



NTNU

Norwegian University of
Science and Technology



Microsoft
Dynamics™

Semester Paper

ValveTech ASA: a new ERP Solution

TPK4165 ERP/PLM systems – Fall 2011

Group 1

Content Page

Content Page	2
Introduction.....	3
Description of the Solution.....	7
Conclusion	29
Appendix A FMS	30
Appendix B Requirement Specification.....	35

Introduction

Background

In recent years, ValveTech ASA has grown significantly and is expected to continue to experience continual success in the times ahead. However, along with this growth comes along more complex business processes that can threaten to slow down ValveTech ASA's growth. Furthermore, growth will necessitate the need to make quicker and more accurate decisions. An Enterprise Resource Planning (ERP) solution will allow for the automation of many of business processes as well as the ability to make quicker and more accurate decisions through the integration of various departments of ValveTech ASA.

Even at present, ValveTech is experiencing problems with its business processes and operations. Information in the current system is not arranged systematically and coherently and it is hence difficult to obtain good and qualitative data that ValveTech's decisions are based upon. At ValveTech, much of the production is based on previously manufactured products, parts and components. It is hence imperative for ValveTech to keep track of its commodities. The current system does not allow for such functionality. Furthermore, ValveTech has lost contracts in some of its customers due to poor delivery precision. Long lead times caused by poor communication between departments have caused ValveTech to be less competitive than it can be in its industry. It is hence advisable for ValveTech ASA to implement an ERP solution now, when it is in its earlier stages of its development, to optimize its business processes which would in turn allow it to unleash its full potential in the coming years.

Overall Solution

Mircrosoft Dynamics AX will be able to handle all the different aspects of the business such as production, sales, purchasing, planning, logistics, and cost accounting. We believe that this ERP solution is well suited for the needs of your company. The platform will serve as a common, easily manageable and user friendly platform and will grow with ValveTech through simple modifications, expansions and upgrades. The main components of the solution are outlined in the chart on the following page:



From the figure, we can see that Microsoft Dynamics AX connects with the various programs that are already used by the company. This will allow for a faster and smoother transition from the current system. The integration between AX and the external applications are made via the standard module: Application Integration Framework.

There will be a direct connection between Microsoft Office (Word, Excel, PowerPoint etc.) and Microsoft Dynamics AX. This means that reporting and documentation, as well as the importing and exporting of these may take place through Microsoft Office. Microsoft Office is no doubt a familiar tool to most, if not all, of employees.

AX will also be able to link to ValveTech's current CAD tools, i.e. Autodesk Inventor, Autodesk AutoCAD, and Cadett ELSA. This allows for the easy access to the CAD file to edit the designs for the various products. However, this link is static, which means changes to the CAD model do not affect the product in AX. For this reason, it is advisable for ValveTech to implement a PLM system, for example Teamcenter, or a CADERP integration system, for example Agni Link, which allows changes in the CAD model to be automatically reflected in AX. This would reduce the number of repetitive and non-value adding operations.

Finally, we will integrate planning tool Primavera Enterprise in the ERP solution. This program provides information on resource planning capacity and dependency between operations. These pieces of information are vital for the production planning of the company.

Common implementation of ERP systems is that it can be very time consuming. There is a lot of information regarding goods, manufacturing, inventory management, suppliers, customers, and so on that has to be added to the system. Furthermore, it will take time for users to get used to the system. An advantage of using Microsoft AX is that the user interface is similar to that of other Microsoft applications, which will aid users in learning how to use the software. Anyway, after this period AX will save ValveTech much time. All information is stored systematically and can be used repetitively with easy access. This decreases the number of errors and increases efficiency, which in turn allows for greater economic growth of the company.

Main Improvements with the Introduction of Microsoft Dynamics AX

ValveTech is facing problems regarding the information flow and communication between the various departments in the company. This means that it takes unnecessary time for an order to be transported after it has been confirmed. At high cycle times, customer service is worse, and there is a great likelihood of losing customers, even with quality products. Today, the company has information flowing through many bodies. Among other things, secretaries and physical mailboxes are major bottlenecks in the operations of the firm. For example, production orders are placed in the production manager's bin on a daily basis. However, in the worst case, the production manager collects these orders only twice a week. Also, goods ready for transportation have to wait for a delivery note to be attached to them which is printed out manually by the supply chain manager. This causes much delay in the value chain. It is stated that goods have been found to be idle for up to two weeks waiting for a delivery note. Much time is hence unnecessarily wasted and it is important to find ways to rectify this issue.

Microsoft Dynamics is able to link all the departments together into a common platform and everyone can work with the same information. This means that all relevant information will be readily available to the various departments without the bottlenecks of the current system. For example, when an order has been confirmed by the sales department, the production department can immediately see what must be produced and the warehouse can immediately see what is needed for the production. When the production is completed, the warehouse will similarly be able to receive the consignment note directly from the system. This allows the entire process to be much more efficient. All these can be achieved with AX's built-in notification function.

Overview of Products

As mentioned, ValveTech utilizes many different programs for different processes and different aspects of a product. This means that information is scattered. It may be necessary to find out why the statuses of products are as they are, and it is currently difficult to see where the components

come from, where they are and how they have been used before. Historical information of products is not taken into much account in the current system.

AX offers a simple user interface where all information is linked. This allows, for example, lists of what the different vendors supply to be made or lists of customer that receive discounts. Since all data regarding products is stored in the system after they are registered, it is possible to see what has been previously done before. Since 80% of ValveTech's products consist of mainly previously used components, this is very important. Not only does AX give an overview of products that are under production and that will be sold, but a list of all goods and components that have been ever produced.

Inventory Control

In order for ValveTech to have a high level of customer service as well as to remain cost-efficient, it is important for it to have a good forecasting system. A good forecast of the future market demand will allow ValveTech to minimize lost sales due to insufficient stocks, as well inventory costs from excess inventory.

According to ValveTech, the control of the inventory of all its products is based on the reorder point principle. Such a strategy does not take into account fluctuations in the market demand. As a result, there is a higher tendency for ValveTech to produce too few or too many units of a product. This is especially so as ValveTech is a company that manufactures innovative products and can hence expect its products to have an unstable market demand.

The main planning in AX is a module that can aid in creating a forecast-driven inventory control system. It generates plans based on sales and production orders and suggests how much each component should be ordered, and when they should be ordered. Furthermore, AX is able to calculate the amount of safety stock to keep in the inventory according to a three-year sales history as well as a targeted customer service level. This would allow ValveTech to have a much more efficient and responsive.

Automated Functions

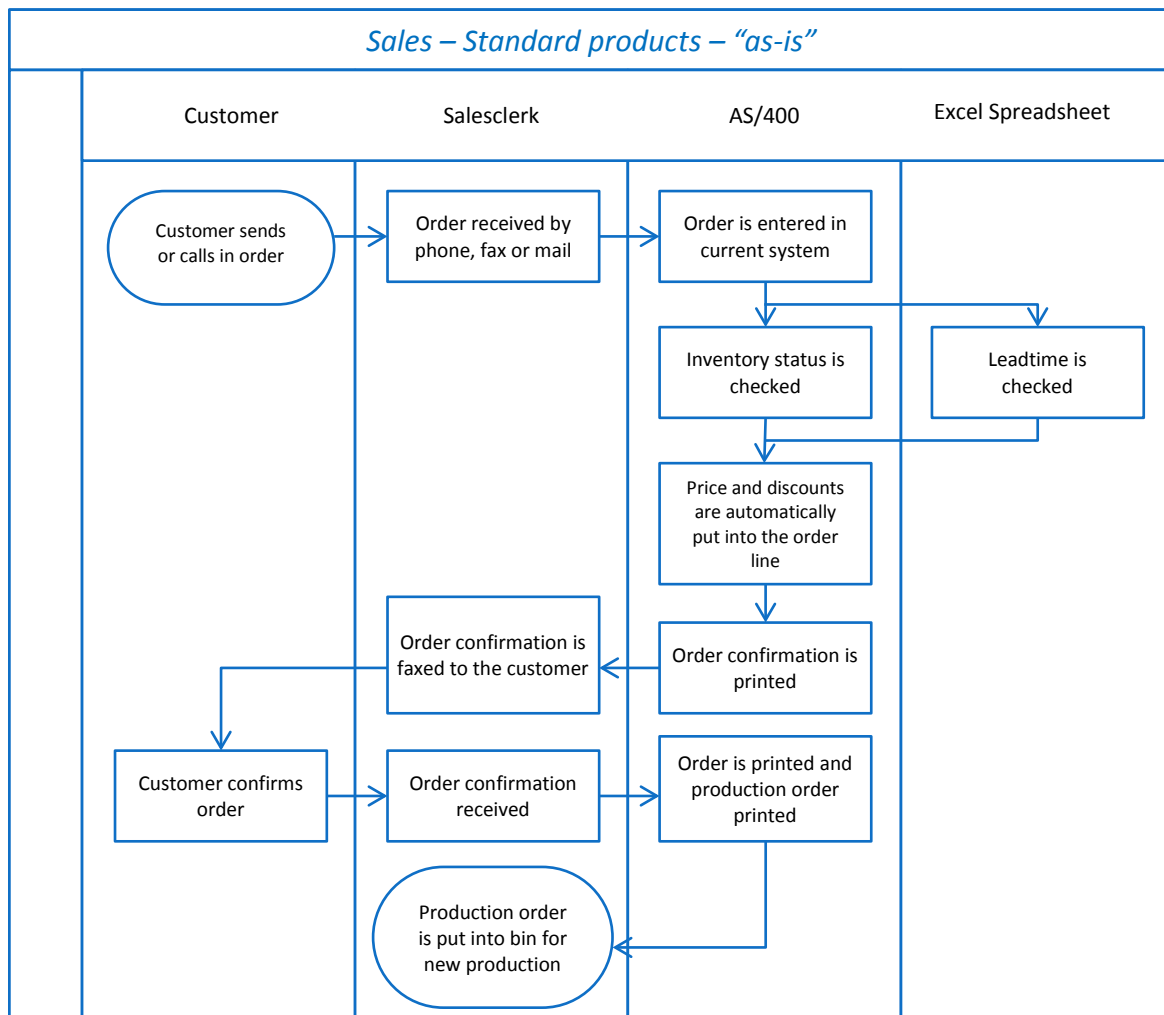
AX reduces the amount of manual administrative work that has to be done through its numerous automated calculations. Manpower can hence be freed up to do more value-adding tasks while greatly reducing the number of errors in the system that is caused by human error. For example, in the current system, in order to confirm an order, the sales clerk has to manually check an excel sheet for the lead-time, which is based on the customer's location and whether the product is in stock or not. Lead-time calculation is not performed in the system today as the system is not able to take into account the day of arrival of the shipments. AX is able to calculate the lead-time automatically while taking all these factors into account.

