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Failure Modes Effects Analysis (FMEA) In Teamcenter 2005

Steve Boerman
Technical Consultant

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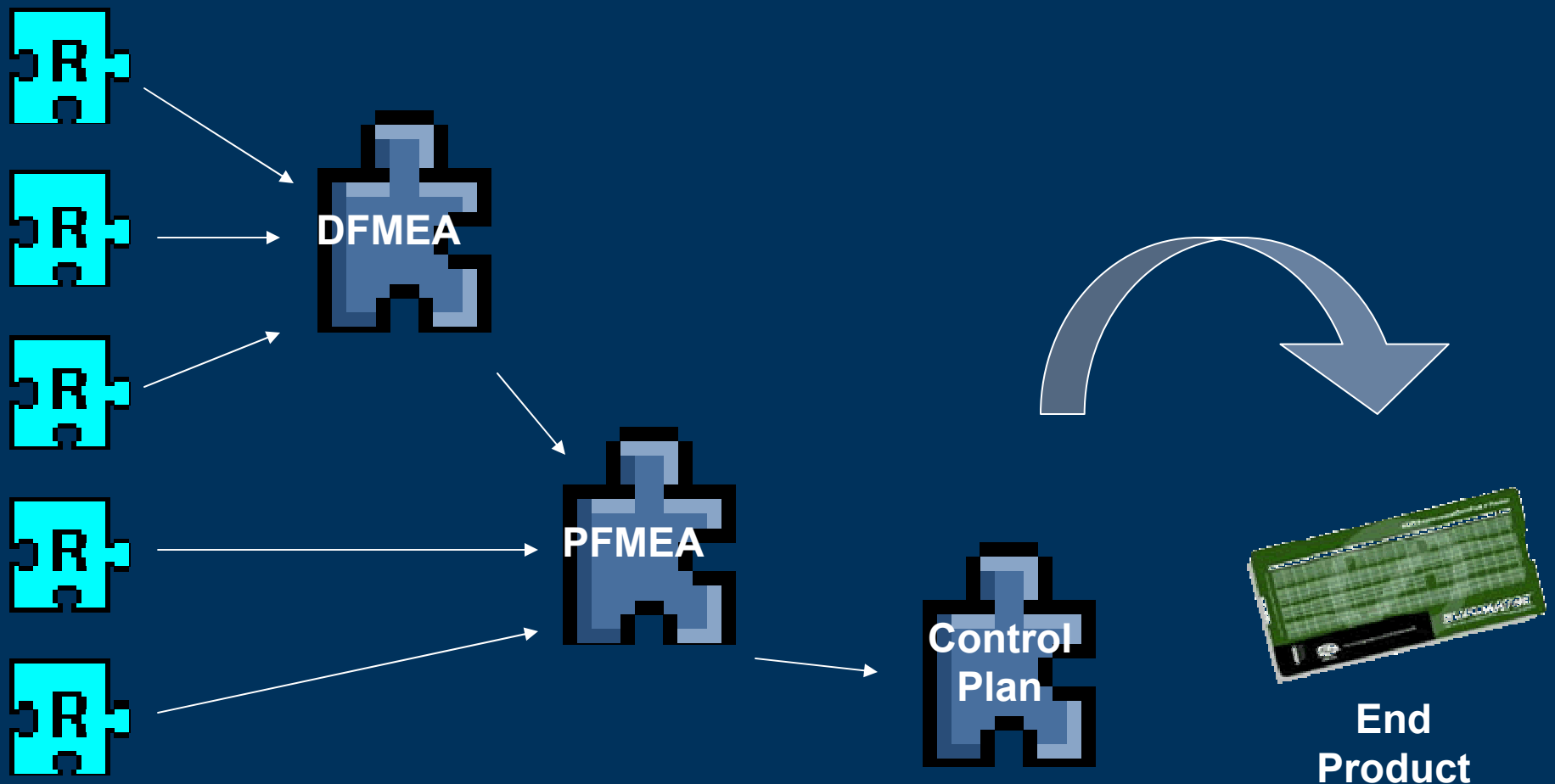
The Quality Process



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Auto-population of FMEA's

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Standard FMEA Document

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POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

Print # 01.03 Body — Rev. A — FMEA Number: 1234

System/Subsystem/Componen: SubSystem — Design Responsibility: Body Engineering — Prepared by: J. Ford-Assembly

