Infor LN Service User Guide for Field Service

Important Notices

Trademark Acknowledgements

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About this document

This guide provides information about the various concepts and processes such as reference activities, service order processing and field change order, available in Field Service.

Objectives

This document is designed to meet the objectives described below. It is assumed that you already have a understanding of LN Service.

Understand the following concepts:

- Reference Activities
- Service Order Processing
- Field Change Order
- Failure Analysis

To perform the following tasks:

- To generate maintenance planning
- To generate service orders
- To plan and release service orders
- To close service orders
- To cancel service orders

Document summary

This user's guide explains the various concepts and process available in the Field Service module.

How to read this document

This document is assembled from online Help topics. As a result, references to other sections in the manual are presented as shown in the following example:

For details, refer to LN Service Online Help.

Please 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.

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Chapter 1
Introduction

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This chapter provides a brief introduction of the Preventive Maintenance and Service Order Control functionality available in Field Service module.

Preventive Maintenance

This module enables you to use preventive maintenance for assets in an effective and efficient way. These assets can belong to your customers or can be your own internal assets. The planned activities can be covered by service contracts. These activities could be agreed with the customers and, therefore, must be automatically controlled by the service order system.

The supported preventive maintenance policies are as follows:

- Usage-based maintenance (UBM), based on periods or based on counter readings.

A trigger for service can be based on the number of kilometers, mileage, or working hours. After a specified usage, the predefined service activities must be carried out. Measurements can be used to track the usage and to plan next activities. Agreements can be based on the usage of assets.

- Condition-based maintenance (CBM) based on visits and measurements or reported measurements.

Condition-based maintenance depends on the condition of the asset, including components, or configuration lines. You can register several measurements to describe the condition of the asset. You can carry out condition monitoring based on the reports generated from inspections or inspection history, which you can obtain from Service Order Control.

Maintenance planning can be triggered from the Planning and Concepts (SPC) module. However, configurations that are linked to contracts must be initiated from the Contract Management (CTM) module.

For each of the selected Installation groups, LN checks what serialized items are linked to the Installation groups. If serialized items are found, the related anonymous items or service items can be identified. The generated planning provides the activities that must be carried out. When the planned activities are released, these activities can be transferred into actual service orders.

Service Order Control (SOC)

You can use the Service Order Control module to create the order quotations, plan the order, and monitor the execution of the order, and then process the order, book costs, and trigger invoicing.

Various types of orders exist:

- Internal and external orders
- Scheduled and non-scheduled orders
- Inspections and customer visits
- Preventive and corrective work

These procedures are available to handle these orders in the service environment:

- **External maintenance**
  Preventive orders
- **External calls**
  Corrective orders
- **Internal maintenance**
  Preventive orders but no invoicing
- **Internal calls**
  Corrective orders but no invoicing
- **Helpdesk**
  Orders for telephone support by an expert
- **Return material authorization (RMA)**
  RMA procedure to ship items back to the warehouse
- **Tool maintenance**
  Preventive maintenance concerning tools
- **Field change order (FCO)**
  Orders to change a component in the installed base
- **Other procedures**
  Procedures, such as orders for training, and installing equipment

Based on these procedures, you can create user-definable service types. Their names can be tailored to the environment of the service and maintenance organization. Activities can belong to one of these service types. If planning constraints are met, activities can be grouped together in one service. Preventive Maintenance (PM) activities, (breakdown) calls, contractual visits, field change orders, and manually created orders with or without a quotation can be handled in this module.

The service engineers must carry out the service orders taking into account various types of constraints, such as the working hours of engineers, holidays, the availability of the item to serve, and so on. The required materials have to be planned, allocated, purchased, or manufactured. Warehousing handles the spare parts, which can be transferred into the engineer's van. The service order must be controlled. As a result, several statuses can be distinguished (from Free to History). The costs spent, such as labor, material, travel costs, and so on, can be booked.

The invoice is made, depending on the contract and warranty terms valid for the maintained item. If an order is made from a quotation, invoicing can be based on the terms of the quotation.

The analysis data related to the item (for problem management) can be stored as a reported problem, an established problem, a proposed solution, or a solution. The proposed solution may result in an activity.

Based on the failure analysis, a component that fails too often can be recalled from the field. This process is supported by **Field Change Order** functionality. A selection can be made of all outstanding components using the item code. An order is made to control the FCO, the costs can be charged to the production or sales department by using separate ledger accounts.

The Graphical Planning Board is an external application for viewing the service order details and for planning of the service orders. A service engineer after completing a service order can update the status in Mobile Service, which will update the LN data. The data, such as purchases made to run the order, hours spent by the service engineer, materials used, and so on, can be entered in the Mobile Service by the engineer and the same will be updated in the LN database.

Chapter 2
Preventive Maintenance Concepts

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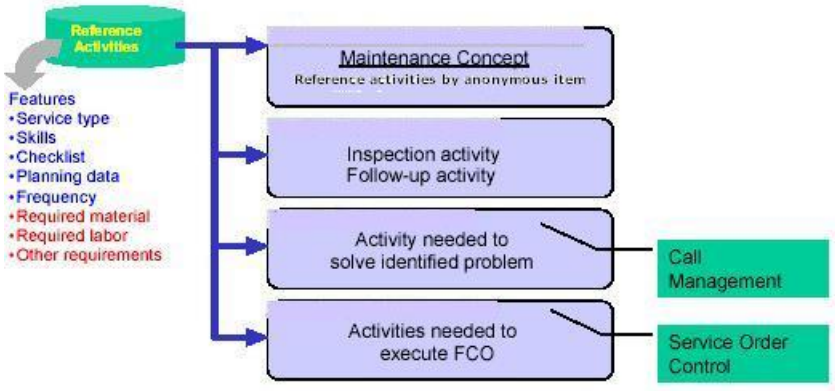
This chapter provides a brief description of the concepts available in preventive maintenance.

Reference activities

Reference activities define the work required to carry out specific maintenance activities, as well as the resources required to carry out the work. For every reference activity, you can register the service type, required skills, whether or not a checklist applies, relevant planning data, and so on. For planning reasons, you can also register the required material, labor, and any other requirements.



You can link reference activities to specific service items or models, which in turn enables you to use reference activities to define maintenance concepts.

- Create inspection templates

You can use an inspection template to specify that a specific measurement must be carried out. In the inspection template, you register the inspection activity itself, as well as the activity that must be carried out when the measured value is below the registered norm value. Both these activities must initially be defined as reference activities.

- Link activities to identified problems and solutions in Call Management (CLM).

When a call is transferred to a service order, any linked reference activity is also copied.

- Link activities to field change orders (FCOs).

LN enables you to register a number of activities that must be carried out when you execute field change orders. You must initially define these activities as reference activities.

- To define and maintain reference activities related to depot repair.

Labor rate procedure

The labor rates are specified in labor rate codes. The advantage is that the labor rates can be controlled centrally. This means that if the labor rate is changed, it is changed in every session in which that labor rate is used.

Labor rates are usually specified as hourly rates. At company level, you can set the time unit (other than hour) on which the labor rates are based. Use the Conversion Factors (tcibd0103m000) or Units (tcmcs0101m000) session for time units to calculate the labor rate for the specified time.

You can use labor rates to define the labor requirements lines for reference activities and planned activities, or to estimate the cost of activities related to service orders.

Because you can define labor rates at several levels, LN selects the labor rates in the applicable sessions, as follows:

Reference Activity - Resource Requirements (tsacm2120m000)

1. The labor rate of the task that is linked to the reference activity.
2. The labor rate that is linked to the reference activity.
3. The labor rate of the service center that is linked to the reference activity.

Planned Activity - Labor Requirements (tsspc2111m000)

1. The labor rate of the task that is linked to the planned activity.
2. The labor rate that is linked the planned (reference) activity.
3. The labor rate of the skill that is linked to the planned activity.
4. The labor rate of the service center that is linked to the planned activity.

Service Order Estimated Labor Costs (tssoc2130m000)

You can link labor rates to the labor cost lines of service order quotations. When you copy the quotation to a service order, LN copies the labor rates of the quotation's estimated labor lines. In all other cases, the Labor Rate remains empty.

Note

Estimate is one of the available search path values for actual labor rates in the search path fields of the Service Order Parameters (tssoc0100m000) session.

Service Orders Actual Labor Costs (tssoc2131m000)

In the search path fields of the Service Order Parameters (tssoc0100m000) session, you can specify a search path that LN uses to determine the service order's actual labor rates. After you enter the spent labor hours for a service order in the Service Order Hours (bptmm1130m000) session, LN enters the labor rates of the first available search path value.

Note

You can change the sales rate for an actual labor cost line manually. However, any changes or additions to the lines in the Service Order Hours (bptmm1130m000) session applicable for this line will use the sales rate found considering the search path.

The following formula will then be used
to calculate the new sales rate:

$$\text{new sales rate} = \frac{\text{old total sales amount plus or minus new update amount}}{\text{new total quantity}}$$

If the new total quantity is zero, the total sales amount will also be zero. If the calculation of the new total sales amount results in a negative amount, the amount will be zero.

Note

If no labor rate is found for any of the search path values, LN enters the following in the Service Orders Actual Labor Costs (tssoc2131m000) session:

- Zero (0) for the service order's labor sales rate.
- The employee's labor rate for the service order's labor cost rate.

Measurements

Inspection

To measure the value of multiple situational variables (measurements) that relate to a serialized item, and compare these to preset boundary values. Inspections can establish the necessity of maintenance activities. Reference activity related to a set of measurement types.

Measurement

Determination of the value of a particular dependent variable of a serialized item in a specific situation, for example, cooling water intake temperature.

Unit of measurement

A measurable (physical) variable and an identification of the unit of this variable, for example, pressure in kPa.

Unit

The indication in which the unit of measurement is expressed.

Independent Variable

Unit of measurement, which determines the dependent variable. Also known as the x-variable.

Dependent Variable

Unit of measurement, which together with a norm value (and a start value)determines when maintenance activities must be carried out. The value of this variable is determined when the measurement is executed. Also y-variable, this variable depends on the x-variable; y = f(x).

Use Trend

The estimated behavior of the value of the dependent variable, for example, the tread of a tire, as a function of the independent variable, for example, time. Possibilities include increasing, decreasing, cyclic increasing, cyclic decreasing, between limits, outside limits, or none.

Maintenance policies

Corrective Maintenance (CM) policy

The maintenance activity that is carried out to repair an item after a defect is identified. The item must be restored to the technical state required for it to fulfill its function properly. This policy is supported by the following modules:

- Call Management
- Service Order Control
- Maintenance Sales Control
- Work Control System

Periodic Maintenance (P)

Preventive maintenance that takes place at a constant interval or during certain times of the service period. The maintenance frequency is expressed in a time unit.

Counter Value (CV)

Preventive maintenance that takes place at a constant interval. This interval is expressed in a usage-related unit, *for example, operating hours or kilometers*. The actual moment of maintenance is when the norm value of the counter is reached. These actual moments can be predicted.

Periodic Maintenance (P) & Counter Value (CV)

You can use periodic maintenance and counter value policies in combination. Maintenance is carried out whenever one of both conditions is reached first. Maintenance is carried out at a particular time, unless a specified norm value is reached.

Example

A car can be serviced under warranty twice when usage is 10,000 km or six months, whichever comes first.

Predicted Activities (PA)

You can compare this method with Counter Value (CV). The maintenance intervals are based on the predicted progress of the value of a specific measuring quantity (dependant variable) based on measuring data from the past (history data). This method optimizes the intervals of maintenance. The data that is measured during maintenance can be sent to the history data again. As a result, the maintenance prediction is continuously amended to the latest measurements.

Inspections (PI)

During an inspection, a set of measurements is carried out for a specific item. Maintenance is required when the measured value of the dependent variable of each measurement type does not meet the norm value. Maintenance is carried out depending on the outcome of the inspection. Each measurement can

result in a different activity. The inspection intervals can be based on the expected progress of the value of a specific measuring quantity (dependent variable).

Preventive Maintenance (PM) policy

All maintenance activity that are carried out before the item malfunctions. The aim is to keep the item in the technical condition that is required for correct functioning. This Service Planning & Concepts module supports the policy. Preventive maintenance can be divided into:

- Use Based Maintenance (UBM)
- Condition Based Maintenance (CBM)

Inspections (PI)

During an inspection, a set of measurements is carried out for a specific item. Maintenance is required when the measured value of the dependent variable of each measurement type does not meet the norm value. Maintenance is carried out depending on the outcome of the inspection. Each measurement can result in a different activity. The inspection intervals can be based on the expected progress of the value of a specific measuring quantity (dependent variable).

Use Based Maintenance (UBM)

Preventive maintenance that takes place after a certain period of use, independently of the condition of the item at that moment. Use Based Maintenance can be subdivided into:

- Periodic Maintenance (P)
- Counter Value (CV)
- Periodic Maintenance (P) & Counter Value (CV)

Inspections (PI)

During an inspection, a set of measurements is carried out for a specific item. Maintenance is required when the measured value of the dependent variable of each measurement type does not meet the norm value. Maintenance is carried out depending on the outcome of the inspection. Each measurement can result in a different activity. The inspection intervals can be based on the expected progress of the value of a specific measuring quantity (dependent variable).

Condition Based Maintenance (CBM)

Preventive maintenance that takes place if a required measurement no longer meets the specified norm value. For example, if an engine has oil pressure less than value x, corrective action must be taken. Condition based maintenance can be subdivided into:

- Predicted Activities (PA)
- Inspections (PI)

Inspections (PI)

During an inspection, a set of measurements is carried out for a specific item. Maintenance is required when the measured value of the dependent variable of each measurement type does not meet the norm value. Maintenance is carried out depending on the outcome of the inspection. Each measurement can result in a different activity. The inspection intervals can be based on the expected progress of the value of a specific measuring quantity (dependent variable).

Service inspections and preventive maintenance scenarios

Measurements are used to determine the value of an item's variable (measuring quantity) in a specific situation. Example Tire treads depth. When measurements are registered for serialized items during inspections, maintenance notifications are generated, based on pre-defined maintenance trigger.

The type of the measurement determines whether a trend (estimated behavior) and a measurement unit are used. For alphanumeric measurement types, used for measuring conditions instead of absolute values, trend and measurement unit cannot be defined.

Measurement types are used for:

- Inspections on work orders for serialized items
- Inspections on service orders for serialized items
- Inspections on serialized items only
- Expected measurements on planned activities for preventive maintenance
- Counter value on serialized items that can be used in service contracts on the contract coverage lines

Maintenance triggers sets

Maintenance Trigger Set is a set of maintenance triggers that is used to trigger maintenance notifications when performing measurements. A maintenance trigger set is linked to a measurement type. A maintenance triggers set can be linked to a counter reading that is linked to a serialized item.

Maintenance triggers

Maintenance Trigger is a trigger that determines when maintenance must be performed for an item. A maintenance trigger is linked to a measurement type and consists of 1 or more maintenance triggers. The relation between the measurement type and a maintenance trigger set is 1 to many. When a measurement is performed (using a measurement type), Infor LN checks whether a maintenance trigger is defined for a measurement. If a maintenance trigger is defined and triggered, a maintenance notification is generated. It is possible to assign the maintenance notification to a person responsible for the follow up actions of the notification.

Maintenance trigger assignments are used to determine which trigger set is applicable for which item, item group, etc when performing a measurement for a specific position. Maintenance trigger set is a rule book with an effective/expiry dates. The order in which trigger set are selected is as follows:

- Maintenance trigger set specified on counter reading of serialized item.
- Maintenance trigger assignment rule book.
- Maintenance trigger on reference activity measurement type.
- Measurement type.

The Simulate Maintenance Trigger Set Rules (tsmdm0276m000) session is used to determine which trigger set is used.

Inspections

Inspections can be created manually (directly for an item) or generated using web services or reference activities when planning service orders/work orders.

Inspections (measurement types) can be defined in Reference Activity - Measurement Types (tsacm3160m000) session for Item – Reference Activity combinations. When defining a reference activity, with inspections on a service order activity or work order activity, inspections are generated in Inspections (tscfg3100m000) session.

Inspections can be:

- Generated from a Measurement, meaning, it is an inspection that must be executed.
- Retrieved from the physical breakdown structure.
- Retrieved from another serialized item.
- Retrieved from other counter reading.

Note

For advance inspections, besides setting up measurement types and maintenance trigger sets, counter reading must also be defined.

Counter groups

Counter groups can be used to support advanced measurement scenarios. Counter groups are used for numeric measurement types only. You can use counter groups to:

- Calculate trends for maintenance to be performed in future
- Retrieve measurements from other items or other measurements
- Define multiple trigger sets for one measurement

The counter group is used to default the counter readings when a serialized item is created. On a counter reading, it is possible to determine where the inspections are sourced from.

Trend information can also be defined on the counter reading. Trend calculation can be used to predict when maintenance is necessary. Trend calculation is :

- Based on a manually entered trend
- Retrieved from physical breakdown (only applicable if the counter is retrieved from the physical breakdown structure).
- Retrieved from specific item (only applicable if the counter is retrieved from another serialized item).
- Retrieved from another measurement type of type counter (especially if the wear is based on the usage)

When a serialized item is created, a default counter reading is created for the serialized item. Infor LN defaults the measurement type from the service item data. The counter value can be updated manually or the counter value can be reset. You can define reset rules to indicate how counter values can be reset.

Maintenance notifications

Maintenance notifications are generated based on maintenance triggers that are applicable when registering measurements for serialized items during inspection. Based on the measurement type and position of the measurement, the applicable maintenance trigger set is determined. Infor LN uses the following search logic:

1. From the counter readings defined for serialized items
2. From maintenance trigger set assignments
3. From reference activity
4. From the measurement type

Maintenance notifications follow-up

Based on the maintenance notification, you can decide the follow-up required for the maintenance. When a maintenance notification is generated it must be possible to set the maintenance notification to:

- Ignore for Now
- Always ignore
- Transfer to a planned activity, service order/work order and so on

Transfer maintenance notifications

Maintenance Notifications can have a follow-up activity defined indicating the next maintenance task that must be performed on the specific serialized item. These maintenance notifications can be transferred to various objects, such as, service orders, internal work orders, service order quotations and maintenance sales quotations.

