

Variant Configuration Solution for Make-To-Order Business and Characteristic-Based Planning

Summary

Variant configuration (VC) has been one of the more popular (and more difficult) areas of SAP® software for quite some time. Many manufacturing companies running SAP software want to get up to speed with make-to-order options for their customers, and the potential to configure products online using the SAP Internet pricing and configuration (IPC) tool just makes the need to conquer make-to-order manufacturing more intense. But as VC experts have learned firsthand, you're not going to have a successful VC rollout if you haven't tackled the challenge of designing the right product models for your company. Otherwise, you might get stuck with an unmanageable amount of product variations, or, alternately, a model with rigid choices that is not structured to meet customer preferences. In this white paper, we get into the nitty-gritty of VC product modeling. Using an illustrated example of vehicle manufacturing, we walk through the two main modeling techniques: rules and constraint-based modeling.

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Author Bio



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Challenge

Industries producing configurable materials are defense , automotive , high tech , media, and so on.

Complex products are reflected in complex configuration tasks for sales and production. A company that sells or produces products with variants needs to perform these tasks quickly and accurately. As the development and life cycles of products become shorter and shorter, this is becoming increasingly difficult.

Order-to-cash processes starts with inquiries and quotations. And problems start for the company when trying to attach all the characteristics of the product and derive a price to quote to the customer: preparing a price for a product with materials cost, production costs and other margins.

A production order is given when the quotation is confirmed. A cost effective path of production with feasible delivery date is calculated. And the details are driven down to the production order as well to avoid any error.

Geographical Area / Scope of Solution

Make-to-order (MTO) scenarios are not related to geographical areas. The process remains the same in different industries or regions; what is basic is the complexity with which they produce their variable product.

Order and supply are the broad areas where variant configurations utilization is described in the “Solution” section.

Solution

After the customer inquires about a product and asks for the price, the manufacturer has to design a product with relevant characteristics. Different industries use different logic in calculating the price of a product. However, the price of a product with similar characteristics is same in all the sales areas of the industry.

A company has different marketing divisions within a country or in different countries. The same price must be maintained for a product to deliver the goods to a customer at accurate rates.

Some clients might take goods from different plants. Delivering them at similar rates remains a key issue.

In SAP software we can have a dummy or reference plant where all product prices are maintained, and from here, extended to other plants / marketing regions.

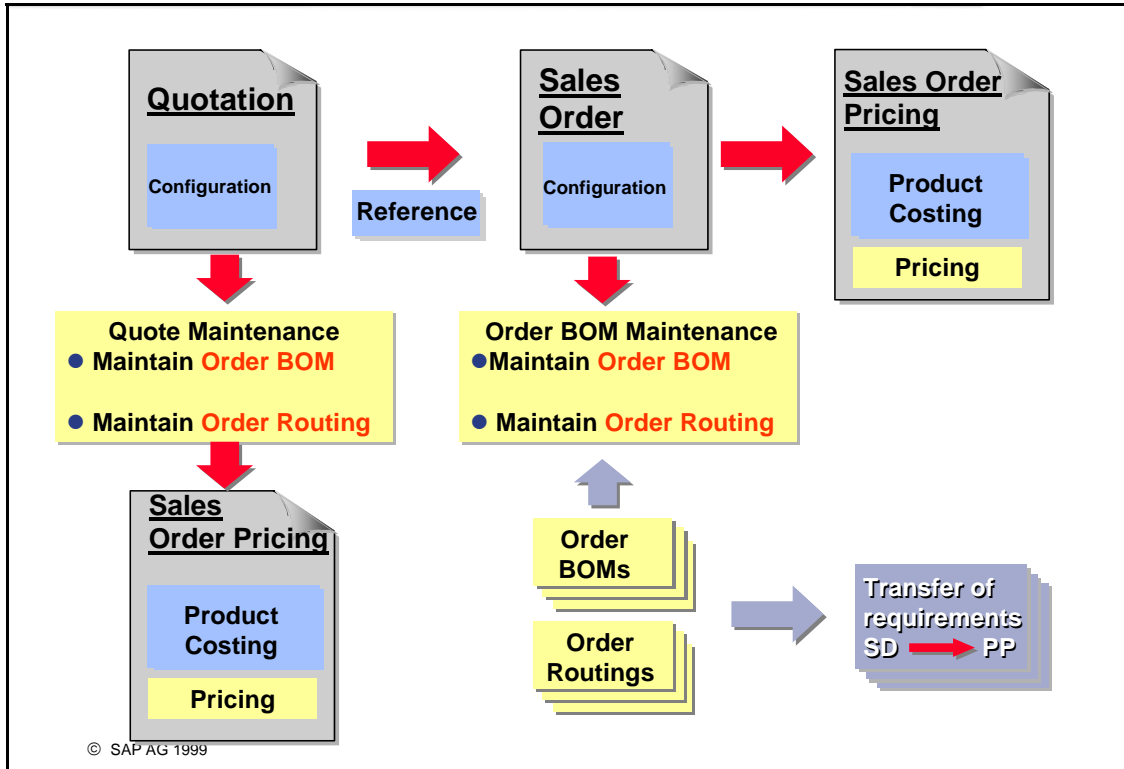
Some key details to be maintained include:

- Cost rates to be used but calculated outside of SAP software based on old data
- Organizational settings regarding enterprise structure in SAP software
- All materials used in production and the “reference plant cost” of the same (to configure and cost the products)
- All machines used (reference plant technical restrictions, reference plant setup and running time settings)
- The reference plant super bill of materials (BOM) and super routing after collection of above data
- All used work and cost centers and their “reference plant” hourly rates populated in fixed and variable costs
- All “reference plant” overhead costs as defined in the agreed cost component structure
- Condition records for pricing (settings for the different contribution margins, price up and down lifts, and so on as defined in the valid pricing procedure)

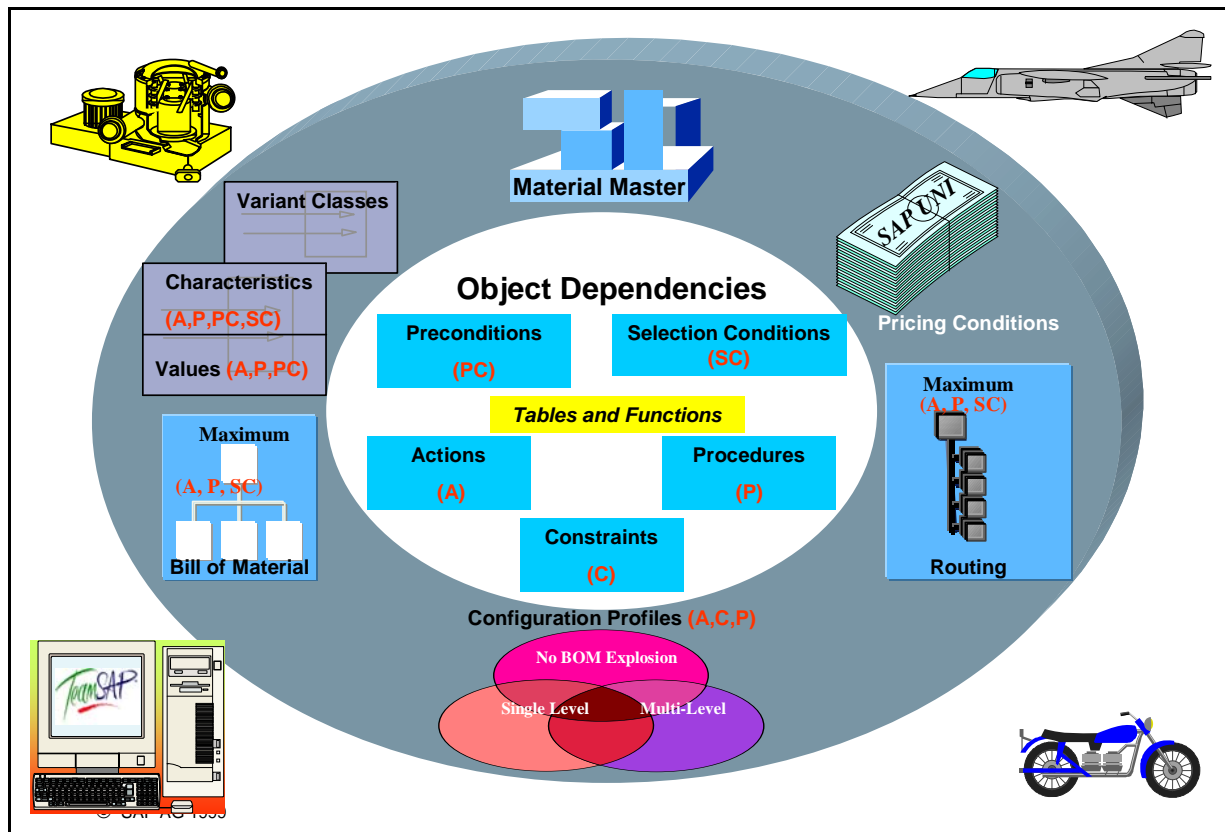
When quoting a price on a product, the quotation can be created in a dummy plant. Dummy machines, machine times, hourly rates for the machines, production routes, overhead costs, and delivery time combinations can be used with delivery quantity to finalize a rate.

Then a sales order is created with reference to the quotation. A sales order is created on actual plants as production requirements are raised on the basis of an actual plant.

Product Costing Model



Master Data in Variant Configuration (SAP)



- Material master
- Characteristics values
- Variant class
- Configuration profile
- Maximum BOM
- Maximum routing
- Price conditions
- Object dependencies

Configurable materials are to be created in the system. Different materials are created depending on the groups of products. It's easy to make one dummy material for a group of products. Materials can be created based on process or complexity.

For example, in the media industry, an advertisement is booked on a defined page of certain plants (editions). A group of editions can be taken as material; for example, editions are E1, E2, E3, G1, G2, G3, F1, and so on; material can be named as "E", "G", and "F".

Materials are created as they are further classified with complex characteristics. The items are then classified for the different product groups, different preconditions, and values.

A user creates a quotation in the reference plant and then chooses the different characteristics. For example:

- Product group: type of advertisement
- Size: length and width
- Color: color or monochrome
- Page number: page number in the newspaper
- Different editions: All the editions in which the advertisement is to be published

Media Industry Scenario

In media companies, advertisement space is a sales quantity. Different production editions are treated as plants and different sales regions are distinguished by sales organization. Space is booked as per key characteristics like number of editions, page number, color, length, width and so on.

