



# Infor LN Manufacturing User Guide for Costing

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## About this Guide

This document describes the purpose and the use of costing in Manufacturing.

### Objectives

The objectives of this document are to describe the purpose and the use of costing in manufacturing.

### Intended Audience

This document is intended for those who want to learn how to use, and setup costing functionality.

### Assumed Knowledge

Familiarity with the business processes involved in costing, and general knowledge of the LN functionality will help you understand this document. In addition, Standard Cost Calculation and Production Order Costing training courses are available to give you a head start.

### Document summary

#### How to read this document

This document was assembled from online help topics. Consequently, references to other sections in the manual are presented as shown in this example:

Refer to the Table of Contents to locate the referred section.

Underlined terms indicate a link to a glossary definition. If you view this document online and you click on underlined text, you jump to the glossary definition at the end of this document. Non-underlined references do not represent a link to glossary definitions or other elements.

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## Chapter 1: Introduction

### Costing (CST)

Use the Production Order Costing module to define and calculate the standard and actual costs of all items, that are bought, sold, stored in warehouses and used for production.

### Multiple Financial Companies In Manufacturing

The financial transactions of production orders can be posted to the *financial companies* of the following entities:

- Project
- Production order
- Work center
- Warehouse

These entities belong to certain *enterprise units* which are linked to financial companies.

#### How to define the enterprise units

Projects and production orders have *calculation offices* which determine the enterprise unit. See Calculation Offices.

A work center corresponds to a *department* with the same code as the work center. Define the enterprise unit of a work center in the Departments (tcmcs0565m000) session.

Define the department of an employee in the **Employees - General (tccom0101m000)** session.

Define the enterprise unit of a warehouse in the **Warehouses (tcmcs0503m000)** session.

#### Posting transactions

Orders for a project always have the company number of the project. LN posts all of the project's financial transactions to this company.

If the **Financial Transactions by Work Center** check box in the **Production Order Parameters (tisfc0100s000)** session is selected, LN posts *WIP transactions* related to work centers to the work center's financial company. Surcharges defined on end item level or production results are always posted to the company of the production order.



If the **Cover Overhead Costs in Employee Department** check box in the **People Parameters (bpmdm0100m000)** session is selected, LN posts the overhead costs of operations to the company of the employee's work center. The employee's work center can be different from the work center where the operation is carried out.

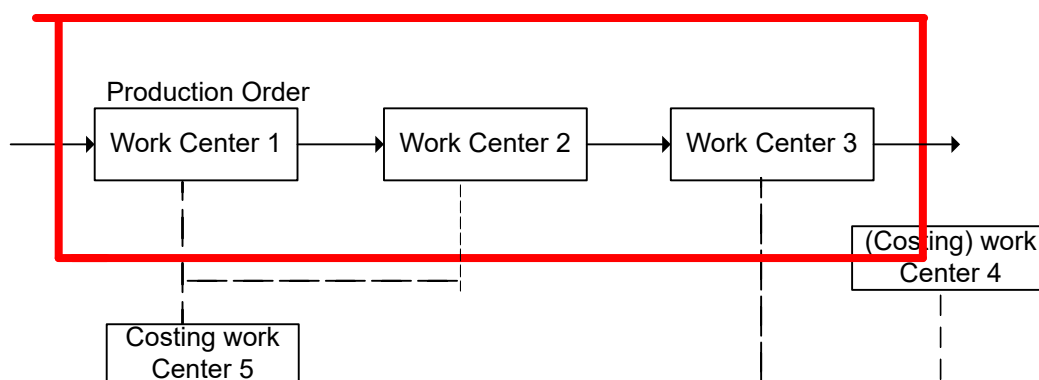
LN posts financial transactions that result from inventory transactions to the warehouse company. LN creates intercompany entries in Financials during posting.

## Calculation Offices

A calculation office is a *work center* that determines the *enterprise unit* for a PCS project or production order. The enterprise unit is linked to a *financial company*, which is financially responsible for a project or production order. Projects and production orders are always linked to a calculation office, so that LN can book the costs and *production results* of the production order or project to the financial company.

### Note:

- Work centers and warehouses can belong to *enterprise units* that are different from the calculation office's enterprise unit. The financial transactions of the work centers and warehouses are posted to the financial companies of their own enterprise units. Alternatively, *intercompany trade relationships* must be defined between the enterprise units.



### Defining a calculation office of the type costing

- Start the **Enterprise Units (tcomm0130m000)** session
- Select the enterprise unit for which you want to define a *department*.  
Selecting the enterprise unit, will start the **Enterprise Unit (tcomm0630m000)** session.
  - In the **Enterprise Unit (tcomm0630m000)** session, on the Departments tab you can add a new department.
  - The New Department command displays a new window.  
Specify the department type **Work Center**

- Specify the work center type **Costing**.
- In the **Work Centers (tirou0101m000)** session, you must specify the rest of the calculation office data.

If the Sites parameter in the **Implemented Software Components (tccom0100s000)** session is either **In Preparation** or **Active** you can also:

- Start the **Sites (tcemm0150m000)** session.  
Select the site for which you want to define a department, this will start the **Site (tcemm0650m000)** session.
- In the **Site (tcemm0650m000)** session, select the Departments tab.  
The New Department command displays a new window.
- Specify the department type **Work Center**
- Specify the work center type **Costing**.
- In the **Work Centers (tirou0101m000)** session, you must specify the rest of the calculation office data.

### Calculation offices for production orders

On a production order's calculation office, LN posts material costs, operation costs, surcharges, and subcontracting costs.

The default calculation office depends on the setting of the Calculation Office defined in field in the **Production Order Parameters (tisfc0100s000)** session.

You can select one of the following options:

- **Default Production Order Data**  
The calculation office that you define in the Default Production Order Data (tisfc0102m000) session is the default calculation office for a production order. You can change the calculation office for a specific production order on the **Costing** tab in the Production Orders (tisfc0501m000) details session.
- **Prepare for Production Department**  
Costs for existing production orders are booked to the calculation office linked to the order series of the production order. You can setup the date required to book costs to the production department calculation office.  
  
Note: If operations are still present on the selected production orders when the option is selected, the calculation office is defined based on the production department the last operation is linked to.
- **Production Department**  
The calculation office for the production department linked to the production order is used. The production department calculation office is defined in the Production Department (tirou2100m100) session.

**Note:** If Standard Cost by Enterprise Unit parameter in the **Implemented Software Components (tccom0100s000)** session is selected, using the **Production Department** option as the default for the calculation office is mandatory.

### Calculation offices for PCS projects

On a PCS project's calculation office, LN posts non-item project costs, such as project surcharges, hours posted on activities, and general project costs. Furthermore, the PCS project's calculation office is used to aggregate the total costs and revenues of the project.

**Note:** You can select a regular work center, sales office or warehouse as the calculation office for a PCS project.

### Default calculation office for PCS projects

If you generate a PCS project on a sales order or service order, a calculation office for the PCS project can be defaulted in three ways, dependent on the value in the Enterprise Unit for calc.off. used from field in the **Project Control Parameters (tipcs0100m000)** session:

- **Department**  
The default calculation office for the PCS project is the calculation office that is linked to the enterprise unit of the sales office or the service department. You can define a default calculation office of a specific enterprise unit in the **Enterprise Units (tcemm0130m000)** session.
- **Warehouse**  
The default calculation office for the PCS project is the calculation office that is linked to the enterprise unit of the warehouse. You can define a default calculation office of a specific enterprise unit in the **Enterprise Units (tcemm0130m000)** session.
- **None**  
The default calculation office for the PCS project is determined by the number group and the order series of the sales order, service order, or production order for which the PCS project is created. You can use the **Default Project Data by Number Group (tipcs0103m000)** session to define calculation offices for combinations of number group and order series.

## Costing Work Centers

*Costing work centers* serve as an extra level on top of the planning work centers to make costing and planning more independent.

### General

With the costing work centers, you can change an *operation*'s work center during production planning when the estimated costs are already frozen, provided the new planning work center has the same *enterprise unit* as the costing work center. As a result, when you change a work center, you no longer need to change all work centers in the *operation* set and recalculate the estimated costs.

A costing work center has the following advantages:

- Provides more flexibility to update the planning manually
- Facilitates the ad hoc subcontracting of an operation
- Enables you to create one costing center for each enterprise unit

A costing work center can also function as a *calculation office* for the linked enterprise unit.

## Settings

If you want to post your financial transactions on *work center* level, the Financial Transactions by Work Center check box in the **Production Order Parameters (tisfc0100s000)** session must be selected.

- 1 Define a department of the **Work Center** department type in the Departments (tcmcs0565m000) session.
- 2 Specify the *enterprise unit* to which the (costing) work center belongs in the **Departments (tcmcs0565m000)** session.
- 3 Create a costing work center in the Work Centers (tirou0101m000) session with:
  - The **Work Center Type** field set to **Costing**.
  - An *operation rate* code entered in the **Operation Rate Code** field.
- 4 In the **Work Centers (tirou0101m000)** session, create a main work center or a sub- work-center, which are also referred to as planning work centers, and link the defined costing work center to the relevant planning work center in the Costing Work Center field.

### Note:

- The enterprise unit of the planning work center must be the same as the enterprise unit of the *costing work center*.
- If a costing work center is defined, the costing work center's operation rate is used for calculation purposes.
- If no costing work center is defined, the operation rate that is used can be the work center's operation rate, or the task relationship's operation rate, as defined in the Type of Operation Rates field of the **Standard Cost Calculation Parameters (ticpr0100m000)** session.

## Functional explanation

When a *production order* is created, the estimated hours and associated costs are transferred to the *costing work center* that is linked to the planning work center. If no costing work center is linked, the estimated hours are transferred to the planning work center.

If the estimated costs are frozen on a moment that is defined in the Moment Freezing Estimates field of the **Production Order (tisfc0101s000)** session, the end item unit costs are calculated. Note: version control must be disabled.

You can view the end item unit costs by costing work center in the End Item Unit Costs (ticst0510m000) session. When the estimated costs are frozen, the *WIP transfers* are calculated.

The WIP transfers take place between the costing work centers.

### Note:

- After the costs are frozen, the planning work center can change as long as the new planning work center has the same enterprise unit as the costing work center. The costing work center cannot change after the costs are frozen.
- If you decide to ad hoc subcontract an operation and decide to use an external work center instead of a planning work center, the only condition is that the external work center is linked to the same costing work center as the other work centers.

## Operation rates

An operation rate is a rate determined by labor costs, machine costs, or overhead costs. Operation rates are defined in the Operation Rates (ticpr1150m000) session, where these rates are linked to a *cost calculation code* and an *operation rate code*. The operation rates are registered by means of *cost components* of the **Operation Costs** type.

Five types of operation rates exist:

- **Labor** (average costs of one hour of labor).
- **Machine** (average costs for a machine for one hour).
- **Labor Overhead** (indirect costs for one hour of labor).
- **Machine Overhead** (indirect costs for a machine for one hour).
- **Labor Setup** (costs of setting up for production)

For various operation cost types, the amounts are calculated as follows:

- Labor Setup  
: Labor Setup Resources (FTE) \* Setup (h) \* Rate
- Labor  
Labor Resources (FTE) \* Run (h) \* Rate (in which Run (h) = Cycle Time \* Order Quantity)
- Labor Overhead  
: Labor Resources (FTE) \* Run (h) \* Rate (in which Run (h) = Cycle Time \* Order Quantity)
- Machine  
(Setup (h) + Run (h)) \* Number of Machines \* Rate
- Machine Overhead  
(Setup (h) + Run (h)) \* Number of Machines \* Rate

### Note:

A different order quantity is used in the calculation for different types of items:

- Standard Items  
*Economic Order Quantity*
- Customized Items  
Recommended Order Quantity

If the order quantity of the project item is 0, the standard costs by project have not been calculated. You can use the Calculate Standard Costs by Project (tipcs3250m000) session to manually calculate the costs.

If the order quantity of the project item is not known, LN uses the order quantity 1 in the operation cost calculations the results of which are displayed in the Job Shop Operation Cost Analysis (tirou4101m100) session.

### Operation Rates With Job Shop by Site Active

If the **Job Shop by Site** parameter is set to **Active** in the **Implemented Software Components (tccom0100s000)** session, the operation rates are retrieved from the **Operation Rates (ticpr1151m000)** session.

The operation rates are applied directly to production orders by operation cost type.

Operation rates are defined on six levels:

- **Actual rates**  
These rates are defined at employee level, only labor and labor setup rates. They only apply to actual hours, not to estimates.  
Note: These employee-level rates do not apply to the standard cost calculation.
- **Manufacturing projects**  
Note: Only for applicable customer specific products.  
These rates are defined at project level specifically for customized project items with a project specific cost calculation code for the project.
- **Reference operation**  
The reference operation is a combination of reference operation code, machine type, work center and site.
- **Machine capacity group**  
Rates are defined for the combination of machine type, work center and site.
- **Work center**  
The work center of the machine capacity group.
- **Production department**  
The rates are defined by the production department's calculation office.

When no rate for an operation type is found, LN interprets this as zero.

**Note:**

The search goes from detailed to global. LN will use the first operation rate type found, levels above the one where the operation rate is found are ignored. This means different operation rates can be retrieved from different levels.

Neither Repetitive Manufacturing and Assembly Control have reference operations nor machine capacity groups.

Managing Existing Operation Rates in the **Operation Rates (ticpr1151m000)** session If you need to change the data for an existing rate with the **Approved** field set to **yes**:

- 1 Select the operation rates row you want to copy.
- 2 Copy the selected row.  
The new row retains the sequence, description and type of operation costs of the source row.  
The new row has the **Approved** field automatically set to **no**.  
You can manage the rest of the data, such as rate and cost component. You can also alter the effective date for the changed rate.
- 3 Use the **Approve** command, once you have made all the changes, to change the status of the **Approved** field to **yes**. LN will automatically set the expiry date of the previous, approved row with the same cost calculation code, operation rate code, site and sequence to the effective date of the newly approved rate.

## Operation Rates With Job Shop by Site Inactive

For operation rate lines sequence numbers are defined, which allows for multiple operation rate lines. You can define a maximum of 999 lines for each operation rate.

The operation rate code with accompanying operation rates is linked to a work center in the **Work Centers (tirou0101m000)** session, and/or to a work center/task relationship in the **Task Relationships (tirou0104m000)** session.

Whether the operation rates linked to the work center or to the work center/task relationship are used for cost calculation depends on the setting of the **Type of Operation Rates** field in the **Standard Cost Calculation Parameters (ticpr0100m000)** session.

## Cost Calculation Process

### 1 Determine the routing for the item

To calculate the standard cost of an item, first the appropriate routing for the item must be determined. LN must know the routing to determine the set of operations that is used to produce the item. In addition, the best order quantity in which the item is produced must be established.

Because the production order quantity is not established yet, when you calculate the standard cost, the selection of the routing is based on the number in the **Fixed Order** field, or the **Economic Order Quantity** field in the **Items - Ordering (tcibd2100m000)** session. If the **Quantity-dependent Routing** check box is not selected, the default routing is taken. For more information, refer to Selection of routing to calculate costs.

For customized items, LN determines the number of end items by totalizing the end items for all project parts (see the **Project Parts (tipcs2111m000)** session). For the rest, the same procedure is followed as for standard items, except that a customized item can only have one quantity-dependent routing.

### 2 Calculate net output and gross output for the operations

For every operation, the net output and the gross output are calculated. The net output and the gross output are used to calculate material costs and operation costs for an operation.

For the last operation, the output is end-items. For the previous operations the output are intermediate products. The scrap and yield on the operations are taken into account to calculate the gross output for each operation.

Standard cost calculation starts with determining the output of the last operation. For the last operation, the net output equals the order quantity as determined in Step 1. You can calculate the gross output of the last operation based on the net output using the operation's scrap and yield:

$$\text{Gross output} = [\text{net output} \times 100 / \text{yield \% on operation}] + \text{scrap quantity on operation}$$

The gross output of the last operation equals the net output of the preceding operation. Using the scrap and yield of the preceding operation, you can calculate the gross output of that operation. In the same way, the gross outputs and net outputs of the other preceding operations are calculated, one after another.

All quantities and amounts are recalculated to one end item by dividing the quantities and amounts by the number of end items as determined in Step 1.

### 3 Calculate operation costs

LN must determine the man hours and the machine hours spent on an operation. The way that man hours and machine hours are calculated by LN depends on whether an operation has a fixed duration or not. For more information, refer to Calculating man/machine hours.

To calculate operation costs, the calculated hours for an operation are multiplied by the operation rates. Operation rates are defined in the **Operation Rates (ticpr1151m000)** session, and can exist for labor, machines, and overhead. The operation rates are linked to an operation rate code (defined in the **Operation Rate Codes (ticpr0150m000)** session).

The operation rate code is linked to a work center in the **Work Centers (tirou0101m000)** session, and/or to a work center/reference operation in the Reference Operation (tirou4650m000) session. Whether the operation rates linked to the work center, or to the work center/reference operation are used for cost calculation, depends on the setting of the **Type of Operation Rates** field in the Standard Cost Calculation Parameters (ticpr0100m000) session.

If the operation rates of the *work center* are used for cost calculation, LN must determine the work center type of the work center on the operation.

If the work center is a main work center or regular work center, LN looks for the operation rates, and uses them to calculate the operation costs. If the work center is a subcontracting work center, LN determines the subcontracting method, and Subcontracting rates.

All quantities and amounts are recalculated to one end item by dividing the quantities and amounts by the number of end items as determined in Step 1.

### 4 Calculate material costs for the operation

To calculate the material costs for an operation, LN needs to know the material input. Material input is referred to as net input if the scrap is not taken into account. Net input is calculated as follows:

$$\text{Material net input} = \text{gross output items preceding operation} \times \text{net quantity in BOM}$$

Note that the gross output of end items for the last operation equals the order quantity as determined in step 1.

However, LN needs to know the gross input of materials for every operation. The gross input is based on the net input, but takes the BOM line's scrap into account:

$$\text{Gross input} = [(\text{scrap\% of BOM line}/100 + 1) \times \text{net input}] + \text{scrap qty of BOM line}$$

Note that input is related to component materials. Output is related to semi-finished products and end products, and is calculated as described in Step 2.

To calculate material costs for an operation, LN multiplies an operation's gross input of materials by the prices of the materials concerned. If the material is a purchased item, the purchase price is taken. If the material is an (manufactured) item that consists of materials itself, the item's standard cost is taken. The standard cost of materials is calculated dependent on the multilevel calculation method that was selected in the **Calculate Standard Cost (ticpr2210m000)** session. For more information, refer to Cost calculation methods.

The standard cost of the material includes the surcharges for the material's item warehouse. However, the item warehouse surcharge is not aggregated to the cost of the main item. Instead, the surcharges for the BOM warehouse are aggregated to the cost of the main item.

In cost calculation, LN handles phantoms as normal items.



All quantities and amounts are recalculated to one end item by dividing the quantities and amounts by the number of end items as determined in Step 1.

#### 5 Search for previous operation

In the preceding steps of this cost calculation procedure, the costs for the last operation of the routing is calculated. If another, previous operation is found, the cost calculation process is repeated as from Step 3. If a previous operation is not found, the process continues with Step 6.

In (standard) cost calculation, LN ignores the network routing that is established by using phantoms. LN includes the costs for the routing of the phantom in the material costs of the phantom item.

#### 6 Calculate material costs for unlinked materials

If no operations exist for an item, no operation costs are present. Consequently, the previous steps do not apply. Because material is required to produce the item, LN calculates in this step the costs of these so-called unlinked materials. The calculation for unlinked material costs equals the calculation as described in Step 4.

Note that if operations are available, but (some of) the materials have 0 (zero) as a value in the **Position** field, in the **Job Shop List of Material (tibom3610m000)** details session, or the **BOM Line - Material-Routing Relationships (tibom0140m000)** session, LN assumes that those materials are required in the first operation of the routing.

