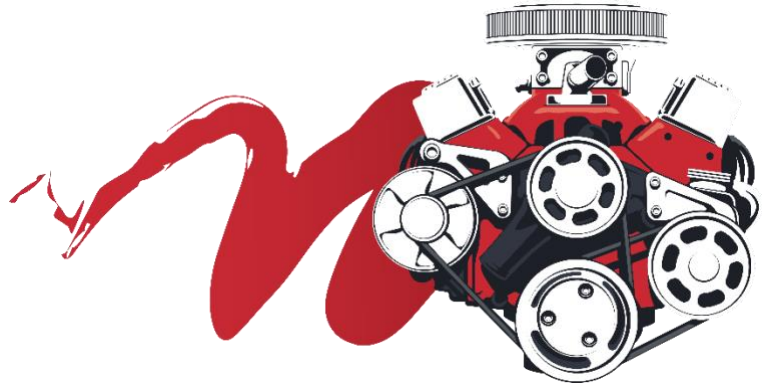


# The Power of a Configurator in a PLM System

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The industry is full of terms like [Engineer-to-Order](#) and [Mass Customization](#) [1]. These used to only apply to consumer products, but within the past several years there has been a noticeable change in customer expectations. Every industry is subject to the expectation that a consumer can go to an app and create a tailored product experience. No longer are car options A, B, and C enough. Buyers want to specify color, trim, wheels, materials, infotainment, and other bells and whistles. Health conscious individuals are looking for bio-matched pharmaceuticals. Even the defense industry, once thought of as the bastion of locked-in and unchanging baselines, is getting requests for mission-specific articles, custom accessories, and unique labeling. Custom fit medical devices and sports equipment are rising industries thanks to additive manufacturing and changing regulations.

None of these requests are completely new ideas or products. They are typically a variation of an existing product, or family of products, being sold by a company. Whereas in the past, the seller would have a few options for the consumer to select from to tailor their experience, today consumers are expecting to be able to control even the most minor details.

- How does a company manage the vast amounts of data behind each and every combination of options?
- How does a company keep track of those configurations?

## A Look at the Numbers

Before trying to answer those questions, let us take a deeper look into the issue. Most people are familiar with the options available when buying a car: body style, wheels, exterior color, interior color, interior fabric, heated seats, and so on. If an automotive company were to sell only a single model of automobile, they still have many different product configurations in their catalog. The following table shows the data from a single online car buying experience.



Option	Number of Choices
Body Style	3
Trim	8
Drive (2- or 4-wheel)	2
Exterior Color	12
Add-on Packages	11
Wheels	3
Tires	2
Mechanical	12
Exterior Cosmetic	28
Radio	2
Interior Comforts	8
Accessories	149

Leaving off the accessories, there are a total of more than 204 million different configurations.

$$3 * 8 * 2 * 12 * 11 * 3 * 2 * 12 * 28 * 2 * 8 = 204,374,016$$

Here is the tricky part. Not all those options are compatible. The good news is that there are fewer than 204 million combinations. The bad news is, now someone must keep track of which options work together and which ones do not.

- Do you think 204 million configurations are created manually?
- Do you think there is an engineering drawing and Bill of Material for every available option combination?