Description of the Solution

SALES PROCESS

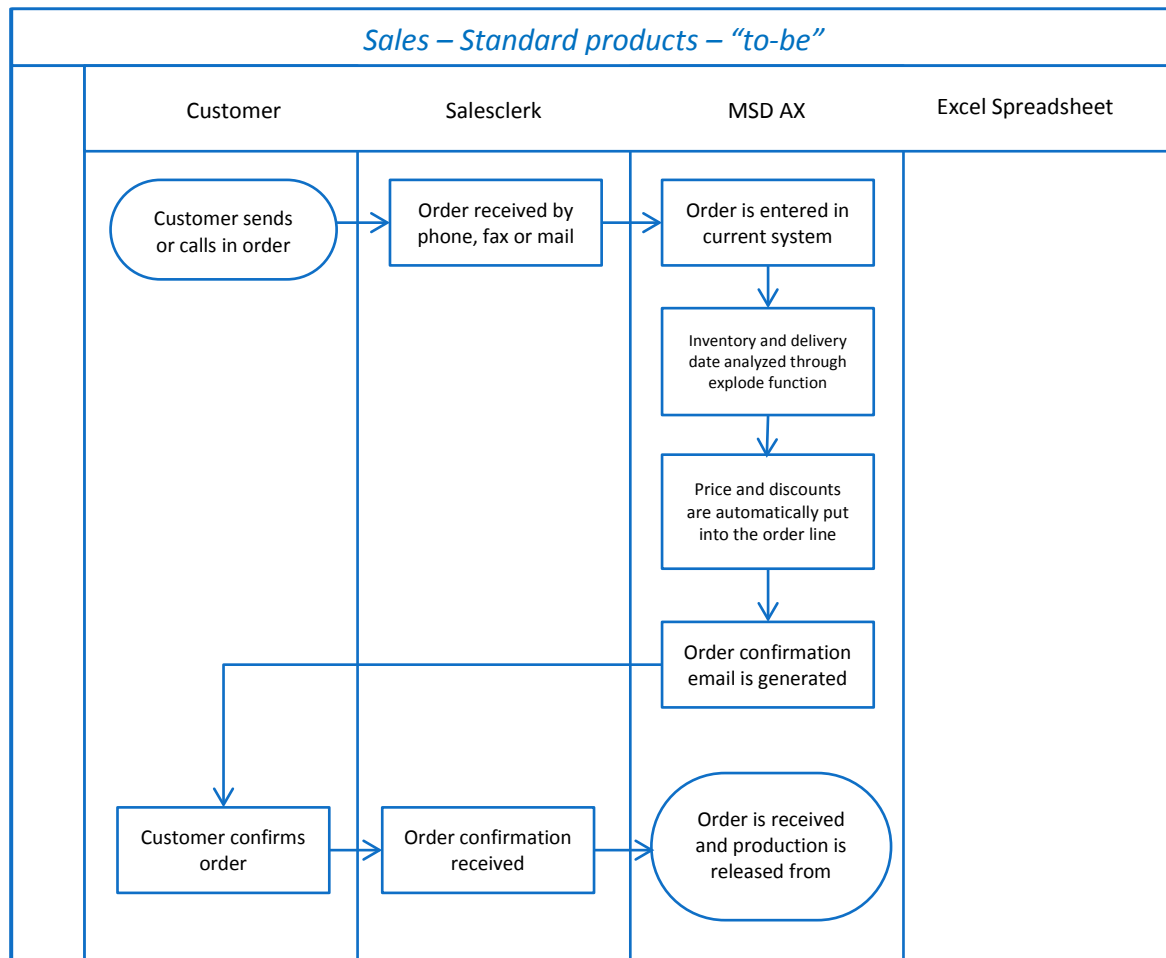
The sales process consists of standard products, new products and spare parts.

STANDARD PRODUCT



The current standard sales process starts when the sales department receives an order by phone or fax. These orders are entered into the current AS/400 system by the sales clerk. Subsequently, the

sales clerk checks the inventory level in the system and also the lead-time of the product in an excel sheet, which is dependent on the customer's location and whether the item is in stock or not. The delivery date is confirmed and an order confirmation is posted. Price and any discounts are automatically displayed for each order line from a build in price list functionality. The order



confirmation is then sent to the customer. When the sales clerk receives the confirmation of the order from the customer, the order is printed and a production order is printed. The production order is placed into the bin of the production manager for new production orders.

In the new system, the sales process for standard products is similarly started when a customer sends in an order by phone, fax or mail. The order is entered into Microsoft Dynamics AX by creating a new sales order.

The dates of the desired shipping can be set here. The available dates for shipping in the system can be changed according to your company's shipping schedule by creating a new working time template. Working times for this calendar can be created for Wednesday and Friday. Subsequently a new calendar can be created using the new working time template. Subsequently, the warehouse of interest can be allocated with that calendar in the warehouse form under inventory management. Subsequently, the available dates for shipping from this warehouse will be restricted to Wednesday and Friday and the system will subsequently be able to calculate the lead time for the delivery of the product to the customer automatically.

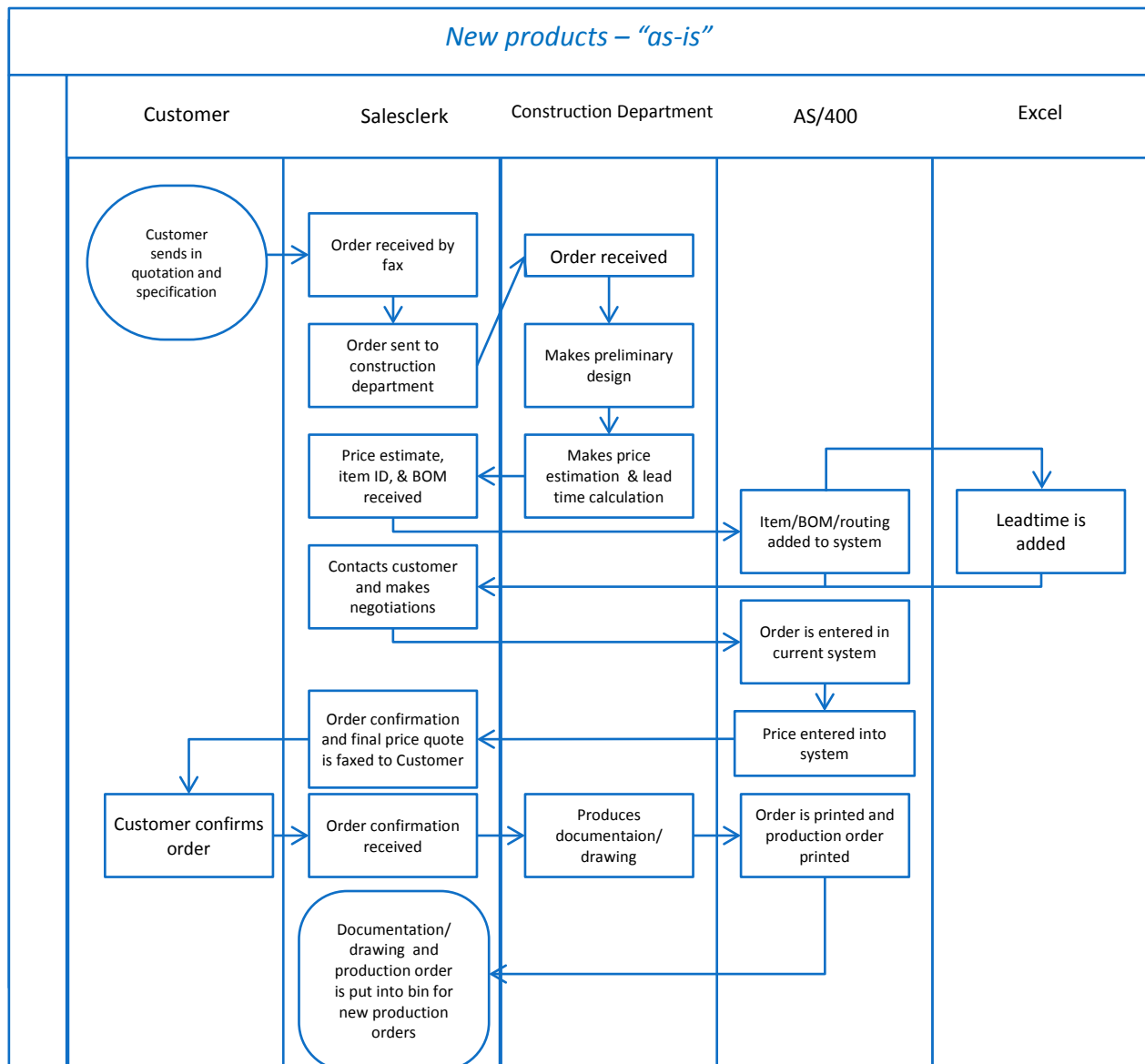
Day	Available s...	Day	Available re...
Friday	25.11.2011	Friday	25.11.2011
Wednesday	30.11.2011	Wednesday	30.11.2011
Friday	02.12.2011	Friday	02.12.2011
Wednesday	07.12.2011	Wednesday	07.12.2011
Friday	09.12.2011	Friday	09.12.2011
Wednesday	14.12.2011	Wednesday	14.12.2011
Friday	16.12.2011	Friday	16.12.2011
Wednesday	21.12.2011	Wednesday	21.12.2011
Friday	23.12.2011	Friday	23.12.2011
Wednesday	28.12.2011	Wednesday	28.12.2011

After the details of the order have been entered, the inventory and delivery dates are analyzed through the explode function that is available in the system.

Price and discounts are automatically put into the order line by the system according to the customer account. The order is confirmed and an email is generated and sent to the customer. When the customer receives the order by the sales clerk, a production order can be released.

NEW PRODUCTS

The current process dedicated to sales of new products is very complex. It is similar to the situation of standard products, but at the beginning there is a specification document, that is sent by fax.

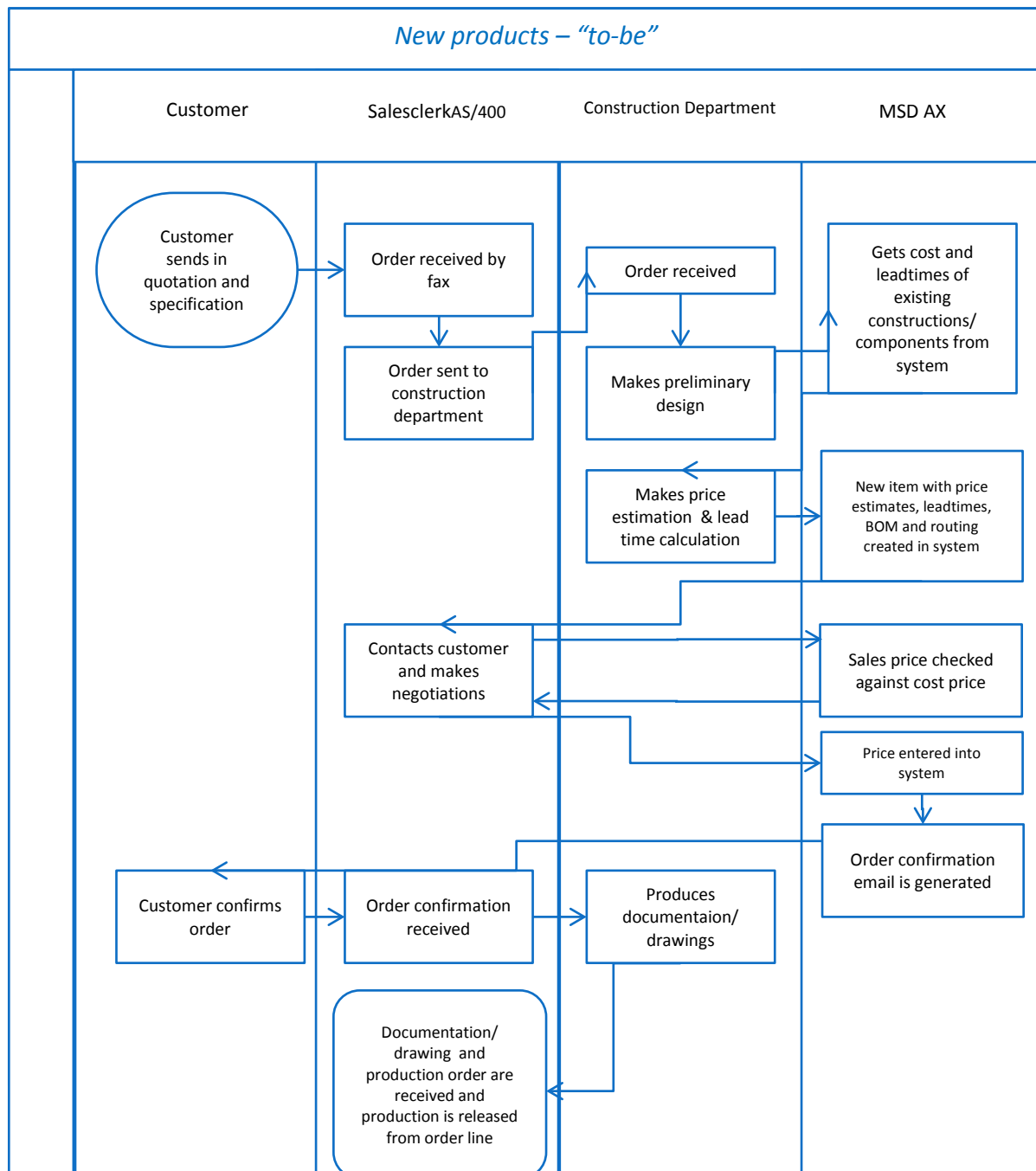


The client sends these specifications of new parts to the sales department. After that, the workflow moves to the building department, that has the task of carrying out the design, the calculation of the estimated price and the lead time.

