Infor LN Service User Guide for Field Service

Important Notices

Trademark Acknowledgements

Publication Information

Document code	tsfieldservug (U9000)
Release	10.7 (10.7)
Publication date	March 7, 2019

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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 guide explains the various concepts and processes available in the Field Service.

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.

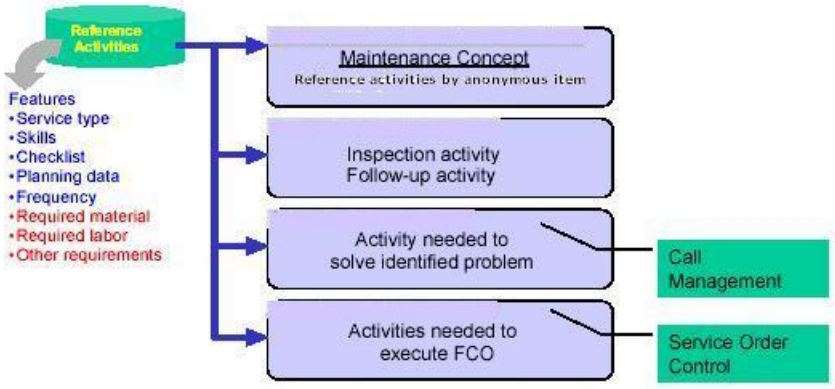
Chapter 2
Preventive Maintenance Concepts

2

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.

Activity groups

If you link the reference activities to an activity group, you can simultaneously carry out actions on these reference activities in the following sessions:

- Print Reference Activities (tsacm1401m000)
- Print Reference Activity - Resource Requirements (tsacm2420m000)
- Switch Status Maintenance Plan (tsspc2201m000)
- Delete Maintenance Plan (tsspc2202m000)
- Transfer Planned Activities to Field Service (tsspc2220m000)
- Print Planned Activities (tsspc2400m000)

Service planning

In Service service planning is divided into three phases:

- Maintenance concepts planning. The Service Planning & Concepts module contains the functionality for planning maintenance that is based on planned activities.
- Global SRP.

Tolerance periods

If you use a tolerance period for an Installation group activity type, all activity types within this tolerance period can be automatically related to the Installation group activity type. To do this, you must use a specific function.

In the maintenance forecast, activity types can be linked to the activity type that is designated as the Installation group activity type. The saving in activities to be performed by means of clustering, can be manually implemented in the cost estimation of the Installation group activity type.

For this purpose, the cost estimates of the corresponding activity types are copied to the Installation group activity type.

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

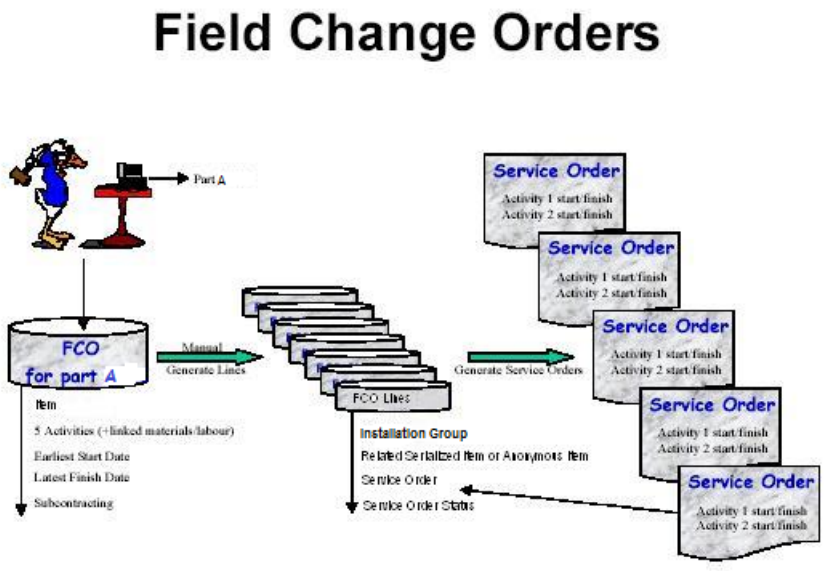
3

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 location 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 Orders (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 Field Change Order 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 Field Change Order Lines (tssoc5110m000) session. Alternatively, you can run the Generate Field Change Order 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 Orders (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 the Resource Management Workbench (tssoc8351m000).

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:**
  Service activities can apply to a whole location.
- **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 locations.

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 - Part Lines (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.

Travel Cost Lines Default Setup

Various travelling parameters that enables automatic and/or manual creation of the travel lines are grouped together and specified on the traveling tab in the General Service Parameters (tsmdm0100m000) session.

Service Order Traveling Cost Parameters

To implement the traveling functionality and to enable travel related fields, the **Traveling Cost Method** parameter in the General Service Parameters (tsmdm0100m000) session must be set to:

- **Based on Service Order or Activity**
- **Based on Service Area**
- **Based on Serialized Item**
- **Based on Installation Group**
- **Based on Distance Zone**

- **None**

Note

If this parameter is set to **None**, travelling functionality is not implemented in Service

Travel Cost Lines Defaulting Setup

Use the **Traveling Cost Specification** group box in the Service Order Parameters (tssoc0100m000) session, to indicate the type of travel cost lines that must be created.

The **Traveling Cost Method** parameter specifies the entity, from which the values in the travel field are defaulted

Travel Cost Method	Defaults for Travel Distance	Defaults for Travel Time	Defaults for Call-out Charge
Serialized Item	**Travel Distance** defined in the Serialized Items (tscfg2100m000) session	**Travel Time** defined in the Serialized Items (tscfg2100m000) session	**Call-out Charge** defined in the Serialized Items (tscfg2100m000) session
Installation Group	**Travel Distance** defined in the Installation Groups (tsb-sc1100m000) session	**Travel Time** defined in the Installation Groups (tsb-sc1100m000) session	**Call-out Charge** defined in the Installation Groups (tsb-sc1100m000) session
Service Area	**Average Traveling Distance** defined in the Service Areas (tsmdm1105m000) session	**Average Traveling Time** defined in the Service Areas (tsmdm1105m000) session	**Call-out Charge** defined in the Service Areas (tsmdm1105m000) session
Service Order or Activity	**Travel Distance** defined in the Service Order Activities (tssoc2110m000)/ Service Orders (tssoc2100m000) session	**Travel Duration** defined in the Service Order Activities (tssoc2110m000)/ Service Orders (tssoc2100m000) session	Call-out Charge defined in the Service Order Activities (tssoc2110m000)/ Service Orders (tssoc2100m000) session
Distance Zone	Travel Distance search sequence. LN looks for	Travel Time search sequence. LN looks for the	**Call-OutCharge** of Zone Classes (tsmdm1121m000) defined

the following search sequence: **1.** Serialized Item **2.** Installation Group **3.** Service Area	following search sequence: **1.** Serialized Item **2.** Installation Group **3.** Service Area	in Distance Zones (tsmdm1120m000) session

Note

- If **Time and Material** price contract term is specified, the sales price is retrieved from the pricing contract.
- For all the **Traveling Cost Method** options, if the call-out charges is not defined, the **Standard Sales Price** is defaulted from the General Service Parameters (tsmdm0100m000) session.
- If a Travel Total Line is defined, this total line is invoiced. The sales price on the Travel Time and Travel Distance line wil be zero and accumulated on the Travel Total Line.

Creating and Generating Travel Cost Lines

The travel lines can be created manually or generated automatically.

