Customization at Scale: Reaching a Market-of-One Profitably

CIMdata Commentary

Key takeaways:

- *To stay competitive and profitable, manufacturers must respond to consumers' increasing demand to personalize the products they buy.*
- *Companies with complex and highly configurable product lines must have an end-to-end lifecycle mindset.*
- *Manufacturers require a flexible, scalable platform that supports the full lifecycle of product knowledge and incorporates robust configurator capabilities integrated with their product development process, as well as business systems to support a broad range of product features and complexity.*
- *Siemens PLM Software has developed a broad configurator solution suite that delivers best-in-class variability management capabilities.*

Introduction

The Internet has changed many facets of life, including how we, as consumers, find, configure, and purchase almost everything. The customer-centric focus and the associated personalized experience that configurable products offer has changed customer expectations. Buying standard, off-the-shelf products is no longer the norm; replaced by the ability to personalize each purchase without a penalty in cost or delivery time.

Customers want what they want and are demanding more complex and highly configurable products. Unfortunately, with increased product configurability (personalization and the need to serve markets of one) comes increased complexity in design, manufacturing, and service, and resulting costs and inefficiencies. In the past, the answer to managing complex configurability was to make the product simpler (i.e., reduce configuration options) or to create custom product development software tools to help manage the complexity. Neither is a good option any longer as customers are driving the demand for more options, not fewer, and software development costs continue to rise as capabilities and variations continue to grow.

Efficiently delivering products to markets of one while keeping costs in check requires manufacturers to make accurate assessments of how consumer features being considered or offered will impact product requirements, design, manufacturing, and service. As a result, companies that want to thrive in today's rapidly evolving, highly configurable product market need a new and more efficient end-to-end approach to the design, sales, production, delivery, and maintenance of their products' configurability.

Similarly, as the trend in product definition increasingly focuses on the importance of electronics and software content holistically integrated with the mechanical product definition, there is a need for a consolidated configuration knowledge base that can support complete multi-domain product definition.

Just as it is increasingly critical to have consistency and seamless definition across the multi-domain product definition of mechanical, electrical, and software, it is also important to understand how decisions related to consumer choice impact the end-to-end product and production process. Closely connecting product features and configuration rules to support

impact analysis and guide end-to-end product definition increases clarity and accuracy which improves the bottom line.

To be successful, companies need to be able to quickly and efficiently configure their products to meet their customers' needs without having to specifically engineer each and every variation. Beyond product design, variability also needs to be supported seamlessly downstream. Variation in products typically drives variability in manufacturing and assembly processes, packaging, technical documentation, service contracts, and other functions. For many functions, this requires companies to know not only what configurations were delivered, but also the specific configuration of each as-maintained product (that is, a "digital twin") so that they can deliver tailored customer service throughout the product's life. Not only do companies need to respond quickly to ever-changing customer expectations by offering new product options, but they need to manage all the variations ever sold that remain in service.

For many companies their products have not been architected with configuration in mind—especially with the capabilities needed to meet markets-of-one requirements. Their systems are disconnected and not optimized for the complete end-to-end lifecycle. These shortcomings may be addressed by enabling consistent variability management across the product lifecycle, however accomplishing this can be daunting.

Fortunately, the technology and services needed are available to support this transformation.

Variant Configurator Capabilities

Manufacturing companies need highly capable, scalable, variant configurator solutions that enable them to develop, produce, and service literally millions of product variations and configurations across the full product lifecycle.

Any capable configurator is expected to support a core set of capabilities. To be considered as best-in-class, more advanced capabilities are required. Core and advanced capabilities include:

Core Capabilities:
- Easy creation and management of rules, features, constraints, and product line breakdown including definition, validation and debugging
- Dynamic, accurate viewable representations of any configuration
- Bill-of-Materials generation of any product variant
- Presentation of market-facing features to end consumers for selection
- Scalable configurator platform that can quickly and efficiently solve small to very large and complex rule sets for representing variability
- Integrated with other capabilities within the platform to enable performing efficient analysis and optimizations
- Ability to integrate with other enterprise systems, e.g. ERP, CRM, web sites, etc.

