Title: A COMPUTER IMPLEMENTED METHOD AND A COMPUTER SYSTEM FOR MANAGING AND VALUATING INVENTORY

Abstract: A computer inventory system (10) for managing and valuating inventory, comprising an inventory database (20) for storing one or more identifiers; detectors for tracking goods in a working process, every item of goods entering the working process being assigned to an identifier; at least one input/output device (18) for updating a given identifier when the goods assigned to this identifier enter another stage in the working process and for assigning at least one price according to the value added to the goods in working process to each stage in the working process; and a processing unit (14) for retrieving data stored in the inventory database (20) and calculating a price for goods in the working process.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
A Computer Implemented Method and a Computer System
for Managing and Valuating Inventory

Field of the invention

[0001] The present invention relates to the technical field of managing and valuating inventory. Particularly, the present invention relates to a computer system and a computer implemented method for monitoring a physical inventory throughout a working or production process, allowing a manufacturer to valuate a stock of goods in the working process. The invention further relates to a computer program product with a computer-readable medium and a computer program stored on the computer-readable medium with program coding means which are suitable for carrying out such a method when the computer program is run on a computer.

Description of the Related Art

[0002] Traditionally, a manufacturer uses manpower to maintain and manage inventory control of both raw materials and finished products. There already exist computer systems and computer program solutions that assist in collecting and evaluating data as to raw material kept in stock and finished or end products (or work result) kept in stock. As can be appreciated easily, existing methods are limited to any material or goods or products kept in stock, resulting in the fact that only actual quantities of stock can be considered.

[0003] However, there is always a certain quantity of unfinished goods somewhere in the working (or
production) process line which are never considered when valuating the assets. Obviously, this is a drawback for economical and legal reasons as the valuation only reflects part of the whole picture as an asset or item which is taken into account in the raw material stock disappears from that stock only to reappear in the stock of finished goods, but only after a certain time. During that time, the given item is basically non-existent and does not contribute to the calculation of the overall value in the value creation chain.

Summary of the Invention

[0004] It is therefore an object of the invention to provide a system and method for managing and valuating inventory which allows for a complete registration and valuation of goods which are in the working (or production) process (N.B.: in the following called working process). This object is achieved by proposing a computer implemented method for managing and valuating inventory with the features of claim 1 and a computer inventory system with the features of claim 14.

[0005] Accordingly, every item of goods which is entering a working or production process is assigned to an identifier. The one or more identifier contains information which allows for a valuation. This information could be, for example, the characteristics and/or the stage of the working process in which the goods assigned to the given identifier are at that moment.

[0006] According to the invention, the goods which are in the working process are tracked. This can be achieved for example by appropriate detectors. The one or more identifiers are updated when the goods assigned to an according identifier enter another stage in the
working process. Updates can be effected on a regular basis or when appropriate. As a further characteristic of the invention, at least one price is assigned to each stage in the working process, e.g. according to the value added to the goods in the working process in the relevant stage.

[0007] Finally, the content of the one or more identifiers is determined and a price is calculated for goods in the working process.

[0008] Therefore, the invention allows for a sophisticated object cost control by valuating all goods and even rejects in a working process line notwithstanding their status as raw material, unfinished product or finished product. The invention thus allows for a physical inventory which leads to a valuation according to legal requirements in the context of balance sheet purposes.

[0009] It should be emphasized that, in the context of this invention, a "product" or "item of goods" comprises goods of industrial manufacture as well as goods resulting from the provision of a service. Analogously, a "manufacturer" comprises an industrial producer as well as a service provider. It is thus easily understood that the principles of this invention apply to all kinds of working processes involving a value creation chain.

[0010] The invention also covers a computer program with program coding means which are suitable for carrying out a method according to the invention as described above when the computer program is run on a computer. The computer program itself as well as stored on a computer-readable medium is claimed.
[0011] Further features and embodiments of the invention will become apparent from the description and the accompanying drawings.

[0012] It will be understood that the features mentioned above and those described hereinafter can be used not only in the combination specified but also in other combinations or on their own, without departing from the scope of the present invention.

[0013] The invention is schematically illustrated in the drawings by means of an embodiment by way of example and is hereinafter explained in detail with reference to the drawings. It is understood that the description is in no way limiting on the scope of the present invention and is merely an illustration of a preferred embodiment of the invention.