Creating Travel Cost Lines

- **Travel Distance and Travel Time Lines :**
  You can create travel cost lines manually in the Service Order Actual Other Costs (tssoc2141m000) session. LN defaults the values in the relevant fields. For the default mechanism, refer to *Travel Cost Lines Default Setup (p. 38)*. The actual cost rate is based on the actual distance and actual time. The Actual distance in the Service Order Other Costs (tssoc2142m000) session can be entered manually. Actual travel time is defaulted from the Service Order Hours (bptmm1130m000) session. **Note**: You cannot create the **Travel Distance** and **Travel Time** lines manually, if the **Travel Total Line for Distance and Time** check box is selected in the Service Order Parameters (tssoc0100m000) session.
- **Callout Charge Travel Line**
  When you create travel cost lines manually, LN defaults the values in the relevant fields. For the default mechanism, refer to *Travel Cost Lines Default Setup (p. 38)*. **Note**: You cannot create the **Callout Charge** travel lines manually, if the **Travel Total Line for Distance and Time** check box is selected in the Service Order Parameters (tssoc0100m000) session.
- **Travel Total Line**
  The **Travel Total** cost lines cannot be created manually. LN generates the total cost lines, if **Travel Total Line for Distance and Time** check box is selected in the Service Order Parameters (tssoc0100m000) session. When a total travel line is generated in the Service Order Other Costs (tssoc2142m000) session, a travel distance and/or travel time line is also

generated. LN defaults the values in the relevant fields. For the default mechanism, refer to *Travel Cost Lines Default Setup (p. 38)*. Travel time is specified using Service Order Hours (bptmm1130m000) session. Actual travel costs are registered on the **Travel Distance** and/or **Travel Time** line. The sales amount of the **Travel Distance** line and/or **Travel Time** line are aggregated to the **Travel Total** line, that is invoiced.

Generating Travel Cost lines

The travel lines can be generated based on **Travel Planning Method** or **Moment of Travel Line Creation**.

Generating Travel Cost Lines based on Travel Planning Method

Based on the value, the **Travel Planning Method** field is set to, in the Service Orders (tssoc2100m000) session, the generated travel lines are linked either to the Service Orders (tssoc2100m000) or the Service Order Activities (tssoc2110m000) session.

- **Header Based**
  If the **Travel Planning Method** is set to **Order Based**, the generated travel lines are linked to the Service Orders (tssoc2100m000) header. For each type of travel cost line (**Travel Distance**/ **Travel Time**), a separate cost lines is generated. You cannot enter a serialized item on the service order header, hence the contract coverage is based on the contract set up for the **Installation Group** defined in the Service Orders (tssoc2100m000) session.
- **Activity Line Based**
  If the **Travel Planning Method** is set to **Activity Based**, the generated travel lines are linked to the Service Order Activities (tssoc2110m000) session. For each type of travel cost line (**Travel Distance**/ **Travel Time**), multiple cost lines for the service order is generated. Contract coverage is applicable for the contracts defined for **Item** and **Installation Group**. For each unique **Location Address** specified in the Service Order Activities (tssoc2110m000) session, travel cost lines are generated. LN groups all the activity lines with the same **Location Address** to generate travel lines. The travel lines are linked to the activity line with the lowest activity line number.

Note

- If the **Traveling Cost Method** is set to **Based on Service Order or Activity** in the General Service Parameters (tsmdm0100m000) session, creation of the cost lines are based on the **Travel Duration** and **Travel Distance** fields of the service order or activity.

Generating Travel Cost Lines based on Moment of Travel Line Creation

The **Moment of Travel Line Creation** field in the Service Order Parameters (tssoc0100m000) session determines the moment of generation of travel lines; during order entry or during execution of Global Service Resource Planning (SRP).

- **Generation During Global SRP**
  If the **Moment of Travel Line Creation** field is set to **During Service Order Resource Planning** in the Service Order Parameters (tssoc0100m000) session, the travel lines are generated when the Service Order Resource Planning (tssoc2260m000) session is executed. LN links the generated travel lines, based on the value **Travel Planning Method** is set to. When you re-plan a service order, existing travel lines are deleted and new travel lines are created.
- **Generation During Order Entry**
  If the **Moment of Travel Line Creation** field is set to **During Order Creation** in the Service Order Parameters (tssoc0100m000) session, the travel lines are generated when a service order is created. LN links the generated travel lines, based on the value **Travel Planning Method** is set to. If the **Travel Planning Method** field in the General Service Parameters (tsmdm0100m000) session is set to **Order Based**, the travel line is generated immediately after the service order header is created. If the **Travel Planning Method** field is set to **Activity Based**, the travel line is generated immediately after the service order activity is created.

Recalculating Travel Cost Lines

Recalculating Travel Cost lines

The travel cost lines are not modified automatically, if there is change in service order header or service order activity created manually or generated automatically. You must use the Recalculate Travel Cost Lines (tssoc2245m000) session to update the travel lines. You can use the **Recalculate Travel Cost Lines** option in the Service Orders (tssoc2100m000)/ Service Order Activities (tssoc2110m000) session. All the existing travel cost lines are removed and new lines are created based on the setup data and service order/activity line data.

Recalculation is applicable only if all the existing travel cost lines can be deleted and new travel lines can be created. You can also use the **Recalculate Travel Cost Lines** check box in the Release Plan (tsspc3240m000) session to update the travel lines after the activity **Travel Distance** and **Travel Duration** is updated in the Service Orders (tssoc2100m000) session.

Note

The **Recalculate Travel Cost Lines** option is not available if the **Generate Travel Lines for Service Orders** check box is not selected in the Service Order Parameters (tssoc0100m000) session.

Moving of Travel Total Lines to other Activity Lines

You can move the travel cost lines from one activity line to another.

If the **Travel Planning Method** is set to **Activity Based** in the Service Orders (tssoc2100m000) session, the travel lines are automatically generated per location address to the first activity. The activity line number of a **Travel Total** Line and on the related **Travel Distance** and **Travel Time** lines is disabled.

If the **Travel Planning Method** is set to **Order Based**, the travel lines are linked to the Service Orders (tssoc2100m000) header, activity line number of the travel cost line is zero.

Service Scheduler Workbench

The Infor LN Service Scheduler Workbench is used for planning and scheduling of Service Order and Work Order activities. You can use the workbench to improve efficiency and provide high visibility of the Field Service and Work Order activities.

The activities can be scheduled and released based on the conditions such as skills, availability, and locations.

The Service Scheduler workbench is positioned with Service Planning. The Service Planning functionality includes:

- Territory Planning
- Preventive Maintenance Planning
- Group Planning

The Service Scheduler Workbench is used to link the plans generated by the Group Planning functionality.

You can generate a pre-plan using the Group Planning functionality. After the group plan is transferred for execution, the details and exceptions are planned and scheduled using the Service Scheduler Workbench.

Service Scheduler Workbench

You can use the Service Scheduler Workbench to plan and schedule the service orders/activities. Service orders and activities can be scheduled and released, based on the various attribute such as skills, availability, and locations. You can use this Workbench to plan the activities of the field service engineer efficiently, as well as provide enhanced visibility of the activities.

Note

When the user accesses this session, the data is populated based on the **Service Office** linked to the user in the Service Offices by User Profile (tsmdm1155m000) session.

Planning the activities for the service engineers

- Based on the availability of the engineer, you must drop the activity on the Gantt chart. The Workbench calculates the new planned start and planned finish time. The calculated time may differ from the requested times of the activity.

Note

When the planner drops an activity near an existing activity, and if the time gap between the activities' Assignment Finish time is less than or equal to five minutes, the activities are organised sequentially.

- Based on the requested time of the activity, you must first select the unassigned activity. The Workbench displays the list of skilled engineers available for the activity. The planner must drop the available engineer on the activity.

Note

To assign an activity to multiple engineers, the planner can drop all the selected engineers on the activity.

- Based on a geographical selection, you must select the activities in the region. In the grid, you must select the unassigned activities of that region, and drop the available engineers on the Gantt.

Multi activity planning

Multi activity planning enables a user to perform time-based and route-based planning.

- **Time-based**
  This enables the planner to plan multiple activities sequentially. The planner can either select Forward Planning or Backward Planning.
  - Forward Planning: Select the required multiple activities on GANTT. Move the first activity (with the pointer placed on the left side) to the required time, to plan the activities sequentially, starting from the first activity's planned start time. Planner can also change the planned start time of the first activity using the drag and drop option. The Planned Start Time of the sequential activities is modified. Only the first activity can be moved.
  - Backward Planning : Select the required multiple activities on GANTT. Move the first activity (with the pointer placed on the left side) to the required time, to plan the activities sequentially, starting from the last activity's planned start time. Planner can also change the planned start time of the last activity using the drag and drop option. The Planned Start Time of the sequential activities is modified. Only the last activity can be moved.
- **Route-based**
  Route-based planning helps the user to plan the group of activities based on the route which is determined based on the location of the activities of the group. Travel distances and travel times are calculated for activities. Distances are calculated based on the GPS coordinates populated for the address. The travel time is combined with the duration of various activities that have to be executed on location. For more information refer to the *route-based planning process (p. 166)*.

