

Four Types of Configurators

Which One is Right for Your Business?

A buyer's guide to understanding the configurator market

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Companies using CPQ saw a 105% increase in deals compared to non-CPQ users.

Configure-Price-Quote: Best-in-Class Deployments that Speed the Sale, 2013.
www.aberdeen.com

Executive Summary

Companies that build configurable, multi-option, and customizable products are finding that a configurator can provide a competitive edge by reducing lead times, automating quotation documentation, increasing workforce efficiency, eliminating errors and rework, and increasing customer satisfaction.

Introducing a configurator into an organization requires a considerable investment of both time and resources. Capturing knowledge to define configuration rules is time consuming, whether undertaken by a consultant or by a company's own personnel.

However, once these rules are captured, they become a company asset. To maximize the benefit from this asset, it's important to select a configurator that not only addresses the company's immediate requirements, but also provides a growth path to adopt advanced options in the future.

The configurator market can appear confusing. Unlike financial accounting software, which has specific functionality for categories such as accounts receivables, payables, and a general ledger, there are no such standard definitions of what configuration software must contain. All configurators are not the same, and today there are hundreds of different software products that fall under the umbrella term of "configurator" or "product configurator".

In this white paper we examine the capabilities of the four major categories of configurator products available in the market today:

- Knowledge-based engineering (KBE) solutions
- ERP configurator modules
- Product visualization solutions
- Enterprise product configurators

This white paper highlights the functionality that companies are looking for in a configurator today, and examines the scope of the four categories of configurators mentioned above. This document provides some of the key questions you should ask potential software vendors, and will help you select the right product for your company's needs.

Background

For many industry sectors, the days of producing standard products or products with limited options are over. Driven by customer demand and the need to differentiate themselves, manufacturing companies are offering more custom or configurable products.

In the past companies did not offer customization, as it was just too expensive for the manufacturer and the customer. Today, if your company offers standard products only and does not allow customers to configure your products to their specifications, your business is at a serious disadvantage. Simple standard products are too easily copied and manufactured in regions with low-cost production. To combat this threat, companies must offer more value to their customers and distribution channels.

To compete with low-cost rivals, many North American and European manufacturers have adopted Lean techniques, which reduce waste and improve productivity. Most of these companies start these initiatives on the shop floor. However, many have discovered that there is a greater benefit to be derived by cutting out waste and errors from the front-end business processes. This is because the complicated quote-to-production process of a complex product manufacturer—involving multiple departments including sales, estimating, engineering, and customer service—can lead to slow response, potential errors, and an increase in overall product lead time.

How long does it take your company to deliver a product quotation?



The business-to-business market for configurable products is also being influenced by what is available in the business-to-consumer market. One example is Dell Computer (www.dell.com). With Dell's direct sales model and online configurator, customers can get exactly the computer they want instead of choosing from pre-built configurations. To stay competitive, other computer companies now must offer the same capabilities. In another example, automobile manufacturers are providing customers with the ability to pick colors and options, and price a vehicle, without stepping into a showroom.

This trend has moved into the industrial and high-tech equipment market for products such as conveyor systems, elevators, telecommunications systems, medical technology, and technical furniture. Customers are asking why they are limited to a small number of different styles. They are demanding the ability to customize the exact size and specifications of the end product. Increasingly, companies must offer configurable products to stay competitive, and offer these products with the same lead times for which they would offer standard products. To address these challenges, manufacturers need sophisticated configurator solutions that can help reduce lead times, eliminate errors, and lead to increased revenue and margins.

Benefits of a Configurator Solution

What are the benefits a company can typically hope to obtain from a configurator? With a configurator, your business can reduce lead times, automate quotation documentation, increase the efficiency of your workforce, eliminate rework, and increase customer satisfaction and market share.

Reduce Lead Times

In some industries, faster turnaround on quotations is a competitive edge. By automating the quote-to-production process with a configurator, sales and customer service personnel can dramatically reduce both the time taken to create a quote, and the whole quote-to-production process. Since all the information needed to produce an accurate quote is captured up front, the internal order department doesn't have to go back to the dealer or sales rep to track down information that wasn't included on the original order form. The configurator automates the creation of sales and production drawings, bills of material (BOM), and routings so the order gets to manufacturing faster, reducing the overall product delivery lead time.

