BEST PRACTICES FOR MANAGING AND VALIDATING PRODUCT CONFIGURATIONS

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PTC

June 8th, 2016

TOPICS

- ❑ Product Platforms Overview
- ❑ Product Platform/Configuration Management
- ❑ Product Platform/Configuration Validation
- ❑ Q&A

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- ❑ **Product Platforms Overview**
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WHAT ARE PRODUCT PLATFORMS

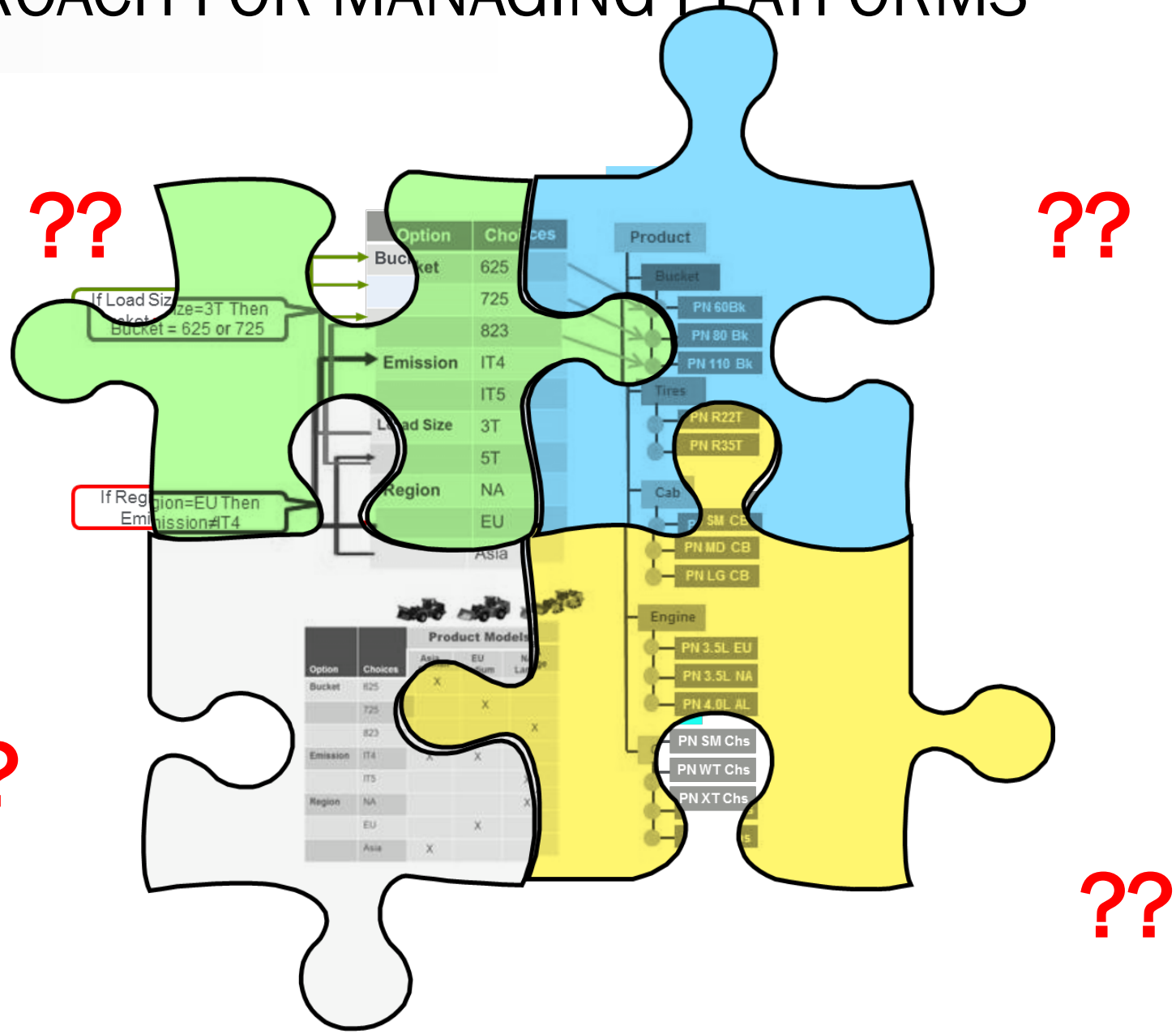
STRATEGY: An enterprise strategy to efficiently meet diverse customer needs by focusing on high levels of re-use.

DEFINITION: A platform includes elements and architectural rules that enable a set of broad product offerings

THE PUZZLING APPROACH FOR MANAGING PLATFORMS

The information for a Platform is created and managed **separately!**

In a **jigsaw** puzzle of company systems



TRYING TO SOLVE THE PUZZLE FOR THE ENTERPRISE

PRODUCT LIFECYCLE

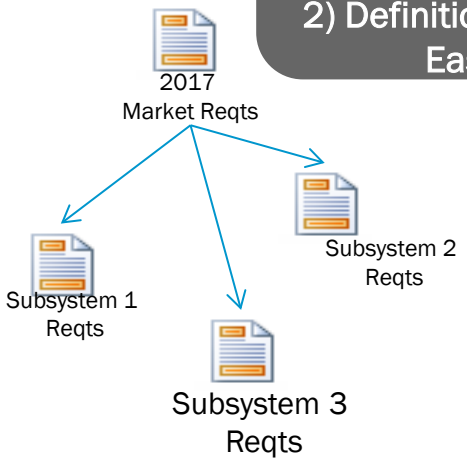
Plan | Concept | Design | Validate | Produce

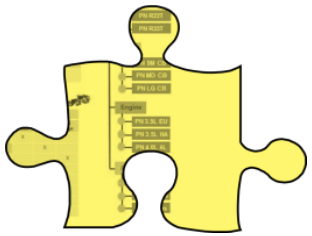
Strategic Issues

1) No Sandbox to Design Configurable Product

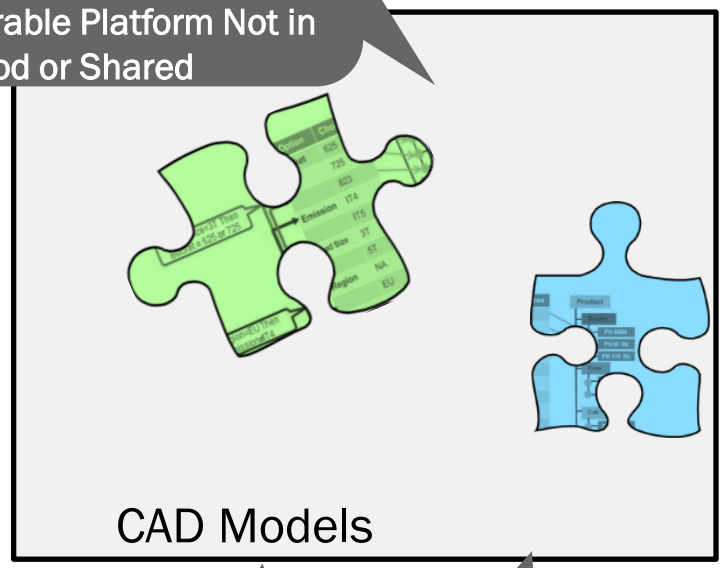
2) Definition of Configurable Platform Not in Easily Understood or Shared