Using a variety of software systems, including Excel spreadsheets, data are entered manually into the system AS/400 by a salesclerk. After this, a new item is created with its own ID and BOM; the salesclerk has also to contact the customer and arrange to meet him of final negotiations.

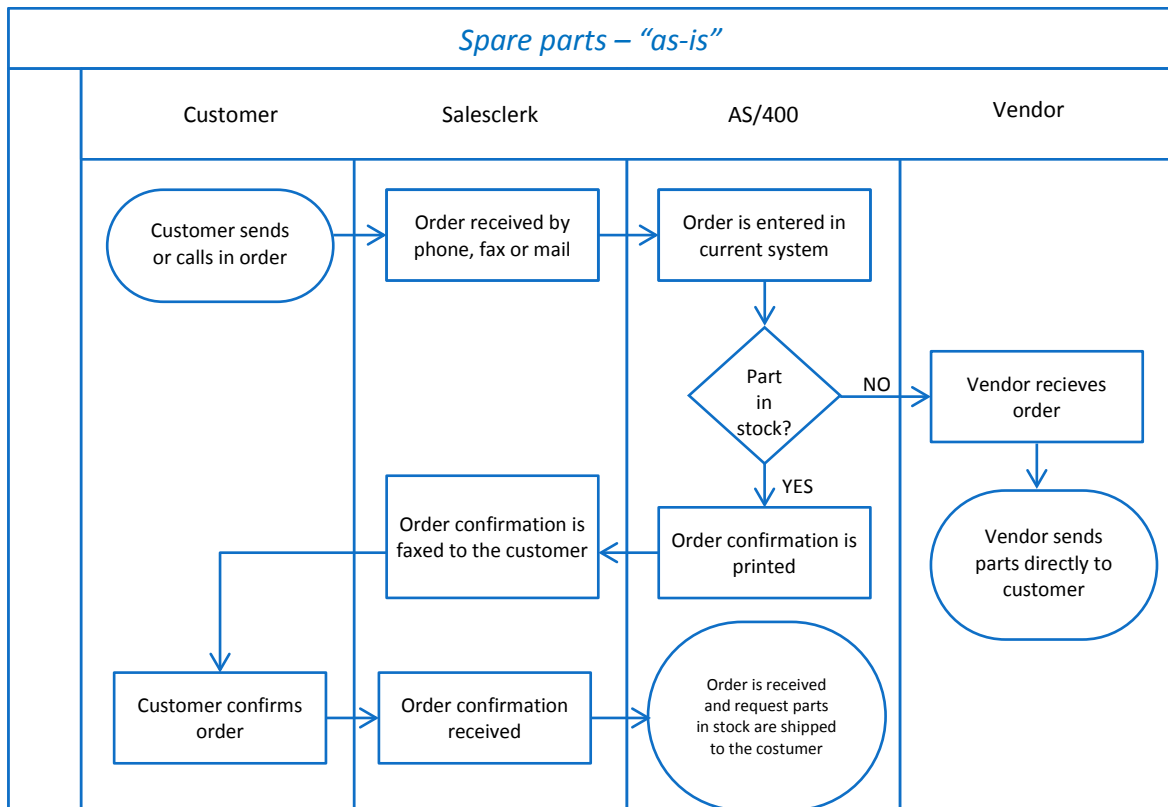
Once the order has been accepted by the client, the documentation necessary to complete the order is printed and placed in the mailbox of the production manager. All these steps cause the entire current process to take up to 4 weeks after receipt of an order, until the confirmation of the effective price.

AX fully meets the need for simplification of this highly inefficient process. Firstly, since the majority of new products is composed largely of existing components and products from the company, it can optimize the process that examines the new products, because the software contains all the information about pre-existing components in its database. In addition, the part made by committed and reliable time in AX: the software is assigned the cost calculation and evaluation of lead time. The price estimates are made automatically considering the components already in production, lead times and routing. Then a quotation for the customer can be prepared, ensuring that the price is



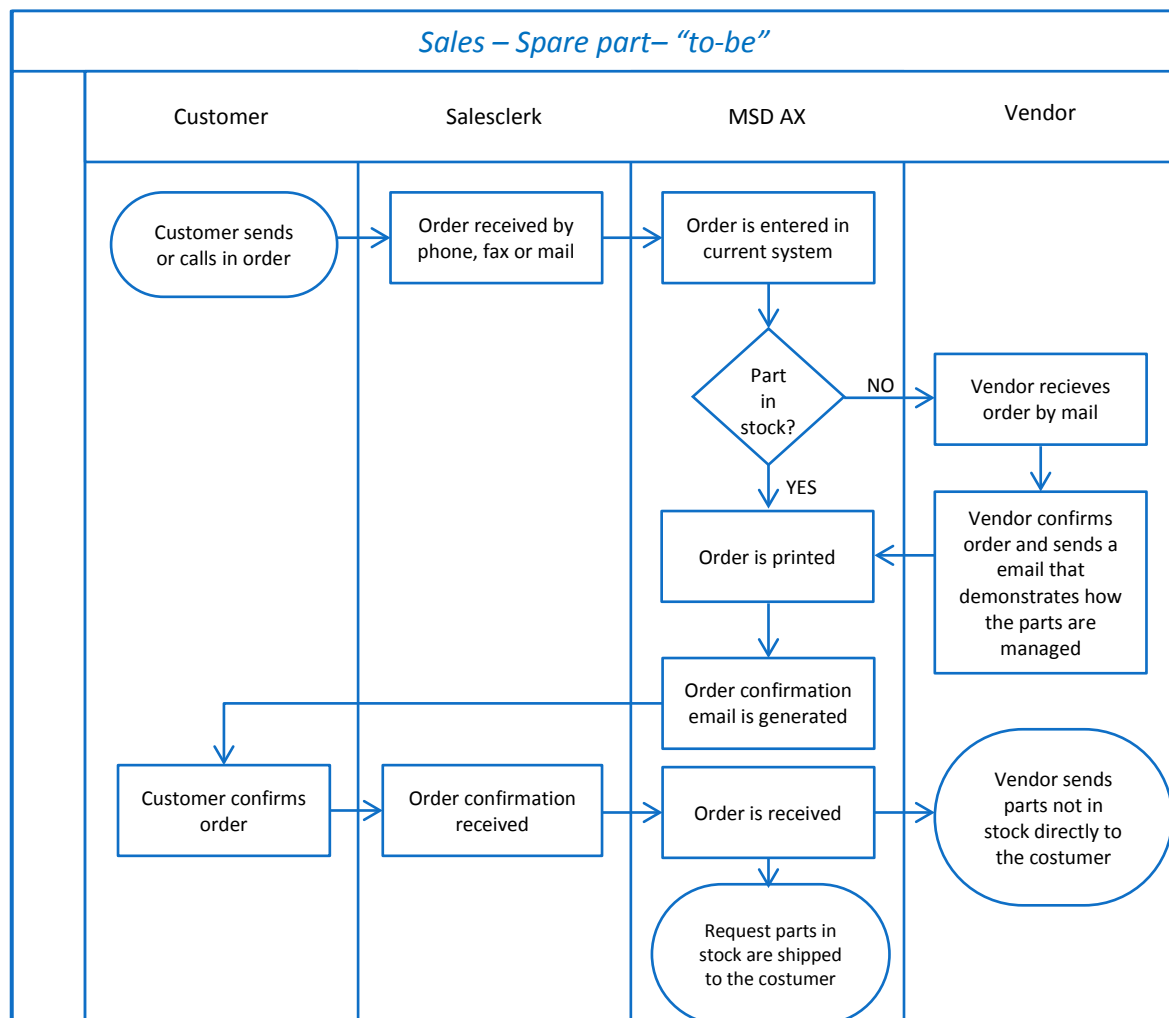
actually higher than the cost of production. Once the customer agrees, the software generates a document of acceptance which can be delivered by e-mail. Finally the order can be sent to the construction department, using the information from AX through the integration of other software like Teamcenter.

SPARE PARTS



ValveTech regularly composes spare parts lists based on product documentation/drawings. Spare parts lists include both sub-products consisting of several components, and spare parts of a single component. The sale of spare parts is carried out in the same manner as standard products. Spare parts are either manufactured by ValveTech, or are purchased components. If a purchased spare part is not in stock it is usually delivered directly from vendor to the customer without going through ValveTech warehouses.

Spare parts in AX follow the same procedure as a standard product in AX and they all have the same options. The main benefit is to have a much automated process that avoids accumulation of paper and human error in the orders.



GENERAL REQUIREMENTS TO THE SALES PROCESS

Segmentation of sales orders (standard products, new products, spare parts)

It is not necessary to treat standard products, new products and spare parts differently. The sales processes for all of them are similar aside from the fact that a new product has to be first created in the system. It would hence be cumbersome and unnecessary to segment the sales orders this way.

Connection of orders to different market segments

AX allows the connection of prospects, customers, vendors and competitors to different market segments. This can be done with the Business Relationship form found under Customer Relationship

Management (CRM). A market segment can be selected under the General tab for each business relation.

The screenshot shows the AX CRM (f35) form with the General tab selected. The form is divided into several sections: Identification, Classification, Administration, Organization, and Status. The Identification section includes fields for Business account (5000), Vendor account, and Customer account. The Classification section includes fields for Customer classification group, ABC code (None), and District (Foreign). The Administration section includes fields for Stopped (No), One-time customer/vendor, and Credit limit (0,00). The Organization section includes fields for Organization number, Segment (Manufacturing), and Subsegment. The Status section includes fields for Status (Negotiation), Chain, and Parent business relation (5001). The form also includes a Filter section at the top and a Tree view section on the right.

Connection of orders to different currencies

AX allows the connection of orders to different currencies by selecting the desired currency under the currency field in the new sales order form. This can also be done automatically for a registered customer by selecting the desired currency for the currency field under the general tab in the customer form. If a desired currency is not already in AX, a new currency can be created in the Exchange Rates form under General Ledger.

The screenshot shows the AX General ledger (f35) form with the Exchange rates - New Record form open. The form has tabs for Overview, General, Currency converter, Posting, and Round-off. The Overview tab is selected, showing a table of currencies with columns for Cu... (Currency), Name, L... (Language), and Sy... (Symbol). The table lists the following currencies: CAD (Canadian Dollars), CNY (Chinese Yuan), DKK (Danish Krone), EUR (Euro), GBP (British Pound), and USD (US Dollars). The Exchange rate section at the bottom includes fields for Start date, Exchange ra..., and T... (Tax). The form also includes buttons for External codes, Print exchange rates, and Send electronically.

Blocking Customers from ordering

AX allows specific customers to be blocked if ValveTech no longer wishes to do business with them. This can be done through the customer form in Accounts Receivable by selecting "All" for the stopped field under the general tab. The next time a sales order is created for this customer the system will inform that it is blocked.