Best in Class Advanced Capabilities:
- Central configurator knowledge base plus solver for technical, sales, manufacturing, service, and other domains
- Comprehensive support of configuration impact analyses spanning variability and content to ensure that the complete "collateral" impact and cost of feature or product changes is clearly understood

- Revision/version and effectivity control for features and constraints to enable controlled changes to the variability knowledge base
- Seamless connectivity to mechanical, electrical, software, formulation, resulting documentation, and other product data
- Ability to consistently guide product definition from requirements through engineering, manufacturing, and service
- Support the flow of data across and throughout the structure of elements in the planning, development, and manufacturing processes, known as the digital thread, enabling digital twins
- A decoupling of the configurator from any one PLM solution, providing flexibility when integrating to existing business processes

Siemens PLM Software's Configurator Solution

Siemens PLM Software (Siemens) is a recognized leader in end-to-end product definition and lifecycle configuration management. They have worked successfully with many manufacturers of complex products over many years to develop a deep understanding of the needs and issues of variant configuration management. Their primary variant configurator solution is built on Teamcenter, which has had solid core functional configurator capabilities for many years. Siemens is now making large investments in more advanced configurator technology to ensure it provides a comprehensive configurator solution that incorporates the best-in-class capabilities needed in today's market of complex products.

CIMdata believes Siemens' latest offering delivers a robust configurator solution suite that enables the end-to-end, multi-domain product definition capabilities supported by the rest of their broad portfolio.

The strengths of the Siemens configurator solution include:

- Constructed on a solid platform architecture that supports effective scalable performance for any magnitude of product variations and configurations across the full product lifecycle
- Manages complex product variability across the full product lifecycle
- Delivers a variant capability that supports the digital thread product definition across a very wide range of design and manufacturing applications and beyond
- Provides Product Line Engineering: supporting the full lifecycle starting with product planning inputs and driven through the entire end-to-end product definition
- Seamlessly manages mechanical, electrical/electronic, and software data
- Has visual configuration on-demand for any (and across many) product variants
- Provides the ability to perform comprehensive engineering analysis, change management, and impact analysis across product configurations and related content
- Provides micro-services that ensure variant capabilities are available across the entire application ecosystem
- Supports the full continuum of Configure-to-Order (CTO) through Engineer-to-Order (ETO)

By delivering these capabilities, CIMdata believes that Siemens has demonstrated that they understand the evolving needs of their customers and the key role that a world-class

configurator solution plays in supporting the increasingly complex, multi-domain products these customers produce and deliver to their consumers.

To support the growing drivers of product complexity, e.g., software and electronics, the Siemens configurator solution is designed to integrate with the increasingly broad Siemens portfolio such as the recent acquisition of Mentor Graphics. It is seamlessly connected across the Teamcenter lifecycle collaboration backbone as well as available independently (it supports use cases that do not require Teamcenter) as a central knowledge base to support Mentor solutions and other adjacent applications such as Configure-Price-Quote (CPQ).

Conclusion

Product manufacturers are being pushed to support a high degree of product variety and personalization without driving up costs or eroding profitability. To get a handle on this growing complexity and manage it through the product definition process, these manufacturers are increasingly requiring that product variability be managed consistently along with product definitions as they mature.

CIMdata sees the Siemens response to this demand as a competitive configurator solution with a comprehensive set of functionalities that can support a full range of product complexity across the product lifecycle. The centralized configurator knowledge base can be integrated to the technical product definition, externalized for sales and marketing, and fed downstream for manufacturing execution, procurement, and service. Teamcenter users with complex product variability or who are currently using other configurator technology should explore Siemens' capability. Manufacturers not using a PLM or collaboration backbone, or one other than Teamcenter, should still explore the Siemens configurator version designed to run independent of Teamcenter.

About CIMdata

CIMdata, an independent worldwide firm, provides strategic management consulting to maximize an enterprise's ability to design and deliver innovative products and services through the application of Product Lifecycle Management (PLM). CIMdata provides world-class knowledge, expertise, and best-practice methods on PLM. CIMdata also offers research, subscription services, publications, and education through international conferences. To learn more about CIMdata's services, visit our website at http://www.CIMdata.com or contact CIMdata at: 3909 Research Park Drive, Ann Arbor, MI 48108, USA. Tel: +1 734.668.9922. Fax: +1 734.668.1957; or at Oogststraat 20, 6004 CV Weert, The Netherlands. Tel: +31 (0) 495.533.666.