Delayed Time to Market
- Delayed offerings
- Difficult to update

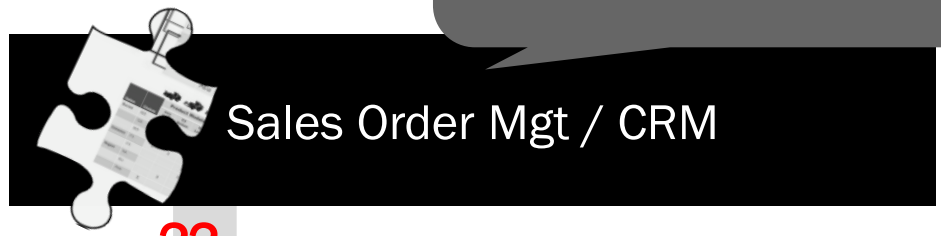




E-BOMs



PLM



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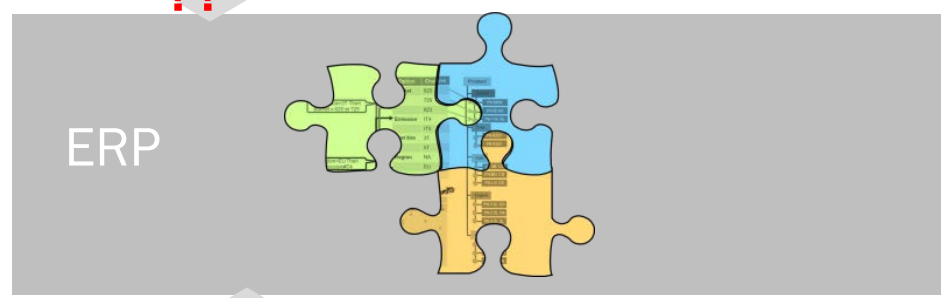

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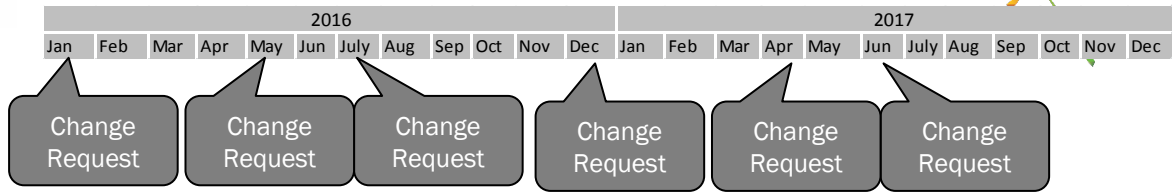
Unable to Validate by Configuration
- Virtual Fit
- BOM + Compliance

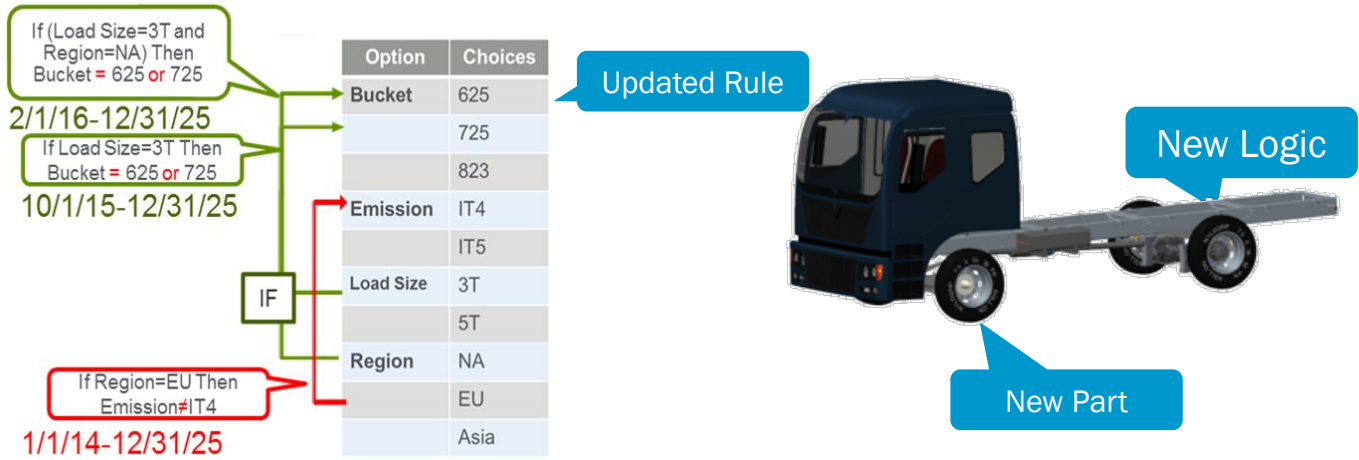
Error-Prone Production Planning by Configuration
- Forecast Volumes
- Mfg Operations

BOMs and
ned Expressions

GLOBAL PLATFORMS APPROACH

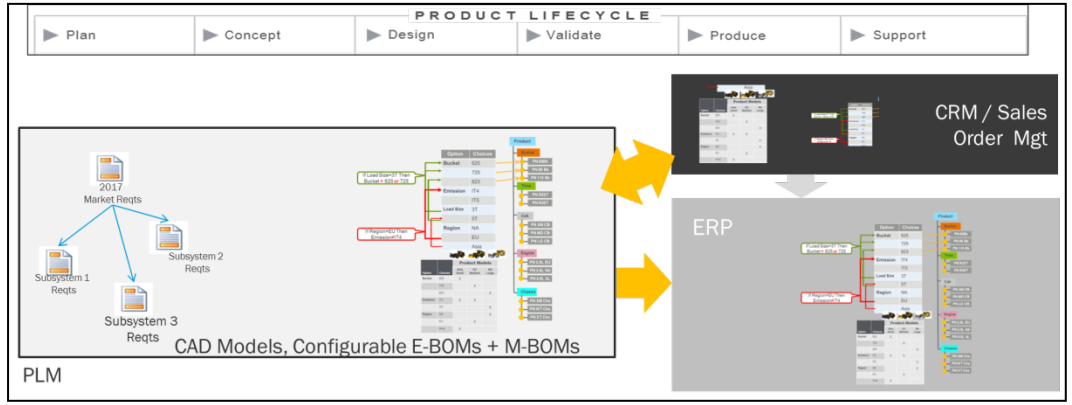
- Robust WIP PLM to develop Platforms
  - All Elements of Platform have lifecycle and revision mgt
    - Architecture
    - Modules - Part Structure and CAD Models
    - Controls – Rules & Expressions
    - Configuration definitions
  - Consistent Change Mgt Governance
    - WIP to Release to Obsolescence
    - Change Impact Analysis
    - Evaluate Part and Rule effectivity at same time