Rates are derived on the basis of the above characteristics. Items are created in the system and variant keys give the basic rate depending on the different conditions.

Advantages

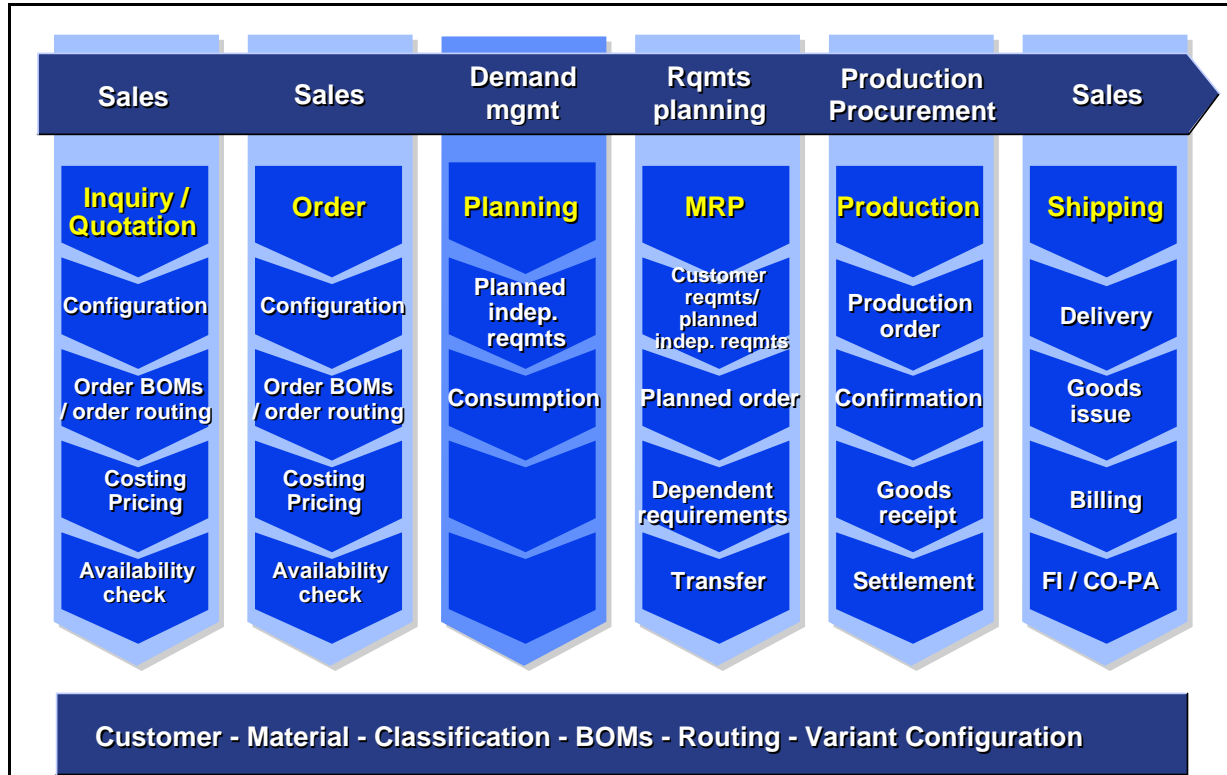
- Enterprise integration (between functional areas such as inbound logistics, manufacturing, outbound logistics, finance, and controlling) to avoid information gaps
- Internal supply chain integration (across plants, warehouses and sales offices) for better visibility for planning and control
- External supply chain integration with external partners like transporters leading to on time delivery with least cost
- Detailed cost and contribution margin analysis made possible using one or more characteristics of sales orders for better cost control and sales planning