Model Year(s)/Vehicle(s): 2005 — Key Date: 9/3/04 — Date (Orig.): 8/3/04

Team: T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps — Date (Rev.): 8/22/04

Item/ Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Design Controls	Det	R.P.N.	Recommended Actions	Responsibility & Target Date	Action Results: Actions Taken	Sev
Front Door LH	Corroded interior lower door panels	Unsatisfactory appearance due to rust	7	None	Upper Edge of protective wax application specified	6	Vehicle general durability test T-118 T-109 T-301	7	294	Add laboratory accelerated	A. Tate-Body Eng. 8/9/04	Based on test results upper	7
			7	None	Insufficient wax thickness specified	4	Vehicle general durability testing as above	7	196	Added laboratory	Combine w/test for	Test results (Test No. 1481)	7
			7	None	Inappropriate wax formulation specified	2	Physical and Chemical Lab test Report No.1265	2	28	None			Undefin
			7	None	Entrapped air prevents wax from entering	5	Design aid investigation with non-functioning spray	8	280	Add team evaluation using	Body Eng. & Assembly		7
			7	None	Wax application plugs door drain holes	3	Laboratory tes using "worst case" wax	1	21	None		Based on test, 3 additional vent	Undefin
			8	None	Insufficient room between	4	Drawing evaluation of	4	128	Add team	Body Eng. &	Evaluation	7

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POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

Print #	01.03 Body	Rev.	A	FMEA Number:	1234
System/Subsystem/Componen	SubSystem	Design Responsibility:	Body Engineering	Prepared by:	J. Ford-Assembly
Model Year(s)/Vehicle(s)	2005	Key Date	9/3/04	Date (Orig.)	8/3/04
Team:	T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps			Date (Rev.)	8/22/04

Item/ Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Design Controls	Det	R.P.N.	Recommended Actions	Responsibility & Target Date	Action Results: Actions Taken	Sev
Front Door LH	Corroded interior lower door panels	Unsatisfactory appearance due to rust	7	None	Upper Edge of protective wax application specified	6	Vehicle general durability test T-118 T-109 T-301	7	294	Add laboratory accelerated	A. Tate-Body Eng. 8/9/04	Based on test results upper	7
			7	None	Insufficient wax thickness specified	4	Vehicle general durability testing as above	7	196	Added laboratory	Combine w/test for	Test results (Test No. 1481)	7
			7	None	Inappropriate wax formulation specified	2	Physical and Chemical Lab test Report No.1265	2	28	None			Undefin
			7	None	Entrapped air prevents wax from entering	5	Design aid investigation with non-functioning spray	8	280	Add team evaluation using	Body Eng. & Assembly		7
			7	None	Wax application plugs door drain holes	3	Laboratory tes using "worst case" wax	1	21	None		Based on test, 3 additional vent	Undefin
			8	None	Insufficient room between	4	Drawing evaluation of	4	128	Add team	Body Eng. &	Evaluation	7

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Automatic Population of Header Information

POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(PROCESS FMEA)

Print # 01.03 Body Rev. A FMEA Number: 1450

Item: Front Door LH/011 Process Responsibility Body Eng./Assembly Opps Prepared by: J. Ford-Assem

Model Year(s)/Vehicle(s) 2005 Key Date 9/3/04 Date (Orig.) 8/5/04

Team: T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps Date (Rev.) 8/15/04

Process Function/ Require-ments	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Process Controls	Det	R.P.N.	Recommended Actions	Responsibility & Target Date	Actions Taken
Manual appliation of wax inside door	Insufficient wax coverage over specified surface	Deteriorated life of door Leading to unsatisfactory appearance due to rust through paint over time and Impaired function of interior	7		Manually inserted spray head not inserted ar enough	8	Visual check each hour 1/shiftfro film thickness (depth meter) and coverage	5	280	Add positive depth stop to sprayer	Mfg. Eng. 9/10/04	Stop added, sprayer checked on line
			7		Spray heads clogged becuase viscosity too high, temperature too low, pressure too low	5	Test spray pattern at start-up and after idle periods, and preventative maintenance program to clean heads	3	105	Use Design of Experiments (DOE) on viscosity vs. temperature vs.	Mfg. Eng. 9/10/04	Temperature and pressure limits were determined and limit controls have veen
			7		Spray head deformed due to impact	2	Preventative maintenance programs to maintain head	2	28	None		

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- Benefits to Auto Population
  - Enter Common Information Once
  - Reduced Manual Errors and Rework
  - Increased Document Quality

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Creating FMEA's and Collaborative Authoring

