AIAG-VDA 소개


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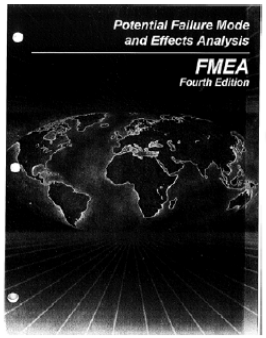
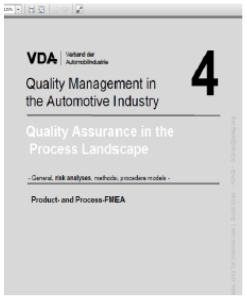
0. NEW FMEA 변화

AIAG-VDA FMEA 통합 필요성

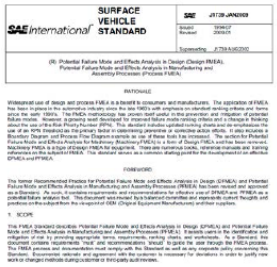
Project Team Objective

AIAG





Provide consistent direction, guidance to all automotive suppliers



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

AIAG-VDA FMEA Project

Why ?

- 보증 결과, 필드 고장, 리콜 경험을 반영하여 제품 및 프로세스 위험 분석 방법론을 개선하기 위함.
- AIAG에서 Quality Survey를 통해 고객지정 요구사항(CSR) 효과적인 반영 및 중복사항을 최소화 하기 위함.
- AIAG와 VDA FMEA 통합 방법론을 개발하여, FMEA 비즈니스 프로세스가 모든 고객의 요구 사항을 충족하고, 견고하고, 정확하며, 완벽한 FMEA를 작성할 수 있음.

What ?

- SAE J1739와 연계 된 개선 된 방법론을 명확하게 정의한 단일 저작권법 AIAG-VDA FMEA 매뉴얼 개발.
- VDA 및 AIAG에서 최선을 다해 프로세스를 결합하여 두 산업 그룹의 요구 사항을 충족

AIAG-VDA FMEA 통합 필요성

VDA FMEA와 AIAG FMEA 2 종류를 OEM업체들이 요구하고 있음

1949 : FMEA 방법은 군용 규격 MIL-P-1629로 미군에 의해 개발

1963 : 미국 항공 우주국 (NASA)은 Apollo 프로젝트에 적용

1977 : 포드 자동차가 자동차 산업에서 FMEA 방식을 사용하기 시작

1980 : 독일에서 FMEA (DIN 25448)

