

# Realizing the Benefits of a Better FMEA tool

Mary McAtee  
Chuck Boots

## Introduction: Chuck Boots

### Chuck Boots: Technical Presales Consultant II

- 20+ years of manufacturing/quality experience
- Bachelor of Science, Business Management
- 5 years as Siemens customer 3 years in current role
- Apollo RCA, Int/Ext/Supplier auditing, Six Sigma



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## Introduction: Mary McAtee

### Mary V. McAtee: Technical Presales Consultant II

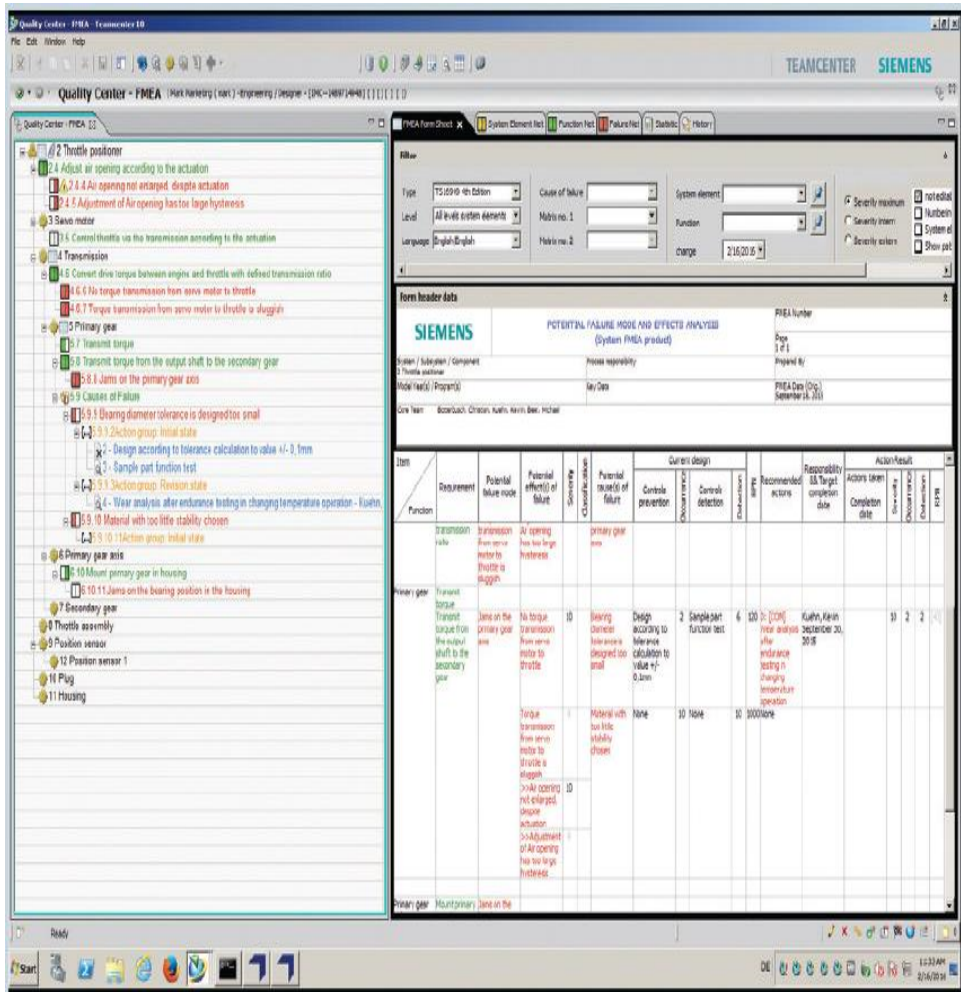
#### QM/FQC/LQC

- Mechanical Engineer with 30+ years Quality and Reliability Engineering Experience
- New England Research Center: R&D Infrared Detector Development
- MA/Com Space Center: Leading Provider of High Reliability Microelectronics
- Lead Assessor: ISO 9001, ISO 14001, OHSAS 18000, TS 16949



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# FMEAs and Risk Management: Not just for the Automotive Industry Anymore



- Failure Modes Effects Analysis (FMEA), both Design FMEAs and Process FMEAs evolved from the defense industry in the late 60s.
- The Automotive Industry embraced the concept for design, manufacturing and safety risk assessment.
- FMEAs have proved their worth and are increasingly becoming the standard in other industries including aviation, medical device and energy.

## Spreadsheets the Historical Tool of Choice



Historically Design and Process FMEAs and Control Plans have been developed in Excel spreadsheet formats which has some inherent drawbacks:

- Spreadsheets are not optimal for collaborative working groups.
- Spreadsheets are limited in providing functionality that supports intelligent reuse and qualification by similarity
- Change Management across the process can be challenging.