Automate Quotation Documentation

A complete, professional-looking quotation document that is comprehensive, yet easy to read and understand, greatly improves a company's image in the eyes of the customer. The ability to automatically generate quotations and pricing, sales drawings, and specifications not only saves valuable time, but also further enhances the company's image as one that is easy to do business with.

Increase Efficiency

Automating the quote-to-production process frees engineers' time to work on designing products instead of creating estimates. Sales people can spend more time prospecting and talking with customers, instead of on paperwork. The customer service department's workload is reduced as accurate quotations and configurations lead to fewer queries. With access to online information, customers can be more self-sufficient answering their own routine inquiries. Support personnel can then spend more time solving complex problems when they occur.

Eliminate Rework and Increase Customer Satisfaction

Complex products have complex configurations and complex pricing, resulting in greater opportunity for human errors. A configurator can dramatically reduce these potential human errors by pre-defining rules that create only valid configurations and accurate pricing. This is a significant cost saving, as many errors are not discovered until the time of manufacturing, resulting in expensive rework. A configurator can reduce the chance of mistakes in the final product reaching the customer, thus eliminating potential warranty claims and increasing customer satisfaction.

Key Benefits:

Decrease quotation lead time between 40-80%

Companies using CPQ saw a 27% shorter sales cycle than non-CPQ users.

Configure-Price-Quote: Best-in-Class Deployments that Speed the Sale, 2013.
www.aberdeen.com

Increase Market Share

The single biggest benefit of a successful configurator implementation is increased revenue and profit. Not only can the right configurator increase a company's throughput without adding additional personnel, but it can also help win more business and increase market share. By making it easier for the extended sales force (including distributors and dealers) to do business with the OEM, market share is often positively affected. This is especially true when a company's dealers are not exclusive but instead sell other products, including those of competitors. A configurator can also facilitate the expansion of a sales force, or establishment of a new sales channel, by greatly reducing the amount of training and experience needed to sell a configured product.

Defining the Configurator Market

Ten years ago, there were two distinct types of configurator—the sales configurator and the production configurator. But as the market advanced and the availability of the Internet increased, configurator functionality has become both deeper and broader. All configurators are not the same, and today there are hundreds of different software products that fall under the umbrella term of “configurator” or “product configurator”. Unlike financial accounting software, which has specific functionality for categories such as accounts receivables, payables, and a general ledger, there are no such standard definitions of what configuration software must contain.

This white paper explains the different types of configurators on the market today and will help you select the right product for your company's needs.

We have identified four categories of configurators:

- Knowledge-based engineering (KBE) solutions
- ERP configurator modules
- Product visualization solutions
- Enterprise product configurators Before examining the different characteristics of each category, let's consider the types of requirements that a potential buyer may look for in a configurator solution.
- The process of defining configuration rules differs based on the physical nature of the product being defined. There are separate categories of rules for assemble-to-order (ATO) or configure-to-order (CTO) products and engineer-to-order (ETO) products.

By 2015, the integrated automation of CPQ will help companies grow revenue by 10%.

MarketScope for Configure, Price and Quote Application Suites, 2013.
www.Gartner.com

Assemble-to-order/Configure-to-order (ATO/CTO) Rules

ATO/CTO manufacturers typically make products that are a combination of standard components, assembled or configured to a customer's specification. Computers, server cabinets, and even automobiles are examples of ATO/CTO products. A new product may be created at a top level, but the component part numbers remain the same.

ATO/CTO rules generally are less complicated to capture than ETO rules, but can still have significant complexities depending on the number of components that make up the final product, and the various ways that the components can fit together.

Engineer-to-order (ETO) Rules

Due to the nature of the products, the ETO environment typically requires more complex rules than that of the ATO/CTO environment. A company requires ETO rules if a portion of its customers' orders require the creation of new part numbers either at the sub-assembly or end part levels. Unlike ATO/CTO, where the rules are based upon pre-determined options, ETO companies require the configurator to handle dimensional variables and to allow for parametric changes in their products. The configurator must also handle non-standard requests for pricing, costing, quoting, part numbering schemes, bill of material creation, and routings generation.

The physical nature of the product typically determines whether the company is ATO/CTO or ETO. For example, a company that assembles plastic products from standard components is more likely to be ATO/CTO. Likewise, a company that manufactures wooden tables in standard sizes could fit this category. But a company that offers wooden tables in whatever size and shape a customer desires could have ETO configuration requirements.