Integration

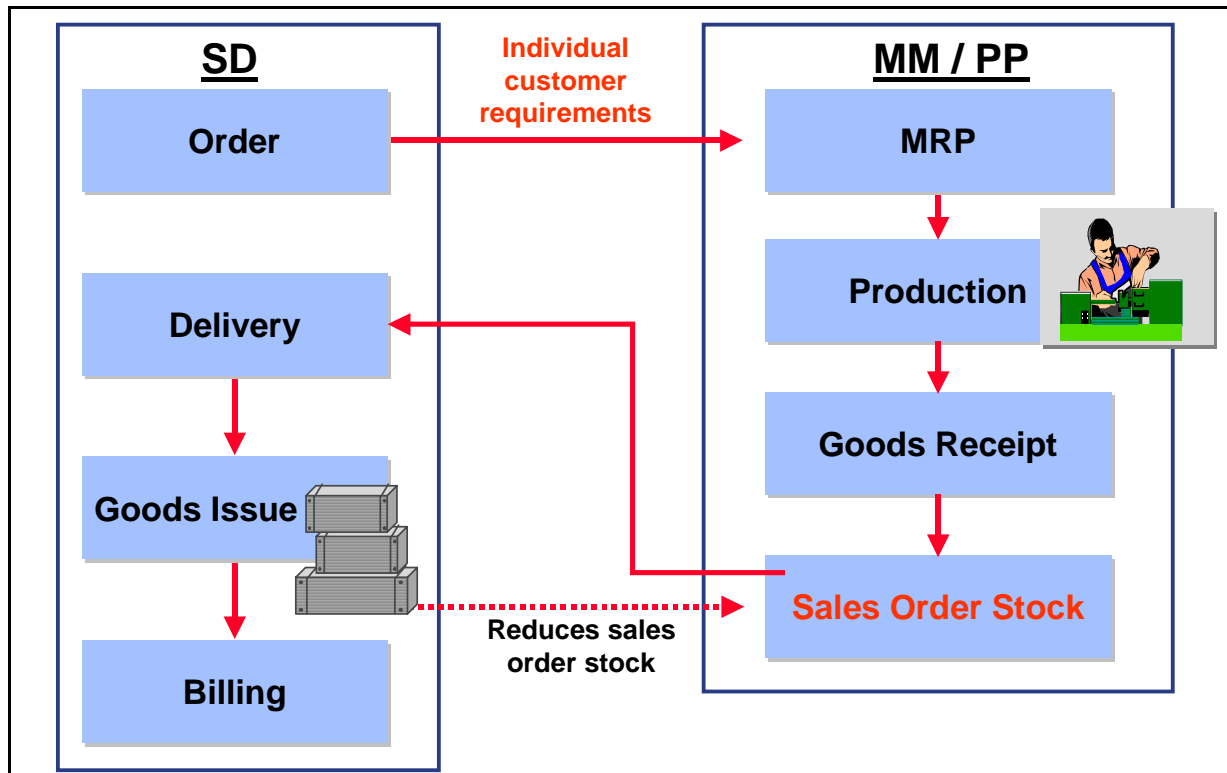
Key Areas of Utilization

- Make to order
- Characteristic-based planning (demand and planning)
- Mobile sales (part of customer relationship management)
- Engineering change management (part of product development management)

Business Process Integration (MTO)



Inquiry/Quotation Processing



A customer requests products needed by him. These are to be defined in SAP software. The characteristics given by the customer, such as dimensions, color, and so on, are to be maintained in the quotation document for quoting a price to the product.

All the conditions and dependencies get executed in background using the data entered; values are calculated.

With the help of the above process, all the required materials (raw materials, pallets, packaging materials, and so on) will be determined and calculated in terms of quantity.

After conducting the variant configuration it is possible to do a costing run for the configured material. The basis for the costing is the result of the routing and assigned machine time on one side and all the determined materials and their consumption from the bill of material on the other side. Different overhead costs will also be accounted based on how they have been maintained in the cost component structure. All costs are expressed in standard costs for the plant.

When the costing has been completed the “cost of goods manufactured” and the “cost of goods sold” are based on plant rates. The “costs of goods sold” value is the basis for the next step in the quotation process: pricing.

If a customer asks for a change (specifications or conditions), the quotation is then changed and a new quotation is created and should be forwarded to the customer. If the customer rejects the quotation, quotation lines are indicated as such, so as to run statistical reports. On a periodic basis, the sales coordinator follows up quotations, using list display of quotations.

Price Calculation in Quotation

- Super BOM and super routing are created for a set of products. Now depending on the characteristics and dependencies, a set of raw materials and machines gets chosen automatically. The major properties of machines, such as downtime, runtime and so on, are available from master data.
- Condition types for different categories will be required, such as discount, commission, rebate, transportation, and so on in the pricing procedure.

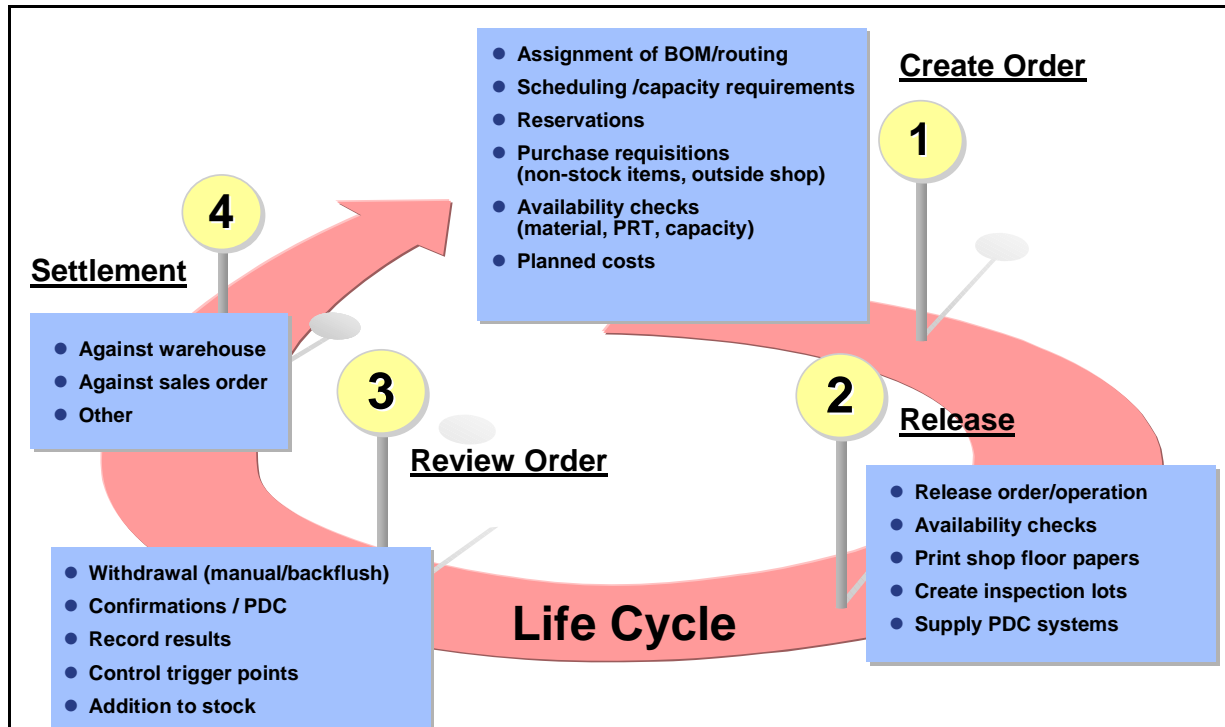
Quotation Review

Certain SAP reports are available to examine quotation details and compare with previous quotes.

