



# **Costing for Microsoft® Business Solutions–Navision®**

Technical White Paper for Navision 4.00

Published: May 2004

This paper is intended for people who are involved in the implementation of costing functionality at a customer site and for those who need to advise customers or make modifications within the area. It gives an overview of the principles used within the costing area of Microsoft Business Solutions–Navision 4.00. Several in-depth examples are provided.

# Contents

Introduction .....	1
Inventory Posting .....	3
Inventory Adjustment and Reconciliation with General Ledger.....	5
Automatic Cost Posting .....	5
Post Inventory Cost to G/L .....	5
Adjust Cost – Item Entries.....	5
Expected Cost Posting .....	6
Account Types.....	7
Cost Components .....	9
Costing Method.....	10
The Effect of Costing Method on Valuing Inventory Increases .....	10
The Effect of Costing Method When Assigning Value to Inventory Decreases .....	11
Average Cost Calculation .....	12
Setting the Valuation Date.....	12
Adjusting the Average Cost.....	13
Application Type .....	14
Fixed Application .....	14
Transfer Application .....	16
Revaluation .....	17
Calculating Revaluable Quantity .....	17
Determining Whether an Inventory Decrease Is Affected by a Revaluation.....	18
Variance Calculation .....	20
Determining Standard Cost .....	20
Rounding.....	21
Glossary.....	22
Appendix 1 – Controlling Accounts Posted to in General Ledger .....	24
Calculating the Amount to Post to General Ledger.....	25
Appendix 2 – Variance Calculation for Manufactured Items .....	26
Appendix 3 – Capacity Ledger Entry Diagram .....	27
About Microsoft Business Solutions .....	28

# Introduction

This paper gives an overview of the principles used within the costing area of Microsoft Business Solutions–Navision 4.00 and provides several in-depth examples. Here is a summary of the questions that are addressed in each section:

## **Inventory Posting**

- What kinds of entries are created during inventory posting?
- What is the relationship between these entries?

## **Inventory Adjustment and Reconciliation with General Ledger**

- How and when is the inventory reconciled with the general ledger?
- How are the posting dates for general ledger and value entries controlled?
- How does the expected cost influence the inventory valuation?
- What is the purpose of the cost adjustment batch job?
- Which accounts are posted to during reconciliation?

## **Cost Components**

- To what level of detail can cost be broken down?

## **Costing Method**

- How does the costing method influence inventory valuation?

## **Average Cost Calculation**

- How is the average cost updated if:
  - Items are sales invoiced before they are purchase invoiced?
  - Postings are backdated?
  - The user needs to recover from an incorrect posting?

## **Application Type**

- How can a fixed application be used to reverse cost exactly?
- How is an item valued when it is transferred from one location to another?

## **Revaluation**

- What kinds of valuation bases are supported?
- Is it possible to backdate a revaluation and have the COGS updated correctly for the items already sold?
- How is the revaluable quantity calculated?

## **Variance Calculation**

- How are variances calculated?
- When is the standard cost determined?

## **Rounding**

- How are rounding residuals handled?

## **Appendix 1 – Controlling Accounts Posted to in General Ledger**

- What is the relationship between different types of value entries and the accounts posted to in general ledger?

### **Appendix 2 – Variance Calculation for Manufactured Items**

- How are the standard cost shares and variances calculated for a manufactured item?

### **Appendix 3 – Capacity Ledger Entry Diagram**

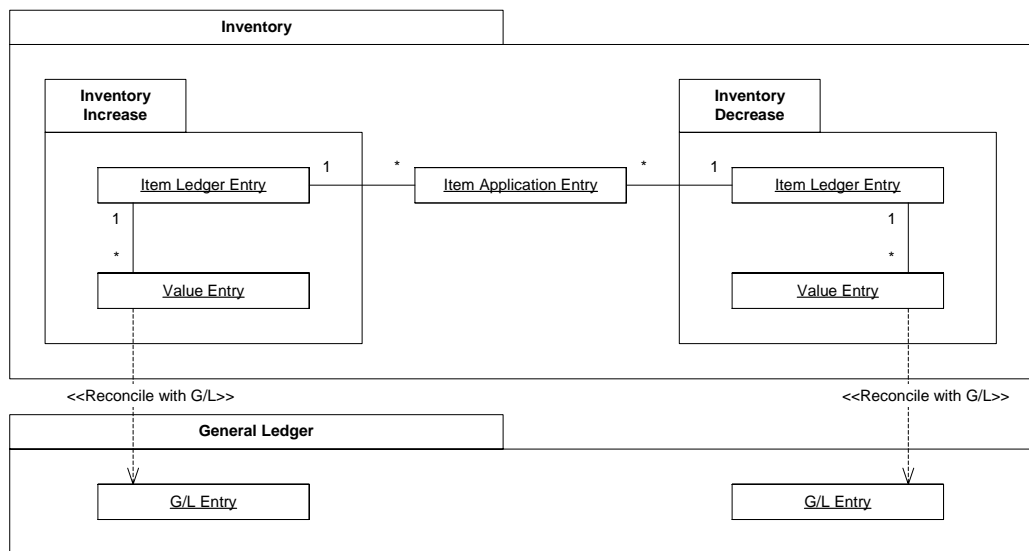
- What are the relationships between the production order and the ledger entries that it posts to?

## Inventory Posting

Inventory transactions result in two kinds of postings—quantity and value. Quantity posting describes the change in quantity on inventory. The program stores this information in item ledger entries. Value posting describes the change in inventory value. This information is stored in value entries. One or more value entries can exist per item ledger entry.

For WIP inventory, there is a special kind of quantity posting that accounts for capacity, which is measured in either time or units. This information is stored in capacity ledger entries. The related value entries describe the added value of the conversion cost. One or more value entries can exist per capacity ledger entry.

Item ledger entries are applied against each other. To apply means to link an inventory increase with an inventory decrease so that it is possible to say exactly which increase was used for which decrease and vice versa. The program stores this information in item application entries.



Item ledger, capacity ledger, value, and item application entries are created when the user posts an item journal line. The item journal line can either be posted directly, for example, from the item journal, or it can be posted indirectly, for example, from a purchase line. When a purchase line is posted, it is first transferred to an item journal line, and then the journal line is posted as if the transaction had been entered directly.

Note that the entry type indicates which G/L account to post to—not whether it is an inventory increase or decrease. That is determined either by the sign of the quantity on the item ledger entry or the valued quantity on the value entry (as they always have the same sign). For example, a sales entry with a positive quantity describes an inventory decrease caused by a sale, and a sales entry with a negative quantity describes an inventory increase caused by a sales return.