1993 : AIAG FMEA Reference Manual

1994 : SAE J1739 FMEA

2008 : SAE J1739 4th Edition, AIAG FMEA 매뉴얼 4th Edition

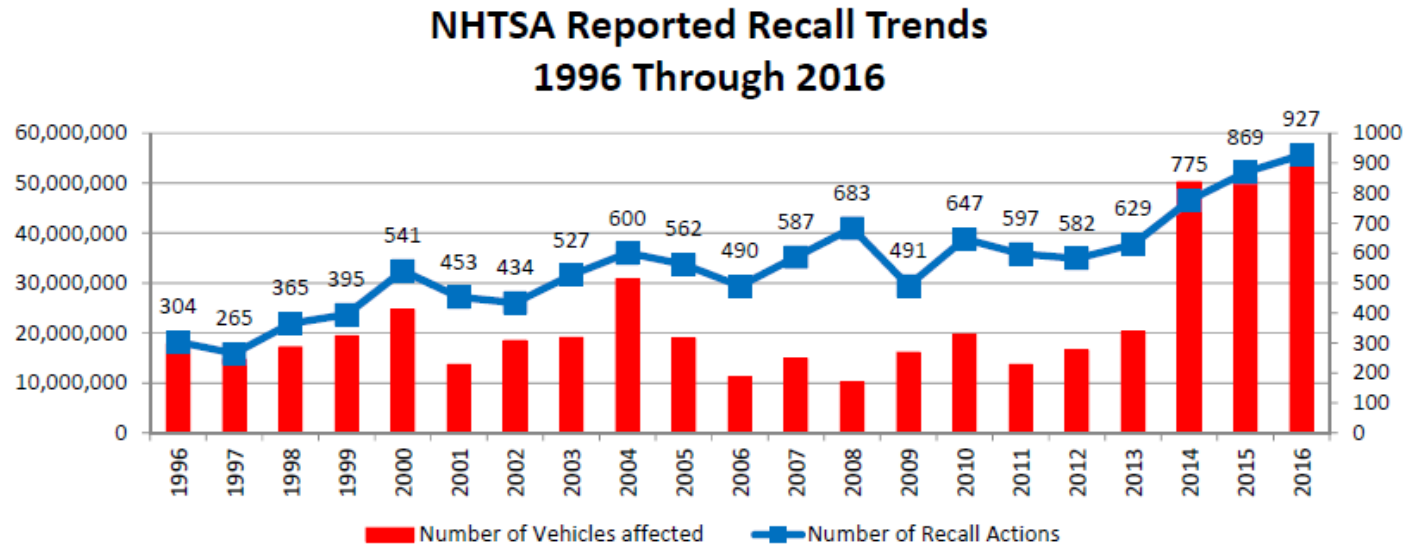
2017 : AIAG-VDA FMEA 초판 발행

2019 : AIAG-VDA FMEA 규격 승인

0. NEW FMEA 변화

96년 이후 자동차 Recall 건수는 지속적으로 증가하고 있음.

Traceability | AIAG



AAMA Alabama Automotive Manufacturers Association

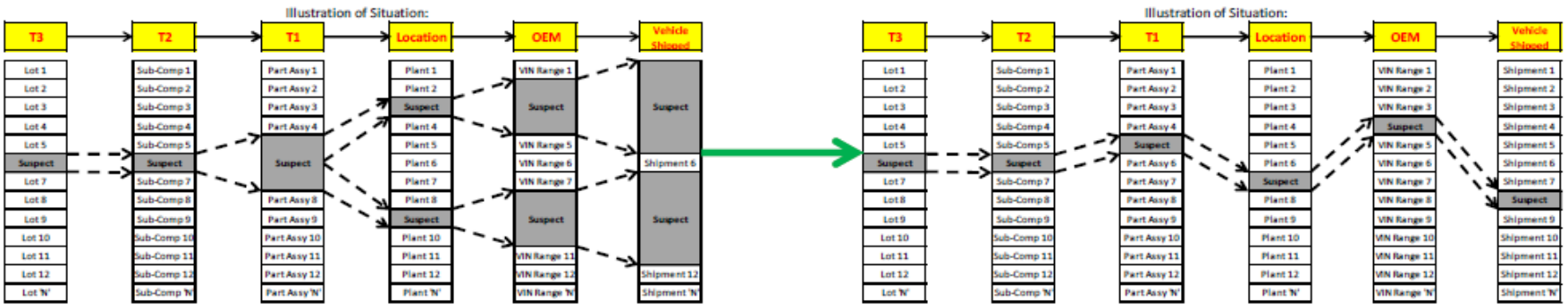
Insight. Expertise. Results.

0. NEW FMEA 변화

자동차 고장원인을 하위 부품사 원인까지 추적 필요성 증대

Traceability | AIAG

- Our Goal:



Not Knowing Where Parts Are

Easily Finding Parts

AAMA Alabama Automotive Manufacturers Association

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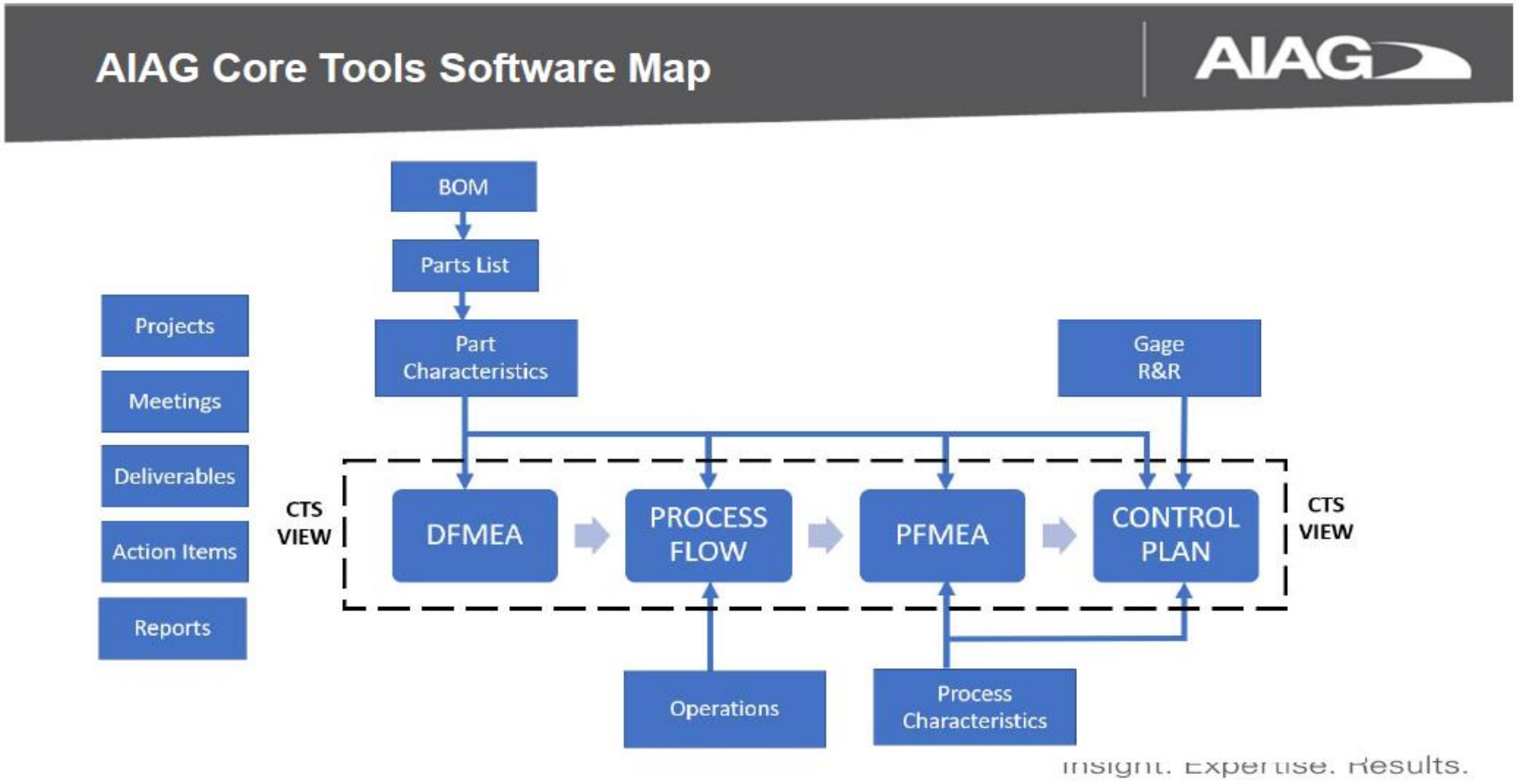
AIAG에서 FMEA의 신뢰성 향상을 위한 SW의 개발 보급