Let's now consider some of the other attributes of various types of configurator solutions:

Integration with Enterprise Resource Planning (ERP) and/or Customer Relationship Management (CRM)

In most companies, configurators exist as a part of a larger IT infrastructure that may include ERP and CRM applications. The configurator should integrate seamlessly with these business applications without the need to write a custom interface. But historically, ERP and MRP applications lack the tools to integrate to other applications such as configurators. The configurator needs to include system integration capabilities that allow it to interact and share data bi-directionally with other critical enterprise applications.

An Enterprise Application Integration (EAI) approach allows the enterprise to share data and processes without having to make sweeping changes to the applications or data structures. The integration tools must be flexible enough to handle the wide variety of formats and protocols, and have the capability to build integration business logic.

Key Benefits:
Reduce order lead
times 10-50%

Modern integration tools provide graphical representation and point-and-click mapping of data structures between applications. Another consideration of application integration is to provide monitoring and alert capabilities to track and maintain data moving from one system to another. Foreexample, if the configurator is sending sales order data to the ERP system, and that system is unavailable, there needs to be a way to store the data so it is not lost.

Web-Based Architecture

A web-based architecture provides the flexibility to support a variety of users—internal, external, or both. The advantage of a web-based configurator is that it requires no software on the client other than a standard web browser. This approach eliminates the need to keep laptop and desktop computers up-to-date with the latest configuration rules, as all the data operations are performed on the server.

Dynamic Drawing Capabilities

“Dynamic drawing capabilities” refers to the ability of the configurator to automate specific engineering tasks such as the creation of sales and production CAD drawings. This functionality enables the configurator to create drawings on the fly without any human intervention.

Configurators can be used to generate sales or customer approval drawings. Including sales drawings in quotations is a must-have for many industries, and doing so decreases order mistakes by allowing customers to see a drawing of the configured product before it is manufactured. In addition to sales drawings, some companies require the configurator to automatically generate production drawings, including all of the drawings necessary to produce the product (part, assembly, weldment, and/or flat pattern drawings).

Advanced Order Entry

Companies with MRP or ERP systems typically use the order entry capabilities of those systems to enter sales orders. However, companies with a high percentage of orders that include configurable products may find it beneficial to replace the order entry capabilities of their ERP/MRP system with order entry functionality found in some configurators. In this case, the configurator needs more than basic order entry capabilities. For example, because order entry users often work collaboratively to process orders, order workflow functionality may be necessary, and a configurator supporting advanced order entry should support multiple people working on an order at different times. Advanced order entry also supports entering orders rapidly and allows orders to be created directly, without necessarily requiring a pre-order quoting process.

Create Multi-Level, Multi-View BOM

The ability to translate features and options into a BOM is one of the most common requirements for a configurator. Depending on the complexity of the configured products, some companies require sophisticated BOM functionality, including the ability to capture

complex BOM rules, generate multi-level BOMs, and allow for multiple views of the BOM, such as an engineering view or production view.

Manufacturing Routing Generation

Another common requirement for a configurator is the ability to create a routing report that includes the operations and resources needed to manufacture the product. Because the format and detail contained on a manufacturing routing report varies greatly from company to company, it is important to select a configurator that can generate a routing with the appropriate level of detail.

Some applications simply require routings that contain a list of operations needed to make and/or assemble the product. Others require a more sophisticated routing report and require the configurator to calculate operation characteristics such as set up, run, move and queue times. In addition, some applications require that the routing be linked to the BOM to show the list of parts used on each operation.

Advanced Pricing Generation

The ability to automatically calculate price is another common requirement for a configurator. The methods used to price products and services can be very complex and sophisticated. Configurator functionality must be flexible enough to mimic a company's existing pricing methods, and automatically calculate an accurate price. Advanced pricing needs to take into account a variety of factors, including different price books for different users, discount structures, and allowable limits. In some industries, pricing must account for variable factors such as the price of steel or labor.