## Example

The user posts a purchase order as received and invoiced, for 10 items with a direct unit cost of LCY 7 and an overhead rate of LCY 1. The posting date is 01-01-03. The program creates the following entries:

### Item Ledger Entries

Posting Date	Entry Type	Quantity	Entry No.
01-01-03	Purchase	10	1

### Value Entries

Posting Date	Entry Type	Cost Amount (Actual)	Cost Posted to G/L	Item Ledger Entry No.	Entry No.
01-01-03	Direct Cost	70	0	1	1
01-01-03	Indirect Cost	10	0	1	2

### Item Application Entries

Entry No.	Item Ledger Entry No.	Inbound Item Entry No.	Outbound Item Entry No.	Quantity
1	1	1	0	10

### Item Ledger Entries

Posting Date	Entry Type	Quantity	Entry No.
01-15-03	Sale	-10	2

### Value Entries

Posting Date	Entry Type	Cost Amount (Actual)	Cost Posted to G/L	Item Ledger Entry No.	Entry No.
01-15-03	Direct Cost	-80	0	2	3

### Item Application Entries

Entry No.	Item Ledger Entry No.	Inbound Item Entry No.	Outbound Item Entry No.	Quantity
2	2	1	2	-10

At the end of the month, the user can reconcile these straightforward inventory transactions – which do not need cost adjustment - with the general ledger by running the Post Inventory Cost to G/L batch job. The posting date is 01-31-03. The program updates the Cost Posted to G/L and creates the following G/L entries:

### Value Entries

Posting Date	Entry Type	Cost Amount (Actual)	Cost Posted to G/L	Item Ledger Entry No.	Entry No.
01-01-03	Direct Cost	70	<b>70</b>	1	1
01-01-03	Indirect Cost	10	<b>10</b>	1	2
01-15-03	Direct Cost	-80	<b>-80</b>	2	3

### G/L Entries

Posting Date	G/L Account No.	Amount	Entry No.
01-31-03	<Inventory Account>	70	1
01-31-03	<Direct Cost Applied Account>	-70	2
01-31-03	<Inventory Account>	10	3
01-31-03	<Overhead Applied Account>	-10	4
01-31-03	<Inventory Account>	-80	5
01-31-03	<COGS Account>	80	6

# Inventory Adjustment and Reconciliation with General Ledger

There are two ways to reconcile the inventory ledger with the general ledger:

- Activate the automatic cost posting option
- Use the Post Inventory Cost to G/L batch job

## Automatic Cost Posting

When the user has activated this option, the program automatically posts to the general ledger every time the user posts to the inventory ledger. The posting date of the G/L entry will be equal to the posting date of the item journal line.

## Post Inventory Cost to G/L

When the user runs this batch job, the program creates G/L entries on the basis of value entries. The entries can be summarized per posting group. The user sets the posting date of the G/L entry on the request form for the batch job.

The Post Inventory Cost to G/L batch job allows the user to post adjustments, which were recognized after the accounting period was closed, to an open accounting period. The advantage is that these adjustments can be posted without reopening a closed accounting period.

However, if the batch job request form is not filled in carefully, it is possible to end up in a situation where inventory ledger and general ledger balances are out of sync. The Posting Date field on the Options tab and the filter on the Posting Date field on the Value Entry tab are the most important settings.

## Adjust Cost – Item Entries

Before running the Post Inventory Cost to G/L batch job, it is important to run the Adjust Cost – Item Entries batch job. The main purpose of this batch job is to update COGS for sales entries, as this is not always possible to calculate at the time of posting. An item can, for example, be sales invoiced before it has been purchase invoiced. In order to make a correct inventory valuation while allowing this flexibility, it is necessary to make a cost adjustment some time later by running the Adjust Cost – Item Entries batch job.

Another key purpose of this batch job is to update the unit cost on the item card. Because of this, we recommend running the Adjust Cost – Item Entries batch job as often as possible, during non-working hours. This ensures that the unit cost is updated for items on a daily basis.

The Adjust Cost – Item Entries batch job creates value entries for rounding and adjustment. The new adjustment and rounding value entries have the posting dates of the original value entries, unless those value entries fall within a closed accounting period, meaning that the posting date is earlier than the date in the Allow Posting From field in the general ledger setup. In this case, the batch job assigns the posting date that the user entered in the request form in the Closed Period Entry Posting Date field.

## Example

The user posts a purchased item as received and invoiced on 01-01-03. The user later posts the sold item as shipped and invoiced on 01-15-03. The user runs the Adjust Cost – Item Entries and Post Inventory to G/L batch jobs with the posting date set to 01-31-03. The following entries are created:

**Value Entries**

Posting Date	Item Ledger Entry Type	Cost Amount (Actual)	Cost Posted to G/L	Invoiced Quantity	G/L Entry No. (Account)	G/L Entry No. (Bal. Account)	Entry No.
01-01-03	Purchase	10.00	10.00	1	1	2	1
01-15-03	Sale	-10.00	-10.00	-1	3	4	2

**G/L Entries**

Posting Date	G/L Account No.	Description	Amount	Entry No.
01-31-03	2130	Inventory Account	10.00	1
01-31-03	7291	Direct Cost Applied Account	-10.00	2
01-31-03	2130	Inventory Account	-10.00	3
01-31-03	7290	COGS Account	10.00	4

Later, the user posts a related purchase item charge for 2.00 LCY as invoiced on 02-10-03. The user runs the Adjust Cost - Item Entries batch job and then runs the Post Inventory to G/L batch job with the posting date set to 02-28-03. The final result is as follows. Note that the adjustment of COGS is now recognized in February for the G/L entries.

**Value Entries**

Posting Date	Item Ledger Entry Type	Cost Amount (Actual)	Cost Posted to G/L	Invoiced Quantity	G/L Entry No. (Account)	G/L Entry No. (Bal. Account)	Adjustment	Entry No.
02-10-03	Purchase	2.00	2.00	0	5	6	No	3
01-15-03	Sale	-2.00	-2.00	0	7	8	Yes	4

**G/L Entries**

Posting Date	G/L Account No.	Description	Amount	Entry No.
02-28-03	2130	Inventory Account	2.00	5
02-28-03	7791	Direct Cost Applied Account	-2.00	6
02-28-03	2130	Inventory Account	-2.00	7
02-28-03	7290	COGS Account	2.00	8

**Expected Cost Posting**

When only the quantity part of an inventory increase has been posted, the inventory value will not change unless the user has activated the expected cost posting to general ledger option. In this case, the expected cost is posted to interim accounts at the time of receipt. Once the receipt has been completely invoiced, the interim accounts are then balanced and the actual cost is posted to the inventory account.

Starting in version 4.00, for reconciliation and traceability purposes, the invoiced value entry shows the expected cost amount that has been posted to balance the interim accounts.

**Example**

In the following example, the user has activated automatic cost posting and expected cost posting to general ledger. The user posts a purchase order as received. The expected cost is LCY 95.