Preventive maintenance scenarios

Preventive maintenance scenarios are used as the basis to generate planned activities. A maintenance scenario has scenario lines based on which planned activities can be generated; based on time (example 12 times a year), based on time according to a predefined pattern (example after 2 months small maintenance, after 3 months big maintenance, after 5 months small maintenance), and based on usage (example after 10000 km, execute maintenance or after profile of tire is below 3 mm).

Preventive maintenance scenario lines

Based on the preventive maintenance scenario lines, a maintenance plan is generated for the serialized item. You can define the following types of scenarios:

- **Usage-based scenario**
  For a usage-based maintenance scenario line, the scenario line is defined for a specific child item that matches with the item of the serialized item for which the plan is generated. The measurement type, maintenance trigger and counter readings are also defined. The counter reading must include trend information in order to calculate the planned activities. A maintenance trigger set is defined, and the applicable trend information is retrieved. For the defined counter value and start date, based on the trend data and maintenance trigger set, the first expected maintenance moment is determined. When this planned date is within the defined time fence, a planned activity is generated for the follow-up activity defined for the applicable maintenance trigger. This process is repeated, using the new planned date as the counter start date for the next iteration. When counter reset rules are defined for a default start value, the counter value used to calculate the next maintenance moment, is reset. This type can only be used for advanced inspection scenarios.
- **Time-based scenario**
  A time-based scenario is used to define the reference activity that must be planned and how many times within the time frame (example: inspection to be done 12 times per year). For a time-based maintenance scenario line, the process to generate a plan based on master routing is different from that of generating the plan for a reference activity. When generating the plan based on master routing, the default routing option is defined, in case multiple routing options exist. Otherwise, an error report is generated in Infor LN. The new start date is determined, based on the value the **Start Maintenance Cycle** field is set to, in the Generate Maintenance Plan (tsspc2200m000) session. If the start date is within the time fence, the routing operations are read from the master routing, in descending order, and planned in time. When the plan is generated for reference activities, the planned activity start date is determined using the same logic.
- **Time-based with pattern scenario**
  This scenario is used to define the pattern using the relative moments when a reference activity must be performed and a planned activity must be planned for it. When generating a maintenance plan based on a time-based pattern line, the process to generate a plan based on master routing is different from that of generating the plan for a reference activity. When generating the plan based on master routing, the default routing option is defined, in case multiple routing options exist. Else, Infor LN generates an error report. To determine the start

date of the planned activity, the defined calendar moments in the activity pattern line are used. This process is repeated for each pattern line as long as the planned date is within the time fence.

Preventive maintenance scenario line patterns

Preventive maintenance can also be sometimes performed on an irregular basis. In such cases, a time-based pattern can be set up with relative moments defining when maintenance must be performed.

Generate maintenance plan

Use the Generate Maintenance Plan (tsspc2200m000) session to generate maintenance plans for serialized items for which a preventive maintenance scenario applies. The rule book for maintenance scenarios defines the applicable scenarios.

Note

A maintenance plan can be generated only if maintenance scenario is defined for the serialized item.

Dependent variable and norm value

The variable and the value that determine when maintenance activity must be carried out. The dependent variable is a unit of measurement.

Example

A copying machine must be serviced after every 15,000 copies. The dependent variable is the number of copies. The dependent norm value is 15,000.

- In case of predicted inspections (PI), the value of the dependent variable must be measured and compared with the norm values. If the measured value is outside the limits of the norm values (upper/lower limit), an activity must be carried out. You can do this immediately or as a follow-up activity.

Example

The norm value was not reached at the moment of maintenance. The next time the activity for this machine will be carried out, is one month later. The prediction is changed.

- In case of counter value (CV) and predicted activity (PA): Maintenance must be carried out when the norm value is reached. As a result, this value determines whether the activity must be carried out. Note: If a car must be inspected every 2,000 km, the first norm value is 2,000 km, the second norm value is 4,000 km, and so on.

Chapter 3
Service Order Control Concepts

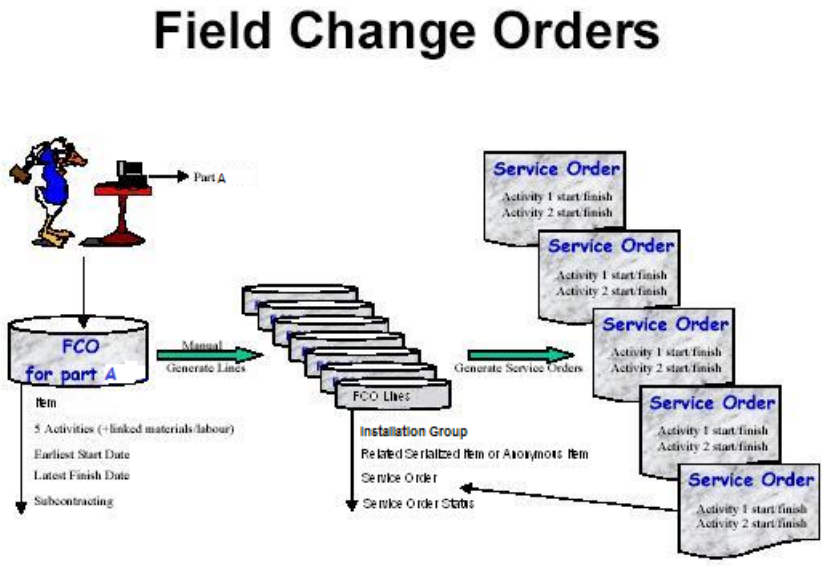
3

This chapter provides a brief description of the concepts available in service order control.

Field change orders (FCO)

A field change order (FCO) is an order to modify a part of a installation group that is installed at the customer site or in your own organization. You mainly use field change orders to solve production errors collectively, and to introduce product modifications. You can also subcontract the execution of the FCO.

You mainly use Field Change Orders (FCOs) to solve production errors collectively (product recalls) or to modify a product. In the case of production errors, the costs are usually at the service organization's expense.



Use the Field Change Orders (tssoc5100m000) session to define a field change order. Organizations that play roles in manufacturing and servicing can use this session. If a manufacturing defect is found

with an item that has been used as a part of Installation groups, a field change order is raised for global replacement of such defective items. The item to be serviced and the activities to be performed are registered in this entity.

FCO Lines

After you create the FCO header, in which the anonymous item or serialized item and the related activities that you want to replace are specified, you can either manually define FCO lines or have the lines generated automatically.

Each FCO line represents one specific serialized item or one anonymous item in an Installation group. The advantage of automatic generation is that LN checks all related Installation groups, taking the active dates into account. You can use the Generate Field Change Order Lines (tssoc5210m000) session to generate lines automatically for a range of FCOs, sold-to business partners, and Installation groups or serial numbers.

Generate Service Orders for FCO

You can generate service orders for field change orders (FCOs). The planned start time on the service order is the planned start date entered in the Generate Service Order (tssoc5220m000) session. To determine the planned finish time on the service order, you add the sum of all reference activities' durations to the planned start time.

Functionality to generate Field Change Order

- The first time you define an FCO, the FCO receives the status Free.
- In the Field Change Orders (tssoc5100m000) session, you can define up to five activities for an FCO. When you generate a service order for an FCO, LN generates a service order activity line for each of the FCO's activities.
- In the Field Change Orders (tssoc5100m000) session, you select the item code to which the FCO applies, and in the FCO Lines (tssoc5110m000) session you specify the serialized items (which must have this item code) on which the FCO's activities will be carried out.
- You can manually enter the serialized item(s) to which the FCO applies in the FCO Lines (tssoc5110m000) session. Alternatively, you can run the Generate FCO Lines (tssoc5210m000) session, in which LN generates FCO lines for all serialized items derived from the item code entered on the FCO. The FCO's status changes from Free to Lines Generated when you create the FCO's first FCO lines.
- You can generate service orders for a range of FCOs using the Generate Service Order (tssoc5220m000) session. When you generate the first service orders for an FCO, the FCO's status changes from Lines Generated to Execution.
- In the Service Order Parameters (tssoc0100m000) session, the service type selected determines the service type of service orders that you generate from FCOs. This service type also determines the service order's coverage type, so you can, therefore, define a contract coverage for FCOs.

- After all of an FCO's service orders are finished, in other words, if the status orders of the service items are either Closed or Canceled, the FCO's status can be Closed. You can then remove the FCO and its FCO lines from LN.

Subcontracting

Often, one company does not deliver the entire offering of Service, as is the case of products. In some cases, the entire service of a product is subcontracted to a supplier. The customer still has the advantage of one main contractor as contact.

The following functionality handles activities carried out by a subcontractor in Service Order Control:

- A procedure is available that automatically generates a purchase order for subcontracting purposes. This procedure proceeds synchronously with the purchase procedure for materials that are acquired by purchase (see delivery type: By Purchase Order).
- The subcontractor who will carry out the activity, and the item that identifies the subcontracting in purchase, can be recorded for each activity.
- The purchase order is generated when subcontracting is defined as another cost line in the Service Order Estimated Other Costs (tssoc2140m000) session. The global SRP automatically generates the purchase order when additional purchase data is entered.
- The agreed period in which the subcontracting must be realized and can be recorded as an appointment under the activity.

Note

- You cannot include these time boundaries as purchase data.
- You can define subcontracting as other requirement by planned activity.
- If you only enter the item in the Item field and you leave the Buy-from B.P. field empty, a vendor rating/selection can be carried in Purchase Control.

Service order processing

Service orders are generated from the Call Management module, Service Planning & Concepts module, and Infor LN Project. However, you can also create service orders manually. If required, you can create the service order from a quotation. Another way to create a service order is to generate orders out of the FCO functionality. Service orders can be defined and processed on active PCS projects, or on already delivered PCS projects.

The service order can have several statuses throughout the order life cycle, ranging from **Free** to **Closed**. These statuses enable you to control the service order. Interruption is a sub-status that you can use for parts non-availability or because the customer’s asset is not available or any other reason.

The following statuses are available with the following meaning:

- **Free**
  The order is currently not planned or scheduled. Everything can be changed.
- **Planned**
  The **Planned** status is to enable service resource planning (SRP) to plan the order, which means that the parts required will be allocated to the warehouse or purchased. The activities are soft allocated to the preferred service engineers for a configuration.
- **Released**
  When the order reaches this status, the order is ready to be executed. If intelligent scheduling is required, this can be achieved by a service scheduler or by a service scheduler assistant. Alternatively, if fixed (preferred) engineers are allotted to service orders, a batch process can be run to plainly release a service order. In any case, this step would release warehouse material, if stock is available, and enables you to start execution of the orders. Emergency calls can be transferred to service orders in Released status directly.
- **Completed**
  The job is finished, material used, hours used, and so on, and can be entered in LN.
- **Costed**
  All costs and expenses are booked to the service order, so the auditor can check the order. Contractual obligations and warranty obligations are checked to calculate the invoice price. This also means that costs are properly booked and the invoices for these service orders can be sent.
- **Closed**
  The invoice process is also carried out, which means that the order is entirely processed and, therefore, can be closed and deleted. However, before orders can be closed the reconciliation processes in Financials must be carried out.

The steps to carry out also depend on the service procedures that were selected. If, for example, the Preventive Maintenance for Plant (Internal) Maintenance service procedure is selected, no invoice is created but Service costs are booked.

If a warranty is valid for an asset, either no invoice is made or discounts are offered based on the agreements, but possibly a more detailed report about the problem will be required from the engineer. Repair warranty can be made applicable based on the company policies or based on a selection by you by means of a Service type. Repair warranty offers 100 percent coverage.

Service resource planning

In the first stage, at the global service resource planning of the service order, materials are allocated to the selected warehouse or purchase orders at entry. In addition, the preferred engineers are soft allocated for the orders that must be carried out. In the second stage, during the SRP or the batch process, the service orders are released if engineers are already allocated to the orders.

To schedule and release a service order more logically, you can use tools such as LN Service Scheduler 2.3 or LN Service Scheduler Assistant 1.2 constraints such as skills, availability, locations, and so on.

These tools feature various planning constraints to use the engineers most efficiently and have high visibility of field service activities.

You can create a service order from the service quotation.

The following planning constraints and resource checks can be valid for the whole planning cycle. Bear in mind that you define the plan bucket yourself.

- **Area or service center:**
  The service engineer can be responsible for an area.
- **Combine service activities:**
  The service activities carried out on one configuration and/or location can be combined to work more efficiently, especially with calls.
- **Response time:**
  The response time agreed in the contract, warranty, service order, or call to fix the problem.
- **Skills engineer:**
  Without the right skills, the engineer may not be able to fix the problem.
- **Locations/sites:**
  Service activities can apply to a whole location/site.
- **Calendar functionality:**
  To check the working hours of an engineer or work center.
- **Appointment confirmations:**
  In the Call Management and Maintenance Planning Concepts modules, you can make appointments with the customer.
- **Preferred engineers:**
  An engineer linked to a customer asset is responsible in the first place, second place, and third place. For scheduling, these engineers must be checked first.
- **Overtime:**
  Overtime allowed for an engineer is another check that can be done.
- **Available parts:**
  Without available parts concerning the service order that must be carried out, you cannot reach a high first time fix rate. If the right part is not available, an alternative part can be delivered.
- **Service kit allocation:**
  To carry out a service order, sometimes a service kit is required and, therefore, must be planned and allocated.
- **Asset calendar:**
  A calendar in which the availability of an asset can be checked, for example, machines for plant maintenance or customer assets.
- **Planned maintenance:**
  The machines must be available (no usage is planned).

Service Order Costing

All actual costs, such as material labor, tools used, and travel costs, can be registered. Declarations, hotel expenses, and so on can also be related to a service order. Expenses such as hotel invoices are first paid by the Accounts Payable module (Financials) and can be charged to the service order. Subcontracting costs can also be charged to a service order.

Hours spent on general issues such as car replenishment, car maintenance, collection of parts, personal problems, such as doctor’s visit and so on, can also be reported.

The costs can also be entered in the remote service application such as Mobile Service. For possible invoicing, which depends on the contract or warranty agreed, you can transfer the costs by remote access to Service from the field directly.

Order costs/amounts can be covered by any applicable/valid agreements, such as service contracts, warranty, repair warranty, service order quotations, or FCO based on the applicable discounts in each case.

The user can have a visibility into the gross margin or net margin per order, and take actions based on the perceived profitability of the order. Online margin control also makes it possible to get a quick overview of the costs on the service orders.

Service Order Invoicing

The invoice process is triggered when you set the order or activity status to Costed. The cost lines that underlie the order or the activity are sent to Invoicing, from where further processing is carried out to send the invoices to the customer sites.

Depending on the case at hand, an order can be costed at once, costed at an activity level, or each cost line can be costed individually. Taxes applicable for each country are applied at the time of invoicing.

The invoice from a contract (installments) or an invoice from a maintenance sales order can be combined with a service order, into a collect invoice to prevent a bureaucratic burden in the financial department. In the background, the ledger accounts in Financials are updated. The order information is held until the financial reconciliation is carried out.

Failure Analysis

Failure Analysis explains about gathering up-to-date data related to confirmed failures, providing failure reports at right points, the results of a selected analysis, and providing primary or preliminary causes of failures in various instances. An assumption is made here that the report would be as good as the data captured, so if the data gathered were inaccurate the report on failure analysis also would be inaccurate.

You can use Service Resolution - Failure Analysis (tsclm3170m000) session to register failure on a material line on any of the following order:

- Service order – material lines
- Maintenance sales order – Part delivery/receipt lines
- Work order – material resource lines

You can use Service Resolution History - Failure Analysis (tsclm4100m000) session to view total failure history in an Organization.

You can use Consolidated Failure Analysis (tsclm4110m000) session to view the failure data of both active and history failure analysis data.

Integration of Project with Service

To handle service requirements of a completed project and of projects in progress, Infor LN Project is integrated with Infor LN Service.

Handling service requirements of completed projects involves providing service to a part or the entire project, as per the contract. This is made possible by transferring the project structure and the materials consumed in the project to Infor LN Service.You can copy the activity or the element structure and the material cost lines of the actual consumed material items, to Service so that these items become part of the physical breakdown structure. This enables identifying the items that need service and maintenance.

To handle service requirements of projects in progress, you can generate service orders for the project, in Infor LN Project. The cost incurred for the service performed, is transferred from Infor LN Service to Infor LN Project. To generate service orders, the reference activity from Infor LN Service is linked to the activity or element labor budget lines in Infor LN Project.

When the service order is set to Costed in Infor LN Service, the cost is transferred to Infor LN Project and is aggregated as labor cost. You cannot close a project with outstanding service orders or if all the service orders linked to the project are not costed.

Repair Warranty

When a **Service Order** or **Maintenance Sales Order** are generated/created from bad fix calls, manual service orders, or planned activities, based on the service type parameter set, LN covers the Order under Repair Warranty. The service type that is defaulted to the service-order activity line or the Part maintenance line is the service Type repair warranty. The service type repair warranty is defined in Service Order Parameters (tssoc0100m000) session or in the Maintenance Sales Control Parameters (tsmsc0100m000) session.

If the service type on the Part Maintenance line is equal to the one defined in the Maintenance Sales Control Parameters (tsmsc0100m000) session for Repair Warranty, the pricing method on the Maintenance Sales Order Line (tsmsc1110m000) session is automatically set to Repair Warranty,

indicating that Repair warranty coverage is applicable for the Part Maintenance line. You can modify (other than Repair warranty) the pricing method, by changing the Service type, which is not equal to the one that is defined in Maintenance Sales Control Parameters (tsmsc0100m000) session for Repair Warranty, which in turn means that repair warranty coverage is not applicable.

When a new **Service Order Activity** is created LN checks, if there are any previous activity undertaken either in Service Order Control or to Maintenance Sales Order Control within the Repair Warranty duration specified under the serialized item. LN defaults the service type meant for repair Warranty (SOC) into the new Activity. If the parameter Service type for repair warranty is empty, LN leaves the Service Type empty and Repair Warranty is not applied for this activity.