# Sample Spreadsheet FMEA

**POTENTIAL  
FAILURE MODE AND EFFECTS ANALYSIS  
(PROCESS FMEA)**

Part Number: \_\_\_\_\_

FMEA Number: 116409.02

Part #: \_\_\_\_\_

Process Responsibility: \_\_\_\_\_

Prepared by: \_\_\_\_\_

Part Description: \_\_\_\_\_

Key Date: \_\_\_\_\_

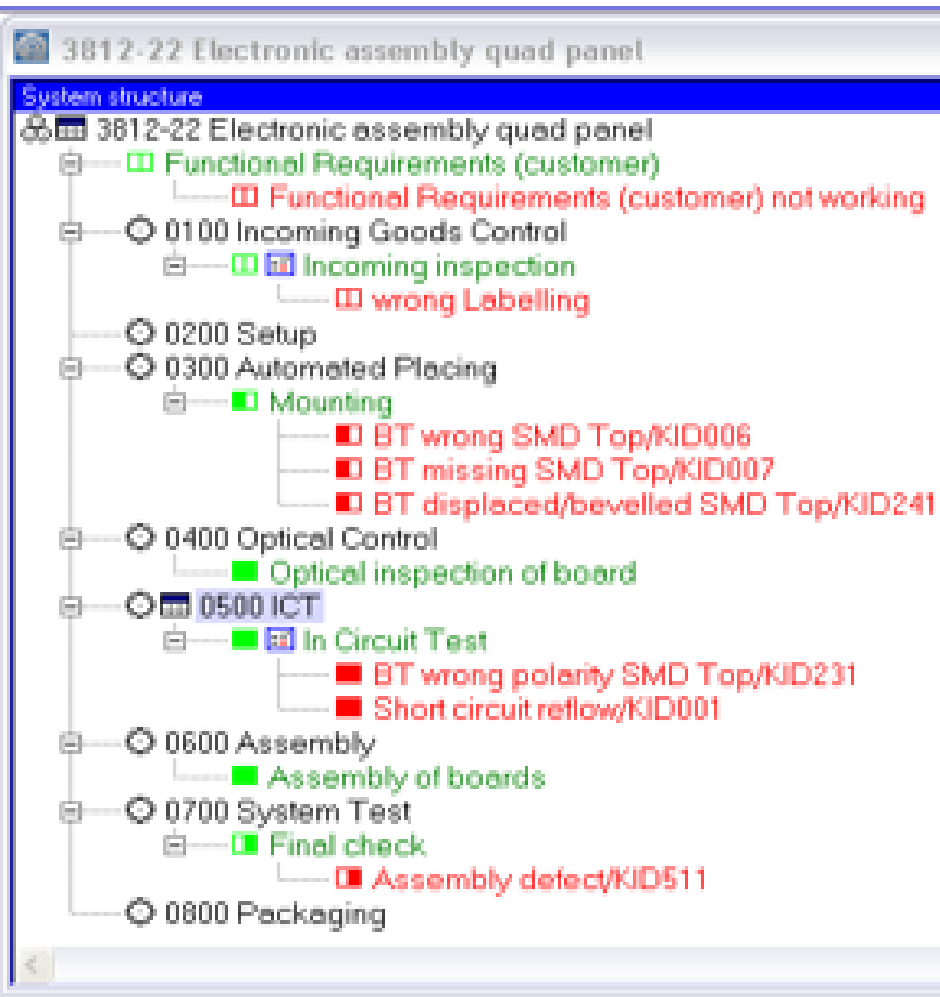
Date (Orig.): \_\_\_\_\_

Core Team: \_\_\_\_\_

Date (Rev.): \_\_\_\_\_

Process Step	Process Function/Requirements	Potential Failure Mode	Potential Effect(s) of Material Failure	Sev	Class	Potential Cause(s)/Mechanism(s) of Failure	Occur	Current Process Controls Prevention	Current Process Controls Detection	Desc	R.P.N.	Recommended Action(s)	Responsibility & Target Completion Date	Action Results				
														Actions Taken	S	e	c	R. P. N.
1-A	Chemicals Unload and verify freight	Unload wrong quantities	Inventory level incorrect within manufacturing system	1		Receiving Technician error	2	Training on receiving procedures	Visual freight verification to shipment documentation (Packing Slip, Bill of Lading)	8	16	None						
		Damage freight	Unusable product	1		Improper handling techniques	2	Fork-lift Training / Licensed Drivers	Visual freight verification	8	16	None						
	Input receiving data and forward paperwork	no input or input of wrong quantities or part number	Inventory level incorrect within manufacturing system	1		Receiving Technician error	2	Training on receiving procedures	Cycle count, physical inventories, and visual and operator feedback	8	16	None						
1-B	Door Beams Unload and verify freight	Unload wrong quantities	Inventory level incorrect within manufacturing system	1		Receiving Technician error	2	Training on receiving procedures	Visual freight verification to shipment documentation (Packing Slip, Bill of Lading)	8	16	None						
		Damage freight	Unusable product	1		Improper handling techniques	2	Fork-lift Training / Licensed Drivers	Visual freight verification	8	16	None						
1-C	Brackets Unload and verify freight	Unload wrong quantities	Inventory level incorrect within manufacturing system	1		Receiving Technician error	2	Training on receiving procedures	Visual freight verification to shipment documentation (Packing Slip, Bill of Lading)	8	16	None						
		Damage freight	Unusable product	1		Improper handling techniques	2	Fork-lift Training / Licensed Drivers	Visual freight verification	8	16	None						
	Place freight in storage location	Place in wrong location	Unable to locate material when needed	1		Operator Process Error	2	Delivery address, rack label, visual map, or item number Plant Address/Locator System	Physical Inventory	8	16	None						
	Determine run sequence and quantity	Schedule incorrect quantity or sequence	Parts not available when needed	1		Operator Process Error	3	Daily shop floor schedule/ parts needed list, Kanban red zones	Visual hot boards, Customer ratings, On-time delivery reports	7	21	None						
2-A	Load Formula Chemicals	Wrong Formula Selected	Out of Spec. Material	3		Operator Error	1	Operator Training	Material Performance INS-2001	5	15	None						
		Formula will not load on computer	Machine will not operate	2		Prior weigh-up not discharged	1	Operator Training & TPM system	X5 alarm (maximum residue exceeded)	1	2	None						

