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(54) SYSTEMS AND METHODS FOR FORECASTING DEMAND FOR A SUBCOMPONENT

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(57) **ABSTRACT**

Techniques for determining how to translate forecast sales data of at least one configuration of assembled product into a forecast schedule of subcomponents composing the assembled product is described. To this end, forecast sales data of at least one configuration of assembled product is received. Usage factors of a plurality of subcomponents composing the assembled product are also received. Each usage factor corresponds to the at least one configuration of assembled product. The forecast schedule of subcomponents composing the assembled product is then composed by applying the usage factors of the plurality of subcomponents to the forecast sales data of at least one configuration of assembled product wherein the forecast schedule includes demand for the subcomponents over time.

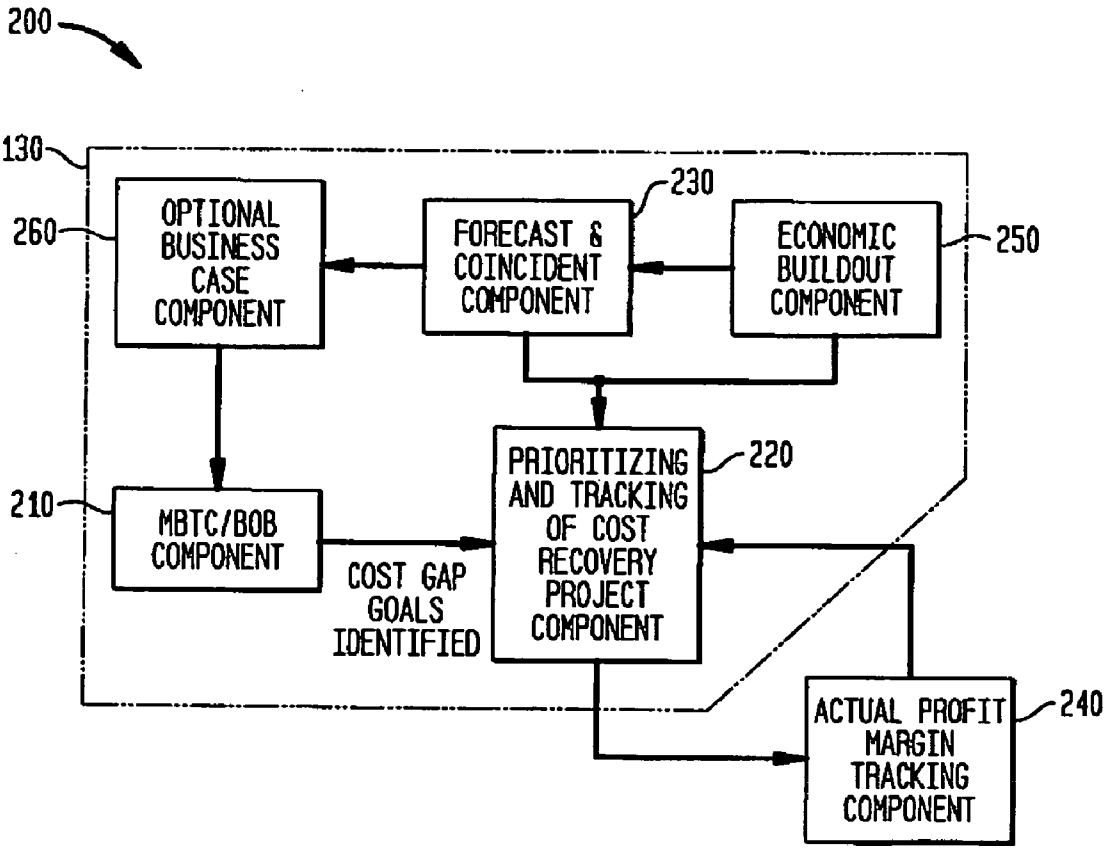


FIG. 1

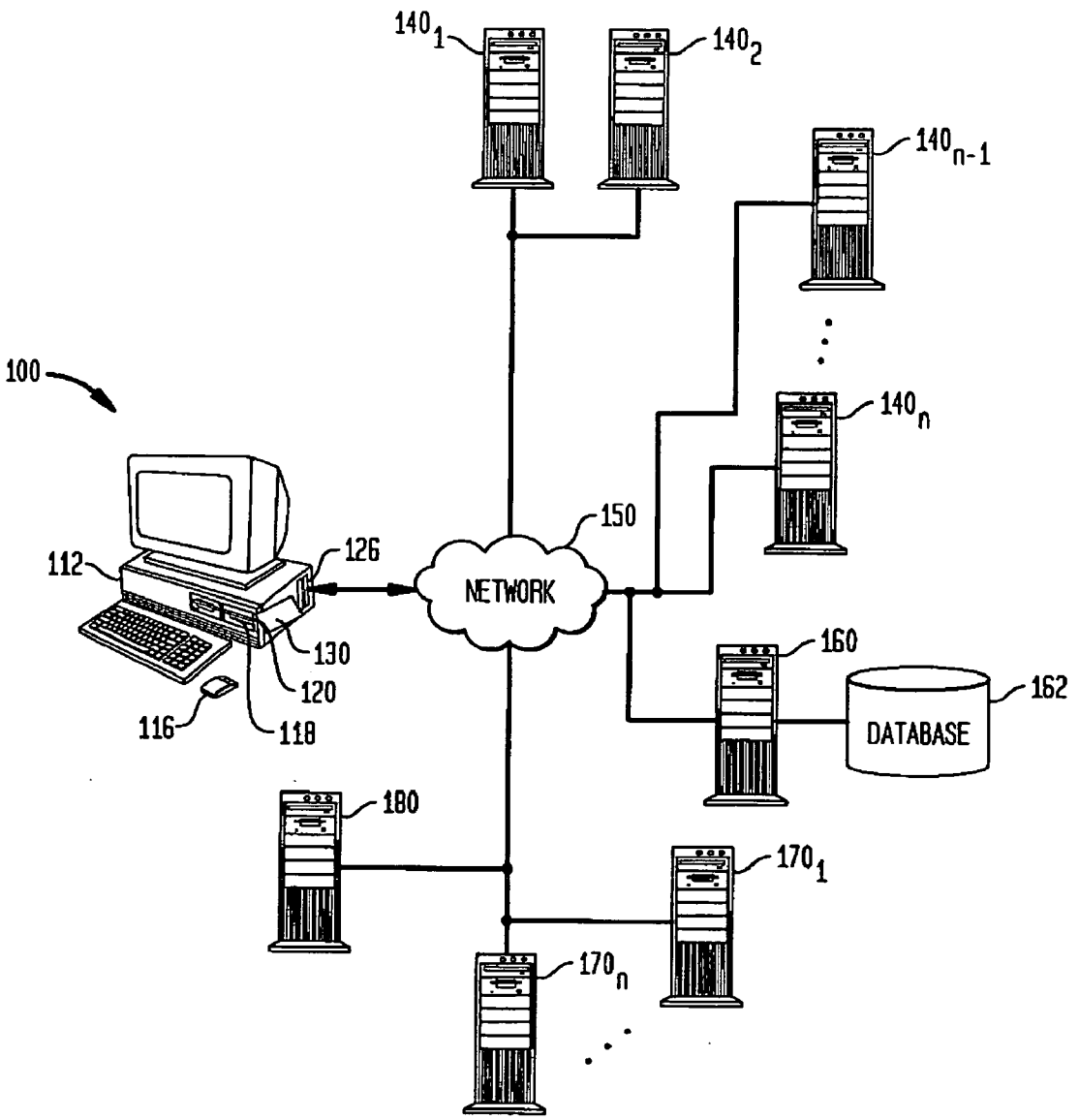

140 1
140 2
140 n-1
140 n
100
112
126
150
NETWORK
130
120
116
118
160
162
DATABASE
180
170 1
170 n

FIG. 2

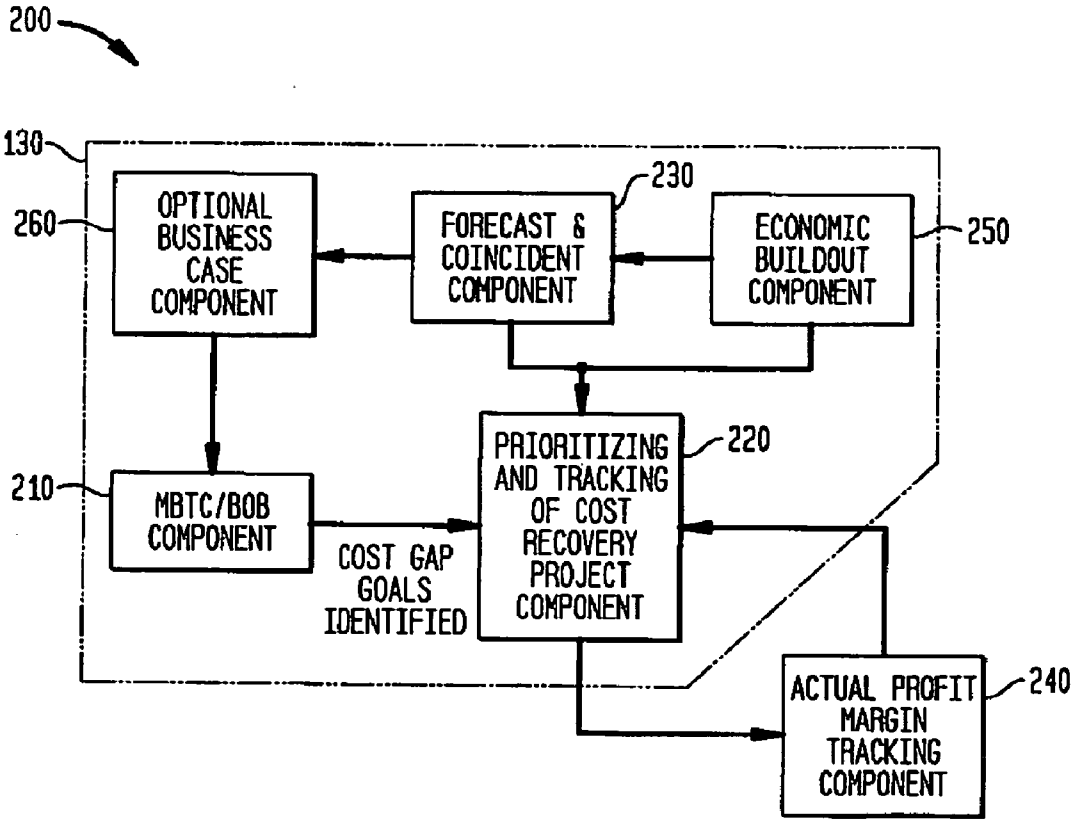

200
130
260
OPTIONAL BUSINESS CASE COMPONENT
230
FORECAST & COINCIDENT COMPONENT
ECONOMIC BUILDOUT COMPONENT
250
PRIORITIZING AND TRACKING OF COST RECOVERY PROJECT COMPONENT
220
210
MBTC/BOB COMPONENT
COST GAP GOALS IDENTIFIED
ACTUAL PROFIT MARGIN TRACKING COMPONENT
240