**Value Entries**

Posting Date	Entry Type	Cost Amount (Expected)	Expected Cost Posted to G/L	Expected Cost	G/L Entry No. (Interim Acc.)	G/L Entry No. (Int. Bal. Acc.)	Item Ledger Entry No.	Entry No.
01-01-03	Direct Cost	95	95	Yes	1	2	1	1

**G/L Entries**

Posting Date	G/L Account No.	Amount	Entry No.
01-01-03	<Inv. Accrual Acc. (Interim)>	-95	2
01-01-03	<Inventory Account (Interim)>	95	1

At a later date, the user posts the purchase order as invoiced. The invoiced cost is LCY 100.

**Value Entries**

Posting Date	Cost Amount (Actual)	Cost Amount (Ex-pected)	Cost Posted to G/L	Ex-pected Cost	G/L Entry No. (Account)	G/L Entry No. (Bal. Account)	G/L Entry No. (Interim Acc.)	G/L Entry No. (Int. Bal. Acc.)	Item Ledger Entry No.	Entry No.
01-15-03	100	-95	100	No	5	6	3	4	1	2

The invoice posting clears the interim account and posts the invoiced amount to the inventory account.

**G/L Entries**

Posting Date	G/L Account No.	Amount	Entry No.
01-15-03	<Inv. Accrual Acc. (Interim)>	95	4
01-15-03	<Inventory Account (Interim)>	-95	3
01-15-03	<Direct Cost Applied Account>	-100	6
01-15-03	<Inventory Account>	100	5

Account Types

During reconciliation, inventory values are posted to the inventory account in the balance sheet, and the same amount, but with the reverse sign, is posted to the relevant balancing account. The balancing account is, in most cases, an income statement account. However, when posting direct cost related to consumption or output, it is a balance sheet account. The type of the item ledger entry and value entry determines which G/L account to post to.

**Example**

This example, which describes a chain that is manufactured from purchased links, gives an overview of the various account types that are used in a typical scenario. The user has activated the expected cost posting option. The details are as follows:

- Link: Costing method = Standard  
Standard cost = LCY 1  
Overhead rate = LCY 0.02
- Chain: Costing method = Standard  
Standard cost = LCY 150  
Overhead rate = LCY 25
- Work center: Direct cost per minute = LCY 2  
Indirect cost % = 10%

*Purchase*

1. The user purchases 150 links and posts the purchase order as received.
2. The user posts the purchase order as invoiced. This results in an overhead amount of LCY 3 to be allocated and a variance amount of LCY 18.
  - 2a. The interim accounts are cleared.
  - 2b. The direct cost is posted.
  - 2c. The indirect cost is calculated and posted.
  - 2d. The purchase variance is calculated and posted (only for standard-cost items).

	Inventory (Interim)	Inventory Accrual (Interim)
1.	150	150
2a.	150	150

	Inventory	Direct Cost	Indirect Cost	Purchase Variance
2b.	165	165		
2c.	3		3	
2d.	18			18

*Sale*

3. The user sells 1 chain and posts the sales order as shipped.
4. The user posts the sales order as invoiced.
  - 4a. The interim accounts are cleared.
  - 4b. COGS is posted.

	Inventory (Interim)	COGS (Interim)	Inventory	COGS
3.	150	150		
4a.			150	150
4b.				

*Consumption*

5. The user posts consumption of 150 links used to produce 1 chain.

Material:

	Inventory	WIP
5.	150	150

6. The work center used 60 minutes to produce the chain. The user posts conversion cost.
  - 6a. The direct costs are posted.
  - 6b. The indirect costs are calculated and posted.

Capacity:

	Direct Cost	WIP	Indirect Cost
6a.	120	120	
6b.		12	12

*Output*

7. The user posts expected cost of 1 chain.
8. The user finishes the production order and runs the Adjust Cost - Item Entries batch job.
  - 8a. The interim accounts are cleared.
  - 8b. The direct cost is transferred from the WIP account to the inventory account.
  - 8c. The indirect cost (overhead) is transferred from the indirect cost account to the inventory account.
  - 8d. This results in a variance amount of LCY 157 (variances are only calculated for standard-cost items).

	WIP	Inventory (Interim)	WIP	Inventory	Indirect Cost	Variance
7.	150	150				
8a.			150	150		

8b.	282	282			
8c.		25		25	
8d.			157		157

For the sake of simplicity, only one variance account is shown. In reality, five different accounts exist: Material, Capacity, Capacity Overhead, Subcontracting and Manufacturing Overhead variance.

*Adjustment/Revaluation/Rounding/Transfer*

9. The user revalues the chain from LCY 150 to LCY 140.

	Inventory	Inventory Adjustment
9.	10	10

The exact relationship between the above-mentioned account types and the different types of value entries is shown in Appendix 1 – Controlling Accounts Posted to in General Ledger.

## Cost Components

Cost components are different types of costs that comprise the value of an inventory increase or decrease. They can be grouped into the following general types:

- Direct cost—cost that can be traced directly to a cost object
- Indirect cost—cost that is allocated without direct traceability to a cost object
- Variance—the difference between actual and standard costs, which is only posted for items using the standard costing method
- Revaluation—a depreciation or appreciation of the current inventory value
- Rounding—residuals caused by the way in which valuation of inventory decreases are calculated

Some of these costs can be broken down further. The direct cost of an item, for example, can consist of the following cost components:

- Item cost (= direct purchase price)
- Freight cost
- Insurance cost

Freight and insurance costs are item charges that can be added to an item's cost at any time. When the user runs the Adjust Cost – Item Entries batch job, the program updates the value of any related inventory decreases accordingly.

The different types of variance are listed below. These are described more thoroughly in the section on Variance Calculation.

- Purchase
- Material
- Capacity
- Subcontracted
- Capacity Overhead

- Manufacturing Overhead

## Costing Method

Microsoft Business Solutions–Navision supports the following costing methods:

- FIFO (First In First Out)
- LIFO (Last In First Out)
- Average
- Specific
- Standard

They all have one thing in common—when the quantity on inventory is zero, the inventory value must also be zero. However, the costing methods differ in the way that they value inventory decreases and whether they use actual cost or standard cost as the valuation base.

### Example

The following sequence of inventory increases and decreases is used below to show the effects of different costing methods. Note that the resulting quantity on inventory is zero, and consequently the inventory value must also be zero, regardless of the costing method.

Posting Date	Quantity	Entry No.
01-01-03	1	1
01-01-03	1	2
01-01-03	1	3
02-01-03	-1	4
03-01-03	-1	5
04-01-03	-1	6

### The Effect of Costing Method on Valuing Inventory Increases

If the costing method uses actual cost (FIFO, LIFO, Average or Specific costing method) as the valuation base, then the inventory increases are valued as shown below.

Posting Date	Quantity	Cost Amount (Actual)	Entry No.
01-01-03	1	<b>12</b>	1
01-01-03	1	<b>14</b>	2
01-01-03	1	<b>16</b>	3

If the costing method uses standard cost as the valuation base, then the inventory increases are valued as shown below.