#### 7 Calculate surcharges

The last step in the cost calculation procedure is to calculate the surcharges. Several types of surcharges are distinguished when calculating the standard cost, for example, surcharges for items, for item groups, for item/warehouse combinations, and for general warehouses. In addition, you can distinguish between surcharges that are effective during the item's receipt in the warehouse, or during issue of the warehouse. Surcharges are defined in the **Item Surcharges (ticpr1110m000)** session. Surcharges are calculated in a specific sequence. This sequence is important because surcharges can be calculated over other surcharges. For standard cost calculation, surcharges are calculated in the following order:

- Item receipt surcharges
- Item group receipt surcharges
- Item/warehouse receipt surcharges
- Item group/warehouse receipt surcharges
- General warehouse receipt surcharges
- Item issue surcharges
- Item group issue surcharges
- Item/warehouse issue surcharges
- Item group/warehouse issue surcharges
- General warehouse issue surcharges

Note the following:

- The general warehouse is the warehouse that you define for the item in the **Items - Ordering (tcibd2100m000)** session. You can define surcharges for the general warehouse in the **Item Surcharges (ticpr1110m000)** session. To do this, you leave the **Item** field and the **Item Group** field empty, and you select the general warehouse to define the surcharge for.
- The item/warehouse surcharges are only taken into account for cost calculation, if the warehouse equals the general warehouse defined in the **Items - Ordering (tcibd2100m000)** session.

For standard cost calculation, item and warehouse surcharges are included regardless of their realization moment (receipt or issue). If multiple surcharges of the same type are defined, they are handled by their sequence number, lowest number first.

#### **8** Aggregated or detailed cost

In LN, you can determine how to break down the standard cost: from aggregated on the cost components defined in the **Item - Costing (ticpr0107m000)** session, until detailed in a greater or lesser degree. If you want to break down your standard cost in a detailed way, you must enter a chart with an associated detailed cost component structure in the **Item - Costing (ticpr0107m000)** session. For more information, refer to Cost Component Scheme in Manufacturing.

## Valuation Prices For Standard/Customized/STO items

You can actualize the calculated standard cost and the valuation price as follows:

- For standard items in the Calculate Standard Cost (ticpr2210m000) session and the Actualize Standard Cost and Revalue Inventory (ticpr2220m000) session.
- For customized items in the Calculate Standard Costs by Project (tipcs3250m000) session.

During the actualization process, the cost component structure (consisting of the aggregated and detailed cost components), the standard cost, and the valuation price are made effective. In other words, the structure and prices are stored for an item for a certain date. After the actualization, the effective cost component structure can be viewed, for example, in the Effective Cost Component Structure by Assembly Line and Item (ticpr3162m000) session.

If an item's cost component structure has changed, or the valuation price or standard cost for an item with the valuation method Standard Cost, Warehousing adjusts the inventory value of a warehouse. The inventory value adjustment processes the actual order price into the inventory value of the items. The value correction is posted to Financials and is stored under a revaluation order code. The revaluation order code is generated automatically and can be viewed in the **Item Standard Costs (ticpr3501m000)** session. You can use the revaluation code in Warehousing to track the valuation changes.

**Note:** You cannot actualize costs of a *project* of the type **Budget**.

## Chapter 2: Standard Cost Calculation

### Standard Cost Calculation (CPR)

You can use the Standard Cost Calculation module to calculate *standard cost* and simulated standard cost based on BOM and routing data. You can also calculate sales prices. For an overview of the module, see the Cost calculation methods topic.

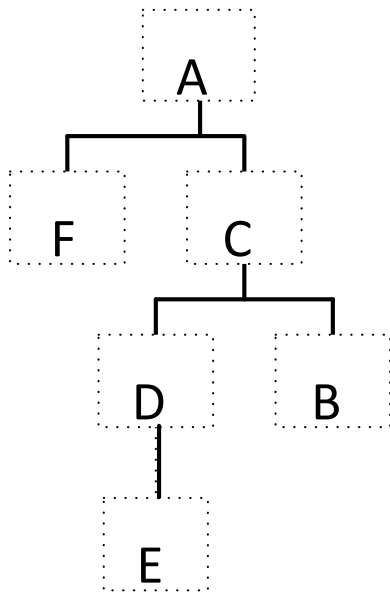
### Cost calculation methods

The cost calculation method determines how a product structure is analyzed during the calculation of the standard cost and valuation price.

**Note:**

- In a *multisite* environment Standard Cost by Enterprise Unit parameter in the **Implemented Software Components (tccom0100s000)** session is activated. The standard cost is maintained for an item and *enterprise unit* combination.
- The item costing data for cost and service items is always maintained at **company** level.

The BOM that follows is used to explain the calculation methods:



Top-down LN calculates the standard cost of each item that affects the standard cost of the selected item. During a cost calculation, LN analyzes the structure of the item.

#### Example

When the standard cost of item C in the example is calculated, LN calculates the standard costs of items E, D, and B in this sequence.

A single level calculation is similar to the top-down method, but the expansion of the bOM stops at the first level (F and C). The standard cost of the underlying items is not recalculated (F and C are not recalculated). The standard cost and valuation price of the existing underlying structure are adopted as is.

#### Example

When the standard cost of item C is calculated, LN reads the prices of items D and B in the Item - Standard Cost Details (ticpr2505m000) session.

In the bottom-up calculation method: LN searches the product structure for items whose standard cost is affected when the standard cost for the main item changes.

If item B is the starting point, items C then A are recalculated. When the calculation is executed in that order, with bottom level items first, the updated standard cost can be read for the higher levels during the calculation process.

The prices of items that are on a lower level in the BOM are not calculated, but are read in the Item - Standard Cost Details (ticpr2505m000) session.

**Example**

When the price of item B in the above figure is calculated, the price of items A and C will also be calculated.

## Calculating Estimated Costs

**Note:**

- If Standard Cost by Enterprise Unit functionality is active, the estimated costs are calculated for a specific item and *enterprise unit* combination.
- For *cost* and service items standard cost is always defined at **Company** level.

The calculation procedure of the estimated order costs is similar to the standard cost calculation. Only the differences are discussed.

- 1 The calculation of the estimated order costs uses other data sources. Estimated order costs are based on:
  - Ordered quantity in the production order
  - Estimated materials
  - Production planning
- 2 For the estimated order costs, only the item receipt surcharges (for end items) are calculated.
- 3 The fixed costs are excluded from the estimated order costs, if one of the following check boxes is cleared:
  - The **Include Fixed Costs in Valuation Price** check box in the Standard Cost Calculation Parameters (ticpr0100m000) session.
  - The **Include Fixed Costs in Project Valuation** check box in the Project Control Parameters (tipcs0100m000) session.
- 4 The calculation is influenced by the **Financial Transactions by Work Center** check box in the Production Order Parameters (tisfc0100s000) session. If the check box is selected, for every operation the estimated order cost is accumulated from the current operation and from previous operations. The amount is stored on the WIP transfer cost component.
- 5 Estimated order costs do not lead to financial transactions. The estimated order cost are used for:
  - The determination of the production results
  - WIP transfer prices
  - Preclosure posting of surcharges.
- 6 Subcontracting is the process of outsourcing a part of the production process to a supplier. Two types occur:
  - Unplanned subcontracting
  - Planned subcontracting

The order estimate always includes costs for subcontracting.

## Standard Cost

Every item in LN must have a *standard cost* before you can generate orders for the item.

The item's standard cost is set up by logistic company or by *enterprise unit* if Standard Cost by Enterprise Unit functionality is active. The standard cost serves as a basis for the item's *valuation price*, can be calculated multiple times each day and stored with the item.

The standard cost is calculated in the Standard Cost Calculation (CPR) module. If you want to examine the effect of changes of the item in LN, you can also simulate costs for an item.

Calculating the standard cost of an item, requires information that affects the costs, such as the materials that are used for the item (derived from the *bill of material (BOM)*), the hours that are spent producing the item (derived from the routing), and the surcharges that apply (derived from the master data).

### Note:

- If Standard Cost by Enterprise Unit functionality is active, standard cost is calculated per combination of item and *enterprise unit*.
- For cost and service items standard cost is always defined at **Company** level.
- If you select the Standard Costs Base check box for a specific item and enterprise unit combination in the Item - Costing (ticpr0107m000) session, the selected item's costing data is used as the item's standard cost base.

If the Standard Cost per EU Mandatory check box in the **Standard Cost Calculation Parameters (ticpr0100m000)** session is cleared, and no item costing data is available for a specific item and enterprise unit combination, the standard costs base costing data is used.

- PBOM

The production bill of material (PBOM) is used in cost calculation to determine the required materials to produce an item. An item PBOM provides information on:

- The materials of which the item consists.
- The quantity of materials that is used for the item.
- The scrap and yield on the materials.

The production bill of materials is linked to the item at company level and copied to the *site* along with the item. **Note:** the source of materials may vary by site, depending on the *planning cluster* linked to the item, consequently the cost of the materials may vary as well.

- Routing

The *routing* is used in cost calculation to determine the number of *man hours* and *machine hours* required to produce an item on a specific site. An item's routing provides information on:

- Which operations are carried out to produce the item.
- The operations' setup time and *cycle time*.
- The *scrap* and *yield* on the operations.

- Surcharges

Surcharges are estimates to cover for indirect costs during production, for example, the costs of order intake, the costs of inspections, or the costs of depreciation of machines and buildings. Surcharges can be defined for items or warehouses. For more information, refer to Surcharges.

In LN, a standard cost calculation code stores the standard cost calculation data that is used to calculate the cost. The standard cost calculation code specified in the Standard Cost Calculation Parameters

(ticpr0100m000) session, stores data to calculate the standard cost. Other cost calculation codes store the data for simulation purposes.

### Standard cost with intercompany trade

If inventory is transferred between warehouses linked to different enterprise units, value may be added to the standard cost of the transferred item.

The added value depends on the defined intercompany trade relations between enterprise units, and the surcharge of the receiving warehouse.

If the Costing Source for the specified item in the **Item - Costing (ticpr0107m100)** session is **Intercompany Transfer Or Intercompany Purchase**, you must specify the **Supplying Enterprise Unit** from which the transfer takes place.

For more information, see Intercompany trade - introduction

## Standard Cost by Enterprise Unit

Every item in LN must have a *standard cost* before you can generate orders for the item.

The standard cost is calculated in the Standard Cost Calculation (CPR) module. If you want to examine the effect of changes of the item in LN, you can also simulate costs for an item in this module.

The standard cost of an item is calculated on either the **Company** or the **Enterprise Unit** level.

### Note:

- The Standard Cost by Enterprise Unit check box in the **Implemented Software Components (tccom0100s000)** session must be selected to implement the functionality.
- If the item for which standard cost is calculated has the costing type **Sales Scheme**, the item is either skipped during calculation, or defaults to a cost component structure.
- For *cost* and *service* items standard cost is always defined at **Company** level.

The standard cost is a financial model of the way an item is produced. An item can be either:

- Purchased from a supplier (external)
- Purchased from an enterprise unit (intercompany)
- Manufactured

The item's standard cost is set up by logistic company or by *enterprise unit*. The standard cost serves as a basis for the item's valuation price and can be calculated multiple times each day. Each calculation is stored for future reference.

In a *multisite* environment, a single item can have multiple standard costs dependent on the number of *enterprise units* and *sites* a company has.

You can use the Item - Costing (ticpr0107m100) session to manage item costing data by enterprise unit.

The following topics describe the calculation:

- Standard Cost

- Standard Cost by Enterprise Unit
- Cost calculation methods
- Cost Component Scheme in Manufacturing
- Calculating Standard Cost and Actualizing Cost Component Scheme

## Item Costing Setup

If the Standard Cost by Enterprise Unit check box in the **Implemented Software Components (tccom0100s000)** session is selected, the master data is automatically generation for the Item - Costing (ticpr0107m000) session, rather than by the item costing defaults you defined.

The generation of the item costing data is triggered by the setup of the logistic flow of an item rather than by the item costing defaults you defined.

### Note:

The setup of the logistic flow of an item serves as a base. Automatic generation of costing data cannot be derived unambiguously in all scenarios.

For example, item data by warehouse is essential for item costing data generation, but is not always created for an item. Or, an item may have insufficient data available to derive the costing source, in the case of item by warehouse not having a supply method defined, and the warehouse not being the ordering warehouse.

Because the generation of item costing data is based on the setup of the logistic flow of an item, the existing item costing defaults for a particular enterprise unit do not automatically translate into actual item costing data for that enterprise unit.

By defining how a product is produced, where an item is produces, between which locations it is transferred and how the product is sold the costing data is adapted to the situation.

Costing data is adapted by:

- Defining item data by *company, site, warehouse* and office.
- Adding item by site and warehouse.

### Note:

- The item costing **Sales Scheme** option is taken from the costing defaults.
- Adjusting costing data must be updating manually, not by changing the logistic flow of the item.

Item-costing is based on:

- Item Properties
- Item by Warehouse Properties
- Supply Relations
- Item Sales Properties
- Item Purchase Properties

### Sites functionality not active

**Note:** If the Sites field in the **Implemented Software Components (tccom0100s000)** is set to either **Inactive** or **Enterprise Model in Preparation**, generation of costing data cannot be triggered by defining item sales data.



The generation of item costing is triggered by:

- Defining the item in the **Items (tcibd0501m000)** session.  
Items of the type **Cost** or **Service** have no *enterprise unit*. Only one item costing record is created, independent of sites and warehouses when the item is created in the **Items (tcibd0501m000)** session.
- Defining item by warehouse data
  - For the ordering warehouse. Item costing data is based on the costing source.
  - For other warehouses. Item costing data is based on the supply-from warehouse or supplying warehouse if no supplying system is specified.
- Defining supplying relations for the item. Item costing data is based on the warehouses of the supplying and receiving item.
- The purchase office you defined in the item purchase data.

**Note:** All data is present only at company level.

If the Sites field in the **Implemented Software Components (tccom0100s000)** is set to **In Preparation**, all processes use item data defined on **Company** level and item data by warehouse.

If you have already defined item data by *site*, it is not yet in use.

If you create new item data, item costing should be based on new item by site and item by office data present.

The same triggers apply as when the sites functionality is active.

## Item Properties

Items of the type **Cost**, **Generic** or **Service** have no item costing data by *enterprise unit*. Only one item costing record is created, independent of *sites* and warehouses when the item is created in the **Items (tcibd0501m000)** session.

## Item by Warehouse Properties

Items of type **Product** and **Tool** require item costing by *enterprise unit*.

The logistical item data for items of these types is defined either by *site* or office. Usually, item costing is created with values defined while ordering:

Field	Value
<b>Enterprise Unit</b>	EU of ordering warehouse
<b>Costing Type</b>	<b>Logistics</b>
<b>Warehouse</b>	Ordering warehouse
<b>Costing Source</b>	Based on supply source (item by site)

Field	Value
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

**Note:** The item site may not have an enterprise unit defined, but the warehouses linked to the site are always part of an enterprise unit. Therefore, the warehouses are used to relate the item by site data to item costing by enterprise unit.

If the costing source of the item by site is **Distribution**:

- And the supplying warehouse or site is part of the same enterprise unit, the item the costing source is determined by the costing source of the selected warehouse/site.
- And the supplying warehouse or site is part of a different enterprise unit from the item the costing source then the source is **Intercompany Transfer**.

Case	Costing Created	Costing Source
No supplying relations are present.	No	
Supply by enterprise unit	No	
Supply by another enterprise unit, within the same company.	Yes	<b>Intercompany Transfer</b>
Supply by other company by warehouse transfer	Yes	<b>Intercompany Transfer</b>
Supply by other company by purchase order (and sales in the supplying company)	Yes	<b>Purchase</b>

In the case of supply by another enterprise unit within the same company, item costing is set:

Field	Value
<b>Enterprise Unit</b>	EU of ordering warehouse
<b>Costing Type</b>	<b>Logistics</b>
<b>Warehouse</b>	Ordering warehouse
<b>Costing Source</b>	<b>Intercompany Transfer</b>
<b>Supplying Enterprise Unit</b>	The enterprise unit of the warehouse of the Supplying <i>plan item</i> -of supplying relations. In the case of multiple relations, the highest priority takes precedence.
<b>Supplying Purchase Office</b>	-
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

- Source: Purchase  
If the item by site has **Purchase** as the source, the costing source depends on the location of the *purchase office*.

- If the purchase office belongs to the same enterprise unit, the costing source is **Purchase**.
- If the purchase office is in another enterprise unit, the costing source is **Intercompany Purchase**.

Field	Value
<b>Enterprise Unit</b>	EU of ordering warehouse
<b>Costing Type</b>	<b>Logistics</b>
<b>Warehouse</b>	Ordering warehouse
<b>Costing Source</b>	<b>Purchase</b>
<b>Supplying Enterprise Unit</b>	-
<b>Supplying Purchase Office</b>	-
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

or

Field	Value
<b>Enterprise Unit</b>	EU of Order Warehouse
<b>Costing Type</b>	<b>Logistics</b>
<b>Warehouse</b>	Ordering warehouse
<b>Costing Source</b>	<b>Intercompany Purchase</b>
<b>Supplying Enterprise Unit</b>	EU of purchase office
<b>Supplying Purchase Office</b>	Purchase office of item purchase by site
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

and

Field	Value
<b>Enterprise Unit</b>	EU of purchase office
<b>Costing Type</b>	<b>Purchase</b>
<b>Warehouse</b>	-
<b>Costing Source</b>	<b>Purchase</b>
<b>Supplying Enterprise Unit</b>	-
<b>Supplying Purchase Office</b>	-

Field	Value
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

- Source: Subcontracting  
If the item has **Subcontract** as the source in the **Items by Site (tcibd1550m000)** session, item costing depends on the location of the purchase office:
  - If the purchase office is in the same enterprise unit, the costing source is **Subcontract**.
  - If the purchase office is in another enterprise unit, the costing source is **Intercompany Purchase**.
- Other supply sources  
If a supply source is used other than **Distribution, Purchase or Subcontract**, the costing source defaults from the supply source:
  - **Job Shop**
  - **Repetitive**
  - **Assembly**

Field	Value
<b>Enterprise Unit</b>	EU of ordering warehouse
<b>Costing Type</b>	<b>Logistics</b>
<b>Warehouse</b>	Ordering warehouse
<b>Costing Source</b>	Based on supply source (item by site)
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

### Other warehouses

Supply from Warehouse item data by warehouse is created for:

- An item with the supplying warehouse is other than the ordering warehouse
- An item with Supply from Warehouse check box in the **Item Data by Warehouse (whwmd2510m000)** session selected.
- An item with the supplying warehouse is in the same company but a different *enterprise unit* from the receiving one.

Field	Value
<b>Enterprise Unit</b>	EU of the warehouse (or item by warehouse)
<b>Costing Type</b>	<b>Logistics</b>
<b>Warehouse</b>	Warehouse
<b>Costing Source</b>	<b>Intercompany Transfer</b>
<b>Supplying Enterprise Unit</b>	EU of the supplying warehouse

Field	Value
<b>Supplying Purchase Office</b>	-
<b>Cost Component Scheme</b>	The scheme defined in the item costing defaults

If item data by warehouse is created for:

- An item with the supplying warehouse is other than the ordering warehouse
- The Supply from Warehouse check box in **Item Data by Warehouse (whwmd2510m000)** is selected for the item.
- The supplying warehouse in another company

The item costing must be created with an **Intercompany Transfer** costing source.

If item data by warehouse is created for:

- An item with the supplying warehouse is other than the ordering warehouse
- The Supply from Warehouse check box in **Item Data by Warehouse (whwmd2510m000)** is selected for the item.
- The supplying warehouse in the same enterprise unit.

No item costing is generated if the Supply from Warehouse check box in **Item Data by Warehouse (whwmd2510m000)** is cleared, item costing is created in the same way as with costing source **Purchase**.

## Supply Relations

Item costing is created based on a supplying relation if:

- The supplying relation is for a single item.
- The actual plan item source is set to **Distribution**.
- No item costing is present for the plan item warehouse.
- The item is supplied from another enterprise unit.

Case	Costing Created	Costing Source
Supply by another enterprise unit, within the same company.	Yes	<b>Intercompany Transfer</b>
Supply by other company by warehouse transfer	Yes	<b>Intercompany Transfer</b>
Supply by other company by purchase order (and sales in the supplying company)	Yes	<b>Purchase</b>

- The supplying warehouse or site is defined on two levels:
  - For items with the order system **PLanned**, in the Supplying Relationships (cprpd7130m000) session.

- For **supply system** by defining relationships between warehouses in the Item Data by Warehouse (whwmd2510m000) session.

If the item has been defined in the Items by Site (tcibd1550m000) session, only the supplying relationships defined in the Supplying Relationships (cprpd7130m000) session are applicable.