FIG. 3A

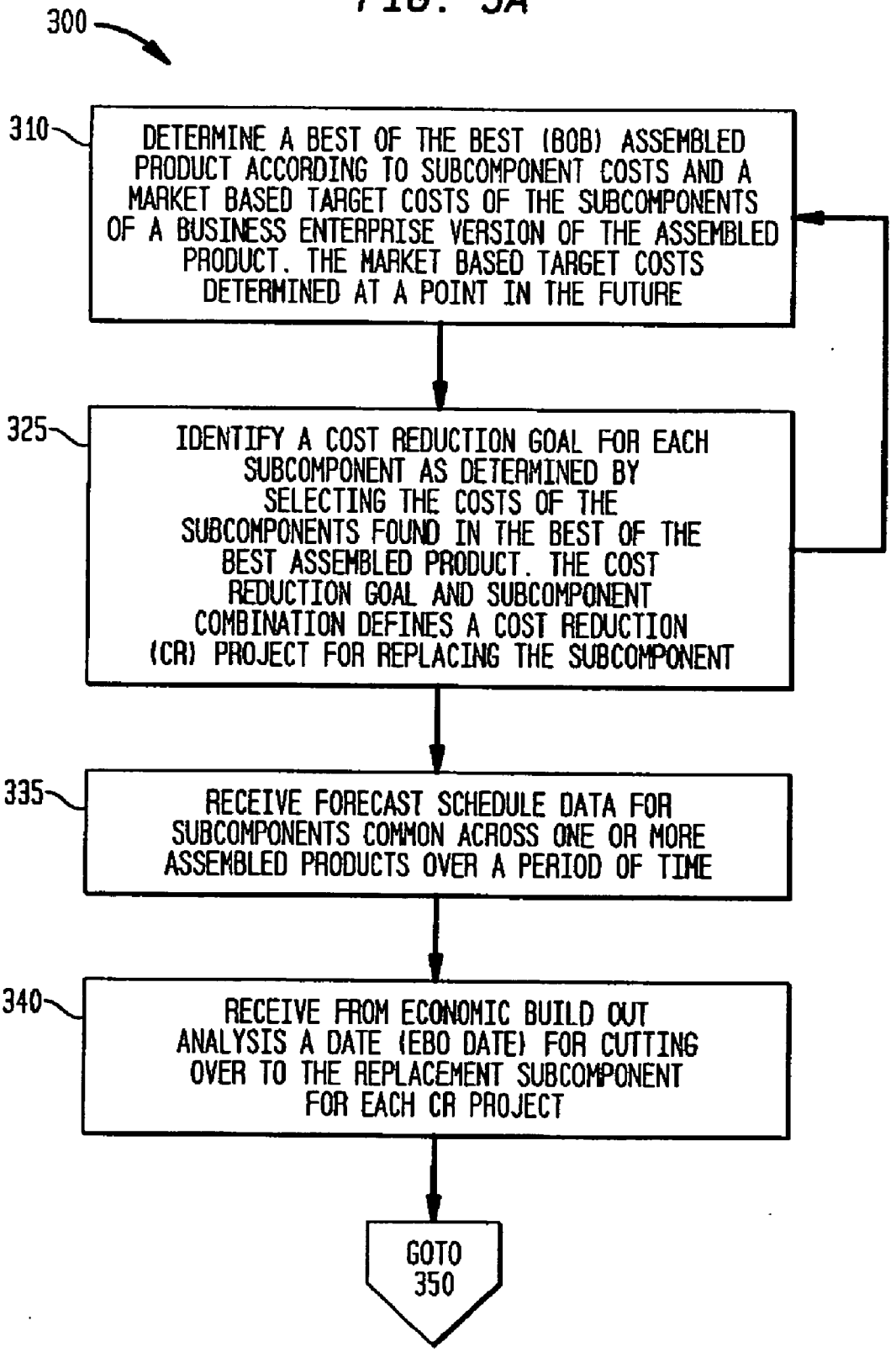

300
310
DETERMINE A BEST OF THE BEST (BOB) ASSEMBLED PRODUCT ACCORDING TO SUBCOMPONENT COSTS AND A MARKET BASED TARGET COSTS OF THE SUBCOMPONENTS OF A BUSINESS ENTERPRISE VERSION OF THE ASSEMBLED PRODUCT. THE MARKET BASED TARGET COSTS DETERMINED AT A POINT IN THE FUTURE
325
IDENTIFY A COST REDUCTION GOAL FOR EACH SUBCOMPONENT AS DETERMINED BY SELECTING THE COSTS OF THE SUBCOMPONENTS FOUND IN THE BEST OF THE BEST ASSEMBLED PRODUCT. THE COST REDUCTION GOAL AND SUBCOMPONENT COMBINATION DEFINES A COST REDUCTION (CR) PROJECT FOR REPLACING THE SUBCOMPONENT
335
RECEIVE FORECAST SCHEDULE DATA FOR SUBCOMPONENTS COMMON ACROSS ONE OR MORE ASSEMBLED PRODUCTS OVER A PERIOD OF TIME
340
RECEIVE FROM ECONOMIC BUILD OUT ANALYSIS A DATE (EBO DATE) FOR CUTTING OVER TO THE REPLACEMENT SUBCOMPONENT FOR EACH CR PROJECT
GOTO 350

FIG. 3B

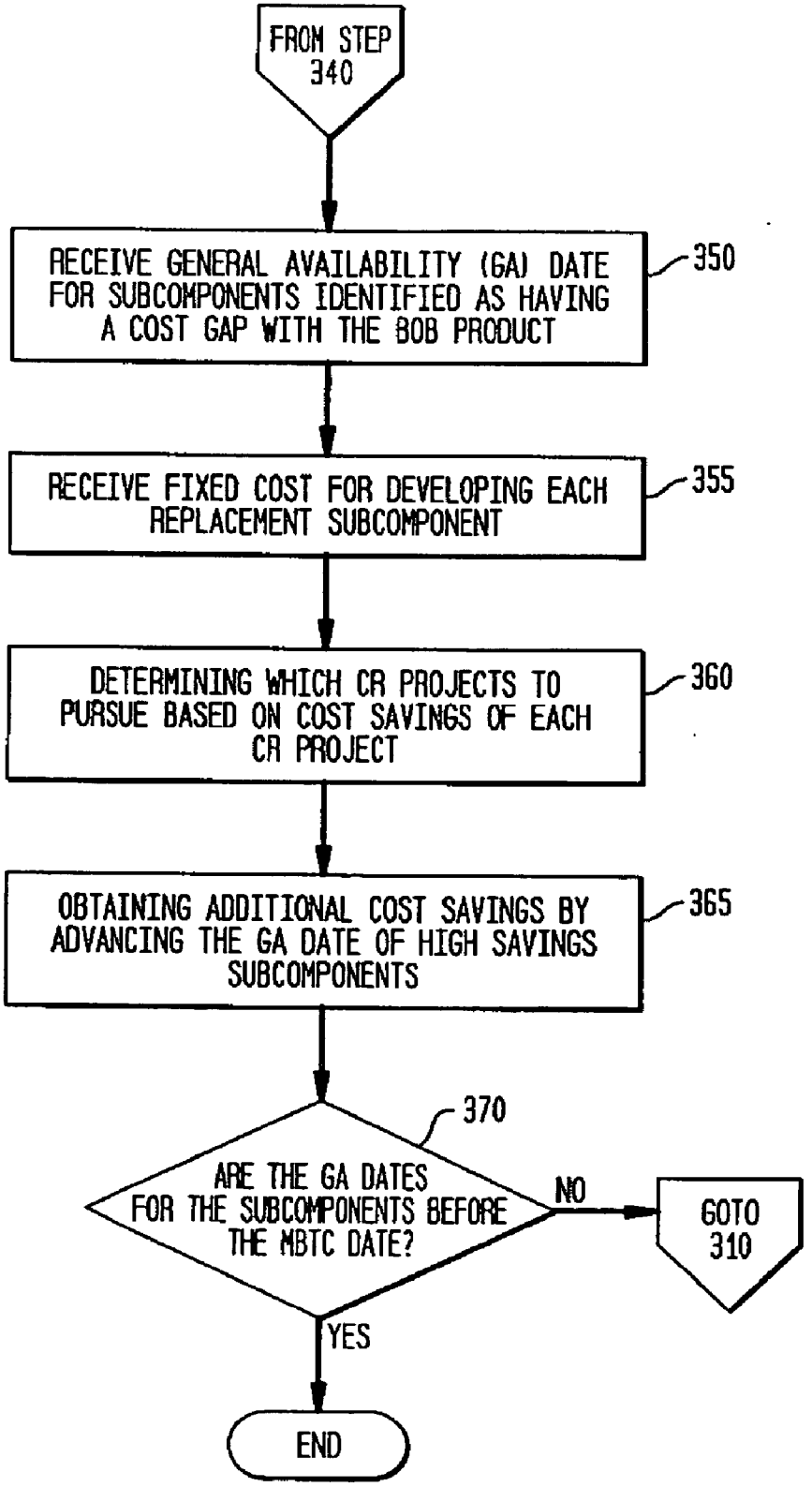

FROM STEP 340
RECEIVE GENERAL AVAILABILITY (GA) DATE FOR SUBCOMPONENTS IDENTIFIED AS HAVING A COST GAP WITH THE BOB PRODUCT
350
RECEIVE FIXED COST FOR DEVELOPING EACH REPLACEMENT SUBCOMPONENT
355
DETERMINING WHICH CR PROJECTS TO PURSUE BASED ON COST SAVINGS OF EACH CR PROJECT
360
OBTAINING ADDITIONAL COST SAVINGS BY ADVANCING THE GA DATE OF HIGH SAVINGS SUBCOMPONENTS
365
370
ARE THE GA DATES FOR THE SUBCOMPONENTS BEFORE THE MBTC DATE?
NO
GOTO 310
YES
END