Quote Creation

Many companies want to improve the quality of the quotation sent to their customers. This includes the ability to control the format and look of the document. Most configurators can produce a professional looking quote or proposal document that is based on a standard template and for many companies this will suffice. Other companies require additional functionality, so that the configurator will customize the quote by inserting specific calculations, text, and images based on the features and options that the user selects. The configurator should also provide a variety of methods to produce and send the quote or proposal document to the customer. These methods include printing, faxing, and creating a PDF file to send via email.

Quotation Management

Once a quote is created, quotation management provides users with the capability to save, edit, and maintain the quote through its lifecycle, over multiple versions, tracking changes, and viewing history. Quotation management also includes the ability to monitor pricing and discounts, and to provide warnings if pre-defined limits are exceeded.

Security and filters should be provided to restrict access to information. For example, a regional sales manager may be prevented from viewing quotes outside their area of responsibility.

Key Benefits:

Reduce costs 10-40%

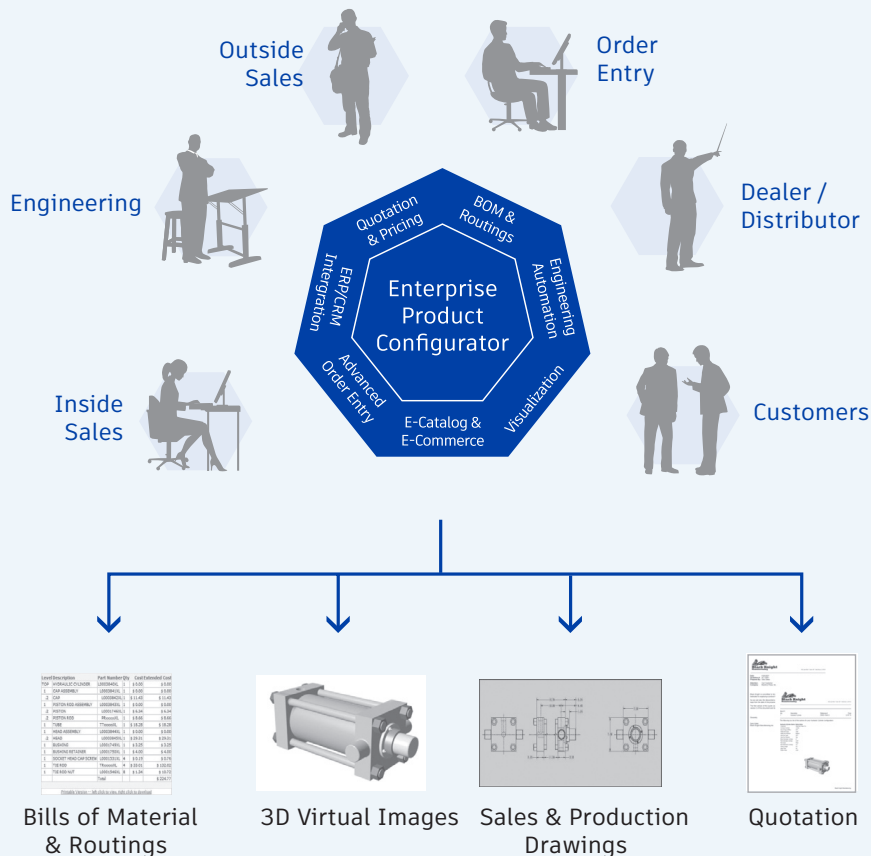
Advanced Document Creation

Advanced document creation functionality provides the ability to automatically generate additional documents, such as legal agreements, terms and conditions, and warranty information.

Visualization

The ability to present images of available options during the configuration process can be very useful, especially if the users are not experts in the products they are configuring. For example, simply providing options A, B, & C in a dropdown list is not as helpful as showing an image of each option. Some configurators can dynamically generate virtual 3D images and web-viewable 3D VRML models (“spin and zoom”) of exactly what was configured. This functionality provides a much easier way for the user to verify the accuracy of the configuration, rather than simply looking at a bill of material. Advanced visualization capabilities make the configuration process more efficient and reduces errors.

A web-based enterprise product configurator allows for many different user scenarios, and provides the necessary outputs to support the quote-to-production process.