Posting Date	Quantity	Cost Amount (Actual)	Entry No.
01-01-03	1	<b>15</b>	1
01-01-03	1	<b>15</b>	2
01-01-03	1	<b>15</b>	3

## The Effect of Costing Method When Assigning Value to Inventory Decreases

### FIFO

The FIFO costing method assigns the value of the first increases on inventory (entry no. 1, 2, 3). COGS is calculated using the value of the first inventory acquisitions.

Posting Date	Quantity	Cost Amount (Actual)	Entry No.
02-01-03	-1	<b>-12</b>	4
03-01-03	-1	<b>-14</b>	5
04-01-03	-1	<b>-16</b>	6

### LIFO

The LIFO costing method assigns the value of the last increases on inventory (entry no. 3, 2, 1). COGS is calculated using the value of the most recent inventory acquisitions.

Posting Date	Quantity	Cost Amount (Actual)	Entry No.
02-01-03	-1	<b>-16</b>	4
03-01-03	-1	<b>-14</b>	5
04-01-03	-1	<b>-12</b>	6

### Average

The average costing method calculates a weighted average of the remaining inventory on the valuation date of the inventory decrease. (This calculation is described in detail in the section Average Cost Calculation.)

Posting Date	Quantity	Cost Amount (Actual)	Entry No.
02-01-03	-1	<b>-14</b>	4
03-01-03	-1	<b>-14</b>	5
04-01-03	-1	<b>-14</b>	6

### Standard

The standard costing method works similarly to FIFO. The difference is that the inventory increases are valued at standard cost (rather than actual cost), which affects the value of the inventory decreases.

Posting Date	Quantity	Cost Amount (Actual)	Entry No.
02-01-03	-1	<b>-15</b>	4
03-01-03	-1	<b>-15</b>	5
04-01-03	-1	<b>-15</b>	6

### Specific

The costing method makes an assumption about how cost flows from inventory increase to inventory decrease. However, if more accurate information about the cost flow exists, a user can override this assumption by creating a fixed application between entries. A fixed application creates a link between an inventory decrease and a specific inventory increase and will direct the cost flow accordingly. In Microsoft Navision, a fixed application has the same effect as using the specific costing method.

The following entries show how a fixed application affects the valuation of the inventory decreases.

Posting Date	Quantity	Cost Amount (Actual)	Applies-to Entry	Entry No.
02-01-03	-1	-14	2	4
03-01-03	-1	-12	1	5
04-01-03	-1	-16	3	6

## Average Cost Calculation

Valuing inventory decreases at a weighted average would be straightforward if purchases were always invoiced before sales are invoiced, postings were never backdated, and the user never made mistakes. However, the reality is somewhat different from this ideal.

The way the average costing method is implemented in Microsoft Navision allows the following:

- The user can invoice the sale of an item before the purchase of the item has been invoiced.
- The user can backdate a posting.
- The user can recover from an incorrect posting.

The secret behind this flexibility is the use of the valuation date and fixed application (see the Fixed Application section for a detailed description). The valuation date is defined as the date from which the value entry is included in the average cost calculation.

The average cost is calculated as the sum of the values of the Cost Amount (Actual) field divided by the sum of the invoiced quantity for those value entries with a valuation date that is equal to or earlier than the inventory decrease. The program sets the valuation date automatically.

## Setting the Valuation Date

Beginning with version 4.00, the program sets the valuation dates of WIP inventory using the same criteria that it uses to set the valuation dates of other non-WIP inventory decreases. The program uses the following criteria to set the valuation date:

Scenario	Posting Date	Valued Quantity	Revaluation	Valuation Date
I	-	Positive	No	Posting date of item ledger entry
II	Later than latest valuation date of applied value entries	Negative	No	Posting date of item ledger entry
III	Earlier than latest valuation date of applied value entries	Negative	No	Latest valuation date of the applied value entries
IV	-	Positive	Yes	Posting date of the revaluation value entry

## Example

The following entries illustrate the different scenarios.

Value Entries							
Scenario	Posting Date	Item Ledger Entry Type	Valuation Date	Valued Quantity	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
I	01-01-03	Purchase	01-01-03	2	20	1	1
I	01-15-03	(Item Charge)	<b>01-01-03</b>	2	8	1	2
II	02-01-03	Sale	02-01-03	-1	-14	2	3
IV	03-01-03	(Revaluation)	03-01-03	1	-4	1	4
III	02-01-03	Sale	<b>03-01-03</b>	-1	-10	3	5

- The first four entries are straightforward.
- In Entry no. 5, the user has entered a sales order with a posting date (02-01-03) that precedes the latest valuation date of applied value entries (03-01-03).
- If the corresponding value in the Cost Amount (Actual) field for this date (02-01-03) were used for this entry, it would be 14. This would give a situation where the quantity on inventory is 0, but the inventory value is -4.
- The program responds by setting the valuation date equal to the latest valuation date of the applied value entries (03-01-03). The value in the Cost Amount (Actual) field becomes 10 (after revaluation). In this way, the quantity on inventory is 0, and the inventory value is also 0.

If the quantity on inventory is less than zero after posting the inventory decrease, then the valuation date is initially set to the posting date of the inventory decrease. This date may be changed later – according to the rules described above – when the inventory increase is applied.

## Adjusting the Average Cost

It may be necessary to recalculate the average cost at a later date if, for example, the user posts an inventory increase or decrease with a valuation date that precedes one or more inventory decreases. The user does this by running the Adjust Cost – Item Entries batch job.

## Example

Initially, the following entries exist for the item.

Valuation Date	Quantity	Cost Amount (Actual)	Entry No.
01-01-03	1	10	1
01-02-03	1	20	2
02-15-03	-1	-15	3
02-16-03	-1	-15	4

The user posts an inventory increase (entry no. 5) with a valuation date (01-03-03) that precedes one or more inventory decreases. In order to balance the inventory, the average cost must be recalculated and adjusted to 17.

Valuation Date	Quantity	Cost Amount (Actual)	Entry No.	
01-01-03	1	10	1	1
01-02-03	1	20	2	2
<b>01-03-03</b>	<b>1</b>	<b>21</b>	<b>5</b>	<b>5</b>
02-15-03	-1	-17	3	3
02-16-03	-1	-17	4	4

## Application Type

Entries are usually applied according to the cost flow assumption that is defined by the costing method. However, if more accurate information about the cost flow exists, the user can overrule the general cost flow assumption by using a fixed application, which creates a link between an inventory decrease and a specific inventory increase and vice versa.

### Fixed Application

In the case of average cost items, a fixed application has the purpose of avoiding errors in the average cost calculation. Creating a fixed application can be useful, for example, when correcting an erroneous posting. Item ledger entries that are applied to each other are not valued by average. The two relevant entries serve to cancel each other, and the sum value of the Cost Amount (Actual) field for the transaction becomes zero. Thus, the program excludes it from the normal average cost calculation.