**Brief description of the Drawings**

[0014] In the drawings,

Figure 1 is a schematic view of a computer inventory system according to the invention;

Figure 2a is a schematic depiction of an inventory method known from the prior art;

Figure 2b is a schematic depiction of an inventory method according to the invention; and

Figures 3 and 4 are more detailed schematic illustrations of an embodiment of the inventory method according to the invention.

**Detailed Description**
[0015] Figure 1 illustrates schematically a computer inventory system 10 according to the invention. The computer system 10 comprises a computer 12 with a bus 22 for communicating data, a processing unit 14 and an inventory database 20 for storing one or more identifiers. The computer system 10 further comprises at least one input/output device 18 which in the depiction of Figure 1 is a client with keyboard, mouse for cursor control and a monitor. However, there could also be provided additionally or alternatively automatic input/output devices such as bar code readers and the like. The at least one input/output device 18 is connected with the computer within an intranet network.

[0016] Still further, the computer system 10 comprises a plurality of detectors 24 for tracking goods in a working process, the detectors being linked to the computer 12 via an interface 16.

[0017] Referring now to Figure 2a, an embodiment of a traditional inventory in balance sheet is described. Figure 2 shows at 30 a schematic depiction of a raw material in stock. It is assumed that there are ten pieces of raw material 30 in stock. Each of the raw material pieces 30 is worth USD 3 (USD = U.S. Dollars) resulting in a value of USD 30 for raw material on stock. Further, Figure 2 shows at 38 a schematic depiction for a finished product on stock, whereas it is assumed that there are five pieces of finished product 38 on stock. The overall value for the finished products 38 on stock is USD 100 taken into account the price of USD 20 per piece. This results is an overall inventory value of USD 130.
[0018] As already pointed out above, this conventional inventory method ignores intermediate stages of goods being processed. According to the invention, and as illustrated in Figure 2b, there can be several stages of a production process, each containing a plurality of unfinished products. In the embodiment described herein, there are three stages referenced as WP1, WP2 and WP3 for the working process stage 1, 2 and 3. The unfinished products in each of the stages WP1, WP2 and WP3 are indicated with reference numerals 32, 34, and 36. As further illustrated in Figure 2b, there are six pieces of unfinished products 32 in stage WP1, eight pieces of unfinished products 34 in stage WP2 and twelve pieces of unfinished products 36 in stage WP3.

[0019] According to the invention, each stage is assigned a price for the unfinished product of that stage, i.e. a price is assigned to every unfinished product taking into consideration its stage and the value added through the production process until the given stage. In the embodiment described herein, the price assigned to the first stage WP1 is USD 10, the price assigned to the second stage WP2 is USD 12 and the price assigned to the third stage is USD 15. This results in an overall value for unfinished products in all three stages of USD 60 + USD 96 + USD 180 = USD 336, a value which was neglected hitherto with traditional inventory systems and methods.

[0020] According to the invention, an identifier is stored in database 20 and unfinished goods are assigned to an identifier. Each identifier contains information as to the characteristics and/or the production stage of each assigned item of goods as well as the quantity. Every time a product or item of goods enters another stage being detected via detectors 24, the identifier is updated accordingly and the update is stored in database
20. The tracking of the products is performed by means of detectors 24 and results in a number of products contained in a given stage of the production or working process. However, it is to be understood that it is also possible to input the number of products in a given stage manually. According to a further embodiment, the invention also provides for a manual or automatic correction of the values generated by stage detectors, the correction possibly being based on manual counting or on data provided by a logistics system.

[0021] The calculation of the inventory value on the basis of the identifiers can be effected continuously or periodically. Preferably, the frequency of periodic calculations can be set through input/output device 18. The frequency can for example be oriented at the fiscal year, (interim) balance sheet closing or key dates etc. In the following, items in the working process will be called Work in Progress (WIP) items (or as a synonym Work in Process items). In the continuous procedure, WIP items are counted continuously during the entire fiscal year whereas in the periodic procedure all WIP items in the production process are physically counted on the balance sheet key date in which case every item has to be counted.