Order

- Once the quotation is approved by the customer, a sales order needs to be created in SAP.
- Sales order is created by customer service / sales department in reference to the final quoted document, so that all the ordered items are included. An analysis of rejected items can also be done.
- All the items get copied with quoted rates and quantities in the new sales order.
- One identifying feature of sales-order-related production is that the product is not made to stock, but is manufactured directly on the basis of a specific sales order.

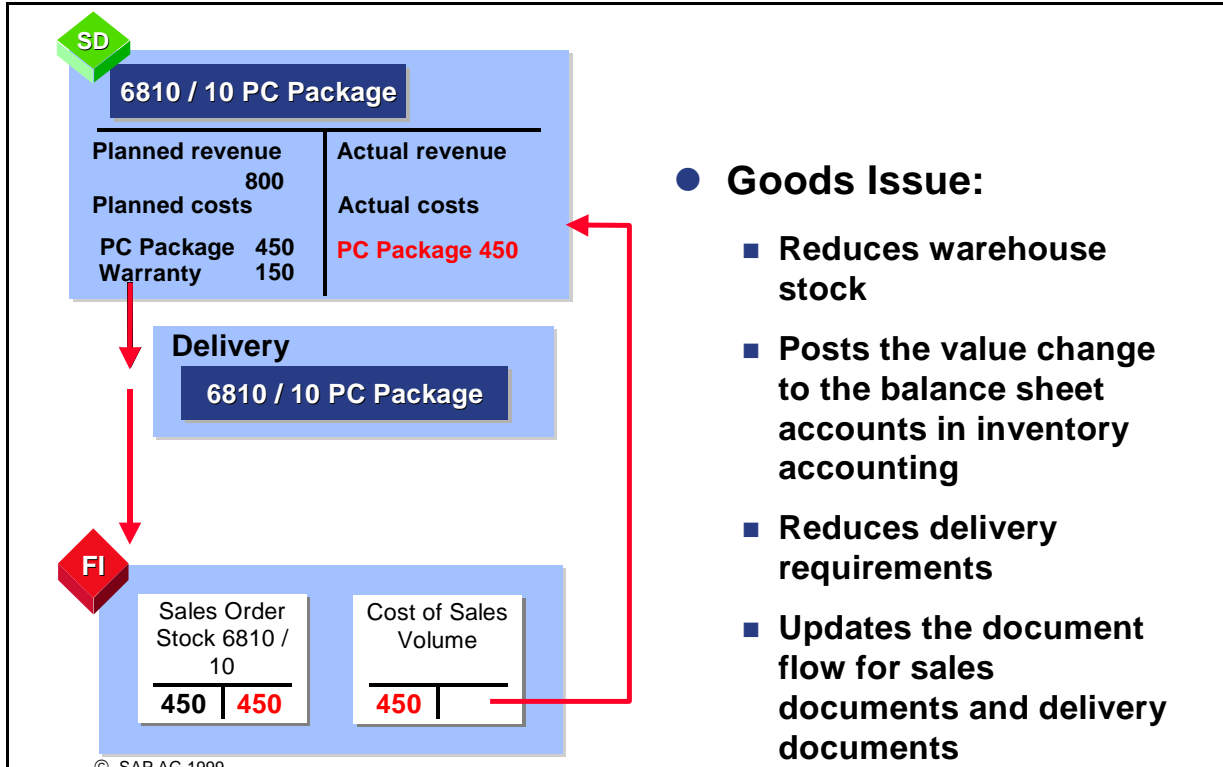
Production Order



- Individual customer requirements are generated from the sales order item and passed on to material requirements planning (MRP) – production planning (PP).
- MRP then plans the material requirements and the product is manufactured. Once the product is manufactured, it is posted to sales order stock specific to this one sales order item (this is achieved by posting a goods issue).
- MRP takes current and future sales into account. The planned and exact requirement quantities trigger the net requirements calculation. The requirement elements for MRP are sales orders, planned independent requirements, material reservations, the planned dependent requirements produced by the BOM explosion, and so on.
- If shortage quantities are detected during requirements planning, order proposals are generated. These are internal planning elements that can be changed, rescheduled, or deleted at any time (purchase requisitions and planned orders).
- The system creates planned orders for planning the production quantities for in-house production. Once planning has been completed, the planned orders are converted into production orders. In this case, the planned dependent requirements in the planned order are converted into reservations in the production order.
- For external procurement, the system creates a planned order (or purchase requisition) for planning the external procurement quantity. Once planning has been completed, the planned order is converted into a purchase requisition and, later, the purchase requisition is converted into a purchase order.
- Using the creation indicator for purchase requisitions on the initial screen of the planning run, you can control whether you create purchase requisitions directly or if you want to create planned orders first.