You can define supplying relations for a group of items, or all the items in a selected company or one single item.

## Item Sales Properties

If an item is sold by a *sales office* without a warehouse, item costing type **Sales Scheme** is required. Examples are:

- The office is in EU1, but delivery is by a warehouse in EU2.
- Direct delivery.

Item costing is created automatically if:

- The warehouse of the item by sales office is in another *enterprise unit*, or the warehouse is empty.
- No item costing is present.
- The item type is **Product** or **Generic**.

### Note:

If item costing of the type **Logistics** or **Purchase** is created for the sold item, it will overrule any costing of the type **Sales Scheme**.

Example: If costing for enterprise unit X is created in the **Items - Sales by Office (tdisa0181m000)** session, and later Item Data by Warehouse requires costing for *site* X, item costing will be updated and costing type **Sales Scheme** will be replaced by **Logistics**.

## Item Purchase Properties

Items sold by a central *purchase office* to a different *enterprise unit* from where they originate must have item costing type **Purchase**.

**Note:** Item by purchase office is optional if no specific purchase office is defined in the item data. If the *sites* functionality is active, Item Purchase by Site is mandatory. The purchase office can be defined in Item Purchase as well as in Item Purchase by Site.

Case	Costing Created	Costing Source
Supply by other company by purchase order (and sales in the supplying company)	Yes	Purchase

## Standard Cost calculation of purchased items

The total costs of a purchased item is the sum of the purchase costs, plus surcharges. Both are regarded as added cost (refer to Added costs).

The *cost calculation code* lists, by priority, the type of purchase price used for cost calculation. The current and average purchase prices are retrieved from the Items (tcibd0501m000) session. The simulated purchase price is retrieved from the Simulated Purchase Prices (ticpr1170m000) session.

Surcharges are applied to the purchase price. Because the total costs equal the added cost, surcharges of the methods added costs and total costs result in the same amount.

The *standard cost* of a *purchased item* consists of:

- The purchase price, derived from the Purchase Price field in the **Item - Purchase** session or the Simulated Purchase Price field of the Simulated Purchase Prices (ticpr1170m000) session.
- The *landed costs*, derived from the landed costs defined in the Item - Purchase (tdipu0601m000) session.
- The warehouse (receipt) surcharge, derived from the data defined for the warehouse specified in the Warehouse field of the **Items - Ordering (tcibd2100m000)** session.

## Selection of routing to calculate costs

A routing can be used in the following calculations:

- The calculation of an item's standard cost.
- The calculation of production order costs and production order lead time.

### Note:

- In the Items - Ordering (tcibd2100m000) session, the data is specified on global (company) level, you can manually edit the item ordering data for each individual site.

The routing used for the calculation depends on the following settings:

- If the **Quantity-dependent Routing** checkbox in the Item - Production (tiipd0101m000) session is cleared, LN checks the default routing that is defined in the Job Shop Master Data Parameters (tirou0100m000) session. If that default routing code is also linked to the item and site combination in the Item - Routings (tirou1101m000) session, the default routing is used in the item's standard cost calculation. If the default routing is not linked to the item and site combination, no routing is used in standard cost calculation.
- If the **Quantity-dependent Routing** checkbox in the **Item - Production (tiipd0101m000)** session is selected, more than one Order quantity dependent routings can be linked to an item. If the production order quantity of the item is unknown at the moment of setup, you must estimate the quantity to determine which routing is applicable. The order quantity is derived from the item ordering data defined in the Items - Ordering (tcibd2100m000) session:
  - If the **Method** field is **Fixed Order Quantity**, routing selection is based on the number in the **Fixed Order** field.
  - If the **Method** field has another value, routing selection is based on the number in the **Economic Order Quantity** field. To select a routing, LN compares the value in the **Fixed Order** field or the **Economic Order Quantity** field with the value in the **Up to Quantity** field in the **Item - Routings (tirou1101m000)** session.

### Routing used in a production order

In production orders, a routing is used to calculate production order costs and to determine the production order lead time. In the **Routing** field in the Production Order (tisfc0101m100) session, the applicable routing is displayed. Dependent on the setting of the **Quantity-dependent Routing** checkbox in the **Item - Production (tiipd0101m000)** details session, the default routing, or an order quantity dependent routing is selected in the **Routing** field. The routing is determined as follows:

- If the **Quantity-dependent Routing** checkbox in the **Item - Production (tiipd0101m000)** details session is cleared, LN checks the default routing that is defined in the **Job Shop Master Data Parameters (tirou0100m000)** session. If that default routing code is also linked to the item in the **Item - Routings (tirou1101m000)** session, the default routing is displayed in the **Routing** field. If the default routing is not linked to the item in the **Item - Routings (tirou1101m000)** session, the **Routing** field will be empty.
- If the **Quantity-dependent Routing** check box in the **Item - Production (tiipd0101m000)** details session is selected, more than one (order-quantity-dependent) routing can be linked to an item in the **Item - Routings (tirou1101m000)** session. The number entered in the **Quantity Ordered** field in the **Production Orders (tisfc0501m000)** details session determines which of the order quantity dependent routings is displayed in the **Routing** field.

**Note:** You can manually modify the displayed routing in the **Routing** field in the **Production Order (tisfc0101m100)** session.

## Calculating operation costs (labor, machine, overhead)

Labor, machine, and overhead costs are calculated to determine the operation costs.

**Note:** The calculation is applicable if the **Job Shop by Site** parameter in the **Implemented Software Components (tccom0100s000)** session is set to **Inactive**.

If the work center is a main work center, LN first checks the setting of the **Type of Operation Rates** field in the Standard Cost Calculation Parameters (ticpr0100m000) session. If the parameter value is **Work Center Rate**, LN reads the work center's operation rate code. A number of labor, machine, and overhead rates have been recorded using the above-mentioned operation rate code for the selected cost calculation code in the Operation Rates (ticpr1150m000) session.

Based on this data, LN calculates the labor and machine costs required to carry out the relevant operation using the following formulas:

$$\text{Labor costs} = \text{labor hours} \times \text{labor rate}$$

$$\text{Machine costs} = \text{machine hours} \times \text{machine rate}$$

Depending on the method used to calculate overhead costs (set via the **Operation Rates (ticpr1151m000)** session), LN calculates the overhead costs on the basis of the labor hours or machine hours. This is done using the following formula:

$$\text{Overhead costs} = \text{labor hours or machine hours} \times \text{overhead rate}$$

According to the direct costing principle, no overhead costs are included in the cost calculation code.



The operation costs for the operation comprise labor, machine, and overhead costs.

If the **Type of Operation Rates** field is **Task Relationship Rate**, LN reads the task's operation rate code and goes through the same cycle, as described above.

## Calculating operation costs (labor and machine hours)

LN determines the labor and machine hours to calculate the operation costs.

For each operation found in the structure, LN determines the *reference operation* type.

The formula LN applies to calculate the labor hours depends on whether or not the operation has a fixed duration. If the operation has a fixed duration, LN applies the following formula to calculate the machine hours:

```
machine hours = ( setup time * number of machines ) + ( cycle time * number of machines / routing quantity )
```

If the operation does not have a fixed duration, LN applies the following formula to calculate the labor hours:

```
labor hours = ( average setup time * labor occupation for setup ) + ( cycle time * quantity planned input * labor occupation for production / routing quantity )
```

The formula LN applies to calculate the machine hours depends on whether or not the operation has a fixed duration. If the operation has a fixed duration, LN applies the following formula to calculate the machine hours:

```
machine hours = ( setup time * number of machines ) + ( cycle time * number of machines / routing quantity )
```

If the operation does not have a fixed duration, LN applies the following formula to calculate the machine hours:

```
machine hours = ( setup time * number of machines ) + ( cycle time * quantity planned input * number of machines / routing quantity )
```

Next, LN determines if the work center type is carried out at a main work center, a sub-work center, or a subcontracting work center.

If the work center is a main work center or a sub-work center, the costs are calculated as described in Calculating operation costs (labor, machine, overhead). If the work center is a subcontracting work center, the calculation is performed as shown in Operation subcontracting without material flow support.

## Performance considerations when calculating cost and valuation prices

If you calculate and actualize cost and valuation prices, and performance is low, you can decide to use extra servers ('parallel bshells') to increase the speed of the calculation and actualization process.

You must define the servers in the Performance Boosters (tcmcs0597m000) details session. If you activate the servers, an extra tab is added to the **Calculate Standard Cost (ticpr2210m000)** session: The **Parallel Bshells** tab.

### Calculation and actualization

Calculation in parallel bshell mode is done bottom-up, and level by level, starting with the lowest level (purchased items). Within a level, the items are calculated in single-level mode.

If you actualize cost and valuation prices in parallel bshell mode, no report is printed with actualized costs and valuations. Instead, after running the **Calculate Standard Cost (ticpr2210m000)** session, you can use the **Print Inventory Revaluation Transactions (whina1422m000)** session to print the revaluation transactions.

### Batch size

In the **Calculate Standard Cost (ticpr2210m000)** session on the **Parallel Bshells** tab, in the **Batch size** field, you can define the number of items that are submitted in one go to the parallel servers (bshells). If you define a large batch, you reduce the overhead per item, which can speed up the calculation and actualization process. However, a large batch can also slow down the process because of the waiting times at the end of a level. When in doubt, use the default of this field.

### Logfile

If you are calculating or actualizing in parallel bshell mode, warnings that are normally sent to a printer or display device, are now logged in logfile `log.cpr2210`. Use the **Display Error Log (ttstperlog)** session to review the logfile.

Additional information about the calculation and actualization process, for example, the number of items and runtimes, can be logged in log file `log.cprd112001`. To get this additional logfile, add the following setting to your BWC file:

```
-set LOGGER=1 -set LOGGER_LEVEL=INFO
```

## Chapter 3: Cost Components

### Cost Component Scheme in Manufacturing

A cost component scheme is a mandatory structure that specifies the breakdown of the cost of an item to the level of detail you want, using cost components. You can define this structure in the Cost Component Scheme (ticpr0109m000) session.

In the Standard Cost Scheme Details (ticpr0110m000) session, you can collect all the cost components of the type **collect** in a scheme.

In other words, in the cost component structure, you can break down the cost to the level of detail you want: from completely aggregated to a detailed breakdown.

Cost components are also used to:

- Compare estimated and actual production order costs.
- Express production variances.

Cost component codes are defined in the Cost Components (tcmcs0148m000) session, and assigned to one of the cost types:

- **Operation Costs**
- **Material Costs**
- **Surcharge**
- **General Costs**
- **Not Applicable**

You must link a cost component of the applicable costing type to all entities in LN that are accountable for costs: materials, operations, surcharges, labor, and so on.

**Note:**

- If Standard Cost by Enterprise Unit functionality is active, a cost component scheme is linked to a item and *enterprise unit* combination.  
Cost and service items of which the costs are not enterprise unit related, cannot be linked to an enterprise unit. The costs of these item is calculated on **Company** level.
- The cost component type **Not Applicable** is used in Project and Service.

#### Cost component structure set up

- 1 Define four cost components of the component type **Aggregated** with the cost types **Operation Costs**, **Material Costs**, **Surcharge**, and **General Costs** in the Standard Cost Scheme Details (ticpr0110m000) session.

The aggregated cost components are used to represent the total amounts per item and cost type.

- 2 Define four cost components of the component type **Collect** with the cost types **Operation Costs**, **Material Costs**, **Surcharge**, and **General Costs** in the Standard Cost Scheme Details (ticpr0110m000) session.

Select **Yes** in the **Collect in Scheme** field.

**Note:** If you do not specify cost components of type **Detail**, or **Collect** with the **Collect in Scheme** set to **No**, all costs are broken down on the cost components with the **Collect in Scheme** set to **Yes**.

- 3 Define cost components of type **Collect** with the **Collect in Scheme No** and the Cost Component field set to **Detail** in the Standard Cost Scheme Details (ticpr0110m000) session.

**Note:** This step is optional.

**Note:** Four cost components of the type **Aggregated** and **Collect** are mandatory for a valid cost scheme.

### Cost Component scheme validation

You must validate a new or modified cost component scheme before use. A cost scheme must be valid before it can be linked to an item.

The validation process for individual schemes is initiated from the Cost Component Scheme (ticpr0109m000) and Cost Component Scheme (ticpr0609m000) sessions, and the validation of multiple schemes simultaneously in the **Validate Cost Component Schemes (ticpr0209m000)** session.

To be valid, the cost component scheme must contain:

- Four **Aggregated** cost components of these types:
  - **Operation Costs**
  - **Material Costs**
  - **Surcharge**
  - **General Costs**
- Four **Collect** cost components with the **Collect in Scheme** field set to **Yes**:
  - **Operation Costs**
  - **Material Costs**
  - **Surcharge**
  - **General Costs**

A valid cost component scheme has the **Validated** check box selected, and the date of validation displayed in the **Last Validation Date** field.

If you modify a cost component scheme, the **Validated** check box is cleared and the date displayed in the Modified field in the **Cost Component Scheme (ticpr0109m000)** and **Cost Component Scheme (ticpr0609m000)** sessions.

If the cost components scheme is modified, but not validated, the modifications can be removed using the **Undo Scheme Modifications** option. Modifications are effective only once the cost component scheme is validated.

**Note:** You can only use validated cost component schemes in the Item - Costing (ticpr0107m000), and Assembly Line Costing Data (ticpr0115m000) sessions.

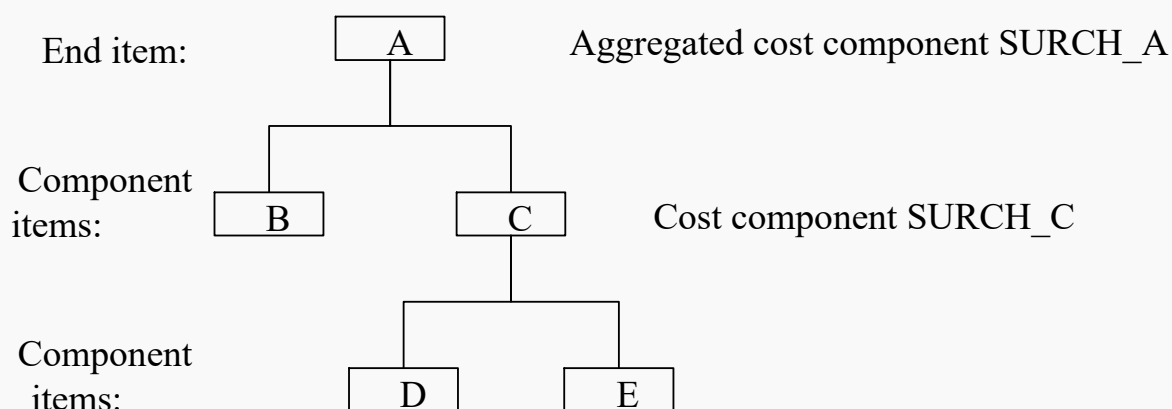
### Booking costs on cost components

During production of a manufactured item, all costs are booked on the cost component to which the costs are linked. These cost components can differ from the cost components in the end item's cost component structure.

- Operation costs are booked on the cost component as defined in the Operation Rates (ticpr1150m000) session.
- Material costs are booked on the materials' cost components. You can view the cost components in the Item Inventory - Cost Details (whwmd2517m000) session.
- Surcharges are booked on the cost component as defined in the Item Surcharges (ticpr1110m000) session.

After production, if you report an order as complete and the items are received in the warehouse, the costs are booked on the cost components as defined in the end item's cost component structure. If the Moment of Completion Posting field in the **Production Orders (tisfc0501m000)** session is **quantity Completed**, the costs are booked as soon as a quantity of the production order is reported completed.

### Example



### Explanation:

If you defined a detailed cost component SURCH\_C for component item C in the **Standard Cost Scheme Details (ticpr0110m000)** session, and you want to report the costs posted to the detailed cost component SURCH\_C separately for end item A, you must also define cost component SURCH\_C in the chart details for end item A. If you do not define a cost component SURCH\_C for item A, cost component SURCH\_C becomes part of item A's aggregated cost component SURCH\_A. You must define the detailed cost components of an item's cost component structure in the **Standard Cost Scheme Details (ticpr0110m000)** session.

## Aggregated cost components

Each item has four cost components of the type **Aggregated** that are defined in the **Item - Costing (ticpr0107m000)** session:

- **Material Costs**  
The costs of raw materials.
- **Operation Costs**  
The cost of operations and subcontracting for the finished end item, and all the required subassemblies.
- **Surcharge**  
All item surcharges, and warehouse surcharges.
- **General Costs**  
All costs that do not fit the other categories.

## Detailed cost component

A detailed cost component contains nonaggregated costs that originate directly from surcharges, operations, or purchases. These costs are defined in the following sessions:

- Item Surcharges (ticpr1110m000)
- Operation Rates (ticpr1150m000)
- Subcontracting Rates (ticpr1160m000)
- Items (tcibd0501m000)

When you specify a Cost Component Scheme in the **Item - Costing (ticpr0107m000)** session, and you define the cost component details for that scheme in the **Standard Cost Scheme Details (ticpr0110m000)** session, the costs are posted using the detailed cost components that you defined as scheme details.

## Defining Cost Component Scheme

If you link a chart to an item in the **Item - Costing (ticpr0107m000)** session, to an item group in the **Item - Costing Defaults (ticpr0108m000)** session, or to an assembly line in the **Assembly Line Costing Data (ticpr0115m000)** session, the detailed cost components that you define in this session are reported in the effective cost-component structure for a specific item.

In the **Item - Costing (ticpr0107m000)** session and the **Assembly Line Costing Data (ticpr0115m000)** session, you can choose from the *appropriate* menu to display the effective cost-component structure of the item. LN stores the effective cost-component structures by item and by date.

**Making detailed cost components effective**

LN stores the effective cost component structures by item and by date. Before you can see the latest changes to the detailed cost components in the **Effective Cost Component Structure (ticpr3101m000)** session, you must successively use the following sessions to actualize the cost components:

- **Calculate Standard Cost (ticpr2210m000)**
- **Actualize Standard Cost and Revalue Inventory (ticpr2220m000)**

## Chapter 4: Surcharges

### Surcharges

In the Item Surcharges (ticpr1110m000) session, you can define two types of *surcharges*:

Item surcharges

- Surcharges by item group
- Surcharges by item

Warehouse surcharges

- General surcharges by warehouse
- Surcharges by item group/warehouse
- Surcharges by item/warehouse

Item surcharges are the basis for extra costs and discounts (in terms of percentage of fixed amounts) in the cost/valuation price structure for items. If you define surcharges by item as well as surcharges by item group, the surcharges by item group are ignored during cost calculation. If general surcharges by warehouse are defined, they are used in cost calculation on top of surcharges by item or surcharges by item group.

Surcharges can relate to fixed costs and variable costs and are entered under a *cost calculation code*. You can record surcharges and/or discounts for the total costs, or just for added costs.

*Surcharges* in the Standard Cost Calculation module are estimates and are posted by a *cost component*.

Surcharges are used as follows:

- To calculate the Standard Cost
- To calculate the *valuation price*
- To do production order costing
- To determine the inventory value in case of actual costing methods

### Booking triggered by

Item and warehouse *surcharges* are added to the Valuation Prices during the *receipt* of the item into a warehouse or when the item is *issued*. The moment when costs are added is important for inventory valuation.

The standard cost includes item surcharges and does not depend on when costs are posted. Warehouse surcharges for the standard warehouse (the standard warehouse is defined in the **Items (tcibd0501m000)**



session) are included in the standard cost, too. If an item is a component in the *bill of material* (BOM), LN uses the BOM warehouse to calculate the standard cost of the component item.

## Receipt

Item surcharges are added to the Valuation Prices during the receipt of the item into a warehouse. For purchased items, this is the moment of receipt into the warehouse (the **Warehouse Receipt (whinh3512m000)** session or the **Warehouse Inspections Overview (whinh3122m000)** session). For manufactured items, this is the moment of:

- Order completion.
- Order closing.
- Correcting the WIP value, based on actual costs.

Warehouse surcharges are added to the Valuation Prices for inventory valuation at the moment of receipt into the warehouse.

## Issue

Item surcharges are added to the Valuation Prices at the moment the item is *issued* to work-in-process, or as a material on the service order.