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FMEA Construction

FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

Print # 01.03 Body — Rev. A — FMEA Number: 1234

System/Subsystem/Componen: SubSystem — Design Responsibility: Body Engineering — Prepared by: J. Ford-Assembly Opps

Model Year(s)/Vehicle(s): 2005 — Key Date: 9/3/04 — Date (Orig.): 8/3/04

Team: T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps — Date (Rev.): 8/22/04

Item/ Function	Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Design Controls	Detec	R.P.N.	Recommended Actions	Responsibility & Target Date	Action Results: Actions Taken	Sev	Occ	Det	R.P.N.
Front Door LH	Corroded interior lower door panels	Undatisfactory appearance due to rust	5	None	Upper Edge of protective wax application specified	2	Vehicle general durability test T-118 T-109 T-301	8	80	Add laboratory accelerated	A. Tate-Body Eng 8/9/04	Based on test results upper	4	2	3	24
					Insufficient was thickness specified	4	Vehicle general durability testing as above	8	160	Added laboratory	Combine w/test for	Test results (Test No. 1481)	4	1	2	8
					Inappropriate wax formulation specified	2	Physical and chemical lab test report No. 1265	2	20	None			3	1	4	12
					Entrapped air prevents wax from entering	5	Design aid investgation with non-functioning spray	8	200	Add team evaluation using	Body Eng. & Assembly		7	2	2	28
					Wax application plugs door drain holes	3	Laboratory test using "worst case" wax	1	15	None		Based on test, 3 additional vent	7	2	2	28
					Insufficient room between panels for spray head	4	Drawing evaluation of spray head access	5	100	Add team evaluation using	Body Eng. & Assembly	Evaluation showed	7	3	2	42
Front Door RH	Corroded interior lower door panels	Undatisfactory appearance due to rust	4	None	Upper Edge of protective wax application specified	5	Vehicle general durability test T-118 T-109 T-301	8	160	Add laboratory accelerated	A. Tate-Body Eng 8/9/04	Based on test results upper	3	2	3	18
					Insufficient was thickness specified	4	Vehicle general durability testing as above	3	48	Added laboratory	Combine w/test for	Test results (Test No. 1481)	7	1	4	28
					Inappropriate wax formulation specified	2	Physical and chemical lab test report No. 1265	2	16	None			7	6	3	126
					Entrapped air prevents wax from entering	5	Design aid investgation with non-functioning spray	5	100	Add team evaluation using	Body Eng. & Assembly		7	4	1	28
					Wax application plugs door drain holes	3	Laboratory test using "worst case" wax	1	12	None		Based on test, 3 additional vent	7	4	2	56
					Insufficient room between panels for spray head	6	Drawing evaluation of spray head access	4	96	Add team evaluation using	Body Eng. & Assembly	Evaluation showed	7	3	2	42

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FMEA Construction

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
2						FAILURE MODE AND EFFECTS ANALYSIS											
3	Print #	01.03 Body	Rev.	A		(DESIGN FMEA)						FMEA Number:	1234				
5	System/Subsystem/Componen	SubSystem				Design Responsibility:		Body Engineering				Prepared by:	J. Ford-Assembly Opps				
7	Model Year(s)/Vehicle(s)	2005				Key Date		9/3/04				Date (Orig.)	8/3/04				
9	Team:	T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps										Date (Rev.)	8/22/04				
11					C	Potential	O		D								
12	Item/	Potential	Potential	S	l	Cause(s)/	c	Current	e	R.	Recommended	Responsibility	Action Results				
13	Function	Failure	Effect(s) of	e	a	Mechanism(s)	c	Design	t	P.	Actions	& Target	Actions	S	O	D	R.
14		Mode	Failure	v	s	of Failure	u	Controls	e	N.		Date	Taken	e	c	e	P.
15					s		r		c					v	c	t	N.
17	Front Door LH	Corroded interior lower door panels	Undatisfactory appearance due to rust	5	None	Upper Edge of protective wax application specified	2	Vehicle general durability test T-118 T-109 T-301	8	80	Add laboratory accelerated	A. Tate-Body Eng 8/9/04	Based on test results upper	4	2	3	24