FIG. 4A

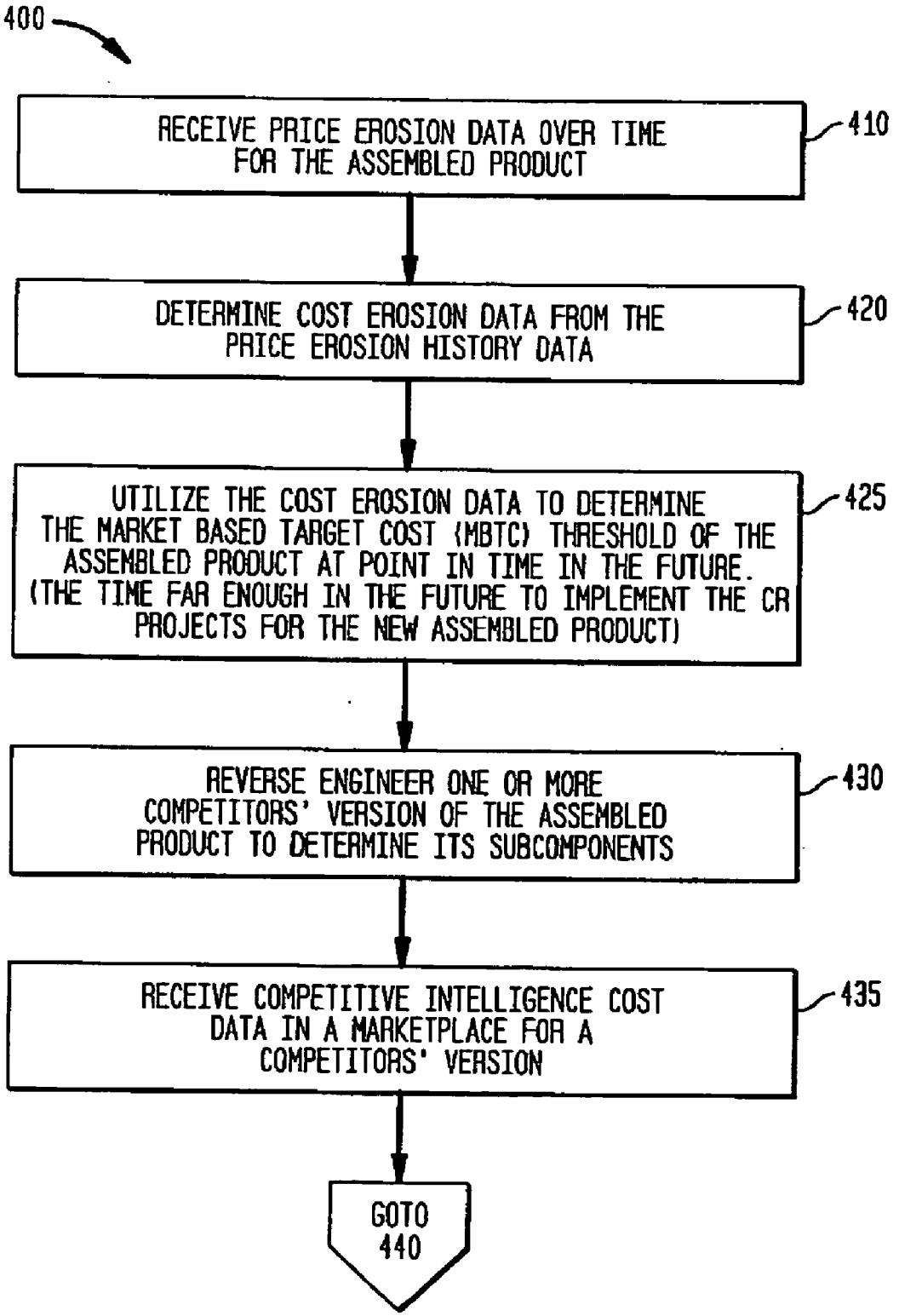

400
RECEIVE PRICE EROSION DATA OVER TIME FOR THE ASSEMBLED PRODUCT
410
DETERMINE COST EROSION DATA FROM THE PRICE EROSION HISTORY DATA
420
UTILIZE THE COST EROSION DATA TO DETERMINE THE MARKET BASED TARGET COST (MBTC) THRESHOLD OF THE ASSEMBLED PRODUCT AT POINT IN TIME IN THE FUTURE. (THE TIME FAR ENOUGH IN THE FUTURE TO IMPLEMENT THE CR PROJECTS FOR THE NEW ASSEMBLED PRODUCT)
425
REVERSE ENGINEER ONE OR MORE COMPETITORS' VERSION OF THE ASSEMBLED PRODUCT TO DETERMINE ITS SUBCOMPONENTS
430
RECEIVE COMPETITIVE INTELLIGENCE COST DATA IN A MARKETPLACE FOR A COMPETITORS' VERSION
435
GOTO 440

FIG. 4B

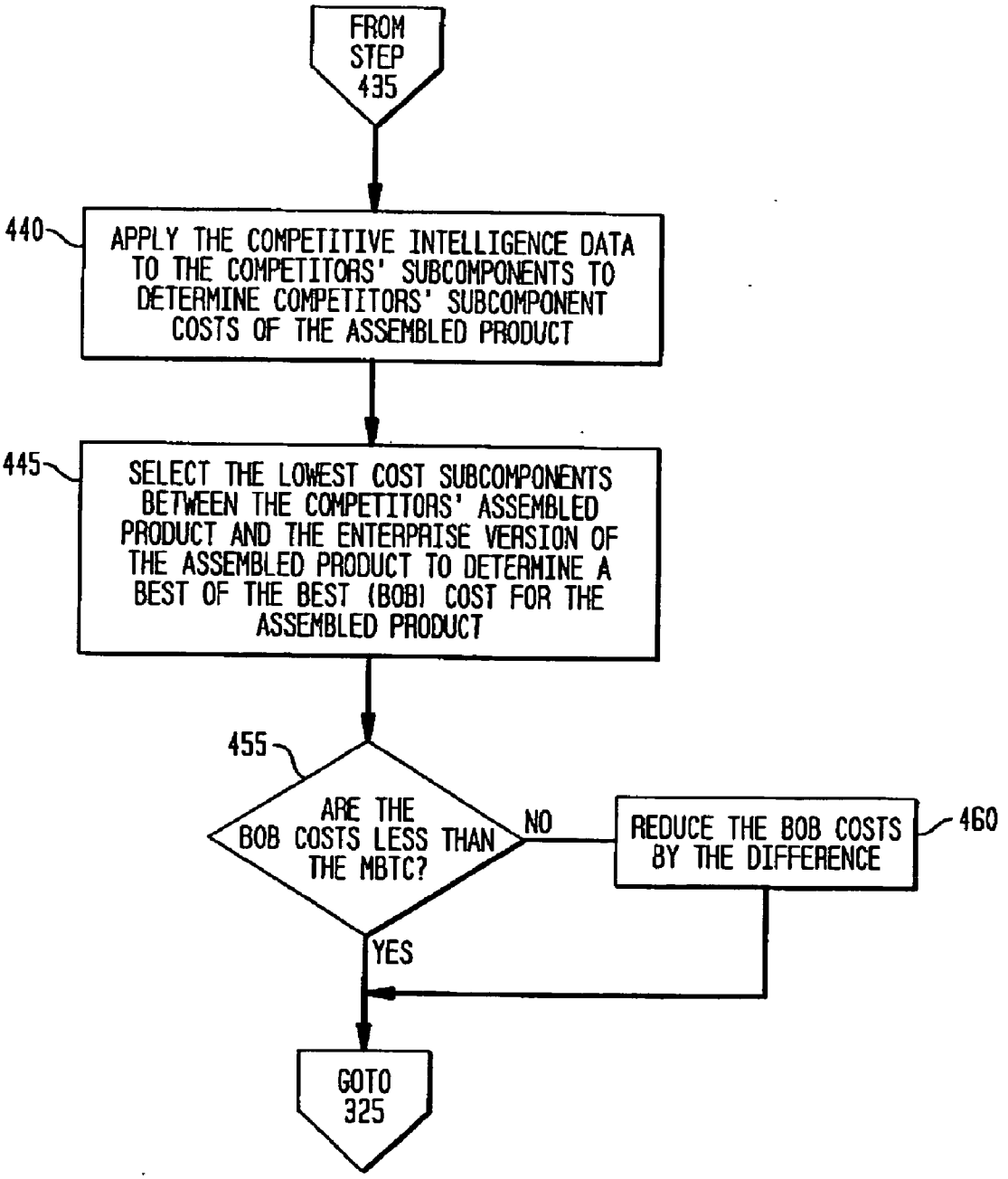

FROM STEP 435
440
APPLY THE COMPETITIVE INTELLIGENCE DATA TO THE COMPETITORS' SUBCOMPONENTS TO DETERMINE COMPETITORS' SUBCOMPONENT COSTS OF THE ASSEMBLED PRODUCT
445
SELECT THE LOWEST COST SUBCOMPONENTS BETWEEN THE COMPETITORS' ASSEMBLED PRODUCT AND THE ENTERPRISE VERSION OF THE ASSEMBLED PRODUCT TO DETERMINE A BEST OF THE BEST (BOB) COST FOR THE ASSEMBLED PRODUCT
455
ARE THE BOB COSTS LESS THAN THE MBTC?
NO
REDUCE THE BOB COSTS BY THE DIFFERENCE
460
YES
GOTO 325