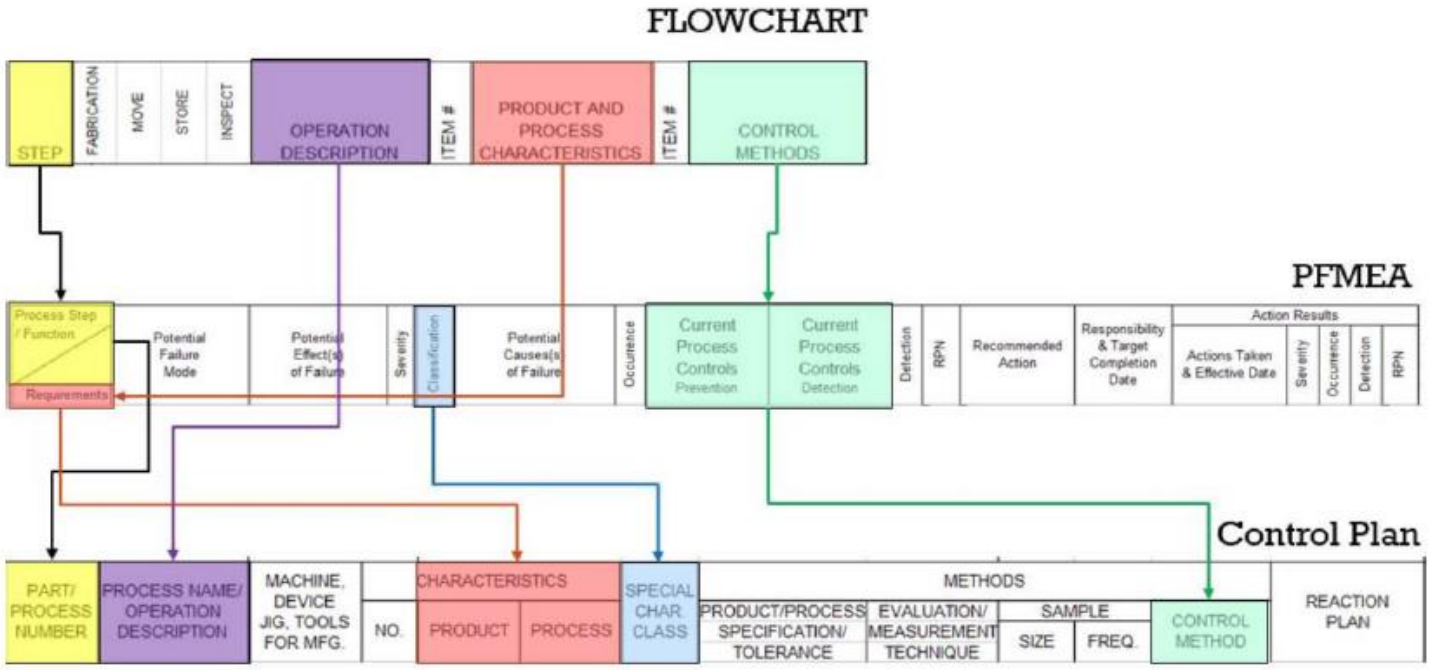


0. NEW FMEA 변화

FMEA의 신뢰성향상을 위한 Core Tool 간의 연계성 강화 필요

Form Linkage is Critical

AIAG



Insight. Expertise. Results.

2015년 부터 AIAG와 VDA FMEA 통합을 위한 활동 시작

Projects meeting and face to face meetings

First contacts November 2014

- **Since May 2015 regular conference calls (weekly / bi-weekly)**
- **Three face to face meeting took place**

1.Design FMEA main results Meeting in CW 07/2016 (AIAG)

- Review of VDA and AIAG approach
- Definition of 6 step approach
- Clarification of inputs and outputs of the 6 steps
- Review of Ranking Charts (S, O, and D)
- RPN is replaced by Action Priority (AP)
- DFMEA: Classification column special characteristics deleted

0. NEW FMEA 변화

AIAG와 VDA TFT 활동으로 새로운 FMEA(5판)이 탄생 함.

Design FMEA main results

- 특별특성 : SI 6 to IATF 16949/8.3.3.3
- P-FMEA와 Control Plan에 약어로 "분류"란에 표시
- D-FMEA : 양식에 "분류"란이 없음 ➔도면에 특별특성 표시

Process FMEA main results Meeting in CW 17/2016 (VDA)

Review of Process AIAG and VDA
Disposition of PFMEA as 7 **step approach**
PFMEA: Classification column special characteristics remains
RPN is replaced by Action Priority (AP)

FMEA-MSR (Monitoring and System Response) main results : 04/2017 (AIAG)

Meeting in CW 12/2018 (VDA)

Disposition of Feedback. Review of all chapters. Editorial and technical revision

AIAG-VDA FMEA 참여자

Attendees

Audi AG
Continental Teves AG
Daimler AG
Daimler Truck North America*
FCA US LLC Ford Motor
Company General Motors*
Honda of America Mfg., Inc. Ing.-
Büro Pfeufer (on b. of VDA-QMC)
Knorr-Bremse SfN GmbH Nexteer
Automotive*
ON Semiconductor
Opel Automobile GmbH
Robert Bosch GmbH
Schaeffler Technologies AG & Co KG
VOLKSWAGEN AG
ZF Friedrichshafen AG
ZF TRW