When a new Maintenance Sales Order Control line (Part maintenance) is created LN checks, if they fall with in the repair warranty duration defined in Serialized Items (tscfg2100m000) session. LN defaults the pricing method as Repair Warranty. LN defaults the Service Type meant for repair warranty (MSC) into the maintenance sales order lines. If this parameter is not present, LN leaves the Service Type empty and Repair Warranty is not applied.

Note

The automatic repair warranty service type is applied when the Serialized item on which the service orders activity or the Part Maintenance line is within the Repair warranty duration mentioned in the serialized item.

Repair warranty is applicable only for part maintenance line in Maintenance Sales Order.

The financial transaction for Repair Warranty is included as Repair Warranty Costs in service order or a maintenance sales order as the Transaction Origin.

When an Invoice Report is printed in Central Invoicing, this Repair Warranty Coverage amount is printed along with other coverages.

Coverage procedure

Use the following sessions to register and modify the costs incurred during the execution of a service order:

- Service Order Estimated Material Costs (tssoc2120m000)
- Service Order Actual Material Costs (tssoc2121m000)
- Service Order Estimated Labor Costs (tssoc2130m000)
- Service Orders Actual Labor Costs (tssoc2131m000)
- Service Order Estimated Other Costs (tssoc2140m000)
- Service Order Actual Other Costs (tssoc2141m000)

These cost lines specify the used materials, labor, and other costs during the execution of a service-order activity. If you define the estimated cost data in the Service Order Estimated Material Costs (tssoc2120m000) session, LN automatically defines the actual cost data in the Service Order Actual Material Costs (tssoc2121m000) session.

LN displays the specified item's inventory data in the Service Order Estimated Material Costs (tssoc2120m000) session and the Service Order Actual Material Costs (tssoc2121m000) session.

Coverage actual costs

The Coverage tab of the actual costs sessions indicates how the cost line is financially covered. After you enter or change the Total Sales Amount field on an actual cost line, LN automatically determines the coverage. You can always manually change the coverage.

Coverage amounts determined by LN:

- service contract
- warranty
- service-order quotation
- field change order (FCO)
- Service-order invoicing

User-defined coverage amounts:

- Other costs

Note

LN determines the coverage for the registered costs in the following sequence:

1. Warranty
2. Service contract
3. Service-order invoicing

Change coverage manually

If the cost line is not financially approved, you can manually change the coverage. There is no coverage if you clear the check boxes for the coverage of service contracts, service-order quotations and warranties. These check boxes are selected by default. If you change one of these check boxes, the coverage that is stored in the sales amount fields is zero. In this case, LN transfers the sales amount to another coverage amount. You can manually change the following fields:

- **Others**
- **Invoice Sales Amount**

Until the cost line is financially approved, LN handles the coverage as allocated costs and not as actual spent costs. For this reason, you can manually change the coverage for service contracts, service-order quotations and warranties.

Cost amounts

LN determines the cost amounts for the coverage, which the user cannot maintain. The cost amount fields are necessary because the cost amounts are posted to Financials. If you manually change the sales coverage, LN calculates the cost amounts in a similar and proportional way.

Warranty

The warranty becomes active if it is related to a serialized item for which the activity must be carried out. In the Configuration Control module you can link the warranty to the serialized item. If no warranty is related to the given serialized item, LN checks if a warranty is related to a parent serialized item. If a warranty is valid for the serialized item, LN determines which part of the Total Sales Amount is covered by warranty terms. The amount covered by warranty is stored in the Warranty field. If the total sales amount is not fully covered by warranty, LN checks if service contract coverage applies.

Service contract

If an active service contract is linked to the Installation group on the service-order header, LN uses data stored in the Contract Management module to determine the sales amount that is covered by the service contract. This amount is stored in the Contract field.

Service-order quotation

You can generate a service order from a service-order quotation. The service-order quotation number is stored in the service-order header. LN uses the procedure for service order invoicing to invoice the fixed amounts that are agreed for the service-order quotation. For this reason, LN creates a special activity when you generate the service order. This activity has no meaning for the normal order procedure. To exclude this activity from the order procedure, the activity status becomes Completed. The service-order quotation amounts that are agreed with the customer and that are defined by cost type, are copied to actual cost lines and stored as amounts to be invoiced (in the **Invoice Sales Amount** field). When you register the actual costs for the service order, LN automatically checks for each actual cost line if:

- The entire actual sales amount is covered by the service-order quotation.
- The sales amount must be entirely or partly invoiced because the service-order quotation does not cover the amount.

Field change order

If a service order is generated from a field change order, the field change order number is stored in the service order header. The actual costs that are registered for the service order are financially covered by a special budget for field change orders. The entire actual sales amount is stored in the **Sales Amount Field Change Orders** field.

Other

In the Others field you can enter a coverage amount that the customer is exempt from paying, which cannot be classed as one of the predefined coverage categories:

- Warranty
- Service contract
- Quotation
- FCO

Note

If you enter a negative value in this field, the value is added to the invoice amount. This enables you to charge a customer for a field change order.

Service-order invoicing

LN stores the sales amount that is not covered by the warranty or the service contract in the **Invoice Sales Amount** field, if the service procedure for the service type that is related to the service-order activity is:

- External Problem
- External Maintenance
- Tools Maintenance

For all the other service procedures, LN stores the sales amount in the **Others** field.

Contract Terms for Service Contract and Service Contract Quotation

For a contract, you can specify whether a contract line is a coverage line, a pricing line, or a combination of two.

Coverage terms

A coverage term stores agreements on the duration, the cost covering method, and the costs of the agreements. This can be created for (a combination of) a service contract (quotation), installation group, coverage type, term type, or sequence number. The cost and sales amounts of the term are also stored. The defined coverage terms are valid for the duration of the service contract. It is also possible to phase these terms, depending on time or on the value of the main counter of a counter model. The coverage terms can be specified in the cost terms.

The contract quotation **Coverage Term** and the contract **Coverage Term** are defined in Contract Quotation Coverage Terms (tsctm1120m200) and Contract Terms (tsctm1120m300) sessions.

Pricing terms

You can configure the pricing terms for the configuration line in the service contract or service contract quotation. This configuration pricing term can also be used as a pricing template. For a configuration line, you can select a price term of the type time and material (with detailed pricing data) or the fixed repair price. The time & material is used to define a sales price for the material, labor, or other costs. The fixed price is used as a fixed repair price for the maintenance and/or service performed for the item. To set up the pricing term, you must set the **Contract Price Type** field to **Time and Material** or **Fixed Repair Price** in the Contract Configuration Lines (tsctm1110m300) session.

Note

- The **Contract Price Type** field is enabled only if the **Prices** checkbox is selected in the Contract Configuration Lines (tsctm1110m300) session.
- The pricing terms can be used only when the **Use Prices in Service Contracts** checkbox is selected in Contract Management Parameters (tsctm0100m000) session.

Contract coverage and contract pricing terms

For a service order, you can configure the coverage terms as well as the pricing terms (of the type time and material only) for the same configuration line. The sales prices for the transactions are first defined by LN and then the coverage terms are defined. The sales price on the cost terms is the agreed price, however, the covered sales amount and covered cost amount is the coverage.

Note

- The **Contract Price Type** field is enabled only if the **Prices** checkbox is selected in the Contract Configuration Lines (tsctm1110m300) session.
- The pricing terms can be used only when the **Use Prices in Service Contracts** checkbox is selected in Contract Management Parameters (tsctm0100m000) session.

Fixed prices

To define the contract pricing term of the type **Fixed Repair Price**, you can set the **Contract Price Type** field to **Fixed Repair Price** in the Contract Configuration Lines (tsctm1110m300) session. A fixed price is a commitment based on an agreed price. When more or less time, material, etc., is spent, only the gross margin is affected and the customer pays only the agreed price. If a fixed price is configured per order, each transaction (field service activity or maintenance sales order part maintenance line) is invoiced for the specified service contract price; irrespective of the cost booked against that order.

Using price terms and coverage terms

You can use coverage terms and/or price terms for a service contract applicable for service orders/maintenance sales orders.

Using price terms of the type Time and Material for service orders

- For service orders, LN retrieves the sales price from service contract price terms. This sales price is used for the service cost lines. The **Price Origin** is set to **Service Contract**
- If service contract price terms are not defined, the sales price is defaulted from the price books, labour rates (regular pricing data); the **Price Origin** is set to **Other**.

- If the sales price is not applicable because the service cost line is covered by a fixed price, the **Price Origin** is set to **Not Applicable**.

For service order actual costs:

- The sales price defined for the price term is retrieved from the service contract price terms. The **Price Origin** is set to **Service Contract**.
- If the sales price is not found, the sales price on the material cost lines is based on the regular pricing data, the sales price on the labor cost lines is based on applicable labor rates, and the sales price on the other cost line is based on applicable regular pricing data. The **Price Origin** is set to **Other**.
- If the sales price is changed manually then the **Price Origin** is set to **Manual**
- If the sales price is not applicable because costs are covered by a quotation or a fixed price, the **Price Origin** is set to **Not Applicable**.

Note

If a price term for labor is defined for the pricing contract, the labor rate is defaulted with the sales price defined for the price term. If the sales price is not defined for the price terms, the labor rate is defaulted based on the search path defined in the Service Order Parameters (tssoc0100m000) session. The contract is not included in the search path because the contract is always leading.

Using price terms of the type Time and Material for maintenance sales orders

- For maintenance sales orders, LN retrieves the sales price defined for the price term related to the cost type. The **Price Origin** is set to **Service Contract**.
- If the sales price is not found, the sales price is based on the regular pricing data. The **Price Origin** is set to **Other**.
- If the sales price is changed manually, the **Price Origin** is set to **Manual**.
- If the sales price is not applicable because costs are covered by a quotation or a fixed price, the **Price Origin** is set to **Not Applicable**.

Using contract coverage and price terms of the type Time and Material

When coverage cost terms as well as the pricing terms are applicable for every transaction, LN first applies the price term (time and material) for the transactions and then the coverage terms. Since a service contract can be used for price terms (for time & material) as well as coverage terms, LN uses an indicator to determine if price terms are applicable or coverage terms are applicable.

Using price term of the type Fixed Price for service orders

For service orders, LN retrieves the sales price from service contract price terms. The service order, service order activity is invoiced for the agreed sales price defined in the service contract, irrespective of cost booked against that order. The service order invoice line is created in Service Order Invoice Lines (tssoc2115m000) session, that includes the sales price and the invoice data. The sales price on the service order invoice line is the agreed sales price defaulted from the agreed fixed price in the service contracts. The **Price Origin** is set to **Service Contract**.

Using price term of the type Fixed Price for maintenance sales orders

For maintenance sales order part lines, if the pricing method is set to **Fixed Repair Price**, the sales price in the maintenance sales order part line is the agreed sales price. The sales price is defaulted only if the item is defined in the Part Lines (tsmsc1110m000) session.

For part maintenance lines with pricing method set to **Fixed Repair Price**:

- The sales price is retrieved from the service configuration lines. The **Price Origin** is set to **Service Contract**
- If the sales price is not defined for the service configuration line, the sales price is based on the **Sales Price** defined in the Items - Service (tsmdm2100m000) session. The **Price Origin** is set to **Other** in Part Lines (tsmsc1110m000) session.
- If the sales price is added manually, the **Price Origin** is set to **Manual**.
- If the sales price is not defined, the sales price is based on the regular pricing data.

The coverage line is created with the price term set to Fixed Repair Price method, to save the sales price and invoice data. The sales price on the service order invoice line is the agreed sales price, which is defaulted by the agreed fixed price in service contracts. The price origin on this line is populated with the price origin of the maintenance part lines. For all other coverage lines linked to the maintenance part lines, the **Price Origin** is set to **Not Applicable** in the Part Lines (tsmsc1110m000) session.

Search path for applicable pricing terms and/or coverage terms

To determine the applicable pricing terms and/or coverage terms, LN uses the following search path:

- Based on installation group and item without a serial number. LN searches for:
  - **a.** The terms defined for the installation group and the item.
  - **b.** The terms defined for the installation group only.
  - **c.** The terms defined for the item.
- Based on installation group. LN searches for the terms defined for the installation group.
- Based on serialized item. LN searches for:
  - **a.** The terms defined for the serialized item
  - **b.** The terms defined for the parent item of the serialized item (if a parent item exists)
  - **c.** The terms defined for the installation group and the item.

d. The terms defined for the installation group only.

e. The terms defined for the item.

Recalculation of sales price and linking of a contract on service order

If the pricing data on the Service Order/Service Order Activities is modified, the sales price must be recalculated. You can also link/unlink a service contract with pricing terms to the Service Order.

Recalculation based on data changes

The **Sales Price** and **Sales Amounts** defined in the cost line (material, labour and, other cost) or in the Service Order Fixed Prices (tssoc2115m000) session are based on the **Pricing Contract**, **Pricing Contract Change** and the **Pricing Contract Line** fields in the Service Order Activities (tssoc2110m000) session and the Service Orders (tssoc2100m000) session. If the value of these fields change, the **Sales Price** and the **Sales Amounts** must be recalculated using the **Recalculate Price/Discounts Entire Order** option in the Service Orders (tssoc2100m000) session and **Recalculate Price/Discounts Entire Activity** option in the Service Order Activities (tssoc2110m000) session .

- Pricing Method - If you change the value of the **Pricing Method** field to **Fixed Order Price** in the Service Orders (tssoc2100m000) session and to **Fixed Repair Price** in the Service Order Activities (tssoc2110m000) session, LN generates a service order fixed price line in the Service Order Fixed Prices (tssoc2115m000) session. The sales price and the discount amount of the related cost lines must be recalculated.
- Cost Line Price - If the **Sales Price** is modified on the cost line (material, labour and, other cost), LN sets the **Price Origin** field to **Manual**. If you use the **Recalculate Price/Discounts Entire Order** option in the Service Orders (tssoc2100m000) session, the **Sales Price** is defaulted from the service contract, if a pricing contract is present, and LN sets the **Price Origin** field to **Service Contract**. If no pricing contract is present the default sales price is retrieved and LN sets the **Price Origin** field to **Other**.
- Change of Activity Line of a Cost Line - You can move Cost Lines manually by changing the activity line to another activity. Because the pricing method or the service contract linked to the Cost Line can be modified, the sales price and the discount amount of the related cost lines must be recalculated.

Note

- If the **Use Fixed Repair Prices in Service Orders** check box in the Service Order Parameters (tssoc0100m000) session or the **Use Prices in Service Contracts** check box in the Contract Management Parameters (tsctm0100m000) session is selected, you cannot change the activity line number of a consolidated travel line.
- Travel cost can be defaulted from a contract.

Manual Recalculation

- Cost Line Price - You can use the **Recalculate Cost Line Price** option in the cost line sessions to retrieve the default **Sales Price** and **Price Origin** for the cost lines. **Note**: When you use the **Recalculate Cost Line Price** option in the Service Order Actual Material Costs (tssoc2121m000) session, the **Discount Amount** must also be recalculated.
- Fixed Price Line Price - You can use the **Reprice** option in the Service Order Fixed Prices (tssoc2115m000) session to retrieve the default **Sales Price** and **Price Origin**.
- Recalculate Price Entire Order / Activity - You can use the **Recalculate Price/Discounts Entire Order** option in the Service Orders (tssoc2100m000) session and **Recalculate Price/Discounts Entire Activity** option in the Service Order Activities (tssoc2110m000) session to recalculate prices of an entire order or an activity. The Price and Discount Recalculation (tssoc2240m000) session opens. Use this session to retrieve the default price and price origin of all the related cost lines and fixed price lines. You can select the **Overwrite Manual Price** check box in this session to overwrite the manually modified sales price with the default sales price defined for the service contract.

Manual Price Change

- Fixed Repair Price of Activity Line - If the value of the **Pricing Method** field is manually set to **Fixed Repair Price** in the Service Orders (tssoc2100m000) session LN sets the value of the **Price Origin** field to **Manual** in the Service Orders (tssoc2100m000) session. The **Contract Ignored** check box in the Service Orders (tssoc2100m000) session indicates if a valid fixed price contract exists for the activity line and the contract is unlinked or the price is manually overwritten.
- Cost Line Price - If you manually change the **Sales Price** on the cost lines, LN sets the value of the **Price Origin** field to **Manual** in the cost lines sessions. The **Contract Ignored** check box in the cost lines session indicates if a valid fixed price contract exist for the activity line and the contract is unlinked or the price is manually overwritten. You can use the **Recalculate Cost Line Price** option in the cost line sessions to retrieve the default **Sales Price** and **Price Origin** for the cost lines.

Note

The **Contract Ignored** check box is visible only if the **Use Prices in Service Contracts** check box is selected in the Contract Management Parameters (tsctm0100m000) session.

Unlink and Link Pricing Contract

Click **Link / Unlink Contract** in the Service Order Activity - Lines (tssoc2110m100) session to link or unlink a service contract with pricing terms to a service order activity - lines. If a contract is linked to a service order activity - lines, LN populates the **Pricing Contract**, **Pricing Contract Change** and the **Pricing Contract Line** fields in the Service Order Activity - Lines (tssoc2110m100) session. The contract can be a Time and Material contract or Fixed Repair Price contract. For more information on pricing contract, refer to *Contract Terms for Service Contract and Service Contract Quotation (p. 37)*. When you link or unlink a pricing contract, the related cost lines and fixed prices are recalculated. If a contract is linked, the pricing method must be changed as defined in pricing contract.

If the **Contract Ignored** check box is selected/cleared in the Service Orders (tssoc2100m000) session, the following are the possible scenarios:

- If this check box is selected and **Pricing Contract**, **Pricing Contract Change Number** and the **Pricing Contract Line** fields in the Service Order Activity - Lines (tssoc2110m100) session are specified, a valid service contract is linked and the sales price of the service contract is overruled.
- If this check box is selected and **Pricing Contract**, **Pricing Contract Change Number** and the **Pricing Contract Line** fields in the Service Order Activity - Lines (tssoc2110m100) session are not specified, a service contract is not linked.
- If this check box is not selected and **Pricing Contract**, **Pricing Contract Change Number** and the **Pricing Contract Line** fields in the Service Order Activity - Lines (tssoc2110m100) session are specified, a valid service contract exists, and pricing terms data is used.
- If this check box is not selected and **Pricing Contract**, **Pricing Contract Change Number** and the **Pricing Contract Line** fields in the Service Order Activity - Lines (tssoc2110m100) session are not specified, a valid service contract does not exist.