### Example

The entries below illustrate the following scenario for an item that uses the average costing method:

- Entry no. 1 and 2: The user posts two purchase invoices – the latter with the incorrect direct unit cost of LCY 1000.
- Entry no. 3: The user posts a purchase credit memo, with a fixed application applied to the purchase entry with the wrong direct unit cost. The sum value of the Cost Amount (Actual) field for the two fixed applied value entries becomes 0.
- Entry no. 4: The user posts another purchase invoice with the correct direct unit cost LCY 100.
- Entry no. 5: The user posts a sales invoice.
- The inventory quantity is 0, and the inventory value is also 0.

### Value Entries

Posting Date	Item Ledger Entry Type	Valued Quantity	Cost Amount (Actual)	Applied-to Entry	Valued by Average	Item Ledger Entry No.	Entry No.
01-01-03	Purchase	1	200		No	1	1
01-01-03	Purchase	1	1000		No	2	2
01-01-03	Purchase	-1	-1000	2	No	3	3
01-01-03	Purchase	1	100		No	4	4
01-01-03	Sale	-2	-300		Yes	5	5

If the user had not made a fixed application between the purchase credit memo and the purchase entry with the incorrect direct unit cost, the adjustment would have looked like this:

**Value Entries**

Posting Date	Item Ledger Entry Type	Valued Quantity	Cost Amount (Actual)	Applied-to Entry	Valued by Average	Item Ledger Entry No.	Entry No.
01-01-03	Purchase	1	200		No	1	1
01-01-03	Purchase	1	1000		No	2	2
01-01-03	Purchase	-1	-600		Yes	3	3
01-01-03	Purchase	1	100		No	4	4
01-01-03	Sale	-2	-700		Yes	5	5

- Entry no. 3: The value in the Cost Amount (Actual) field is valued by average, and therefore includes the erroneous posting of 1000. It becomes 600 and is over-inflated.
- Entry no. 5: The value of the Cost Amount (Actual) field for this entry is also inaccurate.

Fixed applications are also a very good means of reversing cost exactly – in connection with a sales return, for example.

**Example**

The entries below illustrate the following scenario:

- The user posts a purchase invoice.
- The user posts a sales invoice.
- The user posts a sales credit memo for the returned item (which applies to the sales entry) in order to correctly reverse the cost.

**Value Entries**

Posting Date	Item Ledger Entry Type	Valued Quantity	Cost Amount (Actual)	Applied-from Entry	Item Ledger Entry No.	Entry No.
01-01-03	Purchase	1	1000		1	1
02-01-03	Sale	-1	-1000		2	2
03-01-03	Sale	1	1000	2	3	3

- A freight cost, related to the purchase order that was posted earlier, arrives. The user posts it as an item charge.

**Value Entries**

Posting Date	Item Ledger Entry Type	Valued Quantity	Cost Amount (Actual)	Applied-from Entry	Item Ledger Entry No.	Entry No.
04-01-03	(Item Charge)	1	100		1	4

When the user runs the Adjust Cost – Item Entries batch job, the increased cost for the purchase entry is forwarded to the sales entry. The sales entry then forwards this increased cost to the sales credit entry. The result is that the program ensures that the cost is correctly reversed at all times.

**Value Entries**

Posting Date	Item Ledger Entry Type	Valued Quantity	Cost Amount (Actual)	Applied-from Entry	Item Ledger Entry No.	Entry No.
01-01-03	Purchase	1	1000		1	1
02-01-03	Sale	-1	-1100		2	2
03-01-03	Sale	1	1100	2	3	3
04-01-03	(Item Charge)	1	100		1	4

## Transfer Application

When an item is transferred from one location to another, the program makes a transfer application. Valuing a transfer entry depends on the costing method. For items using the average costing method, valuation is made using the average cost on the valuation date of the transfer. For items using other costing methods, valuation is made by tracing back to the cost of the original inventory increase.

### Example

- The first example shows a transfer from location BLUE to location RED for an item using the average costing method.
- As the average cost on the valuation date of the transfer is LCY 15, the transfer is also valued accordingly.

#### Value Entries

Posting Date	Item Ledger Entry Type	Location	Quantity	Cost Amount (Actual)	Entry No.
01-01-03	Purchase	BLUE	1	10	1
01-01-03	Purchase	BLUE	1	20	2
02-01-03	Transfer	BLUE	-1	-15	3
02-01-03	Transfer	RED	1	15	4

- The second example shows a transfer from location BLUE to location RED for an item using the standard costing method.
- The item was originally purchased at location BLUE with the standard cost set to LCY 10, and was then transferred to location RED with the standard cost set to LCY 12.
- Since the value of the original inventory increase is LCY 10, the transfer is valued at that – and not LCY 12.

#### Value Entries

Posting Date	Item Ledger Entry Type	Location	Quantity	Cost Amount (Actual)	Entry No.
01-01-03	Purchase	BLUE	1	10	1
02-01-03	Transfer	BLUE	-1	10	2
02-01-03	Transfer	RED	1	10	3

## Revaluation

The user can revalue inventory using any valuation base that reflects the inventory value most accurately. It is also possible for the user to backdate a revaluation, and the program will update COGS correctly for those items that have already been sold. In order to allow this flexibility, the program can:

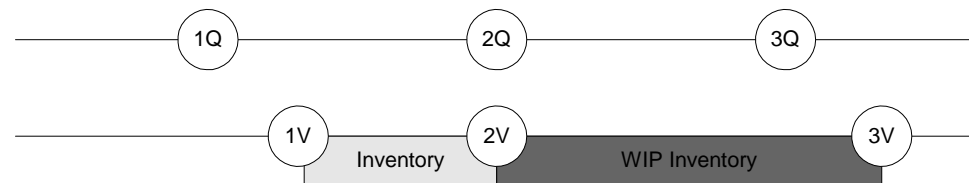
- Calculate the revaluable quantity at any date
- Determine whether an inventory decrease has been affected by a revaluation

### Calculating Revaluable Quantity

Revaluable quantity is the remaining quantity on inventory that is available for revaluation at a given date. The program calculates it as the sum total of the quantities of completely invoiced item ledger entries, which have a posting date that is equal to or earlier than the revaluation posting date.

After a revaluation has been calculated, the user may post an inventory increase or decrease that has a posting date that precedes the revaluation posting date. However, this quantity will not be affected by the revaluation. The program, in order to balance the inventory, considers only the original revaluable quantity.

As revaluation can be made on any date, it is necessary to have conventions for when an item is considered part of inventory (non-WIP and WIP) from a financial point of view. The figure and example below illustrate when the transition occurs.