Note

A planner can maintain the default information required for multi activity planning, using the fields defined in the Multi Activity Planning tab, in the User Setting tab.

Planning Modes

Primarily, there are two planning modes in the Service Scheduler Workbench.

Employee Based Planning

This type of planning is used to assign the service order activities, work order activities, and planned activities to engineers. The activities can be assigned/unassigned/reassigned to engineers based on these planning methods:

Plan based on the availability of the engineer

This planning method depends on the availability of the engineer to visit the customer. You must select an activity and using the drag-and-drop feature, to add the activity to the Gantt chart. The workbench calculates the new planned start and finish time. However, the time may deviate from the requested time of the activity.

Plan based on the requested time of the activity

This plan is based on the availability of the engineer to perform the activity, based on the requested planned start and finish time. When you select an unassigned activity, a list of skilled engineers available to perform the activity, is displayed. Using the drag-and-drop feature link the activity to the required engineer. This process is executed to ensure that the planned start and finish time is not modified.

Plan based on a geographical selection

This plan is used to group the activities in a specific region, to reduce the travel time. Using the map, you must select the activities for a required region. In the grid, you must select the unassigned activities for the region, and using the drag-and-drop option, add the activities to the Gantt chart. Optionally, the activities can be sequentially planned simultaneously.

Installation Group Based Planning

Using this planning method, you can plan the service order activities and planned activities, based on the Installation group or serialized items. In this view, you can effectively perform preventive maintenance by the Installation group or serial and accordingly plan the service activities for the group.

Assigned Activities Section - GANTT

This Assigned Activities section displays a graphical view of the service activities based on the planned start and finish time of the assignment. The user can view all the engineers in the left panel and the order activities assigned to the engineers in the right panel. The employee’s availability and

non-availability, based on the calendar data, is also displayed. The first and second row of the Gantt chart display the activity constraints of a selected activity, including the planned Start/Finish Time, Earliest Start/Latest Finish Time, the calendar assigned to the Installation Group, and so on.

Assigned Activities Section: Other Features

These are the additional features supported by the Service Scheduler.

Engineer Section

A list of engineers for each selected department is displayed on the Gantt chart. The Engineer widget displays this information:

Selection: If this checkbox selected, the employee's location is highlighted on the map.

Picture: Displays the photograph of the employee. This is an optional feature and can be set using the Show Picture option in the Gantt tab in the User Settings section.

See Appendix: Adding Employee Picture.

Refresh Location: Retrieves the latest location of the engineer from the application and refreshes the location data on the map.

Activity Constraints

You can use this feature to check if the earliest start time, latest finish time, the calendar assigned to the Installation Group, planned start time, planned finish time, and ATP are synchronized or if there is a deviation. This is depicted in the first two rows titled, Planned Timeline and Earlier Start-Latest Finish Timeline, in the Gantt chart.

Use the Show Activity Constraints option in the User Settings section to enable or disable this option.

When an activity is selected, the first two rows in the Gantt chart display an activity bar for each row. The activity bar in the Planned Timeline represents the planned start time and planned finish time of the activity. The activity bar in the Earlier Start-Latest Finish Timeline represents the earliest start time and latest finish time of the activity. An indicator is also displayed for the ATP date. The Installation Group Calendar information is highlighted in the second row. If there is conflict for the activity, an indicator is displayed on the activity bar. To view the reason for the conflict hover over the indicator.

You can select the colors for the activity bars on the Planned Timeline and Earlier Start-Latest Finish Timeline, using the ATP indicator option in the User settings section, on the Colors tab.

Zoom in and Zoom out

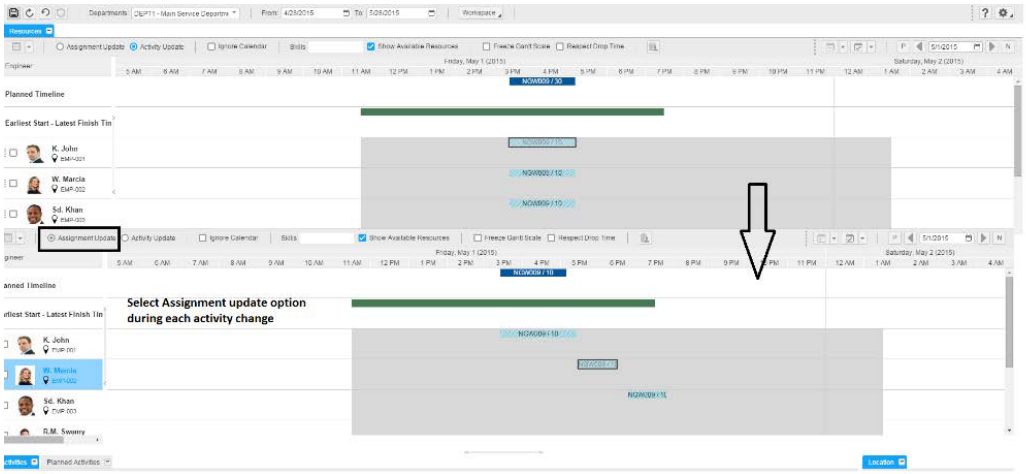
You can use the Zoom option (CTRL + Scroll Wheel) for a Gantt Time scale.

Double-click the time interval to zoom in on the chart.

If a particular activity must always be displayed in the visible region, point on that activity and select CTRL + Scroll Wheel.

Assignment Update

Use this option to plan for each assignment individually. For example, there are 3 assignment lines for an activity. You can schedule these 3 assignments with the durations 2 hours, 2 hours, and 1 hour respectively.When the plan is saved, the planned start and planned finish times of all the three assignments are updated in Infor LN. However, the activity duration, activity planned start, and activity planned finish times are not modified.



Activity Update

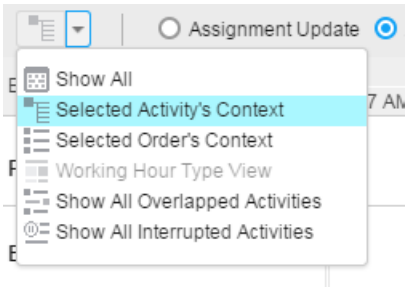
Use this option to plan for all assignments for an activity at a given time. For example, the activity's duration is of 5 hours and the activity has 3 assignment lines. You can schedule the 3 assignments with the duration of 7 hours. When the plan is saved, the planned start and planned finish times of all the three assignments are updated to the application. Also the new vales are applied to the activity duration, activity planned start, and activity planned finish times in the application.

After an activity update is completed and the user changes to an assignment update or vice versa, all the changes are saved, even if the Auto Save check box is not selected in the User Settings section.

Various views in a Gantt chart

You can select various options to display the data using these filters:

- Selected Activity's Context: All engineers assigned to the selected activity are displayed in the left panel of the Gantt chart. Only the selected activity and the related assignments are displayed in the right panel. Features such as Unassign, Cut, and Copy are disabled in this view.



- Selected Order's Context: All engineers assigned to all activities for the selected order are displayed in the left panel of the Gantt chart. Only the selected order and the related activities and assignments are displayed in the panel section. Features such as Unassign, Cut, and Copy are disabled in this view.
- Show All Overlapped Activities: All the overlapped activities in the selected time frame (for a day, week, or month) are displayed on the Gantt chart. To exit from this view, select the Show All option.
- Show All: By default, this view is displayed. In this view, all the service engineers are displayed.When the data is updated (refresh) or an unassigned activity from the grid is selected, the view changes to the default view.
- WHT (Working Hour Type) View: When you select the display color for the Working Hour types in the User settings, the Working Hour Type View icon is enabled. Click the Working hour icon. All the engineers available for the configured working hour types are filtered and displayed. This option helps in planning the weekend duties, new product duties and so on.