- D FUNC
- D MODE
- D CAUS
- D CONT
- D ACT

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	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
2						FAILURE MODE AND EFFECTS ANALYSIS											
3	Print #	01.03 Body	Rev.		A	(DESIGN FMEA)						FMEA Number:	1234				
5	System/Subsystem/Componen		SubSystem			Design Responsibility:		Body Engineering				Prepared by:	J. Ford-Assembly Opps				
7	Model Year(s)/Vehicle(s)		2005			Key Date		9/3/04				Date (Orig.)	8/3/04				
9	Team:	T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps										Date (Rev.)	8/22/04				
12	Item/	Potential	Potential	S	C	Potential	O		D	R.	Recommended	Responsibility	Action Results				
13	Function	Failure	Effect(s) of	e	l	Cause(s)/	c	Current	e	P.	Actions	& Target	Actions	S	O	D	R.
14		Mode	Failure	v	a	Mechanism(s)	u	Design	t	N.		Date	Taken	e	c	e	P.
15					s	of Failure	r	Controls	c					v	c	t	N.
17	Front Door LH	Corroded interior lower door panels	Undatisfactory appearance due to rust	5	None	Upper Edge of protective wax application specified	2	Vehicle general durability test T-118 T-109 T-301	8	80	Add laboratory accelerated	A. Tate-Body Eng 8/9/04	Based on test results upper	4	2	3	24
18						Insufficient was thickness specified	4	Vehicle general durability testing as above	8	160	Added laboratory	Combine w/test for	Test results (Test No. 1481)	4	1	2	8
19						Inappropriate wax formulation specified	2	Physical and chemical lab test report No. 1265	2	20	None			3	1	4	12
20						Entrapped air prevents wax from entering	5	Design aid investgation with non-functioning spray	8	200	Add team evaluation using	Body Eng. & Assembly		7	2	2	28
21						Wax application plugs door drain holes	3	Laboratory test using "worst case" wax	1	15	None		Based on test, 3 additional vent	7	2	2	28
22						Insufficient room between panels for spray head	4	Drawing evaluation of spray head access	5	100	Add team evaluation using	Body Eng. & Assembly	Evaluation showed	7	3	2	42

Quality Folder

- D FUNC
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POTENTIAL
FAILURE MODE AND EFFECTS ANALYSIS
(DESIGN FMEA)

01.03 Body — Rev. A — FMEA

Subsystem/Component: SubSystem — Design Responsibility: Body Engineering — Pre

Year(s)/Vehicle(s): 2005 — Key Date: 9/3/04 — Da

T. Fender- Car Prod. Dev., Childers- Man., J. Ford-Assembly Opps — Da

Potential Failure Mode	Potential Effect(s) of Failure	Sev	Class	Potential Cause(s)/ Mechanism(s) of Failure	Occur	Current Design Controls	Detec	R.P.N.	Recommended Actions	Re
Corroded interior lower door panels	Unsatisfactory appearance due to rust	7						224	Add laboratory accelerated	A. Eng
		7						196	Added laboratory	Cor w/t
		7						28	None	
		7						280	Add team evaluation using	Boc Ass
		7	None	Wax application plugs door drain holes	5	Laboratory tes using "worst case" wax	1	21	None	
		8	None	Insufficient room between panels for spray head	4	Drawing evaluation of spray head access	4	128	Add team evaluation using	Boc Ass
Corroded interior lower door panels	Unsatisfactory appearance due to rust	7	None	Upper Edge of protective wax application specified	6	Vehicle general durability test T-118 T-109 T-301	7	294	Add laboratory accelerated	A. Eng

TcR Office Interface

This spreadsheet was saved from a TcR Excel-live session.
Do you want to connect to the TcR server?

If you click No, all changes will be accumulated.

Yes | No

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- Benefits to Collaborative Authoring
  - Reduce Travel and Need for Single Site Meetings
  - Reduce Cycle Time Enabled by Concurrent Document Authoring
  - Single Source to Quality Documentation