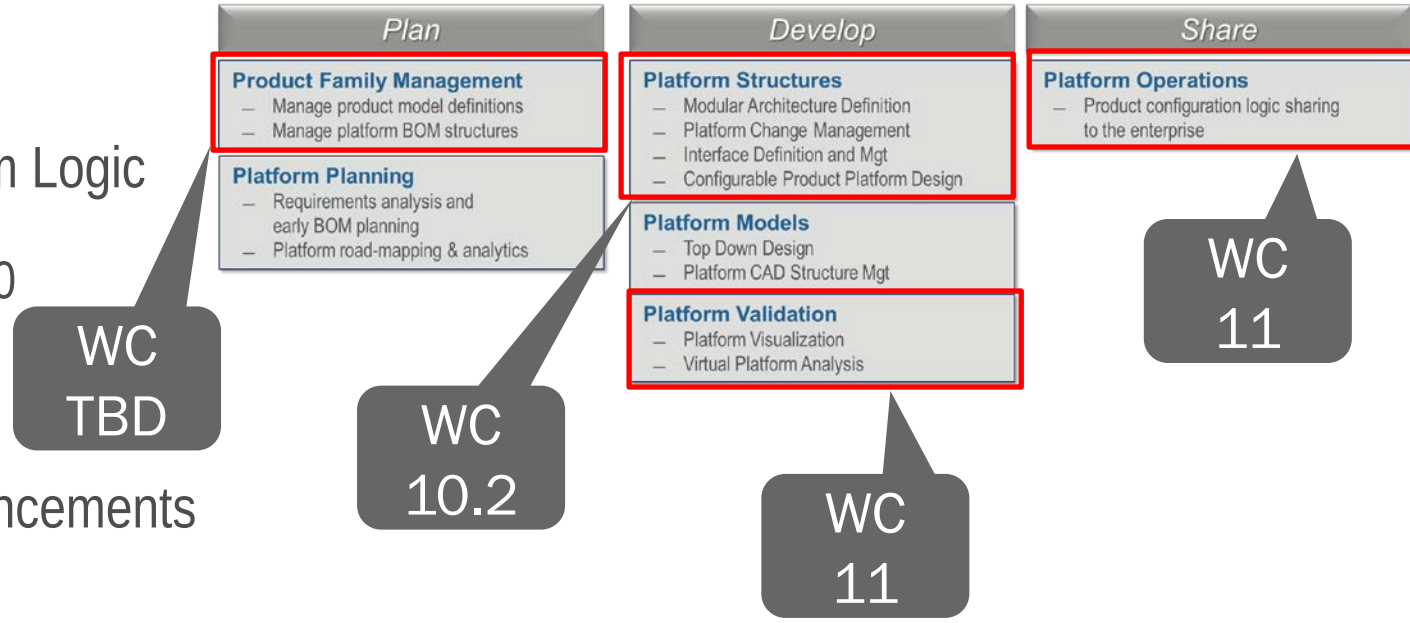
- Flexible Approach to Share with Enterprise
  - ESI for Options & Variants - XML descriptions
  - Consistent source of truth for product platform

- Key Benefits
  - Validate Platform before Release
    - Virtual fit, Material Compliance
  - Enable Production planning before Release
    - Part volumes, Mfg Operations
  - Collaborative Market & Sales Planning before Release
    - Share Product Options & Rules with Sales Configurators
    - Plan configurations early with integrity of design information



GLOBAL PLATFORMS ROADMAP

- Mature Platform Structures
  - Expanded Rules and Rule Maintenance
  - Enable Consistent Change Mgt of Platform Logic
  - Releases
    - Updates in WC 10.2 M010, M020, M030
    - Infrastructure updates in WC 11.0
- Improve Platform Validation
  - Windchill Interference Management Enhancements
  - Releases - Windchill 11.0
- Enable Platform Sharing with Platform Operations
  - ERP Connector for O&V
  - Releases - Windchill 11.0
- Product Family Infrastructure
  - Releases - TBD



TOPICS

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- ❑ **Product Platform/Configuration Management**
- ❑ Product Platform/Configuration Validation
- ❑ Q&A

WINDCHILL PLATFORM MANAGEMENT

Modular Platform

Option Set

Assigned Expressions

Configurable Module

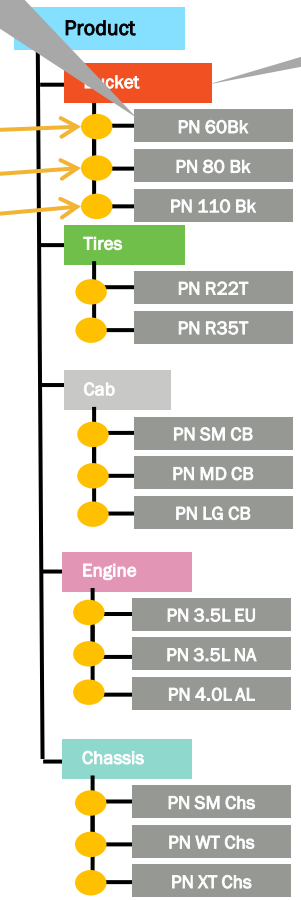
Rules

Module Variants

If Load Size=3T Then Bucket = 625 or 725

If Region=EU Then Emission≠IT4

Option	Choices
Bucket	625
	725
	823
Emission	IT4
	IT5
Load Size	3T
	5T
Region	NA
	EU
	Asia



Option	Choices	Product Models		
		Asia Small	EU Medium	NA Large
Bucket	625	X		
	725		X	
	823			X
Emission	IT4	X	X	
	IT5			X
Region	NA			X
	EU		X	
	Asia	X		

Variant Specs

Windchill Terms

Confidential and Proprietary - Not for Distribution

PIAGGIO MANAGES COMPLEXITY WITH PLM

PIAGGIO®

Piaggio is Europe's largest manufacturer of two-wheeled vehicles and is known throughout the world for their superior technology, craftsmanship and design. Piaggio's stylish and fuel-efficient line of motor scooters are the epitome of practical indulgence.

"To stay ahead of our competition, we must constantly find new ways to better manage the complexities of sharing product information across multiple brands and throughout multiple geographies. With a solution for Product Lifecycle Management this isn't a problem, it's an opportunity…

Combining know-how with the leading PLM technology gives us the ability to manage the ever-growing complexities of our business so that we can always deliver the right products, at the right time, in any market."

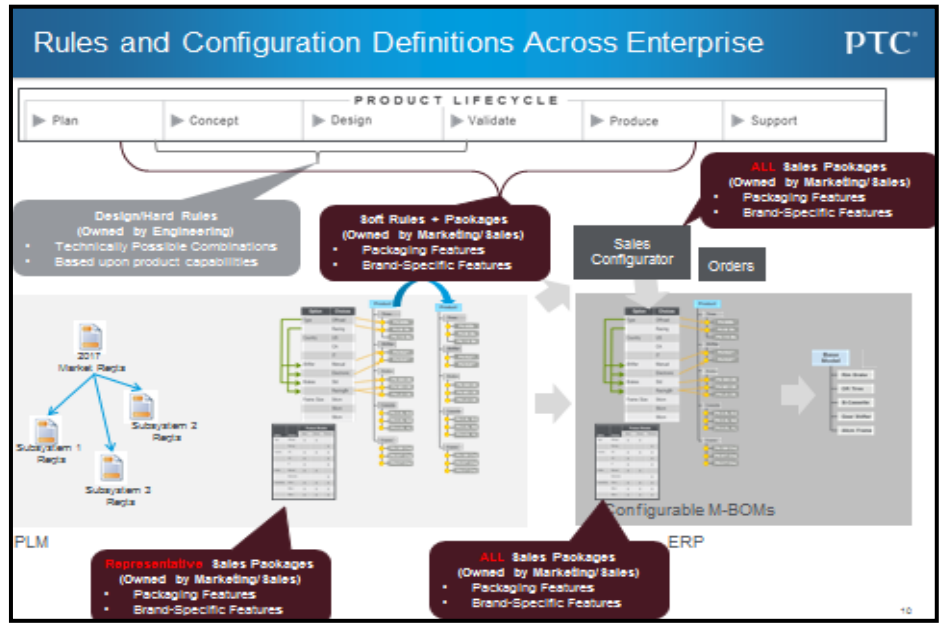
http://www.ptc.com/solutions/product-lifecycle-management/piaggio.htm

ENTERPRISE SYSTEMS INTEGRATION FOR OPTIONS & VARIANTS - WINDCHILL 11.0

- Goal
  - Reduce Time to Market and Improve Product Quality by Sharing a Full Platform Definition with Order Execution and other downstream environments