Note

- The **Link / Unlink Contract** option is disabled only if pricing contract data does not exist and the call status cannot be modified.
- The **Contract Ignored** check box is visible only if the **Use Prices in Service Contracts** check box is selected in the Contract Management Parameters (tsctm0100m000) session.

Location

A physically recognizable area in a maintenance shop, a service department or a work center where parts are temporarily stored. You can also use a location to store parts that belong to a specific work order.

A location can be, for example:

- A floor of a service department or work center that is subdivided by means of a coordinate system
- A shelf or a part of a shelf in a cupboard

Shop location and work order location

You can use a shop location and a work order location to store the following:

- Incoming parts that are waiting to be processed
- Parts that must be delivered after they are processed
- Parts that are waiting to be processed in a specific work center
- Parts that are processed in a work center, and that must be delivered to another work center

The locations in a shop or work center are identified by the service department to which they belong.

Locations for Follow-up work orders

A location that is used for a follow-up work order is a temporary delivery location for dissasembled parts that are processed separately and subsequently must be assembled.

If all dissasembled parts are stored in one location, the default work order location is used. This is the delivery location on the initial work order. If one or more disassembled parts are stored in a different location, a follow-up work order is defined for each part. The delivery location of the initial work order is then used as the default delivery location for all related follow-up orders.

Follow-up work order are generated from the material resource lines of the initial work order. The delivery type of this work order material resource line is Delivery to Follow-up Work Order. At the same time, a work order material resource line is added to a selected assembly activity that has the Delivery from Follow-up Work Order delivery type.

Alternative Item

Alternative items serve as a substitute for the standard item when the standard item cannot be delivered or is being replaced. If several items can be substituted for a standard item, you can assign a priority code to each alternative item.

You can specify alternative items for the components in an item breakdown under different parent items. You can select the correct alternative item based on the parent item

When you delete an item breakdown relation then the corresponding alternative items are also deleted. When there is a change in the item breakdown then the corresponding item in the alternative items must be updated.

ATP

An item master plan contains ATP (ATP) information. You can use the ATP information to determine the quantity available and to support order acceptance.

You can use the information to :

- Determine the availability of the stock of the spare part.
- Identify warehouse in which it is available
- Determine the date when the spare part can be promised to determine the service execution dates and service delivery dates.

Impact of ATP Date

When an ATP check is performed successfully there is an impact of the ATP date on Earliest Start Time(EST), Planned Start Time(PST) , Planned Finish Time(PFT), Latest Finish Time (LFT) and Planned Delivery Date(PDD).

The below table displays the Earliest Start Time(EST), Planned Start Time(PST) , Planned Finish Time(PFT), Latest Finish Time (LFT) and Planned Delivery Date(PDD), when the ATP check is not performed:

EST	PST	PDD	PFT	LFT
5-Apr-07	7-Apr-07	7-Apr-07	10-Apr-07	11-Apr-07

When the ATP check is performed and in case the ATP Date is greater than the Planned Delivery Date then following is the impact of the ATP date:

- The EST date is reset to the ATP date.
- The LFT date increases by the same number of days as the difference between the EST and the new EST as shown in the table below:

ATP Date	EST	New EST	PST	New PST	PDD	New PDD	PFT	New PFT	LFT	New LFT
8-Apr-07	5-Apr-07	8-Apr-07	7-Apr-07	8- Apr-07	7-Apr-07	8-Apr-07	10-Apr-07	9-Apr-07	11-Apr-07	14-Apr-07

When the ATP check is performed and ATP is greater than PDD and the new EST is greater than PST date then following is the impact :

- The EST date is reset to the ATP date.
- The PST date is reset to the ATP date.
- The PDD also reset to the ATP date.
- The PFT date increases by the same number of days as the difference between the PST and the new PST.
- The LFT date increases by the same number of days as the difference between the EST and the new EST as shown in the table below:

ATP Date	EST	New EST	PST	New PST	PDD	New PDD	PFT	New PFT	LFT	New LFT
8-Apr-07	5-Apr-07	8-Apr-07	7-Apr-07	8- Apr-07	7-Apr-07	8-Apr-07	10-Apr-07	11-Apr-07	11-Apr-07	14-Apr-07

Note

The delivery date on the Maintenance Sales Order line is updated with the ATP date when an ATP check is performed successfully.

Chapter 4
Master Data Setup

4

This chapter describes the steps you must follow to set up master data for Field Service module.

Master Data Setup (PM)

Before you start to use the Preventive Maintenance (Service Planning and Concepts) module, you must set up or check some static data. This process includes checking planning parameters, defining measurement types, and defining activity groups.

Planning and Concepts setup sessions

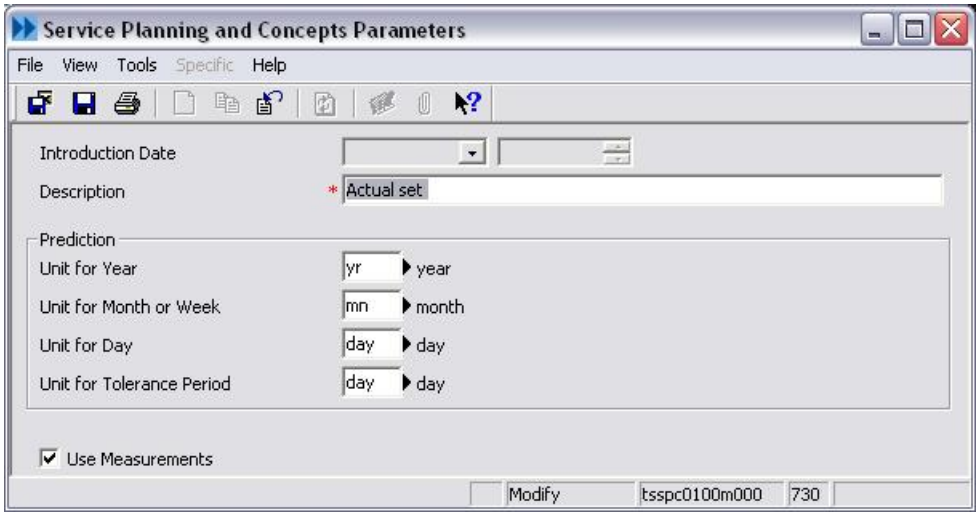
Enter the Planning and Concepts data in the following sessions:

- Set planning parameters in the Service Planning Parameters (tsspc0100m000) session.
- Define units of measure in the Measurement Units (tsmdm0160m000) session.
- Define measurement types in the Measurement Types (tsmdm0165m000) session.
- Define activity groups in the Activity Groups (tsacm0110m000) session.
- Define usage classes in the Usage Classes (tsspc0130m000) session.

The following sections describe each of these sessions.

Service Planning and Concepts Parameters (tsspc0100m000)

Use the Service Planning Parameters (tsspc0100m000) session to check the default settings, because the time units are used in Planning and Concepts (SPC). If you intend to use counter-value maintenance or condition-based maintenance, make sure the Use Measurements check box is selected. If this check box is not selected, only usage maintenance is valid.



Note

- Determine the time units that are appropriate to your planning requirements
- Make sure that the required time units and their conversions are entered into the logistic tables of LN Common Data.

Measurement Units (tsmdm0160m000)

Use the session to define units of measurement that counters can use to plan maintenance activity.

Note

Before you enter data in this session, check if the required units exist in the logistic tables of Common. You can add units that are not present in the Units (tcmcs0101m000) session. You cannot define any conversions for units that you add.

Measurements (tsmdm0165m000)

The counter value and the condition-based maintenance policies depend on the use of measurement types. Measurement types define the way in which a measurement is carried out. Characteristics used to define a measurement type include:

- An independent variable.
- A dependent variable.
- A norm value.

Example

The copier needs service at 15,000 copies, and you must estimate the time (independent variable) before a copier reaches that 15,000 level (dependent variable). If you link a measurement type to an

item, the measurement type specifies that counter value maintenance must be performed. If you link a measurement type to a reference activity, you will perform periodic inspection maintenance.

Activity Groups (tsacm0110m000)

Use this session to define activity groups. Reference activities that are similar can be assigned to a common group. Assigning activities enables you to plan for the activity group rather than including multiple single activities in a maintenance plan.

Usage Classes (tsspc0130m000)

A usage class is a categorization of usage based on environmental factors. You can use usage classes to define more than one maintenance concept for an object or a model.

Example

The usage class of a truck can be national or international. The required maintenance for national use will be different than for international use.

Master Data Setup (SOC)

Before you start using Service Order Control, you must set up or check some static data. This includes checking service order parameters, defining reference activity, activity group and checklist.

Service Order Control setup sessions

Enter the Service Order Control data in the following sessions:

- Set parameters in the Service Order Parameters (tssoc0100m000) session.
- Define reference activities in the Reference Activities (tsacm1101m000) session.
- Define activity groups in the Activity Groups (tsacm0110m000) session.
- Define checklists in the Checklists (tsmdm0140m000) session.

Service Order Parameters

Use the Service Order Parameters (tssoc0100m000) session to define Service Order Control settings.

General

The number group for service orders and service quotations. This number group defines the available series numbers that can be used. You can also activate gross margin control, and set upper and lower margins based on cost of sales or sales.

Orders

The number group for service orders and service quotations. This number group defines the available series numbers that can be used. In addition to defining number groups for service orders and service-order quotations, you can define number groups for costing sheets and field change orders. You can set up the default service type and cost component that are used, when calls are transferred to service orders.

Blocking

You can set parameters for service order blocking and signaling. If the associated check boxes are selected, LN carries out the blocking functionality when the order status changes to Planned or Released. The blocking functionality is also carried out each time a new service order is created. You can set blocking and signaling parameters for any of the following conditions:

Costing

The Costing tab enables you to define what costs your organization uses, the cost component that is used for capturing those costs, and the default used by hours accounting when dealing with travel time. The Generate Return Deliveries area is used to handle goods that were issued to the service order, but were not consumed. Service generates return deliveries based on the delivery types selected.

Reference Activity

Use the Reference Activities (tsacm1101m000) session to define reference activities. Reference activities are defined in a library of activities, and can be linked to service orders, either manually or by means of maintenance concepts. If you define reference activities, you can link material, labor, and other requirements used during execution of the activity. When the activity is linked to a service order, defaults such as the reference activities' material and labor, are loaded on the service order. In addition, you can enter the Installation group and serialized item to which the activity applies.

Activity Groups

Use Activity Groups (tsacm0110m000) session to maintain reference activity groups. You can use reference activity groups to select reference activities in printing or processing sessions.

Checklists

Use Checklists (tsmdm0140m000) session to define checklists. You can define a checklist for service engineers to make certain that all required maintenance activities are carried out. The checklist contains questions that must be answered by the service engineer. The checklist can be printed with the service order and be used for additional supporting documents. The checklist serves as a paper document that can be used to hold information about the activity performed. Checklists can be linked to a maintenance activity, or manually entered onto the service order.

Chapter 5
Field Service Procedures

5

This chapter describes the field service procedures.

To generate maintenance planning

Use the Generate Maintenance Plan (tsspc2200m000) session to generate maintenance planning. You can plan maintenance activity for the installation group and serialized item that the service organization manages. You can schedule and display the activities in the Planned Activities (tsspc2100m000) session. The maintenance planning provides the maintenance activities that must be carried out in the long term.

The operational planning of the maintenance activities is based on the service order planning. All the operational (service) activities are carried out by means of service orders.

How to generate maintenance planning

Step 1: Service contract

If any service contract is active for the Installation group, the planning is not generated for that Installation group.

Step 2: Serialized items

Select all top serialized items that are active during the specified Date-From and Date-To period. If the Date-From is earlier than the start date of the top serialized item, the Date-From becomes the start date. If the end date of the top serialized item is later than the Date-To, the Date-To becomes the end date.

Step 3: Planned Activities

The planned activities are generated for the serialized items that are valid between these two dates. LN also generates the planned activities for the child serialized items that are related to the top serialized item. The child serialized items must also be valid.

Step 4: Usage Class

The usage class that you must use when planned activities are generated is selected in the following order:

1. The usage class of the serialized item
2. The usage class of the first parent serialized item
3. The usage class of the Installation group
4. The usage class

Step 5: Reference Activities

LN checks if reference activities linked to the item are present. If present, the reference activities are used to generate the planned activities.

Step 6: Maintenance Cycle

The maintenance planning can be carried out in three different ways, based on the start of the maintenance cycle:

- **Start Date of Serialized Item**: The start date of the maintenance cycle is equal to the start date of the serialized item.
- **Time from in Selection Range**: The maintenance cycle starts on the Date-From that the planned activities will be generated.
- **1st of January**: The maintenance cycle starts on the first of January.

The relative movements are transferred into the actual dates based on the value of the **Maintenance Cycle** field in the Items - Service (tsmdm2100m000) session. After receiving the start date, the first workable date receives the actual planned start date. The activity duration is added to this date to determine the end date..

To find the first workable date and plan forward, the search path for calendars is:

- The calendar of the serialized item.
- The calendar of the service department that is linked to the Installation group.

Earliest start time =

$$\frac{\text{planned start time} + \text{planned end time}}{2} - \text{tolerance period} * 0.5,$$

For each planned activity that is generated, the requirement lines are copied from the Reference Activity - Resource Requirements (tsacm2120m000) session to one of the following sessions:

- Planned Activity - Material Requirements (tsspc2110m000)
- Planned Activity - Labor Requirements (tsspc2111m000)
- Planned Activity - Other Requirements (tsspc2112m000)

Process Report: List of planned activities generated.

Error Report: List of errors.

Defaults:

- The Date From is the current date.
- The Date To is the current date + one year.

To generate Field Change Order (FCO) and Field Change Order lines

Use this process to generate field change order (FCO), add activities to the field change order and generate FCO lines manually or automatically.

How to generate Field Change Order and Lines

Step 1: Define Field Change Order

Use the Field Change Orders (tssoc5100m000) session to define field change order. The field change order (FCO) procedure is defined as a separate service procedure in the Service Types (tsmdm0130m000) session. Therefore, you can define contract coverage for FCOs. FCOs are intended for collective changes on serialized item in multiple Installation groups. For each FCO, you can define up to five activities. If service orders are generated for FCOs, LN automatically generates a service order activity line for each of these activities. If you define the FCO, the FCO receives the status Free.

Step 2: Generate FCO Lines

After you create the FCO header, in which the anonymous item or serialized item and the related activities that you want to replace are specified, you can either manually define FCO object lines or have the lines generated automatically. Use the Generate FCO Lines (tssoc5210m000) session to generate FCO lines automatically for a range of:

- FCOs
- Sold-to business partners
- Installation groups
- Business partner's serial numbers

You can specify the date on which serialized items must be active. You can also select if a process report or error report must be printed.

Note

- You can run this session more than once for the same FCO. For example, when you generate FCO lines for each sold-to business partner.
- A line is only generated if the serialized item is not yet created for the FCO.
- The sold-to business partner, on the line of the serialized item, is derived from the serialized item.
- For internal maintenance, only the Installation group and Serial Number fields are filled on the FCO line.
- If the lines are generated, the status of the FCO is set to Lines Generated. If you run the session more than once, the status remains Lines Generated.
- FCO lines are also generated for independent serialized items, that is, serialized items that do not belong to Installation groups.

Use the Field Change Order Lines (tssoc5110m000) session to generate FCO lines manually.

Preliminary conditions to generate FCO lines for serialized items

LN generates FCO lines for serialized item if following conditions are met:

- The serialized item is part of an Installation group as a line in the Installations (tsbsc1110m000) session:
  - If the installation status is Installed and the status time is equal to or later than the Active From date entered in the Generate FCO Lines (tssoc5210m000) session.
- The serialized item is part of an Installation group but not as a line in the Installations (tsbsc1110m000) session:
  - The serialized item is present as a child item in the Physical Breakdowns (tscfg2110m000) session.
  - In the Physical Breakdowns (tscfg2110m000) session, the child item status is Installed and the status time is equal to or later than the Active From entered in the Generate FCO Lines (tssoc5210m000) session
- Independent serialized items:
  - The Include Independent Serialized Items check box is selected.
  - The serialized item status is Active in the Serialized Items (tscfg2100m000) session

Preliminary conditions to generate FCO lines for items

LN generates FCO lines for item if following conditions are met:

- In the Items - Service (tsmdm2100m000) session, the value of the Configuration Controlled field for the item must be Anonymous or Not Applicable.
- The item is part of an installation group as a line in the Installations (tsbsc1110m000) session:
  - If the Installation group line status is Installed and the status time is equal to or later than the Active From date entered in the Generate FCO Lines (tssoc5210m000) session.

- The item is present as a child item in the Physical Breakdowns (tscfg2110m000) session:
  - In the Physical Breakdowns (tscfg2110m000) session, the child item status is Installed and the status time is equal to, or later than, the Active From entered in the Generate FCO Lines (tssoc5210m000) session.

To generate service orders for FCOs

Use this process to generate service order for field change order (FCO).

How to generate Service Order for Field Change Order

Use Generate Service Order (tssoc5220m000) session to generate a service order for a field change order (FCO).

Step 1: Sold-to BP

Enter the range of sold-to business partners for which you want to generate service order.

Step 2: FCO

The FCO number for which service order is being generated appears.

Step 3: Line Number

Enter the FCO line number for which service order is generated.

Step 4: Installation Group

Enter installation group for which service order is being generated.

Step 5: FCO Valid on

LN displays the validity of the FCO header. If FCO orders fall between the Earliest Start Time and Latest Finish Time, these FCO Lines are selected to generate service orders.

Step 6: Use Parallel Planning of Activities

If this check box is selected, the service order activities are planned at the same time rather than one after the other.

Step 7: Click Generate

Click Generate to generate the service order.

Service Order

For each FCO line that meets your selection criteria, LN generates a service order.