Key Benefits:
Free up between
1-5 personnel

E-Catalog

Electronic catalog (E-catalog) functionality provides a company's catalog in electronic format, and generally includes the ability to find both standard or configured items through category drilldowns, searches, and filters. The E-catalog also allows users to obtain information such as cut sheets, product descriptions, and product images. This functionality is especially useful when a company's product line includes both standard and configured items. By integrating an E-catalog with a configurator, a quote or order containing both standard and configurable items can be constructed from a single source. E-Commerce

Companies that want to incorporate the configurator as part of their website require the ability for customers to place orders and make payments directly without assistance from internal sales. In many cases, the first phase deployment of a configurator is limited to internal users. But many of these same companies will eventually want to make the configurator available to their end customers and extended sales channels via public or secured websites. It is therefore essential that the configurator contain native E-commerce capabilities, such as shopping cart functionality that enables customers to create, save, review, and place orders for both configured and standard products. Payment functionality should include processing for credit cards, purchase orders, or both.

Configurable Security

Different levels of security restrict access to certain data within the system, depending on the user. Internal and external users may need to see different types of information. For example, certain customers may be restricted to certain product lines, whereas sales people may have access to all product lines. The levels of security provided by the configurator should support your particular business processes.

Advanced Searches, Queries, and Reports

The configurator should provide tools to allow easy access to information. End users need the ability to run searches and queries on configurations or quotations they've previously created. Management needs the ability to run reports to view information such as the number of quotes converted into orders, and performance statistics by sales rep or dealer.

Enterprise Process Centric

A configurator with enterprise process centric functionality allows companies to deploy the configurator as an enterprise application. In this case, the configurator can be simultaneously used across multiple internal departments (such as engineering, sales and customer service) and by external users (such as dealers and end customers).

This functionality provides the flexibility to accommodate many different types of users within an enterprise. A customer, an external sales rep, and an internal order entry person may all use the configurator in different ways. For example: •

- A customer may want to create a configuration and request a quote.
- The sales rep needs to convert the customers' request into a quote, and later a request for order.
- The order entry person may want to convert quotes into orders or simply skip the quote process altogether and place an order.

A configurator with process centric functionality must be supported by roles-based security, with notifications based on changes in status, workflow, and queues. Ultimately, this functionality enables companies to not only automate the creation of deliverables from features and options, but also the entire quote-to-order or quote-to-production process.