Delivery

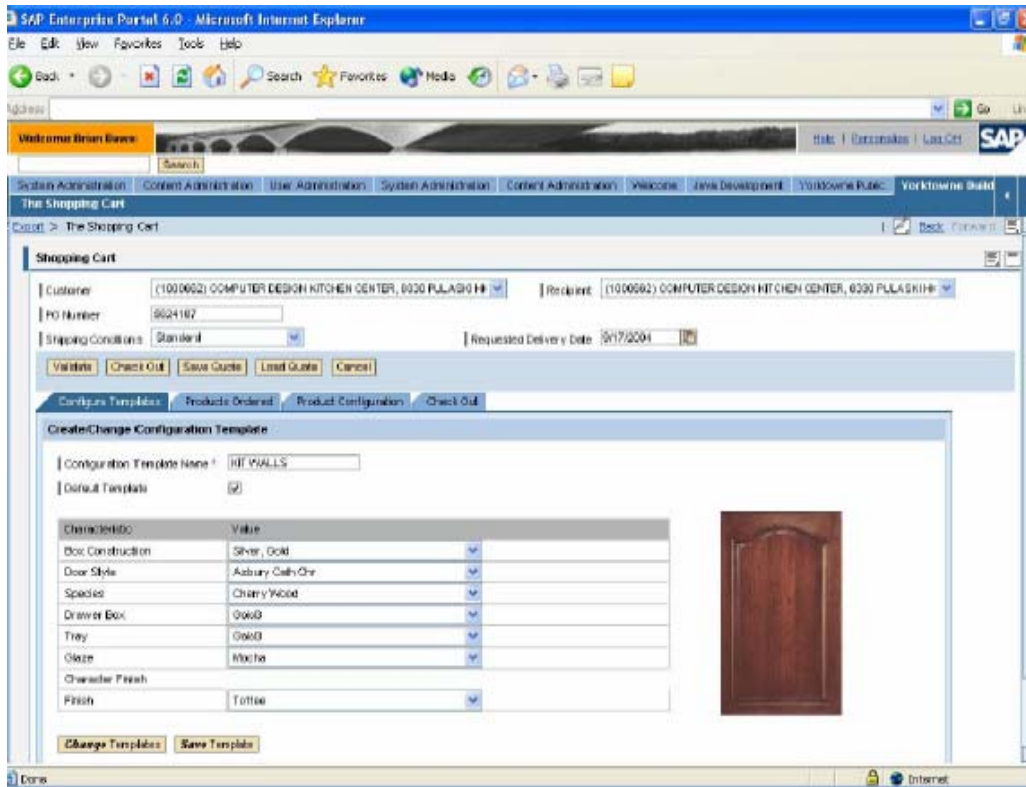
As soon as the product is due for delivery, the delivery can be entered in sales and distribution (SD), and the goods issue can be posted. The goods issue causes a reduction in the sales order stock. A billing document is then created in SD.



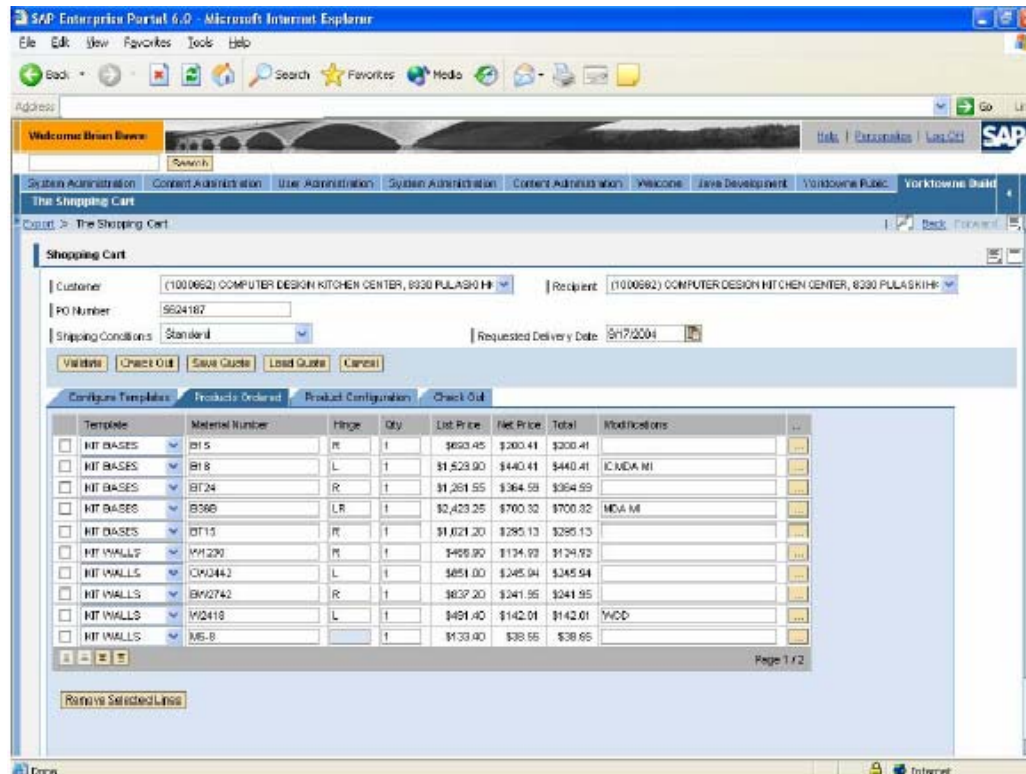
Billing

- An accounting document is created automatically; this document updates the revenue account.
- The status is updated in all corresponding sales, delivery, and billing documents.
- The customer's credit management account is updated.
- The sales statistics for the sales information system are updated.
- Controlling components such as profitability analysis and profit center accounting are updated