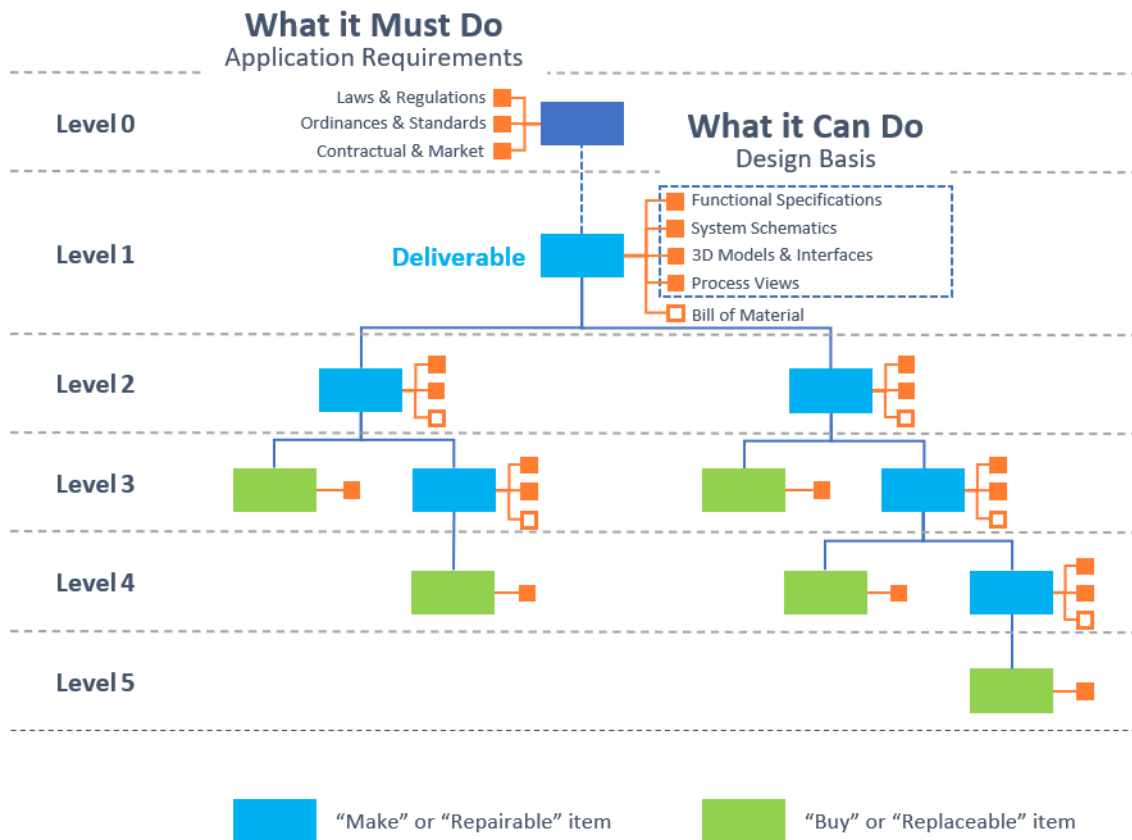
## The Research Shows

With the sheer number of configurations and the hassle to manage them all, why would a company bother to give consumers that much choice? The folks over at [Tech-Clarity](#) have been researching the trends in engineer-to-order and other varieties of mass customization since at least 2014. Jim Brown states that engineer-to-order “is a great way to increase sales and improve margins” [2]. Michelle Boucher follows up later and explains that a company can use mass customization via methods such as engineer-to-order (ETO), design-to-order (DTO), and configure-to-order (CTO) to differentiate their company and their products which can enable a price premium to drive higher profits [3]. Improved profitability is repeatedly linked to generating a customized experience for the consumer [4] by creating personalized products [5].

The answer should be obvious why industries are moving towards mass customization and a personalized product experience for its consumers. The question remains though, how to do it?

## Product Lifecycle Management

For years, the go-to tool for automating the normally manual process of managing configuration data was a product lifecycle management (PLM) system. While workflows and notifications can easily be constructed in a PLM system, the part, items, objects, linkages, and relationships were still mostly manual. A user had to generate another object and link that object to others with the respective relationships. When the structure was complete, the result was a thing of beauty.



Yet, PLM did not solve the issue of managing 204 million different configurations for a single product line. A user could not manually create 204 million objects within the database, all with a unique identification number, name, and revision. Likewise, creating the structure and linking all related items and datasets together seems like an impossible task. Certainly, it cannot be cost effective or increase profits like the research states.