The generated service orders have the following attributes:

- Status is Free.
- Service Type is the value selected in the Service Order Parameters (tssoc0100m000) session.
- Planned Start Time is the **Earliest Start Date** that you entered in the Field Change Orders (tssoc5100m000) session.
- Planned Finish Time is the sum of all the FCOs reference activity durations added to the Planned Start Time.
- Service department, is copied from the FCO.
- Subcontractor for the service-order activity lines copied from the FCO.
- Activity line data is copied from the FCOs reference activities. The number of service order activities generated for the service order equates to the number of reference activities listed for the FCO.

After you generate a service order from an FCO:

- LN fills the FCO line's Service Order field.
- When you generate the first service orders for an FCO, the FCO's status changes from Lines Generated to Execution.

Note

LN generates a service order for each serialized item.

To create service order quotations

Use this process to create service order quotations.

If price agreements are required only once, service-order quotation are used instead of service-contract quotations. You can easily amend the service-order quotation to optimize the agreements with the customer, which is the advantage of first creating a service-order quotation rather than creating a service order first.

How to create service order quotations

Step 1: Define Service Order Quotations

Use the Service Order Quotations (tssoc1100m000) session to create and maintain service order quotations. You can easily amend the service-order quotation to optimize the agreements with the customer. This functionality has the advantage of first creating a service order quotation instead of first creating a service order.

Step 2: Define the serialized item/activity lines

Use the Service Order Quotation Configuration Lines (tsctm1110m400) session to maintain the item, serialized item, and reference activity covered by the service-order quotation. LN copies the reference activity's requirement lines, if defined, from the Service Planning & Concepts module to the service-order quotation's cost terms.

Step 3: Define additional coverage term

You can manually define additional coverage terms in:

- Service Order Quotation Traveling Terms (tsctm1130m400)
- Service Order Quotation Material Terms (tsctm1131m400)
- Service Order Quotation Labor Terms (tsctm1132m400)
- Service Order Quotation Other Terms (tsctm1136m400)

Step 4: Define coverage phase

Define the coverage phase in the Service Order Quotation Coverage Terms (tsctm1120m400) session for the cost terms.

Step 5: Define surcharge/discount terms

You can define the surcharges/discount terms in the Service Order Quotation Configuration Line Totals (tsctm1502m400) session. You can define surcharges/discounts for each service-order quotation, as well as for each coverage type, or both.

Step 6: Print service-order quotation document

Use the Print Service Order Quotation Documents (tssoc1400m000) session to print the service-order quotation documents after you enter all the coverage/cost terms, coverage phases, and surcharge/discount terms.

Step 7: Accept service order quotation

If the sold-to business partner has accepted the service order quotation, you can change the status to Accepted. To accept the service order quotation, open the Service Order Quotations (tssoc1100m000) session, and on the Specific menu, click Approval and, in the dialog box that appears, click accept.

Step 8: Modify service order quotation

If the sold-to business partner wants to have some changes to the service-order quotation, to modify the quotation, you can change the service order quotation status to Free. To modify the service order quotation, start the Service Order Quotations (tssoc1100m000) session and, on the Specific menu, click Correction and in the dialog box that opens, click Modify. You can now continue from Step 3 to amend the service-order quotation contents.

Step 9: Reject service order quotation

If the sold-to business partner rejects the service-order quotation, you can change the service order quotation status to Canceled to reject the quotation. To reject the service order quotation, start the Service Order Quotations (tssoc1100m000) session and, on the Specific menu, click Part Receipt Lines and in the dialog box that appears, click Reject. You can now move the service-order quotation to history.

To process service-order quotations to service orders

Use this process to transfer an accepted service-order quotation to a service order.

If the business partner accepts the service order quotation, you can use the Process to Service Orders (tssoc1200m000) session to transfer the service order. You can select a range of quotations to be processed to a service order.

Preliminary conditions

A service-order quotation can only be processed to a service order if the following conditions are met:

- The status of the business partner (BP) must be Active.
- The invoice-to BP and ship-to BP must be entered on the service-order quotation.
- The status of the service-order quotation must be Accepted.

What gets copied to service orders?

The planning dates are copied to the service order. The terms that are linked to the service-order quotation are copied to the estimated cost lines of the service order. These terms are defined in the following sessions:

- Service Order Quotation Material Terms (tsctm1131m400)
- Service Order Quotation Labor Terms (tsctm1132m400)
- Service Order Quotation Traveling Terms (tsctm1130m400)
- Service Order Quotation Other Terms (tsctm1136m400)

LN copies:

- The material terms to the Service Order Estimated Material Costs (tssoc2120m000) session.
- The labor terms to the Service Order Estimated Labor Costs (tssoc2130m000) session.
- The remaining terms to the Service Order Estimated Other Costs (tssoc2140m000) session.

Reports

You can select the following reports:

- Process report: This report lists all quotations that are successfully processed to a service order, and also shows the service order number.
- Error report: This report lists the quotations that are not processed to a service order, and shows the reason why the quotations are not processed to a service order.

To move service-order quotations to history

Use this process to move service-order quotations to history.

Use the Copy Service Order Quotations to History (tssoc1205m000) session to archive and to delete service-order quotations. The serialized item and activity lines are also posted and deleted. You can specify a range of quotations that must be processed. The choice to print a process report or an error report is optional.

Preliminary conditions

Only the service-order quotations with the following status can be posted to historical data and then be deleted:

- **Canceled**: No restrictions are applicable.
- **Processed**: For service-order quotations that are processed to a service order, the status of the related service order must be Closed or Canceled.

If service order quotations and related lines are transferred to history, you can update the following history sessions:

- History Service Order Quotations (tssoc8510m000)
- History Service Orders (tssoc8551m000)
- History Service Order Activities (tssoc8552m000)
- History Service Order Material Costs (tssoc8555m000)
- History Service Order Labor Costs (tssoc8556m000)
- History Service Order Other Costs (tssoc8557m000)

To generate service orders

This process aims to create a service order. The service order can be initiated from various origins. A call can be transferred into a service order for execution. A job quotation (service-order quotation) after being accepted by the customer must be converted to a service order for execution. Similarly, for preventive maintenance, all the generated planned activities must be transferred to service orders for

execution. Field change orders (FCO) are intended for repair or replace of serialized items installed at customer bases must also be transferred into service orders for execution.

When the service orders are generated, the origin is to be identified and actions to be taken according to the origin. The service order activities are also created along with the service orders. While you perform a service for a customer, you might need to use a tool that, at the end of the order, requires a service. In which case, a service order is created from the Tool Requirement Planning module of Manufacturing, or can be created automatically when you cost the service order. Some predefined requirements must be maintained for the automatic generation of the service order. You must define a predefined activity (reference activity) for a service type for Tool Refurbishment.

Ways to create service orders

You can create service orders in the following ways:

- Define the service orders manually in the Service Orders (tssoc2100m000) session.
- Transfer the planned activities in the Transfer Maintenance Plan to Service Order (tsspc2220m000) session.
- Transfer service order quotations in the Process to Service Orders (tssoc1200m000) session.
- Transfer the field change orders in the Generate Service Order (tssoc5220m000) session.
- Transfer calls from the Call (tsclm1100m000) session by means of the Transfer to Service Order command.

How to define Service Orders manually

Step 1: Service Orders

Run the Service Orders (tssoc2100m000) session to create service orders. The service order is a group of activities that can be selected from a library or defined at the moment the service order is made. The service order consists of a header, order lines, and estimated cost lines. In the header, you can enter general information, including customer, Installation group, site/location, and start and end dates. Each order line is a group of activities that you can link to the item. Each activity/order line can have:

- A problem
- A description
- Activity start and end date
- Estimated cost lines, such as:
  - Tasks to solve the problem
  - Materials required for repair
  - Any other requirements

Step 2: Service Order Activities

Use the Service Order Activities List (tssoc2511m000) session to display the service order activities that are linked to the service order. If the service order status is Free, Planned, or Released, you can add new activity lines. New activities are created with the status Free. The information that is recorded about

the activity is used to specify what type of work is performed. You can record information such as what the work is performed on, for example, item, anonymous item, or serial number, when the work is performed, what skills are required to perform the work, and any changes that will occur to the installation group based on the work performed. The information for the activity is displayed if linked to a reference activity.

Step 3: Service Order Estimated Material Costs

Use the Service Order Estimated Material Costs (tssoc2120m000) session to list, create, and maintain the estimated labor costs that are associated with reference activities defined on a service order.

You can create or maintain the estimated labor costs, if the service order status is Free or Planned. If the service order status is Released, you cannot update these costs. You can only change the estimated costs for service order activities with Free or Planned status. If you add estimated costs, LN copies the costs immediately to the actual costs. A cost component must be related to every estimated cost. Cost components are used as a method for cost control.

Step 4: Service Order Estimated Labor Costs

Use the Service Order Estimated Labor Costs (tssoc2130m000) session to list, create, and maintain the estimated material costs that are associated with reference activities defined on a service order.

Step 5: Service Order Estimated Other Costs

Use the Service Order Estimated Other Costs (tssoc2140m000) session to list, create, and maintain the estimated other costs that are associated with reference activities defined on a service order.

To estimate service order costs

You can specify a service order's requirements in the following sessions:

- Service Order Estimated Material Costs (tssoc2120m000)
- Service Order Estimated Labor Costs (tssoc2130m000)
- Service Order Estimated Other Costs (tssoc2140m000)

A cost component, used as a method for cost control must be related to every estimated cost line and actual cost line.

Purpose to estimate service order costs

- To budget the costs (that are task setting) of carrying out the service order when price agreements are fixed.
- To ensure that the materials are available by allocating or ordering the required materials.
- To ensure that the service engineers are available by allocating the required service engineers.

- To ensure that the tools are available by allocating the required tools.

Note

- If you add a reference activity to a service order, the reference activity's cost lines are copied to the service order's requirements.
- If you generate a service order from a planned activities, a call, or a field change order, the cost lines linked to the constituent reference activities are copied to the service order's requirements.

Planning and releasing service orders

After you create a service order with the appropriate labor and materials, you can plan the service order's execution. This planning consists of assigning the material, providing for the necessary inventory transactions to ensure that the material is available, allocating engineers, and checking the business partner's credit. Planning consists of two phases: global ERP and detailed ERP. Global ERP makes the mid- to long-term plans, such as several weeks or months, while detailed ERP performs the detailed planning for a few days or weeks ahead.

Overview of service resource planning (SRP)

Planning for engineers and service orders is called service resource planning (SRP), and is controlled in the Service Order Control (SOC) module. The input for this planning is all service orders created in the other modules and the constraints defined in contracts, calls, and service master data.

Note

You use the Run Global SRP (tssoc2260m000) session to carry out global SRP for a service order.

Preliminary conditions

To run global SRP successfully for a service order, the following conditions must be met:

- At least one activity must be present for the service order.
- The Planned Start Time and the Activity Duration fields for all activities of the service order must be filled.
- The serialized item for which the activities are planned must be valid.

If the **First Order Procedure Step for Blocking** field is Order Planning or Order Definition in the Service Order Parameters (tssoc0100m000) session and global SRP is run, LN carries out the following actions:

- If no parameters are set for service order blocking, no checks are carried out and all service orders is processed.
- If a service order's **Blocked** check box is selected in the Service Orders (tssoc2100m000) session and the service order blocking is still valid, LN does not plan the service order.

- If the **Blocked** check box is selected and the service order blocking is no longer valid, LN unblocks the service order, and the service order is planned.

If the service order's **Blocked** check box is not selected, LN carries out the SRP. If a blocking reason limit is exceeded, the **Blocked** check box is selected, and LN creates the service order blocking reason in the Blocking Reasons (tsmdm1101m000) session. The service order is not planned.

If you select the Process Report check box and the Error Report check box, the blocked service orders are printed on the error report, and the unblocked service orders are printed on the process report.

Global SRP actions

When you run global SRP, and the required conditions are met, LN processes the service order and service order activities with the following statuses:

- Service orders with a **Free**, **Planned**, or **Released** status can be processed by the global SRP.
- Service order activities with a **Free** status are planned. Activities with a **Planned** status are replanned if the Replan check box is selected.

The attributes of a service order and its related activities that are affected when you run global SRP, depend on the status of the service order and its related activities.

If the service order status is **Free**, LN carries out actions on the following:

- Preferred engineer
- Planned dates of the service order (recalculated)
- Travel cost line
- Service order status
- Service order cost lines:
  - Purchase
  - Allocate material
  - Plan tools

If the service order status is **Planned**, LN carries out actions on the following:

- Planned dates (recalculated)
- Service order cost lines:
  - Purchase
  - Replan tools

If the service order status is **Released**, LN carries out no actions on the service order.

If the service order status is either **Free**, **Planned**, or **Released**, and the activity status is **Free**, LN carries out actions on the following:

- Subcontractor (buy-from business partner)
- Planned dates (recalculated)
- Coverage date
- Inspection lines

- Service order activity status
- Service order activity cost lines:
  - Purchase
  - Allocate material
  - Plan tools
  - Reallocate material
  - Replan tools if the service order status is **Planned**

If the service order status is **Planned** or **Released**, and the activity status is **Planned**, LN carries out actions on the following:

- Planned dates (recalculated)
- Service order activity cost lines:
  - Purchase
  - Replan tools

When you run the Run Global SRP (tssoc2260m000) session, the actions LN carries out on the attributes of a service order (SO) and/or, service order activity, if the status permits, are described in the following sections:

Preferred engineer

The Service Engineer field of the service order is filled with the Installation group's Preferred Engineer 1, when:

- The Allocate Engineers during Global SRP check box in the Service Order Parameters (tssoc0100m000) session is selected.
- The service order order status is Free.

Note

The Service Engineer field of the service order is not be changed if this field is already filled.

Recalculated planned dates

If the activity status is Free or Planned, the Planned Finish Time field will be recalculated based on the serialized item and Installation group calendars. If these calendars are not available, the engineer, work center or company calendars are used. If a serialized item or Installation group calendar is available for the serialized item, the **Planned Finish Time** field on the service order header will also be recalculated. If the required capacity (time) is not available, LN prints the following message in the process report: Required capacity for activity line %1$s not (completely) available.

Note

If you add, delete or change an activity line, the **Planned Finish Time** of the service order will be updated directly. Activities with the status Planned are only replanned if the Replan check box is selected in the Run Global SRP (tssoc2260m000) session.

Coverage date

If the **Coverage Time** field of the service order activity is empty, LN enters the planned start time of the service order.

Travel cost lines

Estimated traveling cost lines are created in the Service Order Estimated Other Costs (tssoc2140m000) session, if the service order status is Free and the Travel Cost Method field in the General Service Parameters (tsmdm0100m000) session is not None.

On the Costing tab, in the Service Order Parameters (tssoc0100m000) session, if:

- Only the Distance check box is selected, LN creates one cost line for the travel distance and one cost line for travel total.
- Only the Time check box is selected, LN creates one cost line for travel time and one cost line for travel total.
- Both check boxes are selected, LN creates one cost line for the travel time and one cost line for travel distance and one cost line for travel total.

Inspection lines

For each measurement type of the Installation group/serialized item that is entered in the reference activity of the activity line, LN creates an inspection line in the Inspections (tscfg3100m000) session.

Service order (activity) status

LN updates the status of the service order or service order activity to Planned when the global SRP has been carried out successfully.

Purchase

- In Service, only global SRP creates the purchase-order lines, if required.
- LN creates purchase orders for a service order's material cost lines whose delivery type is By Purchase Order and Estimated Quantity greater than zero (0).
- For a subcontracted service order activity, with the Service/Cost Item field entered, LN creates a purchase order for the subcontractor's services.
- If the planned delivery date of a purchase item is later than the planned start date of the service order, the Required delivery date %1$u001 for item %2$s not feasible message is printed in the process report.
- The buy-from business partner for the purchase item is determined as follows:
  a. The buy-from business partner of the material line (Service Order Estimated Material Costs (tssoc2120m000).

b. The buy-from business partner of item/supplier information (Item - Purchase Business Partner (tdipu0110m000).

c. The buy-from business partner of the item purchase data (Item - Purchase Business Partner (tdipu0110m000).

Note

- The selected business partner or its parent business partner must also have a pay-to role. If this role does not exist, LN prints a message on the error report and does not create the purchase order.
- If the planned delivery date of a purchase item is later than the planned start date of the service order, LN displays a message.

Materials

If the statuses of the service order and service-order activity are Free, global SRP creates soft allocations for the required items, which means:

- Items with a delivery type of From Warehouse, From Warehouse in Car, From Warehouse by Transp., or From Service Kit are listed in the Order - Planned Inventory Transactions (whinp1501m000) session with the transaction type - (Planned Issue).
- Items with a delivery type of either To Warehouse or Tom Warehouse by Transport (materials expected to be received) are listed in the Order - Planned Inventory Transactions (whinp1501m000) session with the transaction type + (Planned Receipt).

Tools

- For other costs lines whose cost type is Tooling, the required tool is soft allocated, listed in the Estimated Tool Requirements (titrp0111m000) session, with a Tool Requirement Status of Requested for the period from the Earliest Start Time until the Latest Finish Time.
- If these times are not available, the period from the Planned Start Time until the **Planned Finish Time** is used.
- Tool allocation also takes place when a tool must be refurbished, which is when the selected serialized item of the service order activity is of item type Tool in the Item - General (tcibd0101s000) session. The Tool Requirements Planning check box in the Implemented Software Components (tccom0100s000) session must be selected to implement tooling.

Reports

- Process report: Lists all the service orders that are successfully handled by the global SRP, as well as whether an earlier blocked service order is unblocked and processed. The current service order status also appears.
- Error report: Lists all the service orders that are not successfully handled by the global SRP, and the reason why. The current service order status also appears.

Service Order Status

After you plan the service order, LN changes the service order status to Planned.

Parameters

The following parameters are used:

To create traveling cost lines:

- Travel Distance
- Travel Time

To allocate preferred engineers during service orders planning:

- Allocate Engineers during Global SRP

For service order signaling and/or blocking:

- If Credit Limit Is Exceeded
- If Credit Review Is Overdue
- If invoice Is Overdue
- If Business Partner Is Doubtful

For service order procedure step when service blocking must be carried out:

- First Order Procedure Step for Blocking

For traveling costs:

- Travel Cost Method

For implementing tooling:

- Tool Requirements Planning (TRP)

Release Service Orders

After you plan the service order, you can release the service order to service engineer to execute the order. Use the Release Service Orders (tssoc2200m000) session to release a group or a batch of service orders with Free or Planned statuses. You must have at least one activity linked to service order. An activity must have either one or more engineers assigned to it or a header engineer for the service order to be released.