Activity bar context menu options

Right-click the activity bar, on the Gantt chart, to open a context menu with these options:

- **UnAssign**
  Use this option to unassign an assigned activity. You can also unassign multiple activities. After the assignment(s) for an activity are unassigned, the assignment(s) are either removed or converted to unassigned activities, only if the activity belongs to the selected department.
- **Cut, Copy, and Paste**
  When you add an activity to the Gantt chart using the Cut and Paste option, the activity's planned start time is considered as the scheduled start time. If the Cut and Paste (Respect drop time) option is selected, the time defined for the activity is used. The same is applicable for the activity's planned start time for the assignment.

  See Multi Activity Planning for Assigned Activities section.
- **Drill back options**
  These are the available options:
  - Service Order: Drill to Service Order, Drill to Service order lines, Drill to Service order activity lines, and Drill to Service order activity details.

- Work Order: Drill to Work Order, Drill to Work order lines, Drill to Work order activity lines, and Drill to Work order activity details.

  Drill to Service engineers, and Drill to Appointment options are also available. All these options enable you to access the Infor LN sessions. For the drill back sessions such as order details, order lines, Activity details, and Activity lines, if the data in Infor LN is modified the changes are updated to the workbench.

- **Foreman Assignment**
  A foreman is a service employee, to whom several service employees report. If you select an unassigned activity, using the drag-and-drop feature, and assign the same to a foreman, the Foreman Assignment option is enabled. -If this option is selected, additional assignments for each of the service employees assigned to the foreman are created.

  After the Assign action is complete, the view mode changes to the Selected Activity's Context and the newly created assignments are displayed on the Gantt chart in a single screen The Foreman Assignment option can also be enabled using the Copy/Paste option.

- **Show Route**
  When you select multiple activities of the same engineer, the Show Route option is enabled. This option draws a route on the map starting with the first activity in the sequence till the last activity. The GPS co-ordinates of the activity's location address are considered for drawing the route. The route is based on the Assignment Plan Start Time.

- **Release**
  A Free or Planned activity can be set to status 'released' using the Release option.

Gantt Context Menu options

Right-click a blank area on the Gantt chart, the context menu with these options is displayed:

- **Create or Change Working Hour**
  Use this option to change the status of the working hours of an engineer to Available or Unavailable.

- **Create Service Order**
  You can generate a service order from the workbench using the Create Service Order option. An Infor LN session is started from the workbench; wherein the planned date is transferred from the workbench. You must create a new activity. By default, the current engineer is assigned to an activity. To view the new order on the Gantt chart click Save and Exit (Ctrl + L) in the Infor LN session.

- **Create Work Order**
  You can insert a work order from the workbench using the Create Work Order option. An Infor LN session is started from the workbench; wherein the planned date is transferred from the workbench. You must create a new activity. By default, the current engineer is assigned to an activity. To view the new order on the Gantt chart, click Save and Exit (Ctrl + L) in the Infor LN session.

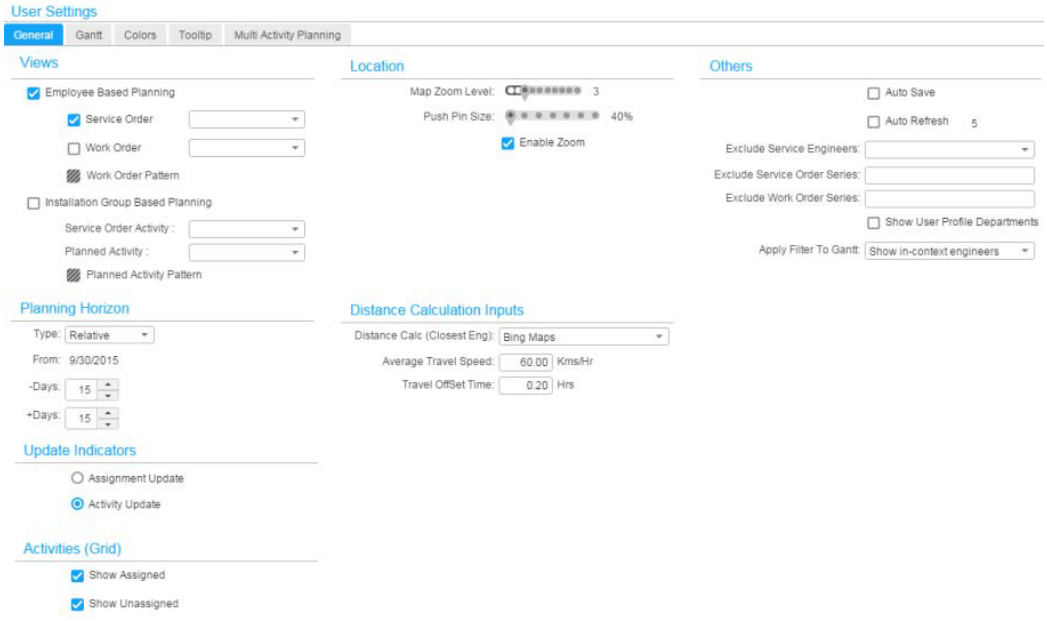
- **Drill back sessions**
  Drill back sessions such as Drill to Employee details, Drill to Skills by Employee, Drill to Hours accounting, Drill to General hours accounting, and Drill are used to access the Infor LN calendar and enable you to access the Infor LN sessions from the Workbench.

User Settings Section

The Service Scheduler Workbench supports the Persistent Docking layout. You can use this feature to define the grid column width, grid column sequence, docking panes position, in the workbench using the Save Defaults option on the Workbench tool bar.

General Settings

The settings available on the General tab:



Views

The Views section allows you to select the views that must be displayed in the workbench and also select the items (service orders or work orders) with the Status (Free or Planned, etc) to be displayed.

To differentiate between different objects on the Gantt chart, the pattern can also be specified.

Planning Horizon

- The Type field can be set to Fixed or Relative.
- Fixed type retrieves the data from the date as specified in the From field.
- Relative type retrieves the data based on the current date.
- The Days field can be set to the number of days for which data must be fetched from the Infor LN.

Update Indicators

You can specify the type of update that must be performed at the Activity level or the Assignment level.

Location

Map Zoom Level: You can select the default map zoom level for the Service Scheduler Workbench.

Activities (Grid)

Using this option, you can choose to display the assigned, or unassigned, or both types of activities in the Activities section.

Location

Map Zoom Level: You can specify the default zoom level of the map for the Workbench.

Pushpin Size: You can specify the default pushpin size to be displayed on the map.

Enable Zoom: Select this option to enable the zoom in and zoom out on the map.

Distance Calculation Inputs

- **Distance calculation for the closet engineer**
  This method is used to calculate the distance between two locations.

  As The Crow Flies: Distance is calculated using a simple formula

  Bing Maps: Uses a dedicated web service. An internet connection is required wherein Infor LN requests the Bing maps web service to calculate the distance.
- **Average Travel Speed**
  Average travel speed to be used for the calculation of the travel time when planning a route.
- **Travel Offset Time**
  Travel offset time to be used for the calculation of the travel time when planning a route.

Others

- **Auto Save**
  When the Auto Save Option is set to ON, all the actions executed are immediately saved on the Infor LN backend server. You cannot revert this action.
- **Auto Refresh**
  When the Auto Refresh check box is selected, the changes in the application are updated in the workbench periodically, based on the specified time interval.

  Note: The auto refresh feature is enabled only when Auto Save is set to On. This feature is not available for planned activities.
- **Exclude Service Engineers**
  The selected Service engineers are excluded from the workbench.

- **Exclude Service Order Series**
  The service orders with the specified order series are excluded from the workbench.
- **Exclude Work Order Series**
  The work orders with the specified order series are excluded from the workbench.
- **Show User Profile Departments**
  When this option is checked, the Departments menu in the toolbar only displays the service departments that are linked to the user profile.
- **Apply Filter to Gantt**
  Based on this parameter, the filter from the Activity grid is applied to the Gantt chart section.
  - Show in-context engineers: All the activities belonging to the engineers in the grid are displayed on the Gantt chart.
  - Show grid content only: All the activities that are currently visible in the grid, are displayed on the Gantt chart.

Gantt

The Gantt tab enables you to define the display options for the Gantt chart.

View Options

You can define the Gantt time scale displayed in the Workbench.