(f35) Customers - Customer account: 4000, Light and Design

Overview General **Setup** Sales order Address Contact information Payment Dimension

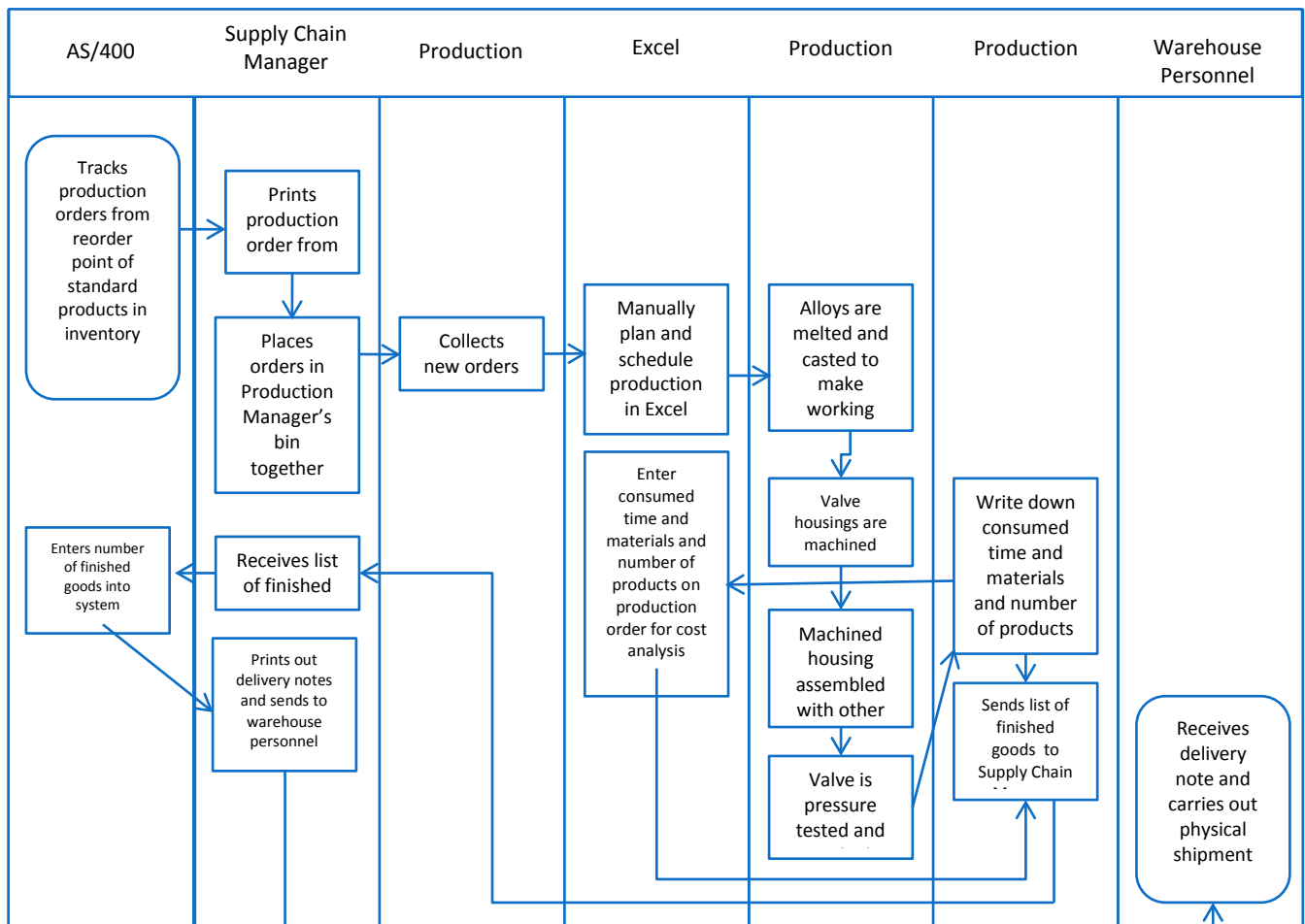
Identification
 Customer account: 4000
 Name: Light and Design
 Search name: Light and Design
 Customer group: 20
 Currency: USD
 Language: En-us
 Customer classification group: 01

Credit
 Mandatory credit limit: ☐
 Credit rating:
 Credit limit: 0,00

Administration
 Stopped: All
 One-time customer: No
 Invoice
 Statistics group: All
 Account statement: Always
 Demand planning: ☐

Vendor
 Vendor account:

Production



Currently, ValveTech's production orders originate from two sources. The first is from the reorder point of standard products in inventory. The other is from sales orders of new products or products that are not in stock. Every day, the Supply Chain Manager runs the system and prints out the list of items whose inventory level have fallen below the reorder point and places the list together with the

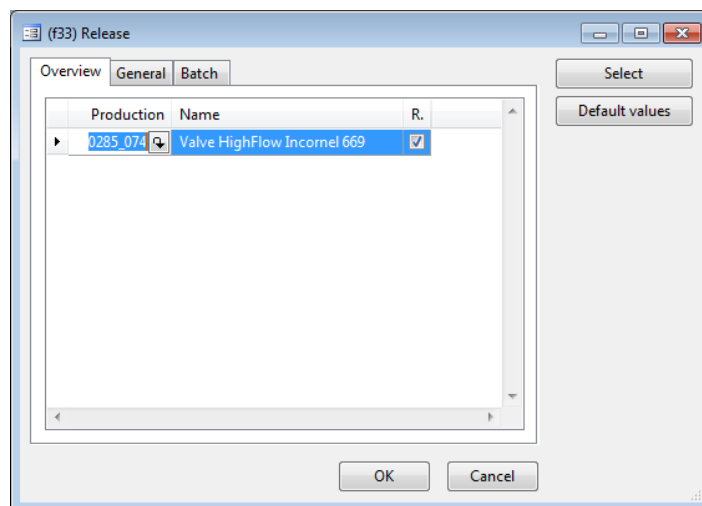
sales orders in the production manager's bin. The production manager collects these orders at least twice a week and plans the production manually in Microsoft Excel. The schedule is released and production subsequently commences.

The production workers write down the consumed time and materials and the number of products on production line. At the same time, he sends the supply chain manager a list of finished goods. The supply chain manager enters the list into the system and prints out delivery notes and sends them to the warehouse personnel who makes the physical shipments. As we can see, there are currently many unnecessary work process caused by the manual inter-departmental transfer of documents. These are non-value adding activities and decreases ValveTech's competitive advantage in terms of the degree of their responsiveness to the market demand.

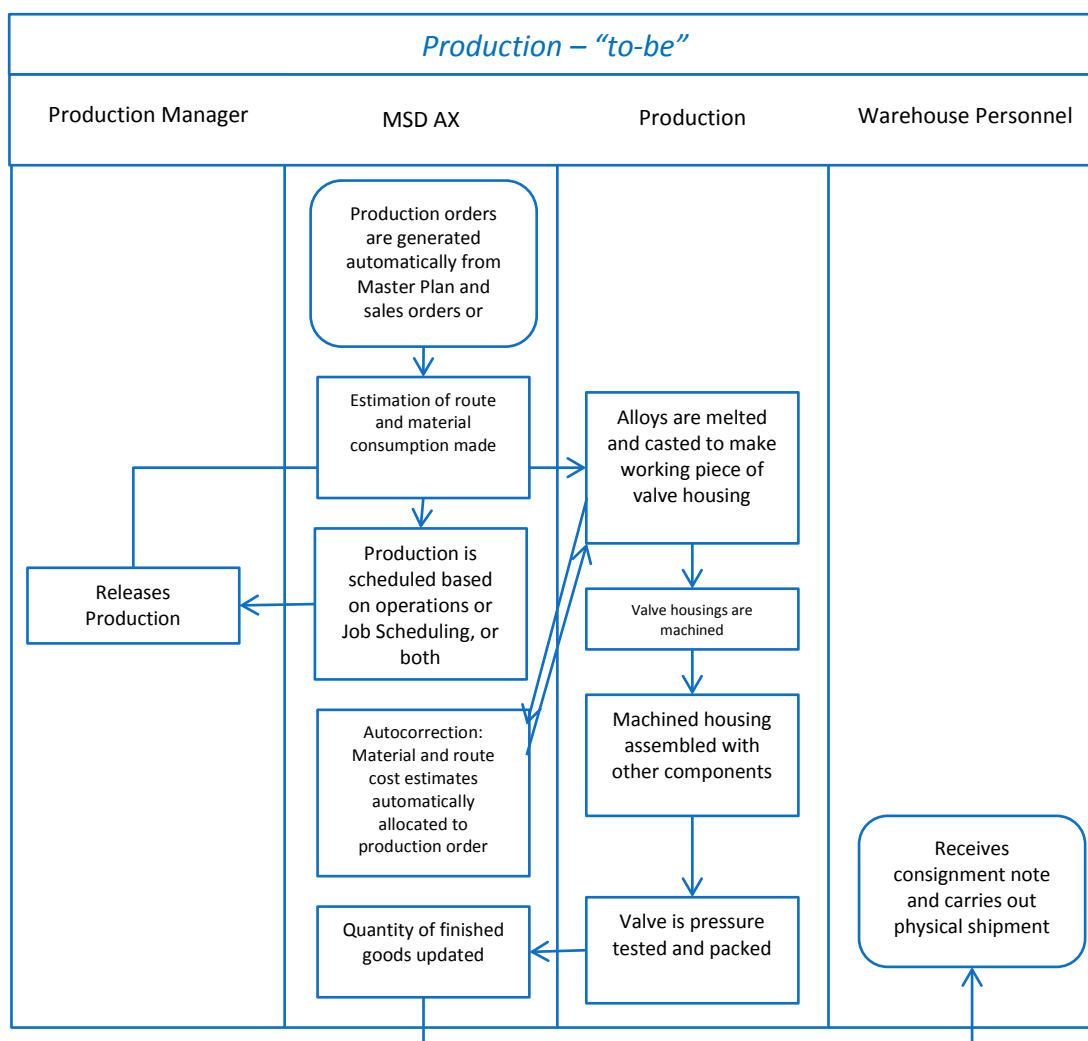
With the implementation of AX, the production orders are generated automatically by AX from the Master Production Schedule and/or from sales orders. If need be, they can also be generated manually.

From there, AX makes an estimation of the route and material consumption that will be made by the production.

Next, the production is scheduled either based on operations or job scheduling, or both. An operations schedule provides a long-term plan while a job scheduling provides a short term detailed plan. The production is released when the schedule is finalized and production subsequently starts.

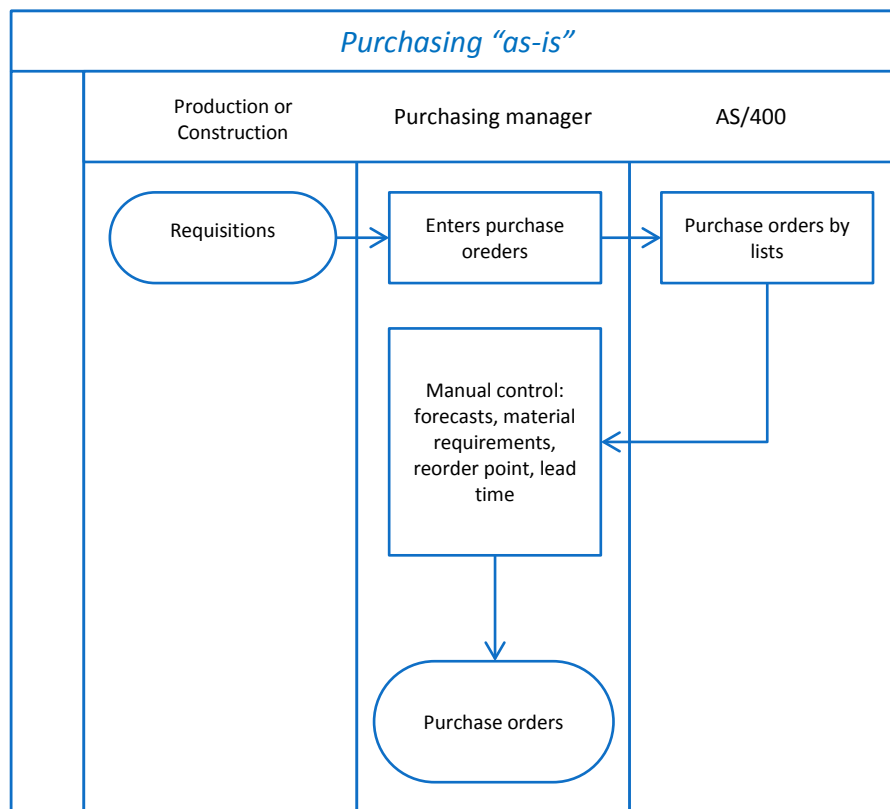


After the production is finished, the quantity of finished goods is reported in the inventory by stating how much the actual consumption of time and materials deviated from the estimation of the system. The warehouse personnel receive a consignment note from AX and carries out the physical shipment of the finished products.