Platform Operations
- Product configuration logic sharing to the enterprise

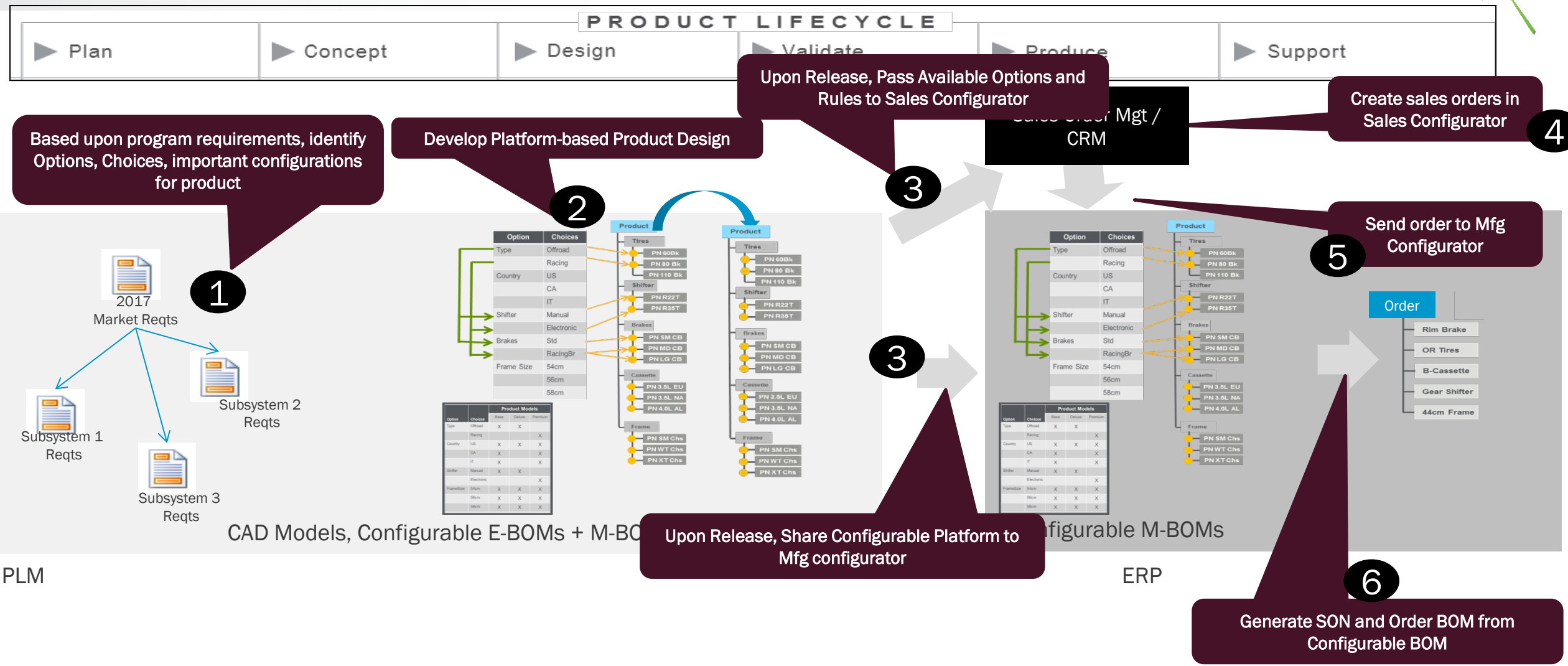
- What to Share
  - Publishing Platform Information Externally
    - Platform release to production systems
    - Full Release or Incremental releases
  - Publishing Platform Definition
    - Configurable E-BOM or M-BOM Structure
    - Options & Choices, Option Set with Local Rules
    - Logic associated with Configurable Structure
    - Associated Change Notices
  - Publishing Updated Platform Definition
    - Updates to all Configurable Structure items
    - Updated Option Set with Local Rules
    - Associated Change Notices



- How to Share
  - API-based/XML, flexible Windchill ERP Connector Approach
  - Publish to 1 or More Distribution Targets

- Packaging & Pricing
  - ESI for Options & Variants Subscription License

CONFIGURABLE PRODUCTS – ATO ORDER FLOW



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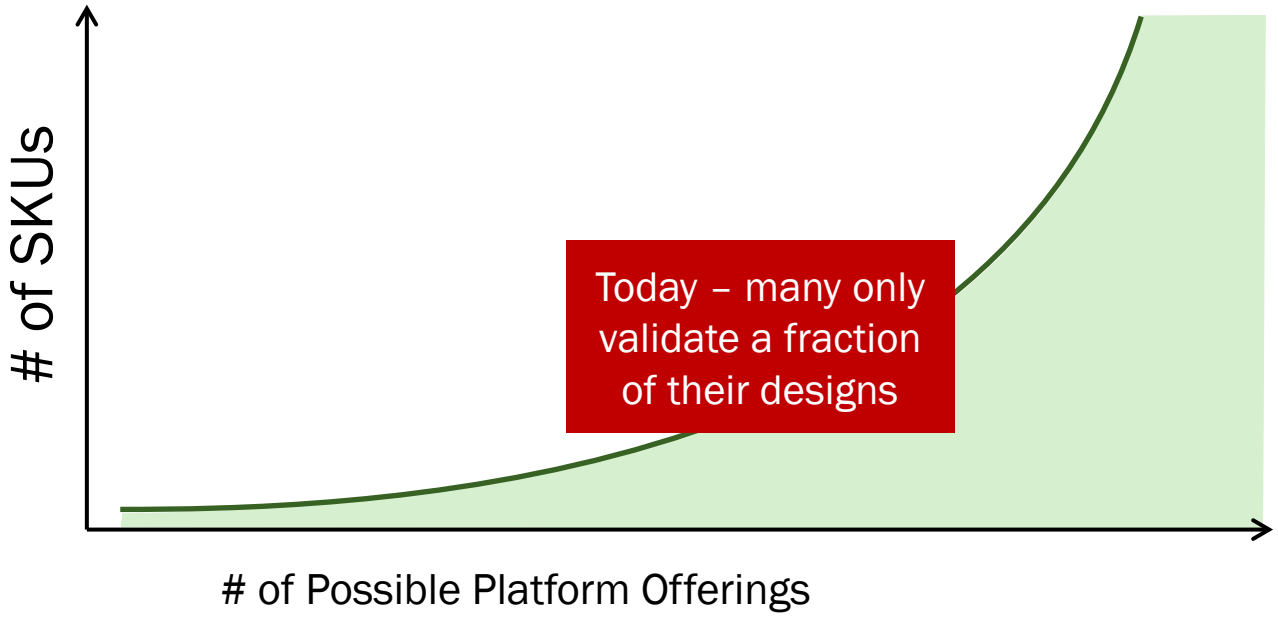
VALIDATING PRODUCT PLATFORMS