<b>1Q</b>	<b>Receipt of purchased item</b>
<b>1V</b>	<b>Invoicing of purchased item</b>
<b>2Q + 2V</b>	<b>Consumption of purchased item</b>
<b>3Q</b>	<b>Output of manufactured item</b>
<b>3V</b>	<b>Invoicing of manufactured item</b>

### Example

This example uses the production of an iron chain that consists of 150 links.

**1Q** The user posts the purchased links as received:

#### Item Ledger Entries

Posting Date	Item No.	Entry Type	Quantity	Entry No.
01-01-03	LINK	Purchase	150	1

**1V** The user posts the purchased links as invoiced and, from a financial point of view, they are now part of inventory:

#### Value Entries

Posting Date	Entry Type	Valuation Date	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
01-15-03	Direct Cost	01-01-03	150	1	1

**2Q + 2V** The user posts the purchased links as consumed for the production of the iron chain. From a financial point of view, they are now part of the WIP inventory. Starting with version 4.00, the program sets the valuation date using the same criteria as in a normal inventory decrease, rather than setting it to 12-31-9999 as in past versions.

**Item Ledger Entries**

Posting Date	Item No.	Entry Type	Quantity	Entry No.
02-01-03	LINK	Consumption	-150	2

**Value Entries**

Posting Date	Entry Type	Valuation Date	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
02-01-03	Direct Cost	02-01-03	-150	2	2

**3Q** The user posts the chain as output and finishes the production order:

**Item Ledger Entries**

Posting Date	Item No.	Entry Type	Quantity	Entry No.
02-15-03	CHAIN	Output	1	3

**3V** The user runs the Adjust Cost – Item Entries batch job, which posts the iron chain as invoiced – indicating all material consumption has been completely invoiced. From a financial point of view, the links are no longer part of WIP inventory when the output is completely invoiced by the Adjust Cost batch job.

**Value Entries**

Posting Date	Entry Type	Valuation Date	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
01-15-03	Direct Cost	01-01-03	150	1	1
02-01-03	Direct Cost	02-01-03	-150	2	2
02-15-03	Direct Cost	02-15-03	150	3	3

## Determining Whether an Inventory Decrease Is Affected by a Revaluation

Starting in version 4.00, the program no longer uses different criteria for WIP inventory decreases and non-WIP inventory decreases when determining whether the decrease is affected by a revaluation.

When calculating the cost adjustment for a non average-cost item, the program uses the following criteria to determine whether an inventory decrease is affected by a revaluation:

Scenario	Entry No.	The later of either the Posting Date or the Valuation Date	Affected by Revaluation
I	Earlier than revaluation entry no.	Earlier than revaluation posting date	No
II	Earlier than revaluation entry no.	Equal to revaluation posting date	No
III	Earlier than revaluation entry no.	Later than revaluation posting date	Yes
IV	Later than revaluation entry no.	Earlier than revaluation posting date	Yes
V	Later than revaluation entry no.	Equal to revaluation posting date	Yes
VI	Later than revaluation entry no.	Later than revaluation posting date	Yes

## Example

The first example shows a scenario for inventory decreases:

- The user posts a purchase of 6 items.
- The user posts a sale of 1 item, posting date = 02-01-03.
- The user posts a sale of 1 item, posting date = 03-01-03.
- The user posts a sale of 1 item, posting date = 04-01-03.
- The user calculates the inventory value for the item from the revaluation journal, posting date = 03-01-03, and posts the revaluation of the item from a unit cost of LCY 10 to LCY 8.
- The user posts a sale of 1 item, posting date = 02-01-03.
- The user posts a sale of 1 item, posting date = 03-01-03.
- The user posts a sale of 1 item, posting date = 04-01-03.
- The user runs the Adjust Cost - Item Entries batch job.

### Value Entries

Scenario	Posting Date	Item Ledger Entry Type	Valuation Date	Valued Quantity	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
	01-01-03	Purchase	01-01-03	6	60	1	1
	<b>03-01-03</b>	<b>(Revaluation)</b>	<b>03-01-03</b>	<b>4</b>	<b>-8</b>	<b>1</b>	<b>5</b>
<b>I</b>	02-01-03	Sale	02-01-03	-1	-10	2	2
<b>II</b>	03-01-03	Sale	03-01-03	-1	-10	3	3
<b>III</b>	04-01-03	Sale	04-01-03	-1	-10	4	4
	<b>04-01-03</b>	<b>Sale</b>	<b>04-01-03</b>	<b>-1</b>	<b>2</b>	<b>4</b>	<b>9</b>
<b>IV</b>	02-01-03	Sale	03-01-03	-1	-10	5	6
	<b>02-01-03</b>	<b>Sale</b>	<b>03-01-03</b>	<b>-1</b>	<b>2</b>	<b>5</b>	<b>10</b>
<b>V</b>	03-01-03	Sale	03-01-03	-1	-10	6	7
	<b>03-01-03</b>	<b>Sale</b>	<b>03-01-03</b>	<b>-1</b>	<b>2</b>	<b>6</b>	<b>11</b>
<b>VI</b>	04-01-03	Sale	04-01-03	-1	-10	7	8
	<b>04-01-03</b>	<b>Sale</b>	<b>04-01-03</b>	<b>-1</b>	<b>2</b>	<b>7</b>	<b>12</b>

## Variance Calculation

Variance is defined as the difference between the actual cost and the standard cost. In this equation, the actual cost can change (if a user posts an item charge at a later date, for example), but the standard cost is a fixed, capitalized cost. Therefore, when the actual cost changes, the program must update the variance accordingly.

Note that a revaluation will have no effect on the variance calculation, as this only changes the inventory value.

### Example

The following scenario and postings illustrate how the variance calculation works. The program uses the equation: Actual Cost – Standard Cost = Purchase Variance.

- An item is purchased at LCY 90, but the standard cost is LCY 100. Thus, the purchase variance is LCY –10.  
The program credits LCY 10 to the purchase variance account.
- Later, the user posts an item charge of LCY 20. This increases the actual cost to LCY 110 and the value of the purchase variance becomes LCY 10. The program debits LCY 20 to the purchase variance account (thus making the net purchase variance equal to LCY 10).
- Finally, the item is revaluated from LCY 100 to LCY 70. This doesn't affect the variance calculation – only the inventory value.

	Inventory	Direct Cost	Purchase Variance	Inventory Adjustment
Purchase	100	90	10	
Item Charge		20	20	
<b>Total before revaluation</b>	<b>100</b>	<b>110</b>	<b>10</b>	
Revaluation	30			30
<b>Total after revaluation</b>	<b>70</b>	<b>110</b>	<b>10</b>	<b>30</b>

## Determining Standard Cost

The standard cost is used when calculating variance and the amount to capitalize. Since the standard cost can change over time, it is necessary to have a convention for when it is considered fixed for the purpose of calculations.