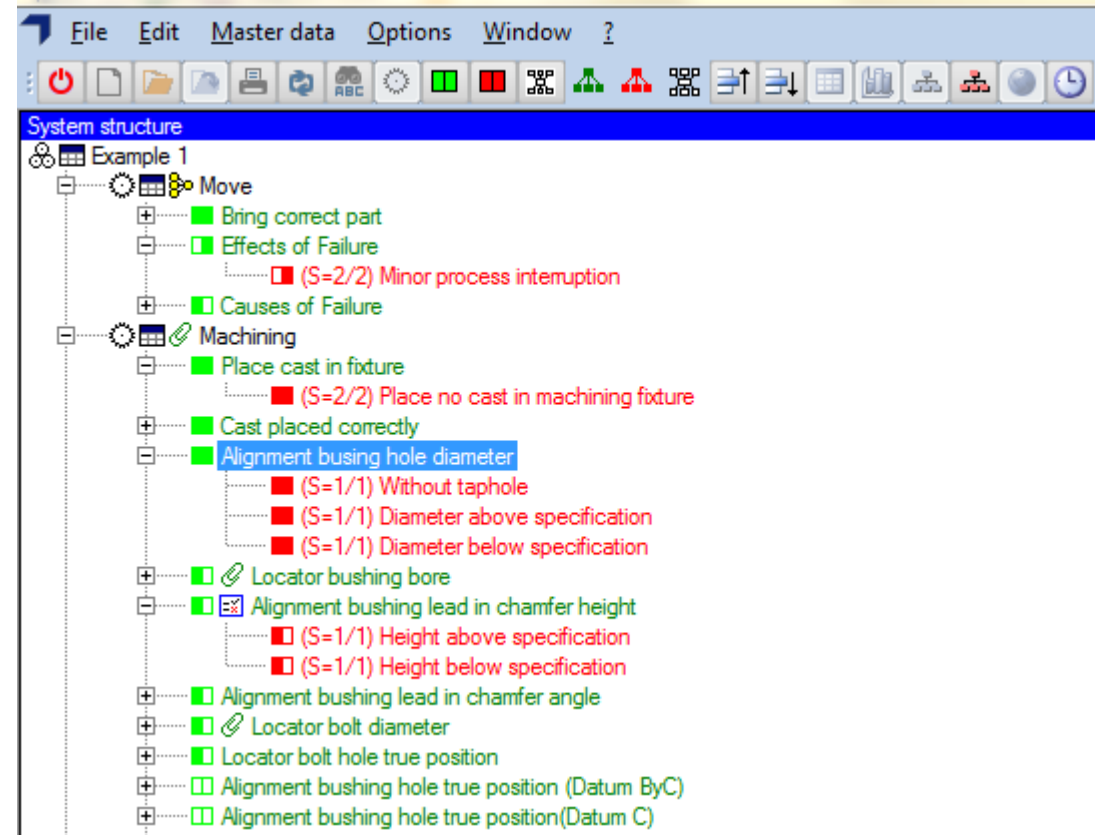
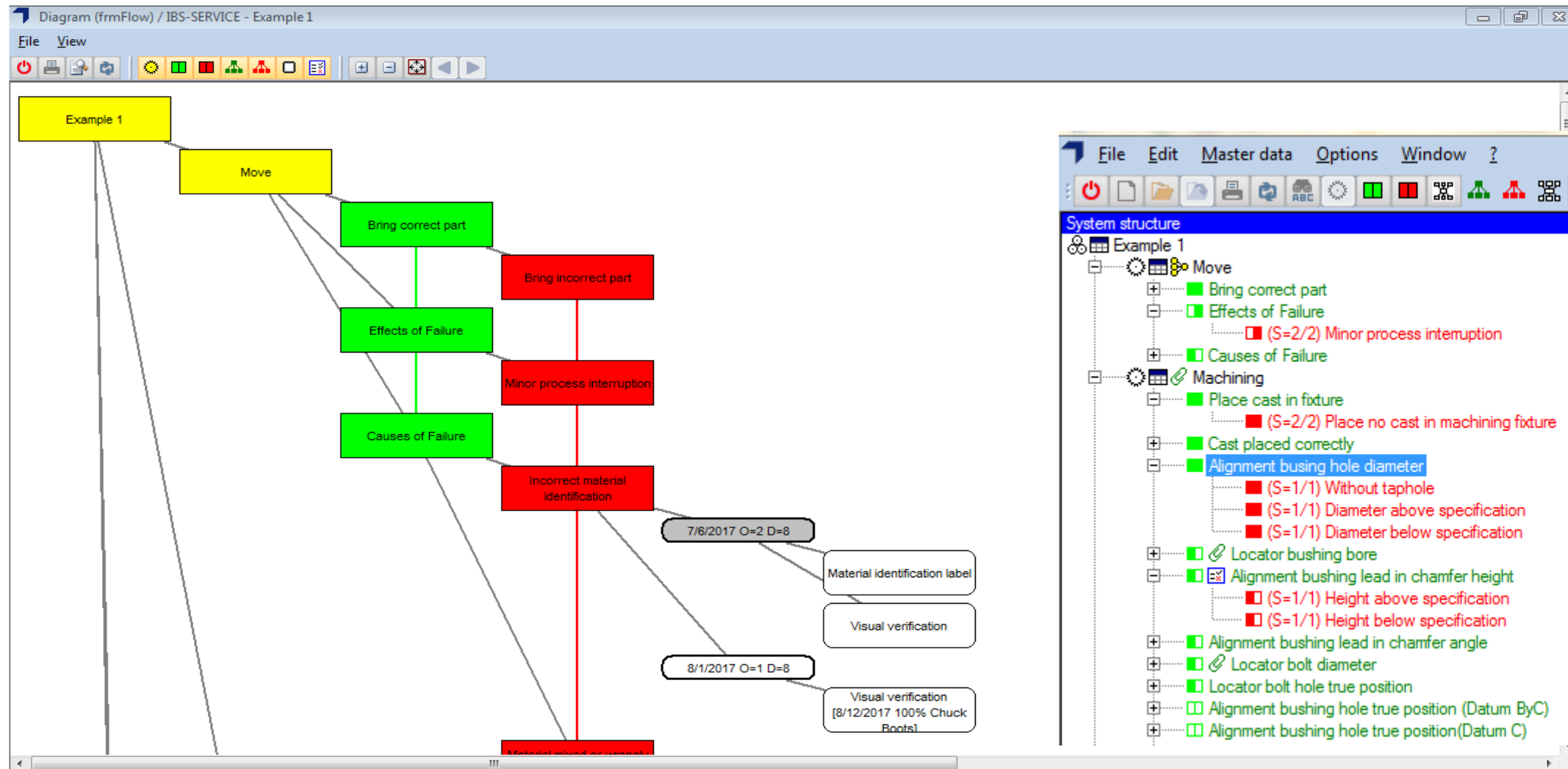
## Tree Structure Design and Process FMEA Advantages



Moving to a tool that utilizes a tree structure methodology provides many advantages:

- Tree structure FMEAs can take in content from block diagrams to form the backbone of the Process FMEA.
- Design & Process FMEAs can seamlessly take in content and updates from Bill of Materials (BOM) and Bill of Process (BOP) data maintained in other systems including ERP and PLM Systems such as SAP and Teamcenter.
- Querying and reusing data is much more straight forward and real time to facilitate collaborative team efforts.
- Output can display in a variety of required regulatory formats including AIAG and VDA.