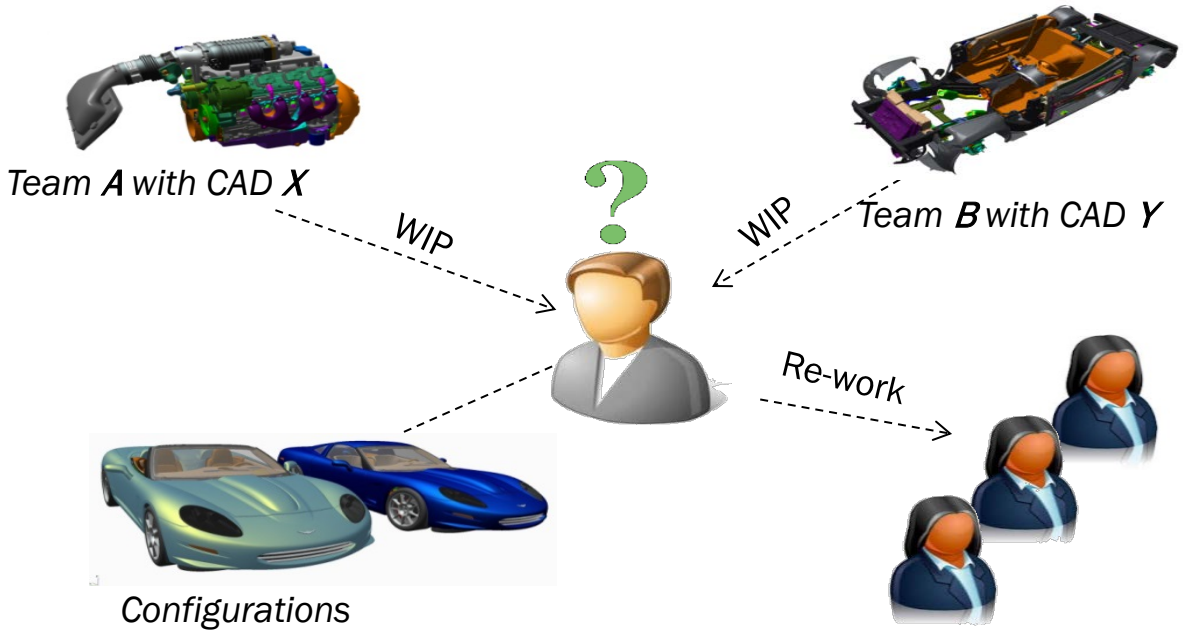


- Platform Structures enables the creation of large amounts of product variation

- But….how do you know if there are interference issues in the designs?

- This can be too complex and time consuming to try to accomplish by hand

INTERFERENCE MANAGEMENT CHALLENGES



Challenges

Inability to check large and multi-CAD design packaging

Inability to validate multi-team designs

Inability to validate product configurations

Significant manual effort required

Negative Consequences

Expensive late-stage re-work

Missed schedules

Low product confidence

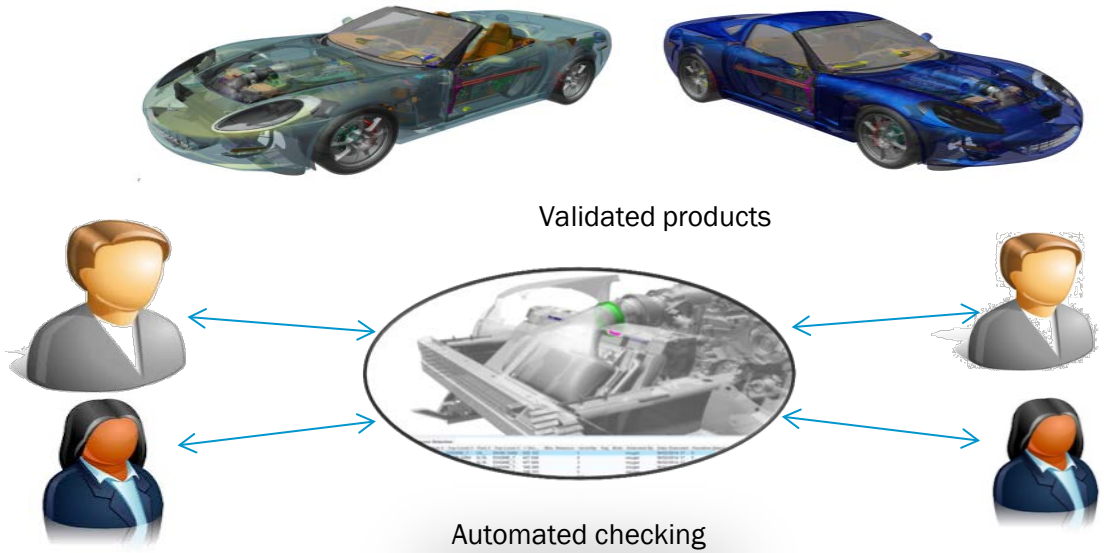
Metrics

Number of ECOs

Cost of design changes

Delay in product release due to design interferences

AUTOMATED INTERFERENCE CHECKING TRANSFORMED CUSTOMER



After Scenario

Clash-free designs
from disparate teams and tools

Accelerated issue resolution
clear communications and disposition

Validated product packaging
from product configurations

Positive Outcomes

Reduced re-work and lowered development cost through automated interference checks

Schedules met

Improved product confidence

Justification

Siemens Rail Systems uses EVR Interference Checking to validate large and complex train designs.

"Strong credit must also be given to PTC's interference checking product" – CIMdata Oct, 2013

AUTOMATED INTERFERENCE CHECKING AND MANAGEMENT

Challenge: Ensure timely interference checks on multiple products and product configurations

Practice

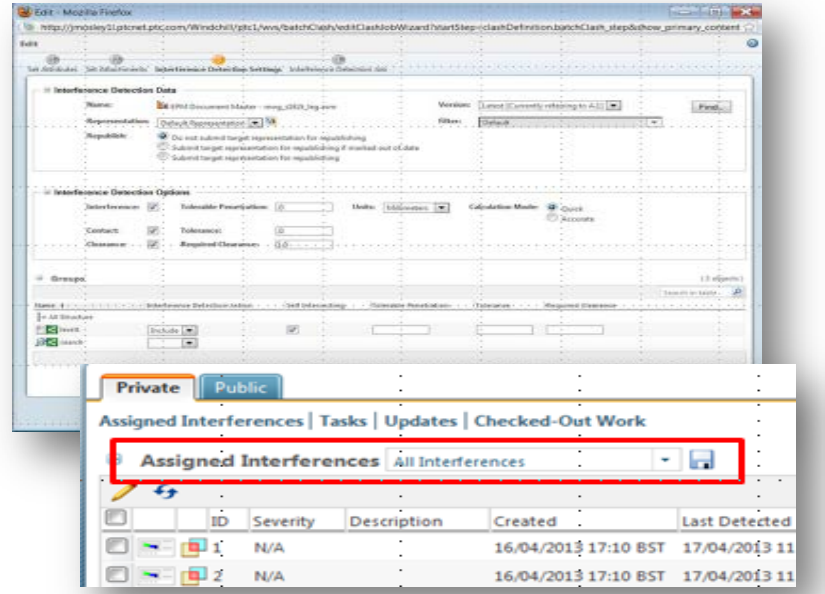
- Use automated interference checking and interference management to validate multiple products are interference free

Capabilities

- Automated, server-based and scalable interference checking service
- Powerful dynamic groups support work-in-progress designs and product configurations
- Powerful reporting and assignment disposition tools
- Intuitive navigation of interference reports directly from PLM
- Compare interference reports
- Manage, Assign, and Track Interference tasks to their logical end

Value

- Interference checking automation helps ensure large, configurable, complex products are interference-free to reduce design management cost, reduce re-work and prevent schedule slippage



SMS SIEMAG IMPROVES OPERATIONS WITH PTC CERO VIEW

SMS SIEMAG
SMS group

Challenges

- Early detection of possible collisions of steel structure, pipework and machine parts
- Identifying where crane tracks or escape routes are obstructed or blocked due to the confined plant space
- Creating extensive and comprehensible customer documentation early in the planning phase

Solution

- Creo View is used to prepare DMU models needed for collision checks
- DMU model is used to check crane tracks and plant escape routes
- Virtual model is used for customer presentations and training of customer maintenance teams