Note

After you release the service order, LN changes the service order status to Released.

To complete service order activities

Use this process to set the service order status to Completed.

How to complete the Service Order

After the service engineer completes the activities on the service order, you can change the service order status to Completed.

Step 1: Select Service order

Select the service order for which activities are completed by the service engineer, from the Service Orders (tssoc2100m000) session.

Step 2: Select the activities

Select the activities for which status must be set to Completed from the Service Order - Lines (tssoc2100m100) session. On the Specific menu, click Complete to set the service order activities status to Completed. If more than one activities are present for the service order, you must set the status of each activities to completed.

Step 3: Completed

When all the activities are set to Completed, the service order status changes to Completed.

Preliminary Checks

Before a service order activity status is set to Completed, LN checks the following:

- All related warehouse orders must be Completed.
- All related purchase orders must be Completed.
- The service-order activity status must be Released.

What attributes gets affected?

If the service order activity is Completed, LN carries out the following actions:

- Return material (RMA) deliveries are created for items that are indicated as Repairable, using the Repairable check box in the Items - Service (tsmdm2100m000) session.
- For the relevant delivery types, parameters are available in the Service Order Parameters (tssoc0100m000) session to control the automatic generation of return deliveries for non-consumed spare parts. These parameters are:

If the service order activity is Completed, LN carries out the following actions:

- **Delivery Type 'From Warehouse'**.

- **Delivery Type 'From Warehouse by Transport'**.
- **Delivery Type 'From Purchase Order'**.

The quantity of a spare part to be returned is calculated by subtracting the actual delivered quantity from the estimated quantity. If an activity is Completed, LN generates the warehouse orders for the quantity to be returned.

Automatic return deliveries are possible for the following delivery types:

- From Warehouse: For external service type a warehouse transfer is generated. For internal service type the warehouse order is defined as planned receipt.
- **From Warehouse by Transport**: A warehouse transfer order must be generated.
- **By Purchase Order**: A warehouse transfer order must be generated.

To control planned start/finish time of service order (activity)

Global SRP and the edit options on the graphical planning board controls these dates.

You can replan as follows:

1. Shift the service order on the graphical planning board.
2. Change the planned start or finish date of the service order in the Service Orders (tssoc2100m000) session.
3. Select the **Replan** check box in the Run Global SRP (tssoc2260m000) session, if you run the global SRP.

The following restrictions to change the planned start date of a service order apply:

- You can shift the service order between the limits of the planned start and latest finish dates.
- You cannot plan the start date before the current date.

If the planned start date of a service order activity is changed, the planned finish date is determined by the service order activity duration and by checking the calendar data.

If you change the start date of an activity, LN checks if the planned start and finish dates of the service order must be changed. The planned start date of the service order is the earliest planned start date of the service order activity that is related to the service order. The planned finish date of the service order is the latest planned finish date of the service order activity that is related to the service order.

Note

You can replan the service order if the status is Free, Planned, or Released. If the start date changes for an existing service order, LN recalculates the planned start and finish dates of all the related activities.

To close service orders

You can close a service order in the Close Service Orders and Copy to History (tssoc2201m000) session. In this session, you can set the status of the order, the related activity lines, and the related cost lines to Closed. The service order and related lines can be posted to history or can be deleted.

Note

To post the service-order data to history, you must select the Service Order History check box in the Service Order Parameters (tssoc0100m000) session.

If you select the Delete Service Order check box, the specified range of orders is also removed from the Service Orders (tssoc2100m000) session.

Only orders that have a Costed or Canceled status can be processed. If these orders and related lines are posted to history, the following history sessions are updated:

- History Service Orders (tssoc8551m000)
- History Service Order Activities (tssoc8552m000)
- History Service Order Material Costs (tssoc8555m000)
- History Service Order Labor Costs (tssoc8556m000)
- History Service Order Other Costs (tssoc8557m000)

If you close an order, LN performs the following checks:

1. The order must not be blocked.
2. All order cost lines must have the Posted to Finance status.
3. If tools are required to carry out the order, all tools must be returned. The tool requirements must have been deleted from the Estimated Tool Requirements (titrp0111m000) session.

If one of these conditions is not met, the order will not be closed and will not be posted to history.

To cancel service orders

With the Cancel Service Order (tssoc2204m000) session, you can cancel a single service order or cancel all service orders that are defined for a service contract. You must enter a cancel reason and cancel date. Additional cancel text is optional. Printing a process and an error report is optional.

To cancel a service order, you must ensure the following:

- No actual costs and revenues are recorded on the service order.
- The service order and related activity lines have a Planned or Released status.
- If the service order is created for a service contract, the status of the service contract must be Active or Canceled.

After you cancel a service order, the following applies:

- The status of the service order is Canceled.
- The reason code, cancel text, and cancel date are filled on the service order.
- The status of the service order activity is Canceled.
- The materials that are allocated for the service order are canceled.
- The warehouse orders that are created for the service order will be canceled if the items/materials are not issued or received yet. If the items/materials are issued or received, return deliveries are created (warehouse orders of type Transfer).
- If the service order is created from a call, the status of the call is Solved.
- If tools are needed to carry out the sales order, the tool requirements are deleted from the Estimated Tool Requirements (titrp0111m000) session.

Note

Service orders that are blocked cannot be canceled.

To print service order documents

The following service order (SO) documents can be printed: Internal documents:

Internal documents:

- Service order sheets
- Inspection reports
- Checklists

External documents

- Acknowledgement sheets
- Appointment sheets
- Repair reports

The external documents are printed in the business partner's language.

You can print the following on the service order (SO) document:

- Service order (SO)
- Sold-to business partner
- installation group
- Service type
- Service department
- Service engineer
- Order status
- Planned start time
- Latest finish time

Service order header

You can select the service order header or service order activity details to be printed. You can also print the estimated service order requirement lines. The engineer can fill in the actual cost-line data on each estimated requirement line. You can also print a number of blank cost lines for material, labor, and traveling costs. The number of blank lines can be given.

Checklist

The checklist is filled in by engineers after the activity is carried out.

Acknowledgement/appointment sheet and repair report

You can define a user-dependent layout (template) of the acknowledgement sheet, the appointment sheet, and the repair report in the Service Order Parameters (tssoc0100m000) session.

An appendix (standard layout) is printed for each activity. This appendix is printed in the business partner's language.

To define appointments for service orders

To define appointments, in the Service Order Activities (tssoc2110m000) session, click **Appointment** to register the appointment in the Appointments (tsmdm0123m000) session. The slack time is reduced or reverts to zero.

If appointments are defined, LN fills the **Earliest Start Time** and the **Latest Finish Time** fields with the appointed times.

The **Planned Start Time** and **Planned Finish Time** are planned at the start of the appointed period. The **Appointment** check box will also be selected.

- In planning tools, appointed service orders are handled as firm planned.
- The **Appointment** check box can always be maintained by the user. If you clear the check box, the existing appointment is deleted.

Note

If an appointment is defined for a service-order activity, the entire service order is handled as an appointment. LN selects the **Appointment** check box in the Service Orders (tssoc2100m000) session.

To block service orders

In the Service Order Parameters (tssoc0100m000) session, you can set the parameters for service-order blocking. The checks for blocking can be performed at each step in the service order procedure. Select

the First Order Procedure Step for Blocking check box to indicate at how many stages a service order must be checked to see if the service order meets any of the selected signaling and blocking parameters and, if so, LN blocks the service order.

If a service order blocking parameters is selected, LN carries out the blocking functionality when the order status changes to Free, Planned, or Released. The blocking functionality is also carried out each time a new service order is created.

The blocking reasons appear in the Blocking Reasons (tsmdm1101m000) session.

A service order can be blocked for one or more of the following reasons:

- The credit limit of the invoice-to business partner is exceeded.
- The invoice-to business partner has overdue invoices.
- The credit review period has been exceeded, and the invoice-to business partner still has overdue invoices.
- The status of the invoice-to business partner is Doubtful.

Note

- The activities and the cost lines of the service order cannot be blocked.
- You cannot exclude specific service orders from blocking, if service-order blocking is used.
- If no blocking parameters are set, service order blocking is disabled.

Templates for external service order documents

To create a template for external service order documents, take the following steps:

1. Start the Service Order Parameters (tssoc0100m000) session.
2. Click the Orders tab.
3. Click Text Editor button. The Texts dialog box appears.
4. Select the appropriate template item:
   - Acknowledgement sheet template
   - Appointment sheet template
   - Repair report template
5. Define the template with the variables supported in the selected template item, as listed below.
6. Save the template and exit.

Template variables

Variables for the contact of Installation group:

```
$conf.titl    Title
$conf.init    Initials
$conf.bfsn    Before Surname
$conf.surn    Surname
$conf.suff    Suffix
$conf.name    Name
```

Variables for the contact of the sold-to business partner:

```
$ordr.titl    Title
$ordr.init    Initials
$ordr.bfsn    Before Surname
$ordr.surn    Surname
$ordr.suff    Suffix
$ordr.name    Name
$curr.date    System Date while printing
$order        Order Number
$ordr.desc    Order Description
$clus         Installation group Code
$clus.desc    Installation group Description
$project      Project
$project.desc Project Description
$svcn.desc    Service department Description
$engineer     Service engineer
$duration     Duration of Service Order
$unit         Unit of Duration
$appo         Appointment (yes/no)
$el.st.tm     Earliest Start Time
$pl.st.tm     Planned Start Time
$pl.fn.tm     Planned Finish Time
$lt.fn.tm     Latest Finish Time
$employee     Sales Employee
$empl.dep     Sales Employee Department Description
$empl.tel1    Sales Employee Telephone 1
$empl.tel2    Sales Employee Telephone 2
$empl.mail    Sales Employee E-mail
$refa         Reference A
$refb         Reference B
$contract     Contract Code
$cntr.desc    Contract Description
$city1        City 1 of Company
$city2        City 2 of Company
$numb.app     Number of Appendices (applicable for repair reports)
```

Example

Title: $conf.titl Initials: $conf.init Before Surname: $conf.bfsn Surname: $conf.surn Suffix: $conf.suff Name: $conf.name Skill: $skla.desc $city1, $curr.date

Dear customer,

Please be informed that the service order $order $ordr.desc must be carried out on the $pl.st.tm.

This service order will be carried out for the Installation group: $clus - $clus.desc.

This service order is part of the $project $project.desc project.

The service order will be carried out by the $engineer engineer of the $svcn.desc service department and will take approximately $duration $unit to be accomplished.

This order falls financially under contract $contract $cntr.desc.

Yours sincerely, $employee $empl.dep Tel. 1: $empl.tel1 Tel. 2: $empl.tel2 E-mail: $empl.mail

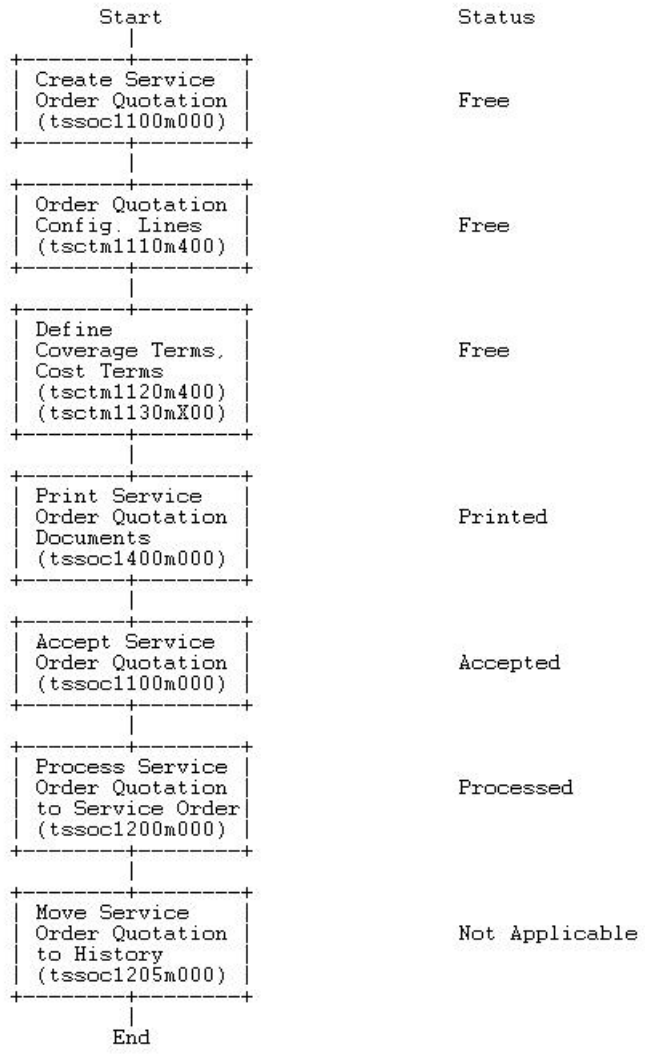
Detailed information:

Appointment: $appo

Earliest Start Time: $el.st.tm Planned Finish Time: $pl.fn.tm Latest Finish Time: $lt.fn.tm

Reference A: $refa Reference B: $refb

Service-order quotation process



To use overtime

To use the overtime functionality, you must define the following:

- The Overtime check box in the Service Orders (tssoc2100m000) session is intended for service applications on which maintenance activities cannot be carried out during normal working time. The check box is not inteded for call solution, which in urgent cases must be carried out in overtime.

- On a service contract header, a service-contract quotation, or a service-order quotation, you can also specify that overtime is applicable. The consequence of using overtime is that the customer usually must pay more. You can specify this when you select a labor rate in which overtime costs are calculated.
- If a service contract or a service-order quotation is specified in the service order header, the default value for overtime is copied from the service contract or the service-order quotation.
- In the Employees - Service (tsmdm1140m000) session, you can specify the Maximum Overtime per Day for a service employee.

Chapter 6
Group Planning

6

This chapter provides a description of the concepts available for group planning.

Group planning data set-up

The purpose of Group Planning functionality is to assign a service engineer to a service order or a service department to a work order/planned activity. Group planning prepares groups that are containers of work, that can be assigned to a resource. Within a group, service activities and activity sets level are present. For example:

- If group is the tray containing sheets of paper,
- the activity set is the paper clip grouping multiple sheets of paper and
- the activity is the sheet of paper

Group Planning can be time based and route based. Route calculation requires extended calculations since every 'to be planned 'activity has to be fitted into the correct node of the existing route. The prerequisite being, GPS coordinates are known for the installation address. Time based calculations are much faster, but these time based calculations do not result in travel times and therefore give a more optimistic view.

Overview

When activities are grouped into activity sets and groups, a service engineer or a service department can be assigned to a group.

Infor LN plans sets of activities where grouping is based on service characteristics. Grouping characteristics can be, for Example, service areas, skill, service type, project, item, contract, installation number, and so on.

Infor LN always plans the set of activities in a sequence. The sequence determines which activity is planned first and influences the fact whether time windows (time constraints) are exceeded. Therefore, the sorting configuration is important. Steps to generate plan:

- Group activities in Groups and Activity Set (depending on configuration)

- Sort the activities
- Plan forward of the sorted activities taking the time windows into account

The groups, groups and activities for group planning are created when a group planning is generated using the Generate Plan (tsspc3200m000) session. Activities can be added to existing groups or new groups. New orders can be added to the group plan using the service order and work order session. For a group, the activities can have the following Group Planning Activity Status.

Group Planning can be broadly classified into following three process steps:

1. Generate group planning (tsspc3200m000) : Service order activities, work order activities, or planned activities are read. These activities are used to generate the group planning groups, group planning activity sets and group planning activities . The generated entities are stored in the database. During the generation of the group planning, the start and end dates of the order activities are updated. For service orders, the travel start and end dates of the order activities are also be updated.
2. View and update group planning (tsspc3100m000, tsspc3110m000, tsspc3120m000) : The generated group planning can be viewed and modified. The date/time fields of the group planning activities can changed. For service orders, travelling can be taken into account. For work orders and planned activities, travel time calculations are not applicable.
3. Release group planning (tsspc3240m000) : When the group planning process is complete, the original service order activities, work order activities, and planned activities can be modified. The updated date/time fields of the group planning activities are copied to the original service order activities, work order activities, and planned activities. For service orders the updated travel date/time fields are also copied to the original service order activities.

Group planning concepts

The entities defined for the group planning functionality:

Service planning parameters

For the group planning functionality, the parameters are defined in the General Service Parameters (tsmdm0100m000) session and in the Service Planning and Concepts Parameters (tsspc0100m000) session. The parameters can be classified into three groups: parameters for the planning of service order activities, parameters for the planning of work order activities, and parameters for the planning of planned activities.

Note

Route planning is only applicable for service orders and planned activities. Route planning cannot be applied to work orders.

Group sequence

Group sequence defines the sequence of a group attribute. The groups must be sequenced, because a number of group attributes can be used to group activities into groups and activity sets.

Group attribute

Group attribute defines the attribute of an activity or related order header or related master data (for example, item group). All activities with the same value for a given group attribute are grouped into the same group or activity set. For Example when the service area is used as group attribute, all activities with the same service area are grouped into a group or activity set. Group attributes are defined in the Planning Attributes (tsspc0110m000) session. For each attribute, you can define the planning sequences.

Group method

Group method is used to indicate if the group attribute is used to group the service order activities into groups or activity sets. **Group Method Parallel** indicates that the service order activities are grouped into separate groups. Groups are created parallel in time and independent of other groups. Planning is for a group. Example the planning of the activities in group GRP000111 is independent from the planning of the activities in group GRP000112. **Group Method Sequential** indicates that the service order activities are grouped into separate activity sets within the same group (sequentially in time). Activity sets are created sequentially in the same group.

Activity set sequence

The sequence of the activity sets with the specified attribute values within a group.