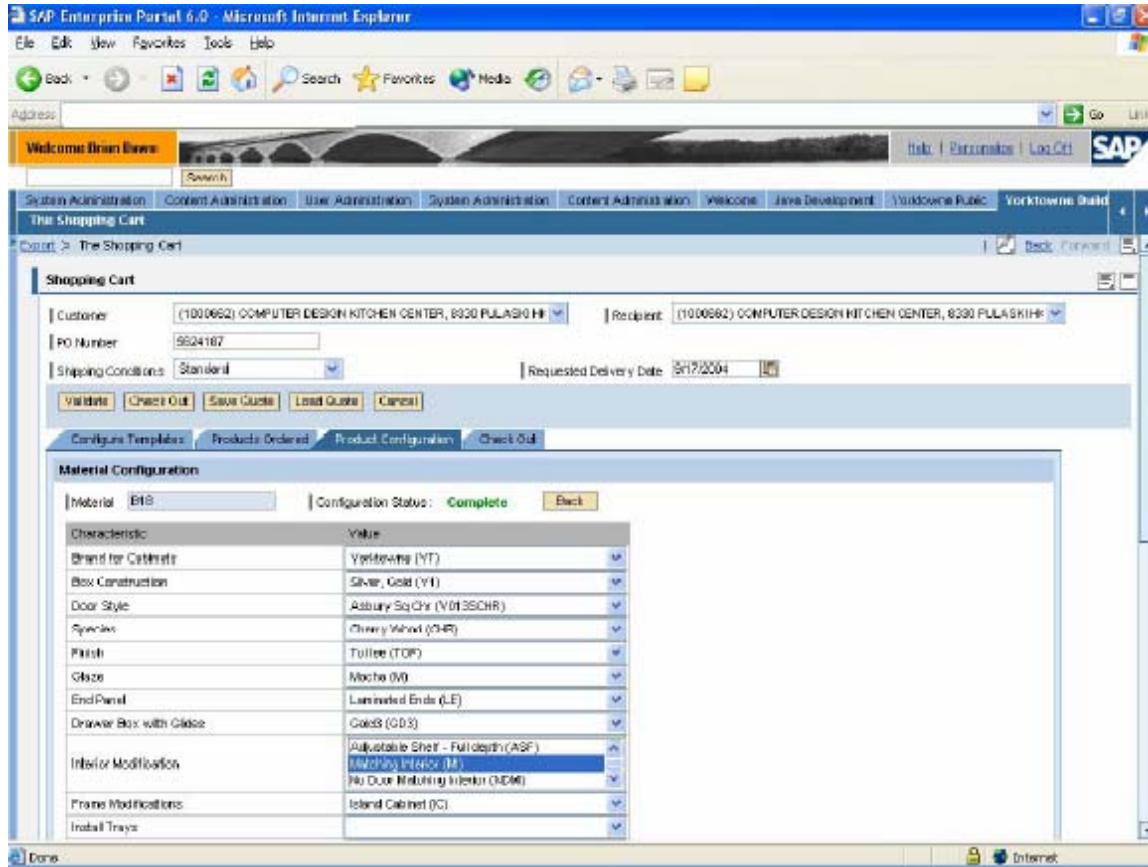
Online Order Entry – Template Screen



Online Order Entry – Item Screen



Online Order Entry – Configuration Screen



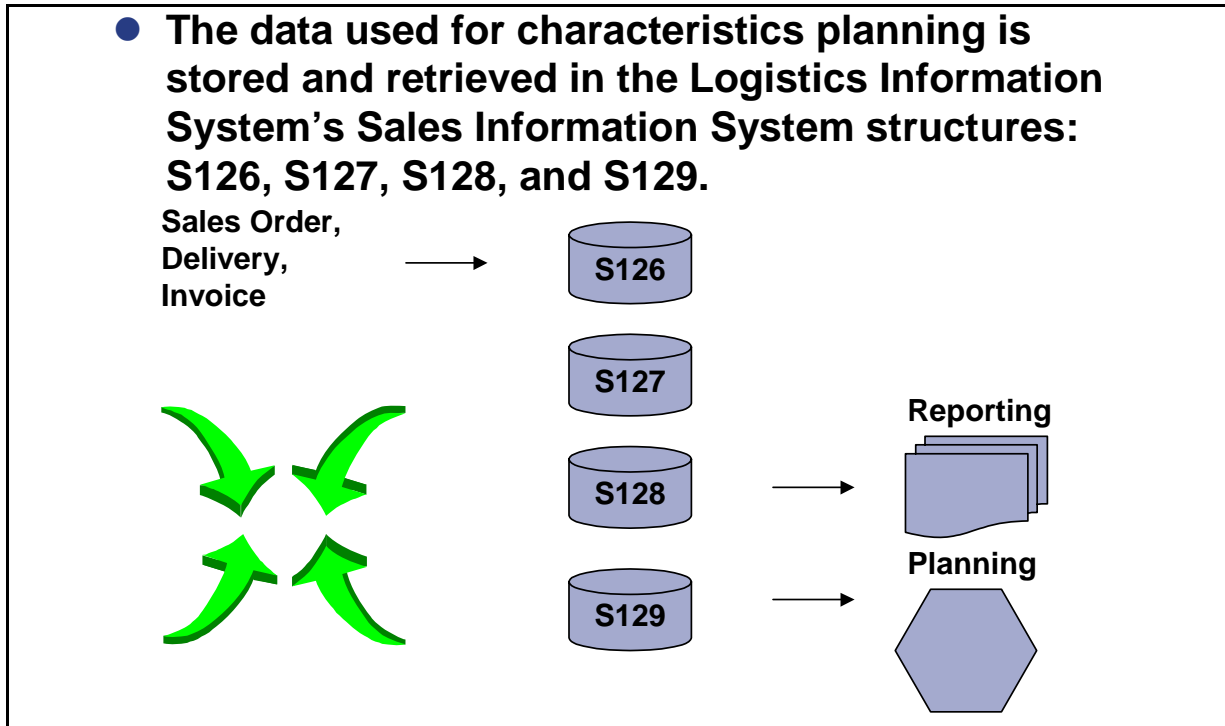
Characteristic Based Planning

Variant configuration provides multiple options for products, thus adding a level of complexity when it becomes necessary for planning these products

Characteristics are used for variant configuration to describe the options allowed for products. It becomes necessary to plan for these characteristics-based options. There are two basic approaches to this characteristic based planning concept.

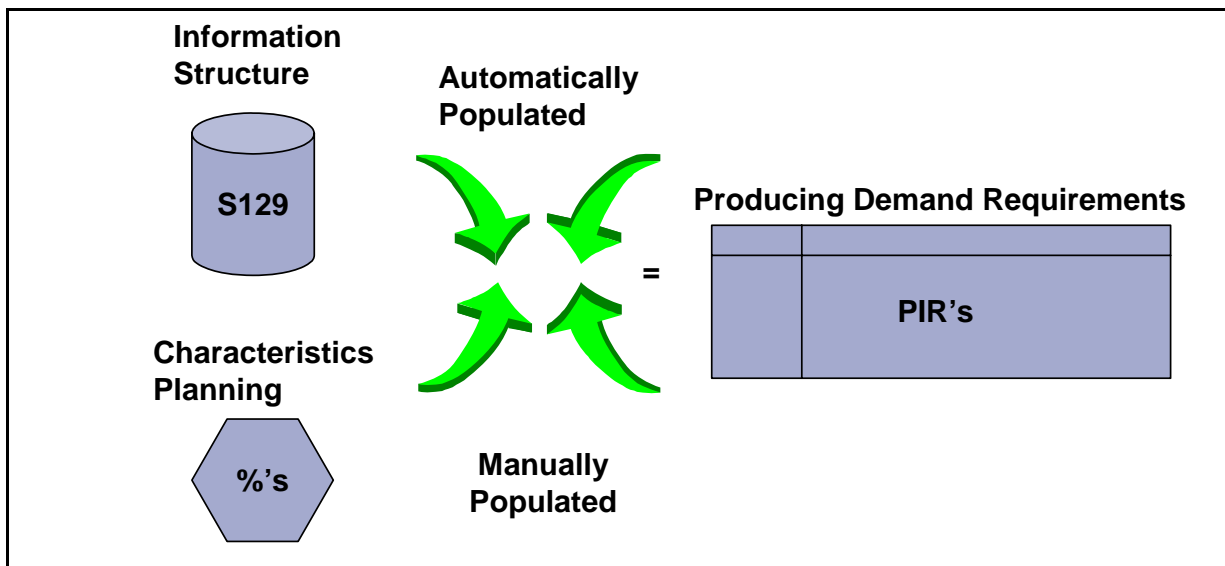
- Extracting information from logistics information system (LIS)
- Manually assigning planning percentages

For this, certain defined info structures are available in the software. We can utilize few of them such as S126, S127, S128, and S129.



Information structure S129 is available for the planning of products with many variants. The planning data that is created here can be passed onto characteristics planning.

The figures updated in info structure S129 can be automatically or manually transferred to demand management.



The material master is updated with relevant strategy group as detailed.

The following strategies may be used to assist with characteristic-based planning:

- **Strategy 70**
 - **Applies one-level below the parent which has strategy 25**
- **Strategy 56 - BOM Characteristic Planning**
- **Strategy 89 - Assembly Processing with Characteristic Planning**
 - **Applicable only with Long Term Planning**

Best Practices

- All materials created will be configurable materials for super BOM
- Before a quotation is created, items are created in the system with required characteristics and details.
- Rejected items in the quotation are updated in the document for review purpose.
- Change in characteristics will have an adverse effect on the pricing and production planning. To avoid hampering the process, items characteristics should be changed before MRP is run and should be avoided afterwards.

Conclusion

This solution provides a set of clarifications to industries producing variant products. It helps them arrive at a base price for a set of products, and it helps the customer to give a variety of combinations for a similar product with manageable profit margins. Production departments can be given the exact details to avoid scrap loss, rework, and delivery problems.

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