The standard cost is determined at the time of invoicing. For manufactured items, this occurs during cost adjustment, when material and capacity consumption have been completely invoiced. In addition, determining both the indirect cost % and the overhead rate follows the same conventions that apply when determining the standard cost.

The calculation of standard cost and variance for a manufactured item is shown in Appendix 2 – Variance Calculation for Manufactured Items.

## Rounding

Rounding residuals can occur when valuing the cost of an inventory decrease that is measured in a different quantity than the corresponding inventory increase. The program will calculate rounding residuals for all costing methods when the user runs the Adjust Cost – Item Entries batch job.

When using the average costing method, the rounding residual is calculated and recorded on a cumulative, entry-by-entry basis.

When using a costing method other than average, the rounding residual is calculated when the inventory increase has been fully applied (when the remaining quantity for the inventory increase = zero). The program then creates a separate entry for the rounding residual. The posting date on the rounding entry follows the same rule as other adjustment entries created by Adjust Cost batch job. If the original entry is in an open accounting period, the rounding entry gets the posting date of the original entry. Otherwise, the rounding entry gets the posting date from the request form.

### Example

This example uses the following sequence of inventory increases and decreases to show how the program handles the rounding issue. In both cases, the user has run the Adjust Cost – Item Entries batch job.

#### Item Ledger Entries

Posting Date	Quantity	Entry No.
01-01-03	3	1
02-01-03	-1	2
03-01-03	-1	3
04-01-03	-1	4

For an item using the average costing method, the rounding residual (1/300) is calculated with the first decrease (entry no. 2) and carried forward to entry no. 3. Therefore, entry no. 3 is valued as -3.34:

#### Value Entries

Posting Date	Quantity	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
01-01-03	3	10	1	1
02-01-03	-1	-3.33	2	2
03-01-03	-1	<b>-3.34</b>	3	3
04-01-03	-1	-3.33	4	4

For an item using a costing method other than average, the rounding residual (0.01) is calculated when the remaining quantity for the inventory increase is 0. The rounding residual has a separate entry no. 5:

#### Value Entries

Posting Date	Quantity	Cost Amount (Actual)	Item Ledger Entry No.	Entry No.
01-01-03	3	10	1	1
02-01-03	-1	-3.33	2	2
03-01-03	-1	-3.33	3	3
04-01-03	-1	-3.33	4	4
01-01-03	0	<b>-0.01</b>	1	5

## Glossary

<b>acquisition cost</b>	An item's purchase price plus any related costs
<b>actual cost</b>	The cost of an item when you accumulate all incurred costs, including costs of production and item charges.
<b>conversion cost</b>	All manufacturing costs other than direct materials costs. These costs are for transforming direct materials into finished goods.
<b>cost object</b>	Anything for which a separate measurement of cost is desired. This could be a product, customer or project, for example.
<b>exact cost reversing</b>	A link established between two entries: an inventory increase and an inventory decrease and vice versa. The link ensures that the cost of both entries is equal but with different signs.
<b>expected cost</b>	A preliminary cost that you expect to appear on an invoice from a vendor. If you choose to post expected cost to the general ledger, you must set up interim accounts that parallel the account to which the final cost will be posted. You post the expected cost when you have received the items but not the invoice from the vendor.
<b>interim account</b>	A G/L account to which expected costs are posted.
<b>item application</b>	A link between an inventory increase and an inventory decrease that makes it possible to specify exactly which increase was used for which decrease (and vice versa). The program stores this information in item application entries.
<b>item charge</b>	A cost your company incurs in connection with the purchase or sale of a particular item, or an amount your company debits a customer or vendor for services related to the sale or delivery of particular items.
<b>reconciliation</b>	Recording inventory valuation information in the general ledger. The program calculates the amount to be posted to the general ledger from value entries and creates G/L entries.
<b>revaluable quantity</b>	The quantity available for revaluation at a given date.

<b>standard cost</b>	A carefully predetermined cost.
<b>valuation base</b>	The cost basis that a company uses to determine the value of its inventory
<b>valuation date</b>	The date from which the value entry is included in the average cost calculation.
<b>Variance</b>	The difference between the actual cost and the standard cost.
<b>WIP inventory</b>	Work-in-process inventory is comprised of produced goods in various stages of completion. From a financial point of view, an item is included in WIP inventory once it has been posted as consumed and until the manufactured item is completely invoiced.

## Appendix 1 – Controlling Accounts Posted to in General Ledger

The following table shows the relationship between different types of value entries and the accounts and balancing accounts that are posted to in the general ledger.

Item Ledger Entry Type	Value Entry Type	Variance Type	Expected Cost	Account	Balancing Account
Purchase	Direct Cost	-	Yes	Inventory Account (Interim)	Inv. Accrual Acc. (Interim)
	Direct Cost	-	No	Inventory Account	Direct Cost Applied Account
	Indirect Cost	-	No	Inventory Account	Overhead Applied Account
	Variance	Purchase	No	Inventory Account	Purchase Variance Account
	Revaluation	-	No	Inventory Account	Inventory Adjmt. Account
	Rounding	-	No	Inventory Account	Inventory Adjmt. Account
Sale	Direct Cost	-	Yes	Inventory Account (Interim)	COGS Account (Interim)
	Direct Cost	-	No	Inventory Account	COGS Account
	Revaluation	-	No	Inventory Account	Inventory Adjmt. Account
	Rounding	-	No	Inventory Account	Inventory Adjmt. Account
Positive Adjmt. , Negative Adjmt., Transfer	Direct Cost	-	No	Inventory Account	Inventory Adjmt. Account
	Revaluation	-	No	Inventory Account	Inventory Adjmt. Account
	Rounding	-	No	Inventory Account	Inventory Adjmt. Account
Consumption	Direct Cost	-	No	Inventory Account	WIP Account
	Revaluation	-	No	Inventory Account	Inventory Adjmt. Account
	Rounding	-	No	Inventory Account	Inventory Adjmt. Account
Output	Direct Cost	-	Yes	Inventory Account (Interim)	WIP Account
	Direct Cost	-	No	Inventory Account	WIP Account
	Indirect Cost	-	No	Inventory Account	Overhead Applied Account
	Variance	Material	No	Inventory Account	Material Variance Account
	Variance	Capacity	No	Inventory Account	Capacity Variance Account
	Variance	Subcontracted	No	Inventory Account	Subcontracted Variance Account
	Variance	Capacity Overhead	No	Inventory Account	Cap. Overhead Variance Account
	Variance	Manufacturing Overhead	No	Inventory Account	Mfg. Overhead Variance Account

Item Ledger Entry Type	Value Entry Type	Variance Type	Expected Cost	Account	Balancing Account
	Revaluation	-	No	Inventory Account	Inventory Adjmt. Account
	Rounding	-	No	Inventory Account	Inventory Adjmt. Account
-	Direct Cost	-	No	WIP Account	Direct Cost Applied Account
	Indirect Cost	-	No	WIP Account	Overhead Applied Account

### Calculating the Amount to Post to General Ledger

Starting in version 4.00, the program uses the new expected cost fields on the Value Entry table to calculate the amount of expected cost to post to the general ledger.