Results

- Expensive, on-site modifications are avoided improving overall schedule effectiveness
- Improved safety planning due to virtualized crane tracks and route concepts
- High level of customer satisfaction due to quicker familiarization and greater overall understanding of the plant

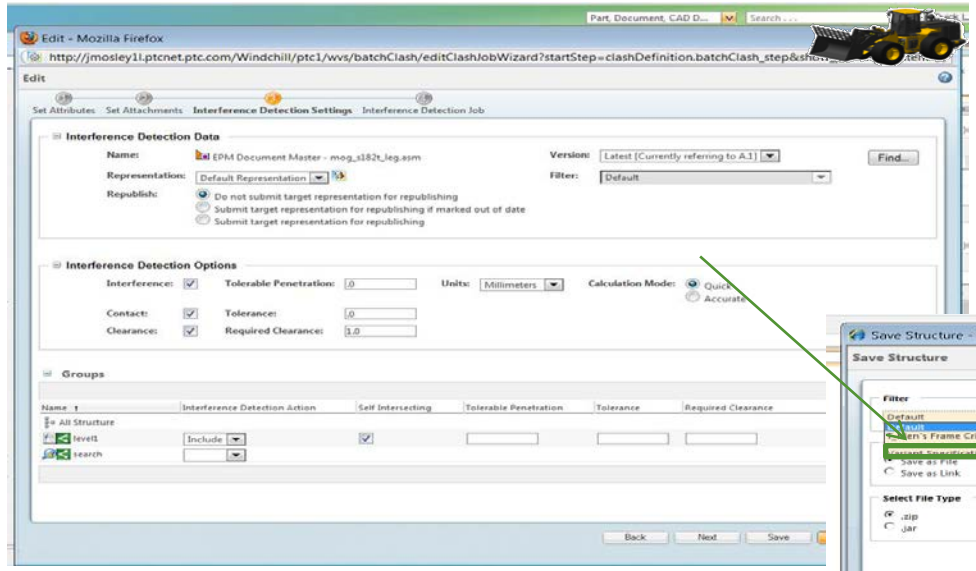
BATCH INTERFERENCE – VARIANT SPECIFICATION SUPPORT FOR FILTER CRITERIA

LIVE WORX 16

CONFIGURATIONS

Capabilities

- Re-use product configuration definition – Variant Specifications from Configurable Design
- Set Variant Specifications in Interference Definitions
  - Facilitates common understanding and analysis of related product configurations
  - Updates to variant specification definitions can propagate to Interference Definition
- Enhanced Ad-hoc Representation Creation
  - Create representations from Variant Specifications



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Emission	IT4	X	X	
	IT5			X
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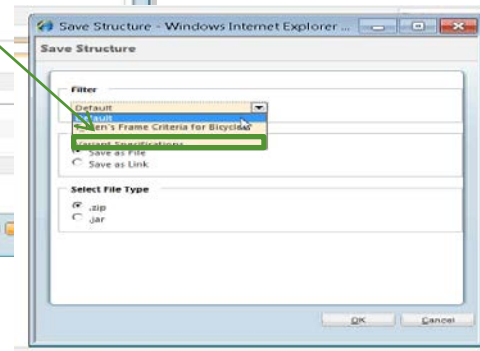
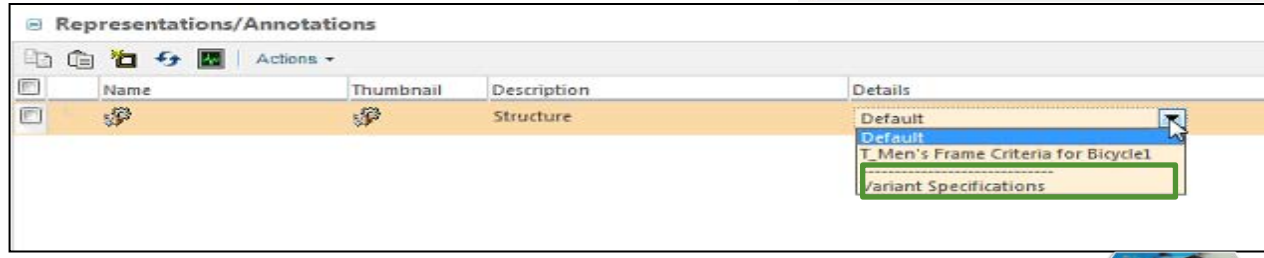
	EU		X	
	Asia	X		





Benefits

- Improved Quality and Consistency of Interference Analysis Results tightly aligned with Product Design

Note: The user must be a member of the Platform Structures Group to use Variant Specifications

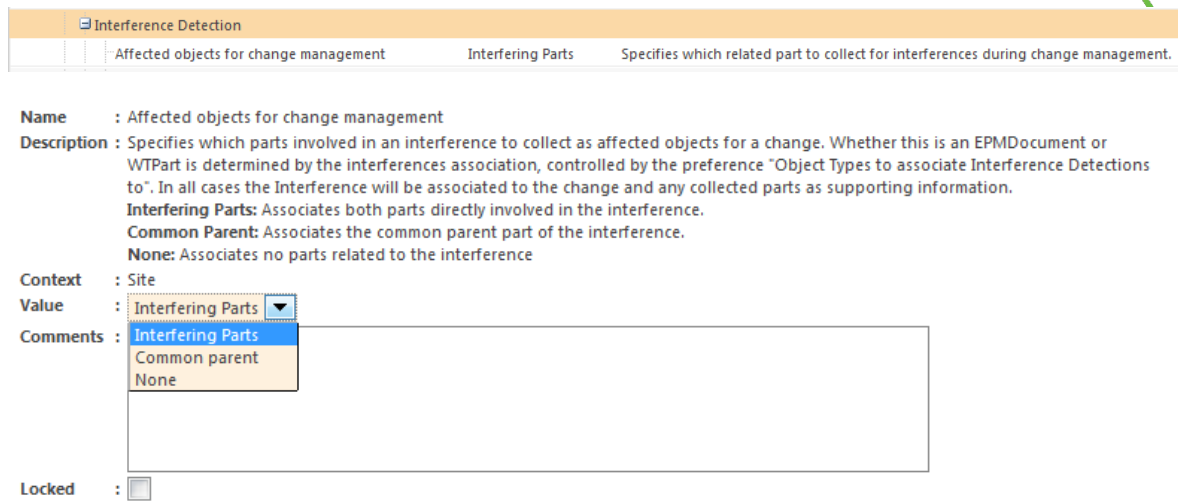
BATCH INTERFERENCE – INTEGRATION WITH CHANGE MANAGEMENT