A special case is the warehouse item transfer. During a transfer, the item code changes. Item issue and receipt surcharges are applied during these warehouse item transfers. The item surcharges are not used during item movements between warehouses. The item surcharges are only used once during the process flows.

Warehouse surcharges with realization moment Issue are added to the Valuation Prices when the item leaves the warehouse. This total value is used as the cost of goods sold, transfer price, and so on. When subsequent warehouse transfers are carried out, the warehouse surcharges are included in the valuation price again and again. This means that when an item is moved back and forth between warehouses, the valuation price increases in case of actual costing. Not when the item is a *FTP item*.

For the *price calculation code* of type Sales Price, only item surcharges with the realization moment issue can be defined.

# Added costs

The added value/costs represent the actual increase of utility from the viewpoint of the customer as a part is transformed from raw materials to finished inventory. The distinction between added and non-added is used to determine the surcharge amount.

For new purchased items:

- The added costs are the material costs plus surcharges.

For manufactured items:

- The added costs are the operations costs plus surcharges. Materials (including the item receipt surcharges and warehouse surcharges) are considered as non-added cost.

For items transferred between warehouses:

- The added costs are the warehouse surcharges.

## Chapter 5: Backflushing

### Backflushing

If you do not want to record every issue of a material or every spent production hour individually, you can apply *backflushing* instead. This saves time, but some precision is lost.

Typically, backflushing is used for low cost material with a regular consumption. Backflushing does not reflect the physical material flow, but is an administrative process. With the material shipped to the place of manufacture and consumed, to be administratively accounted for on the order later.

### Backflushing Requirements

#### Prerequisites

To backflush assembly parts and hours, the following conditions must be met:

- The line station orders must be **Completed**.  
The current session is, therefore, usually run when an assembly order is reported complete at a line station, from the *appropriate* menu of the Line Station - Assembly Orders (tiasl6510m000) session.
- The assembly parts must be allocated.  
Materials that were not allocated, can not be backflushed. Refer to Build Assembly Part Allocation (tiasc7240m000) for more information about the allocation of materials.

#### Functionality

During backflushing, the following happens for each *line station order* that is processed:

- The costs of different *cost components* are converted to the effective cost component structure by assembly line and item, defined in the Standard Cost Calculation (CPR) module.
- The number of assembly hours that must be backflushed is determined. The assembly hours are posted and backflushed in People automatically.
- The number of assembly parts that must be backflushed is determined. The inventory is adjusted for each assembly part in Warehousing.
- The planned stock transactions for each clustered line station order are reduced.
- The **Line Station Order Status** is set to **closed**.

## Parameters

The way backflushing is carried out, depends on the Transaction Processing parameter, which you define in the **Assembly Control Parameters (tiasc0100m000)** session.

- **Order Based** Requirements are backflushed for each individual assembly order.
- **Line Station Based** Requirements are backflushed for each line station, with requirements of all the line stations orders added together. LN determines to which *clustered line station order* and *time bucket* the materials belong. LN combines the backflushing of materials that belong to the same time bucket, for a certain line station.

## Financial Transactions

Backflushing results in the following financial transactions:

- Transaction origin: ASC Production
- Financial int. transaction: issue

Debit	production WIP
Credit	inventory

- Transaction origin: ASC Production
- Financial int. transaction: operation costs

Debit	production WIP
Credit	absorbed labor costs

# Setting up backflushing

The parameter settings that control backflushing are explained using an example. The following items have been defined :

- CLOCK
- PIN

The PIN item is used as a component for the CLOCK item in a task called ASSEMBLE.

- Backflushing materials

Use the following settings in the **Item - Production (tiipd0101m000)** session to set up the items for backflushing:

- Select the **Allow Backflushing** check box for the PIN item.
- Select the **Materials** check box for the CLOCK item.

When you create a production order, these check boxes determine the default settings of:

- The **Materials** check box in the **Estimated Materials (ticst0101m000)** session (for PIN).
- The **Backflush Materials** check box in the **Production Order (tisfc0101s000)** session.

You can modify these check boxes for a particular production order. LN backflushes the material only if you select both of these check boxes.

If you clear the **Backflush Materials** check box, LN clears the **Materials** check boxes for all materials.

- Backflushing hours

Use the following settings to set up the items for backflushing of hours:

- Select the **Backflushing** check box for the ASSEMBLE task in the **Task Relationships (tirou0104m000)** session.
- Select the **Hours** check box for the CLOCK item in the **Item - Production (tiipd0101m000)** session.

When you define an *operation* for the ASSEMBLE task, the **Backflushing** check box in the **Task Relationships (tirou0104m000)** session determines the default setting of the **Backflushing** check box in the **Routing Operations (tirou1102m000)** session.

When you create a production order, LN sets the defaults as follows:

- The **Backflushing** check box in the **Routing Operations (tirou1102m000)** session determines the default setting of the **Report Labor Hours** check box in the **Production Planning (tisfc0110m000)** session.
- The **Hours** check box in the **Item - Production (tiipd0101m000)** session determines the default setting of the **Hours** check box in the **Production Order (tisfc0101s000)** session.

You can modify these check boxes for a particular production order. LN backflushes the hours only if you select both of these check boxes.

If you clear the **Hours** check box, LN clears the **Report Labor Hours** check boxes for all operations.

To make backflushing of hours possible, you must also:

- Enter a value in the **Default Labor Resource** field in the **Work Centers (tirou0101m000)** session.
- Enter a value in the **Labor Type** field in the **Production Order Parameters (tisfc0100s000)** session to determine whether work is charged as normal hours or overtime hours.

- Serialized items

Serialized items can only be backflushed if in the **Item - Warehousing (whwmd4500m000)** details session the Serials in Inventory check box is cleared, and the Register Lot Issue During As Built field in the **Item - Warehousing (whwmd4600m000)** session is **yes**. In all other cases, serialized items cannot be backflushed.

If the serialized item is lot-controlled, the lot from which the items are backflushed is based on the outbound method (**Last In First Out (LIFO)**, **First In First Out (FIFO)**) as is defined in the **Item - Warehousing (whwmd4500m000)** details session.

- Backflushing in Job Shop

Set the following parameters in the **Production Order Parameters (tisfc0100s000)** session:

- Select a backflushing method to determine the level of user interaction in the backflushing procedure.
- Select the devices for the backflushing materials and hours reports.

- Backflushing in Repetitive Manufacturing

You can manage materials backflushing in the **Repetitive Manufacturing Parameters (tirpt0100m000)** session. Depending on the selected backflushing method, backflushing is triggered after quantities end item are reported completed, when a shift is reported completed, or one of the other triggers.

Backflushing updates the *work cell* cost document.

**Note:** If you use the Enterprise Modeler Content Pack with LN, consider using the MMN0220 (Backflushing for Production Orders) *wizard* to set up backflushing. You can execute this predefined wizard from the **Wizards by Project Model (tgwzr4502m000)** session after you specified the *business function model* for your company.

## Calculate backflush quantity

If you report the total ordered quantity as completed, the material quantity that is issued through backflushing equals the *estimated material* quantity.

If you report a part of the ordered quantity as completed, the material quantity to issue is calculated as follows:

```
Backflushed material quantity =
Estimated quantity x (Quantity to backflush / Quantity planned input)
```

- The *quantity-planned input* is the ordered quantity, corrected for scrap and yield on the operation.
- The estimated quantity that appears in the **Estimated Materials (ticst0101m000)** session.

Any scrap on the material that you do not define as a percentage but as a fixed quantity is issued all at once as soon as backflushing is carried out. You can define these scrap quantities in the following sessions:

- **Estimated Materials (ticst0101m000)**
- **Production Planning (tisfc0110m000)**

## Process backflushed materials

LN backflushes the materials linked to the operations for which quantities are reported as completed. If a production order has no operations, LN backflushes all materials.

For details about the calculation of the quantities to issue through backflushing, see Calculate backflush quantity.

You can see the result of backflushing materials in the **Production Order (tisfc0101s000)** session.

LN subtracts the backflushed material quantity from the **Subsequent Delivery** field and adds the same quantity to the **To Issue** field. The corresponding warehousing order is immediately initiated.

## Backflushing example

In a machine factory, chains are manufactured. A chain is made of 40 chain links. A machine produces 10 chains in a minute. You release a production order for 300 chains.

The estimated production cost is:

- Estimated materials: 12000 chain links
- Estimated hours: 0.5 hour

Evidently, the operation to produce the chain cannot start before the chain links have been issued from the warehouse to the job shop. However, if you apply backflushing, you do not record the physical issue of materials in the system.

When the production order is finished, 295 chains are reported completed, and 10 chains are reported rejected, because they were not put together correctly.

The quantity to backflush is 305 (= 295 + 10) chains.

The actual production cost is recorded as:

- Actual materials: 12200 chain links
- Actual hours: 0.508 hour

## Chapter 6: Inventory Valuation

### Inventory valuation

Inventory can be valued using several valuation methods:

- *Standard cost*
- *Mov. Aver. Unit Cost (MAUC)*
- *First In First Out (FIFO)*
- *Last In First Out (LIFO)*
- *Lot Price (Lot)*
- *Serial Price (Serial)*

Valuation methods result in a particular inventory value in the ledger. However, the market value of the inventory can sometimes be lower than the inventory value in the ledger, for example, when item prices decrease, or when the items are almost at the end of their life cycle. Consequently, the value in the ledger does not always represent the real value of the inventory anymore.

The International Financial Reporting Standards (IFRS) in some cases require reporting the market value of the inventory instead of an inventory value determined by the original purchase prices. The market value can provide you with a better insight into the real value of the inventory. Reporting inventory value based on market values instead of (higher) purchase prices is also referred to as *lower cost or market value (LCMV)*.

You can choose whether or not to revalue the inventory value to the market value. Therefore, the following options are available:

- **Reporting inventory value without revaluation**  
The inventory value is determined using market values. However, this inventory market valuation is only temporary. At the start of the next financial period, the original inventory value (based on purchase prices) is used.
- **Reporting inventory value with revaluation**  
The inventory value is determined using market values. After that, the inventory is revalued with the market value. So, at the start of the next financial period, the market value is used as the new inventory value.

#### **Market values in Warehousing**

In LN, you can use market values to value inventory for purchased items as well as for manufactured items. Market values can be entered in the Market Values (whina1118m000) session.

Market values, which are either approved purchase prices or manually entered prices, are used in the following sessions:



- **Perform Inventory Valuation (whina1210m000)**

If, on the **Difference** tab, under **Compare Inventory Value With**, either of the following options is selected:

- **Market Value (including surcharges)**
- **Market Value (excluding surcharges)**

- **Change Valuation Method (whina1232m000)**

If, after changing the valuation method, the inventory value must be equal to the market value.

- **Actual Costs Correction (whina1230m000)**

If the valuation method is **First In First Out (FIFO)**, **Last In First Out (LIFO)**, **Lot Price (Lot)**, **Serial Price (Serial)**, or **Moving Average Unit Cost (MAUC)**, and the inventory value must be equal to the lowest of the current inventory value and the market value.

- **Calculate Standard Cost (ticpr2210m000)**

If the valuation method is **Standard Cost**, and the new standard cost (and inventory value) must be equal to the lowest of the current standard cost and the market value.

If an item's market value that is entered in the **Market Values (whina1118m000)** session is lower than the item's original purchase price, the market value is used to calculate the valuation price.

#### Example Standard Cost valuation method

The value of the inventory is obtained by multiplying the inventory by the standard cost of the items. Each workday the inventory will be changed by transactions, and the standard cost is valid for a specific period. To calculate the value of the inventory from a particular date in the past, multiply the inventory and the standard cost on that date.

## Valuation Prices

The actual price that is used in inventory valuation and financial transactions performed on the item, for example, the standard cost of goods sold, inventory transfer, and the issue to work-in-process value.

The valuation price differs from the standard cost in the following ways:

- It is based upon one of the valuation methods (*fixed transfer price (FTP)*, *last in, first out (LIFO)*, *first in, first out (FIFO)*, *moving-average unit cost (MAUC)*, and *lot costing*)
- It is based upon the economic value, and not on standard structures
- It is not necessarily a fixed price (differs according to the situation and the transaction)
- It is used for financial transactions and for accounting purposes

## Standard Cost and Valuation Price

The standard cost is calculated for an item and *enterprise unit* combination, using a standard cost calculation code and based on the cost scheme linked to the item.

The purpose of the cost calculation is:

- Simulation
- Estimation
- Analysis

In a *multisite* environment there are several scenarios for triggering a standard cost calculation:

- For one enterprise unit only

One item costing data record and enterprise unit is selected.

Depending on the selected cost calculation method, the calculation is performed top-down, bottom-up or single level.

**Note:** For materials with costing course **Intercompany Transfer** or **Intercompany Purchase** the standard costs are calculated using intercompany trade functionality. Effective standard costs of materials in the supplying *enterprise unit* are used to fill the source amounts.

- For all enterprise units linked to the company

All records with costing source **To be assigned**, **Job Shop** or **Purchase** are selected first. An error message is shown if no records are present for a material in a selected enterprise unit. For materials with a **Intercompany Transfer** or **Intercompany Purchase** supply source, standard costs in the supplying enterprise unit are also recalculated.

**Note:** When the calculation is complete for an item and enterprise unit combination, you must check if the combination is in use as intercompany supply elsewhere, and recalculate the standard costs in the destination enterprise unit.

Once the calculations for all other costing sources are complete, select all records with the costing source **Intercompany Transfer** and **Intercompany Purchase**, if standard costs for this item and enterprise unit combinations were not already calculated during the run.

- For a range of enterprise units linked to the company

The standard cost calculation is done in a loop for all enterprise units in the selected range. For each individual enterprise unit the first scenario is executed.

The only exception occurs, if materials with the cost source **Intercompany Transfer** and **Intercompany Purchase** are present, and the supplying enterprise unit is selected in the range. The standard costs are then recalculated for the combination of the item and supplying enterprise unit at once.

**Note:** If the Standard Cost by Enterprise Unit check box in the **Implemented Software Components (tccom0100s000)** session is selected, but the **Standard Costs at Level** check box in the **Items (tcibd0501m000)** session is set to **Company** for the selected item, the item is excluded from the cost calculation by enterprise unit. This may occur when an already existing item was converted into a multisite environment.

### Actual Cost

The actual cost calculation is done by using a valuation method ( *standard cost*, *last in, first out (LIFO)*, *first in, first out (FIFO)*, *moving-average unit cost (MAUC)*, or *lot costing*) and is based upon economic value. The valuation price calculation is situation- and transaction-dependent. The valuation price calculation is done based on:

- Inventory value
- Issue
- Receipt

- Transfer

The purpose of the actual cost calculation is to facilitate financial transactions and accounting.

Two different prices occur within the actual cost. This depends on the moment when LN books the surcharge, which can be during the receipt or during the issue of an item. The calculation of this so-called receipt actual cost and the calculation of the issue valuation price are different. The calculations are expressed as follows:

For the receipt valuation price calculation of item A in warehouse 001, LN determines:

- The independent surcharges
- The warehouse-specific surcharges
- The item and item-group-specific surcharges

The issue actual cost is equal to the receipt valuation price plus:

- The issue item surcharges
- The issue item/warehouse surcharges
- The issue warehouse surcharges

## Calculating Cost and Valuation Prices

Select the **Actualize Standard Cost and Revalue Inventory** check box in this session, or use the **Actualize Standard Cost and Revalue Inventory (ticpr2220m000)** session to update the standard cost displayed in the Item - Costing (ticpr0107m000) session. Enter the following data:

- The ranges of item groups and standard items
- Cost calculation code
- Standard cost calculation method

You can calculate the valuation and standard cost of standard items only. In the Calculate Standard Costs by Project (tipcs3250m000) session you can calculate the prices for customized items.

Use the Archive/Delete Cost History (ticpr2230m000) session or select the **Delete Standard Cost History Data** check box to remove the standard cost history data. You can only select the **Delete Standard Cost History Data** check box if also the **Actualize Standard Cost and Revalue Inventory** check box is selected. Depending on the **Number of Years to Retain Standard Cost History** field in the **Standard Cost Calculation Parameters (ticpr0100m000)** session, data is deleted during the actualization process.

## Example of standard cost and valuation price calculation

This example describes how standard costs and valuation prices are calculated related to surcharges, defined on item level and on warehouse level. The difference between variable and fixed costs is ignored in this example.

In this example, item A has material costs of 10 dollars and operation costs of 6 dollars. Item A has been linked to warehouse 001 (in the general item data). The surcharges are defined as follows:

Surcharge sequence	1	2	3	4	5	6
Item	A	A	A	A	A	A
Warehouse	...	...	001	001	002	002
Realization moment	re- ceipt	is- sue	re- ceipt	is- sue	re- ceipt	is- sue
Surcharge	2	4	3	5	1	6

### Standard cost

The standard cost is the sum of the following:

- Standard costs  
All nonsurcharges
- Valuation price on receipt in warehouse  
All surcharges that are linked to the nonspecific warehouses (surcharges 1 and 2)
- Valuation price on issue from warehouses 001 and 002  
All surcharges that are linked to the standard warehouse 001 of the item (surcharges 3 and 4)

This results in the following calculation:

Nonsurcharges	16	(material and operation costs)
Nonspecific surcharges	6	(surcharge 1, 2)
Specific surcharges	8	(surcharge 3, 4)
Standard cost	30 dollar	

Item A is a material of item B. If item A is linked to item B in the BOM. The BOM warehouse is 003. To calculate the standard cost of main item B, the material costs of item A and the surcharges of BOM warehouse 003 are taken into account. The surcharges of item A's standard warehouse 001 are not used.

### Valuation price (receipt)

The receipt valuation price is the sum of the following:

- Standard Costs  
All nonsurcharges
- Valuation price on receipt in warehouse  
All receipt surcharges that have not been linked to specific warehouses
- Valuation price on issue from warehouses 001 and 002  
All receipt surcharges that have been linked to the specific warehouse

This results in the following calculation:

warehouse	001	002
Nonsurcharges	16	16
Nonspecific receipt surcharges	2	2
Specific receipt surcharges	3	1
Receipt valuation price	21 dollar	19 dollar

### Valuation price (issue)

The issue price of an item in a warehouse is the sum of the following:

- Standard Costs  
All nonsurcharges
- Valuation price on receipt in warehouse  
All receipt surcharges that have not been linked to specific warehouses
- All receipt surcharges that have been linked to the specific warehouse
- Valuation price on issue from warehouses 001 and 002  
All issue surcharges that have not been linked to specific warehouses
- All issue surcharges defined for that specific item/warehouse

This results in the following valuation and issue prices for item A in warehouses 001 and 002:

Warehouse	001	002
Nonsurcharges	16	16
NonSpecific receipt surcharges	2	2
Specific receipt surcharges	3	1
Nonspecific issue surcharges	4	4
Specific issue surcharges	5	6
Issue price	30 dollar	29 dollar

## Calculating Sales Prices

The sales price is based on the cost plus method. The basis is a cost calculation according to a specified *cost-calculation code*. On top of the calculation code you must enter a *sales price* calculation code. This is the code under which specific sales price surcharges are stored. As a result, the standard costs are added to the sales prices surcharges.

### Note:

- Fixed costs are included in the sales price if the Include Fixed Costs in Sales Price check box is selected in the **Standard Cost Calculation Parameters (ticpr0100m000)** session.

- Simulated retail prices and simulated sales prices for standard items are stored. These prices can be used to establish of a customer sales price or a retail price.
- You cannot calculate the sales prices for customized items or standard to order items.
- If *multisite* functionality is active, the sales price can be calculated at the global item level for the whole company, or per enterprise unit.
- If the Standard Cost by Enterprise Unit check box is selected in the **Implemented Software Components (tccom0100s000)** session, an item can have multiple sales prices if it is manufactured on several sites which are linked to different enterprise units.

You can actualize the sales price in the Items - Sales (tdisa0501m000) details session. In this session simulated retail prices and simulated sales prices for standard items are stored. These prices can be used to establish a customer sales price or a retail price.

Use the Calculate Item Sales Prices by Project (tipcs2241m000) session to calculate the sales prices for budgeted items.

## Chapter 7: Production Order Costing

### Production order costing in JSC

Production order costing deals with the production order costs for all items of all production types that are handled in the Job Shop Control module. The costing functionality for order costing of standard items and customized items is the same. You can calculate:

- Estimated order costs
- Actual order costs
- Production results

**Note:** If the Standard Cost by Enterprise Unit parameter in the **Implemented Software Components (tccom0100s000)** session is active, estimated and actual order cost calculation are based on the *enterprise unit* of the warehouse linked to the particular component or end item.