PURCHASING

Concerning the purchasing task, the actual situation at ValveTech ASA consists of a simple process, in which a central role is played by the purchasing manager.

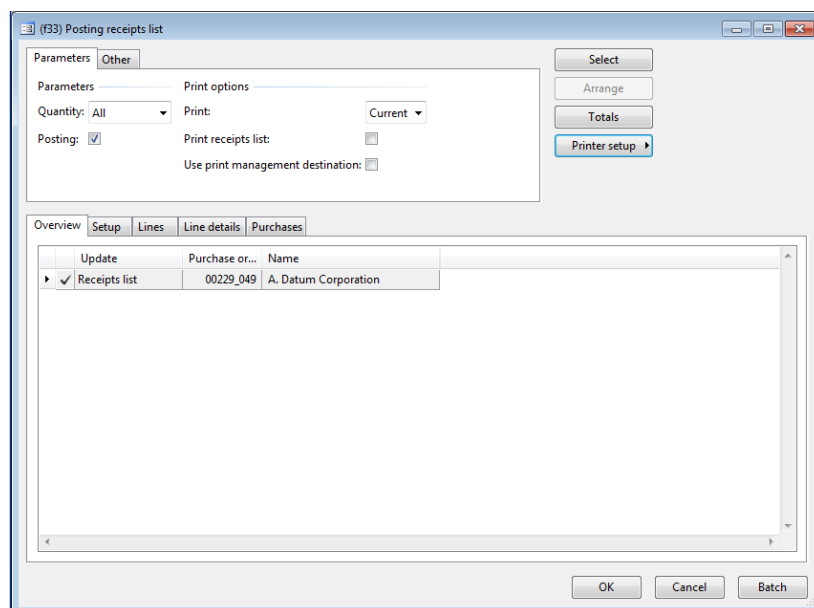
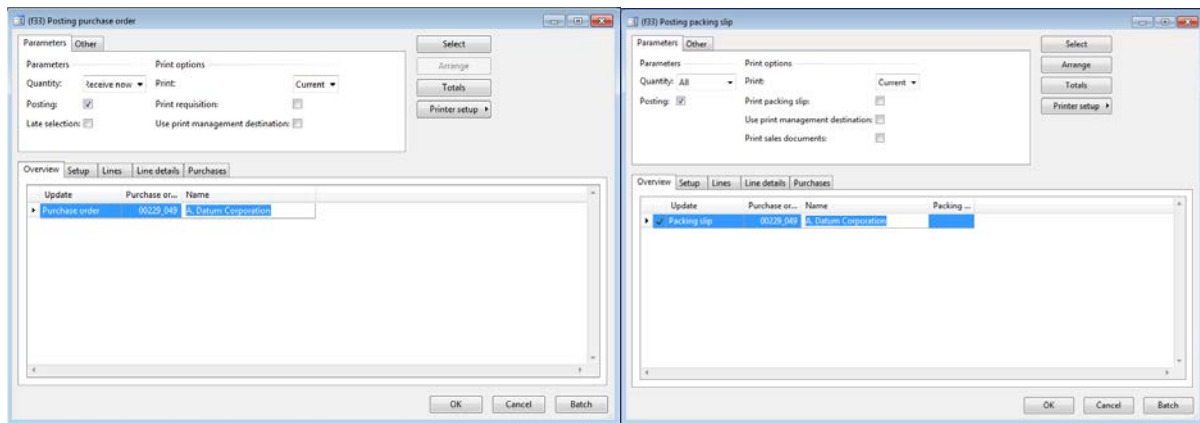


The production or construction department requires to the purchasing manager what they need.

After all the requisitions have come to him, an order list is created by the manager manually. He also has to count the forecasts, the material requirements, the reorder point and the lead times. Finally he is able to send a purchase order. This process causes a high risk of errors, due to the strong manual component and the need to have a person with working experience and knowledge. In addition, it is not guaranteed that he will not make mistakes.

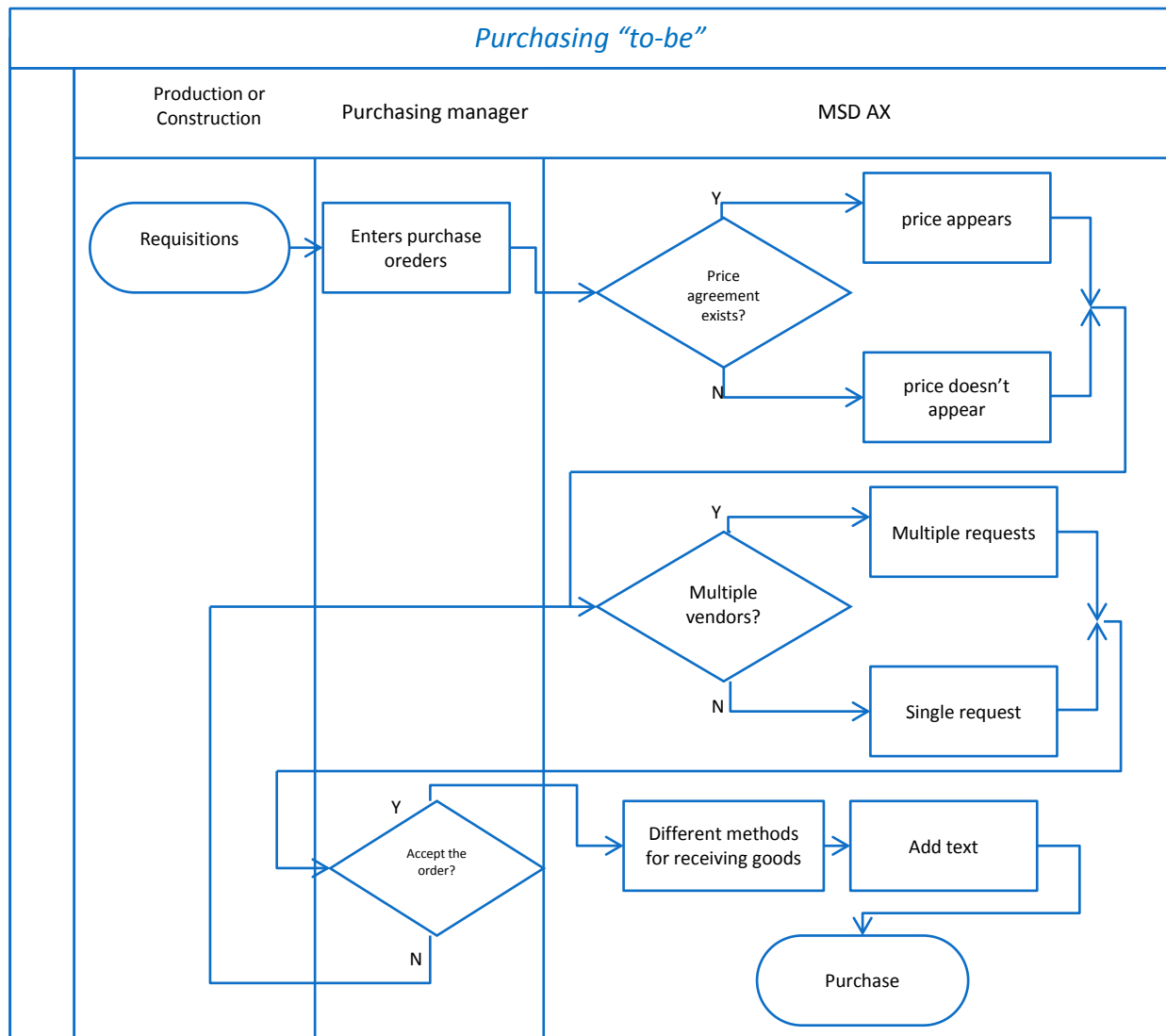
To prevent useless waste of time the company can adopt the AX system: first of all it is not necessary to enter both the purchase orders and requirements for production. You can also leave the software to calculate the key elements, such as the reorder point, the forecasting. Indeed it uses a broader historical and more comprehensive database, and it is directly linked to the inventory and BOM lists.

Also, the manual method of creating lists can be dismissed. The manager can simply enter a new order, and the system automatically recognizes the needs of all items and related components. But AX can add other interesting feature to perform the purchasing task.



About the pricing agreement: with AX it is possible to have an overview of all the price proposals by different vendor. Only when the user agrees with one of them, he can see the price related to the order. If an agreement already exists, the price is automatically shown.

It is also possible to use a specific function: if you want to send a request to different vendors, there is a specific function in the purchasing module. This is not standard, but you can implement it through a dedicated interface and customization of the structure of AX (using the appropriate FMS document). This interface allows the user to accept or reject the proposal of the vendor and make it an actual order.

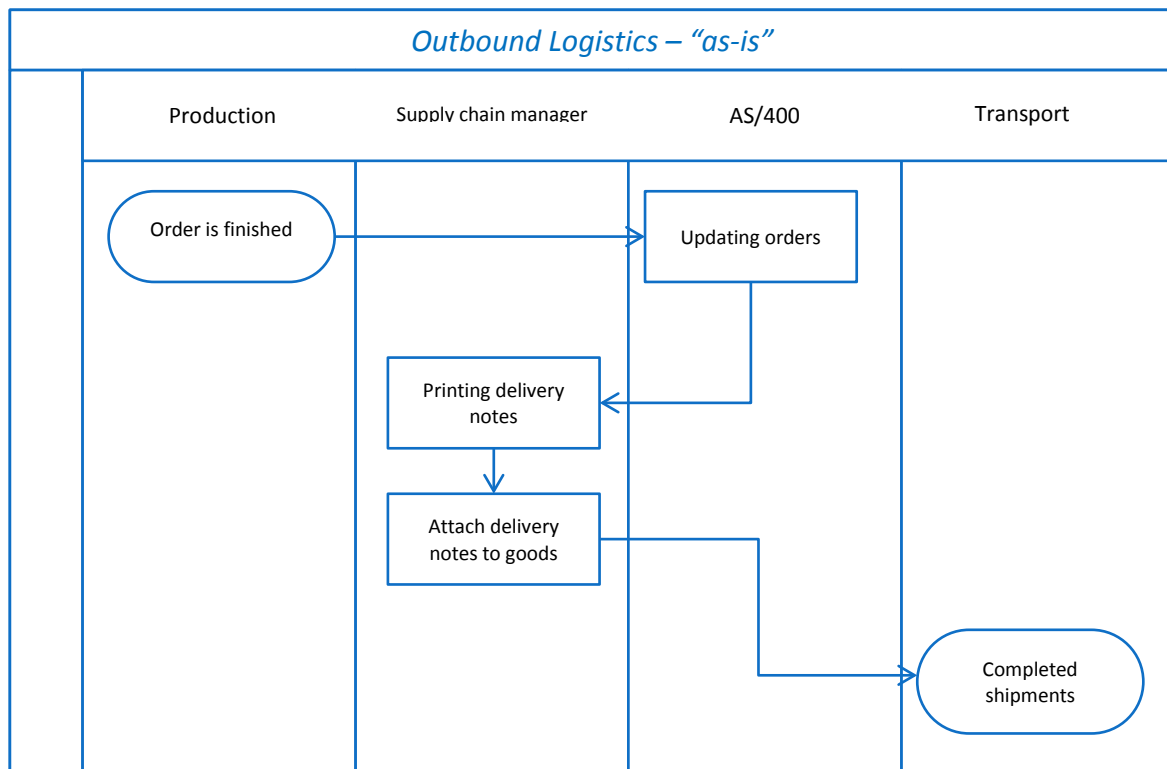


Accepting a quotation, some different methods of receiving goods can be requested; the system can manage all the additional controls and measurements.