AIAG-VDA FMEA 발행일정

2019.4.4 WEBINAR

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

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AIAG-VDA FMEA 핵심변경사항

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

0. NEW FMEA 변화

AIAG-VDA FMEA 핵심변경사항

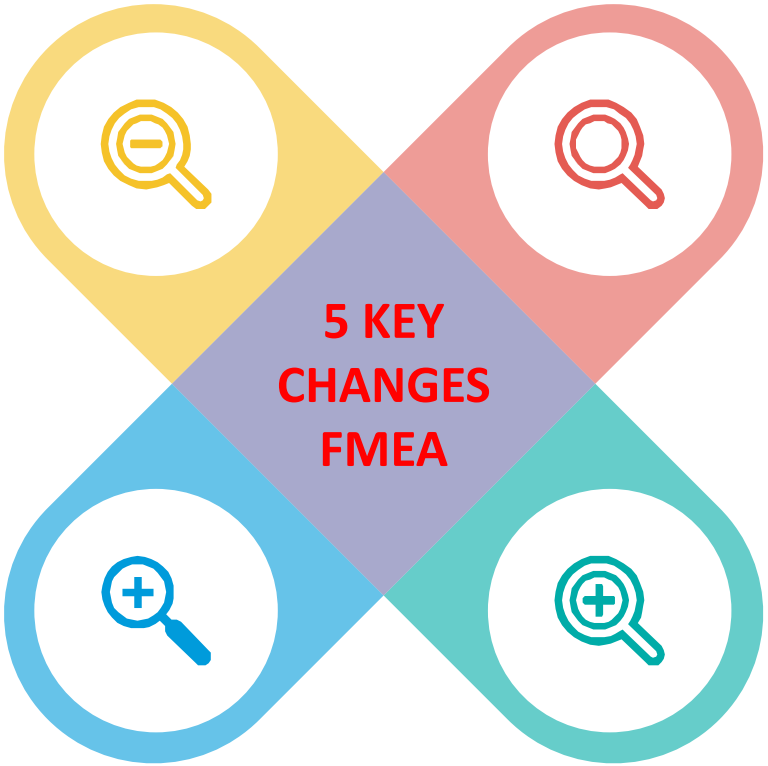
VDA FMEA를 BASE로 AIAG와 SAE J1739를 통합하여 NEW FMEA를 개발 함.