FIG. 5

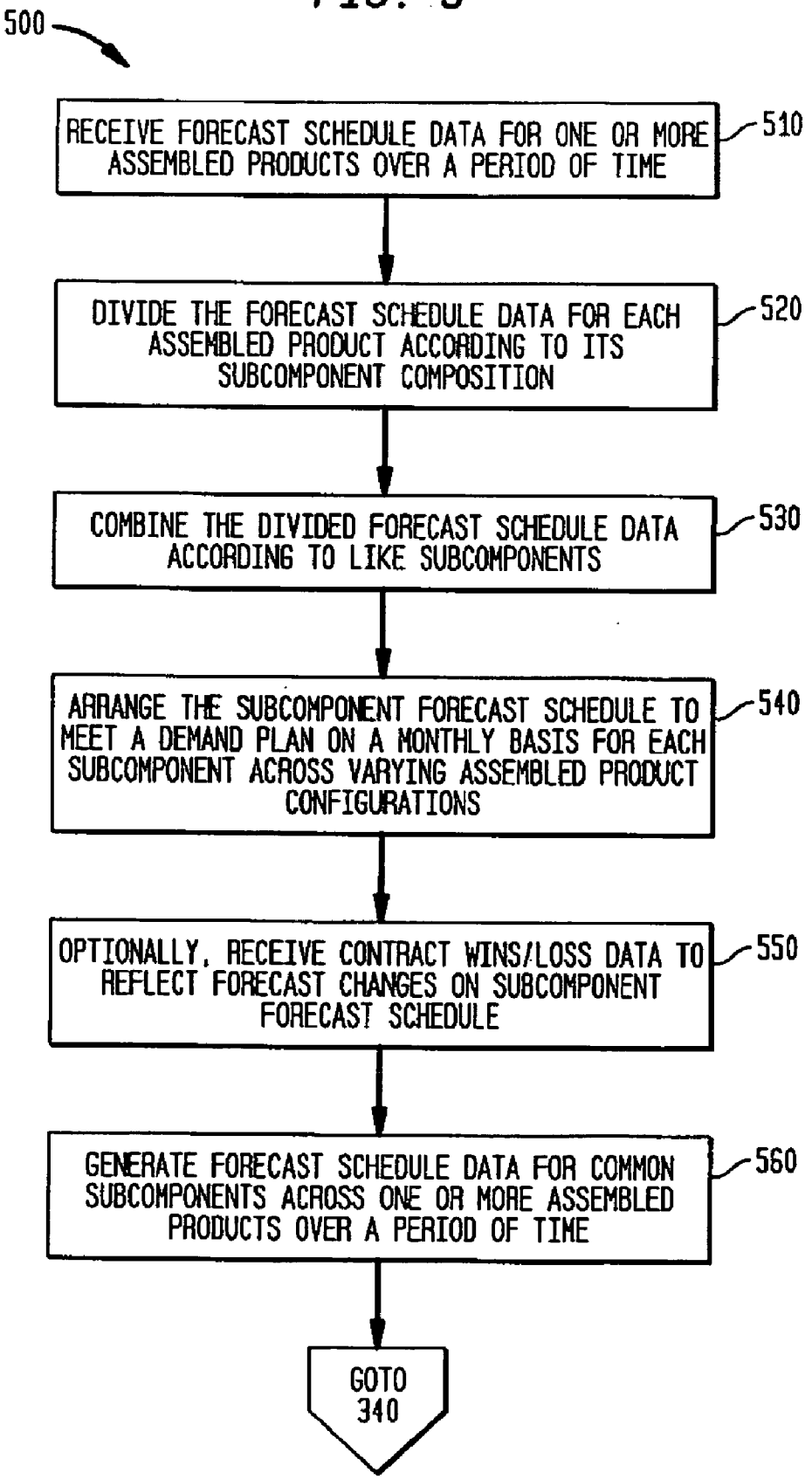

500
RECEIVE FORECAST SCHEDULE DATA FOR ONE OR MORE ASSEMBLED PRODUCTS OVER A PERIOD OF TIME
510
DIVIDE THE FORECAST SCHEDULE DATA FOR EACH ASSEMBLED PRODUCT ACCORDING TO ITS SUBCOMPONENT COMPOSITION
520
COMBINE THE DIVIDED FORECAST SCHEDULE DATA ACCORDING TO LIKE SUBCOMPONENTS
530
ARRANGE THE SUBCOMPONENT FORECAST SCHEDULE TO MEET A DEMAND PLAN ON A MONTHLY BASIS FOR EACH SUBCOMPONENT ACROSS VARYING ASSEMBLED PRODUCT CONFIGURATIONS
540
OPTIONALLY, RECEIVE CONTRACT WINS/LOSS DATA TO REFLECT FORECAST CHANGES ON SUBCOMPONENT FORECAST SCHEDULE
550
GENERATE FORECAST SCHEDULE DATA FOR COMMON SUBCOMPONENTS ACROSS ONE OR MORE ASSEMBLED PRODUCTS OVER A PERIOD OF TIME
560
GOTO 340

FIG. 6

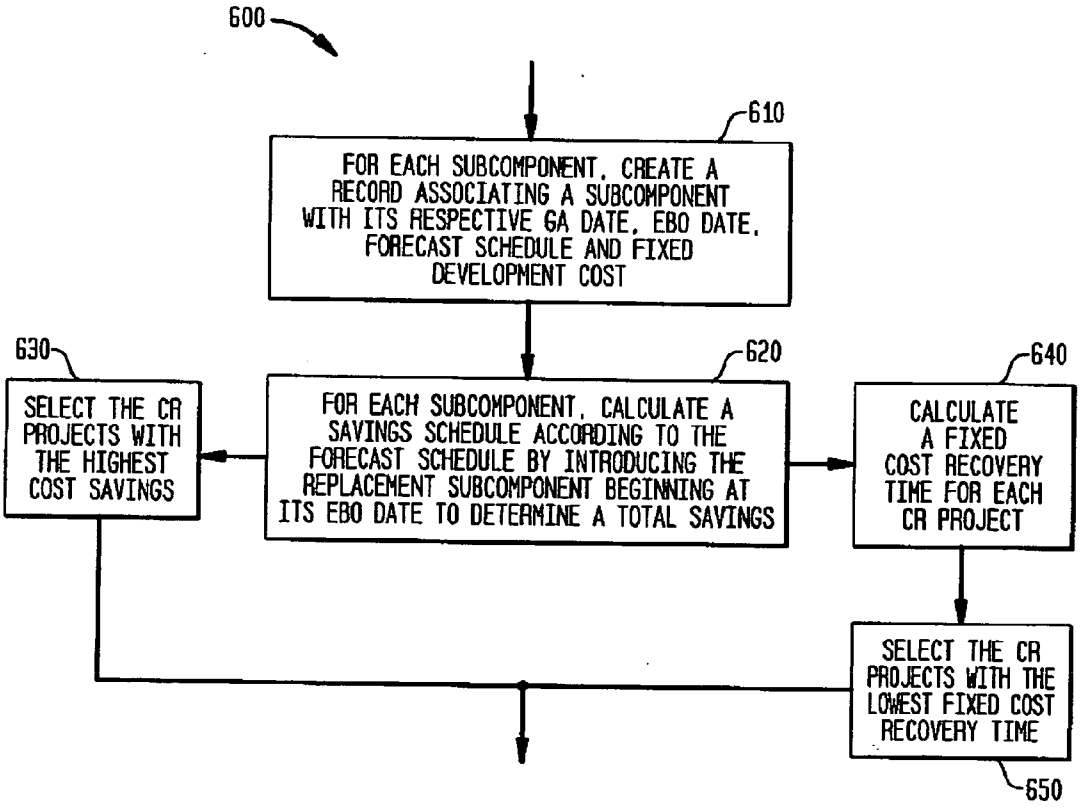

600
610
FOR EACH SUBCOMPONENT, CREATE A RECORD ASSOCIATING A SUBCOMPONENT WITH ITS RESPECTIVE GA DATE, EBO DATE, FORECAST SCHEDULE AND FIXED DEVELOPMENT COST
620
FOR EACH SUBCOMPONENT, CALCULATE A SAVINGS SCHEDULE ACCORDING TO THE FORECAST SCHEDULE BY INTRODUCING THE REPLACEMENT SUBCOMPONENT BEGINNING AT ITS EBO DATE TO DETERMINE A TOTAL SAVINGS
630
SELECT THE CR PROJECTS WITH THE HIGHEST COST SAVINGS
640
CALCULATE A FIXED COST RECOVERY TIME FOR EACH CR PROJECT
650
SELECT THE CR PROJECTS WITH THE LOWEST FIXED COST RECOVERY TIME