**Expected Cost:** Cost Amount (Expected) – Expected Cost Posted to G/L

**Actual Cost:** Cost Amount (Actual) – Cost Posted to G/L

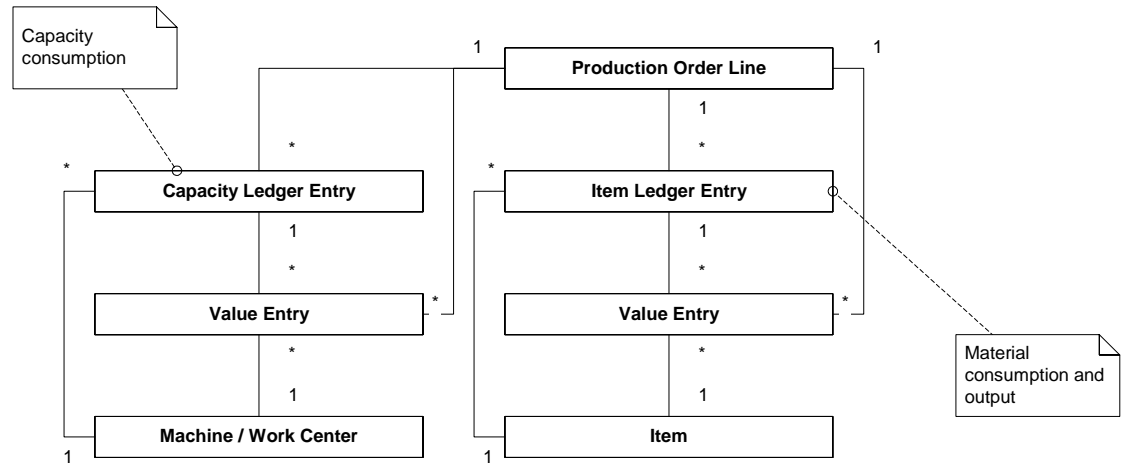
Note that 'Cost Amount (Expected)', 'Expected Cost Posted to G/L', 'Cost Amount (Actual)' and 'Cost Posted to G/L' are fields on the Value Entry table.

## Appendix 2 – Variance Calculation for Manufactured Items

The following table shows how the cost shares are calculated for an item when using the Calculate Standard Cost function.

	<b>Purchased Item</b>	<b>Manufactured Item</b>
<b>Standard Cost</b>	Single-Level Material Cost + Single-Level Capacity Cost + Single-Level Subcontrd. Cost + Single-Level Cap. Ovhd Cost + Single-Level Mfg. Ovhd Cost	
<b>Single-Level Material Cost</b>	Unit Cost	$\sum_{\text{Components}} \text{Standard Cost}$
<b>Single-Level Capacity Cost</b>	0	$\sum_{\text{Operations (not subcontrd.)}} \text{Direct Unit Cost}$
<b>Single-Level Subcontrd. Cost</b>	0	$\sum_{\text{Operations (subcontrd.)}} \text{Direct Unit Cost}$
<b>Single-Level Cap. Ovhd Cost</b>	0	$\sum_{\text{Operations}} \text{Direct Unit Cost} * \text{Indirect Cost \%} / 100 + \text{Overhead Rate}$
<b>Single-Level Mfg. Ovhd Cost</b>	0	$(\text{Single-Level Material Cost} + \text{Single-Level Capacity Cost} + \text{Single-Level Subcontrd. Cost}) * \text{Indirect Cost \%} / 100 + \text{Overhead Rate}$
<b>Rolled-up Material Cost</b>	Unit Cost	$\sum_{\text{Components}} \text{Rolled - up Material Cost}$
<b>Rolled-up Capacity Cost</b>	0	$\sum_{\text{Components}} \text{Rolled - up Capacity Cost} + \text{Single - Level Capacity Cost}$
<b>Rolled-up Subcontracted Cost</b>	0	$\sum_{\text{Components}} \text{Rolled - up Subcontracted Cost} + \text{Single - Level Subcontracted Cost}$
<b>Rolled-up Cap. Overhead Cost</b>	0	$\sum_{\text{Components}} \text{Rolled - up Cap. Overhead Cost} + \text{Single - Level Ovhd Cost}$
<b>Rolled-up Mfg. Ovhd Cost</b>	0	$\sum_{\text{Components}} \text{Rolled - up Mfg. Ovhd Cost} + \text{Single - Level Mfg. Ovhd Cost}$

## Appendix 3 – Capacity Ledger Entry Diagram



## About Microsoft Business Solutions

Microsoft Business Solutions, a division of Microsoft, offers a wide range of integrated, end-to-end business applications and services designed to help small, midmarket and corporate businesses become more connected with customers, employees, partners and suppliers. Microsoft Business Solutions' applications optimize strategic business processes across financial management, analytics, human resources management, project management, customer relationship management, field service management, supply chain management, e-commerce, manufacturing and retail management. The applications are designed to provide insight to help customers achieve business success. More information about Microsoft Business Solutions can be found at <http://www.microsoft.com/BusinessSolutions/>

This is a preliminary document and may be changed substantially prior to final commercial release of the software described herein.

The information contained in this document represents the current view of Microsoft Corporation on the issues discussed as of the date of publication. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented after the date of publication.

This white paper is for informational purposes only. MICROSOFT MAKES NO WARRANTIES, EXPRESS OR IMPLIED, IN THIS DOCUMENT.

Complying with all applicable copyright laws is the responsibility of the user. Without limiting the rights under copyright, no part of this document may be reproduced, stored in, or introduced into a retrieval system, or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the express written permission of Microsoft Corporation.

Microsoft may have patents, patent applications, trademarks, copyrights, or other intellectual property rights covering subject matter in this document. Except as expressly provided in any written license agreement from Microsoft, the furnishing of this document does not give you any license to these patents, trademarks, copyrights, or other intellectual property.

© 2004 Microsoft Business Solutions ApS, Denmark. All rights reserved.

Microsoft, Great Plains, Navision, Visual Studio, and Windows are either registered trademarks or trademarks of Microsoft Corporation, Great Plains Software, Inc., FRx Software Corporation, or Microsoft Business Solutions ApS or their affiliates in the United States and/or other countries. Great Plains Software, Inc., FRx Software Corporation, and Microsoft Business Solutions ApS are subsidiaries of Microsoft Corporation. The names of actual companies and products mentioned herein may be the trademarks of their respective owners. The example companies, organizations, products, domain names, email addresses, logos, people and events depicted herein are fictitious. No association with any real company, organization, product, domain name, e-mail address, logo, person, or event is intended or should be inferred.