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FMEA Traceability

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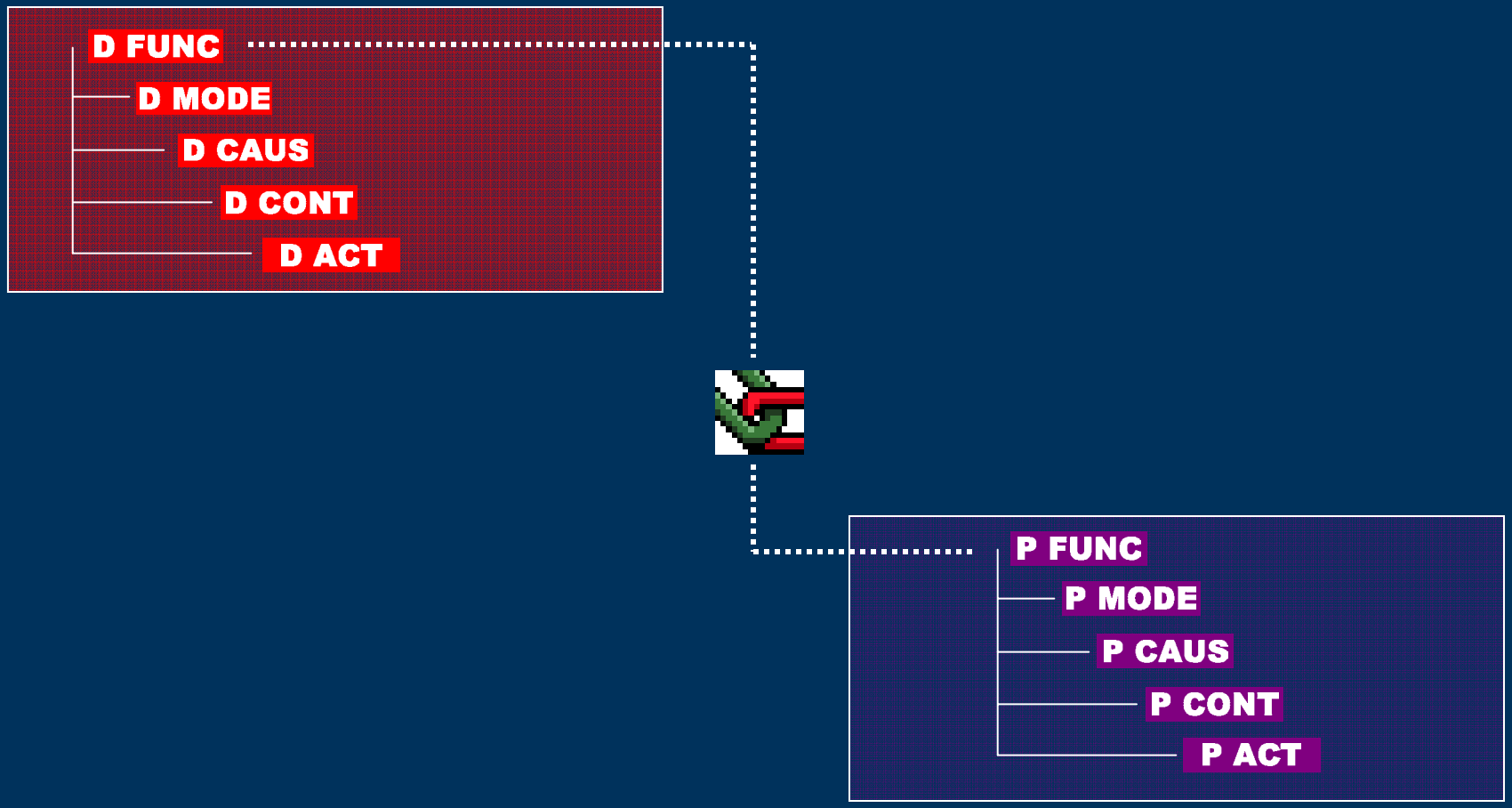
Enabling Traceability