These are the options:

- Today: The Gantt time scale is set to Today. You can also select the Visible units and the Starting Hour.
- Current Week: The Gantt time scale is set to Week. You can also select the Visible units and the Starting Day for Week options. The Starting Day for Week setting is considered only when the Current Week is the selected View, the first time the application is launched.
- Current Month: The Gantt time scale is set to Month. If the Current Month is the selected view option, the time scale is 31 days from the current date.
- Current Quarter: The Gantt time scale is set to Current Quarter.

Indicator Symbols

You can define the symbols for the various order flags in this order of priority:

- Blocked
- Emergency
- Appointment
- Appointment + Emergency

Legends

This option is used to configure the Legends that must be displayed on the Gantt tab.

Others

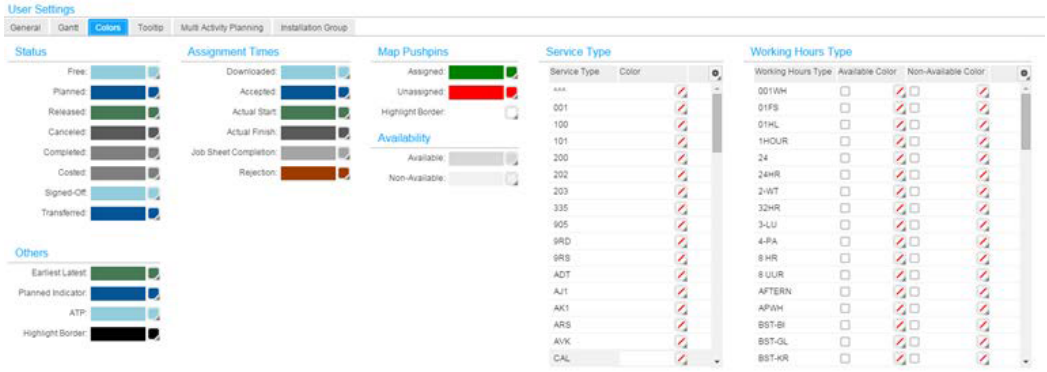
- **Activity Block Description**
  The selected option is displayed on the activity bar.
- **Color Procedure**
  You can define the colors for the activity bar based on the Color Procedure. For example, if the Status is selected, the colors defined for the activity status such as Free, Released, and Planned are displayed.
- **Show Available Resources**
  Select this check box, to enable the Show Available Resources option.
- **Freeze Gantt Scale**
  Select this check box, to enable the Freeze Gantt Scale option.
- **Respect Drop Time**
  Select this check box, to enable the Respect Drop Time option.
- **Round Drop Time to**
  Use this setting to define the granularity of related drop in time by either 15 minutes, 30 minutes, or 1 Hour.
- **Show Activity Constraints**
  Use this option to view the first two rows of the Gantt chart. This helps you to determine, if the earliest start time, latest finish time, Installation Group calendar, planned start time, planned finish time, and ATP are in sync or if there is a deviation.
- **Show Engineers with Effective Skills**
  Effective date of the skill is considered when filtering the engineers based on skills.
- **Show Picture**
  Use this option to display the picture of the engineer on the Gantt tab.
- **Show Conflict Indicator on Activity Bar**
  The conflict indicator is displayed on the Planned Timeline. When this option is selected, the conflict icon is also displayed on the Activity bar.

Employee Sequence

You can group employees or define the sequence such that the selected employees are displayed at the top of the Gantt chart. Select a row to enable the Up or Down arrows. Use the arrows, to shift the position of an employee. When you set the sequence, the same is displayed on the Gantt when the Gantt engineers data is updated due to an action such as the selection of Unassigned activity, changing of the filter views, or filtering the data based on skills.

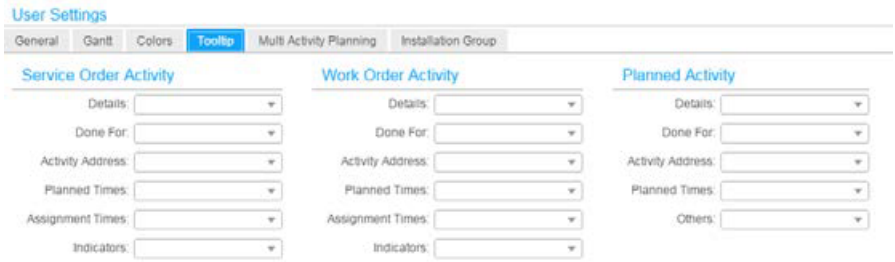
Colors

Use the Colors tab to define the colors for these options:



Tooltip

The Tooltip option is configurable. You can use this option to choose the fields that must be displayed with in the tooltips that are displayed on Map and Gantt.

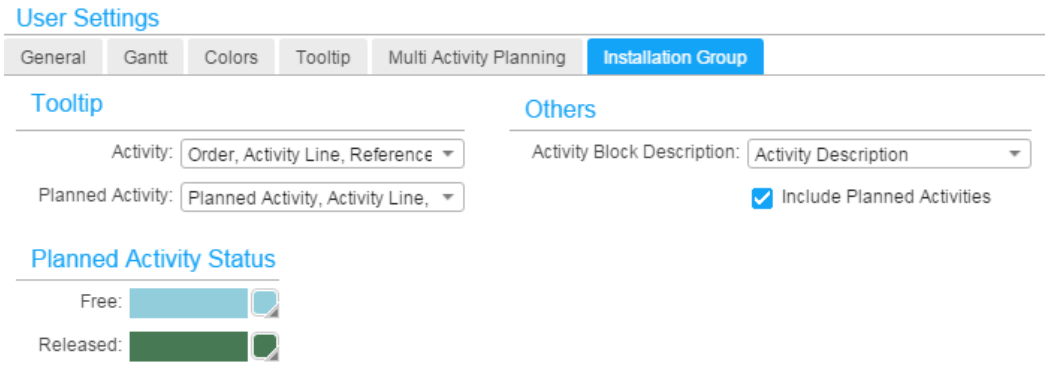


Multi-activity Planning

Multi-activity planning enables you to implement the Time based and Route based planning methods.

Installation Group

Settings related to installation group and serials view are listed on this tab. This tab is displayed only if the Installation Group based planning is enabled in the General tab.



Tooltip

You can configure the details to be displayed on the tooltips in the installation or serial view.

Include Planned Activities

If this option is selected, then the planned activities are also brought along with service activities when the installation group views are loaded.

Activity Block Description

The selected option is displayed on the activity bar.

Activities Section

The unassigned and assigned activities are displayed in the grid view. The user can view the service activities with the status Free, Planned, and Released.

Planned activities are displayed on the Planned Activities tab.

You can assign planned or unassigned activities to the required employee using the Gantt chart and the drag-and-drop option.

Activities Section

The Activities grid displays the assigned, unassigned activities for the given time horizon as supplied by you on the toolbar. Use the filters available for each column, to filter the data and view a limited set of selection.

Planned Activities

Planned activities are used to list the activities planned for a serialized item or Installation Group and improves the long term preventive maintenance process.

When a planned activity is selected, the required skills are populated in the Skill combo section and the engineers with matching skills are displayed on the Gantt chart.

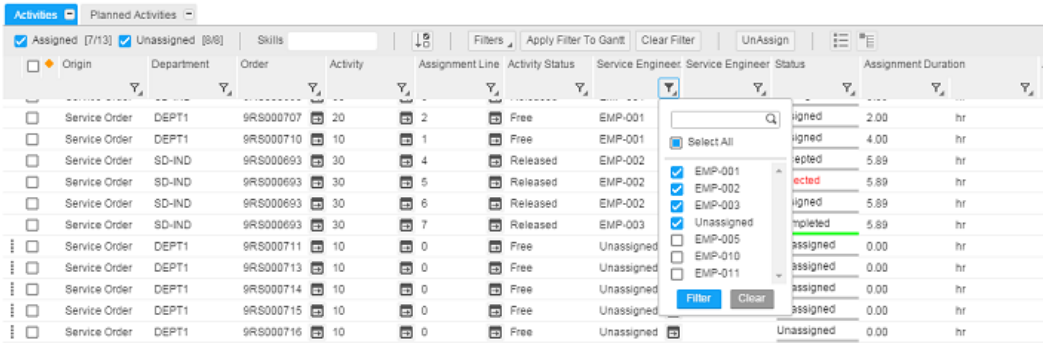
To transfer a planned activity to a service order, drag the selected planned activity to the Gantt area of a corresponding engineer and for the required time.