FIG. 7

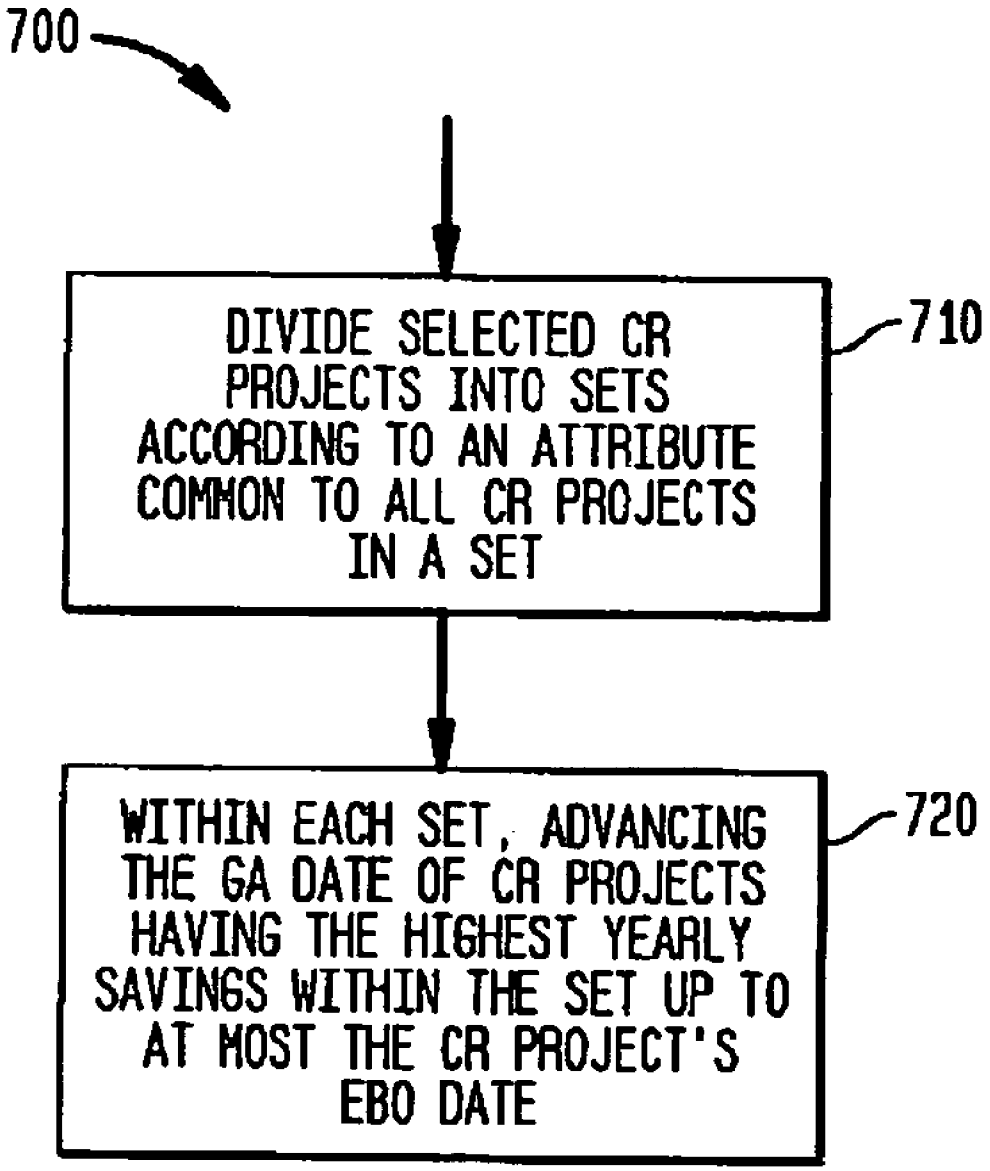
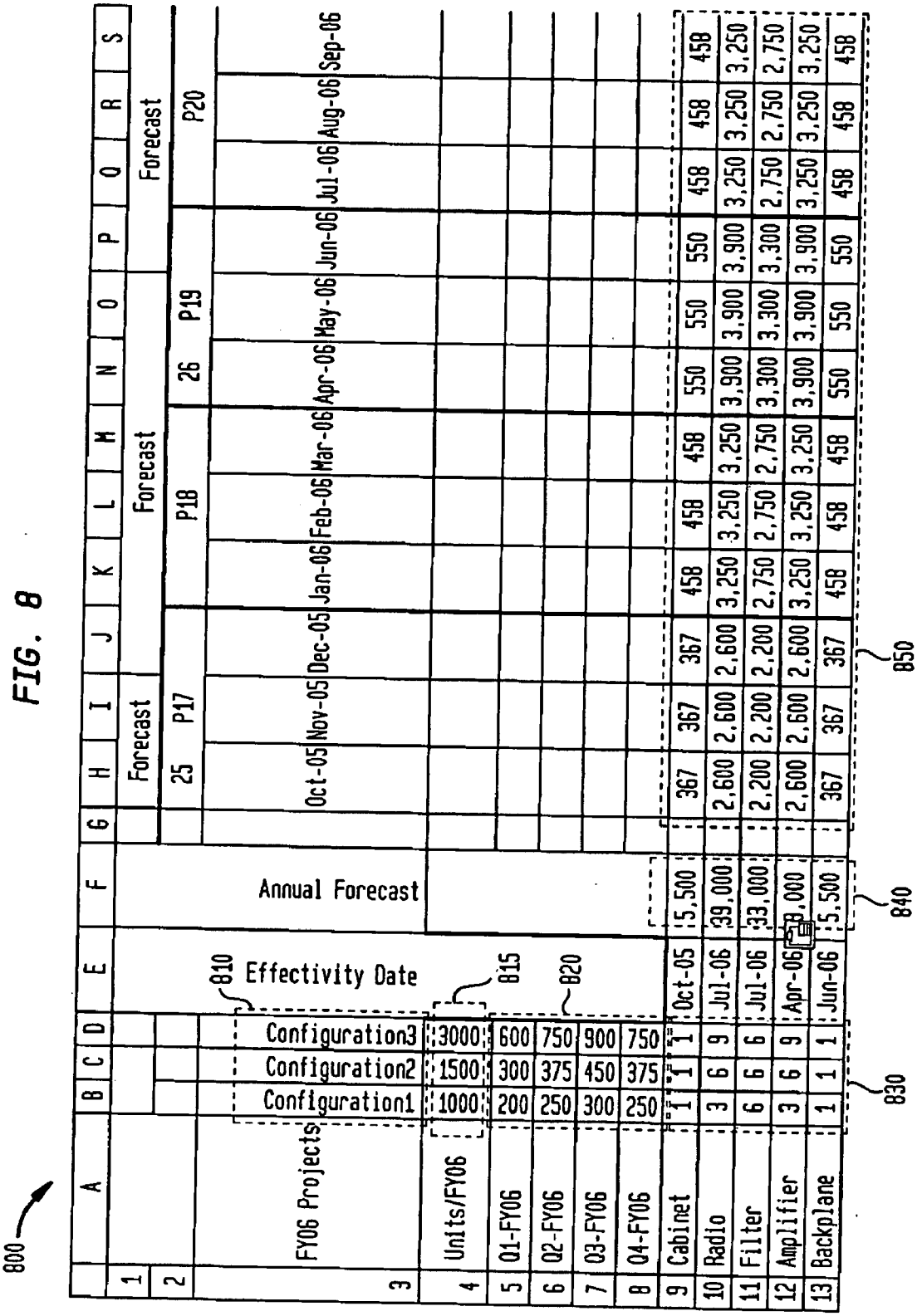

700
DIVIDE SELECTED CR PROJECTS INTO SETS ACCORDING TO AN ATTRIBUTE COMMON TO ALL CR PROJECTS IN A SET
710
WITHIN EACH SET, ADVANCING THE GA DATE OF CR PROJECTS HAVING THE HIGHEST YEARLY SAVINGS WITHIN THE SET UP TO AT MOST THE CR PROJECT'S EBO DATE
720

FIG. 8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P17
P18
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P19
P20
Oct-05
Nov-05
Dec-05
Jan-06
Feb-06
Mar-06
Apr-06
May-06
Jun-06
Jul-06
Aug-06
Sep-06
Annual Forecast
FY06 Projects
Units/FY06
Q1-FY06
Q2-FY06
Q3-FY06
Q4-FY06
Configuration3
Configuration2
Configuration1
3000
1500
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750
375
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900
450
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375
250
810
Effectivity Date
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820
Oct-05
Jul-06
Jul-06
Apr-06
Jun-06
Cabinet
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Amplifier
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SYSTEMS AND METHODS FOR FORECASTING DEMAND FOR A SUBCOMPONENT

FIELD OF THE INVENTION

[0001] The present invention relates generally to improvements in the field of project management, and, in particular, to systems and methods for forecasting demand at a subcomponent level across at least one configuration of an assembled product.

BACKGROUND OF THE INVENTION

[0002] Typically, the price at which an assembled product can be sold drops rather quickly over the life time of the product. An assembled product such as a telecommunication base station may comprise many subcomponents. Furthermore, the telecommunication base station may be sold in various configurations to meet customer scaling requirements. Each configuration may include a different quantitative mix of subcomponents. To be competitive in today's global economy and maintain a consistent profit, a business enterprise, which builds and sells the assembled product, needs to manage the costs of these subcomponents.

[0003] Many times these subcomponents can be replaced by cheaper subcomponent's due to technology advances, manufacturing efficiency, and the like. Integrating new subcomponents into an assembled product can prove costly depending on the new subcomponents complexity. For example, a new subcomponent may require additional software for it to operate in the assembled product, a new wiring plan to electrically connect the new subcomponent to the assembly, a new packaging plan for the assembled product, and the like.

[0004] Since operating budgets of the business enterprise are limited, how does the business enterprise decide which subcomponents should be replaced? Out of the subcomponents chosen to be replace, what goals should be used to determine a reasonable price reduction target? Without any goals, how can allocating development resources between projects defined by each new subcomponent be justified? When would be the best time to introduce an assembled product with one or more new subcomponents to minimize stranded inventory and maximize savings? How does a business enterprise measure the effectiveness of introducing the assembled product with one or more new subcomponents? Conventionally, management teams of the business enterprise introduce an assembled product on an adhoc basis without being able to answer these and other related questions, resulting in wasting time on replacing subcomponents which do not affect the bottom line, increased development costs, and shrinking profits, if any at all, remain after introducing the new subcomponents.

SUMMARY OF THE INVENTION

[0005] Among its several aspects, the present invention recognizes and addresses the need for computer implemented methods and computer readable medium for translating forecast sales data of at least one configuration of assembled product into a forecast schedule of subcomponents composing the assembled product. To this end, forecast sales data of at least one configuration of assembled product is received. Usage factors of a plurality of subcomponents composing the assembled product are also received. Each usage factor corresponds to the at least one configuration of assembled product. The forecast schedule of subcomponents composing the assembled product is then composed by applying the usage factors of the plurality of subcomponents to the forecast sales data of at least one configuration of assembled product wherein the forecast schedule includes demand for the subcomponents over time.