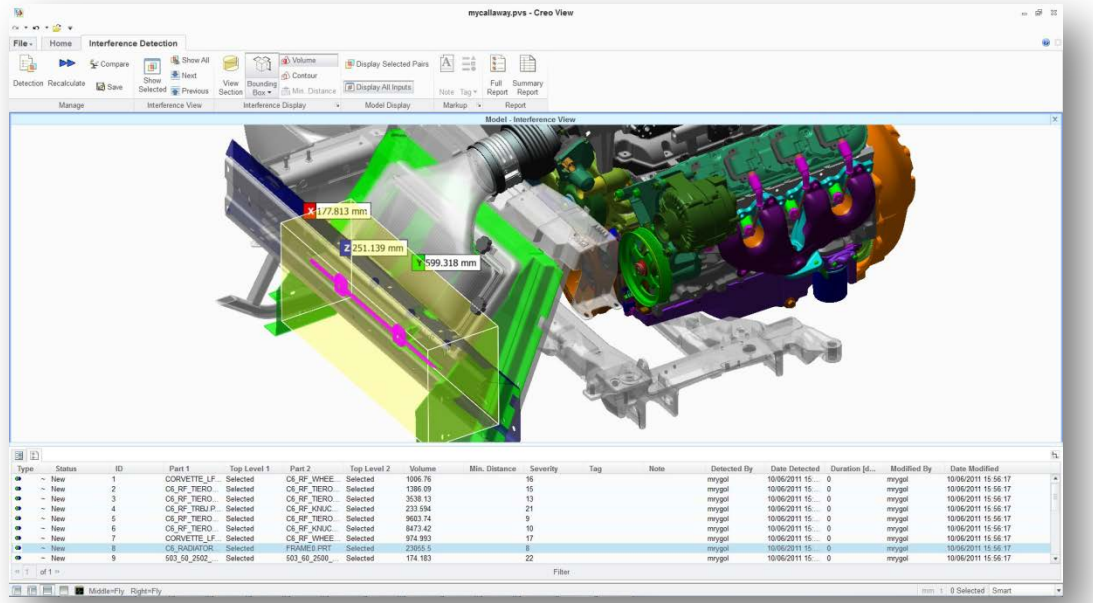
Capabilities

- Interferences can be associated with change notice, change request, problem report, variance
- A New Change management Object can be created directly from an Interference Report
  - What is added as Affected Objects and Annotations is controlled by a preference
- The Clipboard can be used to add interferences to existing Change Management Objects
- Open Interference Report into Creo View for detailed examination

Benefits

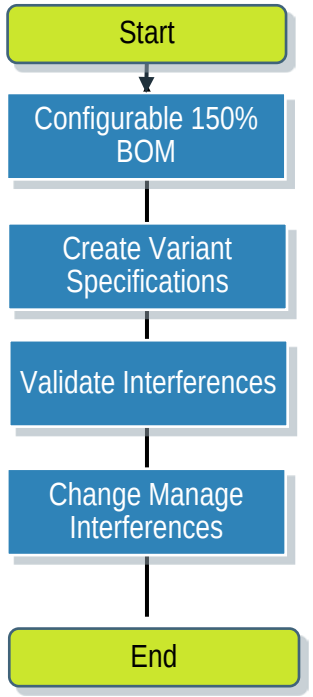
- Change management can be used to track the resolution of interferences



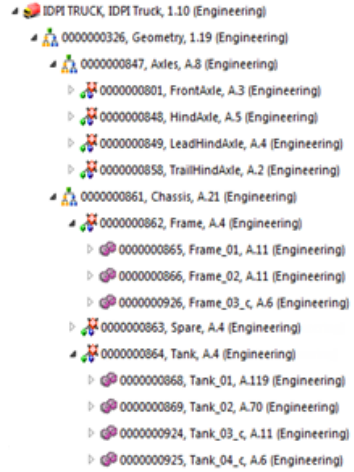


PLATFORM VALIDATION BEST PRACTICE STEPS

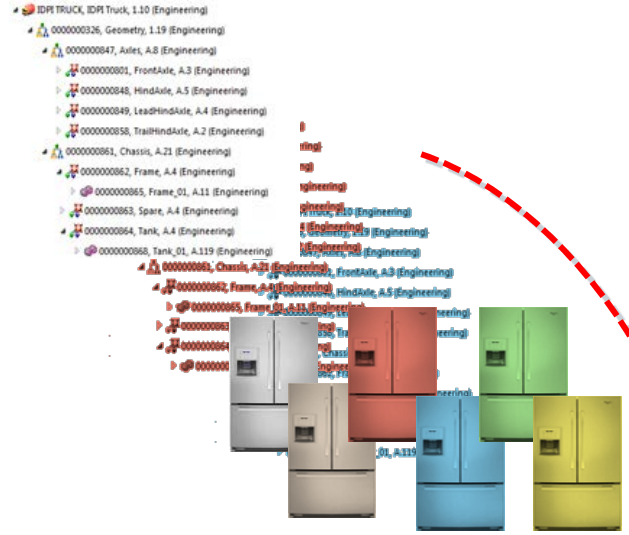
► Storyboard Overview



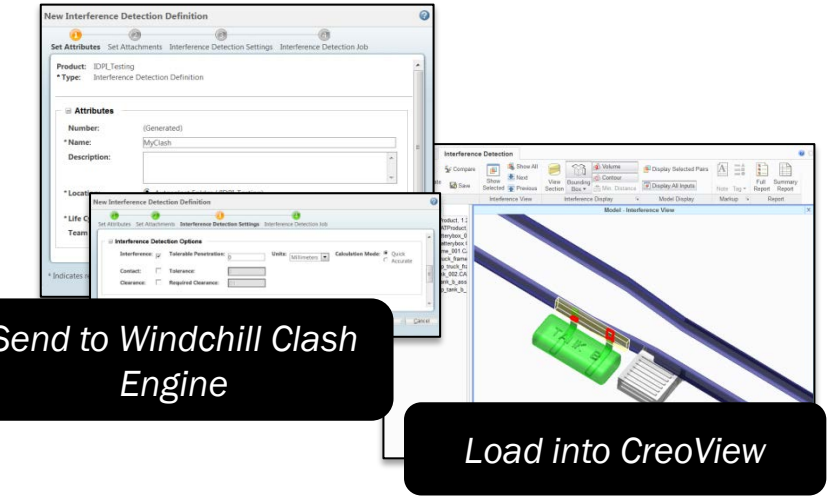
Configurable 150% BOM



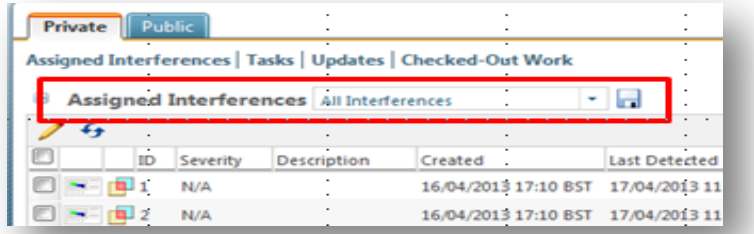
Create Variant Specification(s)



Validate Interferences



Change Manage Interferences



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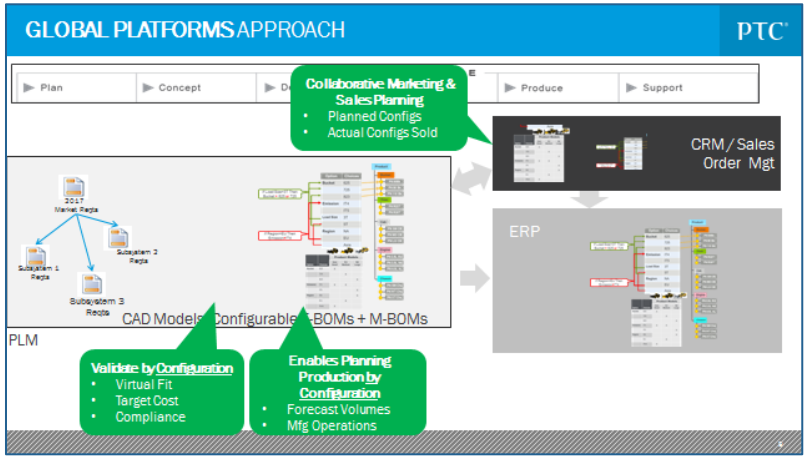
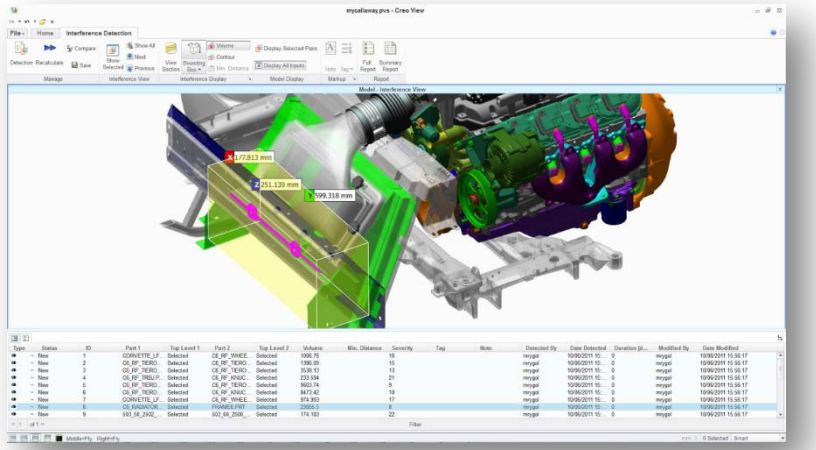
SUMMARY