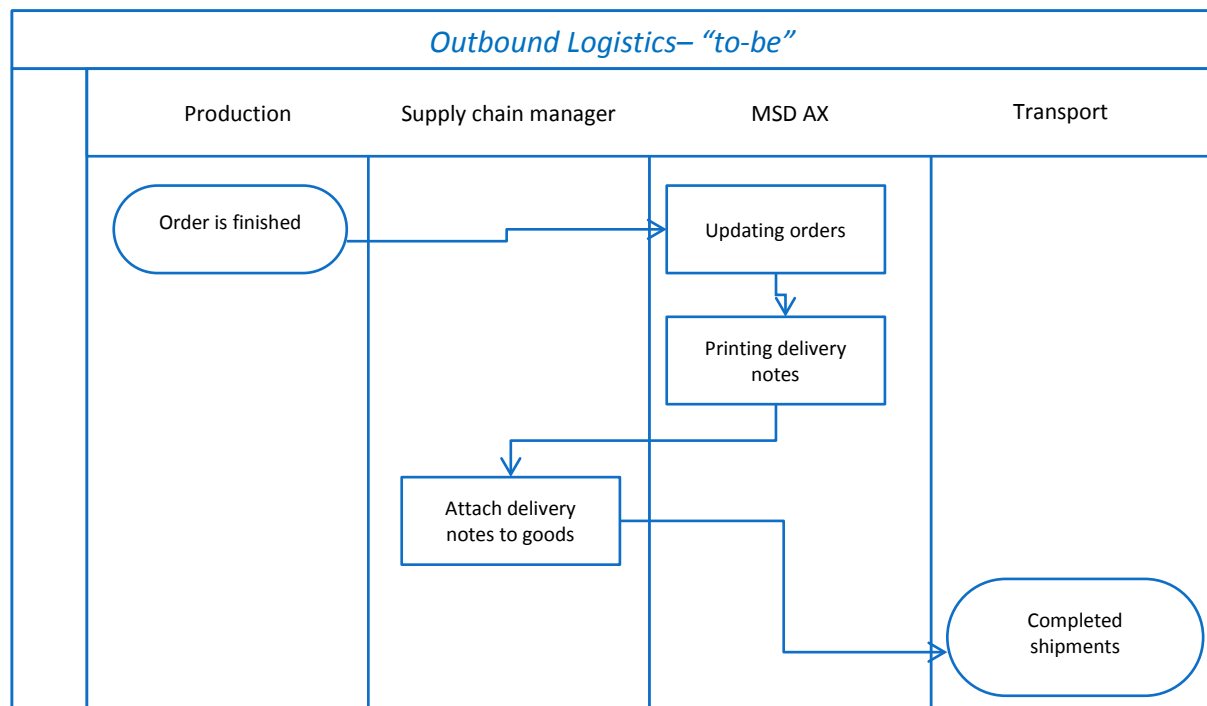
You could also add comments or details about the order, for instance the affordability of the vendor, the quality of the previous purchased goods (measurement feedbacks).

OUTBOUND LOGISTICS

Regard to the outbound logistics, in the present situation there is a big waste of time: the supply



chain manager releases notes only after the order is completed. The difficulty lies in managing the delivery of entire order or individual lines. Time wasted from waiting for updated shipping documents is a cause of inefficiency, and results in goods that wait for 2 weeks to be shipped for this reason.

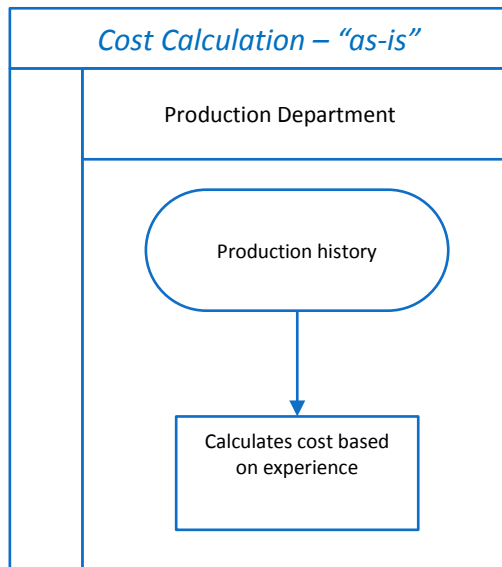


AX allows the company to save time, having characteristics of high integration. When the order is complete, the supply chain manager can immediately get the shipping documents, thanks to a fully

automated process. Thus it is possible to eliminate almost completely the waiting time of goods that are ready for delivery.

COST CALCULATIONS

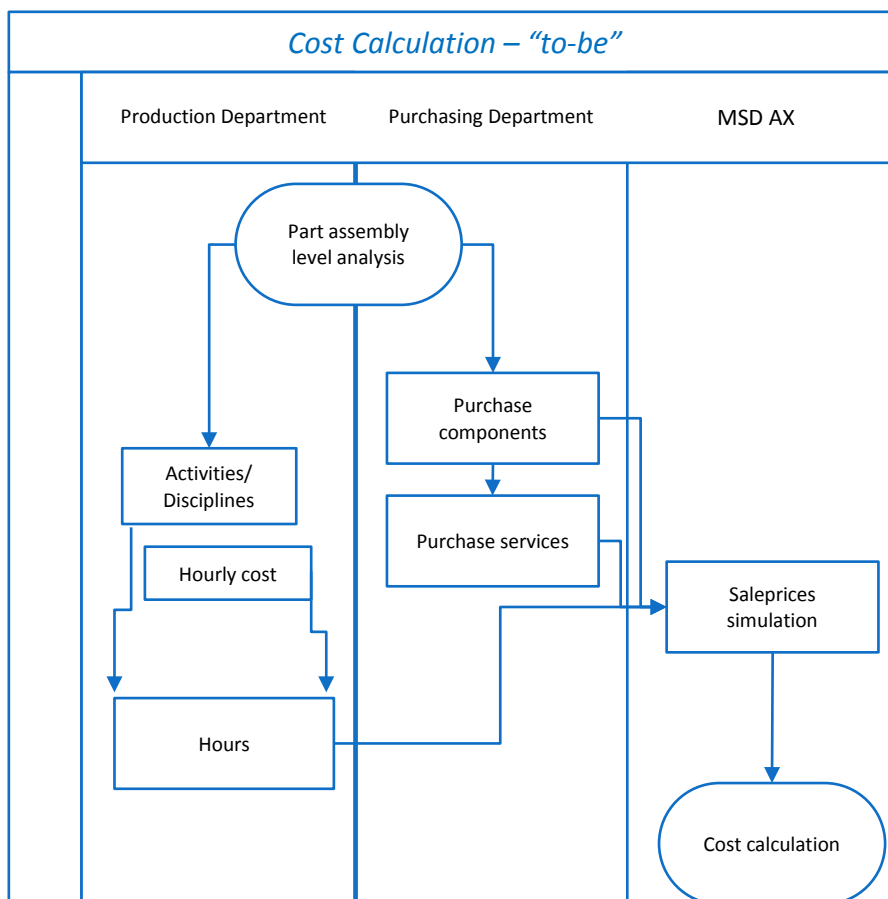
Currently the company costs are calculated based on past experience only. Microsoft AX helps the company to maximize profits and raise the level of customer service. The software allows setting an hourly cost for each discipline and working process. Knowing the components of each item, and their fabrication route, it is possible to estimate the processing time for each of them.



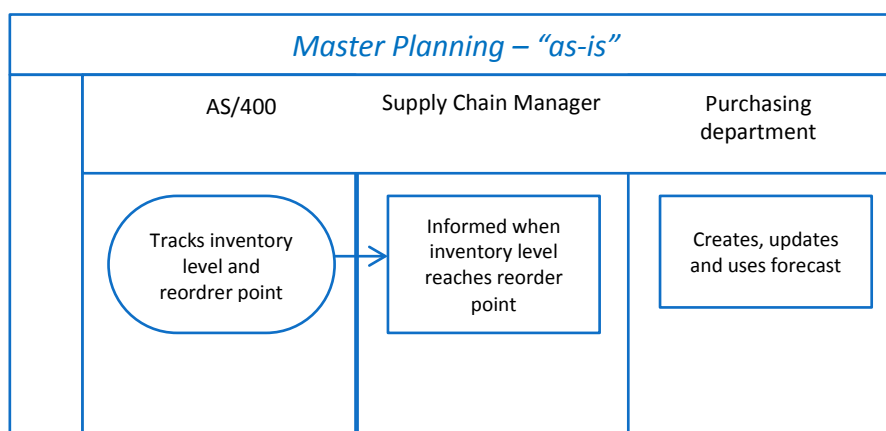
AX is also capable to take account of the purchase price of components and services used. With all this information as input, it provides an optimization of the calculation of costs.

Calculation ...	Item number	Confi...	Size	Shade	Quantity	Unit	Cost pric...	Sales pric...	Net weigh...
00070_072	P-2000/R				70,00	Pcs	4,35	8,65	0,20

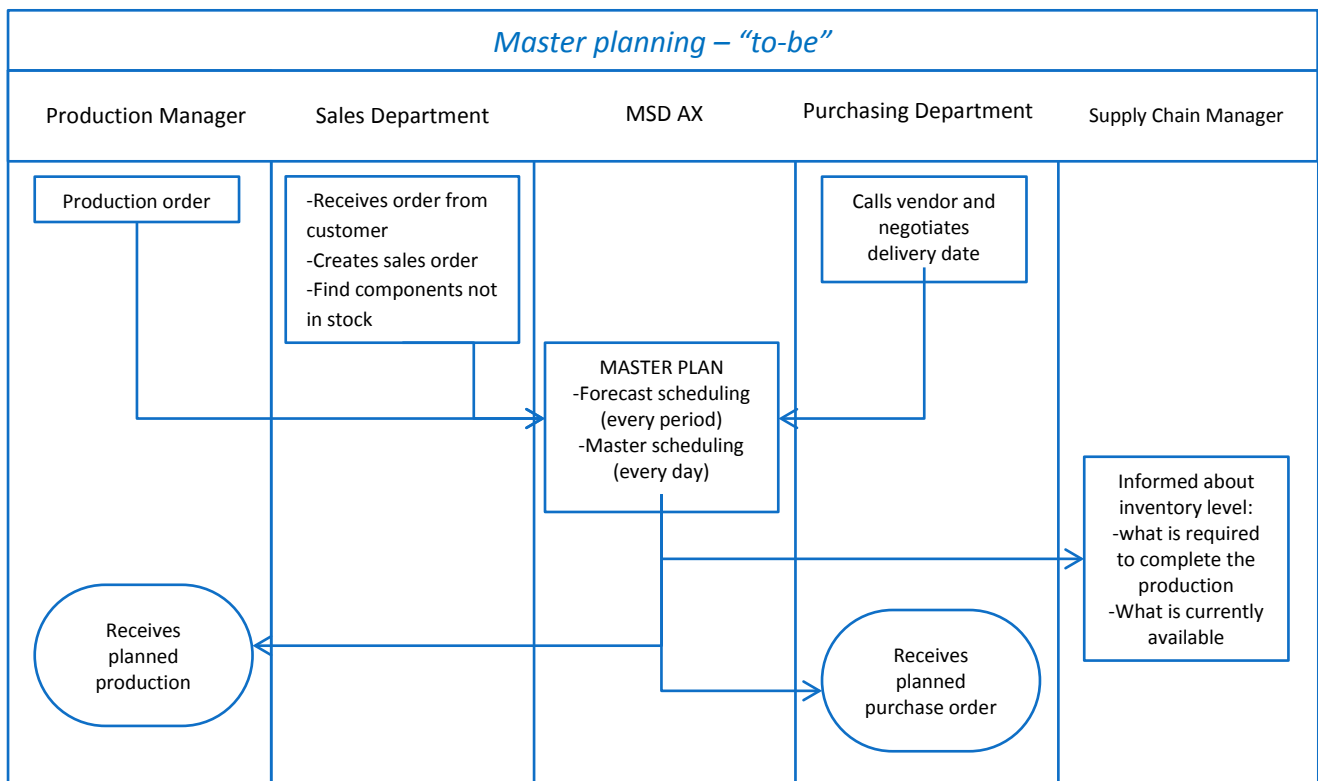
Order unit: Unit: Pcs Quantity: 70,00 Sales price per unit: 8,65