Other Features

The other features available are:

Grid Filter

This option is provided for each column in the grid. Using these filters you can filter the data by selecting and clearing the data available in the columns.



Saving Filters

The planner can add a combination of column filters and save the same to the User Settings. For example, if a planner regularly filters data based on the Service Type, ‘001’ and the Activity status ‘Free’ and ‘Released’, these steps are required:

1. Apply the required column filters on the grid.
2. In the ‘Filters’ list on the grid toolbar, select Add.
3. A dialog box is displayed with a list of selected filter columns and the respective values. Specify a filter name and select Add. Saved filters are displayed as menus in the Filters list.

To apply the filter, click the required filter name and the filter is applied to the respective columns of the grid. The selected filter can also be saved to user settings along with the ‘Save Settings’ option. This ensures that the next time the workbench is started, the last selected filter is applied to the grid.

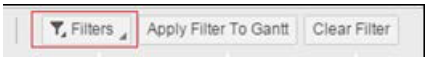
The options for managing filters:

- Add: A new filter with the specified name is added.

- Update: The current filter is updated with the latest changes.
- Remove: The current filter is deleted.

This functionality is available in the grids for Employee Based Planning and also for Installation group, Serial based planning or both.

When the filters are applied on the grid, a filter icon appears on the ‘Filters’ dropdown on the grid toolbar, indicating that the grid is displaying a filtered set.



Special Filter for Service Engineer and Assignment line Column

When using the filter for the Service Engineer or Assignment Line column, by default, unassigned records are filtered in.

Apply Filter To Gantt

Use the Apply Filter To Gantt option to apply the data from the grid to the Map and Gantt section of the workbench, and enable you to improve the planning with the limited or filtered data.

Clear Filter

Use this option to clear all the filters applied on the grid. In case, the filter is also applied to the Gantt and map, then this option reset data in all the views to its default state.

Sort by Selected Activities

Use this option to group selected activities.

Skills

Use the Skills option to list the required skills for the selected activity in the grid. Mandatory skills are displayed with a Red asterisk (*).

Select Order Activities

Use this option to select all the activities that belong to the selected order.

Select Activity Assignments

Use this option to select all the assignments that belong to the selected order-activity.

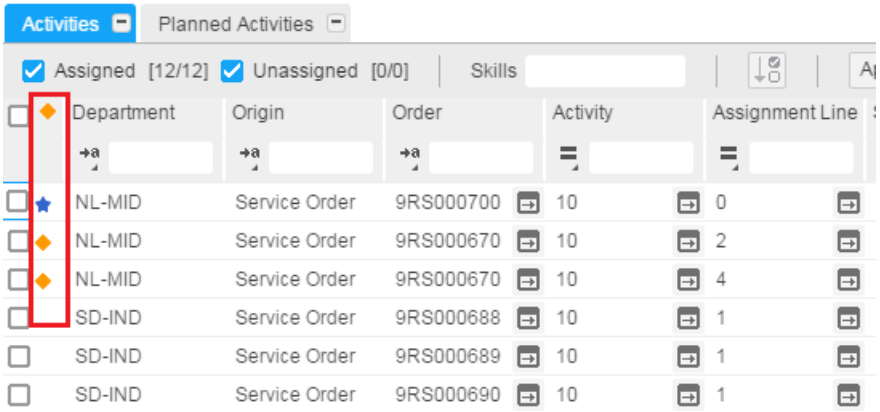
State Indicators

State Indicators help to easily identify the edit state of activities in the grid, based on different criteria:

1. An activity is modified, indicated by an orange diamond icon.

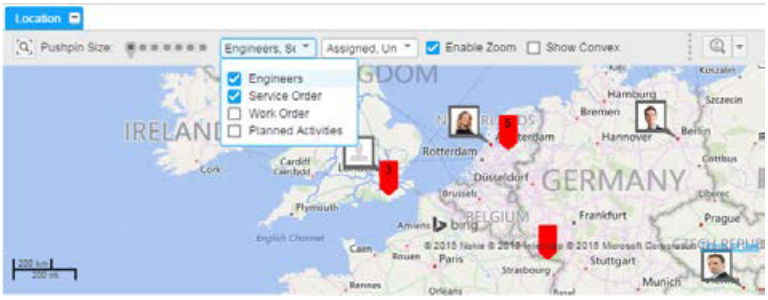
2. A new assignment line is added using the Copy/Paste or Drag-and-drop option from the unassigned list to the Gantt chart. Indicated by a blue star icon.

The activities are displayed with indicators:



Location Section

This section provides a map view of the engineers and activities (assigned/unassigned/planned), which helps in easily identifying the location of the engineer and the activity.



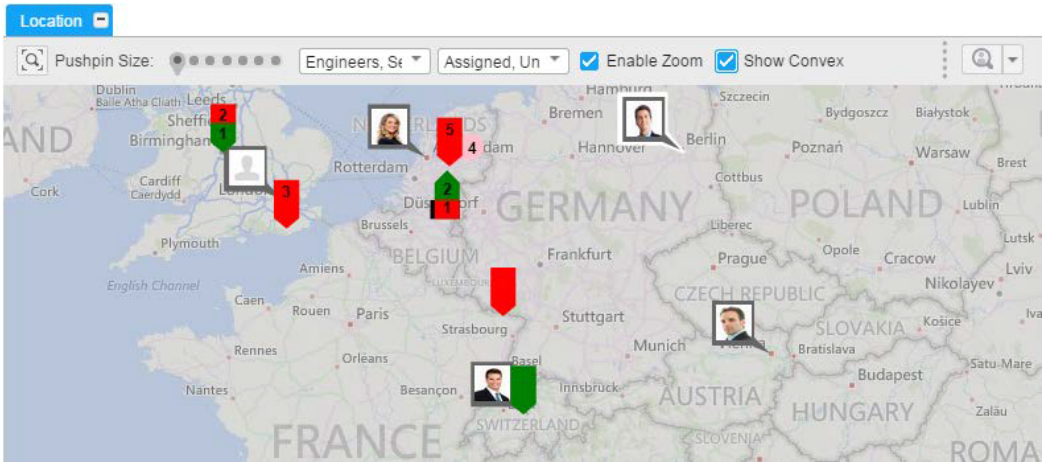
You can filter the data to be displayed using the Items To Show list option. The image displays the filter applied on the engineer and the service order. Similarly, you can filter the assigned activities, unassigned activities, and the engineer's locations that must be displayed on the map.

Icons

Icon	Description
	Activity pushpin: Represents the assigned and unassigned service activities. User can hover over the pushpin to view the tooltip.
	Work Order Pushpin: Represents the assigned and unassigned work order activities. User can hover over the pushpin to view the tooltip.
	Engineer Pushpin: Represents the location of the engineer.
	Planned Activity Pushpin: Represents the planned activities. User can hover over the pushpin to view the tooltip.

Location Section – Other Features

The Map/Location section displays the pushpins to represent the engineer, assigned service activity/work order, unassigned service activity/work order, and planned activity.



Pushpin Selections and Zoom

- To remove all selections, click on a blank area of the map.
- Press Shift + Click to select multiple activities.

- When you zoom to a particular location, only the activities available for the location are displayed.
- To select a region or group of activities, you can also press CTRL and drag the pointer to create a box over the required region or activity.
- To zoom to a particular region or activity's location, press SHIFT and drag the pointer to create a box over the required area.
- Activities are displayed as pushpins on the map. You can define the size of the pushpins.
- For a group of activities with the same location address or the same area or when you zoom out of an area or a location, a single pushpin represents the region. The pushpin displays the number of activities. For example, for Germany, a group of 7 unassigned and 9 assigned activities are displayed. The first part of the pushpin displays the unassigned activities and the second part displays the assigned activities. You can define the colors for the pushpin in the User Settings > Map Pushpin section on the Colors tab.
- Use the Enable Zoom option to zoom in on the activity address.When this option is cleared, the map remains at the level already selected by you and you cannot zoom in further.
- Use the Zoom to Fit option to zoom in and view all the selected activities and engineers.
- Use the Show Convex Hull option to indicate the current work area of the engineer.

