

The logo for Tech-Clarity, featuring the word "Tech-Clarity" in a bold, sans-serif font. "Tech" is white and "Clarity" is yellow, both set against a dark blue rounded rectangular background.

Tech-Clarity

Driving Engineer-to-Order Differentiation and Profitability

*Analyzing Trends and
Best Practices in
Product Configuration*



Table of Contents

Executive Overview.....	3
Product Customization is on the Rise.....	*
Understanding Customization Business Drivers.....	*
Creating Differentiation in Customized Products	*
Taking A Deeper Look at Customization.....	*
Recognizing Customization Challenges.....	*
Recognizing Potential Negative Impacts of Customization	*
Identifying the Top Performers	*
Analyzing what Top Performers do Differently.....	*
Evaluating Top Performers’ Process Advantages	*
Analyzing the Technical Enablers of Top Performers.....	*
Identifying the Technical Capabilities of Top Performers	*
Conclusion.....	4
Recommendations	4
About the Author.....	5
About the Research	5
Footnote	6

***This summary is an abbreviated version of the report and does not contain the full content. A link to download the full report is available on the Tech-Clarity website, www.tech-clarity.com.**

If you have difficulty obtaining a copy of the report, please contact the author at jim.brown@tech-clarity.com.



Executive Overview

Customized products are more compelling to customers and drive higher profitability. They can also create chaos in sales proposal and order fulfillment processes as engineers scramble to develop cost estimates, customized designs, and detailed manufacturing and sales documentation. This engineer-to-order (ETO) study finds that some companies have found better ways to design custom products, alleviating the engineering bottleneck created in most companies when quotes requests or orders roll in.

The manufacturing industry needs to adopt best practices and technology to accommodate the growth in customized products. Researchers for this report surveyed over 200 companies, finding that product customization is growing significantly. Why? For some companies, it helps them differentiate. For others, their industry doesn't give them a choice. It's just the nature of the business. Either way, growth in product customization drives increased complexity that leads to late deliveries, recalls / warranty work, and missed financial targets. The cause? Manual processes for custom products make Engineering a bottleneck to getting quotes and orders out of the door.

Manual processes for custom products make Engineering a bottleneck to getting quotes and orders out of the door.

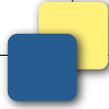
Fortunately Tech-Clarity research¹ shows that companies taking more advanced ETO approaches to customize their products end up with better results. This report investigates trends in customization and digs deeper into these best practices. The analysis finds that manufacturers achieving the highest sales and profitability growth, The Top Performers, place more strategic emphasis on rapid quote and order turnaround. They also perform better when executing orders, experiencing significantly fewer errors.

This research concludes that customization performance can be improved with ETO best practices and technologies.

Our research shows that Top Performers adopt leading design practices including platform, modular, and rules-based design techniques¹. Survey reports show they support these best practices with leading technologies, finding that they are:

- More than twice as likely to use **technical product configurators**
- 53% more likely to have **quote automation**
- 22% more likely to leverage **design automation**

This research concludes that customization performance can be improved with ETO best practices and technologies. These approaches help Top Performers relieve engineering bottlenecks, leading to better order performance and financial results.



Conclusion

Product customization is growing and is expected to continue to grow. Customization provides significant business value, but also brings significant challenges. These challenges result in a large percentage of orders with costly and time-consuming mistakes. Top Performers, however, have fewer order errors than others. One of the key differences between their approaches and the Others' is that they have adopted more engineering automation. ETO automation helps eliminate engineering bottlenecks and manual processes that lead to delays and errors. *“If it’s done right, engineering becomes a nonfactor for leadtimes,”* explains Price Mechanical’s Rogers.

ETO automation helps eliminate engineering bottlenecks and manual processes that lead to delays and errors.

Some of the key enablers that Top Performers employ more than Others are technical product configurators, design automation, MBOM generation, quote generation, and CAD automation. *“The whole idea is to automate a process to allow someone to do something more value-added for the business,”* explains Mark Rogers of Price Mechanical. *“Automation allows engineers to design new things or cost-down products instead of processing orders.”* These technologies help relieve the engineering bottleneck for customized orders and are likely the source of Top Performers enhanced order execution and higher financial performance. Other commonly used technologies including CAD, sales (CPQ) configurators, ERP, and spreadsheets also provide value, but they aren’t correlated with the Top Performers’ better performance.

Automation allows engineers to design new things or cost-down products instead of processing orders.

Mark Rogers, Knowledge Based Engineering Manager, Price Mechanical

Recommendations

Based on industry experience and research for this report, Tech-Clarity offers the following recommendations:

- Focus on speed as a differentiator for customized products
- Adopt modular and platform design approaches to streamline customization
- Recognize the different capabilities of Technical Product Configurators and Sales (CPQ) Configurators, using each for their strengths (and possibly in combination)

- Leverage technical product configurators and design automation to remove manual engineering effort that creates bottlenecks and results in errors in sales and order engineering processes
- Adopt MBOM and quote generation capabilities to improve custom order performance

About the Author

Jim Brown is the President of Tech-Clarity, an independent research and consulting firm that specializes in analyzing the business value of software technology and services. Jim has over 20 years of experience in software for the manufacturing industries. He has a broad background including roles in industry, management consulting, the software industry, and research. His experience spans enterprise applications including PLM, ERP, quality management, service lifecycle management, manufacturing, supply chain management, and more. Jim is passionate about improving product innovation, product development, and engineering performance through the use of software technology.

Jim is an experienced researcher, author, and public speaker and enjoys the opportunity to speak at conferences or anywhere he can engage with people with a passion to improve business performance through software technology.

Jim can be reached at jim.brown@tech-clarity.com. You can read additional research, watch Tech-Clarity TV, or join the Clarity on PLM blog at www.tech-clarity.com. You can also follow Jim on Twitter at [@jim_techclarity](https://twitter.com/@jim_techclarity), or find Tech-Clarity on Facebook as TechClarity.inc.

About the Research

Tech-Clarity gathered and analyzed just over 200 responses to a web-based survey on Product Configuration and “To Order” Manufacturing. Survey respondents were invited by direct e-mail, social media, and online postings by Tech-Clarity, Engineering.com, and Siemens PLM.

The responding companies were a good representation of the manufacturing industries, including Industrial Equipment / Machinery (45%), Automotive / Transportation (18%), Consumer Packaged Goods (18%), Energy / Utilities (14%), Building Products / Fabrication (14%), Electronics / High-tech (13%), Aerospace / Defense (11%) and others including Life Sciences, Marine, and more. Note that these numbers add up to greater than 100% because some companies indicated that they are active in more than one industry.

The respondents represented a mix of company sizes, including 34% from smaller companies (less than \$100 million), 31% between \$100 million and \$1 billion, 23% between \$1 billion and \$5 billion, and 12% greater than \$5 billion. All company sizes were reported in US dollar equivalent.

The respondents were comprised of employees holding various roles. About one-half (49%) were manager or director level. About one-third (32%) were individual contributors, 13% were VP or “C-level,” and the remainder included internal consultants and others.

Respondents included manufacturers as well as service providers and software companies, but responses from those determined not to be directly involved in designing software-intensive products (including software vendors and consultants) were not included in the analysis. The majority of companies were considered to have direct involvement in designing and developing software-intensive products and the report reflects their experience.

Footnote

¹Researchers quoted findings from Tech-Clarity’s Best Practices in Developing Industrial Products because of the high prevalence of customized, to-order products in that industry and it serves as a good source of information for other industries.