# Tree Structure FMEA and Block Process Flowchart Diagram





# AIAG Example Output Format



## POTENTIAL FAILURE MODE AND EFFECTS ANALYSIS (Process FMEA)

FMEA Number: FMEA000207  
Page: 1 of 1

View in action list

Process step/ Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	S	C	Potential Cause(s) of Failure	Controls Prevention	O	Controls Detection	D	RPN	Recommended Actions	Responsibility & Target Completion Date	Actions Taken Completion Date	S	O	D	RPN
System Structure <b>Example 1</b>																		
Item <b>Example 1</b>													Process Responsibility					
Model Year(s) / Program(s)													Key Date 2017-07-06					
Core Team R.Valle, I.Duarte, A.Tercero, J.Valdez, Chuck Boots													FMEA Date (Orig.) 2017-06-23 (Rev.) 2017-09-06					

Process step Function	Requirement	Potential Failure Mode	Potential Effect(s) of Failure	Severity	Classification	Potential Cause(s) of Failure	Current Process				RPN	Recommended Actions	Responsibility & Target Completion Date	Action Results							
							Controls Prevention	Occurrence	Controls Detection	Detection				Actions Taken Completion Date	Severity	Occurrence	Detection	RPN			
Process 70.01: (1) Move (FMEA000209)	Bring correct part	Bring incorrect part	Minor process interruption	2	🏠	Incorrect material identification	Material identification label	2	Visual verification	8	32										
						Material mixed or wrongly identified	Material identification label	2	Visual verification	8	32	None									
Process 70: (2) Machining (FMEA000208)  Documents: -BLACKBEARPASS2.JP G	Place cast in fixture  Cast placed correctly	Place no cast in machining fixture  Cast misplaced in fixture	Minor process interruption  Machine crashes	2  7	🏠  🏠	Process step skipped	Operator training	4	Visual verification	8	64	D: Last machining detection in leak test									
						Process step skipped	Operator training	4	Visual verification	8	224	P: Standard operation sh									
						Fixture allows loading of the part incorrectly	None	8	Visual verification	8	448	P: Install air sensing on machining fixture									
						Fixture cleanliness, chips in fixture	None	8	Visual verification	8	448	P: Cleaning o the fixture by rinsing.									

RPN	System element	Possible defects	Possible defect causes	Avoidance actions	Detection actions	Date/orig.date	Responsibility	Status
43	S/MBR_LH/PH (FMEA000208)	Sheet metal materials cannot strip	Drawback in designing [S/MBR_LH/PH]	Add more stripping points and use more powerful springs		19.02.2007 19.02.2007	Liu	60%
48	S/MBR_LH/PH (FMEA000208)	Quality not allowed	Elastic loading the position of holes as to design incorrectly [S/MBR_LH/PH]	Check the dimension and position of all holes carefully by designer of mold		26.02.2007 26.02.2007	Liu	20%
36	S/MBR_LH/PH (FMEA000208)	Quality not allowed	Drawback of designing in die face or cham bead [S/MBR_LH/PH]	Design of press angle takes spring back into account		24.02.2007 24.02.2007	Liu	100%
54	S/MBR_LH/PH (FMEA000208)	Quality not allowed	Drawback of designing in die face or cham bead [S/MBR_LH/PH]	Confirm the correctness of cushion pin position and adjust it.		27.02.2007 27.02.2007	Liu	20%

AIAG v3 & v4, VDA 96 supported

## Team Collaboration and Efficient Reuse of Data

Team	Team Awesome					
Team no.	5					
Color						
Name	GID no.	Role ID	Department descr.	Role descr.	Email	
Chuck Boots	Chuck.Boots	1		Quality Engineerir	charles.boots@siemens.c	
Mac Don	Mac.Don	3		Production Super	charles.boots@siemens.c	
Test 4	Test.4	6		Planner		
I.Duarte	I.Duarte	2		Manufacturing En		
Test 5	Test 5	7		Machine Operator		
Test 1	Test.1	5		Buyer		

Tree structure FMEAs permit locking lines of the FMEA during editing to assure only appropriate changes are made by the team.

- Revision controls and archive functionality can keep the team oriented and facilitate design by similarity activities.
- Drag and drop of components, subassemblies and assemblies as well as processes and sub processes from one FMEA to another permits easy reuse of data.
- The resulting “where used query net” is extremely valuable when assessing the potential impact of a proposed Engineering Change.

# Reusing Data and Lessons Learned through Linkage

SIEMENS

The screenshot displays the Siemens FMEA software interface with three windows open, illustrating data reuse through linkage. The main window title is "FMEA (frmFMEAMain) / IBS-SERVICE". The menu bar includes "File", "Edit", "Master data", "Options", and "Window". The toolbar contains various icons for file operations and analysis.

The three windows show the following system structures:

- Example 1:**
  - System structure
    - Example 1
      - Move
      - Machining
      - Washing
      - Leak Test
      - Packaging
      - Quality Inspection (GP12)
      - Store the Parts
      - Quality Inspection

- Brick Example:**
- System structure
  - Brick Example
    - Move
    - Quality Inspection (GP12)
- Brick Example 2:**
- System structure
  - Brick Example 2
    - Quality Inspection (GP12)
    - Quality Inspection

The "Quality Inspection (GP12)" element is highlighted in blue in all three windows, demonstrating how data from a parent example is reused in child examples.

## Why Family FMEAs?



Common Processes that Scale across products such as plating, paint and coatings are good candidates for family FMEAs.

- They can be readily referenced across products and when changed cascade through all the impacted products resulting in:
  - Less errors because a product where the process was changed was missed.
  - Easy queries on these processes can provide useful information when making an environmental or safety assessment of where certain processes and chemicals are used.
  - This is increasingly important with the advent of REACH and RoHS in the EU and other parts of the world.

# Inheriting Data

APQP control plan: LVDS-Harness11

Control plan | Add.info | QSYS data | Documents | History | Prozessablaufdiagramm

QM plan no./Plant: LVDS-Harness11  
 QM type/Revision: Proto type 27.09.2007 10:08 (3) Proto t  
 Part no./last modification: 1670041 LVDS Harness

Item	Part no.	Process descr./ operation	Process type
700	1670041/LVDS Harness	700/ Assembly	◆
710	0-1719993-1/ Cable FL2YBCY	710/ Cutting of the cable length	□
200	0-1719993-1/ Cable FL2YBCY	200/ Incoming inspection	◇
900	0-1719993-1/ Cable FL2YBCY	900/ Store goods	□
720	0-1719993-1/ Cable FL2YBCY	720/ Stripping of the cable	◡
730	0-1418746-1/ Ferrule	730/ Pre handling of the stripped	◇
740	928999-1/ MQS Contact	740/ Crimping of MQS contacts	□
750	2-1418659-1/ MQS Housing	750/ Insertion of the housing	◆
760	957333-2/ Tesa Tape	760/ Fixing operation of the wire	□
770	0-1418660-1/ Shell half (Housir	770/ Mounting of the ferrule anc	◇
780	0-1418746-1/ Ferrule	780/ Crimping of the ferrule	□
785	1719311-1/ Tesa Tape	785/ Mounting of the adhesive t	□

Tree structure approaches to managing FMEAs and Control Plans can leverage the ability to inherit required data from a process FMEA into a Control Plan.