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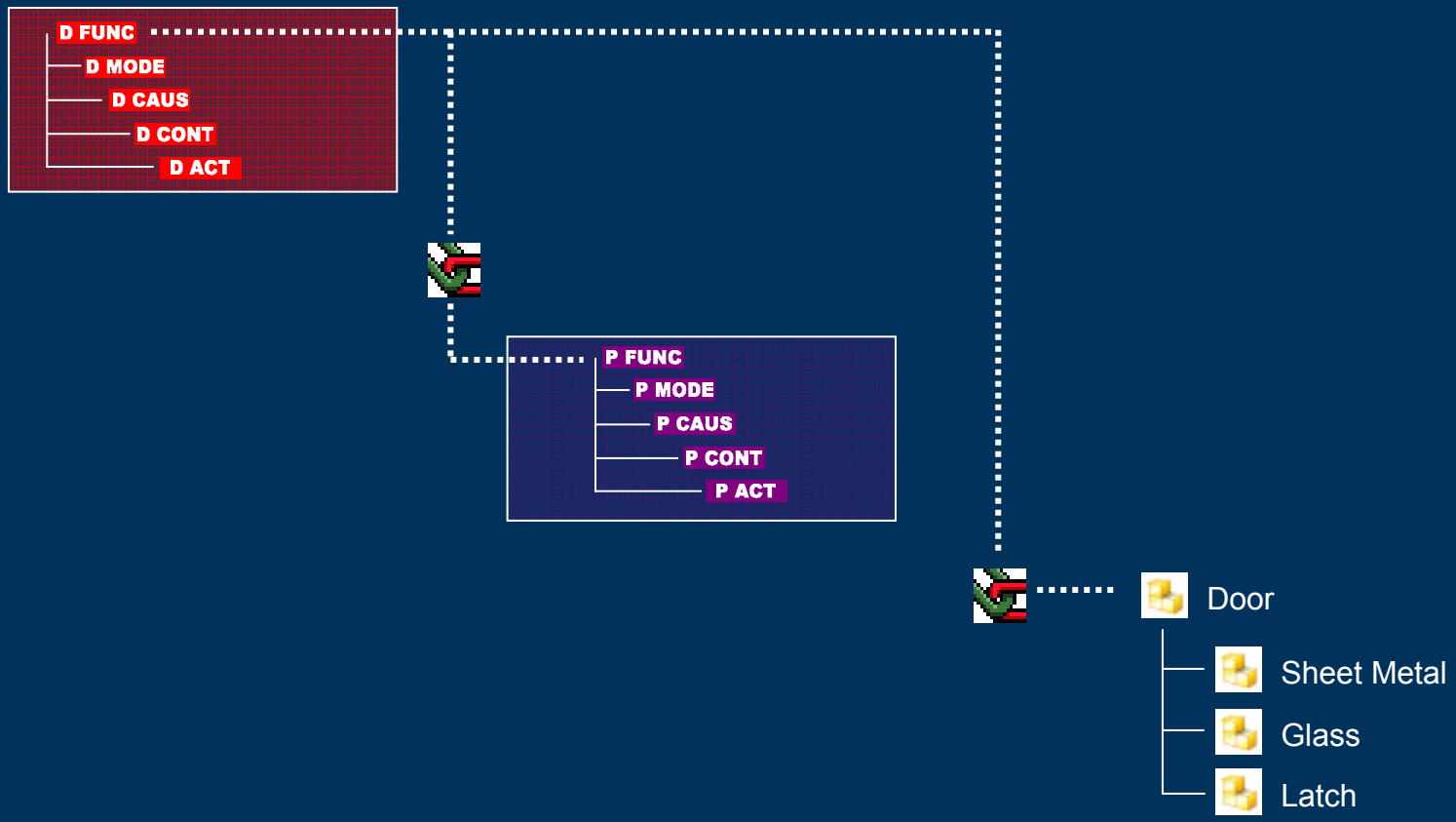
Enabling Traceability



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- Benefits of FMEA Traceability
  - Relate FMEA Information Directly to Product Structure
  - Access Impact of Requirement, Design or Process Change
  - Traceability from Voice of Customer to Product Design

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FMEA Commonization and Reuse

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FMEA Commonization and Reuse

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Existing Product

- D FUNC
  - D MODE
    - D CAUS
      - D CONT
        - D ACT

- D FUNC
  - D MODE
    - D CAUS
      - D CONT
        - D ACT

- D FUNC
  - D MODE
    - D CAUS
      - D CONT
        - D ACT

New Product

- D FUNC
  - D MODE
    - D CAUS
      - D CONT
        - D ACT

- D FUNC
  - D MODE
    - D CAUS
      - D CONT
        - D ACT

- D FUNC
  - D MODE
    - D CAUS
      - D CONT
        - D ACT

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- Benefits to Commonization and Reuse
  - Reduced Verification and Validation Time
  - Increased Time for Innovation
  - Cost Reductions by Leveraging Proven Deliverables

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Why Failure Modes Effects Analysis (FMEA) In Teamcenter 2005

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Commonization and Reuse

- Reduced verification and validation time
- Increased time for innovation
- Cost reduction by leveraging proven deliverables

FMEA Traceability

- Relate FMEA information directly into product structure
- Access the impact of requirement, design or process change
- Complete traceability from voice of the customer to product design

Collaborative Authoring

- Reduce travel and single site meetings
- Reduced cycle time enabled by concurrent document authoring
- Single source to all quality documentation

Auto Population

- Enter common information once
- Reduced manual errors and rework
- Increased document quality

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Failure Modes Effects Analysis (FMEA) In Teamcenter 2005

Thank You

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