Find Closest Engineer

Use this option to locate the engineer closest to the selected activities. This option is used to calculate the distance and time that the engineer takes to travel to the location address of the activity.

To enable the Closest Engineer option:

- Multiple engineers and a single activity must be selected. Use the SHIFT + Click option or press CTRL and drag to create a box over the activities and engineers, and view the required details.
- The estimated time and distance is populated and an Assign option is displayed. To assign the engineer, select the Assign option. The activity is displayed on the Gantt chart. The route to each of the selected activities is displayed in Blue.

  Note: Work order selection is not supported by the Find the closest engineer functionality

Show Convex Hull

Using this functionality, you can view the activities of the engineer, spread across a geographical area.

To view the Convex Hull:

1. Select the Engineer(s) (in the Gantt section or on the Map).
2. On the map tool bar, select the Convex Hull check box. The highlighted geographical area displays the location of the activities for the selected engineer(s) in the Gantt's time range.
3. When you move the Gantt scale, the convex hull realigns the current activities on the Gantt (for each of the current scale) chart.

Assigning an activity to an Engineer

Single Unassigned Activity

When a single unassigned activity is selected, these actions are executed:

- The Gantt chart displays the planned times for the selected activity. Select the ON Freeze Gantt Scale option to disable this action.
- The first and second rows display the activity constraints for the selected activity. The first row displays the activity planned start/finish time for the task. The second row displays the earliest start and latest finish time for the task. The calendar assigned to the Installation Group is also displayed in the background.
- The Skills list is populated with the mandatory and optional skills required to execute the selected activity. Mandatory skills are displayed marked with Red asterisk (*).
- The list of engineers with the skills required for the activity, is populated in the Gantt chart.
- The Show Available Resources option enable you to see the list of engineers available to execute the activity during the planned time.

The workbench planning is based on the calendar information. However, in some cases, planning can be done without the calendar. Use the Ignore Calendar option to ignore the calendar and assign the task during the engineer's non-availability time.

Assigning an activity to an engineer:

1. Plan based on the availability of the engineer: Check when the engineer can visit the customer. Drag the selected unassigned activity from the grid to the Gantt chart and assign the activity to the required engineer. The activity's planned start and finish time are modified.
2. Plan based on the requested time for the activity: Check if an engineer is available for the requested date/time. Select the engineer(s) from the Gantt and link to the selected activity's order number or activity number of the activity, using the drag-and-drop option. The order number and the related unassigned activities for the order are assigned to the engineer. **Note**: You can also select multiple engineers, if the activity must be shared.

Smart Planning using the drag option

When you select (drag-and-drop option) an activity wherein the finish time of the existing activity is almost reached, the time difference between the existing activity's assignment finish time and the selected time is less than or equal to five minutes, the activity is automatically sequenced. This feature helps you plan activities without any delay.

Multiple Unassigned Activities

A plan based on the requested time for the activity. You must check if an engineer is available for the requested date/time.

- You can select multiple unassigned activities from the Activities section and link the activities, using the drag option, to the required engineer on Gantt.

- You can select multiple unassigned activities from the Activities section and link the activities, using the drag option, to the required engineer based on the Activity number or the Order number.

Multiple Unassigned Activities

A plan based on the requested time for the activity. You must check if an engineer is available for the requested date/time.

- You can select multiple unassigned activities from the Activities section and link the activities, using the drag-and-drop option, to the required engineer on the Gantt chart.
- You can select multiple unassigned activities from the Activities section. Then select the required engineer(s) on the Gantt. Now, drag-and-drop the engineers on the activity number or the order number in the Activities grid.

Multi-activity Planning

Multi-activity Planning enables you to define Time based and Route based planning methods.

Time Based Sequential

This plan enables you to schedule multiple activities sequentially. You can choose either the Forward Planning or the Backward Planning option.

- **Forward Planning:**
  On the Gantt chart, select the required multiple activities and using the drag-and-drop option, link the first activity to the required time. Based on the first activity's planned start time, all the other activities are planned sequentially. You can also modify the planned start time of the first activity, which ensures that all other activities are planned sequentially.

  Note: An activity, other than the first activity cannot be selected.
- **Backward Planning**
  On the Gantt chart, select the required multiple activities and using the drag-and-drop option, link the first activity to the required time. Based on the last activity's planned finish time, all the other activities are planned sequentially. You can also change the planned finish time of the last activity using the drag-and-drop option. There by ensuring that, from the last activity, all other activities are also planned sequentially. An activity, other than the first activity cannot be selected.

Route Based

The Route based method helps you to schedule a group of activities based on the route. The route is created based on the locations of the activities for the group. Travel distance and time are calculated

for the activities. Distances are calculated based on the GPS co-ordinates specified for the address. The travel time is combined with the duration of the various activities to be executed at the location.

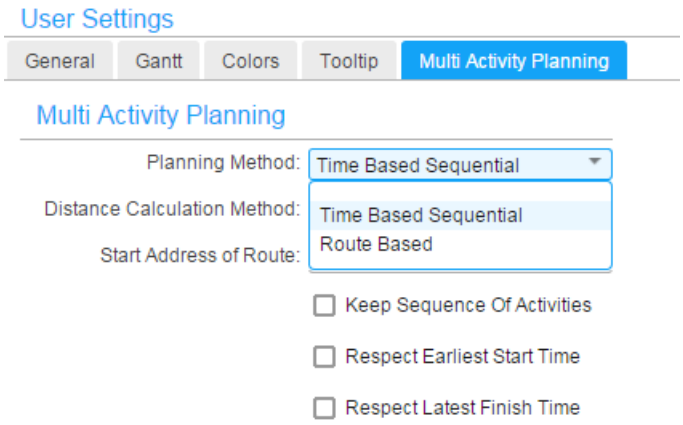
Note

You can also select a work order activity with the service order activity, when performing multi planning.

You can maintain the default information required for the multi-activity planning in the Multi Activity Planning section, on the User Setting tab. You can also define the Planning Method, Distance Calculation Method, Route Start Address, Average Travel Speed, Travel Offset Time, and so on.

Note

Route Based Planning Method is applicable from Infor LN FP8 onwards.



The planning process is executed based on the value of the Planning Method specified in the User Settings.

The Route Based method fields:

- **Distance Calculation Method**
  This method is used to calculate the distance between two locations.
  - As The Crow Flies: Distance is calculated using a simple formula.
  - Bing Maps: Uses a dedicated web service. An internet connection is required wherein Infor LN requests the Bing maps web service to calculate the distance.
- **Route Start Address**
  - First Activity: Start the route at the first activity. This is the default value.
  - Company: Start the route at the company address.
  - Service Department: Start the route at the service department address.
  - Service Engineer: Start the route at the service engineer address.
- **Keep Sequence Of Activity Set**
  If you select this check box, the application does not change the sequence of the activities when planning for the specified group. A route is defined from the first activity, to the last

activity. The order of the activities is not changed. Only the distance and the travel time between the locations of the service orders, are calculated.

When you select this check box and select the Multi-activity Planning option, the Activity Sequence grid with the list of activities, selected by the user, is enabled. Use the Up and Down arrows to change the sequence of activities. After the sequence is set, click Generate Group Plan.

When this check box is cleared, the shortest route between the locations is calculated and the order of the activities is updated.

- **Respect Earliest Start Time**
  Select this check box to indicate if the earliest start time of a service order activity must be considered.
  - Yes: The service order activity is planned with Planned Start Time set to the Earliest Start Time.
  - No: Planned Start Time can be planned before the Earliest Start Time.

  Note: The default value is No.
- **Respect Latest Finish Time**
  Select this check box to indicate if the latest finish time of a service order activity must be considered.
  - Yes: The Planned Finish Time cannot be scheduled after the Latest Finish Time. The service order activity is not planned and a warning message is displayed.
  - No: The Planned Finish Time can be scheduled after the Latest Finish Time.

  Note: The default value is No.

The Preview option is enabled when you select the Multi-activity Planning option. You can check the complete route plan. You can also change the Route Start Address, or Average travel speed, or check the flags (such as Respect Earliest Start Time and so on), before you click Generate Group Plan.

