Teamcenter Variant Matrix

Vereinfachung des Variantenmanagements



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The Business Problem: Managing Product Complexity



Product complexity is increasing



Customers demand greater individual choice



Offer variety without driving up costs



Many contributors to product definition



Complex network of features and constraints intertwined with product content



Increased demand to visualize, validate and perform impact analysis for any (and across many) configurations

Ausgangssituation

IST-Situation

Engineer to Order	Configure to Order
60-80%	20-40%

Individualentwicklung

Gleichteilverwendung 10-30%

Entwicklungsaufwand

Hoher Konstruktionsaufwand bei sinkenden Margen

Steigende Anforderungen

Kunden: Individuelle Produkte, zum besten Preis, am liebsten sofort Wettbewerb / Markt: schneller reagieren, mehr Aufträge

Ihre Zielsetzung

Engineer to Order 20-40%	Configure to Order 60-80%
Modularer Baukasten	
Gleichteile Bis	verwendung 70%
Entwicklungsaufwand	
Aufwandsreduzier Bis	ung Konfigurieren statt 80% Konstruieren
Projektkosten/ -zeitsenkun	g
Montagezeit Bis	Materialkosten 30%



Solution Portfolio / Variant Matrix product spectrum



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Variability Management product overview



- All Parts are Engineered
- Configuration focused on Part inclusion/exclusion
- Final Product Assembly designed during Order
- Technical Driven unlimited possible Solutions

Siemens Configuration

Variability Management product overview

Variant Matrix	Product Configurator	Rules	tream ETO
Standard products	Configure-to-order	High complexity Configure-to-order	Engineer-to-order
			<image/>

CTS & CTO Process

- All Parts are Engineered
- Configuration focused on Part inclusion/exclusion

- ETO Process
- Final Product Assembly designed during Order
- Technical Driven unlimited possible Solutions

Siemens Configuration

Definition: SKU

SKU = Stock keeping unit





Definition: SKU



Definition: CTS





Teamcenter Variant Matrix Rapid creation and management of 100% product variant BOMs



VARIANT MATRIX - Manage Product Variant BOM(s)



Grid style matrix authoring - targeted at high similarity products



Variant Matrix Basic concept

- Solution available on Activ workspace
- Rapid creation and manage of 100% Product Variant B in a grid style matrix
- Product release for manufacturing is based on 100% BOM directly upon completion
- Easy to compare products revisions in a single view

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Individual part Used in different SKUs	dy, North America TYP C dy, Latin America TYP C	ItemRevision	Quantity part occu	if, a Irs ir	nd h n thi	now s P	ofte rod	en, uct	this	5					1						1	•	



Variant Matrix in Action



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Teamcenter Variant Matrix in Action





Modules & Features



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Cantazo Car 150% Part List 100% SKU **Product Line** Premium Entry Heads Up Display Mid Element ID Module A 1 Instrument Clusters Infotainment Modules Displays HUDs Module B 1 1 Module C 1 Premium Mid Entry 6° * 2° 4° * 1.2° 9° * 3° Module D 1 Up to 2 meters Up to 3 meters Up to 5 meters Module E 1 Up to 15.000 cd/m Up to 12.000 cd/m² Up to 10.000 cd/m² 1.8″TFT 1.2"TFT 3.1"TFT or DLP Module F Yes, without color shi Yes, without color sh es without col

Grid style matrix authoring - targeted at high similarity products

Module Part List	Var	riants		
Product Line Heads Up Display	Entry	Mid	remium	
Element ID			_	
Module A				
Module B				
Module C				
Module D				
				PL Matrix is launcher with modules



Module Part List	Var	riants	_	
Product Line Heads Up Display	Entry	Mid	remium	
Element ID			<u>م</u>	
Module A	1	1	1	
Module B		1	1	
Module C			1	
Module D			• 1	
			Consum Prod	ne modules into luct Variants

2



Module Part List	Var	iants		7
Product Line Heads Up Display	Entry	Mid	emium	
Element ID			٦ ٦	
Module A	1	1	1	
Module B		1	1	
Module C			1	
Module D			1	
				1

Add module variants for the selected module A



Module Part List	Variants					
Product Line Heads Up Display Element ID	Entry	Mid	Premium			
Module A	1	1	1			
X1 •						
X2						
X3						
Module B		1	1			
Module C			1			
Module D			1			
User adds placeholder variants under the Module A using RMB command						



Module Part List	Va	riants	5	_
Product Line Heads Up Display	intry	Mid	mium	
Element ID	ш		Pre	
Module A	<u>}</u> 1	1	1	
X1				
X2				
X3				
Module B		1	1	
Module C			1	Open Medule Metrix
Module D			1	