To build up a cost structure for production orders, you must:

**1** Define a calculation office

In the Production Order (tisfc0101s000) session you can maintain a calculation office to collect order-related costs. The value of the work in process is also recorded on the *calculation office*.

In the Sites parameter in the **Implemented Software Components (tccom0100s000)** session is active, you can use the **Production Order (tisfc0101s000)** session to specify the *site* where production takes place.

**Note:** The calculation office and the location where production takes place must belong to the same site.

**2** Decide if the WIP must be stored by work center

In the Financial Transactions by Work Center field in the **Production Order (tisfc0101s000)** session you can indicate where the *work in process* (WIP) is posted to.

If the **Financial Transactions by Work Center** check box is selected, the work in process of materials and hours is stored at work center level. Then you can:

- Calculate the price and efficiency variance by work center, which can be posted to the financial company of the work center or the calculation office.
- Make WIP transfers. This is the posting of a certain WIP value (based on estimated costs) from one work center to another on the completion of intermediate operations. Surcharges are always at order level and are posted to the calculation office. When you finish the last operation, the last WIP transfer is done to the calculation office. When the items are received in the warehouse, the WIP on the calculation office is decreased.

**3** Freeze estimated production order costs

For comparison with the actual order costs, the estimates must be frozen. The moment of freezing is determined by the Moment Freezing Estimates field in the **Production Order (tisfc0101s000)** session. Three moments are available:

- When creating a production order
- When releasing an order
- Before the first WIP transaction

#### 4 Have WIP transfers

*WIP transfers* are postings of a certain WIP (material and hours) value from one work center to another when you complete intermediate operations. As a result, you can calculate price and efficiency variances by work center. In order to have WIP transfers, you must have a cost component structure defined because WIP transfers use the current (effective) cost component structure of the items.

#### 5 Define optional price and efficiency variances

LN calculates a *price variance*, *efficiency variances* and calculation variances during the:

- Closing of an operation
- Intermediate calculation of production results
- Closing of a production order

With the parameters in the **Production Order Parameters (tisfc0100s000)** session you can determine whether LN calculates the price and efficiency results and at which level LN books the calculated efficiency results.

When the **Financial Transactions by Work Center** field in the **Production Order Parameters (tisfc0100s000)** session is checked, the production results as well as the price and efficiency variances are calculated at work center level.

For items with an actual inventory valuation method (LIFO, MAUC, FIFO, LOT COSTING) all calculated price and efficiency variances are posted to inventory where a value adjustment is done. If the items are not in stock anymore, the calculation variances are posted to the inventory accounts as a value correction.

If the results are not recorded by work center, the **Posting Method Efficiency Variances on Calculation Office** check box and the **Posting Method Price Variances to Calculation Office** check box determine how to post:

- Not post at all
- At work center level
- At calculation office level

The postings for materials cost are done for the following origin/financial transactions:

- Price variance
- Efficiency variance
- Additional calculation office variance

#### 6 Perform intermediate posting of production results

You can calculate the production results and post them without order closure, if:

- The production receipts are done against the *FTP price*. So, the inventory is valued against estimated cost after reporting complete finished goods. If you use an actual costing method, the inventory value must be based on the actual costs at the end of each financial period. This is especially the case, when the production order has a high order quantity and a long lead time. At the end of the financial period, the production results can be posted to the inventory ledger accounts.



- In some production environments production orders are never closed. Only partial deliveries are reported completed.
- Assembly line items are never posted to inventory. The work in process is only emptied by a sales delivery. Especially in situations with a time lag between reporting an order complete and a sales delivery, an intermediate calculation of production results can be useful in financial reporting.

## Order planning and order calculation

This text describes what LN does between entering a production order and the calculating of the estimated end unit costs.

After a production order is entered, LN generates:

- The production planning. The production planning is derived from the routing and contains the planned number of production hours. The estimated hours are based on the production planning which can be maintained in the **Production Planning (tisfc0110m000)** session.

The estimated and actual hours are displayed in the **Print Estimated vs. Actual Hour Costs (ticst0402m000)** session.

- The estimated materials for the order. LN derives the estimated materials by means of the bill of material. You can maintain the estimated materials in the **Estimated Materials (ticst0101m000)** session. The estimated and actual materials can be displayed in the **Estimated vs. Actual Material Costs (ticst0501m000)** session.

The estimated materials and estimated hours are input for the calculation of the estimated end-item unit-costs. In this respect, the planned and allocated quantities are related to actual production execution. The estimated quantities are related to the frozen production-order quantity (including scrap and yield (calculation)).

## Estimated and actual material costs

To start production, an estimate must be made of the material cost which will be corrected into actual costs at the end of production. During the generation of a production order material costs are established in the following way.

**Note:** If *multisite* functionality is active, all calculations are performed for an item and *enterprise unit* combination.

### Cost estimation

When a production order is created, the costs related to *materials* are estimated.

The estimated material quantities are based on the net quantities specified in the *BOM* of the manufactured item. The material requirements are increased, to compensate for loss of material through *scrap* and a limited *yield* of the production order.

You can manually change the estimated quantities calculated by LN. It is also possible to replace or add materials, or to change certain parameter settings for the materials.

### Actual material costs

The actual material quantities are the quantities that are issued from inventory. This determines the actual costs. The actual costs may differ from the estimated values, due to final adjustments, material replacements, yield fluctuations, and so on.

## Calculate estimated end item unit costs of a production order

The end item unit costs are the planned costs of one end item for a specific production order. LN calculates the end item unit costs by means of the estimates for hours or materials (item surcharges included). The calculation of estimated end unit costs of a production order is described in the following paragraphs.

LN calculates the estimated end unit costs when one of the following actions takes occurs:

- When the production order is released.
- You use the **Calculate Estimated End Item Unit Costs (ticst0210m000)** session.
- You use the Print Differences between Frozen and Current Estimated Costs (ticst0411m000) session. If you use this session, the costs are only printed, not stored.

If you print the differences between the current estimates and the previous calculated values in the **Print Differences between Frozen and Current Estimated Costs (ticst0411m000)** session, LN calculates the estimated unit costs.

The operation costs and the material costs are determined when you create the production order. The operation costs and the material costs of the *end item* are calculated when the costs are frozen. The data in the Estimated vs. Actual Material Costs (ticst0501m000) and Estimated vs. Actual Hours Costs (ticst0502m000) session are already filled at this moment. LN does the following when you calculate the estimated end-item unit costs:

**Note:** If *multisite* functionality is active, all calculations are done for a combination of item and the *site* where it is manufactured.

### 1 Determines the operation costs

By means of the **Estimated vs. Actual Hours Costs (ticst0502m000)** session, LN determines the operation costs per end-item unit by using the production times and the operation rates. LN calculates the operation rates based on the total costs of wages, machines, and overhead.

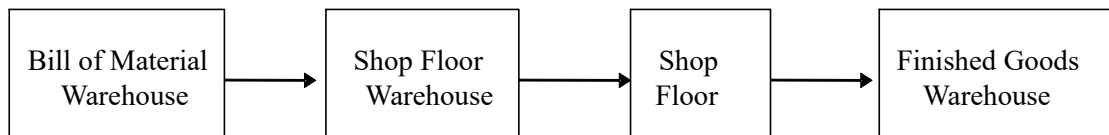
LN stores the operation costs on the cost components. The operation costs are calculated per end-item unit end product. If results are calculated per work center (see the **Financial Transactions by Work Center** field in the **Production Order Parameters (tisfc0100s000)** session), LN calculates the costs per work center. The costs are aggregated in the item-based view of the calculation office by using the aggregated cost components.

### 2 Calculates the material costs

LN determines the required materials stored in the **Estimated vs. Actual Material Costs (ticst0501m000)** session. By means of the *standard cost*, LN calculates the material costs per component.

The standard cost includes the warehouse-related surcharges assigned to the item. If the material is linked to another warehouse, you must change the warehouse surcharge part to this warehouse.

If the work center where the material is issued, is stored as a job shop warehouse, the job shop warehouse-related surcharges must be taken.



LN allocates the material to the job shop warehouse during the release of the order. Even if the calculation is carried out when the order status is not yet released, LN determines the job shop warehouse surcharge. If the material is of Direct Receipt in WIP type, no warehouse surcharge is determined.

If the standard cost is not calculated for a material, LN does not determine material costs.

If you calculate the estimated end unit costs by means of the **Calculate Estimated End Item Unit Costs (ticst0210m000)** session, you can select the **Check Existence of Material Standard Costs** check box. If this check box is selected, LN checks whether all material standard costs are available so that LN can make a correct estimation.

### 3 Calculates the end-item surcharges

After all material and operation costs are calculated, LN calculates the surcharges. The surcharges are calculated in the sequence (item group, item and warehouse level) as defined in the Standard Cost Calculation module.

### 4 Calculates transfer prices

The WIP transfers can only be calculated when, in the **Production Order Parameters (tisfc0100s000)** session, the **Financial Transactions by Work Center** checkbox is selected and the **Transfer WIP method** is **Always** or **Only upon Completion**. The calculated price is the incremental price up to the last operation of the delivering work center.

#### Example

Work Center 1		
	operation 10	operation 20
yield %	100	50
qty plan in	200	200
qty plan out	200	100
net mat per 10 pcs	1 pcs	3 pcs
estimated material qty	20 pcs	60 pcs
cost per pcs	\$ 5	\$ 10

Work Center 1		
total costs	\$ 100	\$ 600
per pcs, per workcenter	\$ 1.00	\$ 6.00
Quantity Ordered = 100 pcs		
Work Center 2		
	operation 30	
yield %	100	
qty plan in	100	
qty plan out	100	
net mat per 10 pcs	2 pcs	
estimated material qty	20 pcs	
cost per pcs	\$ 6	
total costs	\$ 120	
per pcs, per workcenter	\$ 1.20	
The transfer cost of amount per unit from work center 1 to work center 2 =		
(\$100 + \$600) / 100 = \$7.00		
The transfer cost of amount per unit from work center 2 to calculation office =		
\$7.00 + \$1.20= \$8.20		
The base for calculation are all cost components of material and operation costs. The amounts are aggregated together and stored in a transfer price on the transfer component WIP Transfer Cost Component that is defined in the <b>Production Order (tisfc0101m100)</b> session.		
Refer to the Help of the JSC Financial Transactions (ticst3500m000) session and the PCS Financial Transactions by Transaction Origin and Financial Trans. (tipcs3500m000) session for details about financial transactions.		

## Freeze estimated order-costs

You can freeze the estimated end-item unit costs to enable a good comparison between actual and estimated unit costs. The moment of freezing estimated costs is determined by the **Moment Freezing Estimates** check box in the **Production Order (tisfc0101s000)** session.

After you freeze the estimated end-item unit costs you cannot change:

- The estimated materials
- The estimated hours

You can change the following according to the latest schedule changes:

- The materials to be issued
- The production planning
- The materials to be issued

If you freeze the estimated costs, and if changes are made to one of the following:

- The production planning
- The materials to be issued

Then the change does not influence:

- The estimated materials
- The estimated hours

In production planning changes can occur in:

- The scrap and yield percentages
- Ordered quantity

When a change occur after freezing in the scrap & yield percentage, LN adjusts the planning of:

- Following operations
- The number of materials in the **Material to Issue for Production Orders (ticst0101m100)** session

If after freezing, changes are made to the ordered quantity in the production order, LN adjusts (taking Scrap & Yield factors into account) the:

- Estimated materials and estimated hours
- Estimated order costs
- Material and capacity allocations

### Example

A production order has the following data.

Quantity ordered = 100 pcs

Operation	Yield	Scrap	QTY planned input	QTY planned output
10	100%	2 pcs	127	125
20	80%	0 pcs	125	100

Assume the estimates are frozen. When changing the Yield from 80% to 50% on operation 20, the allocations of materials are updated based on the new quantities. The estimated quantity is still related to resp. 127 and 125 pieces respectively.

The new situation is as follows:

	QTY planned input	QTY planned output
10	202	200

	QTY planned input	QTY planned output
20	200	100

When changing QTY ordered from 100 pieces to 150 pieces the estimated costs and the planning change again. The new situation is:

	QTY planned input	QTY planned output
10	302	300
20	300	150

The estimated material costs are based on the estimated yield of 80%, which results in the quantities 187,5 and 189,5 pieces.

## Intermediate Results Calculations

Production results can be calculated without closing the production order. This leads to intermediate results, which are financial transactions in the range of price-, efficiency- and calculation office variances.

Intermediate results can give you insight in the production order's performance.

You can calculate intermediate results in the Calculate Intermediate Results (ticst0201m100) session.

For various costing settings and production order properties, the parameters and details of the calculation vary. Below several examples are described.

- End item receipt based on estimates (standard cost)  
The difference between estimated and actual costs result in an efficiency variance and a price variance per cost component, optionally additional calculation office variances can be booked to clear the WIP.
- Order with project pegging  
Based on the order progress per project peg, the actual production costs are balanced with the actual receipts. This results in additional *calculation office variances* only.
- End item receipt based on actual cost without project pegging  
Calculation of results without actual closing of the order is not allowed.

**Example**

If order completion percentage is based on cost or quantity, the progress of individual operations, determines what portion of the price and/or efficiency variances is booked during production.

3 operations: 10, 20, and 30

10 is at 50% completed, 20 at 30% and 30 at 20%

This means the whole order is at 17% completion.

Variances on operation 10 are booked for  $17/50 = 34\%$ . Variances for operation 20 for  $17/30 = 56.6\%$  and for operation 30 for  $17/20 = 85\%$

## Analyze work in process (WIP)

This topic describes how you can get insight in the *work in process* (WIP) for *production orders*.

To view the work in process, use the Display Work-in-Process (ticst0550m000) session. In this session, you can select the production orders for which you want to see the WIP, and the level of detail of the information. Depending on the value you select in the Aggregation Level field, one of the following display sessions starts:

- **Production Order Work-in-Process (ticst0551m000)**
- **Production Order Work-in-Process by Amount Type (ticst0552m000)**
- **Production Order Work-in-Process by Cost Component (ticst0553m000)**

In the sessions that display aggregated data, you can select a record and choose one of the sessions with more detailed data by selecting that session in the *appropriate* menu.

In each of these sessions, you can print a report with the data you displayed.

**Older reports**

The **Print Work-in-Process (ticst0450m000)** session is available for backward compatibility reasons. To print the estimated-material data as well, use the **Print Estimated vs Actual Production Order Costs (ticst0403m000)** session.

## Calculating estimated quantity

The estimated quantities of the materials of a production order are calculated in the following way:

- The exploded quantity is calculated, based on the *BOM* and the *quantity ordered*.
- The *quantity planned input* is determined.

- The estimated quantity is calculated, based on the net quantity, the quantity planned input and any *scrap* quantity or percentage defined for the material.

**Note:** If *multisite* functionality is active, all calculations are performed for an item and *site* combination.

- Exploded quantity  
The exploded quantity is based on the net quantity in the BOM. For example, according to the BOM, 20 screws are needed to produce a box. 30 boxes are ordered. Consequently, the exploded quantity is 600 (=20x30) screws.
- Quantity planned input  
The estimated material quantity is based on the quantity planned input of the operation to which the material is linked. If the production order has no operations, the quantity planned input is simply the quantity ordered of the production order. The calculation of the quantity planned input is explained in topic Planned quantity to manufacture.
- Estimated quantity  
The estimated quantity is calculated with the following formula:

$$\text{Estimated quantity} = (\text{Net quantity} \times (1 + \text{scrap factor}/100\%) + \text{scrap quantity}) \times \text{planned quantity factor}$$

Where:

- Net quantity: required material quantity, disregarding scrap and yield.
- Scrap factor: scrap factor defined for the material in the BOM.
- Scrap quantity: scrap quantity defined for the material in the BOM.

The planned quantity factor is defined by the following formula:

$$\text{Planned quantity factor} = \frac{\text{Quantity planned input of current operation}}{\text{quantity planned output of last operation}}$$

This calculation is illustrated in Example of estimating materials.

## WIP transfer

*Work in process* transfers between lines are supported and the following steps are distinguished:

- Generation of a WIP transfer warehouse order line.
- Issuing of the WIP from the last line station of the line.
- Receipt of WIP on the first line station of the next line.

### Purpose of WIP transfers

By performing *WIP transfers* the *work in process* of a production order is always recorded in the work center that is actually working on the order. This is especially useful in production situations where the WIP represents a high value or when the production lead time is long, for example the production of capital goods, trains, machines.



If work centers belong to different *enterprise units* and have different reporting currencies, the value of WIP is also an important factor in tax reporting. You can also define invoicing relationships between enterprise units.

### Financial transactions

If Use Actual Cost for Receipt Posting check box in the **Report Orders Completed (tisfc0520m000)** session is selected the cost for *WIP transfers* and completions are based on actual costs.

If Financial Transactions by Work Center check box in the **Production Order Parameters (tisfc0100s000)** session is selected, then WIP transfers are used to empty the work in progress by work center and cost component.

If the Financial Transactions by Work Center check box in the **Production Order Parameters (tisfc0100s000)** session is cleared, completions are used to empty the work in progress on cost component level.

The actual value of the *WIP transfers* amounts is calculated by selecting all incoming financial transaction related to the operation set minus the outgoing financial transactions. The result is multiplied by the current receipt quantity divided by the total quantity received.

All costs that are not already transferred to the effective cost component structure of the end item are handled using a completion transaction.

#### Note:

If subcontracting with material flow is used when the Use Actual Cost for Receipt Posting check box is cleared, the value of the subassembly is added to the subcontracting operation it belongs to during WIP transfers.

If project pegging is implemented for the job shop order, using actual costs for receipt posting, subassembly receipt posting, WIP transfers and completions is mandatory.

If the operation is subcontracted with material flow, the work in progress by work center is handled by the subcontracting functionality.

Completions occur if end items are moved to inventory or on work center level if items are moved to quarantine.

### WIP transfer method

WIP transfers are carried out when a assembly is moved to another work center:

- Always when a quantity is reported completed
- Only when a the whole operation is reported completed. This depends on the Transfer WIP method field in the **Production Order Parameters (tisfc0100s000)** session.

WIP transfers are only available if the following conditions are met In the **Production Order Parameters (tisfc0100s000)** session:

- The Financial Transactions by Work Center check box must be selected.
- The **Transfer WIP method** field must be other than **Not Implemented**.

### Subcontracting and WIP transfer

When a subassembly is outsourced to a subcontractor the costs are registered in the Subcontracting WIP (ticst0607m000) session. These can be calculated based on estimates or the actual amounts of the production costs depending on the parameters specified.

When subcontracting, a *subassembly* is sent to a subcontractor. As a result, *WIP* amounts arise that are associated with the subcontracting process. The following amounts are listed in this session:

- If the Sending WIP check box in the header is selected, the amounts relate to the subassembly that is issued to the subcontractor's job shop.
- If the Sending WIP check box is cleared, the amounts relate to the subassembly that is received from the subcontractor's job shop after work is done.

Subassemblies can be delivered from the shop floor to inventory through partial receipts, when this happens the appropriate portion of the actual production order costs incurred is added to the subcontracting WIP value for the outgoing subassembly.

Depending on the settings of the Use Actual Valuation for Subassembly Receipt Posting check box, the amounts are based on estimated or actual costs.

Use actual costs	Use estimated costs
Actual costing is used for subassemblies within subcontracting with material support.	Estimated costing is used for subassemblies within subcontracting with material support.
Use Actual Valuation for Subassembly Receipt Posting selected.	Use Actual Valuation for Subassembly Receipt Posting cleared.
The Unit tab in the Subcontracting WIP (tict0607m000) session is hidden.	The Unit tab in the Subcontracting WIP (tict0607m000) session is visible.

Each time a subassembly is received into the warehouse, the appropriate portion of actual costs incurred on the subcontracting operation are determined. The amount is considered as subcontracting WIP value of the incoming subassembly. To get the amount to be paid to the subcontractor, the quantity received is multiplied with the price listed on the purchase order line.

The actual value of an incoming subassembly is composed out of different elements and reflects the value at receipt of the incoming subassembly already in inventory.