Planning attribute values

Specific attribute values are defined for each planning attribute to be used to group the related service order activities, work order activities, or planned activities.

Reference point configuration

A reference point configuration determines which reference point(s) apply to which group of attributes / value pairs. Infor LN determines dynamically the reference point that is closest to the activity location address.

Activity - preferred resource

A preferred resource can be the preferred engineer for service orders or the preferred department for work orders or planned activities. Infor LN assigns these preferred resources to groups.

Group Planning Group

When a group planning is generated, group planning activities are created from service order activities, work order activities or planned activities. The group planning activities are grouped into group planning activity sets.

Attribute values for a group

The attribute values that are used when a Group Planning Group was created. Two or more attribute values can be linked to one group.

Resources for a group planning group

The resources are assigned to a group planning group. Resources cannot be assigned to an activity set or separate activities. Two kinds of resources can be used for group planning: engineers and departments. Two or more engineers can be assigned to one group planning group. Only one department can be assigned to one group planning group.

Note

A single service department can be assigned to a work order or a planned activity. Therefore a single service department can be assigned to a group planning activity that is derived from a work order or a planned activity. One or more service engineers can be assigned to a service order. Therefore, one or more service engineers can be assigned to a group planning activity that is derived from a service order. The limitations and restrictions of service orders, work orders, and planned activities are applicable to the group planning.

Groups for activity/activity sets

The group planning activities are created from service order activities, work order activities, or planned activities that are grouped into activity sets. The activity sets are grouped into group planning groups.

Attribute value for a group planning activity set

The attribute values that are used when a Group Planning Activity Set is created.

Group planning activities

When a group planning is generated, group planning activities are created from service order activities, work order activities or planned activities that are grouped into group planning activity sets. Two or more attribute values can be linked to one activity set.

Note

Groups for service orders, work orders, and planned activities are separate groups that are planned and released separately.

Group planning process

To generate the plan, LN does the following:

Step 1: LN populates the activities in the group planning based on the planning attributes

- The group planning populates the selected activities in the groups. Service activities are grouped into activity sets and groups, based on the planning attributes. Activity sets are always part of a group.
- Activity groups are planned in parallel with time and activity sets, within a group, are sequentially planned in time. Group sequences with **Group Method** set to **Parallel** are used to generate groups. Group sequences with **Group Method** set to **Sequential** are used to generate activity sets within a group.

Note: If the activity set is frozen, LN does not allow you to add orders to an existing activity, but new orders can be manually added to an activity set. LN allows you to manually add new service orders to an existing plan, even though the activity set is frozen.

Step 2: Sort the activities

LN sorts the activities in groups and activity sets. By default, sorting is based on the latest finish time. Each activity set contains one order with the earliest of the latest finish time, that is also the earliest time the activity set can start and be used for sorting.

Step 3: Plan forward against the calendar

LN plans the sorted activities considering the time windows into account. Planning is based on the **Plan Forward** parameter in the Generate Plan (tsspc3200m000) session.

Note: Planning can also be based on the route. You can use the **Plan Method** parameter in the Service Planning Parameters (tsspc0100m000) session.

Step 4: Modify the plan manually

LN allows you to modify the plan at two levels:

- At group level: Moves activity sets from one group to another
- Within a group:
  - Changes the sequence of the activity sets
  - Reschedules from specific activity set from user determined start/end time
  - Splits the activity sets
  - Adds (rush) orders to the activity set
  - Changes the sequence of the orders in a group

For example, for a day, when the work load within a group is satisfactory, the user can merge all activity sets in a group, resulting in a single group-activity set combination that contains many service orders. These service orders can be sequenced again before the plan is frozen. **Note** Merging of activity sets results in re-sorting and re-planning

Step 5: Assign resources

You can assign engineers to the activity:

- Manually
- Automatically

You can define up to 20 skills for an activity. The required activity skills must meet the employee assigned for the activity between the planned start and finish time of the activity.

Using the Group planning module, you can create a group of activities or buckets of work to be executed, that can be assigned to an employee/resource.

LN allows you to assign the resources at these levels:

- At group level (based on characteristic): Groups are created for activities with similar characteristics or attributes. For Example, all the washers, dishwashers, and air conditioners are classified in 3 groups. Washers: Marc, John and, Hank; Dishwasher: Peter, Dave; Airco: Marco. LN assigns the resource if the characteristics of the group and the employee are similar. If multiple resources are similar, LN displays the list of employees and the planner can manually select one of the engineers. If a single resource is similar, LN assigns the resource. Alternately, resources can be assigned based on the priority rule. For more information, refer to *Priority Rule (p. 93)*.
- At activity set level. The resource of the group level is the assigned resource. Individual activity sets cannot be assigned to employees. When an activity set is assigned to another employee, the activity set can be moved to another group that is assigned to another resource. The assignment can also be changed on the service order.

Note LN allows you to generate a default assignment. You can assign an engineer to a service order activity directly, based on the service type. However, the assignment generated by group planning is considered before the default assignment.

Step 6: Recalculate planned start and finish time

LN calculates the new start and finish times. When the new planned start and finish times are known, including travel durations, the slack or shortage of time can be displayed to the user (planner) for every group assigned to a resource.

Step 7: Release group planning

The group planning activity data is copied to the corresponding service order activities, work order activities and planned activities using update activities from the Group Planning session. For service orders, the updated travel date/time fields are also copied. Use the Release Plan (tsspc3240m000) session to release the group plan.

Note LN allows you to delete the groups from group planning when the resources and the planned start and finish time, are updated.

Resource allocation for group planning

The allocation of resources to planned groups and activity sets is the last step in the Group Planning process. Resources can be service engineers or service departments. The allocation of resources can be executed manually, semi-automatically, wherein, (LN proposes the resource and the user selects the resource manually), or fully automatically. The allocation can be based on skills, and/or planning attributes.

To allocate resources automatically, the required skills and attributes from the Planning Group are matched with the available skills and attributes of the resources. The Service Planning parameters determine whether resource allocation is based on skills and/or attribute values. Use the Planning Attributes (tsspc0110m000) session to indicates if the attribute must be used for resource allocation.

Skills and attributes can be defined by service engineer and by service department. Service engineers can be allocated to planning groups with activity origin Service Order. Service departments can be allocated to planning groups with activity origin Work Order or Planned Activity. When, for a Planning Group, more than one resource is identified, the resources are prioritized based on Priority Rules (For more information, refer to *Priority Rule (p. 93)*). The availability of the resource is also determined. The result of the group planning process, including the resource allocation, is saved in temporary tables, allowing the user to analyze and modify the result. LN allows you to allocate resources to a group, using various sessions, example, Groups for Service Orders - Resource Allocation (tsspc3604m000) session, Planning Group - Proposed Resources (tsspc3104m000) session and so on. LN also allows you to allocate resources automatically.

When the Group Plan is released using the Release Plan (tsspc3240m000) session, the allocated resources are copied to:

- Service engineer assignments, in case of service orders
- Work order activities, in case of work orders (only one department).
- Planned activities, in case of planned activities (only one department).

The resource allocation process comprises of the following steps:

- Set up data
- Propose resources based on attributes and/or skills
- Optionally, check the availability of the resource
- Sequence the resources based on priority
- Select the resource(s) to be allocated to the Planning Group
- Allocate the resources to the Planning Group
- Release the Group Plan

Data set-up

The data set up for resource planning can be based on attribute values and skills.

Data set-up based on attribute values:

- In the Planning Attributes (tsspc0110m000) session, **Used for Resource Allocation** check box to indicate that the attribute is used for resource allocation.
- In Attribute Group - Preferred Resources (tsspc0120m100) session, a group of type Resource is added. LN adds the default set of attributes to this group. For this default set of attributes, the **Any Value** field is set to Yes. LN assigns the proposed resources to the group. This is the fall back mechanism.
- To allocate resources manually, specific attributes value have to be configured and the **Any Value** check box must be cleared.
- You can add, modify and or delete the attributes.

Note

LN allows you to add attributes that are not defined in the Planning Attributes.

- In the Group - Resources (tsspc3102m000) session, add resources for the Attribute Group. When you add a resource that is already linked to an attribute group, LN generates a warning message.

Data set-up based on skills

Define skill of the type Service Department. When the available skills match with the skills required for the work order activities, or planned activities, resources are proposed during group planning.

Proposed resources

Use the Propose Resources for Planning Groups (tsspc3270m000) session to initiate the process of resource allocation for a range of planning groups. Resources are identified based on attributes and/or skills.

- Allocate resources based on attribute values : You must allocate resources to Planning Groups generated as a result of Group Planning process. Resources are allocated only when the **Check Resource** check box is selected in the Group - Attribute Values (tsspc3101m000) session. LN searches attribute groups for the set of attributes / attribute values, taking into account the activity origin of the Planning Group. The number of proposed resources can be modified (conventionally, can be increased) by clearing the **Check Resource** check box for the attribute.
- Allocate resources based on skills : For every skill, the resources can be accessed in the Service Department - Skills (tsmdm1130m000) session, or Service Employee - Skills (tsmdm1135m000) session, based on the activity origin of the Planning Group. When the activity origin is Service Order, the Service Employee - Skills (tsmdm1135m000) session is

accessed. When the activity origin is Work Order, or Planned Activity, the Service Department - Skills (tsmdm1130m000) session is accessed. For service employees, the skill is effective when the effective date is equal to or before the planned start time, and the expiry date is on or after the planned finish time of the Planning Group. The **Effective Date** and the **Expiry Date** are defined in the Skills by Employee (tcppl0120m000) session. A resource can only be proposed for group planning when the resource has all the mandatory skills. The **Match on Mandatory Skills** check box in the Planning Group - Proposed Resources (tsspc3104m000) is selected. When the resource has also all preferred skills, the **Match on Preferred Skills** check box is selected.

- **Note**: When a group does not require skills and the **Check Resources for Skills** check box is selected, for a service order, work order or planned activities, LN displays all the resources on proposed resources for the group.
- **Note**: When LN checks the resources availability for a group, the resources list includes *attribute based match* resources as well as *matching skills* resources.

- Allocate Resources based on Attributes and Skills : In this scenario, resources are allocated based on attributes and on skills.

Resource selection

Use the **Allocate Resource to Planning Group** checkbox in the Planning Group - Proposed Resources (tsspc3104m000) session to indicate that the resource is allocated to the Planning Group. For Planning Groups with activity origin Service Order, one or more resources can be selected. For Planning Groups with activity origin Work Order, or Planned Activity, only one resource can be selected. When the **Automatically when only one found** check box in the Service Planning Parameters (tsspc0100m000) session is selected, LN selects the **Allocate Resource to Planning Group** check box when only one resource is proposed.

When more than one resource is proposed, and the **Automatically highest priority** check box is selected, LN selects the **Allocate Resource to Planning Group** check box for the resource with the highest priority.

Allocate resources

Resource allocation can be executed in the following two ways:

- Using the **Allocate Resources to Planning Groups** option on the **References** menu in the Planning Group - Proposed Resources (tsspc3104m000) session, the resource is allocated to the Planning Group.
- Using a batch session.

Merge/Split planning groups

When Planning Groups are merged, LN merges proposed and/or allocated resources. This is applicable only for Groups with activity origin Service Order. When Planning Groups are split, you must propose/allocate resources to the new group, that is created.

Release the plan

Use the Release Plan (tsspc3240m000) session to release the plan.

Territory planning process

The territory planning functionality enables you to perform territory and preferred engineer simulations. The objective is to reduce travel by clustering the interchangeable work in geographical areas. The territory engine compares the required capacity for the serials, with the available capacity (the engineers or simulations engineers). The engine calculates the best possible combination of the required capacity for the serialized item and the available capacity. Optionally, an engineer can be made responsible for a territory and the optimal territories can also be calculated.

You can select the serialized items that are to be serviced (required capacity) in a certain geographical area. The engine calculates the required capacity on historical and/or already known data. To check the available capacity, the user can specify existing service engineers, as well as simulation engineers, for maximum flexibility. If the calendar and availability type of an engineer is defined, the engine calculates the available capacity. The user can use the simulation results, to modify the preferred engineer on the serialized item and/or the territory.

Note

The user can also manually change the preferred engineer and the territory of the serialized item.

Step 1: Determining or calculating the required capacity for a list of serials

In order to determine the required capacity, the user specifies the serialized items for which the capacity requirements must be considered. The user can select the serials that must be part of the geographical clustering calculation based on:

- Top serial
- Service department
- Installation group
- Service area. This information can be obtained from the related installation group (when applicable)
- Serialized item groups
- The manufacturer of the serial
- The sold-to business partner of the serial

Based on these criteria, Infor LN compiles a list of serials. The list can be modified by the user.

The user can trigger the calculation to aggregate the available capacity data into different categories such as planned activities, service orders. After triggering the calculation, LN provides an overview wherein the capacity figures can be maintained manually including the number of visits. The user loads the known capacity requirements data into the territory plan. For Field Service, LN bases the number of visits on the number of planned activities and service orders. The number of visits determine how

much travel time is used for the serial during the simulation. The user has the option to roll up the underlying capacity figures to the top serial item. In case the top serial item is the planning level, it is advised to roll up the capacity of the parts to the top serial. The required capacity is loaded into the territory plan.

Step 2: Determining the available capacity

The available capacity must be configured by the user:

- Using simulation users for a rough identification of the territories
- Using named resources for a more detailed identification of the territories. To do so, you can either use the actual calendar of the employee or multiplying the number of days with the available hours for a day.

Configuring the available capacity - The available capacity for resources and the number of territories determine the output of the engine. For the input parameter, the number of territories determine the number of geographical clusters into which the total data set is divided. The capacity available for a territory determines whether the set of serials and the related capacity requirements match, (for example, travel as activity duration) This input parameter helps determine the optimal geographical distribution of territories, on the map.

Step 3: Calculating the capacity allocations

The purpose of the engine is to assign as many required capacities (serialized items) as possible to resources (available capacities, that is the (simulation) employees), taking available capacity, required capacity, and travel time into account. Use the Calculate Capacity Allocations (tsspc4200m000) session to start the territory engine.

The engine can be triggered after configuring the input data:

- The user runs a quick simulation with the average available capacity to be divided over a fixed number of territories. After the simulation, the user can update the territory of the serialized item.
- The simulation can also be performed with actual resources. After the simulation, the territory and the preferred engineer can be updated for the serial item.

Calculation of the territory plan:

1. Indicate the territory reference point on the map (starting location) : The reference points are indicated 'on the map' to run the initial calculation. The first calculation of distances in step 2 is based on these reference points.
2. Allocate serials to the territory: LN allocates serials to the territory according to the second best algorithm.
3. Swap logic: LN finds the longest distance between the (arbitrary) territory reference point and the serial and tries to minimize the long radius by swapping the serial with another territory reference point.
4. For a set of serials, determine the center of gravity (Optional): For reference points that are not fixed, the system determines the average longitude and latitude and shifts the reference

point to the center of gravity of the territory. After a shift in the territory reference point, the system starts again with step2. This process (reiterating from step 2 – step 4) repeats until no substantial improvements are identified anymore.

5. Swap logic for the complete list of serials : For all serialized items, LN verifies if the items can be exchanged with other territories. This is a one-time activity.

Step 4: Using the output of the engine

The basic output of the calculation is the territory or preferred engineer identified for a serialized item. The territory plan can be used to update these attributes of the serialized item.

- Graphical overview: The output of the engine can be viewed using maps that provide an overview of territories. The information about the serial and the required capacity for the serial, along with the activity duration and travel time, is also included. Various colors are used to indicate various territories. The user can update the preferred engineer of the serial based on the territory. The territory planning session can be used to compare territory scenarios. Scenario 1 is on the left side and Scenario 2 is on the right side of the screen. Dual coloring mechanism is used for the markers on the map. In the marker, the color on the left corresponds to the scenario on the left side and the color on the right corresponds to the scenario on the right side. You can also compare the output of the engine with the actual data. The preferred engineer and territory calculated for a scenario can be compared to the preferred engineer or territory in the serialized item master data.
- Territory and preferred engineer without map : You can view the assigned territory and potentially, the preferred engineer data without the map in the Serialized Item Dashboard (tscfg2100m100) session. The user can filter and select multiple serials. The serials can be assigned to a preferred engineer using the Update Engineer and Location Address option from the **References** menu.

Step 5: Recalculating the travel time

When the territory engine is run, you can recalculate the travel time, because the travel time used by the engine is based on the center of gravity. However, the center of gravity is typically, not the home address of the engineer. Therefore, there can be a discrepancy between the calculated and the actual travel times. For example employees are hired to complete assignments in an area that is not, by default, close to the employee's home address resulting in a deviation from the reference point and the center of gravity. This is applicable only for two calculation options:

1. Direct (as the crow flies)
2. Road-based (using a web service [call to Google or Bing API])

Route-based planning process

Group planning can be time based and route based. When a route is planned for group planning activities, LN calculates travel distances and travel times for the activities. The route execution sequence of the activities is based on the route.

The route planning data is copied from group planning to the original service order activity, when the plan is released from group planning.

Note

Route planning is applicable only for service order activity.

A route can be planned based on the set of orders assigned to the engineers of a group. **Note** When different characteristics must be planned in a route, the characteristics are merged into one activity set. The travel times based on distances can also be calculated using the activity set. The addresses contain GPS co-ordinates that are required to calculate distances and also to locate the current location of the service engineer. The travel time is combined with the duration of the various activities that must be executed on location, that results in the new planned start and planned finish times. The new planned start and planned finish times data is transferred to the standard service orders.

A route can be planned for every activity set of a group, that may or may not be assigned to an engineer. When various activity sets must be planned for a route, the activity sets must be merged before a multi-characteristic route is planned. With the activity set, the travel times based on distances can also be calculated for every location in the activity set. The addresses contain GPS co-ordinates that are required to calculate distances. You can also plan the home address of an engineer as a part of the route. These distances can be calculated based on various methods such as a crow flies or web service based. The travel time is combined with the duration of the various activities that must be executed on location that results in the updated planned start and planned finish times. The new data are transferred to the standard service orders.