[0022] The lengths of the intervals can also be driven by the nature of the goods and/or the time of a production cycle. In such a cycle counting inventory, unfinished goods are counted at regular intervals within a fiscal year. These intervals or cycles depend on the cycle counting indicator set through 18 for the item materials which allows fast-moving items to be counted more frequently than slow-moving items. This allows for an even more sophisticated valuation.
[0023] In a further possible approach under the invention called inventory sampling, selected WIP items are physically counted on the balance sheet key date. If the variances between the result of the count and the book inventory balance are small enough, it is presumed that the book inventory balances for the other WIP items are correct.

[0024] According to another embodiment of the invention, more than one price can be assigned to the quantity of products located in a given stage of process. This can be done automatically on the basis of differing calculation methods. Further or alternatively, the price or prices assigned to a stage in the working process can be changed manually. This allows any products in the working process or any rejects to be evaluated simultaneously according to different valuation rules (e.g. valuation according to US-GAAP, IAS, HGB (German Commercial Code) etc.). The result is a balance inventory which allows interpretation of the overall inventory in response to different needs. It also allows for manual correction in case of unforeseen or short-term changes.

[0025] Referring now to Figures 3 and 4, the invention is described in still more detail.

[0026] Figure 3 shows by ways of schematic illustration a production process, the start of the production being on the left hand side of Figure 3 and the end of the production resulting in a finished product being on the right hand side. In between, there is a multitude of various production steps P1 to P8. However, a production or manufacturing line is not only constituted by production steps which can be defined by various pieces of equipment along the line but also by other structures which are due to the organizational environment. This is illustrated in Figure 3 by work
centers W1 to W5, by profit centers PC1 and PC2 as well as cost centers C1 to C3. Thus, there are several levels of inventory relevant groupings as it is of interest to relate inventory not only to the complete company but also internally to stages that are located within a given center.

[0027] With the invention, it becomes thus possible, as shown in Figure 4, to relate inventory valuation to sections of the company which are defined by center structures as exemplified above.

[0028] In the illustration of Figure 3 and 4, it is assumed that the goods enter the production or working process on the left hand side of the illustration. There are ten pieces of raw material 30, then there are six pieces of WIP item 32, eight pieces of WIP item 34, twelve pieces of WIP item 36 and five pieces of finished products 38, the unfinished products 32, 34, and 36 being distributed along the line.

[0029] Figure 4 shows the location of the unfinished products in the respective organizational levels. WIP items 32 are located in production stage P2, in work center W1, in profit center PC1 and in cost center C1, WIP items 34 are located in production stage P5, in work center W3, in profit center PC1 and in cost center C2, and WIP items 36 are located in production stage P7, in work center W4, in profit center PC1 and in cost center C2. As can be seen, no items are located in production steps P1, P3, P4, P6 and P8, nor in work centers W2 and W5, nor in profit center PC2 and nor in cost center C3.

[0030] This results in an inventory valuation broken down per organizational level as follows: obviously, there is no inventory value contained in the structures with no WIP items, i.e. in production steps P1, P3, P4,
P6 and P8, nor in work centers W2 and W5, nor in profit center PC2 and nor in cost center C3. However, there is inventory value contained in the production stages or steps P2 (USD 60), P5 (USD 96) and P7 (USD 180), in the work centers W1 (USD 60), W3 (USD 96) and W4 (USD 180) as well as in the profit center PC1 which contains all unfinished items with a value of USD 336, and in two of the three cost centers, C1 (USD 60) and C2 (USD 276).

[0031] The invention thus allows for the calculation or valuation of unfinished goods for a predeterminable number of stages of the working process, e.g. according to the structure of organizational levels, and thus for a detailed balance sheet for every organizational structure involved in the production process of a company. This in turn opens the possibility of precise internal controlling mechanisms.

[0032] Inventories should be measured at the lower of cost and net realisable value. The net realisable value is the selling price less the cost to complete the inventory and sell it. Cost includes all costs to bring the inventories to their present condition and location. If specific cost is not determinable, the benchmark treatment is to use either the first in, first out (FIFO) or weighted average cost formulas. An allowed alternative is the last in, first out (LIFO) cost formula. When LIFO is used, there should be disclosure of the lower of (i) net realisable value and (ii) FIFO, weighted average or current cost. The cost of inventory is recognised as an expense in the period in which the related revenue is recognised. If inventory is written down to net realisable value, the write-down is charged to expense. Any reversal of such a write-down in a later period is
credited to income by reducing that period's cost of goods sold.
CLAIMS

1. A computer implemented method for managing and valuating inventory, comprising the steps of:
   assigning every item of goods which is entering a working process to an identifier;
   tracking the goods in the working process;
   updating a given identifier when the goods assigned to this identifier enter another stage in the working process;
   assigning at least one price to each stage in the working process;
   determining the content of one or more identifiers; and
   calculating a price for goods in the working process.