[0006] A more complete understanding of the present invention, as well as further features and advantages of the invention, will be apparent from the detailed description, the accompanying drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** shows an illustrative system employing a cost reduction project management system in accordance with the present invention.

[0008] FIG. **2** shows exemplary software components of and interfacing to the cost reduction project management software **130** of FIG. **1** in accordance with the present invention.

[0009] FIGS. **3**A and **3**B (collectively FIG. **3**) show a flow chart of an overall method for managing cost reduction projects in accordance with the present invention.

[0010] FIGS. **4**A and **4**B (collectively FIG. **4**) show a flow chart of a method for determining a best of the best assembled product according to subcomponent costs and market based target costs in accordance with the present invention.

[0011] FIG. **5** shows a flow chart of a method for determining forecast schedule data for subcomponents common across one or more assembled products in accordance with the present invention.

[0012] FIG. **6** shows a flow chart of a method for determining the set of cost reduction projects to pursue in accordance with the present invention.

[0013] FIG. **7** shows a flow chart of a method for extracting additional overall cost savings by advancing the general availability (GA) date of high savings cost reduction projects in accordance with the present invention.

[0014] FIG. **8** shows an exemplary spreadsheet utilized as implementing the forecasting and coincident component **230** in accordance with the present invention.

DETAILED DESCRIPTION

[0015] The present invention will now be described more fully with reference to the accompanying drawings, in which several presently preferred embodiments of the invention are shown. This invention may, however, be embodied in various forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art.

[0016] As will be appreciated by one of skill in the art, the present invention may be embodied as methods, systems, or computer readable media. Furthermore, the present invention may take the form of a computer program on a computer-usable storage medium having computer-usable program code embodied in the medium. Any suitable computer

readable medium may be utilized including hard disks, CD-ROMs, optical storage devices, flash memories, magnetic storage devices, or the like.

[0017] Computer program code or "code" for carrying out operations according to the present invention may be written in an object oriented programming language such as JAVA®, JavaScript®, Visual Basic®, C, C++ or in various other programming languages or may be written in the form of a spreadsheet such as one which is run in a Microsoft Excel® or Lotus 123 environment. Software embodiments of the present invention do not depend on implementation with a particular programming language or spreadsheet. Portions of the code may execute entirely on one or more systems utilized by a server in the network or a mobile device.

[0018] FIG. **1** shows a diagram of a system **100** employing a cost reduction project management system in an environment accordance with the present invention. The illustrated system **100** is implemented as a stand-alone personal computer or workstation **112**. As described in further detail below, system **100** includes cost reduction project management software **130** in accordance with the present invention which is stored in memory and run by the central processing unit of the personal computer **112**. The presently preferred cost reduction project management software **130** is embodied in an Excel spreadsheet. However, the present invention contemplates that the data stored in the Excel spreadsheet may alternatively be stored in a database. In that environment, the cost reduction project management software **130** may be embodied as a program which stores, retrieves, and modifies the data in the database. Cost reduction project management software **130** achieves one or more of the steps defined in FIG. **3**.

[0019] The computer **112** includes a number of standard input and output devices, including a keyboard **114**, mouse **116**, CD-ROM drive **118**, disk drive **120**, and monitor **122**. Optionally, the computer **112** includes an Internet or network connection **126** to automatically retrieve over network **150** input data utilized by cost reduction project management software **130** such as inventory data of sub-components from remote suppliers utilizing known systems such as electronic manufacturer services (EMS), supply chain portal, Webplan®, DataMart® implemented on computing systems $\mathbf{140}_1 \ldots \mathbf{140}_n$, respectively, general availability dates for subcomponents from design and development system **180**, forecast data for assembled product from customer systems $\mathbf{170}_1 \ldots \mathbf{170}_n$ or a sales system **160** containing a database **162** which tracks won and lost contracts. Alternatively or in combination with automatically retrieving input data over network **150**, input data may be manually inputted into cost reduction project management software **130**.

[0020] It will be appreciated, in light of the present description of the invention, that the present invention may be practiced in any of a number of different computing environments without departing from the scope of the invention. For example, the system **100** may be implemented with portions of the cost reduction project management software **130** executing on one or more workstations connected to each other over network **150** or a portion of the cost reduction project management software **130** may execute on a server while a complementary portion of the cost reduction project management software **130** may execute on a workstation networked to the server. Also, other input and output devices such as laptops, handheld devices, or cell phones, for example, may be used, as desired.

[0021] One embodiment of the invention has been designed for use on a stand-alone personal computer, laptop, or workstation on an Intel Pentium or later processor, using as an operating system Windows XP, Windows NT, Linux, or the like.

[0022] FIG. **2** shows the software components of and interfacing to the cost reduction project management software **130** of FIG. **1** for managing cost reduction projects in accordance with the present invention. Cost reduction project management software **130** includes a market based target cost(MBTC)/best of the best (BOB) component **210**, a prioritizing and tracking component **220**, an economic buildout component **250**, a forecast and coincident component **230**, and an optional business case component **260**. Cost reduction project management software **130** interfaces with a known actual profit margin tracking component **240**. The actual profit margin tracking component **240** receives projected cost savings from the prioritizing and tracking of cost reduction project component **220** and revenue data for sold product.

[0023] The economic buildout component **250** utilizes cost data of old and new unique subcomponents and weekly and total forecast or demand for an assembled product to determine at what point in time the old assembled product should cease assembly and the new assembled product should begin assembly. An exemplary embodiment of an economic buildout component **250** is discussed further in commonly owned patent application entitled "System and Methods For Reducing Stranded Inventory" U.S. patent application Ser. No. _____, filed concurrently with this application which is hereby incorporated by reference herein in its entirety.

[0024] The forecast and coincident component **230** receives sales forecast data for at least one configuration of an assembled product, decomposes the at least one configuration into subcomponents, and determines a forecast schedule over time for the subcomponents composing the one or more configurations. An exemplary embodiment of the forecast and coincident component **230** is discussed further in connection with the discussion of FIG. **8**.

[0025] The optional business case component **260** compares costs of subcomponents of two or more technologies which address configurations of an assembled product over a period of time. The optional business case component **260** may receive sales forecast data from the forecast and coincident component **230** or from manual input for subcomponents over time and across a variety of configurations of the assembled product. The optional business case component **260** also receives usage data of subcomponents of a technology to address configurations of the assembled product. The optional business case component **260** determines relative cost savings over time between the one or more technologies according to a forecast plan of the assembled product. The optional business case component **260** may automatically select the most cost effective technology for a given forecast plan. The selected technology and corresponding usage data associated with the subcomponents defining the technology may be transferred to the market based target cost (MBTC)/best of the best (BOB) component

210. An exemplary embodiment of the optional business case component **260** is discussed further in commonly owned patent application entitled "System and Methods of Determining a Business Case for Selecting a Least Cost Technology" U.S. patent application Ser. No. _____, filed concurrently with this application which is hereby incorporated by reference herein in its entirety.

[0026] The market based target cost(MBTC)/best of the best (BOB) component **210** receives competitive data on competitor's equivalent product costs, price erosion trends and determines two items. First, a best of the best assembled product is determined by aggregating the least cost subcomponent taken from one or more competitor products or the business enterprise's assembled product. Second, a market based target cost or goal which takes into account a constant profit margin to be achieved at a later point in time. The later point in time is the estimated amount of time it would take to develop and integrate the BOB product. Comparing the subcomponent costs of the BOB product with the business enterprise's assembled product identifies cost gaps of like subcomponents between the two. Additionally, if the BOB product is greater than the market based target cost, the subcomponent costs of the BOB product are reduced accordingly. An example of how to determine the BOB cost and market based target cost(MBTC) is discussed further in commonly owned patent application entitled "System and Methods of Managing Cost Reduction Projects to Increase Cost Savings of Replacement Subcomponents" U.S. patent application Ser. No. _____, filed concurrently with this application which is hereby incorporated by reference herein in its entirety.

[0027] The prioritizing and tracking component **220** receives the fixed cost for developing each new subcomponent, the cutover date from the economic buildout component **250**, a general availability date from the design/development team assigned to develop and integrate the new subcomponent into the assembled product and the forecast schedule on a subcomponent basis from the forecast and coincident component **230**. The general availability date represents the date at which the new subcomponent will be assembled in the new product for delivery to customers. The prioritizing and tracking component **220** based on cost savings, development cost, and the forecast schedule over which subcomponents will save the most money for the business enterprise over time allows the business enterprise to select which new subcomponents should be pursued. The prioritizing and tracking component **220** also allows subcomponent cost reduction projects to be grouped according to resources assigned or project owners who have authority to assign resource across the group of allows subcomponent cost reduction projects. The prioritizing and tracking component **220** further provides means to advance a GA date for one subcomponent and delay a GA date for another subcomponent in order to save additional total costs. An exemplary embodiment of the prioritizing and tracking component **220** is discussed further in commonly owned patent application entitled "System and Methods for Prioritizing and Tracking Cost Reduction Subcomponent Projects" U.S. patent application Ser. No. _____, filed concurrently with this application which is hereby incorporated by reference herein in its entirety.

[0028] The actual profit margin tracking component **240** receives as input a cost roadmap specifying the cost of subcomponents as a function of time and the actual sales of assembled product containing the subcomponents. The actual profit margin tracking component **240** calculates the total cost of an assembled product containing replaced subcomponents and the total cost of the assembled product containing new subcomponents to calculate a percent reduction in cost. This percent reduction in cost is compared to the BOB product to determine whether the targets/goals established by the MBTC/BOB component **210** are accomplished.

