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Edition May 2023

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Extract from the Special
PRODUCT LIFECYCLE MANAGEMENT

Sustainable Production and Circular Economy with Customer-Specific Product Variants

From Holger Senn

The manufacturing industry is under tremendous pressure globally. Depending on the study and time frame, it is responsible for about 30-40% of global CO2 emissions. Global "net-zero" initiatives such as the EU Green Deal, the EU Taxonomy in financial markets, and increasing customer demands for sustainable products are exerting tremendous pressure for action. Configuration Lifecycle Management (CLM) and new, innovative configuration technologies provide the right data for necessary transformation initiatives towards a sustainable, SDG-compliant circular economy of the United Nations.

For companies with customer-specific products and high variant diversity, the current trend and situation for initiatives in the circular economy are particularly challenging. The respective product portfolio must be modularized, optimized, and digitized to ensure a circular economy over the entire value chain with either less material or lower energy input over longer product life cycles.

The good news is that new technologies and methods already in practice create the prerequisites for a transparent database to derive and provide the necessary insights for sustainable business decisions.

As an example, one of the world's largest wind turbine manufacturers not only relies on consistent modularization of their product portfolio from engineering, to sales and manufacturing, but also increasingly with regard to maintenance and operation of each individually configured wind turbine variant. This results in significantly longer operation times of the turbines and plants with increased energy efficiency, better yields, and higher investment returns.

It is a prerequisite to keep a holistic view of all product models in product development and gradually bring the technical product model to a central platform with other product models including sales, logistics, and service to use Configuration Lifecycle Management (CLM).

CLM is a holistic solution integrated on an open platform that connects all relevant business functions and systems such as PLM, ALM, ERP, CPQ, etc. from product design through sales, production, and service. The recipe for success lies in the collaborative creation of a single-source-of-configuration-truth with all perspectives on a central product model with data, rules, or feature properties to initiate and implement sustainability goals and measures.

Sustainability has become a core criterion for purchasing decisions

Customers' expectations for both individual and more sustainable product variants as the basis for their purchasing decisions are already high today. As in the automotive industry, where it has been common for many years, configurators in all manufacturing industries and across all sales channels must now show various sustainability criteria for each individually configured variant. Guided by the configurator, this allows customers to find an optimal compromise between performance, price, availability, and their respective environmental impacts.

Innovative configuration technology for sustainable production and circular economy

The complexity in variant and configuration management usually arises from trillions of possible feature combinations that can be designed, sold, or built. If all these combinations are calculated together and represented in evaluable solution spaces, inconsistencies are almost always found. These errors could previously only be identified manually and with corresponding effort if they are discovered at all - usually only by chance - in operational processes.

However, with modern configuration technologies using a compilation approach, such as Virtual Tabulation®, it is now possible to calculate these complex solution spaces of valid variant combinations all at once, store them in a compressed table, and make this data available for sustainability analysis from different perspectives. In this way, questions about sales development, upselling potential, CO2 footprint, material usage, or other sustainability factors of a variant can be answered immediately.

The influence of digital business models on the circular economy is immense

Holistic, optimized CLM solutions also provide the basis for increasingly digital usage models (PaaS - Product-as-a-Service), where the customer pays for the output of a specific variant rather than the physical product: Pay-per-Scan (medical technology), Pay-per-Sheet (printing industry), Pay-per-kWh in energy production, or Pay-per-Part (mechanical engineering) are common PaaS models in practice.

For many years, a market leader in high-tech machine engineering for the semiconductor industry has been using Virtual Tabulation® configuration technology primarily in the digital pre-planning of upcoming retrofit and upgrade work to document and ensure compatibility of all domains of mechanics, electronics, and the rapidly increasing software shared throughout the extended lifecycle in the configuration, all without errors. Minimized downtime during maintenance, efficient operation of the equipment, and continuous retrofit measures also contribute to increased part output and service revenues, reduced operating costs, and a better climate balance through extended service life. Thus, not only the machine manufacturer and the customer benefits, but especially the climate benefits from intelligent circular economy.

To learn more about CLM in a sustainability context, please download this whitepaper: https://go.configit.com/clm-for-sustainability

Configuration Lifecycle Management (CLM)

From a sustainability perspective, CLM helps in four key areas:

- **Engineering:** Ensuring compliance with circular economy principles already in the design phase, avoiding over-engineering, optimizing the use of resources across all domains, including planning for product disassembly and future reuse.
- **Sales:** Guiding customers towards sustainable decisions through transparency in the configurator regarding price, performance, and sustainability ("Green Configuration").
- **Manufacturing:** Preventing configuration errors leads to less waste and avoidance of production defects.
- **Service:** Rule-based optimization of products throughout their lifecycle through retrofit measures, take-back and reprocessing of used products from service contracts (Product-as-a-Service).

The author

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Impressum

Verlag: Reif Verlag GmbH · Peter Reif · Alfred-Jost-Straße 11
69124 Heidelberg · E-Mail: peter.reif@reifverlag.de

Redaktion: Christian Deutsch · Redaktionsbüro
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Internet: www.manager-wissen.com
Layout: metropolmedia · 69245 Bammental
Druck: ColorDruck Solutions · 69181 Leimen