The methods to calculate the route:

- You can calculate the distance using 'As a crow flies' or a true distance can be calculated using a dedicated web service. When no distance is found for two locations the distance is calculated using a simple formula. For example, the calculation for 'As a crow flies':
- - Given are two points (dlat1,dlong1) and (dlat2,dlong2) in degrees
  - Convert (lat1,long1) and (lat2,long2) to radians using
    angle_radians = angle_degrees × π/ 180
  - R = 6371010 (mean Earth radius in meters)
    Δlat = lat2- lat1
    Δlong = long2- long1
    $a = \sin^2(\Delta lat/2) + \cos(lat1) \times \cos(lat2) \times \sin^2(\Delta long/2)$
    $distance = 2 \times R \times atan2(va, \sqrt{(1-a)})$
- You can plan the route based on a Bing map. An internet connection is required where LN sends a request to the bing maps web service to calculate the distance.
- You can perform a route calculation or a distance calculation based on sorted data. For a set of sorted orders, you must enter the group sequence. LN calculates the distance between the various addresses of the activities. Based on the average speed and initial start up time, LN estimates, based on the distance.

```
time(distance) =  distance(km) * speed (km/hr) + initial time (hr)
```

- Take time constraints into account yes or no : The shortest route taken into account. Otherwise the earliest start and latest finish of the activities is considered. These time constraints can be configured using the Respect Earliest Start Time and Respect Latest Finish Time parameters in the Service Planning Parameters (tsspc0100m000) session. If these check boxes are selected, and if the specified locations are not part of the route, Infor LN does not allow you to release the activity; the activity remains in the group plan and the status of the activity is set to Not Planned.
- Take the home address of the service engineer into account yes or no: The time period between departure and arrival. When the service engineer departs from home and arrives at home in the evening, the tour is closed, otherwise it is open ended
- The planner can also manually define the sequence of the route. To do so:
  - Modify the sequence numbers
  - Select the Keep Sequence check box
  - Re-plan the route

  Consequentially, Infor LN updates the travel times in a pre-defined sequence. However, this sequence is not optimal and can lead to more travel time and a higher mileage.

Check Resource Availability

LN checks the resource availability if the **Check Resources for Availability** check box is selected in Groups for Service Orders (tsspc3100m000) or Groups for Work Orders (tsspc3100m100) sessions. By default, this field is checked, if the **Check Availability** check box is selected in the Service Planning Parameters (tsspc0100m000) session.

A resource is available for the Planning Group only if the resource is not allocated to another planning group with an overlapping time period (planned start time and planned finish time) that is smaller than the defined availability percentage. LN populates a list of resources that have matching attributes or matching skills, displayed in the Planning Group - Proposed Resources (tsspc3104m000) session. LN allocates the resource with the highest ranking. Select the **Allocate Resource to Planning Group** check box to allocate the resource to the group.

When a resource is allocated to Group Planning, you can view the resource in the Group - Resources (tsspc3102m000) session. You can also view the list of proposed resources in the Groups for Service Orders - Resource Allocation (tsspc3604m000) session. The session also displays the attributes and skills defined for a group. In this session, the planner can select or clear the required attributes, or skills, or both, to check if more resources with a less rigid criteria can be made available for the group. The planner can also use the Groups for Service Orders - Proposed Resources (tsspc3604m400) session to check if the proposed resources' attributes and skills match the requirements of the group.

If the resource is not fully available in the time period of the specific group, the percentage of availability is calculated.

Example

The specific group starts at 8/28/2011 9:00 and ends at 8/28/2011 13:00.

Proposed resource EMPL-1 is allocated to another group from 8/28/2011 9:00 to 8/28/2011 10:00. Therefore, EMPL-1 is occupied for one hour. The availability percentage is (4-1)/4 * 100% = 75%.

```
The formula used to calculate Availability Percentage (AP):

AP = Available hours * 100% / Required hours

Available hours = number of working hours (based on resource calendar) between
 Planned Start Time and Planned Finish Time of the Planning Group -  ( working
 hours (based on resource calendar) between Planned Start Time and Planned
Finish Time of overlapping Groups where resource has been allocated to).
```

It is possible that the available hours exceed the required hours, the Availability Percentage is > 100%. Therefore, the Availability Percentage is set to 100%.

As soon as a resource is allocated to a planning group, LN recalculates the availability for the resource.

When the resource's availability is less than the **Minimum Availability Percentage** defined in the Service Planning and Concepts Parameters (tsspc0100m000) session, LN moves the resource from the proposed resource list.

In case the check availability check box is not selected, LN does not check the availability of the resource. The Availability Percentage is not determined, and is set to 0.0.

Priority Rule

If more than one resource is identified for a planning group, the resources are prioritized based on priority rules. Set the **Proposed Priority** field in the Service Planning and Concepts Parameters (tsspc0100m000) session.

LN ranks the proposed resources based on the priority rules. The ranking or the prioritization enables LN to automatically allocate the resource with the highest ranking. If the **Automatically highest priority** check box, in the Service Planning and Concepts Parameters (tsspc0100m000) session is selected, LN allocates the resources with the highest priority. If this check box is cleared, you must manually allocate the resources.

The defined rules:

S.No	Rule
1	Is not allocated to other Planning Groups
2	Has all Planning Group attribute values
3	Has all required skills
4	Has all preferred skills
5	Has Planning Group with earliest finished activity

LN checks all the rules and ranks for the proposed resources of a group. For example, if the first rule is applicable, the resource gets 24 (= 16) points. If the second rule is applicable, the resource gets 23 (= 8) points. If the rule three is applicable, the resource gets 22 (= 4) points. If the rule four is applicable, the resource gets 21 (= 2) points. If the rule five is applicable, the resource gets 20 (= 1) points. The resources have the same priority only if the same rules are applicable.

Resource A: If only rule 1 is applicable, this resource gets 16 points.

Resource B: If only rule 2, 3 and 4 are applicable, this resource gets 8 + 4 + 2 = 14 points.

Resource C: If only rule 1 and 5 are applicable, this resource gets 16 + 1 = 17 points.

Therefore, resource C gets the highest priority.

When resources are sorted on priority, the highest priority is displayed as the last record. To list the resource with highest priority as the first record, LN recalculates the priority based on the formula:

```
priority = 32-priority
```

Example

After the recalculation the priority for the resources is:

Resource A: If only rule 1 is applicable, the resource gets 16 points. Priority = 32 – 16 = 16.

Resource B: If only rule 2, 3 and 4 are applicable, the resource gets 14 points. Priority = 32 – 14 = 18.

Resource C: If only rule 1 and 5 are applicable, the resource gets 17 points. Priority = 32 – 17 = 15.

Description of the Priority Rules:

- **Rule 1- Is not allocated to other Planning Groups**
  This rule is true when, for a resource, no record exists in Group - Resources (tsspc3102m000) session for any other Planning Group.

- **Rule 2- Has all Planning Group attribute values**
  This rule is true when, for a resource, the **Match on Attribute Values** field in the Planning Group - Proposed Resources (tsspc3104m000) session is set to specific.
- **Rule 3- Has all required skills**
  This rule is true when, for a resource, the **Match on Mandatory Skills** check box and the **Match on Preferred Skills** check box in the Planning Group - Proposed Resources (tsspc3104m000) session is selected.
- **Rule 4- Has all preferred skills**
  This rule is true when, for a resource, the **Match on Preferred Skills** check box is selected in the Planning Group - Proposed Resources (tsspc3104m000) session.
- **Rule 5- Has Planning Group with earliest finished activity**
  The rule is true when the resource is allocated to another Planning Group (or groups) in the Group - Resources (tsspc3102m000) session, and the **Planned Finish Time** of the latest Planning Group is earlier than the other proposed resources. When the resource is not yet allocated to a Planning Group, this rule is definitely true.

Appendix A
Glossary

A

acknowledgment sheet

A letter about a service order that is planned to be carried out, used to inform the business partner. For this purpose, a user-dependent layout (template) can be defined in the Service Order Parameters (tssoc0100m000) session.

activity group

A user-defined category created to group reference activities or planned activities, based on their common features.

Example

A group of assembly activities.

appointment sheet

Appointment sheets can be printed if in the order header it is stated that an appointment has been made. This letter can be sent to the business partner. For this document a template can be defined in the SOC parameters.

ATP

The item quantity that is available to be promised for a customer either immediately, or at a specific time in the future.

ATP check

A check on the quantity that can be promised to a customer based on the allowed demand. The main purpose of the ATP check is to reserve a certain quantity of the spare part or item.

call

A question, complaint, or malfunction that is communicated to the party responsible for the service or maintenance of the item concerned.

checklist

Lists the points to which the service engineer must pay attention during the execution of a service activity. Checklists are used to group specific checks so that more than one check can be defined for a reference activity. According to the answers expected from the check, space is provided when printing the document related to the service order.

contract coverage

The method indicating how the service order costs are covered by the contract.

contract quotation

A quotation to a business partner for the provision of a service contract.

cost component

A cost component is a user-defined category for the classification of costs.

Cost components have the following functions:

- To break down an item's cost price, sales price, or valuation price.
- To create a comparison between the estimated production order costs and the actual production order costs.
- To calculate production variances.
- To view the distribution of your costs over the various cost components in the Cost Accounting module.

Cost components can be of the following cost types:

- **Material Costs**
- **Operation Costs**
- **Surcharge on Material Costs**
- **Surcharge on Operation Costs**
- **WIP Transfer Costs**
- **General Costs**

Note
If you use Assembly Control (ASC), you cannot use cost components of the **General Costs** type.

cost terms

A detailed specification of a coverage term.

cost type

Categories that are used to register the type of costs. Cost types enable you to have a more detailed view of the source of costs.

counter value

Preventive maintenance takes place at a constant interval. This interval is expressed in a usage-related unit, for example, operating hours, kilometers. The actual moment of maintenance is when the norm value of the counter is reached.

Example

A car that must be serviced every 20,000 km.

coverage phases

A coverage term can be phased in time or it can be made dependent on the counter value of an item. It is possible to specify for each phase another covering method.

coverage type

A financial classification that indicates to what extent work is covered under warranty or contract, and what part of the activities can be charged.

credit limit

The maximum financial risk that you accept or are insured against concerning an invoice-to business partner, or that an invoice-from business partner accepts concerning you.

When you create orders, LN continually checks that the total amount of created and invoiced orders does not exceed the credit limit. When you exceed the limit, LN gives a warning message.

credit review period

Within this period the invoice-to business partner must pay his invoices. This can be seen as a so-called overdue invoice period.

dependent norm value

The dependent norm value determines the moment when maintenance is required for an item in a configuration.

- In case of predicted inspections (PI): If the measured value does not meet the norm value, a maintenance activity is required. You can immediately plan a service order that carries out the required maintenance, or a follow-up activity.
- In case of counter value (CV): The maintenance must be carried out when the norm value is reached.

Example (CV): If a car must be inspected every 20,000 km. the first norm value is 20,000 km, the second 40,000 km, and so on.

dependent variable

A unit of measurement, which together with a norm value (and start value) determines when maintenance activities must be carried out.

external maintenance

Preventive maintenance (PM) activities of an item done by a service engineer at the customer's site. This activity is defined in a contract.

external service-order documents

External service order documents include announcement sheets, appointment sheets, and repair reports.

field change order (FCO)

An order to collect and modify, repair, or replace an item (for example, a product recall). You can apply the order to one or more customers. The order can be created by marketing, sales, or manufacturing.

field change order object lines

A field change order line specifies the serialized item that must be modified by the field change order (FCO), and the sold-to business partner who owns it. If a service order has been created for the FCO, the service order's number is displayed on the FCO line.

global SRP

Global service resource planning (SRP) is the long-term planning phase for service orders that are defined in Service, and planned for the mid-to-long term (months).

help desk

A direct support center, staffed by maintenance engineers who solve customer's questions and problems.

inspection

A specific activity that is carried out to determine the condition and the status of a (part of a) configuration or process. Inspection activities can be based on inspection norms that are specified in documents. The inspection activities and inspection intervals are specified in the maintenance program.

inspection report

A report that can be used to register the measured values on an item in case an inspection must be carried out.

inspection templates

A set of measurements that you must carry out on items during an inspection. Inspection templates include the norm values that trigger the reference activities. If an inspection is carried out and the norm value that is defined for the dependent variable is exceeded, one or more reference activities must be performed.

installation

The list of (serialized) items that belong to an Installation group.

installation group

A set of serialized items that have the same location and are owned by the same business partner. Grouping serialized items into an Installation group enables you to maintain them collectively.

internal maintenance

The maintenance activities carried out on internal production devices.

item

A standard maintenance item.

labor rate

The labor rate code, defined in the Labor Rate Codes (tcppl0190m000) session in People. A sales rate and cost rate can be specified in this labor rate code.

You can assign labor rates on a wider scale to, for example,

- A service department, for all work done by the service department.
- An Installation group, for all work carried out on the Installation group.

In the Service Order Parameters (tssoc0100m000) session, default labor rate search paths can be set for the following:

- Estimated sales rate
- Estimated cost rate
- Actual sales rate
- Actual cost rate

location

A physical, recognizable area in a maintenance shop, a service department, or a work center where parts are temporarily stored. Inbound and outbound handling is not registered in LN.

maintenance activity

The smallest unit of work that form the base for all maintenance to be carried out.

maintenance planning

The list of activities planned for serialized items/Installation groups for the purpose of long term preventive maintenance.

maintenance sales order

Orders that are used to plan, carry out, and control the maintenance on customer-owned components, products and the logistic handling of spare parts.

maintenance sales order lines

Lines that store all details of the items that must be maintained, loaned, replaced, delivered, or received.

measurement type

A particular measurement that is used to determine the value of an item's variable (measuring quantity) in a specific situation. Example: Tire tread depth.

measurement unit

Units used to express measurements. The unit can be user-defined or selected from the list of units in Common.

other

All service activities that are not covered by the following service types: help desk, internal problem, external problem, internal maintenance, external maintenance, depot repair, and claim processing.

other requirements by planned activity

All other requirements (such as, tooling, traveling, and subcontracting) for carrying out the activity on the item.

overdue invoice

The invoice that has been left unpaid too long.

planned activities

The fixed moments on which preventive maintenance, by means of planned activities, must be carried out on serialized items/Installation groups. Service maintenance planning shows the demand of service activities in the long term and can be used as input for the service order procedure.

position

The point where the measurement is performed.

Example

Measuring profile of a tire, specify Left Front/ Right Front and so on.

Preventive Maintenance (PM)

The maintenance activities that are carried out on a regular basis to prevent malfunctions or failures.

reference activity

The smallest unit of work that is required to carry out maintenance.

repair report

A report that informs the business partner about the findings of the service orders, in case repairs have been carried out on specific items. A template of the letter can be defined in the SOC parameters. For each activity an appendix (standard layout) will be printed. This appendix is printed in the language of the business partner.

Repair Warranty

The service provider's guarantee that the product is repaired free of charge, if the repair done earlier on the product is not satisfactory or not proper.

requirement lines

The lines that specify the resources required to carry out an activity. Requirement lines can comprise material, tool, and other requirements.

requirements

The material, labor and other requirements can be defined for a reference/planned activity.

return material authorization

Expected return of material from the customer to the service provider. Acronym: RMA

serialized item

An item that is uniquely identified by the item code (manufacturer part number) in combination with the serial number.

serial number

A number that, together with the item code or manufacturer part number, uniquely identifies a component, an item, a machine, or an installation.

This serial number is usually shown together with the manufacturer part number and other identification data on an identification plate that is attached to the item.

service contract

A sales agreement between a service organization and a customer for a specific period, that states the configurations (Installation groups or serialized items) to be maintained, the coverage terms, and the agreed price.

service department

The department that is responsible for the execution of a work order.

service department

A department that consists of one or more persons and/or machines with identical capabilities, that can be considered as one unit for the purposes of service and maintenance planning.

service engineer

A trained technician who carries out the service activities within his/her own organization or on the customer's site.

service order

Orders that are used to plan, carry out, and control all repair and maintenance on configurations as present on customer sites or as present with the company.

service-order activity line

The smallest unit of activity that can be carried out for a service order. Multiple activities can be defined per service order. This can be useful, for example, to combine calls with planned maintenance activities.

service order header

The service order header contains all the data that is entered in the Service Orders (tssoc2100m000) session.

service-order quotation

A service-order quotation is a statement of price, terms of sale, and description of services and materials, that can be sent to a prospective business partner. The business partner data, payment terms and delivery terms are listed in the header. The data about the activities and materials are entered on the quotation lines.

service order sheet

A sheet that informs the service engineer about the work that must be carried out.

service type

The service classification that service providers offer. The service type determines which availability type applies to a service order header, and provides a default order procedure and coverage type.

slack time

The time between the earliest start time and the planned start time of an activity, and between the latest finish time and the planned finish time of an activity. Slack time is deliberately introduced by the planner to reduce the risk that a delay in a single activity is passed on to subsequent activities and, as a result, disturbs the overall planning.

subcontractor

A business partner that is hired to perform certain services, such as the execution of a part of a project or production order. The services are delivered via a purchase order.

surcharge/discount

A *surcharge* can be made, if, for example, a special response time is requested. A *discount* can be given, if, for example, a quantity of a given item is requested as opposed to a single item.

Note

- If a surcharge is applied to an item or order, it is added to the original costs.
- If a discount is applied to an item or order, the original costs are lowered.

tool maintenance

The maintenance activities that are carried out on tooling.

trend

The information that is necessary to calculate the trend of numeric measurements.

usage class

Usage classes categorize the use of an Installation group, configuration, or (serialized) item, based on environmental factors or frequency of use.

You can use usage classes to predict the maintenance required for a Installation group, configuration, or (serialized) item, based on the usage.

Example

The usage class of a truck can be national or international. The required maintenance for national use is different than that for international use, for example:

- Difference in number of kilometers
- Difference in climate

warranty

A guarantee that a component is repaired free of charge or at reduced costs if it does not work according to the agreed specifications within a warranty period.

work center

The subdepartment of the service department that is responsible for the execution of a work order.

work order

Orders that are used to plan, carry out, and control all maintenance on items in a maintenance shop or in a repair shop. A work order consists of at least one work order header, and can have a number of activities that must be carried out on a repairable service item.

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