①7 STEP

1. 계획 및 준비
2. 구조분석
3. 기능분석
4. 고장분석
5. 리스크 분석
6. 최적화
7. 결과문서화

③SOD기준 변경

심각도: 법규-10, 규정-9
검출도 : 검출도 능력



②FMEA-MSAR

FMEA Monitoring and System Response

④P-FMEA Failure

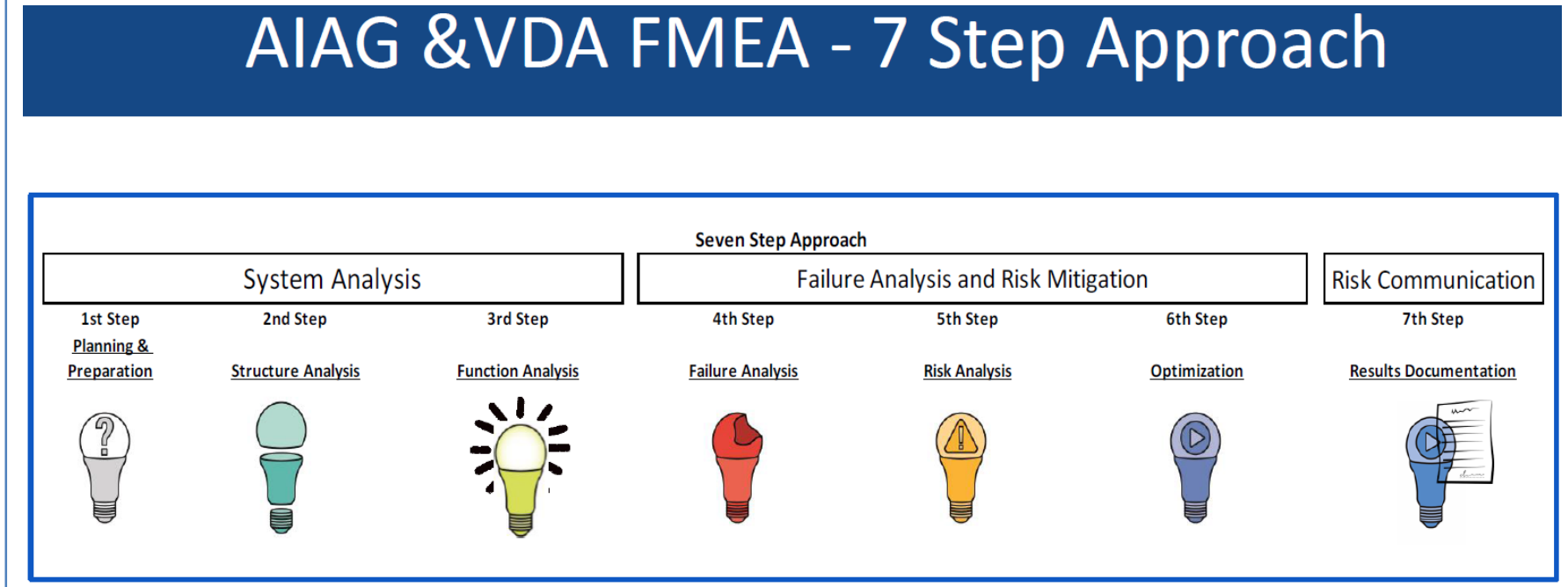
MAN, MACHINE, MATERIAL, environMent

⑤RPN삭제➔AP

High : Shall
Medium : Should
Low : Could

0. NEW FMEA 변화

핵심변경사항- ①7 Step Approach



Applies to DFMEA, Supplemental FMEA – MSR, and PFMEA

핵심변경사항- ②FMEA MSR

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

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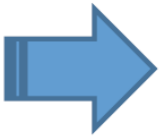
0. NEW FMEA 변화

핵심변경사항- ③ NEW S.O.D.

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**

AIAG 4th Edition
Issue with Severity 10/9
"Without warning" – "with warning"



AIAG & VDA FMEA Handbook
10 – Safe operation defects
9 – Noncompliance with regulations

0. NEW FMEA 변화

핵심변경사항- ③ NEW S.O.D.

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**

AIAG 4th Edition
Rating based on defects/thousand, set for high volume production rates

AIAG & VDA FMEA Handbook
Rating based on robustness of prevention controls, can be applied to any production rate

0. NEW FMEA 변화

핵심변경사항- ③ NEW S.O.D.

New PFMEA Detection Table

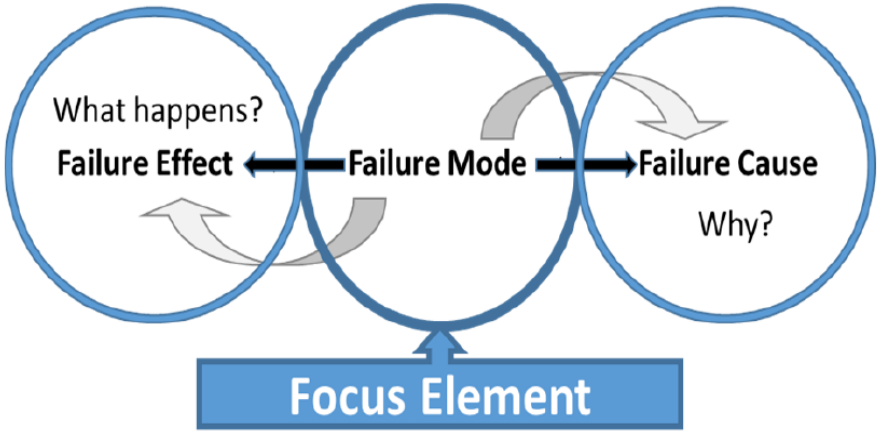
Detection Potential (D) for the Validation of the Process Design				
Detection Controls rated according to the Detection Method Maturity and Opportunity for Detection.				Blank until filled in by user
D	**Ability to Detect**	**Detection Method Maturity**	**Opportunity for Detection**	**Corporate or Product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