MASTER PLANNING



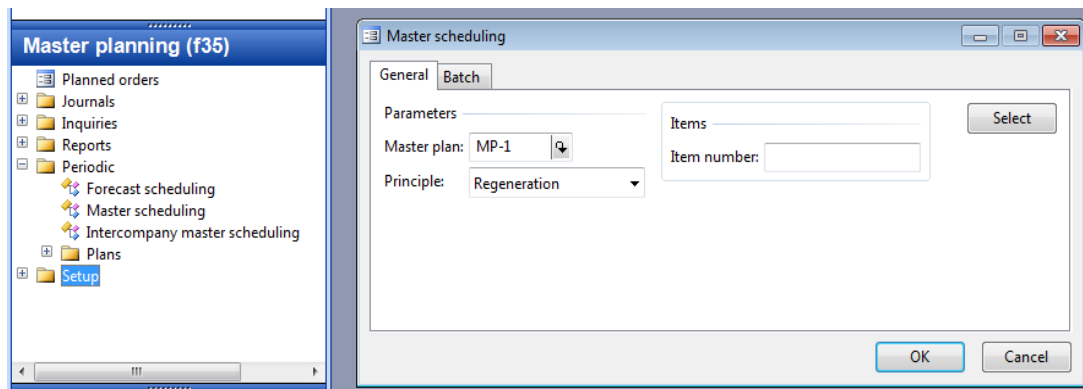
Today inventory is mainly managed through the principle of reorder point. There are challenges related to overstocking of certain items, and a shortage of others. Forecasts are used in the purchasing department, but these forecasts are created manually and manually updated every other month. Then they are manually checked towards the purchase requirements. Moreover the forecasts are not connected to inventory.



Master planning in AX provides the effective planning of:

- What is required to complete the production(s)
- What is currently available
- What is needed (such as what should be manufactured, purchased, transferred or set aside as safety stock)

The accuracy and outcome of the Master planning process depends heavily on how the parameters are set up. It is very important that the models and parameters are set up in a systematic manner. At this point many of the inputs required by the master planning have already been placed in the other menu of AX (contained in sales orders, purchase orders, production orders, and so on) and scheduling can be easily performed:



Scheduling calculates requirements and generates planned orders. The two main scheduling processes in Master planning include the following:

- Forecast scheduling (run one time each defined period)
- Master scheduling (run day to day frequently at night)

To start to plan for the future, you have to have a good idea of what the future might bring. In ValveTech Company, this projection is performed by some type of forecasting technique. Forecasting in Microsoft Dynamics AX provides a reasonable starting point for upcoming product demands and helps you make plans to meet these demands that are realistic over time. A typical planning horizon for this kind of scheduling is between one to three years. Generally, Forecast scheduling calculates gross requirements, is based on forecasts, and enables you to conduct long-term planning of materials and capacity. If future demands can be forecasted with relative accuracy, the Forecast scheduling function can be used to make sure that items are purchased and produced when needed, and that capacity is available when needed. Being able to forecast material and capacity needs accurately helps in the negotiation of good trade agreements with your vendors. If you want to use Forecasting, it is usually run before running the Master schedule.

Master scheduling calculates net requirements, is based on actual orders, and enables you to control inventory replenishment on a day-to-day basis. Regarding production, the scheduling process takes the available material and the current capacity available on the resources into account. Because this process is complex and can take some time to perform, the calculation is usually conducted in nightly batch jobs. A typical horizon for this might be anywhere from one week to six months. The Master schedule determines the material and capacity needed that will meet the demands, considering the current situation (net requirements). When it is run, it checks what inventory is on hand and factors in all sales orders (including sales quotations if they are included in the Master plan setup), inventory transactions, purchase orders and planned production orders to either create a new plan or to make adjustments to an existing one. Essentially, one of the main purposes of running a Master schedule is to calculate how to meet the requirement of "having the right material, at the correct time, in the right place."

Detailed planned orders contain information about:

- Item number
- Configuration
- Order date
- Planned order
- Quantity
- Requirement date
- Delivery date
- Requested date

Depending on the setup the planning process:

- Determines the material and capacity needs for meeting demands, considering the present state of affairs (or net requirements).
- Checks for on-hand inventory, open sales orders, inventory transactions, open purchase orders, planned production orders, and quotations (if these are set up in the Master plan), and assimilates these and other information to make or adjust the plan.
- Includes Forecast scheduling in its calculations if the company uses the Forecast planning feature.

The net requirements results from the following calculation:

Net requirements = on-hand inventory + receipts - issues

On-hand inventory is the quantity that is physically available at the different inventory locations or warehouses.

Expected receipts are all transactions that lead to an increase in inventory at these locations:

- Production
- Purchases
- Transfers from other locations

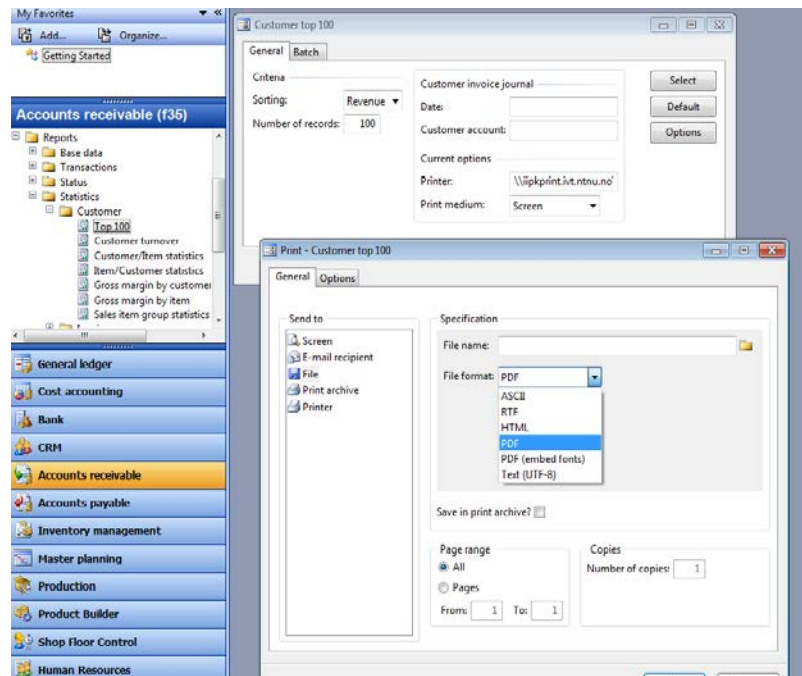
Expected issues are transactions that lead to a reduction of inventory at the various locations. These can be because of:

- A sales order or sales order quotation using existing inventory.
- The consumption of an item needed for a production order, where the item is used as raw material or in a subassembly.

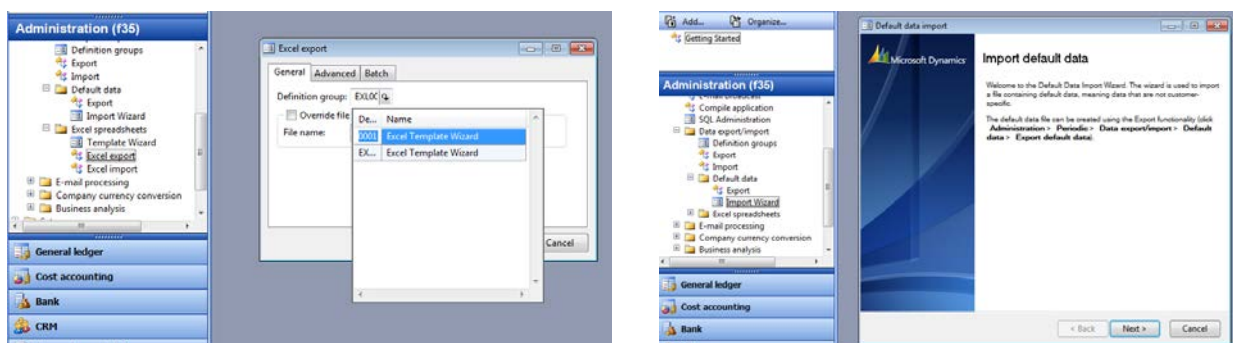
In the end purchasing and inventory must be managed according to forecasts AX constantly update the feedback from the production workers, department managers and warehouse workers. The AX is used function main planning to set up the forecasts and make plans based on sales history and production history, and planned orders and stock.

OTHER

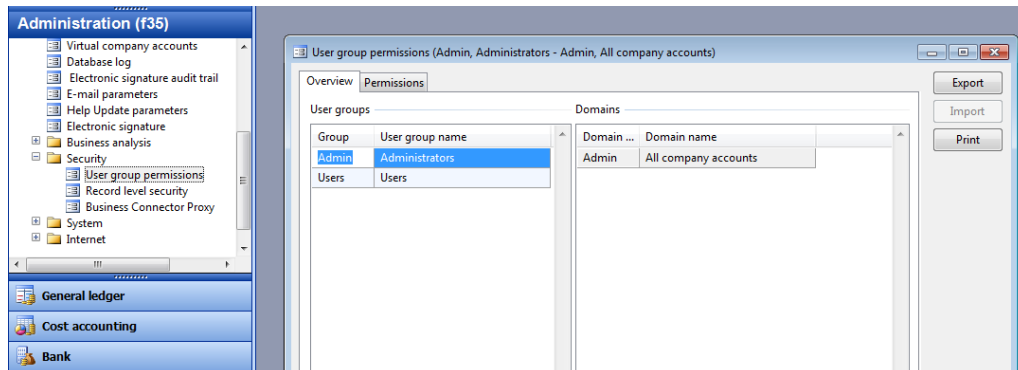
Microsoft Dynamics AX includes hundreds of preconfigured reports that users can generate and print. These reports are called *standard reports* and *auto reports*. Users can generate standard reports by clicking a link in the Reports area of a module's area page. Users can generate auto reports by clicking the Print icon on a form.



It will be also easy to export and import data, and customize various reports and documents. To send emails from AX, an email client must be installed on the computer, e.g. Microsoft Outlook. Even though standard AX does not have connection to Microsoft Office, we can deliver an additional package which allows AX to have full compatibility with Microsoft Office. This would allow the user to import and export documents from Microsoft Word and Excel.



It will also be easy to maintain basic data through the creation, modification or deletion of data, which includes customers, suppliers and documents. If there is an error while doing these, an error message will appear which tells the user the source of the failure. It is also possible to block irrelevant functions for users such that the user will be less likely to wrongly edit existing data.



Conclusion

In a highly competitive market, it is very important to be responsive to the market demand and to be efficient by making the right decisions at the right time. ValveTech ASA being an ambitious company would continue to make its market products and would want to keep making profit. In addition, keeping its customers would be of high importance to ValveTech ASA. However, to be the best among equal players requires a more pragmatic approach in aspect of overhauling major current business processes at ValveTech.

The Microsoft Dynamics AX is a software that comes through when it comes to efficiency in system business processes. In ValveTech ASA, the use of many systems in the operation of the company business processes creates a more complex scenario which is not affordable particularly in aspect of having a responsive service. Also, non-availability of these many systems could be a high possibility as a result of poor connectivity, human error or judgment.

Microsoft Dynamics AX is a comprehensive package that comes with easy navigation and well-connected network of information that is accessible almost at no time. It has a database that stores all relevant information that is needed by ValveTech for its business processes in purchasing, production, planning, sales, and logistic and many more. All these come with easy way of handling and accessibility in AX.

Also, the Microsoft Dynamics AX has the capability of storing history of all the company's business processes over the period of time. This is very important when it comes to business processes streamlining and general operations.

Microsoft Dynamics AX will eliminate delays; will put the ValveTech ASA at an economically viable position in terms of customer service interaction, operations management and comprehensive business processes in a very high efficient and secured manner.