Module Part List	Var	riants	
Product Line Heads Up Display Element ID	Entry	Mid	Premium
Module A	1	1	1
X1			
X2			
X3			
Module B		1	1
Module C			1
Module D			1

Module A Part List	Var		
Module A	1	5	(3
Element ID		^	
Part P1			\setminus
Part P2			
Part P3			
Part P4			

System opens the Module A Matrix with placeholder variants



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Module Part List	Var	riants	
Product Line Heads Up Display Element ID	Entry	Mid	Premium
Module A	1	1	1
X1			
X2			
X3			
Module B		1	1
Module C			1
Module D			1



Module A Part List	Var	riants	
Module A	5	2	Ċ,
Element ID	×	×	×
Part P1	1		
Part P2		1	
Part P3	1		1 •
Part P4		1	1

User creates BOM for the placeholder variants



Module Part List	Var	iants	
Product Line Heads Up Display Element ID	Entry	Mid	Premium
Module A	1	1	1
X1			
X2			
X3			
Module B		1	1
Module C			1
Module D			1





Module Part List	Var	iants		
Product Line Heads Up Display Element ID	Entry	Mid	Premium	System launches the main PL Matrix
Module A	1	1	1	
►X1				
► X2				
▶ X3				
Module B		1	1	
Module C			1	
Module D			1	
h				

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Parts are populated for each of the variant

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Module Part List	Var	riants		
Product Line Heads Up Display Element ID	Entry	Mid	Premium	
Module A	1	1	1	
▼X1	1			
P1	1			
P3	1			
►X2		1		
► X3			1	
Module B		1	1	
Module C			1	User
Module D			1	module

User consumes the module Variants into the PL Variants

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Module Part List	Var	iants		_	
Product Line Heads Up Display	Entry	Mid	Premium		
	1	1	1	_	
		I		_	
► X1	1			_	
►X2		1			
►X3			1	•	
Module B		1	1		
Module C			1	Populate the mail	d n
Module D			1	collapsing	t

Populated Matrix for the main PL after collapsing the module variant BOM



Module Part List	Var	riants		
Product Line Heads Up Display	Entry	Mid	Premium	
Element ID				
Module A				
▼X1				
P1	1			
P3	1			
►X2				
►X3			•	
Module B				
Module C				
Module D				

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Module A Part List	Var	iants	
	X1	X2	X3
Element ID			
Part P1	1		
Part P2		1	
Part P3	1		1
Part P4		1	1

User consumes the module Variants into the PL Variants

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Teamcenter Variant Matrix Features Column menus on Product Variants



Teamcenter Variant Matrix Excel like – selective copy paste

Drag and copy an area in the Matrix to author similar product variants

Excel like drag area to copy cell values and smart paste

Con	tent Variant Matrix Variants C	Overvie	w Where Us	ed Atta	chmer	nts H	istorv	Pa	rticip	ants	
Matrix	Round-Trip Configurati Selection Product Properties on Mode Filter	t Qu Act	ही ick tess								
Filter:]		2600/A;1-Japan, Body only	2602/C;1-Americas Wildlife	2603/A;1-Americas Type A	2604/A;1-Americas Type C	2605/A;1-Germany Type A	Contrast Community Trans D
	Element Name		Substitutes	Action	-	005	005	005	005	005	000
8	002590/A;1-Body, North America TYP A	D	002619	Reference	e	1		1		1	
8	002591/A;1-Body, Latin America TYP A1	1		Reference	e	2	2	1	2	1	
8	002592/A;1-Body, Europe TYP A			Reference	e		1	2	1	1	
8	002593/A;1-Body, North America TYP B			Reference	e	1		1	1	-	op
8	002594/A;1-Body, Latin America TYP B			Reference	e	1		1	2	1	Past

Teamcenter Variant Matrix Search in the Part list

Search for parts by name in the product line part list.