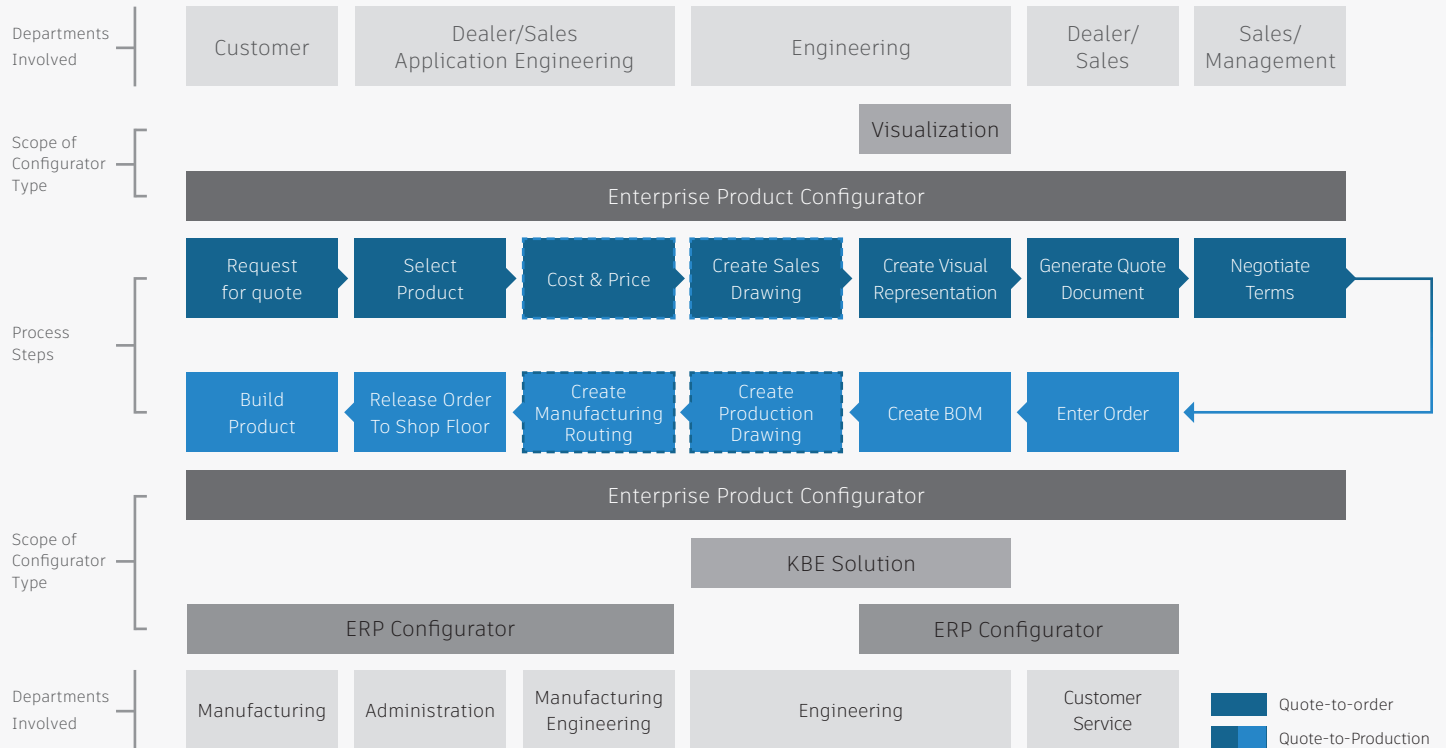
The Four Major Configurator Categories

Configurator products contain different combinations of the functionality described above. In this section, we describe the four major categories of configurator products available in the market today. These are:

- Knowledge-based engineering (KBE) solutions
- ERP configurator modules
- Product visualization solutions
- Enterprise product configurators

While each category is different, one type is not necessarily better than another. It all depends on your company's configuration requirements, and how you plan to use configuration software in your organization.

Many software purchases are justified on the basis of the ability to solve an immediate problem. In the case of a configurator, this problem may be the need to decrease the time to create a quotation, improve order accuracy, and reduce or eliminate configuration errors. It is important, however, to ensure that the configurator selection does not limit the extension of the application to other users, both internal and external, such as dealers and potential customers. If the manufactured product is complex, then the solution may need to cover the quote-to-production processes—including engineering and manufacturing—by providing drawings, bills of material, and production routings.



The diagram depicts the typical process flow covering the quote-to-order and quote-to-production cycle, showing the scope of the configurator types, and their interaction with the various departments.

Knowledge-Based Engineering (KBE) Solutions

Companies that design and build large complex equipment, with an engineer involved throughout the entire design and manufacturing process, most commonly use KBE solutions. KBE solutions are primarily an engineering productivity tool and are typically used by engineers. KBE systems handle ATO, CTO, and ETO rules, and are suitable for companies that simply want to address the engineering portion of their process.

KBE tools are always integrated with a computer-aided design (CAD) application. They are most effective in automating the creation of drawings when completing the engineering work associated with filling an order. KBE solutions can also automate the generation of BOMs. But whereas most configurators have native bill of material generation functionality, KBE solutions rely on the BOM functionality contained within the CAD system. As a result, all of the BOM maintenance and part numbering rules must be performed inside the CAD application. Because users of KBE solutions generally require a version of the CAD system on their computer, these systems are not natively web-based, and are difficult to deploy outside engineering departments.

KBE solutions do not have the architecture that is necessary to successfully integrate with ERP, CRM, or other enterprise applications.

Key Benefits:
Grow market share
by 20%

ERP Configurator Modules

Most ERP/MRP (manufacturing resource planning) systems aimed at the ATO/CTO style of manufacturing include a configurator module. This functionality is typically used by internal customer service or order entry departments, and not by dealers or sales reps in the field. Although a few ERP companies claim a web-based interface, most ERP configurator modules require users to have access to the core ERP system. This limits the usefulness of the configurator.

One of the main benefits of using an ERP configurator module is that the functionality is tightly integrated with other ERP components, such as order entry, pricing, bills of material, routings, and scheduling. However, compared to a standalone configurator application developer, ERP vendors must spread their development resources across many different modules. As a result, ERP configurator modules tend to be functionally lean as compared to configurators from “pure play” configurator vendors. For example, the rules capture functionality may not be as user-friendly. While an engineer or product manager may define the rules, it may require an IT person to create them in the system. Generally, ERP configurator modules have very limited rule-capture capabilities, and can handle only ATO and CTO rules, making ERP-based configurators most suitable for simplistic products and a poor fit for complex products with complex rules and pricing.