The automation of business processes, inter-departmental integration and comprehensive database that Microsoft Dynamics AX provides will allow ValveTech to overcome some of its most prominent operational problems, such as reducing the delay of shipping finished products, reducing the lead-time of production and having excess or shortage of inventory. All these, in turn would allow ValveTech to become both a reliable and cost-efficient corporation.

In conclusion Microsoft Dynamics AXTM will bring about a much anticipated growth and resources needed to combat the upcoming challenges that would be faced in its quest to actualizing its ambitions. From the analysis done in this document, a comprehensive overview would be very well appreciated.

Appendix A

FMS

SALESPRICE CALCULATION

One of the interesting features that make Microsoft Dynamics AX™ a flexible and powerful software is the ability to modify and expand its structure and its interface. AX has a layered architecture; this also means that there is a hierarchy between these layers, they are like concentric circles and they can be modified depending on the user's role.

It's common that during the implementing an ERP system the company must do their processes to meet the processes supported by the system. Indeed it is rare for the standardized system to exactly match the needs of a specific organization.

If some changes are needed, ERP consultant can write the FMS (Function Modification Specification). It is a document that contains all the requirements and the technical details on how to modify the software. It is also useful to communicate with other people about this modification. This is the case of Salesprice calculation. The request is to edit the interface in order to operate with 2 different points of view: you can change the sales price from an aggregate level; but it should also be possible to provide a component level modification.

This feature is not in the standard Microsoft Dynamics AX™ system. An FMS document is attached which explains our proposed modification of the software.

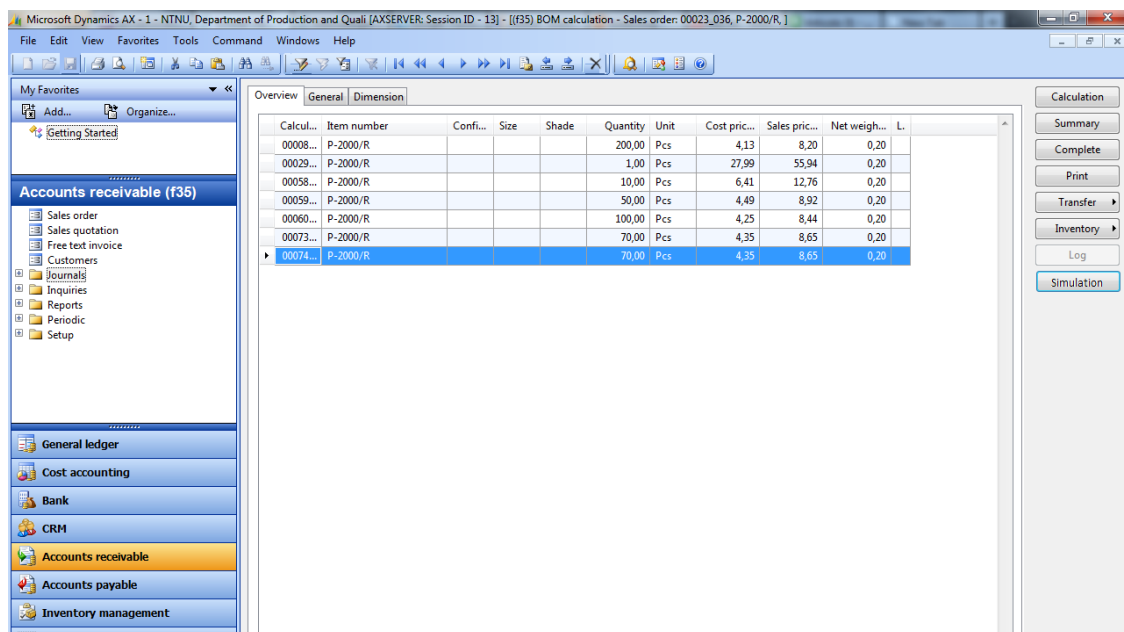
Name <i>modification 01</i>	Change concerning <i>Sales prices simulation</i>
Unit	Comment
Date <i>21.10.2011</i>	Our reference (Reported by) <i>Damiano Milani, Davide Vimercati, Tan Yan Shao</i>

Reason:

Add a functionality to change the sales price of individual components, through a simulation that updates the sales order line with new price.

Change in user interface:

- Creation of a new button called “*Simulation*” in the *BOM Calculation* form. The form can be found by clicking the *Calculation* button in the sales order form and then selecting *BOM calculation*. This originally calculates the cost of an item based on its BOM and route.



- Pressing this button a new window appears, with the following columns:
 - o *BOM level*
 - o *Item Number*
 - o *Quantity*

- o Unit
 - o Unit Price
 - o Cost Price
 - o Net Price
 - o % difference
 - o Price difference
 - o Profit
 - o Item name
- On the right side of the window, there is an *Update* button, which is clicked when the user is satisfied with the new Net Price.

The screenshot displays the Microsoft Dynamics AX - 1 interface. The main window is titled "Microsoft Dynamics AX - 1 - NTNU, Department of Production and Quali [AXSERVER: Session ID - 13] - [(f35) BOM calculation - Sales order: 00023_036, P-2000/R,]". The left sidebar shows the "Accounts receivable (f35)" menu. The main area displays a table with columns: Calcul..., Item number, Confir..., Size, Shade, Quantity, Unit, Cost pric..., Sales pric..., Net weigh..., and L. The table contains several rows of data for item P-2000/R. Below this, a smaller window titled "(f35) BOM calculation - Simulation" is open, showing a table with columns: BOM level, Item number, Quantity, Unit, Unit Price, Net Price, % Difference, Price difference, Profit, and Item name. The table shows two levels of BOM calculation for item CL-100-B. On the right side of the main window, there are buttons for Calculation, Summary, Complete, Print, Transfer, Inventory, Log, and Simulation. The bottom status bar shows "Compute the BOM calculation" and the system clock indicates "19:20 23.11.2011".

Calcul...	Item number	Confir...	Size	Shade	Quantity	Unit	Cost pric...	Sales pric...	Net weigh...	L.
00008...	P-2000/R				200,00	Pcs	4,13	8,20	0,20	
00029...	P-2000/R				1,00	Pcs	27,99	55,94	0,20	
00058...	P-2000/R				10,00	Pcs	6,41	12,76	0,20	
00059...	P-2000/R				50,00	Pcs	4,49	8,92	0,20	
00060...	P-2000/R				100,00	Pcs	4,25	8,44	0,20	
00073...	P-2000/R				70,00	Pcs	4,35	8,65	0,20	
00074...	P-2000/R				70,00	Pcs	4,35	8,65	0,20	

BOM level	Item number	Quantity	Unit	Unit Price	Net Price	% Difference	Price difference	Profit	Item name
0	CL-100-B-D	1,00	Pcs	4,13	4,13	0,00	0,00		Ceiling Lamp -
1	CL-100-B	1,00	Pcs	0,20	0,20	0,00	0,00		Ceiling Lamp -

Functional changes:

The user can select an order from the *Sales Order* window, and adjust the sales prices of the individual components at every BOM level.

A key role is played by the two columns *% difference* and *Price difference* in this table: the user can change one of them with a signed value, in order to add or subtract a percentage or an amount. The *Net Price* of the component is automatically updated based on the *% difference* or *Price difference* made.

The profit earned from the sales of the product is calculated automatically by subtracting the cost price from the net price and is reflected in the *Profit* column. The user can check this column to see if the item is making a large enough profit. If a loss is incurred from an item, the font in the corresponding row will turn red, indicating a negative profit.

The BOM item will always be shown in the first row with BOM level 0. It is possible to edit its sales price in a similar fashion.

Finally, when the user is satisfied with the new *Net Price*, he can press the button *Update*, and the changes made on the selected item will be reflected on the Sales order form.

Technical description:

[Create technical description, fields, tables, test, etc.]

Test example:

- Create a new item in the Inventory Management Panel, with item number A (item type is *BOM*)
- Create a BOM for this item, consisting of 1 component A1 and 2 components A2 (item type is *Item*)
- Enter 10,00 in the *Price* field under the *Price/Discount* tab (*Sales order* section) for A1
- Enter 7,00 in the *Price* field under the *Price/Discount* tab (*Cost section*) for A1
- Enter 20,00 in the *Price* field under the *Price/Discount* tab (*Sales order* section) for A2
- Enter 15,00 in the *Price* field under the *Price/Discount* tab (*Cost order* section) for A2
- Create a *Sales order* for item A of 100 units.
- Open the Sales Order form under the Accounts Receivable module.
- Press the *Calculation* button and select *BOM Calculation*. The *Sales Price Simulation* window will appear.
- The items A, A1, and A2 will appear in the table.
- The cost price of A should be 37,00.

- Item A has a BOM level of 0 while A1 and A2 will have a BOM level of 1.
- Edit the *% difference* column of the component A1, entering 5.
- The *Net Price* should be automatically changed to 10,50.
- The *Profit* should be automatically changed to 3,50
- Edit the *Price difference* column of the component A2, entering -7.
- The *Net Price* should automatically be changed to 13,00.
- The *Profit* should automatically be changed to -2,00 and the row should appear red.
- The *Net Price* in the row on top for item A should show 36,50.
- The *% difference* in the row on top for item A should show -27.
- The *Price difference* in the row on top for item A should show -13,50.
- The *Profit* in the row on top for item A should show -0.50 and the row should appear red.
- If you are satisfied, press the button *Update*.
- In the *Sales order* form, the *Net amount* value for item A should be 3650,00.

Estimate		Order/accept	
Development*	Consultant in charge	Date	Customer sign
XX hours	XXX	dd.mm.yyyy	

Changes after approval are applied below to be estimated and approved with a new signature.

** Billed on a time basis, normally considered a mark of 50-60% of the test, implementation and debugging.*

Checkpoints (give detailed description below, if "yes")	Yes/No
1. Is there a need for other adjustments, subsequent adjustments to the solution?	
2. Is there a need for updating the data, and possibly consider the extent of this?	

Appendix B

Requirement Specification

1 Sale					
Req ID	Requirement Description	Vendor Reply			
		Covered in Standard	Partly covered through workaround	Not covered	Contractor subject
1.1	Customer address	✓			
1.2	Customer delivery address	✓			
1.3	Invoice address	✓			
1.4	Calculation of the Royalty to the licensee	✓			
1.5	Customer Quotation	✓			
1.6	Return orders from the customers	✓			
1.7	Automatic calculation of delivery date based on transportation type	✓			
1.8	Automatic calculation of line discounts	✓			
1.9	Simulation of salesprice from percent or mark-up		✓		
1.10	Have more than five in quantity on the same serial no. on the same sales order line	✓			

2 Production					
Req ID	Requirement Description	Vendor Reply			
		Covered in Standard	Partly covered through workaround	Not covered	Contractor subject
2.1	Support both MTO and MTS strategies	✓			
2.2	Outsource parts of a production order to a subcontractor	✓			
2.3	Product Data Management (PDM)	✓			
2.4	Materials Requirements Planning (MRP)	✓			
2.5	Bottleneck scheduling			✓	
2.6	KANBAN control	✓			
2.7	Gantt chart production planning or similar graphical planning interface	✓			
2.8	Barcode data collection in production	✓			
2.9	Detailed scheduling for individual workstations/machines	✓			
2.10	Graphical presentation of cost calculations		✓		

3 Purchase				
Req ID	Requirement Description	Vendor Reply		
		Covered in Standard	Partly covered through workaround	Not covered Contractor subject
3.1	Supplier delivery plan	✓		
3.2	Purchase order confirmation through a web interface			✓
3.3	Supports follow-up dates such as: inventory dates, delivery dates, confirmation dates	✓		
3.4	Automatic registration of who made the order	✓		
3.5	Separate register for supplier items			✓
3.6	Purchase lead times that are defined for each vendor	✓		
3.7	Quality control on receipt		✓	
3.8	Multi-step goods reception (goods receipt and put away)		✓	
3.9	Support supplier follow-up on delivery time, cost and quality			✓
3.10	Batch and serial number tracking			✓