AIAG 4th Edition
Rating based on "Opportunity for Detection" and "Likelihood of Detection" by Process Controls

AIAG & VDA FMEA Handbook
Rating based on "Maturity of Detection Method" and "Opportunity of Detection"
More stringent ratings, requires control of rejected product to prevent outflow

핵심변경사항- ④ P-FMEA 4M FC 분석

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

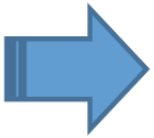
0. NEW FMEA 변화

핵심변경사항- ⑤ RPN폐지 ➔AP 적용

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

AIAG 4th Edition
RPN = S x O x D
All three weighted equally



AIAG & VDA FMEA Handbook
S, O, D considered at the same time, while weighting
Severity highest, then Occurrence, then Detection
Determines Priority of Action = H, M, L

0. NEW FMEA 변화

AIAG FMEA4판에 비해 체계적이면서, 복잡해 짐.

DFMEA Spreadsheet

Design Failure Mode and Effects Analysis (DESIGN FMEA)

SCOPE DEFINITION (STEP 1)

Company Name: Name of company responsible for DFMEA
Engineering Location: Geographical location
Customer Name: Name of customer(s) or [Product Family]
Model Year / Platform: Customer application or company model/style

Subject: Name of DFMEA project
DFMEA Start Date: Date DFMEA project started
DFMEA Revision Date: Latest revision date
Cross-Functional Team: Team Roster needed

DFMEA ID Number: Determined by the compa
Design Responsibility: Name of DFMEA owner
Confidentiality Level: Business Use, Confidenti

CONTINUAL IMPROVEMENT	STRUCTURE ANALYSIS (STEP 2)			FUNCTION ANALYSIS (STEP 3)			FAILURE ANALYSIS (STEP 4)			
History / Change Authorization (As Applicable)	1. Next Higher Level	2. Focus Element	3. Next Lower Level or Characteristic Type	1. Next Higher Level Function and Requirement	2. Focus Element Function and Requirement	3. Next Lower Level Function and Requirement or Characteristic	1. Failure Effects (FE) to the Next Higher Level Element and/or Vehicle End User	Severity (S) of FE	2. Failure Mode (FM) of the Focus Element	3. Failure Cause (FC) of the Next Lower Element or Characteristic
Handbook Example - this row can be hidden or deleted	Window Lifter Motor	Electrical Motor	Brush Card Base Body	Raise and lower window according to parameterization	Commutation system transports the electrical current between coil pairs of the electromagnetic converter	Brush card body transports forces between spring and motor body to hold the brush spring system in x, y, z position (support commutating	Torque and rotating velocity of the window lifter motor too low	6	Commutation system intermittently connects the wrong coils (L1, 3 and 2 instead of L1, 2 and 3), resulting in angle deviation	Brush card body bends in contact area of the carbon brush, due to too low stiffness in carbon brush contact area

RISK ANALYSIS (STEP 5)						OPTIMIZATION (STEP 6)										
Current Prevention Control (PC) of FC	Occurrence (O) of FC	Current Detection Controls (DC) of FC or FM	Detection (D) of FC/FM	DFMEA AP	Filter Code (Optional)	Prevention Action	Detection Action	Responsible Person's Name	Target Completion Date	Status	Action Taken with Pointer to Evidence	Completion Date	Severity (S)	Occurrence (O)	Detection (D)	DFMEA AP
Simulation of dynamic forces on	2	Sample test: measuring the elastics	2	L												

End of Document

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* AMP컨설팅(Advanced Management Provider) 경영시스템 교육,컨설팅 및 인증 협력기관

* ISO/IATF 16949, ISO 9001, 14001, 22301, 26262 컨설팅, 교육, 국제심사원 과정 운영, SQ, Six Sigma 컨설팅

* 문의전화 : 070-8722-9001/ Fax : 050-4364-4094 / CP : 010-8673-1694(대표) / 010-6855-5333 (인증지원팀장)

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