None the less, enterprises have come to rely on PLM systems to be the authoritative source of design data. Not only does it warehouse their data in its internal vault, but it performs configuration management duties on the items including revision control, change workflows, and status accounting. Some PLM systems are even certified out-of-the-box to meet various levels of [CM2](#) compliance. With PLM systems being the master data record for design and enterprise data, there appears to be little likelihood that PLM will be going away any time soon. Therefore, PLM must be enhanced with, augmented by, or integrated with a tool that can handle the lifecycle of configurations.

## Configuration Lifecycle Management

Configurator tools have existed for nearly as long as PLM, although they typically have been standalone software applications that drive, or derive, options and variants of a product family. With a combination of engineering rules and a list of options, configurators could process all variations of a product family. No more manual processing of 204 million different possible combinations to determine what works and what does not. With focused list in hand, a “Single source of Truth for valid combinations,” a user could take that list and create the subset of items inside of the PLM system. Still, an overwhelming task full of potential pitfalls.

What would happen if the user mistyped a data entry while creating an object in PLM? By default, PLM is the master record and therefore it is correct. The configurator tool must be the error. If not, then the correct item would have to be entered into PLM and in the meantime, the database is getting filled with typos. Garbage in, garbage out. As the database fills with bad entries, users question the accuracy of the results.

Intervention resources are spent verifying search results. Performance is often slowed on the database itself. Every error adds up to lost time and wasted resources. In other words, cost.

Now imagine a future where the Configuration Lifecycle Management (CLM) tool is integrated with the Product Lifecycle Management (PLM) tool. Together, they form the single source of truth for product data. Each one provides its own functional view of the configuration’s lifecycle. The possibility of data entry error is reduced if not completely eliminated.

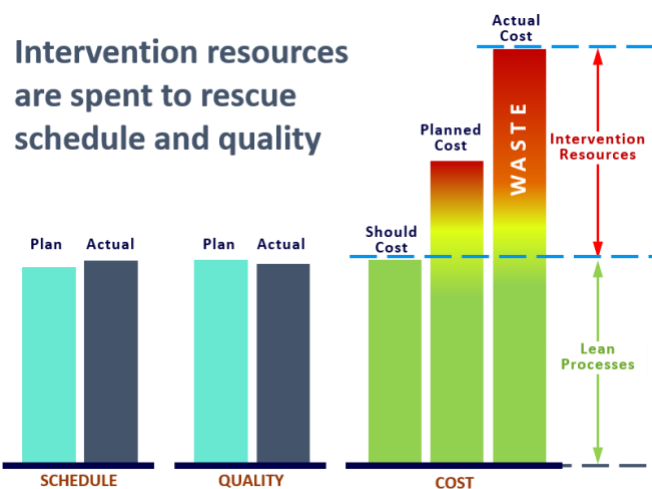
Not only that, but  $CLM + PLM = CPQ$ .

Sales teams can configure, price, and quote new product variations without engineering influence because the “rules” have been predefined. Real time choices can be made in front of the customer and the options that are sold are known to be good. No more going back to the customer, tail between their legs, and apologizing for recommending a variant that is not technically possible.

The power of an enterprise configurator integrated to PLM does not stop there. Imagine being able to connect functions, systems, and business processes as well as product data into a single source of truth. As new requirements and market demands unfold, those “rules” can be adjusted in the CLM tool allowing the enterprise to quickly adapt to changing market needs.

## The Complete Lifecycle

The power of combining CLM and PLM do not stop at the design stage. Both products are designed to manage the entire product lifecycle from conception to decommission. PLM+CLM integrated with [Enterprise Resource Planning](#) (ERP) and [Manufacturing Execution System](#) (MES)



also brings about complete as-built record traceability. Field repairs or service work can also be documented to maintain the as-serviced, as-fielded, as-maintained configuration.

All this power and automation comes at a risk, though. If your processes are not calibrated to true north, implementing an automated solution will not fix your problems. To find out if your company is ready for CLM, [contact the Institute for Process Excellence](#) for an assessment to help you improve your processes and find the right purpose-driven tools that will help your organization scale.

To learn more about CLM tools, Enterprise Configuration capabilities and how these can integrate into the above mentioned IT systems, contact [Configit](#).



## References

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