- Managing and Validating Product Configurations
  - Enabling Platform Validation across the Enterprise
- ESI for Options and Variants
  - Share Released Platform Definitions to other Enterprise Systems
  - Manage Platform Updates
- Windchill Interference Management
  - Validate a much wider range of the platform
  - Confirm designs earlier in the process





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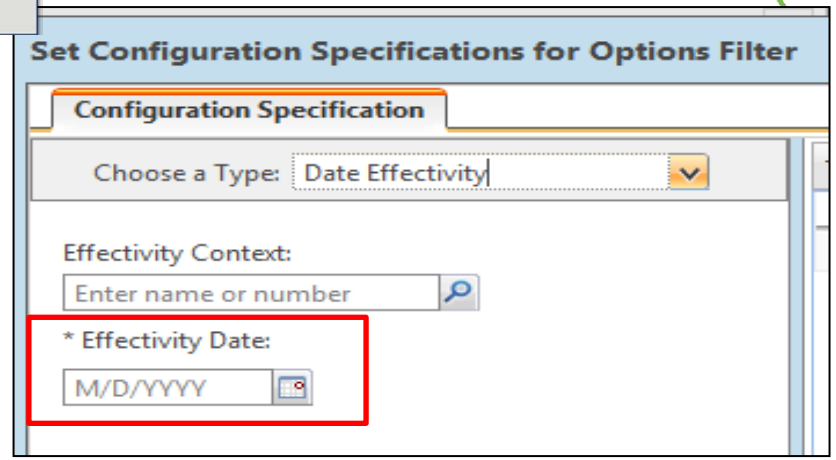
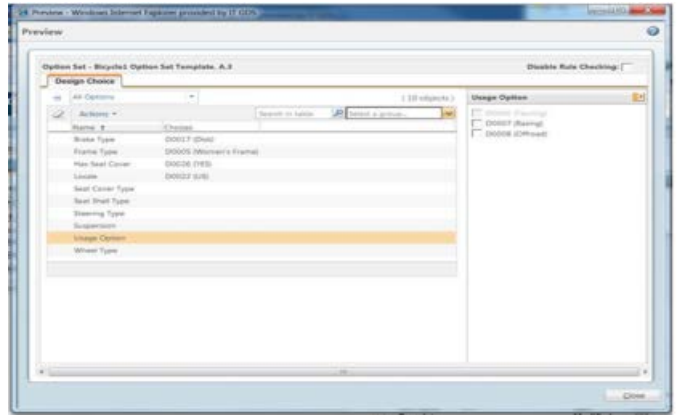
APPENDIX A – GLOBAL PLATFORMS UPDATES FOR WINDCHILL 10.2 M020 & M030

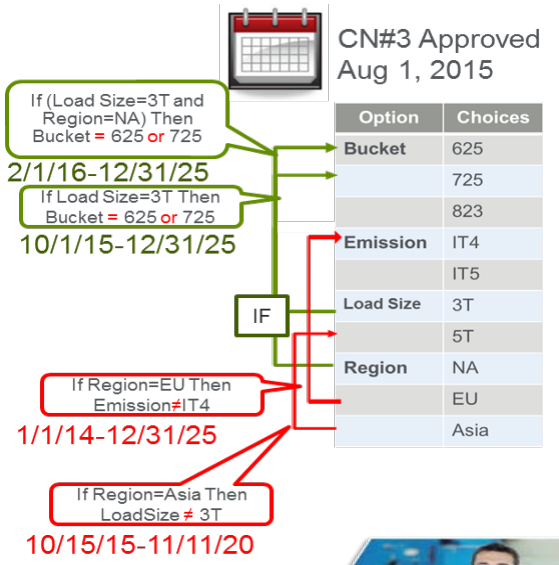
PLATFORM STRUCTURE FEATURES
WINDCHILL 10.2 M020

Platform Structures
- Modular Architecture Definition
- Platform Change Management
- Interface Definition and Mgt
- Configurable Product Platform Design



- Enhanced Platform Rules
  - New Requires Rule
- Improved Platform Logic Change Management
  - New Global Rule Change Management
- Improved Support for Managing Configurations
  - Improved usability of Variant Specification access for filtering configurations (variant specifications)
- Usability and Filtering Enhancements
  - Improved Edit Filter, Preview and Configure dialog





PLATFORM STRUCTURE FEATURES
WINDCHILL 10.2 M030

Platform Structures
- Modular Architecture Definition
- Platform Change Management
- Interface Definition and Mgt
- Configurable Product Platform Design

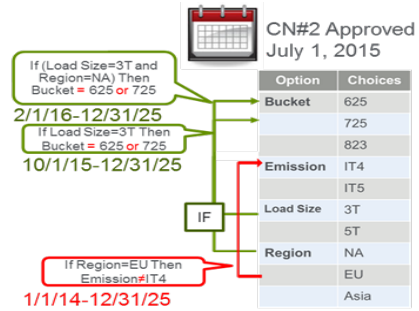
Topics

Enhanced Platform Rules and Assigned Expressions
- Alias - Streamline rule and assigned expression definition
- Choices with Numeric values – simplify rules and reduce maintenance

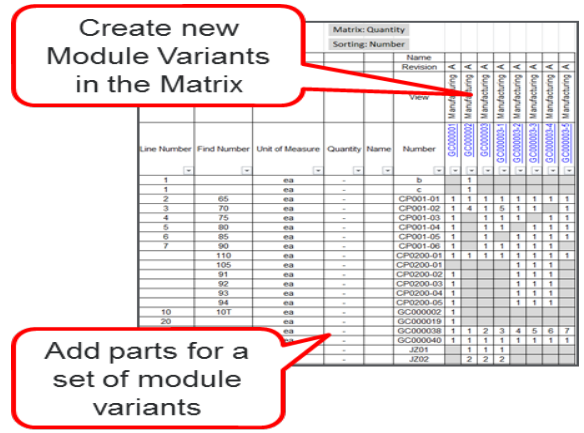
SmallTires →
`Tires=28IN/30IN/32IN/36IN/48IN`

```
IF (Tires>=32IN) THEN HP=45HP/55HP
```

Improved Platform Logic Change Management
- Added Local Rule Change Management
- Added Assigned Expressions Change Management



Enhancements for Managing Module Variants
- Support for Assigned Expressions on Part Occurrences
- Create & Edit Module Variants with Spreadsheets



New Administrative Support for Creating Configurations
- Spreadsheet and API support to create & update configurations (variant specifications)
- Programmatically create and update variant product structures

Usability and Filtering Enhancements
- New filter type – filter out incomplete assigned expressions
- Tailor-able logic expression display (with/without Options)