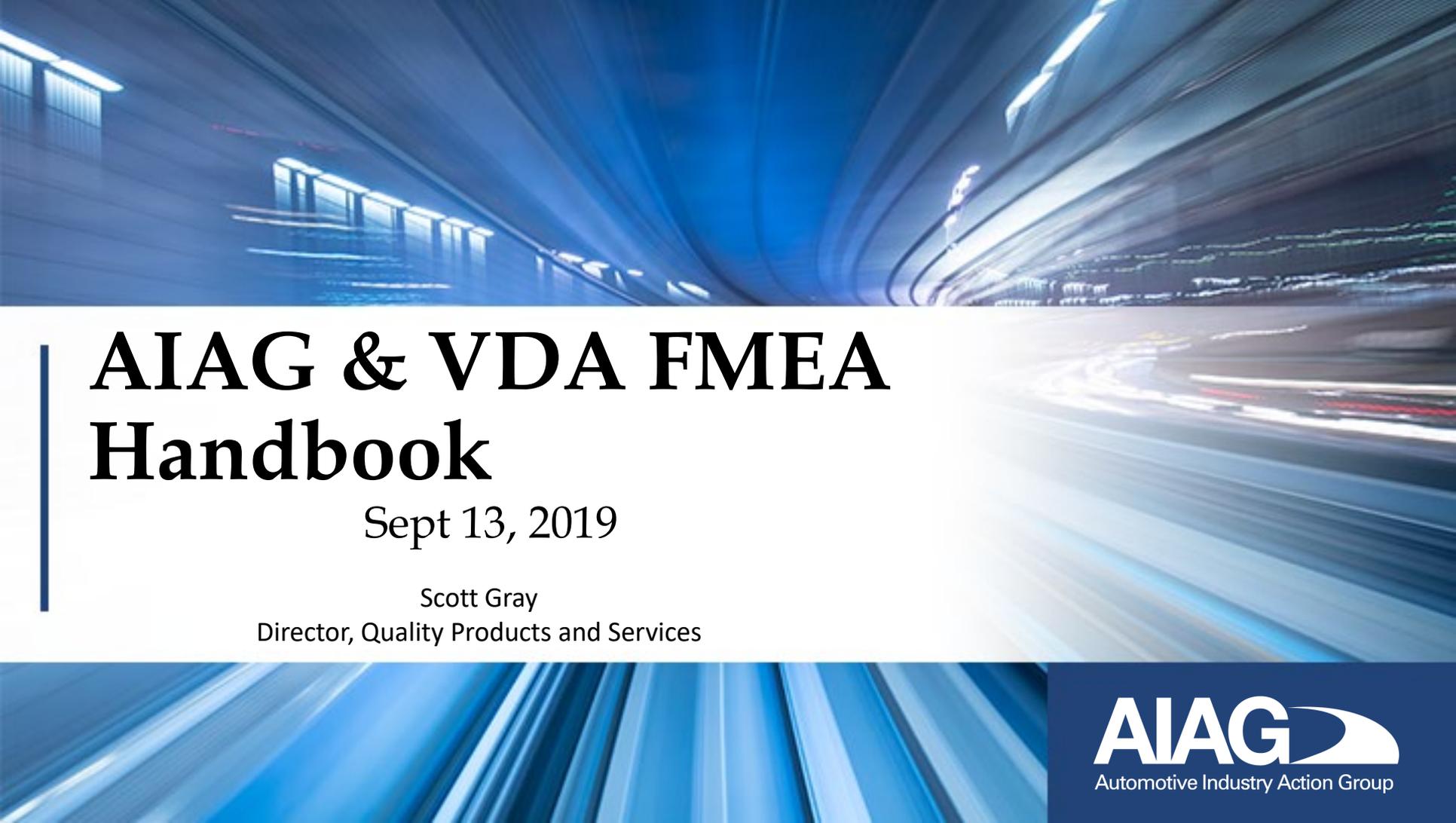
- Expect “rolling change” as deployment model globally
 - No expectation for “rework” of existing FMEAs
- Transition actions and adoption timing
 1. Allow several months for OEM, supplier, and auditor training
 2. OEM’s will update CSR’s to refer to AIAG & VDA FMEA Handbook
 - A. Start with acceptance of new methods, rating tables, form sheets on supplier FMEA’s
 - B. Then shift to requirement for selected new products /processes
 - C. Then evolve to standard requirement for all new FMEA’s
 3. IATF will define when 3rd party auditors start auditing for utilization and compliance
 1. IATF (IAOB) to update the Auditor Development Program (ADP) system
 2. IATF will define the requirements and timing to confirm auditor competency on the new FMEA
- Expect timing for adoption / deployment from N.A. OEM’s to be communicated at AIAG Quality Summit on October 2nd, 2019

AIAG & VDA FMEA Handbook

- Translations
 - AIAG announcing availability of the Chinese translation
 - Pre-orders can be placed now
 - Hardcopy deliveries to occur in by end of September
 - To assure you have an official translation, only accept Handbooks with the official Chinese ISBN #
 - Spanish, Portuguese, Japanese, Korean coming soon
 - VDA is translating into other European languages

New FMEA Training Courses

Course Title	Length	Prerequisites	Format
Transitioning - DFMEA	2 days	Yes	Classroom
Transitioning - PFMEA	2 days	Yes	Classroom
Essentials for Transitioning	2-3 Hours	No	eLearning
Implementing and Understanding - DFMEA	2 days	No	Classroom
Implementing and Understanding – PFMEA and Control Plan	2 days	No	Classroom
Implementing and Understanding – DFMEA plus Supplemental FMEA for Monitoring and System Response	3 days	Yes	Classroom
Design FMEA for Moderators/Facilitators	2 days	Yes	Classroom
Process FMEA for Moderators/Facilitators	2 days	Yes	Classroom
The AIAG & VDA FMEA for Automotive Auditors eLearning	2-3 Hours	Yes	eLearning
AIAG & VDA FMEA – Manager’s Workshop	1 Day	No	Classroom



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