One of the biggest drawbacks of an ERP configurator module is that the rules are not portable from one ERP system to another. As with any configurator implementation, considerable resources are needed to capture a company’s rules. But if a company changes ERP systems, then all the configuration rules must be rebuilt, often times resulting in several man-years of effort. If replacing the ERP system is on the horizon, take this into consideration before deciding to use the ERP configurator module. Product Visualization Solution

These solutions are very effective when it is important to be able to visualize the configured product. In most cases, these solutions are custom-built applications for consumer ATO products, not ETO. An example can be found at Nike’s web site, www.nike.com, where the customer can configure a shoe with custom colors and inscriptions, and view an image of the product as it is configured. As the configurator comparison diagram shows below, these product visualization solution configurators lack the majority of the functionality that most manufacturing companies require in a configurator application.

Enterprise Product Configurator

This is the most comprehensive and newest class of configurator. As the name suggests, the enterprise product configurator leverages its capabilities across the entire company, combining the best functionality of the KBE solutions, ERP configurator modules, and product visualization solutions. While the enterprise product configurator may integrate with many ERP systems, it is not tied to any specific product.

The ability to automate sales and engineering processes makes the enterprise product configurator ideal for companies that want to either deploy a strategic quote-to-production configurator immediately, or start off with a more targeted departmental configurator that can be expanded later.

Capabilities of the enterprise product configurator include:

- The ability to handle the most complex rules for ATO, CTO, and ETO environments.
- A web-based architecture that enables the configurator to be deployed both internally and externally, to automate the quote-to-order processes, and to generate complex product pricing and professional quote documents.
- The option to link to various CAD systems, enabling the enterprise product configurator to automate engineering tasks, such as the creation of sales and production drawings, simple and complex bills of material, and manufacturing routing reports.
- Integrated visualization during the feature and option selection process, and at the end of the configuration, to show 3D virtual product images and VRML of the exact configuration.
- The functionality to deploy integrated E-catalog functionality for use on customer or sales-facing storefronts and aftermarket applications.
- E-commerce functionality that provides a virtual shopping cart to take orders via credit card or via purchase orders from portals, or the main company website, for both configured and standard products.
- Enterprise process centric functionality that allows companies to deploy and leverage the enterprise product configurator's capabilities throughout the organization

Key Benefits:
Eliminate between
40-80% of
human errors.

A company making full use of these capabilities would have customer service representatives entering orders and sales reps creating professional quotes. The company could also allow dealers and customers to configure their own products, create quotes, and enter their own orders. Perhaps the company would integrate the configurator into its web site, to include e-catalog and e-commerce functionality, and in some cases provide the ability to visualize the product as different options are selected. To obtain the benefits of all of these advanced capabilities, the enterprise product configurator must be web-based, process centric, and flexible to facilitate use both internally and externally.

Summary

By streamlining all or part of the quote-to-production process, reducing lead times, and eliminating or greatly reducing errors, configurators provide companies with a competitive edge, especially those companies with highly configurable, complex products.

KBE solutions are fine if a company simply needs a productivity tool for its engineers. For simple products, without complex pricing structures, the configurator module available with an ERP system might suffice, but rule portability is an important consideration when replacing the ERP system.

The all-encompassing enterprise product configurator is the best choice for companies that want to do more with a configurator than simply automating processes or creating documents. The biggest cost involved in a configurator solution is not the software, but the investment in creating the product rules. Once created, the company's product rules become an asset. Making these rules available to more users throughout your extended organization leverages this asset to reduce costs by automating processes, and eventually increasing sales. Even though the initial application of the enterprise product configurator may be internally focused, greater benefits are realized when the enterprise product configurator is exposed to field sales reps, dealers, and customers.

Even within these four configurator categories, there are many functional differences between products. Define your requirements carefully so you can select the right product for your company's needs. The configurator solution should be modular, allowing you to buy just the functionality you need today, but provide the functionality for the future. Making the wrong choice and limiting your company's options will not only limit the potential benefits, but also put your company at a severe disadvantage compared to your competition.

Learn more at autodesk.com/engineeringleadership