

engineering management

tools for all jobs

Technology must suit the business, especially if you have to be light on your feet.

by Jim Brown

Leading a manufacturing concern requires two skills: recognizing what every role in the organization contributes to achieving profitable business, and making sure people have the right tools to get the job done.

Design engineers are important to any organization, and companies must make balanced decisions about bringing on board the technology that best supports them. But in an era of competing computer-aided engineering and product lifecycle management technologies, teasing out the most appropriate ones for your manufacturing organization could be difficult.

How to decide? Technology that allows product designers to be in contact with members of the supply chain as well as with others in the design team is always beneficial, particularly in industries where products must be customized and innovation comes quickly.



Companies that design and build huge assemblies, like this stainless steel wind tunnel, rely on collaborative software to coordinate projects.

Leading manufacturers know one thing: The success or failure of their business depends, in no small part, on their design engineers. Of course, innovative products alone won't ensure a company's success, but lack of innovation will certainly stifle growth over time.

The role of product designer doesn't stop at introducing innovative features into a product. That product also must be designed so it can be manufactured with quality and delivered effectively to the market. Because product lifecycle management technology connects the designer to others in the supply chain, PLM can enhance the designer's ability to develop the optimal design for the product.

PLM helps manufacturers make more successful products because it expands the development process to incorporate market- and customer-driven features into the design. It also works with the procurement, logistics, regulatory, and manufacturing ends of the organization to ensure that the design is delivered at optimal cost. For simple products, or those that are mass-produced in a limited number of models, the designer can

significantly affect profitability by designing the right features into the product at the right price.

Designing to Be Customized

For many industrial products, the engineer's role in profitability doesn't stop there. It also includes designing the innovative product so it can be easily customized. Products that must fit the customer's environment, such as architectural components like doors and windows or industrial products like pumps or valves, can challenge a company's profitability. These products still have to be innovative, but the engineer also has to design for the capability to efficiently customize the product.

Customization starts early in the design process by incorporating flexible design parameters into the product. Innovative features in the design need to be coupled with flexible features so the product can be tailored to customer needs. For example, different materials, dimensions, and other options that can be specified by the customer should be designed into the product in advance. Innovation must go further to ensure that, as the product is tailored for a customer order, the differentiating features don't have to be compromised to accommodate customer needs.

Innovation and customization require creativity in design, and must also be kept in the right cost structure in order to ensure profitability. Customization for many manufacturers today comes at a significant penalty in terms of production and design efficiency and lead times. The first challenge in keeping costs competitive is that incorporating customer specifications into a design is often a manual, time-consuming, and error-prone process. Design engineers are a valuable resource, and should not be spending their time on repetitive design tasks.

The flexibility should be built into the CAD design in advance and then driven by customer order parameters to create tailored CAD models. From these tailored CAD models the manufacturer can generate detailed shop drawings and parts lists for manufacturing. In addition, the tailored CAD models can be used to generate visual prototypes for customers so they can verify, in advance, that the product as ordered will meet their needs. Companies that have automated the tailoring of designs benefit

from more accurate orders, greater design efficiency, and significantly decreased quote and order lead times.

The second challenge in delivering customized products at optimized costs and lead times is the ability to accurately capture the customer order parameters and provide quotes without burdening engineers. The customization process typically starts with a customer quote. Customized CAD models can help with design and production efficiency, but they require a set of valid product parameters as input. Capturing and validating the customer order requirements in advance is crucial to efficiency.



Customized CAD models and collaborative software help engineers and managers deliver products quickly, while capturing customer orders.

An engineer must expose as little of the design complexity as possible to customers so that they can be guided into selecting the right parameters based on their needs, and not on an in-depth

knowledge of the product they are ordering. This configuration environment must be customer-centric as opposed to design-centric, and offer customer information such as pricing in addition to design parameters.

The final challenge in delivering customized products at optimized costs is the overall efficiency of the processes from quote to delivery. Many manufacturers have a disconnected process between capturing customer parameters and producing the product. This disconnected process typically includes manual inclusion of order parameters into the design and manual development of production requirements, such as parts lists and process routings. These manual steps consume valuable time and resources in addition to creating rework due to errors.

The ideal scenario is an integrated process that captures order configuration parameters, uses them to automatically tailor the

designs, and then integrates the resulting production requirements back into the manufacturing systems with order-specific bills of materials and routings.

Software vendors are providing parts of the solution required for engineers to help improve the profitability of delivering customized products. Design automation software based on customer parameters is offered, for example, by PTC, a PLM vendor in Needham, Mass., and by RuleStream Corp., a design automation vendor in Wakefield, Mass. Product configuration is offered by configuration vendors such as Trilogy Software Inc. of Austin, Texas, and by enterprise application vendors such as Cincom Systems Inc. in Cincinnati.

One company, TDCI Inc. in Columbus, Ohio, offers an integrated solution that automates the process under a unified configuration model. The TDCI product, BuyDesign, includes order rules, pricing rules, manufacturing rules, and design rules in a package that ties order configuration, design automation, and integration to ERP and manufacturing systems. These solutions can allow engineers to significantly improve the efficiency and timeliness of the delivery of customized products.

Design engineers play a key role in a company's profitability. For customized products, integrating the design of the product into the design of how the product will be sold and delivered in the supply chain is crucial. Profitability in customized products relies heavily on finding ways to highlight the value of innovative features, while ensuring rapid quote and delivery through reducing the manual effort required in customizing products to customer needs.

Proper design, built with customization in mind, will help profitability. And, who knows, with the increased efficiency in generating quotes and the ability to offer competitive prices, maybe engineers can impact top line revenue by providing easy customization in addition to designing the next best differentiating feature.

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