- The value related to materials and components issued from the subcontracting warehouse to the subcontracting operation.
- The value of the (outgoing) subassembly received from the manufacturer and issued from the subcontractor warehouse to the subcontracting operation.
- The amount paid based on the price including the discount of the subassembly on the subcontracting purchase order. This amount represents the costs of performing the operation at the subcontractor location.

**Note:** If a subcontractor for his part also subcontracts operations, an amount can be split up in an owned part and a not-owned part, which is indicated by the Customer Owned check box.

### Multicompany

If the work centers belong to different enterprise units, the multicompany functionality of the Intercompany Trade module can be used. This includes procedures for intercompany invoicing, document printing, and so on.

## Production order postings

During manufacture various costs are incurred that are posted to the production order. Different parts of production generate different costs.

- Material Costs

Materials are issued against Valuation Prices. The valuation price is stored on the actual WIP value on the aggregated cost components. The costs are labeled as non-added costs.

When LN issues materials, a *moving-average unit cost (MAUC)* price is booked. The MAUC price in the **Estimated vs. Actual Material Costs (ticst0501m000)** session is the actual standard cost for the material line.

*JIT items* are directly received in WIP without passing a warehouse. Special financial transactions exist for these items to enable direct receipt and billing on use. For these type of transactions the purchase result (when FTP valued item) is also entered into WIP.

The postings for materials costs are done for the following origin/financial transactions:

- Production/Issue
- Production/Issue direct receipt
- Production/Purchase result direct receipt

- Operation costs

Operations cost can be split up in two parts:

- Hours costs

In the **Estimated vs. Actual Hours Costs (ticst0502m000)** session, the cost per operation are displayed.

The actual hour costs are posted and processed from People. If the **Process Hours using** field in the **Production Order Parameters (tisfc0100s000)** session is Estimated rates, the hours cost are calculated by using the *operation rate* and the *cost component* from the Standard Cost Calculation module.

If the **Process Hours using** field in the **Production Order Parameters (tisfc0100s000)** session is man and machine rates, the hours costs are calculated by using rates and cost components from the machine data in the **Machines (Machine Types) (tirou0102m000)** session and the employee data in the Items (tcibd0501m000) session.

The hours costs are disaggregated to labor costs, machine costs and overhead costs. For the posting of the overhead, LN checks the **Cover Overhead Costs in Employee Department** check box in the **People Parameters (bpmdm0100m000)** session.

The postings are generated on the moment of process hours accounting. The number of hours can be:

- Entered manually
- Generated by backflushing

The operations costs are posted to the *calculation office* or to the *enterprise unit* of the work center. The postings for operations cost are done for the following transaction origin/financial transactions:

- Production
- Operation costs

Hours are posted against the detailed cost components that are defined in the operation rates. Price and *efficiency variances* are calculated based upon these detailed cost components.

- Subcontracting costs

LN considers subcontracting as the purchasing of a subcontracting item. The purchase order price of the subcontracting item is calculated by using the subcontracting calculation method and the rate factor in the Standard Cost Calculation module.

The postings are generated the moment when you receive the subcontracted intermediates and are posted to the JSC calculation office or to the enterprise unit.

The subcontracting result is determined by comparing the estimated and the subcontract price. So the purchase order price and the actual amount on the purchase invoice are compared. Before you close the production order the purchase orders, generated for subcontracting operations must have been processed. If the order estimate does not contain any costs for subcontracting, you cannot determine subcontracting results.

Both operation hours and subcontracting costs are regarded as operations costs.

- WIP transfers

Work in process of a production order must be recorded at the work center where the actual work for the order took place. WIP transfers allow costs to be assigned to the right work centers.

- Production surcharges

The surcharges related to the production orders are the item receipt surcharges. Surcharges are always posted to the *calculation office* and are considered as production WIP. The surcharges are posted when the order is completed. Surcharges are based upon the estimated order costs. Upon order closing, the actual order costs, the actual surcharges are calculated. Surcharges are always calculated and posted on the production order level by means of detailed cost components.

- Production completion and receipt in inventory

The following phases can be distinguished:

- Report a quantity completed
- Report the order completed
- Receive the items in the warehouse

If the items are reported completed, LN activates a warehouse order. A warehouse order can have a certain inbound procedure. As a result there can be a time lag between the moment reporting completed and the moment the items are posted to the warehouse. This time lag reflects the WIP values.

If a quantity of items are reported completed, these items are posted to the calculation office. A WIP transfer is carried out from the last operation/work center to the calculation office. The reported quantity stay on the calculation office until they are received in the warehouse. Upon receipt in the warehouse the WIP on the calculation office is decreased with the FTP value (minus warehouse receipt surcharges). Both postings are based upon the three aggregated cost components of the end item. The postings are carried out for the following transaction origin/financial transactions: Production. Completion Production. Receipt

First the item is posted to stock with the FTP value. Because you do not know the actual production order cost the actual item (unit) costs cannot be calculated. The actual order costs are determined upon order closure.

- Price, efficiency, and calculation variances

LN calculates a *price variance*, an *efficiency variances* and a *calculation variances* during the:

- Closing of an operation
- Intermediate calculation of production results
- Closing of a production order

## Costing breaks in Enterprise Planning and Manufacturing

In Manufacturing, the cost on a project is absorbed by a project account. With *costing breaks*, you can model dedicated project accounts for specific items and operations. You can define costing breaks at the lowest level such as item code or routing and operation, or at a generic level such as item group, assembly, operation type, or work center.

You can specify costing breaks for production resources and materials in the Costing Breaks (tppdm3600m000) session. When a production order is created, Enterprise Planning searches for costing breaks that can be applied to the new production order.

### Costing breaks in the bill of material

Costing breaks override a project peg distribution of actual supply orders and move the related costs to different *WBS* levels on the same project.

*Costing breaks* are used to assign and track costs in Project. On a *multilevel bill of material*, costing breaks can be added on different levels. These costing breaks are indicated by lower level project peg codes for components, which differ from their parent item's project peg. Costs are moved from the main project peg to pegs that collect specific types of costs such as labour, material, subcontracting, or machine costs. In the BOM, you can apply costing breaks to routings, operations, work centers, or cost types. Multiple costing breaks can be applied to a BOM at the same time.

### Costing breaks for nonpegged items

If the **Costing Breaks** check box is selected in the **Implemented Software Components (tccom0100s000)** session, before you can apply costing breaks to items, items must have a project peg distribution linked.

You can apply Costing breaks to nonpegged items. If the item is nonpegged, the Inherit Project Peg check box in the **Items (tcibd0501m000)** session determines how a project peg distribution is linked to these items. If this check box is selected, the item is treated as pegged and will have a peg distribution generated. If this check box is cleared, and no costing break is found for the nonpegged item during creation in, for example, the estimated materials, the order header project pegs are copied to the project peg distribution of the nonpegged item.

This table shows the actions after which a costing break lookup takes place or the order header project peg is copied:

JSC Status	Cost Type	Action
Planned	Operations	Adding a new operation or copying an existing one.
		Changing the work center on an operation (nonsubcontracting) in case of machine breakdown or lack of resources.
		Changing a work center of the type <b>Subcontracting</b> in case of machine breakdown or lack of resources.
		Changing the work center from the type <b>Subcontracting</b> to <b>Company Owned</b> .
	Material	Adding a material.
		Changing the material from one item to another.
Released	Operations	Adding an operation or copying an existing one.
		Changing the work center from the type <b>Subcontracting</b> to <b>Company Owned</b> .
	Material	Adding a material.
		Changing a material.

**Note:** If an operation with the status **Planned** is deleted all project pegs are removed.

## Chapter 8: Actual Costing

### Actual costing for receipt postings in manufacturing

You can use actual costing in Manufacturing when the item's inventory valuation method is defined as *LIFO*, *FIFO*, *MAUC*, or *lot* controlled in the **Item Data by Warehouse (whwmd2510m000)** session, and the End Item Receipt Posting check box is selected in **Production Order Parameters (tisfc0100s000)** session. For information on how costing is performed when the End Item Receipt Posting check box cleared, refer to Standard costing for receipt postings in manufacturing.

For actual costing to work accurately, procedures must be defined that regulate the timely booking of costs. These are used in case operations or specific quantities on a production order are reported **Completed** while not all costs have been booked.

Correction factors must be defined that are applied in case of partial deliveries to distribute costs using the following methods:

- Correction for costs of completed but not yet received quantities
- Correction for high progress operations
- Correction for setup costs
- Correction for issued materials

If you use backflushing, this must be performed manually before quantities are reported complete in the Report Orders Completed (tisfc0520m000) session.

Otherwise, backflushing is performed after the end item is received in the warehouse, and the backflushed costs are not taken into account when the standard cost for the end item is calculated. For more information, refer to Actual costing and backflushing

Receiving production order items in a warehouse differs depending on the properties of both the warehouse and production order:

- Receiving in warehouse with Standard Cost as the valuation method  
The difference between the actuals and standard cost is booked with a standard cost result and the end item is received in the warehouse at standard cost value. Note: this is not allowed when project pegging is implemented.
- Receiving in warehouse with actual costing  
In this scenario no variances should occur. The end item is received against the value it was produced at.

## Standard costing for receipt postings in manufacturing

A production order's end item is received in inventory against the *standard cost* if one of the following is true:

- The end item's valuation method defined in the Item Data by Warehouse (whwmd2510m000) session is **Standard Cost**.
- The End Item Receipt Posting check box in the **Production Order Parameters (tisfc0100s000)** session is not selected.

If **Standard Cost** is used for a production order, the End Item Receipt Posting check box in the **Production Order Parameters (tisfc0100s000)** session is cleared. The end item's receipt price is a fixed one: the standard cost of the end item.

Warehousing always maintains the *MAUC* price for each item - warehouse combination. If the valuation method is **Standard Cost**, the MAUC price is maintained for informational purposes only. LN updates the MAUC price by using the receipt price (standard or actual cost) during the receipt process.

During closing of the production order, the variances are calculated, copied to Warehousing, and displayed in the Inventory Variances (whina1516m000) session. You can run the Process Inventory Variances (whina1200m000) session to update the MAUC price using the inventory variances.

## Correction for costs of completed but not yet received quantities

If you apply actual costing, you often must deal with completion of a production order in partial quantities. Only costs that are made for the quantities that are already received in the warehouse must be incorporated in inventory valuation. The costs that are made for completed quantities that are not yet received in the warehouse must be left out. Therefore, a correction factor is applied by LN.

### Example

- Quantity completed = 17.
- Order quantity already received in warehouse = 10.
- Quantity to be received = 2.
- Actual costs until now = EUR 17,000.

In this situation, costs are already made for 17 items: EUR 17,000. After the previously mentioned 2 items have been received in the warehouse, 12 item (10 + 2) are in the warehouse. Consequently, the costs for receipt posting based on the actual costs that are made must be the costs for 12 items. Therefore, a correction of 12/17 is applied. The total value of receipt postings after receiving the two items in the warehouse is:

$17000 * 12/17 = \text{EUR } 12,000$



## Correction for high progress operations

If you apply actual costing, you sometimes must deal with operations that have a higher progress factor than the percentage of end items that is already completed on the production order. If the already completed quantity of end items is received in inventory, costs on the operation(s) with higher progress are also included, although these costs do not apply to the received end items. Therefore, a correction factor is used by LN.

### Example

- Production order quantity = 100
- Quantity completed on the production order = 17 (17%)
- Quantity completed on the first operation = 90

The assumption is that no yield or scrap exists, so the following is true:

$$\text{ordered quantity} = \frac{\text{quantity planned input on operations}}{\text{quantity planned output on operations}} =$$

Progress factor on first operation:

$$\frac{\text{Quantity completed on first operation}}{\text{Quantity planned output on first operation}} = \frac{90}{100} = 0.90$$

If 17 items are received in inventory, a correction factor of  $0.17/0.90$  is applied to the costs already made on the first operation to account for the overcompletion of the first operation.

## Correction for setup costs

If you apply actual costing, you must deal with the setup costs for a production order. In case of partial completion of the production order, the setup costs must be spread over all quantities that are completed. If you book all setup costs for the first completed quantity, this quantity will be more expensive than the following deliveries, and inventory valuation will not be correct.

To correct for the setup costs, a formula is used that assumes that setup hours are always posted at the start of an operation. So, the hours must be corrected in such a way that setup related costs are spread evenly over the end items.

The algorithm that is used as setup costs correction factor is based on the ratio of the following hours:

$$A = \text{Production hours} * \% \text{complete} * (1 + \text{Average setup ratio}).$$

$$\text{Average setup ratio} = \frac{\text{Planned setup time}}{\text{Planned production hours}}$$

In words: Hours that are required to report a production order as completed in case the setup time is spread over all time units.

$$B = (\text{Production hours} * \% \text{complete} + \text{Setup time}).$$

In words: Hours that are expected to report a production order as completed if the setup time is consumed first.

$$\begin{aligned} \text{Correction factor} &= A/B \\ &= \text{Production hours} * \% \text{complete} * (1 + \text{Average setup ratio}) / \\ &\quad (\text{Production hours} * \% \text{complete} + \text{Setup time}) \end{aligned}$$

### Example

For operation 10 the following is applicable:

- Setup time = 1 hour
- Production time = 20 hours
- Completion = 25%

Average setup ratio:

$$1/20 = 0.05$$

Setup correction factor:

$$20 * 0.25 * (1 + 0.05) / (20 * 0.25 + 1) = 5.25 / 6.00 = 0.875$$

The setup correction factor is applied to all operation cost of the specified operation, including machine hours.

## Correction for issued materials

Materials are often issued before work on the production order is started. Consequently, the first partial delivery of end items to inventory carries all material costs and is, therefore, much more expensive than the next deliveries. If you apply actual costing, a correction must take place to avoid that all material costs are posted on the first delivery. A correction factor for material costs is applied by LN if the ratio of actual material quantity and estimated material quantity is higher than the production order's completion ratio.

Correction factor:

$$\begin{aligned} &\text{Expected actual material quantity} / \text{Actual material quantity} \\ &= (\text{Completed order qty} / \text{Planned order qty} * \text{Estimated mat. qty}) / \text{Actual material qty} \\ &= (\text{Completed order qty} / \text{Planned order qty}) * (\text{Estimated mat. qty} / \text{Actual material qty}) \end{aligned}$$

**Example**

Material PARTA for production order ZZ0000300:

- Ordered quantity: 10
- Completed quantity: 2
- Estimated quantity PARTA: 20
- Actual quantity PARTA: 10
- Issue costs for PARTA: 150 EUR

Correcton factor =  $(2/10) * (20/10) = 0.40$

Expected material costs = Actual material costs =  $150 * 0.40 = 60$  EUR.

## Actual costing and backflushing

If you use actual costing, the *backflushing* of material and/or hours can be a factor of complication. All backflushing must be performed before an end-item is received in the end-item warehouse. If backflushing is not performed before the end-item is received in the warehouse, the costs are not included in the end-item's standard cost. Consequently, the costs are not included in inventory valuation.

### Actual costing and backflushing for production orders with operations

If you use actual costing in combination with backflushing, it is important that the backflushing is done before the end item is received in the specified warehouse.

If the Backflushing Method is set to **Manual** in the **Production Order Parameters (tisfc0100s000)** session the procedure is:

- 1 Report a quantity as completed on the last operation, or report the whole last operation as completed by using the **Report Operations Completed (tisfc0130m000)** details session. Note: the end items cannot be posted to inventory in the situation described.
- 2 Run the **Backflush Materials and Hours (tisfc0220m000)** session.
- 3 Report a quantity (partly) as complete on the production order by using the **Report Orders Completed (tisfc0520m000)** details session. Reply **yes** to the question whether the end item(s) must be posted to inventory. The receipt of the end items in the warehouse takes place.

If the **Backflushing Method** field in the **Production Order Parameters (tisfc0100s000)** is set to **Interactive**, then the same result can be achieved by answering **yes** to the question "Backflush materials/hours immediately?"

If the **Backflushing Method** field in the **Production Order Parameters (tisfc0100s000)** is set to **Automatic**, the end item can be posted to inventory.

### Actual costing and backflushing for production orders without operations

If you use actual costing and backflushing, and you have NO operations defined for your production order, LN also uses a built-in check to minimize the risk of booking costs too late. The procedure is as follows:

- 1 Because the production order has no operations, you cannot use the **Report Operations Completed (tisfc0130m000)** session. Therefore, report as complete part of the production order, or the whole production order by using the **Report Orders Completed (tisfc0520m000)** details session. Answer **no** to the question of whether the end items must be posted to inventory. Backflushing must take place now, while the end item is not yet received in the warehouse.
- 2 You must receive the end-items in inventory manually by using the Warehousing inbound procedure. For more information, see Warehousing orders.

**Note:** You can only specify a *lot code*, if the end item is posted to inventory.

## Actualizing Standard Cost and Valuation Prices

If the standard costs or valuation prices are actualized, LN:

- Revalues inventory on hand
- Updates the following fields in the **Item - Costing (ticpr0107m000)** session: Standard Cost, Material Costs, Operation Costs, Last Actualization Date.

Use the Archive/Delete Cost History (ticpr2230m000) session or select the **Delete Standard Cost History Data** check box in this session to remove the standard cost history data. Depending on the **Number of Years to Retain Standard Cost History** field in the **Standard Cost Calculation Parameters (ticpr0100m000)** session, data is deleted during the actualization process.

## Calculating Standard Cost and Actualizing Cost Component Scheme

If the Standard Cost by Enterprise Unit check box in the **Implemented Software Components (tccom0100s000)** is selected the standard cost calculation is always performed at enterprise unit level. You must have an enterprise unit or a range of enterprise units specified to perform the calculation.

If the check box is cleared, all calculations are performed using the item costing date defined at **Company** level.

**Note:** For cost and service items the item costing data is always defined at **Company** level.

- 1 Validate that LN calculates the standard cost accurately.  
You can use the Calculate Standard Cost (ticpr2210m000) session to automatically calculate the standard cost.
- 2 Actualize cost component structures for defined generic and FAS items.
  - Defining item costing data  
Use the Item - Costing (ticpr0107m000) session to store costing data that is related to the combination of item and enterprise unit.  
You must enter a validated cost scheme to post costs. In the Cost Component Scheme field, you can enter a cost scheme to which all cost components are linked.

Note: The selected cost scheme must be valid and linked to the enterprise unit for which the standard cost is calculated.

- Actualizing item costing data

Use the Item - Costing (ticpr0107m000) session to actualize the item costing data.

The validated cost component scheme contains the aggregated cost components that are defined for the item in the Item - Costing (ticpr0107m000) session. You can view the effective cost component structure in the Effective Cost Component Structure (ticpr3101m000) session. In the Effective Date field, the date on which the cost scheme is actualized is displayed.

- Defining surcharge data

Use the Item Surcharges (ticpr1110m000) session to define surcharges for a production order.

Surcharges are extra costs in an item's standard cost or valuation price, for example, handling costs or inspection costs.

A surcharge serves as a discount if the amount or percentage entered is a negative value.

## Displaying Estimated vs. Actual Hours Costs

If the **Process Hours using** field in the **Production Order Parameters (tisfc0100s000)** session is **Estimated Operation Rates**, the hours cost are calculated by using the *operation rate*, and the *cost component* from the Standard Cost Calculation module.

If the value of the **Process Hours using** field in the **Production Order Parameters (tisfc0100s000)** session is **Actual Labor Rates**, the hours costs are calculated by using rates and cost components from the machine data in the **Machines (Machine Types) (tirou0102m000)** session, and employee data from the **Items (tcibd0501m000)** session.

The hours costs are disaggregated to labor cost, machine cost, and overhead cost. For posting the overhead, LN checks the **Cover Overhead Costs in Employee Department** parameter in the **People Parameters (bpmdm0100m000)** session.

The postings are generated on the moment of Process Hours Accounting. The number of hours are:

- Entered manually
- Generated by backflushing
- Entered with direct time recording

The operations costs are posted to the *calculation office* or to the work center's *enterprise unit*. The postings for operations costs are done for the following transaction origin/financial transactions:

- Production
- Operation costs

Hours are posted against the detailed cost components that you have defined in the operation rates. Price and efficiency variances are calculated based on these detailed cost components.

**Note:** If you have started **Estimated vs. Actual Hours Costs (ticst0502m000)** by zooming, you can only find and select a record.