[0029] FIG. **3** shows a flow chart of an overall method **300** for managing cost reduction projects in accordance with the present invention. The components of FIG. **2** when executed by system **100** perform one or more of the steps described in the overall method to manage the cost reduction projects. At step **310**, a best of the best (BOB) assembled product according to subcomponent costs and market based target costs of the subcomponents of a business enterprise version of the assembled product is determined by, for example, the MBTC/BOB component **210**. Further details for determining the BOB assembled product will be discussed in connection with FIG. **4**. The market based target costs are determined at a point in the future. The point in the future is a date which initially estimates an amount of time to design, develop and deliver a new assembled product with one or more new subcomponents.

[0030] At step **325**, a cost reduction goal for each subcomponent is identified by selecting the costs of the subcomponents found in the best of the best assembled product. The cost reduction goal and subcomponent combination defines a cost reduction (CR) project for replacing the subcomponent in a newly assembled product. In some cases, the subcomponent will be replaced with a less expensive version. In other cases, a subcomponent's function may be integrated into a new subcomponent which replaces more than one old subcomponent. At step **335**, forecast schedule data for subcomponents common across one or more assembled products over a period of time are received by, for example, the forecast and coincident component **230**. Further details for determining forecast schedule data for subcomponents will be discussed in connection with FIG. **5**.

[0031] At step **340**, an economic build out (EBO) analysis date is received. The EBO date indicates the cutover date at which the new product should be assembled in order to either minimize cost and/or stranded inventory. Further details for determining that cutover date are discussed in commonly owned patent application entitled "System and Methods For Reducing Stranded Inventory" U.S. patent application Ser. No. _____.

[0032] At step **350**, the general availability (GA) date for subcomponents identified as having cost gaps in step **325** is received by, for example, the prioritizing and tracking component **220**. These GA dates may be supplied by a development team assigned to developing the new replacement subcomponent. At step **355**, fixed costs for developing each replacement subcomponent are received by, for example, the prioritizing an tracking component **220**. The fixed costs may be supplied by project managers assigned to tracking the development projects for each replacement subcomponent.

[0033] Due to a business enterprises budgetary and/or resource constraints, it may be too costly to pursue each cost

reduction project. At step **360**, the set of cost reduction projects to pursue, out of those identified as having cost gaps with the BOB, is determined based on the cost savings produced by each cost reduction project. Further details for determining which cost reduction projects to pursue will be discussed in connection with FIG. **6**.

[**0034**] At step **365**, additional overall cost savings are obtained by advancing GA dates on subcomponents having high cost savings. Cost savings are advanced when the GA date for a corresponding cost reduction project is made sooner in time. Cost savings are delayed when the GA date for a corresponding cost reduction project is made later in time. Since the GA date is provided by the development team, advancing a GA date would correspond to allocating additional resources to the corresponding cost reduction project and delaying a GA date would typically correspond to removing resources from the corresponding cost reduction project. In order to balance overall resource allocation, when a GA date is advanced on a cost reduction project, a GA date of another cost reduction project is typically delayed. At step **370**, the GA dates for all the cost reduction projects are compared against the market based target cost date. Recalling that the MBTC date is an initial estimate, it is compared against the GA dates of the cost reduction projects to see if method **300** should be iterated again. If the GA dates are after the MBTC date, then a new MBTC date should be determined. In that case, method **300** proceeds to step **310**. Otherwise, method **300** ends. Further details for extracting additional cost savings determining which cost reduction projects to pursue will be discussed in connection with FIG. **7**.

[**0035**] FIG. **4** shows a flow chart of a method **400** for determining a best of the best assembled product according to subcomponent costs and market based target costs in accordance with the present invention. In particular, method **400** further defines step **310** and one or more of the steps of method **400** may be performed by the MBTC/BOB component **210**. At step **410**, price erosion data over time for an assembled product is received by, for example, the MBTC/BOB component **210**. The price erosion data is forward looking in time and reflects a decrease in price due to factors such a shrinking market demand, manufacturing efficiencies, or the like. At step **420**, cost erosion data is determined from the price erosion data to sustain profitability. For example, a business enterprise may require a 50% profit margin on an assembled product. In that case, the cost erosion data is found by multiplying the price erosion data by 0.50 at each point in time.

[**0036**] At step **425**, the cost erosion data at a particular point in time in the future is a market based target cost (MBTC) which acts as a threshold cost of the assembled product at that particular point in time. The particular point in time is typically set far enough in the future to accomplish the cost reduction projects for a new assembled product. At this point in the overall method **300**, the particular point in time is an estimated date rather than a firm date.

[**0037**] At step **430**, one or more competitors' versions of the assembled product are reverse engineered to determine their subcomponents. At step **435**, competitive intelligence cost data for the competitors' subcomponents are received. At step **440**, the competitive intelligence cost data is applied to the competitors' subcomponents to determine the costs of the competitors' subcomponents of the assembled product. The lowest cost subcomponents between the competitors' assembled product and the enterprise version of the assembled product are selected to determine a best of the best (BOB) cost for the individual costs for the subcomponents in the assembled product. At step **450**, the method compares the total BOB cost with the MBTC determined in step **425**. If the total BOB cost is less than or equal to the MBTC, the BOB cost is more than enough to ensure profitability. Method **400** proceeds to step **325** in overall process **300**. If the total BOB cost is greater than the MBTC, the BOB cost for the individual costs for the subcomponents in the assembled product, although reduced from the currently assembled product, will not ensure the business enterprise's profitability. In this case, method **400** proceeds to step **455**. At step **455**, the BOB cost for the individual costs for the subcomponents in the assembled product is reduced by the difference between the MBTC and the total BOB cost determined in step **445**. Various techniques may be utilized to reduce the total BOB cost. One technique includes reducing the cost of each subcomponent composing the BOB product by a pro rata amount. Another technique includes reducing the costs of the highest cost subcomponents, subcomponents whose costs are over a predetermined threshold, by a pro rata amount. Method **400** then proceeds to step **325** utilizing the reduced BOB cost. An example on how to determine the BOB cost and market based target cost (MBTC) will be described in connection with the discussion of FIGS. **8-10**.

[**0038**] FIG. **5** shows a flow chart of a method **500** for determining forecast schedule data for subcomponents common across one or more assembled products in accordance with the present invention. In particular, method **500** further defines step **335** and one or more of the steps of method **500** may be performed by the prioritizing and tracking component **220**. At step **510**, forecast schedule data for one or more assembled products over a period of time is received. The one or more assembled products are composed of subcomponents common between the one or more assembled products. In other words, the one or more assembled products may include varying configurations of an assembled product. The forecast data includes the number of assembled products expected to be sold on a monthly basis for a period of time such as over the next 18 months. At step **520**, the forecast schedule data for each assembled product is divided according to its subcomponent composition. At step **530**, the divided forecast schedule data is combined according to like subcomponents to define a subcomponent forecast schedule. At step **540**, the subcomponent forecast schedule is arranged to meet a demand plan on a monthly basis for each subcomponent across varying assembled product configurations. For example, the subcomponent forecast schedule will indicate the number of each subcomponent expected to be utilized on a monthly basis to satisfy customer orders.

[**0039**] At step **550**, contract data including won and lost contracts for the sale of assembled products may optionally be received. If this step is invoked, the subcomponent forecast schedule is updated to reflect additional contracts won and lost. Step **550** allows the subcomponent forecast schedule to dynamically track forecast data at a subcomponent level of granularity. At step **560**, forecast schedule data for common subcomponents across one or more assembled products over a period of time is generated. The method **500** returns to step **340** of the overall method **300**. An exemplary

embodiment of the forecast and coincident component **230** is discussed further in commonly owned patent application entitled "System and Methods for Producing a Forecast Schedule of Subcomponents" U.S. patent application Ser. No. _____.

[**0040**] FIG. **6** shows a flow chart of a method **600** for determining the set of cost reduction projects to pursue in accordance with the present invention. In particular, method **600** further defines step **360** and one or more of the steps of method **600** may be performed by the prioritizing and tracking component **220**. At step **610**, a record is created for each subcomponent associating a subcomponent with its respective GA data, EBO date, subcomponent forecast schedule, and fixed development cost. At step **620**, a savings schedule for each subcomponent is created on a monthly basis according to the subcomponent forecast schedule found in FIG. **5**. The savings schedule will begin accumulating savings on the date the replacement subcomponent goes into live production, the subcomponent's EBO date.

[**0041**] Two alternative techniques are utilized to select the set of cost reduction projects according to a business enterprise's budgetary constraints. The first technique is defined by step **630**. At step **630**, the cost reduction projects with the highest total cost savings are selected. The number of cost reduction projects is determined by applying the budgetary constraints to the fixed costs of the highest total cost savings projects until the budgetary constraints are exhausted. The budgetary constraints are consumed by subtracting out the fixed development costs from the highest total cost savings projects until the budgetary constraints are exhausted.

[**0042**] The second technique for selecting the set of cost reduction projects is defined by steps **640** and **650**. At step **640**, for each subcomponent identified to have a cost gap with the BOB cost, a fixed cost recovery time is calculated. The fixed cost recovery time indicates how long it takes to recover the fixed costs for developing a new subcomponent by savings caused by use of the new subcomponent in the assembled product. The fixed cost recovery time is determined by adding up the monthly cost savings found in step **620** until the sum of the monthly cost savings first equal or exceed the fixed costs for the corresponding new subcomponent. At step **650**, the cost reduction projects with the lowest fixed cost recovery times are selected to be pursued. It should be recognized that different multiples of the fixed cost recovery time, such as two times, four times, ten times the fixed costs, and the like, may be utilized by the present invention in order to prioritize the order in which to pursue cost reduction projects.

[**0043**] FIG. **7** shows a flow chart of a method **700** for extracting additional overall cost savings by advancing the GA date of high savings cost reduction projects in accordance with the present invention. In particular, method **700** further defines step **365** and one or more of the steps of method **700** may be performed by the prioritizing and tracking component **220**. At step **710**, the selected cost reduction (CR) projects found in step **360** are divided into sets where there is a common attribute shared by each of the cost reduction projects. For example, the cost reduction projects may be divided based on design/development personnel resources assigned to the respective cost reduction projects, locations of development resources, suppliers of the corresponding subcomponent, and the like. Preferably, all the cost reduction projects within a set share the same resources for developing their respective new subcomponent. At step **720**, within each set, the GA dates of the cost reduction projects having the higher yearly cost savings are advanced earlier in time with advancement limited to their respective EBO date. In order to effectuate an advancement of a GA date, additional resources have to typically be assigned to the respective cost reduction project. As a result, advancing the cost reduction projects having the highest yearly cost savings may cause one or more cost reduction projects in the same set to have their GA dates delayed. Conversely, delaying a cost reduction project having a lower yearly cost savings, one or more cost reduction projects in the same set having high yearly cost savings may be advanced depending on the relative fixed cost of the delayed cost reduction project.