Helps users to narrow down on parts of interest and reduced number of rows in the matrix

	tent Variant Matrix Variants O	verview	Where Us	ed Atta	achmen	its H	istory	Pa	rticipa	ants		
Matri	्ब्रि १८०० ४ = ♥ Round-Trip Configurati Selection Product Properties on Mode Filter	Quick Access										
Filter: Ame	rica]		ly only	Vildlife	ype A	ype C	ype A	ype B	A
						00	10				5	
Us cri	er Keys in the search teria in the filter	Sub	stitutas	Action	100	002600/A;1-Japan, {	002602/A;1-Americ	002603/A;1-America	002604/A;1-America	002605/A;1-German	002606/A;1-Germar	002607/A:1-China Ty
Us cri	er Keys in the search teria in the filter Element Name 002590/A(1-Body, North America TYP A	Sub	stitutes	Action	(c) ce	002600/A;1-Japan, E	002602/A,1-Americ	002603/A;1-America	002604/A;1-America	002605/A;1-German	002606/A;1-German	on 002607/A:1-China Tv
	Element Name 002590/A:1-Body, North America TYP A 002591/A:1-Body, Latin America TYP A11	Sub	istitutes 519	Action Reference Reference	(j) ce ce	N H 002600/A;1-Japan, E	N 002602/A;1-Americ		N002604/A;1-America	H 002605/A;1-German	∾ 002606/A;1-Germar	un 002607/A:1-China Tv
	Element Name 002590/A:1-Body, North America TYP A 002591/A:1-Body, Latin America TYP A11 002593/A:1-Body, North America TYP B	Sub ∑ 0026	istitutes 519	Action Reference Reference	ce ce ce	H H 002600/A;1-Japan, E	N 002602/A;1-Americ	H H 002603/A;1-America	H 002604/A;1-America	N 1 002605/A;1-German	T 002606/A;1-German	un 002607/A:1-China Tv

Teamcenter Variant Matrix Filter Product Variants

Filter the Product variants by it's meta data. E.g. by business zones, categories etc.

Helps to reduce the number of columns in the matrix and can operate only the columns that the user is interested in.

Content Variant Matrix Variants Overview	Where Used Attachments History F	articipants					
Product Filter c	× Matrix Round-Trip Configurati Selection Properties on Mode	Dduct Quick Access					
Revision	Filter		only	oe C		dlife	
Filter			Sody	as Typ	ype B	as Wil	
A (20)	Filter the required		pan, f	nerica	ina T	nerica	
Element Name	Variant by just		A:1-Ja	A;1-Ar	A;1-Ch	A;1-Ar	
Filter	- cristing on the		2600/	2604/	2608/	2602/	
✓ 002600/A;1-Japan, Body only (1) 002602(A)1 American Wildlife (1)	Element Name	Substiti (6)	00	00	00	00	System display
002603/A:1-Americas Type A (1)	002599/A;1-Battery Pack HC						the filtered
✓ 002604/A;1-Americas Type C (1) 002605/A;1-Germany Type A (1)	002592/A;1-Body, Europe TYP A						variant
002606/A;1-Germany Type B (1) 002607/A;1-China Type A (1)	002595/A:1-Body, Europe TYP B		2				
✓ 002608/A;1-China Type B (1) 002609/A;1-China Type C (1)	002596/A;1-Body, Japan TYP B		2				
002610/A;1-UK Type A (1) 002611/A;1-UK Type B (1)	002591/A:1-Body, Latin America TY	A11	2				
002612/A;1-Japan Travel TYP A (1) 002614/A;1-Japan Travel TYP C (1)	002594/A;1-Body, Latin America TYI	В	1				
002615/A;1-Japan, Body Only (1) 002616/A;1-Japan Wildlife Type A (1)	002590/A:1-Body North America T	P.A. D. 002619	1				
002617/A:1-Americas Travel Type D (1)		P. Contraction					



Teamcenter Variant Matrix Export the matrix



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5	- Font	Name =						
	A	В	С	D	E	F	G	н
L	Element Name	Revision Name	ID	Revision	Sequence	Quantity	Unit Of Measure	Release Stat
2	Body	North America TYP A	Body	North America TYP A	14250	A	10	
3	Body	Latin America TYP A11	Body	Latin America TYP A11	14251	A	20	
1	Body	Europe TYP A	Body	Europe TYP A	14252	A	30	
5	Body	North America TYP B	Body	North America TYP B	14253	A	40	
5	Body	Latin America TYP B	Body	Latin America TYP B	14254	A	50	
1	Body	Europe TYP B	Body	Europe TYP B	14255	A	60	
3	Body	Japan TYP B	Body	Japan TYP B	14256	A	70	
)	Battery Pack HC	Battery Pack HC	14257	A	80		each	
0	Battery Pack NC	Battery Pack NC	14258	A	90		each	
1	Battery Charger	North America	Battery Charger	North America	14259	A	100	
2	Battery Charger	Latin America	Battery Charger	Latin America	14260	A	110	
3	Lens	10mm F2.8	Ultra Wide	Lens	10mm F2.8	Ultra Wide	14267	A
4	Lens	12mm F2.8	Full Frame	Lens	12mm F2.8	Full Frame	14268	A
5	Lens	16mm F2.8	Full Frame	Lens	16mm F2.8	Full Frame	14269	A
6	Lens	20mm F2.8	Full Frame	Lens	20mm F2.8	Full Frame	14270	A
7	Lens	24mm F2.8	Full Frame	Lens	24mm F2.8	Full Frame	14271	A
8	Battery Charger	Asia	Battery Charger	Asia	14262	A	230	
9	Power Cable	Japan	Power Cable	Japan	14266	A	240	
0	Power Cable	Europe	Power Cable	Europe	14265	A	250	
1	Battery TYPE 2019	Battery TYPE 2019	14313	A	260		each	
2	Battery Type G	Battery Type G	14591	A	270		each	
3	Japan Type A	Japan Type A	19774	A	280		each	
4	Battery Pack	Battery Pack	19782	A	290		each	
5								
6								
7								
8								
9								