## Chapter 9: Project Costing

### Calculating Item Sales Prices by Project

To calculate the sales price of the item LN:

- 1 Retrieves the standard cost of a budget item from the **Standard Cost by Customized Item (tipcs3550m000)** session.
- 2 Adds the surcharges to these costs, if you selected the **Item Sales Surcharges** check box. Also, depending on the value of the **Budget Surcharges** check box the budget surcharges will be added to the costs.
- 3 Updates the sales price when the new amount is different to the old amount and not equal to zero.

**Note:** Only projects of the Budget type are allowed in this session.

### Calculating Estimated Cost and Valuation Prices by Project

Specify the range of projects and/or *calculation groups* for which you want to calculate the simulated standard costs or valuation prices. In the Calculate Standard Costs by Project (tipcs3250m000) session you can change the simulated price into an actual price.

For the calculation of estimated prices for customized items all items in the project are calculated. As a result the standard cost is always calculated according to the top-down method. So the order quantities for the components are derived from the end item quantity.

### Standard Cost Calculation by Project

You can calculate a *simulated standard cost* for all Project types. During a simulation, LN calculates, and updates the standard costs of customized items in the Standard Cost Calculation module. In the Project Control module, inventory is not revalued and the project price and the customized item price are not updated.

You can perform:

- *Simulated* standard cost calculations
- *Estimated* standard cost calculations
- Actual standard cost calculations

The following steps are taken if an *estimated* calculation of the standard cost is calculated:

- 1 LN calculates the standard cost of all customized items. The standard costs are updated in the Standard Cost Calculation module.

LN calculates the standard cost of all customized items. The standard costs are updated in the Standard Cost Calculation module.

**Note** LN calculates the standard cost of customized items by using the *cost calculation code* of the project. This code is stored in the Projects (tipcs2101m000) session.

- 2 LN revalues inventory for all warehouses with the *standard cost valuation method*.

LN revalues inventory for all warehouses with the *standard cost valuation method*.

**Note** Budgets do not have inventory.

- 3 LN updates the standard costs of all customized items of the current project in the Project Control module.  
LN updates the standard costs of all customized items of the current project in the Project Control module.

**Note** For budgets, LN uses the data as stored in the Item - Standard Cost Details (ticpr2505m000) session. For other project types, LN uses the data as stored in the Item - Standard Cost Details (ticpr3505m000) session.

- 4 LN calculates the estimated project costs. Estimated project costs consist of the following costs:

LN calculates the estimated project costs. Estimated project costs consist of the following costs:

- Item costs of all project parts in the **Project Parts (tipcs2111m000)** session. For standard project parts, LN uses the standard cost that is valid on the date as entered in the Freeze Standard Cost Date field of the **Project Parts (tipcs2111m000)** session. Standard parts are moved into the project on the three aggregated cost components. For customized parts, the estimated item costs are calculated as described above. These are stored in the detailed cost component in the Standard Cost by Customized Item (tipcs3550m000) session.

**Note** Main projects do not have items assigned.

- Activity costs. Activity costs are produced if you perform activities as defined in the **Activities (tipcs4101m000)** session. The *operation rate code*, linked to the task or work center of the activity (dependent on the value of the **Type of Operation Rates** parameter in the Standard Cost Calculation Parameters (ticpr0100m000) session), is used to determine the activity costs. LN does not take activity costs into account if:

- The **Engineering Allowed** check box in the **Projects (tipcs2101m000)** session is not selected.
- The **Activity Estimation** check box in the **Activities (tipcs4101m000)** session is not selected.

- Estimated project surcharges. If no estimated surcharges are defined for a sub project, LN takes the surcharges assigned to the main project. When estimated project charges cannot be found for a specific project, LN determines the estimated general surcharges for projects.

LN does not take surcharges for projects into account when the **Engineering Allowed** check box in the **Projects (tipcs2101m000)** session is not selected.

- For a main project, the costs of all sub projects are added to the costs of the main project.

- 5 LN stores the estimated project costs in the Standard Cost by Project (tipcs3560m000) session.

LN stores the estimated project costs in the Standard Cost by Project (tipcs3560m000) session.

For main, sub, and single projects, the budgeted costs are filled with the estimated costs of the linked budget (from which the project is derived). For a budget, the budgeted costs are always empty. Only the estimated costs are filled.

**6** LN updates the last calculation date for projects of the Budget type.

LN updates the last calculation date for projects of the Budget type.

**Note:** LN calculates the standard cost of customized items by using the cost calculation code of the project. This code is stored in the Projects (tipcs2101m000) session.

- Standard to order items

If a *standard item* with the order policy *standard-to-order (STO)* item is linked to a *project*, the cost calculation program analyzes the complete standard to order structure.

This complete standard to order structure is analyzed as if it were a customized item product structure. This product structure is then automatically exploded to the generic items level. This means that standard items made to order do not have to be included in the product structure to perform a correct calculation of material and operation costs.

As a result, any advantages resulting from batch production, in relation to setup costs, are not visible in the estimated project calculation. This applies if the same standard item made to order is linked to the project structure several times.

- Standard phantom items

Comments referring to standard items made to order, also apply to standard *phantom* items linked to a project. The standard phantom structure is automatically analyzed by the cost calculation program. During this process, material and operation costs are included in the cost calculation of the project for phantoms. Comments made regarding batch production and lowering setup costs do not apply to phantoms.

## Actual Cost Calculation by Project

You can make a *simulated* standard cost for all Project types. During a simulation, LN calculates and updates the standard costs of the customized items in the Standard Cost Calculation module. In the Project Control module, inventory is not reevaluated and the project price and the customized item price are not updated.

You can perform:

- *Simulated* standard cost calculation
- *Estimated* standard cost calculation
- Actual standard cost calculation

**Note** LN does not calculate the standard cost for budgets. The following steps are taken if the standard cost is calculated:

- 1** LN calculates the actual cost of customized items

The actual cost per customized item is determined if you take the financial transactions from the PCS Financial Transactions by Transaction Origin and Financial Trans. (tipcs3500m000) session. All actual costs for an item are retrieved and divided by the total quantity for that item. The actual item standard cost is updated, per cost component, in the Standard Cost by Customized Item (tipcs3550m000) session. The total actual item standard cost is updated in the Item - Costing (ticpr0107m000) session.

**Note:** This step is not executed for main projects.

- 2** LN determines the actual project related costs



LN determines the financial transactions for the current project from the **PCS Financial Transactions by Transaction Origin and Financial Trans. (tipcs3500m000)** session. All actual item costs and general costs form the basic actual project costs.

**3** LN adds the actual project surcharges to the total project costs

When no actual surcharges are defined for a sub project, LN takes the surcharges assigned to the main project. When actual project charges cannot be found for a specific project, LN determines the actual general surcharges for projects. LN does not take surcharges for projects into account when the **Engineering Allowed** check box in the **Projects (tipcs2101m000)** session is not selected.

**4** LN determines the differences per cost component

If LN booked the surcharges in previous calculations, the difference per cost component is determined as follows:

New actual  
surcharges - the old (= already booked) actual surcharges. A financial transaction is then made for the difference between the transaction origin PCS and the financial transaction surcharges.

**5** LN determines the percentage invoiced

To determine the costs of goods sold, LN calculates the percentage invoiced. To calculate the percentage invoiced, the **Revenue Expected** check box in the **Project Details (tipcs2130m000)** session must be selected. If the **Revenue Expected** check box is cleared, the following applies:

- If no warehouse orders or sales orders exist for the current project, the percentage invoiced is 100.
- If sales orders or warehouse orders exist and the invoiced amount is greater than zero, the percentage invoiced is 100.
- If sales orders or warehouse orders exist and the invoiced amount is zero, LN checks whether deliveries are present or not. If deliveries are present, the percentage is 100. If deliveries are not present, the percentage is zero.

**Note:** If the **Revenue Expected** check box is cleared, the percentage invoiced is either 100 or zero.

**6** Update the actual project costs

LN updates the actual project costs in the Standard Cost by Project (tipcs3560m000) session.

**7** Update the invoice amount

LN updates the invoiced amount in the **Project Details (tipcs2130m000)** session.

**8** LN calculates and books the costs of goods sold for projects for which the **Investment Project** check box in the **Project Details (tipcs2130m000)** session is not selected

LN calculates the value of the costs of goods sold as follows:

- If the project must be closed, the costs of goods sold are equal to the project costs.
- If the project must not be closed, the costs of goods sold are equal to the project costs multiplied by the percentage invoiced. Project costs of goods sold can be based on **Actual Costs** or **Estimated costs** dependent on the value of the **Post Project-related Cost of Sales Against** field in the **Project Control Parameters (tipcs0100m000)** session.

LN performs two checks:

- a** If the **Post Project-related Cost of Sales Against** field is set to **Estimated Costs**, LN takes the **Estimated Cost of Sales Limited by WIP Value** parameter into consideration. If the **Estimated Cost**

of **Sales Limited by WIP Value** check box is selected, the cost of goods sold cannot be greater than the actual project costs. The cost of goods sold are limited by the actual project costs.

- b** If the **Post Project-related Cost of Sales Against** field reads **Actual Costs**, the cost of goods sold is equal to the actual project costs, provided the following is true:

$$\text{Percentage invoiced} * \text{estimated project costs} > \text{actual project costs}$$

If the costs of goods sold are calculated, LN stores them. If the costs of goods are already booked during previous calculations, LN only books the difference.

- 9** LN calculates the general result if a project is closed

LN calculates the general result if the project is closed in the **Close Project (tipcs2250m000)** session. If the **Post Project-related Cost of Sales Against** field reads **Actual Costs**, LN cannot calculate a result on project level. As a result, LN undoes the already booked results by booking the opposite amount. Old results only exist if the **Post Project-related Cost of Sales Against** parameter is changed between the previous and the current cost calculation.

Suppose the **Post Project-related Cost of Sales Against** parameter reads **Estimated Costs**. The project result is calculated as follows:

$$\text{Result} = \text{cost of goods sold} - \text{actual project costs} - \text{already booked result}$$

## Standard to order items

- Standard to order items

If a *standard item* with the order policy *standard-to-order (STO)* item is linked to a *project*, the cost calculation program analyzes the complete standard to order structure.

This complete standard to order structure is analyzed as if it were a customized item product structure. This product structure is then automatically exploded to the generic items level. This means that standard items made to order do not have to be included in the product structure to perform a correct calculation of material and operation costs.

As a result, any advantages resulting from batch production, in relation to setup costs, are not visible in the estimated project calculation. This applies if the same standard item made to order is linked to the project structure several times.

- Standard phantom items

Comments referring to standard items made to order, also apply to standard *phantom* items linked to a project. The standard phantom structure is automatically analyzed by the cost calculation program. During this process, material and operation costs are included in the cost calculation of the project for phantoms. Comments made regarding batch production and lowering setup costs do not apply to phantoms.

**Note:** The actual project costs are exclusive to the actual item costs of the project. Results on item level must not be booked here. They should be booked when you close production orders, and so on. The result is booked with transaction origin PCS and financial transaction general result.

## Overview of interim revenue recognition in Project Control (PCS)

Products manufactured used projects in Project Control often have long lead times. During the projects, actual costs are recorded. Revenues and *cost of goods sold* can be determined at the end of the project when the products are finished and delivered.

However, international accounting rules such as IFRS (International Financial Reporting Standards) require greater transparency in business financials. Public companies must be able to recognize costs and revenues not only at the end of the project but also at different times during the project.

With revenue recognition in PCS you can determine the interim revenue and interim COGS for an unfinished project, even before shipping any end item.

### These terms are used in interim revenue recognition

- **Revenue**  
The gross inflow of economic benefits such as cash, receivables, and other assets during an accounting period. Revenue results from the usual operating activities of an enterprise, for example, sales of goods, sales of services, interest, royalties and dividends.
- **Actual costs**  
The real costs of production, hours accounting, purchase, service, sales, finance, warehousing or a PCS project.
- **COGS**  
An accounting classification to determine the amount of direct materials, direct labor, and allocated overhead associated with the products sold during a given period of time.
- **Work-in-Process (WIP)**  
The value of actual costs and results, subtracted from the COGS posted on the project. The WIP value is used for financial reporting on the balance sheet. When a project is closed, the WIP is cleared.

### Percentage of completion

To determine the interim COGS and interim revenues at a specific moment, you must first determine which percentage of the work on the project is completed. You can use three methods to calculate the percentage of completion (POC):

- **Cost to date**  
The actual costs to a specific date divided by the estimated total costs at completion. For example, the total estimated costs of the project are \$1980,-. The actual costs to the point at which you want to recognize revenue are \$200,-. The POC is  $200/1980 = 10,1\%$ .
- **Hours progress**  
The actual hours spent until a specific date divided by the estimated total hours at completion. For example, the total estimated hours of the project are 500. The actual hours until the moment that you want to recognize revenue are 100. The POC is  $100/500 = 20\%$ .
- **Manually entered**  
A percentage that expresses an estimate of the completed work. For example, you estimate that at a specific point, 25% of the work on your project is finished.

This calculation is used to calculate interim revenue at a specific point:

Calculation		Example
Estimated revenue of the projects		4905
Estimated revenue variance	+	1095
Estimated total revenue at completion		6000
Percentage of completion (POC)	*	25%
Earned revenue		1500
Already posted actual revenue	-/-	833
Interim revenue posted in prior periods	-/-	200
Interim revenue of current period		467

To calculate the interim COGS on a specific point:

Calculation		Example
Estimated cost of the projects		2000
Estimated cost variance	+	200
Estimated total costs at completion		2200
Percentage of completion (POC)	*	25%
Earned COGS		550
Already posted actual COGS	-/-	90
Interim COGS posted in prior periods	-/-	219
Interim COGS of current period		241

### Procedure for interim revenue recognition

To calculate interim COGS and revenue, you must go through these of sessions:

- 1 Project Details (tipcs2130m000)
- 2 Calculate Interim COS and Revenues by Project (tipcs3290m000)
- 3 COGS by Cost Component (tipcs3191m000)
- 4 Interim COGS and Revenues by Project (tipcs3190m000)
- 5 Confirm and Post Interim COS and Revenues by Project (tipcs3291m000)
- 6 COGS and Revenues by Project and Order (tipcs3192m000) or COGS and Revenues by Project and Order Line (tipcs3194m000)

The details are described in Recognizing Interim Revenue in Project Control

## Recognizing Interim Revenue in Project Control

This topic describes the steps to calculate interim COGS and interim revenue for a PCS project.

### 1 Project Details (tipcs2130m000)

In the Percentage of Completion Calculation Method field of the Project Details (tipcs2130m000) session, you can specify which method is used to calculate the percentage of completion for the PCS project. The selected POC is used to calculate the interim COGS and revenue.

Note: In the Project Control Parameters (tipcs0100m000) session, you can also select a POC method. This method is used as a default value in the project details of PCS projects that are generated from a sales order line by using the Generate (Project PCS) Structure for Sales Orders (tdsls4244m000) session.

## 2 Calculate Interim COS and Revenues by Project (tipcs3290m000)

To calculate interim COGS and revenues for one or more PCS projects, you must run the Calculate Interim COS and Revenues by Project (tipcs3290m000) session. LN carries out the following steps:

- a The actual costs for the PCS project are calculated up to the **Reference Date**, but the actual standard costs are not overwritten.
  - If the **Perform estimated cost calculation** check box is selected, the estimated standard cost for the PCS project is calculated. The estimated standard cost of the PCS project is based on the standard costs of items linked to the project. The project quantity is also taken into account, plus the estimated surcharges, and the estimated standard cost of the activities. Estimated costs for the PCS project that were already calculated, are overwritten.
  - If the **Perform estimated cost calculation** check box is cleared, the estimated project costs are not calculated but they are taken from the **Standard Cost by Project (tipcs3560m000)** session.
- b Actual hours are calculated. Project hours can originate from the PCS project, the PCS activities, Job Shop Control production orders, and service orders. Hours for Job Shop Control, service and PCS cannot be estimated. Therefore, if interim revenues and COGS for a specific project are determined for the first time, the estimated hours need to be entered manually in the Interim COGS and Revenues by Project (tipcs3190m000) session. Only using the estimated activity hours would be misleading. If you calculate interim COGS and revenue in subsequent periods, the number of hours is used which you entered manually the first time.
- c The estimated and actual COGS/revenues are determined. The sum of the most recent estimated revenues for sales, service, and warehousing is calculated. Furthermore, the sum of actual revenues, the sum of actual COGS for the PCS project, and the related sales orders, service orders, and warehousing orders are determined.
- d The percentage of completion (POC) for the PCS project is calculated based on the method you chose in the Percentage of Completion Calculation Method field in the **Project Details (tipcs2130m000)** session. If you selected Manual as POC method in the **Project Details (tipcs2130m000)** session, you can indicate in the **Stage of Completion** field the percentage of the work on the PCS project that is completed.
- e The Interim COGS and Interim Revenue are calculated.

## 3 Interim COGS and Revenues by Project (tipcs3190m000)

You can view the calculated COGS and revenue in the Interim COGS and Revenues by Project (tipcs3190m000) session. You can manually adjust some of the calculated amounts and the POC percentage. For every PCS project one or more interim COGS/revenues can be listed.

From the *appropriate* menu, or with the buttons, you can handle the rest of the interim COGS and revenue procedure. This described in the next steps of the procedure.

## 4 COGS by Cost Component (tipcs3191m000)

If for a PCS project the Post Interim COS and Revenues by Cost Component check box in the **Project Details (tipcs2130m000)** details session is selected, you can view in the COGS by Cost Component (tipcs3191m000) session how the COGS is distributed over cost components. You must start this session

from the *appropriate* menu of the **Interim COGS and Revenues by Project (tipcs3190m000)** session, or by clicking **Cost Components**.

If the interim COGS and revenue are not yet confirmed or posted, you can still modify the estimated costs and the confirmed interim COGS.

## 5 COGS and Revenues by Project and Order (tipcs3192m000)

If the **COS and Revenues Restricted to Financial Company of PCS Project** check box is cleared, then a COGS distribution is applicable, manual or calculated, to use the Project COGS Distribution (tipcs3110m000) session.

**Note:** Changes to the COGS distribution affect internal billing between companies if *intercompany trade relationships* are defined.

In the Project COGS Distribution (tipcs3110m000) session, you can spread additional costs incurred by the project over the related production orders. Example If you ran an advertising campaign for the end item of the project, you can distribute the campaign costs among the orders linked to the project.

You can manually adjust the confirmed interim revenue per entity.

You can manage the interim revenue for the selected project using the COGS and Revenues by Project and Order (tipcs3192m000) and COGS and Revenues by Project and Order Line (tipcs3194m000) sessions. Additionally it is possible to manage the interim COGS, if the **Post Interim COS and Revenues by Cost Component** check box in the Project Details (tipcs2130m000) session is cleared. If the **Post Interim COS and Revenues by Cost Component** check box is selected, you must use the **COGS by Cost Component (tipcs3191m000)** session.

You can use the COGS and Revenues by Project and Order Line (tipcs3194m000) session to specify a transaction price per order line. The transaction price is used in the calculation of the interim COGS and revenues instead of the estimated revenue.

## 6 Confirm interim COGS and revenue

After you view and adjusting data in the **Interim COGS and Revenues by Project (tipcs3190m000)** session and/or the **COGS by Cost Component (tipcs3191m000)** session, you can confirm the data by clicking (de-) Confirm in the **Interim COGS and Revenues by Project (tipcs3190m000)** session. If after confirming, you still want to make changes, you can click (de-) Confirm again to de-confirm the data.

To confirm interim COGS and revenue, you can also start the Confirm and Post Interim COS and Revenues by Project (tipcs3291m000) session, select the Confirm Interim COS and Revenues check box, and run the session. Confirm and Post Interim COGS and Revenues by Project (tipcs3291m000)

## 7 Post interim COGS and revenue

After confirmation the interim COGS and revenue must be posted to the General Ledger module in Financials. In the **Interim COGS and Revenues by Project (tipcs3190m000)** session, start the Confirm and Post Interim COS and Revenues by Project (tipcs3291m000) session from the *appropriate* menu, or click **Confirm and Post Interim COS and Revenues by Project**. Select the Post Interim COS and Revenues check box, and run the session.