This eliminates redundant data entry and reduces opportunities for errors during the transfer of content.

Data flow from a Design or Process FMEA into a Control Plan can also continue the process further by bringing the data into Inspection Plans.

# Process Flowchart to FMEA to Control Plan Relationship

**1**

**2**

**3**

Item	Process descr./ operation	Part no.	Character status	Setting	Process type	Charact. type	Character type	Characteristic	Product/specification/ tolerances	Function	Import from	Export to	Freq.
700	700/ Assembly	1670041/ LVDS Harness											
710	710/ Cutting of the cable length	0-1719993-1/ Cable FL2YBCY		52-81911	Process	VAR	Length	0,05 ±0,01 Inch	Cutting of the cable length				
200	200/ Incoming inspection	0-1719993-1/ Cable FL2YBCY		52-81911	Process	ATT	quality of the cut jacketed cable	jacketed not damaged/jacketed correct surface/incorrect	Cutting of the cable length				
900	900/ Store goods	0-1719993-1/ Cable FL2YBCY		52-81911	Process	ATT	quality of the cutting area		Cutting of the cable length				
720	720/ Stripping of the cable	0-1719993-1/ Cable FL2YBCY		BET254	Process	ATT	Cable	OK/NO/Insert F4/edit F5/delete F8 insp_step	Stripping of the cable				
730	730/ Pre handling of the stripped cable	0-1418746-1/ Ferrule		BET254	Process	VAR	Length	0,025 ±0,005 Inch	Stripping of the cable				

# Control Plans to Inspection Plan

Item	Part no.	Process Name/ Operation/ Description	Function	Process type	Linked to	Characteristic no.	Characteristic	Product/Process Specification/ Tolerance	Importance	Characteristic status	No.	Cha
BOCAR	38225039	BOCAR/ 38225039										
70.01		70.01/ Move		→								
			Bring correct part									
70		70/ Machining		◇								
			Place cast in fixture									
			Cast placed correctly									
			Alignment bushing hole diameter									
			Locator bushing bore									
			Alignment bushing lead in chamfer height									
						PFC, CP, FMEA	Chamfer Height	Chamfer Height	0.5 ±0.25 mm	Critical		

Part insp plan 1000

Inspection step no.	Characteristic	Char. descr.	LT	Nominal value	UT	Unit short	OK	OK	NDK
1	DR-010	Inner Chamfer	-0.2000	25.2000	0.2000	mm			
2	DR-011	Outer Diameter	-0.2000	25.5000	0.2000	mm			
3	DR-012	Surface					no scratches		scratches
4	DR-014	Surface							
5	DR-012	Tooling					OK		not OK



## Closing the Loop and Change Management



Closed Loop Quality logic expects failures identified during inspection to be communicated back to Engineering closing the loop as lessons learned.

Providing Engineers a fast, reliable means of querying and seeing how failures and defects relate to specific products, and processes permit agile adjustments based on accurate representations of current state of experienced risk



# Examples of Failure Feedback from Inspection to FMEAs

The screenshot displays a software interface with a menu bar (File, Edit, Master data, Options, Window) and a toolbar. The main area is split into two panes:

- System structure:** A tree view for 'MONC M5 PFMEA' containing:
  - Creating spunbond nonwoven to meet customer requirements
  - Create product meeting product cost objectives.
  - Create product in a safe manner
  - Causes of Failure
  - Effects of Failure
  - Blending/Feeding
  - Extrusion
  - Spunbond Spinpump
- Failure net:** A list of failure modes with associated risk and descriptions:
  - (S=1/10) [MONC M5 PFMEA] [Creating spunbond nonwoven to meet customer requirements] Material out of spec
  - (S=1/1) [MONC M5 PFMEA] [Create product meeting product cost objectives.] Negative material usage variance
  - (S=1/1) [MONC M5 PFMEA] [Create product meeting product cost objectives.] Too much energy usage
  - (S=1/1) [MONC M5 PFMEA] [Create product meeting product cost objectives.] Inefficient/ poor run rate
  - (S=1/1) [MONC M5 PFMEA] [Create product in a safe manner] Process is unsafe
  - (S=1/1) [MONC M5 PFMEA] [Create product in a safe manner] Operator Injury
  - (S=1/1) [MONC M5 PFMEA] [Create product in a safe manner] Damage to equipment
  - (S=5/5) [MONC M5 PFMEA] [Causes of Failure] A portion of the production may have to be discarded. Deviation of the process
  - (S=5/5) [MONC M5 PFMEA] [Effects of Failure] Blade position unstable

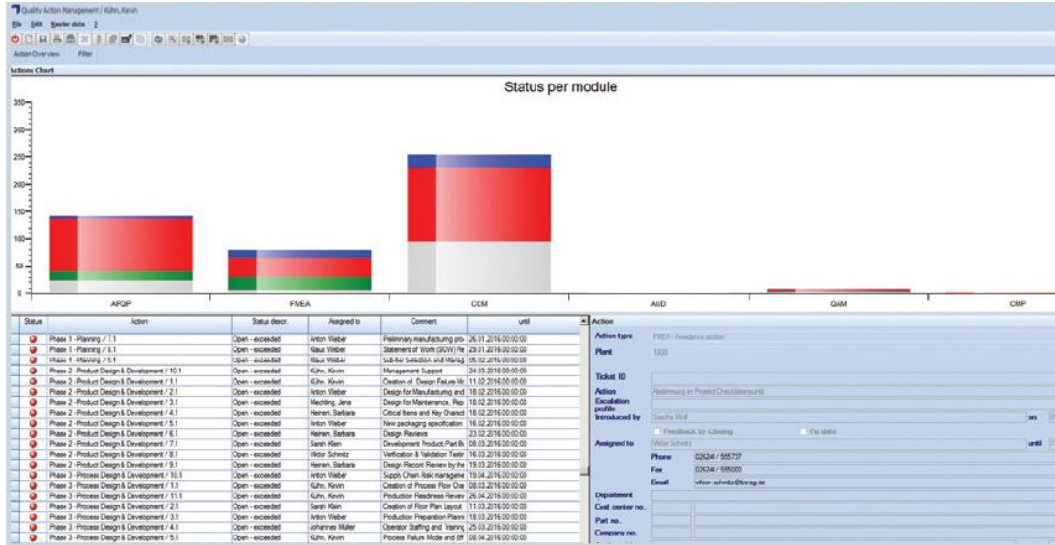
## Change Management: Faster, Better Communication, and Understanding



When a Design or Process FMEA is changed:

- The entire team is made aware
- The changed FMEA becomes a new revision and the previous one is archived but available for future analysis.
- Data, when properly authorized, can flow into the Control Plan and then into the Inspection Plans.
- These changes are real time and that is crucial in distributed global manufacturing landscapes in place today.