Teamcenter Variant Matrix UI Summary

e G	6	002589/A;1-DSLR Product Line Owner: tim (tim) Date Modified: 22-Oct-2019 1624 Release Status: Type: Product Line Revision																					
Home Folders Inbox Favorites	Cont	tent Variant Matrix Variants Overv	listory	Pa	rticip	ants																	
	Matrix Round-Trip Configurati Selection Product Quick Access Product Filter																					Start Edit	i (j) Information
	Filter: Part Filter]	A;1-Japan, Body only	A;1-Americas Wildlife	A;1-Americas Type A	A;1-Americas Type C	Ac1-Germany Type A	A;1-Germany Type B	A;1-China Type A	A;1-China Type B	A;1-China Type C	A;1-UK Type A	A;1-UK Type B	A:1-Japan Travel TYP	A;1-Japan Travel TVP	A;1-Japan, Body Only	A;1-Japan Wildlife Ty	A;1-Americas Travel T	A;1-Japan Travel Type	Start Edit to edit Matrix/parts	, C Open ⊕ Cut
		Element Name	Substitutes	Action 63	002600/	002602/	002603/	002604/	002605/	002606/	002607/	002608/	002609/	002610/	002611/	002612/	002614/	002615/	002616/	002617/	002618/	L L L L L L L L L L L L L L L L L L L	
	8	002590/A:1-Body, North America TYP A	> 002619	Reference	1		1		1		5				1							Authorization	(
	8	002591/A:1-Body, Latin America TYP A11	Reference	2	2	1	2	1	2		1	1	1								Parts/Product	Authorizati	
ැබූ Settings	8	002592/A:1-Body, Europe TYP A	Reference		1	2	1	1		4		1	1		1						Matrix	. 199	
	8	002593/A;1-Body, North America TYP B	Reference	1		1	1	2	1		1		1	2							Controls	Controls	
⑦ Help	8	002594/A:1-Body, Latin America TYP B	Reference	1		1	2	1		2		1	2	1	1							. Edit	
	8	002595/A;1-Body, Europe TYP B	Reference 2	2	1	2		1		1		2		1								. *	
		002596/A;1-Body, Japan TYP B	Reference	2			1		1		1	1	1	1	1							Manage	



Teamcenter Variant Matrix What can be configured?

1. Matrix application can be injected on summary view or Product Line revision or Module Revision.

- 2. Product Filters can be extended to custom datamodel
- 3. Product Header length can be configured

4. Product Header display attribute can be configured to custom property

5. OOTB matrix cells are configured to update quantity attribute, but can be configured for custom attribute.



Variant Matrix: Solution Scope

- Products with a low number of variants
- Complexity does not require feature and rule
 based configuration
- Products need to be managed with individual end-item numbers to allow easy ERP transfer and stock-based production
- Matrix-in-Matrix concept allows management
 of variants on Assembly level



Weiterführende Informationen

Video zur Teamcenter Variantenverwaltung (englisch): https://www.youtube.com/watch?v=F0kKYB347Us

Webseminare

Wege zum konfigurierbaren Produktportfolio: https://www.plm.automation.siemens.com/global/de/webinar/produktkonfigurator/62811 Produkte konfigurieren - Ein Zusammenspiel im CPQ-Prozess: https://www.plm.automation.siemens.com/global/de/webinar/live-webinar-teamcenter-product-configurator/76524 Wie Logik und Regelwerk erstellen: https://www.plm.automation.siemens.com/global/de/webinar/teamcenter-product-configurator/82007 Neuerungen im TC Product Configurator & Variant Matrix:

https://www.plm.automation.siemens.com/global/de/webinar/vereinfachung-des-variantenmanagements/87123





Questions





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Teamcenter, Varianten Management