## COGS and Revenue Postings for PCS Projects in a Multicompany Environment

If you work on a *PCS project* in a *multicompany* environment where sales offices, service departments, and warehouses belong to different *financial companies*, you can choose where financial transactions for PCS related COGS and revenues must be posted:

- On the financial company of sales office, service department, and/or warehouse  
You can choose to use the PCS project to monitor costs and for tracking purposes, while PCS related COGS and revenues are posted on the financial companies of the service department, sales office and/or warehouse. You must then clear the COS and Revenues Restricted to Financial Company of PCS Project check box in the **Project Control Parameters (tipcs0100m000)** session.
- On the financial company of the PCS project  
You can choose to post all PCS related COGS and revenues on the financial company of the PCS project's *calculation office*. As a result, the financial *departments* of sales orders, service orders, and warehouse orders must be in the same financial company as the PCS calculation office. You must select the COS and Revenues Restricted to Financial Company of PCS Project check box in the **Project Control Parameters (tipcs0100m000)** session if you want to post PCS related COGS and revenues on the financial company of the PCS project's calculation office.

If PCS related COGS and revenues are posted on the sales office, service department, or warehouse instead of on the PCS project's calculation office, which means that the **COS and Revenues Restricted to Financial Company of PCS Project** check box in the **Project Control Parameters (tipcs0100m000)** session is cleared, you must allow for the following:

- COGS distribution  
The general COGS is distributed among several departments instead of only on the PCS project's calculation office. You must use the COS Distribution based on field in the **Project Control Parameters (tipcs0100m000)** session to choose whether you want to enter the COGS distribution manually, or that LN calculates the COGS distribution based on the revenue of the sales order, service order, and/or warehouse order. Use the Project COGS Distribution (tipcs3110m000) session to view and maintain the COGS distribution.  
**Note:** The general PCS results are always posted on the PCS calculation office, because they are assumed to be always related to the PCS calculation office.
- Revenue recognition  
If you calculate interim COGS and revenues for a PCS project, and the PCS project has sales orders, service orders, and warehouse orders linked to several financial companies, the calculated COGS and revenues are distributed among various departments. You can view the distributed COGS and revenues by department in the COGS and Revenues by Project and Order (tipcs3192m000) session.  
**Note:** If COGS and revenues for a PCS project are restricted to the financial company of the PCS project, which means that the **COS and Revenues Restricted to Financial Company of PCS Project** check box in the **Project Control Parameters (tipcs0100m000)** session is selected, the interim COGS and revenues are posted to the PCS calculation office. The 'real' COGS and revenues, however, are posted to sales offices, service departments, and warehouses.
- Internal invoices  
If financial transactions are posted on the financial company of a sales office, service department, and/or warehouse, you can also send an additional invoice for general COGS from the PCS project to the sales

office, service department, or warehouse. For this purpose, you must define an *intercompany trade relationship* between the PCS project and the sales office, service department, or warehouse in the Intercompany Trade Relationships 360 (tcitr2300m000) session.

In Invoicing (SLI) and Accounts Payable (ACP), the general COGS on the internal invoice is indicated by a *cost item*. You must define a default cost item in the **Project Control Parameters (tipcs0100m000)** session. Furthermore, PCS project order number is specified on the internal invoice, which is generated based on the number group and series that are defined in the **Project Control Parameters (tipcs0100m000)** on the **Settings for COS** tab.

**Note:** Internal invoices are optional. You can have financial transactions posted to the correct financial company without internal invoice.

## Printing Project Costs and Revenues

- If the report type is **Actual**, only actual costs and revenue are printed.
- If the report type is **Interim and Actual**, actual costs and revenue as well as interim amounts are printed. If revenue recognition functionality is used for PCS projects, this report type provides overviews.

If you select the **Include Costs and Revenues from Sub Projects in Main Project** check box, the costs of goods sold (COGS) and revenue are printed for main projects as well as for subprojects.

If you select report type Actual, you can choose to print several types of reports. These report types are listed below. Financial transactions for these reports are read from table tipcs300, PCS WIP and Inventory Transactions. Financial transactions can be viewed in the PCS Financial Transactions by Transaction Origin and Financial Trans. (tipcs3500m000) details session.

- Project Costs and Revenues (Detailed)

This type of report gives a detailed overview of the project costs and revenues directly related to the PCS project, sales orders, service orders, and warehouse orders. The following data is included in the report:

- PCS related

Financial transactions with transaction origin **Project (PCS): Cost of Sales** and **Additional Cost of Sales**.

The expected and realized gross profit equal the COGS, multiplied with -1.

- Sales/Service related

The **Cost of Sales** financial transactions for the transaction origins **Sales Order** and **Service Order**. For sales, the expected revenue is based on the amount on the sales order that is linked to the PCS project. In the report, the realized revenue is split in Goods Invoiced and Invoiced Installments not Settled.

Based on the revenue and COGS, the gross profit is calculated as follows:



- $$\text{Expected Gross Profit of Goods Sold} = \text{Expected Revenue} - \text{Costs}$$

- $$\text{Realized Gross Profit of Goods Sold} = \text{Realized Revenue} - \text{Costs}$$

- $$\text{To be Invoiced Revenue} = \text{Expected Revenue} - \text{Realized Revenue}$$

- Warehousing related

In the report, a split is made between warehouse transfers with invoicing and warehouse transfers without invoicing. For orders with invoicing, the COGS are determined in the same way as they are determined for sales and service orders. For orders without invoicing, the COGS are based on the issue transactions, and the revenues on receipt transactions. The expected revenue is based on order amount.

- Project Costs and Revenues (Summarized)

If you choose to print a summarized report for project costs and revenues, only one line per project is printed. However, the underlying calculations are done in the same way as for the detailed report.

- Project Costs (Summarized)

This report prints the COGS for each project. The costs of goods sold are split into parts related to:

- Project
- Sales
- Service
- Warehouse (transfers with invoicing)
- Pseudo COGS for Warehousing (transfers without invoicing)

- Project Revenues (Summarized)

This report prints the revenues for each project. The revenues are split into parts related to:

- Sales
- Service
- Warehouse (transfers with invoicing)
- Pseudo COGS for Warehousing (transfers without invoicing)

## Chapter 10: Assembly Order Costing

### Assembly Order Costing

Costing is a crucial aspect of the Assembly Control module. The manner in which costing is performed depends partially on how you define your cost components. Other aspects of costing that are described here are:

- Transaction-processing methods
- WIP transfers
- Calculation of final results
- Differences between Assembly Control module costing and Job Shop Control (JSC) module costing.
- Where to view financial data in the Assembly Control module.

**Note:** The aspects of financial costing that are described here have no relation to the theoretical, mathematical costs associated with line sequencing.

- Cost components

There are four types of cost components:

- Materials
- Operations
- Surcharges
- General Costs

Cost components must be posted on the aggregated and collect levels of the cost scheme, the detailed level is optional.

- Transaction-processing methods

The Assembly Control module is intended for use by companies that produce many variants of complex products in a flow-assembly line. Assembly Control can also be used for low-volume assembly if you select **Order Based** transaction processing. Select your transaction-processing method in the Transaction Processing field in the **Assembly Control Parameters (tiasc0100m000)** session.

- Use **Line Station Based** transaction processing when you do not need to trace back to the original assembly order. Costs are posted to the assembly line. Results are calculated by period by assembly line.
- Use **Order Based** transaction processing when you want your costing performed on the basis of individual assembly orders. Costs are posted by order by assembly line. Results are calculated by order by assembly line.

- WIP transfers

WIP transfers consist of:

- Generating the transfer order

A WIP transfer generates a transfer order. However, if the transfer occurs between line stations that are in different logistical companies, a sales order and a purchase order are generated.

- Performing the material issue

A WIP issue may unblock or immediately process the transfer warehousing order, dependent on your parameter settings. In multicompany situations, the normal sales procedure must be followed in order to ship the goods.

- Performing the receipt

A WIP receipt acknowledges the receipt of the WIP transfer order at a main assembly line that has received work from a supplying assembly line. Warehousing processes the inbound line automatically. If the assembly lines are from two different logistical companies, it is necessary to use sales orders and purchase orders (rather than WIP transfer orders). In multicompany situations, the normal receipt procedure must be followed in order to receive the goods.

You can select whether you want these processes to occur automatically, semiautomatically, or manually.

- Calculation of financial results

When you close an assembly line with the Close Assembly Lines (tiasc7220m000) session, the production results of the line are calculated. All the line station orders must have the status **closed**. The financial results are the WIP transactions (which are estimated costs) minus the actual costs.

### Differences between costing in Job Shop Control and Assembly Control

- In Assembly Control, the quantity completed is always one.
- There is no *scrap* and *yield* in Assembly Control.
- *WIP transfers* are only created between different *assembly lines*, and not between line stations (of the same line).
- There is no set-up time in Assembly Control.
- End item unit costs (estimated material costs and hours costs for an order) are not calculated for an assembly order. This is not necessary because each end item uses the same assembly line, so there is no point in creating separate surcharges for each item.
- In case of **Line Station Based** transaction processing, variances are calculated for an assembly order and not for a generic item.
- Production results are not split into *price variances* and *efficiency variances* in Assembly Control.
- Financial results in Assembly Control are posted to the *cost component* of the assembly line.

Where to view financial data in Assembly Control

- Financial Transactions (tiasc7510m000)
- Print Financial Transactions (tiasc7410m000)
- Print Financial Transactions by Assembly Line (tiasc7414m000)
- Print Costing by Assembly Order or Assembly Line (tiasc7411m000)

## Defining Assembly Line Surcharges

*Surcharges* are extra costs in an item's *standard cost* or *valuation price*, for example, handling costs or inspection costs. A surcharge serves as a discount if the amount or percentage entered is a negative value.

- If you use **Order Based** transaction processing, surcharges are defined for a combination of an assembly line and an item.
- If you use **Line Station Based** transaction processing, surcharges are defined for an assembly line. You cannot define a fixed surcharge amount in case of assembly line based transaction processing.

The surcharges are posted to the assembly line when the line is closed. In case of order based transaction processing, the surcharges are posted to the assembly line by order.

You can use the Assembly Line Surcharges (ticpr1180m000) session to define surcharges for selected assembly lines.

## Defining Assembly Line Costing Data

You can enter a scheme to which detailed cost components are linked in the Cost Component Scheme field of the **Assembly Line Costing Data (ticpr0115m000)** session.

- If a cost component chart is defined for an assembly line, costs are posted on the detailed cost components in the scheme.
- If the scheme is defined for the selected assembly line, the Cost Component Scheme field remains empty, and all costs are posted to the aggregated cost components.

If the **Transaction Processing** field in the **Assembly Control Parameters (tiasc0100m000)** session is **Line Station Based**, you can enter costing data for an assembly line. If the **Transaction Processing** field in the **Assembly Control Parameters (tiasc0100m000)** session is **Order Based**, you can enter costing data for a combination of an assembly line and an item.

**Note:** Detailed cost components are defined for a chart in the **Standard Cost Scheme Details (ticpr0110m000)** session.

## Validating Assembly Lines

The following checks can be performed on the assembly line model integrity:

- There are no divergent line structures and segments present.
- There is correct usage of cost components and calculation office.
- The definition of the line segment structure. For example, if it start with a buffer, connected in a chain and so on.
- The definition of the work centers. The supplying line must feed a line station on the main line.
- The definition of assignments is correct. For example, one or more active average and non-average assignments must be present.
- There must be no gaps in the assembly lines.
- There must be no loops in the assembly line cycles.
- There must be one *enterprise unit* present for each assembly line.

Start the **Assembly Lines (tiasl1530m000)** session:

- 1 Select the assembly line. Click **Validate** on the *appropriate* menu. The **Validate Assembly Lines (tiasl1230m000)** session starts.  
Note that clicking **Validate** is not a mandatory step. This step is automatically performed when you actualize the assembly lines, which is a step to be completed later on in the process. This intermediate **Validate** option allows you to check the assembly line structure.
- 2 Ensure that main line and supplying line are specified in the selection range.
- 3 Click **Validate**. Check the report. If the process runs without errors, LN sets the status of the assembly line structure to Validated for the main line and supplying lines.
- 4 Check that your lines have the Validated status. When a line is created/validated/actualized, lines undergo a change and are set/reset to the Modified status.

### Actualizing Assembly Lines

Start the **Assembly Lines (tiasl1530m000)** session:

- 1 Select the assembly line. Click **Actualize** on the *appropriate* menu. The **Actualize Assembly Lines (tiasl1231m000)** session starts.
- 2 Click **Actualize**. Check the report. Analyze and correct issues, if required. If the process runs without errors, LN sets the status of the assembly line structure to Actualized for the main line and supplying line.

## Calculating Standard Cost and Actualizing Assembly Lines

- 1 Calculate standard cost for all your defined purchased and manufactured items.  
Validate that LN calculates the standard cost accurately. You can use the **Calculate Standard Cost (ticpr2210m000)** session to automatically calculate the standard cost.
- 2 Actualize cost component structures for defined generic and FAS items.
  - Defining assembly line costing data  
Use the Assembly Line Costing Data (ticpr0115m000) session to store costing data that is related to an assembly line, or to a combination of an assembly line and an item. You can enter a cost component chart to post costs on a detailed level. In the **Cost Component Scheme** field, you can enter a chart to which detailed cost components are linked. If a cost component chart is defined for an assembly line, costs are posted on the detailed cost components in the chart. If the **Cost Component Scheme** field is empty, all costs are posted to the aggregated cost components. If the Transaction Processing field in the **Assembly Control Parameters (tiasc0100m000)** session is **Line Station Based**, you can enter costing data for an assembly line. If the **Transaction Processing** field is **Order Based**, you can enter costing data for a combination of an assembly line and an item.
  - Actualizing assembly line costing data  
Use the Assembly Line Costing Data (ticpr0115m000) session to actualize the assembly line costing data, which results in an effective cost component structure by assembly line and item.  
The effective cost component structure contains the aggregated cost components that are defined for the item in the Item - Costing (ticpr0107m000) session. If you entered a chart for an assembly line, the

detailed cost components that were defined for the chart are included in the effective cost component structure.

You can view the effective cost component structure in the Effective Cost Component Structure by Assembly Line and Item (ticpr3162m000) session. In the **Effective Date** field, the date on which the assembly line costing data is actualized is displayed.

Note: You must actualize the costing data for all lines that are part of your assembly line model.

- Defining assembly line surcharge data

Use the Assembly Line Surcharges (ticpr1180m000) session to define surcharges for an assembly line. Surcharges are extra costs in an item's standard cost or valuation price, for example, handling costs or inspection costs. A surcharge serves as a discount if the amount or percentage entered is a negative value. If you use order-based transaction processing, surcharges are defined for a combination of an assembly line and an item. If you use line-station-based transaction processing, surcharges are defined for an assembly line. You cannot define a fixed surcharge amount for assembly-line-based transaction processing. The surcharges are posted to the assembly line when the line is closed. For order-based-transaction processing, the surcharges are posted to the assembly line by order.

Note: If the **Transaction Processing** field in the Assembly Control Parameters (tiasc0100m000) session is set to **Order Based**, you can enter surcharges for a combination of assembly lines and generic items. If you select the **Line Station Based** option in the **Transaction Processing** field of the **Assembly Control Parameters (tiasc0100m000)** session, you can enter only surcharges for an assembly line.

- Actualizing assembly line surcharges

Use the Actualize Assembly Line Surcharges (ticpr2280m000) session to actualize the assembly line surcharges and the assembly line surcharge bases. Effective assembly line surcharges and effective assembly line surcharge bases are created, which are used in assembly line costing. The effective date is the date on which the process is run. You can display the effective assembly line surcharges in the Effective Assembly Line Surcharge (ticpr3150m000) session. You can display the effective assembly line surcharge bases in the Effective Assembly Line Surcharge Base (ticpr3160m000) session.

Select your assembly line from the assembly line's from-to range. For other options, you can use default settings. Click **Actualize** to continue.

Note: You must actualize the surcharges for all lines that are part of your assembly line model.

## Chapter 11: Repetitive Manufacturing Costing

### Repetitive Manufacturing (RPT)

Repetitive Manufacturing is used for the production of standard products that are produced in large quantities in a continuous flow. RPT provides a simplified procedure for the production orders in Job Shop Control.

This type of manufacturing is typically used in these areas:

- Tier 1 and tier 2 automotive, either in stand-alone manufacturing, or as a supply line for larger assembly lines.
- The production of household appliances and consumer electronics.
- Medical supplies and semi-processed foods.
- Any manufacturing environment or parts of manufacturing environment with a continuous and steady demand.

Products suited for repetitive manufacturing have these characteristics:

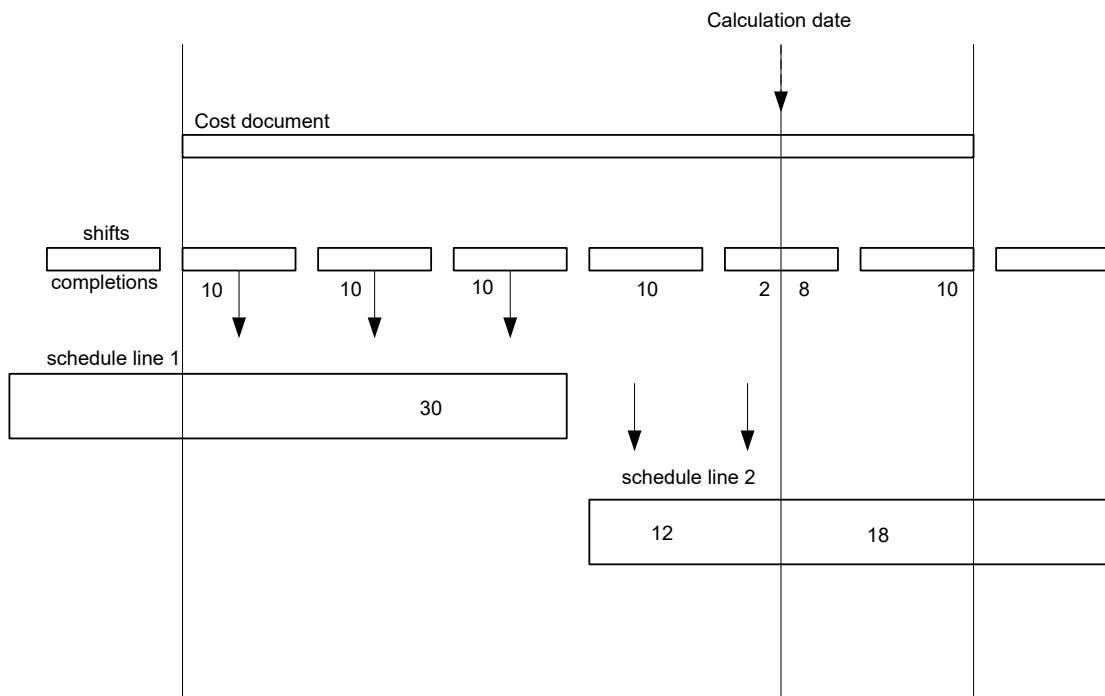
- Standard (not customized)
- Inexpensive
- A limited number of variants
- May be complex
- A flat bill of material

The product of repetitive manufacture can be a sellable end-item, or a sub-assembly for use in a different manufacture process.

Repetitive products may have started out as items produced in job shop, with the method of production changing due to changes in demand or the number of variants making production by different means more effective.

### Calculation of Estimated Material and Hour Cost in Repetitive Manufacturing

Estimated material and hour cost are calculated based on the period defined in a work cell cost document. In the cost document interval schedule lines are planned, or active during shifts. The calculation date for the estimates can be any date and time in the cost document period.



Part of the production for schedule line 1 takes place in the cost document interval, 30 units are produced in three shifts. The material and labor costs estimates are calculated, based on standard cost of the produced item.

The estimated costs for schedule line 1 are based only on actual produced quantity that falls in the cost document interval, because all production for schedule line 1 was completed before the calculation date.

Part of the production for schedule line 2 falls in the cost document interval, but production will continue after the cost document interval end. The calculation is performed while a shift is in progress. In the figure, one shift is completed and 2 units reported complete on an active shift before the calculation date. Based on the 12 units completed, the amount of materials and labor cost is estimated, using standard cost as the basis.

The above calculations account for the estimates based on the actual produced quantity. The expected production for the remaining shifts is calculated from the remaining available production hours and the production rate of the used production model.

The expected quantity of future production is 18 units. This quantity is used to calculate estimated costs based on expected production.

The total cost estimated for schedule line 2 is the sum of estimated cost based on actual production and the expected production.



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