[**0044**] Each set of CR projects may be assigned to a project owner where the project owner is responsible for analyzing the cost savings of the set of CR projects, advancing the GA dates of higher cost saving CR projects, and, potentially, delaying the GA dates of lower cost savings CR projects. Alternatively, the prioritizing and tracking component **220** may include a threshold automatically categorizing those projects whose cost savings exceed the threshold as higher cost saving CR projects and categorizing those projects whose cost savings do not exceed the threshold as lower cost saving CR. In this environment, the GA dates of the higher cost saving CR projects may be advanced automatically, and the GA dates of the lower cost savings CR projects may be delayed automatically.

[**0045**] An exemplary embodiment of how additional cost savings are achieved by advancing the GA date and there effects thereto are discussed further in commonly owned patent application entitled "System and Methods for Prioritizing and Tracking Cost Reduction Subcomponent Projects" U.S. patent application Ser. No. _____.

[**0046**] FIG. **8** shows an exemplary spreadsheet **800** utilized as implementing the forecasting and coincident component **230** in accordance with the present invention. Spreadsheet **800** includes input areas **810**, **815**, **820**, and **830**. Spreadsheet **800** also includes output areas **840** and **850**. Input area **810** reflects various configurations or product mixes presently available or to be designed for an assembled product. Columns B, C, and D in input area **810** contain labels indicating three different configurations of an assembled product. Referring to input area **830**, configuration **1** of the assembled product contains 1 cabinet, 3 radios, 6 filters, 3 amplifiers, and 1 backplane. Configuration **2**, on the other hand, contains 1 cabinet, 6 radios, 6 filters, 6 amplifiers, and 1 backplane. Each column in input area **830** is referred to as the usage factor for a particular configuration. Input area **815** contains the total year demand for the three configurations of the assembled product. The data input area **815** is determined by contracts for sales of assembled product. As the sales of any of the configurations go up, the total year demand for the corresponding configuration goes up accordingly. Consequently, when contracts are won or lost the data in input area **815** is modified manually or programmatically to reflect those sales conditions.

[**0047**] When modified programmatically, the prioritizing and tracking component **220** allows for continuous input of

supplier contracted pricing and direct purchase component costs. The prioritizing and tracking component **220** continuously multiplies the usage factors in input area **830** by updated forecast data for each assembled product configuration.

[**0048**] Input area **820** distributes the yearly demand from input area **815** across the four quarters in a year according to the delivery time on contracts. Output area **840** determines the total annual forecast for each individual subcomponent such as the cabinet, radio, filter, amplifier, and backplane on a subcomponent basis. Output area **850** distributes the total annual forecast for each individual subcomponent on a subcomponent basis across each quarter to meet the assembled product forecast in input area **820**. Furthermore, within each quarter, output area **850** distributes the quarterly forecast for each subcomponent on a subcomponent basis across each month in the respective quarter.

[**0049**] By utilizing spreadsheet **800**, new assembled product configurations may be easily added by inserting new columns, existing configurations may be easily modified by changing the entries in input area **830**, and old configurations may be easily removed by clearing the contents of a respective configuration or deleting the respective column for the configuration. By making any of the previous adjustments to the spreadsheet, the effect on the content in output areas **840** and **850** will automatically be updated to see the forecasted demand for a particular subcomponent in any month.

[**0050**] It should be recognized that the input areas **810**, **815**, **820**, and **830** may be records stored in memory or in a database on computer system **100**. In that environment, the contents of output areas **840** and **850** may be calculated and associated as additional fields to those records. In either embodiment, contents of output areas **840** and **850** are inputted to or retrieved by the prioritizing and tracking component **220**. It should also be recognized that the length in time forecasts on a subcomponent basis may be extended is dependent on how far out in the future data exists on forecasts for the assembled product.

[**0051**] While the present invention has been disclosed mainly in the generic context of sub-components and assembled products, it will be recognized that the present teachings are applicable to all manufactured products such as cell phones, internet protocol (IP) routers, wireless access points, or the like, which contain components manufactured or assembled by multiple suppliers.

1. A computer implemented method for translating forecast sales data of at least one configuration of an assembled product into a forecast schedule for replacing a subcomponents utilized in the assembled product, the method comprising:

receiving forecast sales data of at least one configuration of the assembled product;

receiving a usage factors of subcomponents utilized in the at least one configuration of the assembled product wherein the configuration of the assembled product comprises a configuration of subcomponents;

receiving a general availability date of a replacement subcomponent indicating the date that the replacement subcomponent is ready for assembly into the at least one configuration of the assembled product; and

composing a forecast schedule for replacing the subcomponents utilized in the at least one configuration of the assembled product by applying the usage factor of the subcomponents and the general availability date of the replacement subcomponent to the forecast sales data of the at least one configuration of the assembled product, wherein the forecast schedule includes demand for the subcomponents over time and assembled product cost savings in using the replacement subcomponent.

2. The computer implemented method of claim 1 wherein the step of receiving forecast sales data of at least one configuration of the assembled product is received continuously and wherein the forecast schedule over time is correspondingly updated.

3. The computer implemented method of claim 1 further comprising:

adding a new configuration of the assembled product; and

adding additional usage factors for a plurality of subcomponents composing the configurations of the assembled product, the additional usage factors corresponding to the new configuration of the assembled product, said forecast schedule over time automatically updated in response to the newly added configuration.

4. The computer implemented method of claim 3 further comprising:

deleting one of the at least one configuration of the assembled product, said forecast schedule over time automatically updated in response to the deleted configuration.

5. The computer implemented method of claim 1 wherein the received forecast sales data includes orders for the at least one configuration of the assembled product resulting from a won contract.

6. The computer implemented method of claim 1 wherein the received forecast sales data includes orders for the at least one configuration of the assembled product resulting from a lost contract.

7. The computer implemented method of claim 1 wherein the at least one configuration of the assembled product comprises two or more configurations of the assembled product.

8. A computer readable medium whose contents cause a computer to translate forecast sales data of at least one configuration of an assembled product into a forecast schedule for replacing a subcomponents utilized in the assembled product, by performing the steps of:

receiving forecast sales data of at least one configuration of the assembled product;

receiving a usage factor of a subcomponents utilized in the at least one configuration of the assembled product wherein the configuration of the assembled product comprises a configuration of subcomponents;

receiving a general availability date of a replacement subcomponent indicating the date that the replacement subcomponent is ready for assembly into the at least one configuration of the assembled product; and

composing a forecast schedule for replacing the subcomponents utilized in the at least one configuration of the

assembled product by applying the usage factors of the subcomponent and the general availability date of the replacement subcomponent to the forecast sales data of the at least one configuration of the assembled product, wherein the forecast schedule includes demand for the respective subcomponents over time and assembled product cost savings in using the replacement subcomponent.

9. The computer readable medium of claim 8 wherein the step of receiving forecast sales data of at least one configuration of the assembled product is received continuously and wherein the forecast schedule over time is correspondingly updated.

10. The computer readable medium of claim 8 further comprising:

adding a new configuration of the assembled product; and

adding additional usage factors for a plurality of subcomponents composing the configurations of the assembled product, the additional usage factors corresponding to the new configuration of the assembled product, said forecast schedule over time automatically updated in response to the newly added configuration.

11. The computer readable medium of claim 10 further comprising:

deleting one of the at least one configuration of the assembled product, said forecast schedule over time automatically updated in response to the deleted configuration.

12. The computer readable medium of claim 8 wherein the received forecast sales data includes orders for at least one configuration of the assembled product resulting from a won contract.

13. The computer readable medium of claim 8 wherein the received forecast sales data includes orders for at least one configuration of the assembled product resulting from a lost contract.

14. The computer readable medium of claim 8 wherein the at least one configuration of the assembled product comprises two or more configurations of the assembled product.

15. A system for translating forecast sales data of at least one configuration of an assembled product into a forecast schedule for replacing a subcomponents utilized in the assembled product, the system comprising:

means for receiving forecast sales data of at least one configuration of the assembled product;

means for a receiving usage factor of a subcomponents utilized in the at least one configuration of the assembled product wherein the configuration of the assembled product comprises a configuration of subcomponents;

receiving a general availability date of a replacement subcomponent indicating the date that the replacement subcomponent is ready for assembly into the at least one configuration of the assembled product; and

means for composing a forecast schedule for replacing the subcomponent utilized in the at least one configuration of the assembled product by applying the usage factor of the subcomponents and the general availability date of the replacement subcomponent to the forecast sales data of the at least one configuration of the assembled product, wherein the forecast schedule includes demand for the subcomponent over time and assembled product cost savings in using the replacement subcomponent.

16. The system of claim 15 wherein the means for receiving forecast sales data of at least one configuration of the assembled product operates to receive continuously causing the forecast schedule over time to be correspondingly updated.

17. The system of claim 15 further comprising:

means for adding a new configuration of the assembled product; and

means for adding additional usage factors for a plurality of subcomponents composing the configurations of the assembled product, the additional usage factors corresponding to the new configuration of the assembled product, said forecast schedule over time being automatically updated in response to the newly added configuration.

18. The system of claim 17 further comprising:

means for deleting one of the at least one configuration of the assembled product, said forecast schedule over time being automatically updated in response to the deleted configuration.

19. The system of claim 15 wherein the received forecast sales data includes orders for the at least one configuration of the assembled product resulting from a won contract.

20. The system of claim 15 wherein the received forecast sales data includes orders for the at least one configuration of the assembled product resulting from a lost contract.

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