# Examples of Communication and Controls



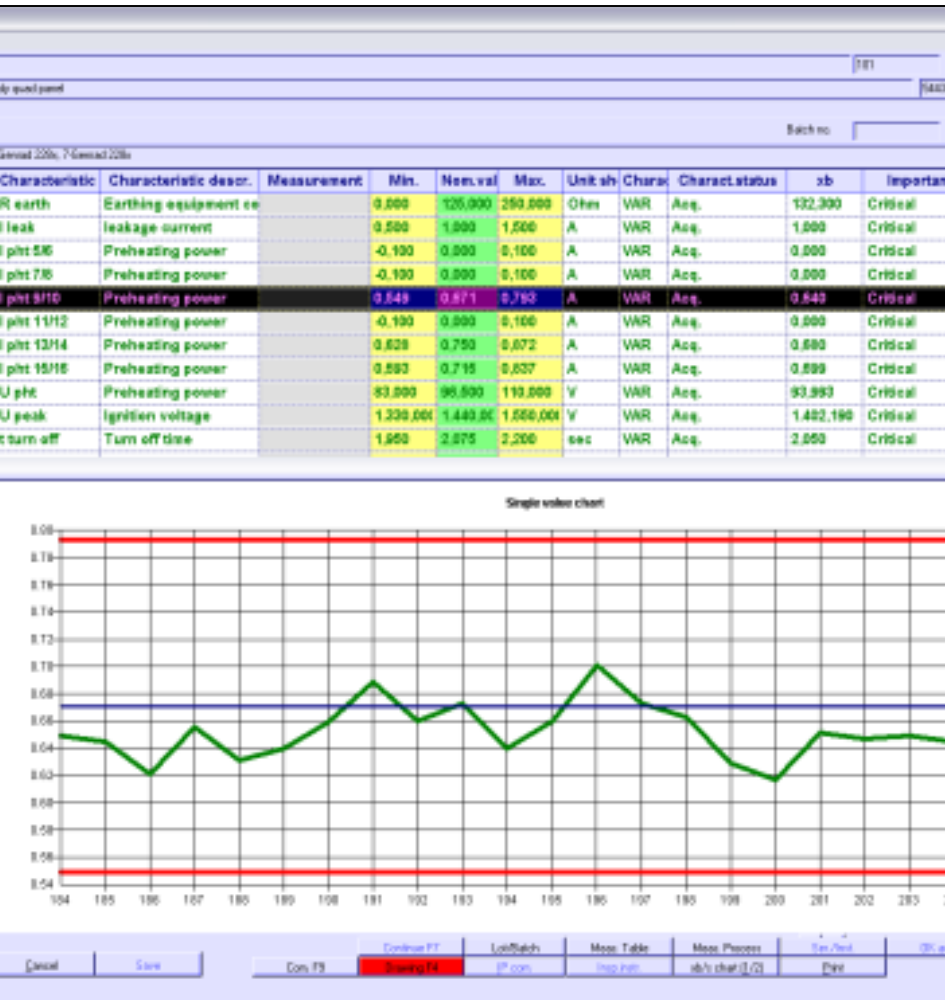
Kategorie	Firmen-Nr	Lieferant	Werk	Ort	Branche	Artikel-Nr	Artikel-Bez	TT-Pkt	MT-Pkt	BW-Pkt	Er-Pkt
C	800088950	Walterscheid RV GmbH	1800	Lohmar		KUNSTSTOFF-01	Klingdeckelverschluss	100,00	50,00	0	0
B	8003	HM Stahlvertriebs-GmbH	1800	München		CL 913	CL Metall Roh für T-Stück	100,00	75,00	95,65	154
A	8003	HM Stahlvertriebs-GmbH	1800	München		CL 915	Draht	100,00	100,00	0	0
C	8004	Schmitz AG	1800	Berlin		CL 911	CL O-Flang	100,00	75,00	77,64	125
C	8004	Schmitz AG	1800	Berlin		CL 913	CL Metall Roh für T-Stück	100,00	50,00	78,05	75
A	8004	Schmitz AG	1800	Berlin		CL 922	Kornstollengravel	100,00	100,00	0	0
A	8004	Schmitz AG	1800	Berlin		CL 923	Kugelhölzger	100,00	100,00	93,83	78
C	8004	Schmitz AG	1800	Berlin		MAX 8208-2000	Druckring	100,00	100,00	98,76	153
A	8006	Meier & Co.KG	1800	Kassel		CL 812	CL-Zusatzstube für T-Stü	100,00	100,00	0	0
A	8006	Meier & Co.KG	1800	Kassel		CL 815	Draht	100,00	100,00	0	0
A	8008	Schneider AG	1800	Köln		CL 923	Kugelhölzger	100,00	100,00	0	0
A	T 801	Archa	1800			T 901	Ceage	100,00	100,00	0	0
								<b>100,00</b>	<b>87,50</b>	<b>82,19</b>	<b>589</b>