2. A method according to claim 1, wherein the identifier comprises information as to the quantity of goods assigned to this identifier.

3. A method according to claim 1, wherein the identifier comprises for its assigned goods information as to their stage in the working process.

4. A method according to any one of claims 1 to 3, wherein a price for goods in a given stage of the working process is calculated on the basis of the number of goods in this stage and the price assigned to this stage.

5. A method according to claim 4, wherein a price for goods in the working process is calculated by adding the prices calculated for all stages of the working process.
6. A method according to claim 4, wherein a price is calculated for a predeterminable number of stages of the working process.

7. A method according to claim 1, wherein the content of a given identifier is determined continuously.

8. A method according to claim 1, wherein the content of a given identifier is determined periodically.

9. A method according to claim 1, wherein determining the content of an identifier comprises the step of determining the number of goods assigned to this identifier.

10. A method according to claim 9, wherein determining the content of an identifier comprises the step of determining the number of goods with the same characteristics assigned to this identifier.

11. A method according to claim 9, wherein determining the content of an identifier comprises the step of determining the number of goods in the same stage of the working process assigned to this identifier.

12. A method according to claim 8, wherein a cycle for the periodic tracking is selectable independently for various goods.

13. A method according to claim 1, wherein the price assigned for a stage reflects the value added to the goods in the working process in the according stage.
14. A method according to claim 1, wherein more than one price is assigned to the products in a stage.

15. A computer inventory system (10) for managing and valuating inventory, comprising
an inventory database (20) for storing one or more identifiers;
detectors for tracking goods in a working process, every item of goods entering the working process being assigned to an identifier;
at least one input/output device (18) for updating a given identifier when the goods assigned to this identifier enter another stage in the working process and for assigning at least one price according to the value added to the goods in working process to each stage in the working process; and
a processing unit (14) for retrieving data stored in the inventory database (20) and calculating a price for goods in the working process.

16. A computer inventory system (10) according to claim 15, wherein the identifier comprises information as to the quantity of goods assigned to this identifier.

17. A computer inventory system (10) according to claim 15, wherein the identifier comprises for its assigned goods information as to their stage in the working process.

18. A computer inventory system (10) according to any one of claims 15 to 17, wherein the processing unit (14) calculates a price for goods in a given stage of the working process on the basis of the number of goods in this stage and the price assigned to this stage.
19. A computer inventory system (10) according to claim 18, wherein the processing unit (14) calculates a price for goods in the working process by adding the prices calculated for all stages of the working process.

20. A computer inventory system (10) according to claim 18, wherein the processing unit (14) calculates a price for a predeterminable number of stages of the working process.

21. A computer inventory system (10) according to claim 15, wherein the processing unit (14) retrieves identifier data stored in the inventory database (20) continuously.

22. A computer inventory system (10) according to claim 15, wherein the processing unit (14) retrieves identifier data stored in the inventory database (20) periodically.

23. A computer program product with a computer-readable medium and a computer program stored on the computer-readable medium with program coding means which are suitable for carrying out a method according to any one of claims 1 to 14 when the computer program is run on a computer.

24. A computer program with program coding means which are suitable for carrying out a method according to any one of claims 1 to 14 when the computer program is run on a computer.

25. A computer-readable medium with a computer program stored thereon, the computer program comprising program coding means which are suitable for carrying out a
method according to any one of claims 1 to 14 when the computer program is run on a computer.
### A. CLASSIFICATION OF SUBJECT MATTER

**IPC 7** 606F17/60

According to International Patent Classification (IPC) or to both national classification and IPC.

### B. FIELDS SEARCHED

**Minimum documentation searched** (classification system followed by classification symbols)

**IPC 7** 606F 605B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched.

Electronic database consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

### C. DOCUMENTS CONSIDERED TO BE RELEVANT

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### Date of the actual completion of the international search

**9 March 2005**

### Date of mailing of the international search report

**17/03/2005**

### Name and mailing address of the ISA

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