Prüfung	Lieferanten-Nr.	Bestell-Nr.	Loggie	Drop Datum	Genehm an	Erstatt am	Status	Bestellmenge	Liefermenge	LC%
CLT Stak v/e Roh-A	18283 SCH	91827 SCH	100	23.04.2007 10:21:40	30.04.2007 16:00:11	30.04.2007 16:00:11	Besting angenommen	100	95	24,0%
CLT Stak v/e Roh-B	20374 SCH	92738 SCH	100	23.04.2007 15:41:36	30.04.2007 15:13:40	30.04.2007 15:13:40	Freigegeben	100	100	26,0%
CLT Stak v/e Roh-C	37465 SCH	73645 SCH	100	23.04.2007 10:42:38	26.04.2007 16:12:04	26.04.2007 16:12:04	Gesperrt	80	80	81,6%
CLT Stak v/e Roh-D	45262 SCH	45468 SCH	100	23.04.2007 14:41:03	30.04.2007 17:02:20	30.04.2007 17:02:20	Freigegeben	100	90	61,0%
CLT Stak v/e Roh-E	54827 SCH	54473 SCH	100	23.04.2007 10:01:13	30.04.2007 17:06:53	30.04.2007 17:06:53	Freigegeben	100	125	34,6%
CLT Stak v/e Roh-F	68866 SCH	77777 SCH	100	23.04.2007 11:00:34	30.04.2007 17:09:49	30.04.2007 17:09:49	Freigegeben	80	80	61,0%
CLT Stak v/e Roh-G	79304 SCH	24918 SCH	100	23.04.2007 11:02:01	30.04.2007 17:11:18	30.04.2007 17:11:18	Besting angenommen	100	100	81,6%
CLT Stak v/e Roh-H	43526SCH	12010 SCH	100	23.04.2007 11:01:40	30.04.2007 17:12:58	30.04.2007 17:12:58	Besting angenommen	100	150	60,0%
CLT Stak v/e Roh-I	52345 SCH	13089 SCH	100	23.04.2007 11:04:53	30.04.2007 17:14:11	30.04.2007 17:14:11	Freigegeben	100	100	10,0%
CLT Stak v/e Roh-J	62423 SCH	28055 SCH	100	23.04.2007 11:07:11	30.04.2007 17:15:11	30.04.2007 17:15:11	Besting angenommen	90	90	15,0%
CLT Stak v/e Roh-K	79545 SCH	45263 SCH	100	23.04.2007 11:13:37	30.04.2008 15:08:15	30.04.2008 15:08:15	Freigegeben	50	50	17,6%
CLT Stak v/e Roh-L	91828 SCH	52828 SCH	100	16.04.2009 16:21:04	30.04.2007 11:14:10	30.04.2009 16:36:45	Gesperrt	100	100	22,0%
CLT Stak v/e Roh-M	90786 SCH	80786 SCH	100	16.04.2009 16:21:04	30.04.2007 11:15:05	16.04.2009 16:43:00	Freigegeben	100	120	22,0%
CLT Stak v/e Roh-N	10543 SCH	11222 SCH	100	16.04.2009 16:21:04	30.04.2007 11:15:53	16.04.2009 16:43:23	Freigegeben	90	90	29,0%
CLT Stak v/e Roh-O	45868 SCH	11222 SCH	100	23.04.2007 11:16:06	30.04.2008 16:13:37	30.04.2008 16:13:37	Freigegeben	100	100	10,0%
CLT Stak v/e Roh-P	34333	22233	100	03.05.2007 17:15:20	30.04.2008 16:18:50	30.04.2008 16:18:50	Freigegeben	105	103	82,0%
CLT Stak v/e Roh-Q	34336	22273	100	03.05.2007 17:16:13	30.04.2008 16:19:23	30.04.2008 16:19:23	Freigegeben	160	160	22,0%
CLT Stak v/e Roh-R	99339	79993	100	03.05.2007 17:17:12	30.04.2008 15:08:43	30.04.2008 15:08:43	Freigegeben	80	72	23,0%
CLT Stak v/e Roh-S	88995	76173	100	03.05.2007 17:18:09	30.04.2008 15:09:08	30.04.2008 15:09:08	Freigegeben	100	98	67,0%
CLT Stak v/e Roh-T	99462	14221	100	03.05.2007 17:18:07	30.04.2008 15:08:29	30.04.2008 15:08:29	Freigegeben	100	100	10,0%

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# Reporting and Analytics



Data is only numbers until it becomes useful information.

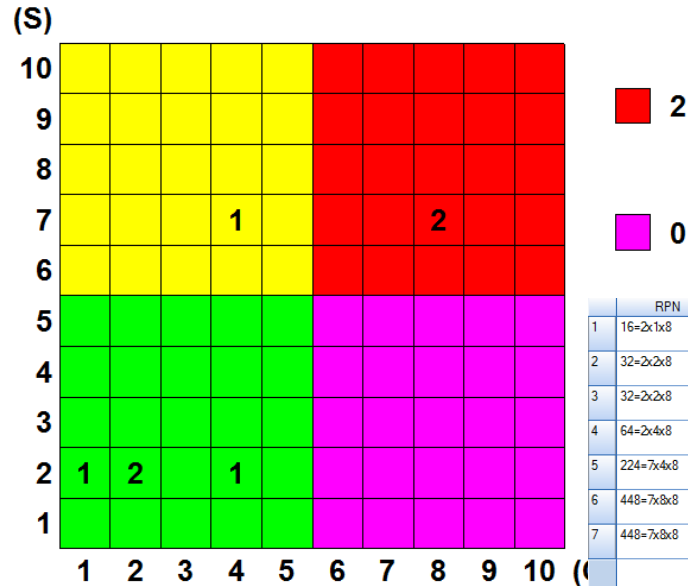
Seeing real time tracking of data and information in trending and reports can drive change and confirm validity of risk assumptions and effectiveness of controls.

Sharing Outputs in formats required by customers seamlessly saves time and creates trust and confidence.

# Examples of Outputs

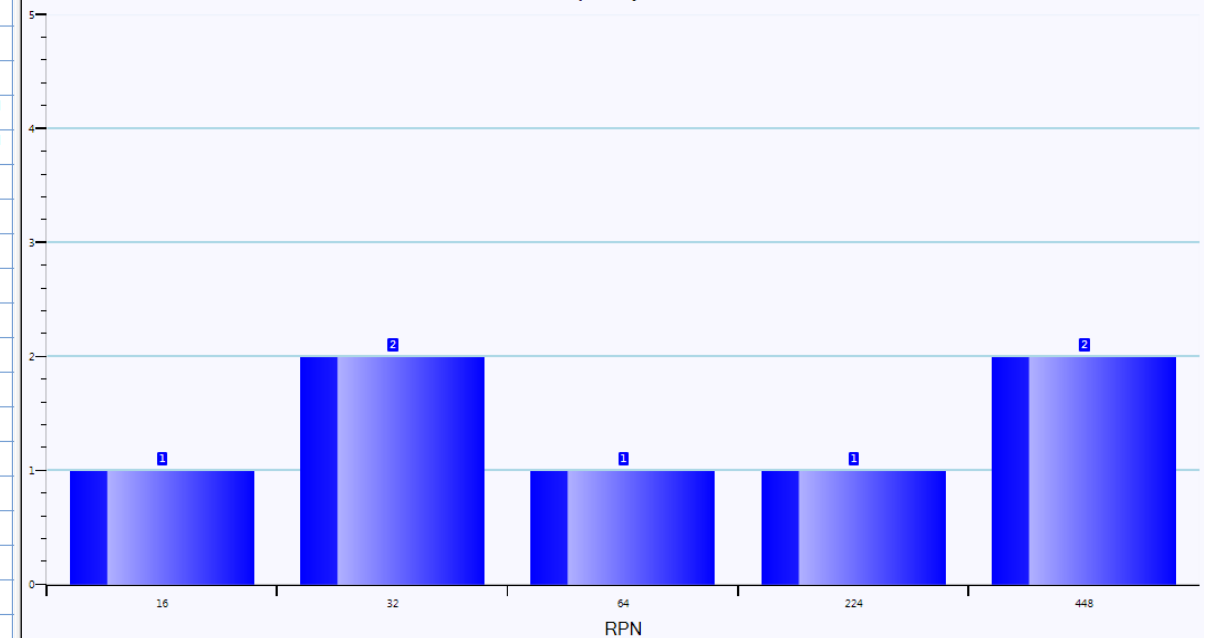
S/O	Cause of failure
1	7/8 [Machining] Fixture allows loading of the part incorrectly
2	7/8 [Machining] Fixture cleanliness, chips in fixture
3	7/4 [Machining] Process step skipped
4	2/4 [Machining] Process step skipped
5	2/2 [Move] Incorrect material identification
6	2/2 [Move] Material mixed or wrongly identified
7	2/1 [Move] Incorrect material identification

Distribution S/O



RPN	Cause of failure
1	16=2x1x8 [Move] Incorrect material identification
2	32=2x2x8 [Move] Incorrect material identification
3	32=2x2x8 [Move] Material mixed or wrongly identified
4	64=2x4x8 [Machining] Process step skipped
5	224=7x4x8 [Machining] Process step skipped
6	448=7x8x8 [Machining] Fixture allows loading of the part incorrectly
7	448=7x8x8 [Machining] Fixture cleanliness, chips in fixture

Frequency RPN



## Siemens and End to End Quality



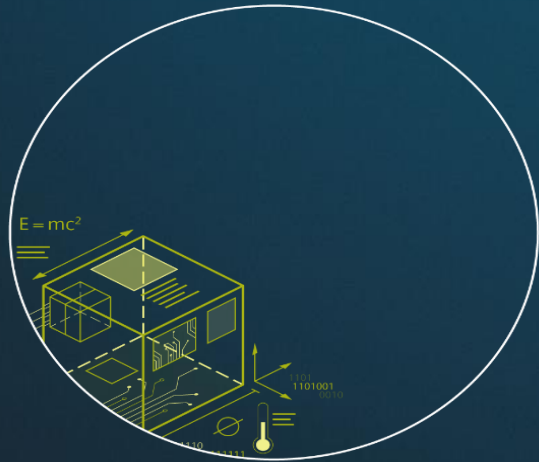
Siemens has invested energy, capital and resources in developing the most comprehensive Design and Quality solutions that scale across both industry sectors and enterprises of all configurations and sizes.

- Product and Application Lifecycle Management for electro-mechanical and embedded technology designs.
- Design and Process FMEAs and Advanced Product Quality Planning (APQP)
- Inspection , SPC and Supply Chain Management including Production Part Approval (PPAP)
- CAD Design Management

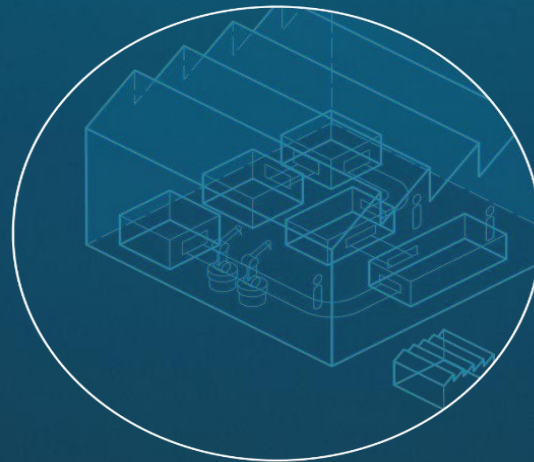
All these systems working together, leveraging the same data sources result in a “single source of truth” with the analytics and reporting to confirm, improve and evolve your business.

## Quality Domains connected seamlessly across the Enterprise

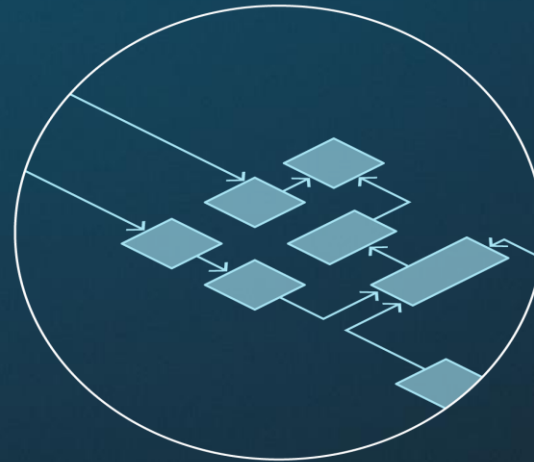
Design  
Quality



Manufacturing  
Quality



Process  
Quality



# Siemens Quality Management Drives

Speed



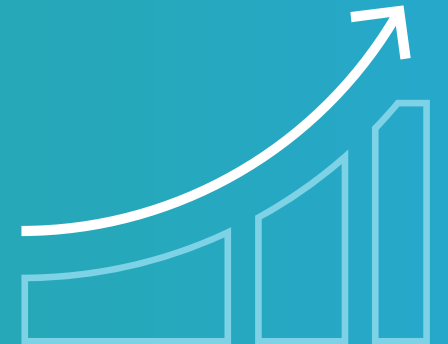
Flexibility



Quality



Efficiency



Security







# Thank You

Please contact [Mary.McAtee@siemens.com](mailto:Mary.McAtee@siemens.com) for any additional information