When you click Preview, the entire route is planned and the complete information such as the Start city of the route, planned travel start and finish times, planned start and finish times, travel duration, travel distance, and End city of the route, are displayed in the Activity Sequence grid. Information about the route start and end city are displayed in a dummy row at the start and end of the Activity Sequence grid. When the Company, or Service Department, or Service engineer for the Route start address is defined, the route begins at the respective location address and is completed only on reaching the Company, or Service department, or Service engineer location address. The travel finish time to reach the respective locations is displayed with the route end city in a dummy row at the end of the grid.

Start time is based on travel distance and time. Planning is based on the start address of the service engineer.

Indicative route on the map based on the locations and sequence.

Multi Activity Planning for Unassigned Activities

To use this functionality, you must select the Respect Drop Time option, select the multiple unassigned activities and link the activities to an Engineer on the Gantt chart, using the drag-and drop option. Activities are adjusted based on the Planning Method specified in the User Settings.

Multi-activity Planning for Assigned Activities

You can use this planning option for the same engineer or another engineer when the activity is a Reassignment.

Case 1 - Same Engineer Assignment

For the same engineer, you must select the multiple activities, using the Shift key, on the Gantt chart. Press the Ctrl key and link the first activity to the required date and time, using the drag-and drop option.

The user selects three activities and links the activities to the required time for the same engineer.

If you set the Planning Method to Time Based Sequential, the activities are arranged in a sequence (as displayed). However, even if the selected time is 8:15 AM, the calendar time is considered and the starting time is adjusted to 8:30 AM.

Note

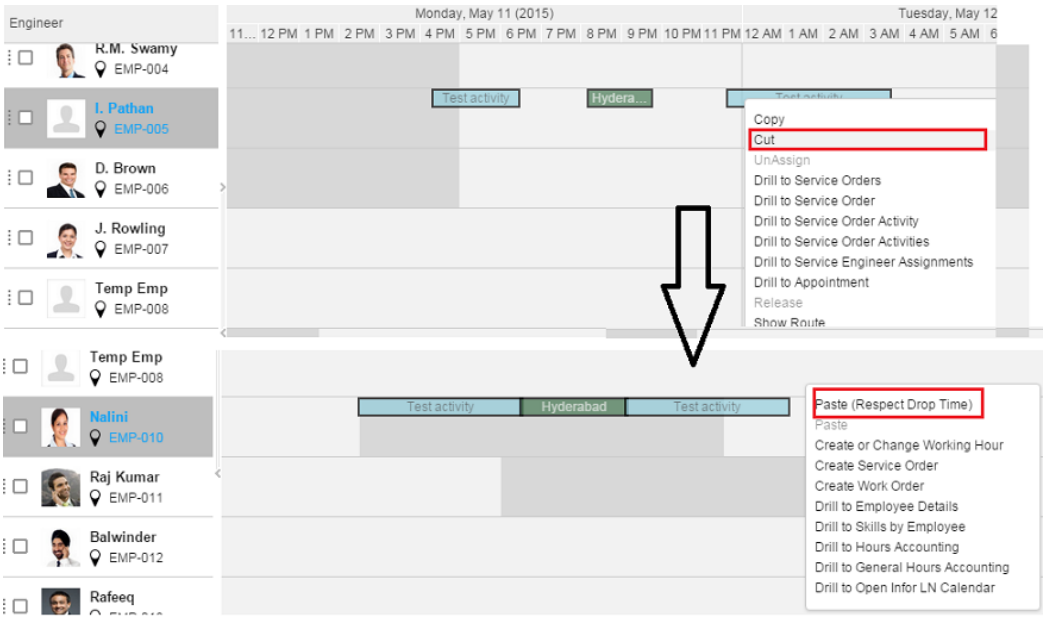
You can also link the selected activity to the required time when using the Forward Planning option (as displayed). Similarly, you can also link the last selected activity to the required time when using the Backward Planning option.

You can also right-click and select the Cut and Paste option (Respect Drop Time) to specify the required time.

Case 2 - Other Engineer Assignment:

To reassign the selected activities to another engineer and to use multi-activity planning, you must select the Respect Drop Time option and link (using the drag-and-drop option) the selected activities to another engineer for the required time. Based on the User Settings, the Multi-activity Planning functionality is used.

You can also right-click and select the Cut and Paste option (Respect Drop Time) to specify the required time.

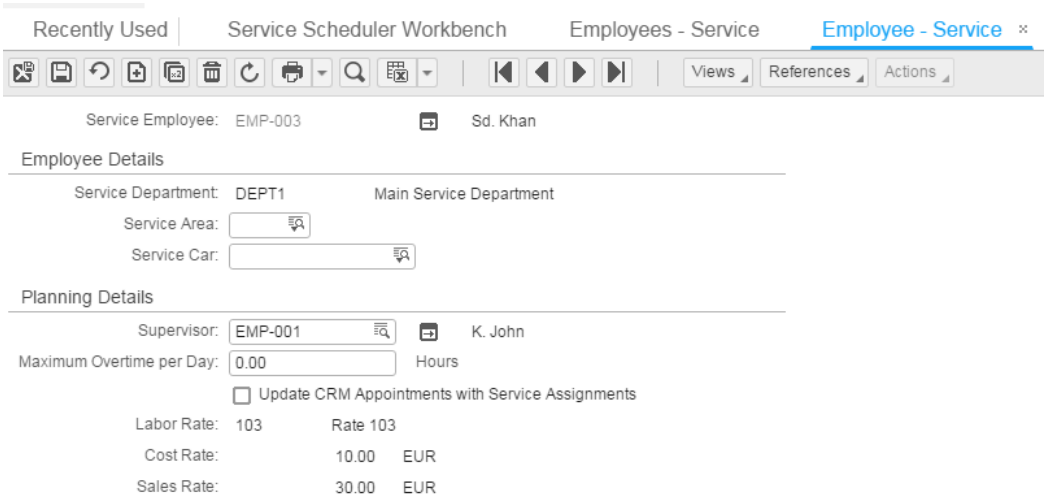


Infor LN Settings

These settings must be configured to start the Service Scheduler workbench using the Infor LN:

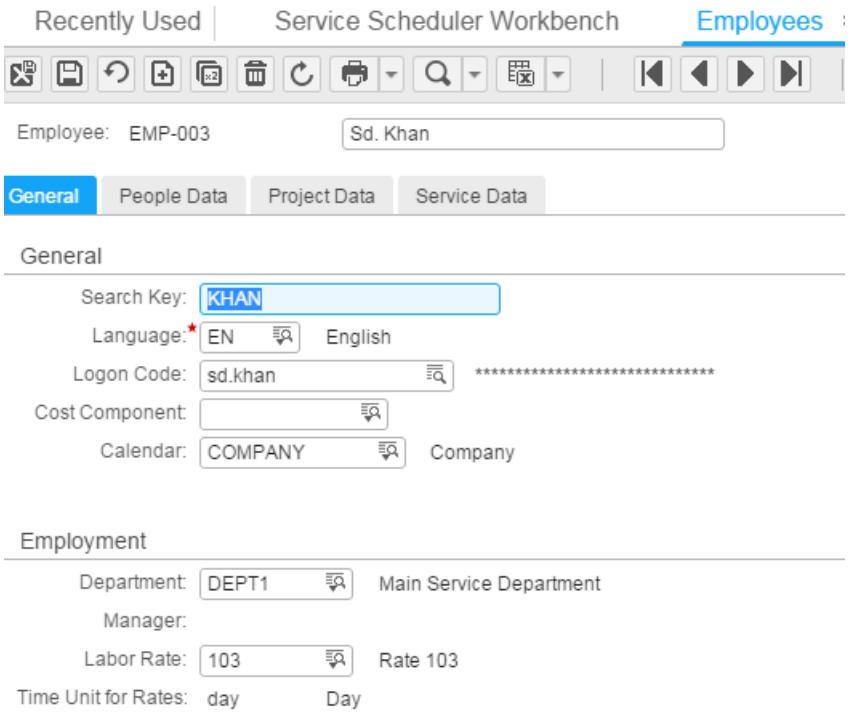
Configure Service Employee

Configure Service Employee using the Employees Service (tsmdm1140m000) or Employee – Service (tsmdm1640m000) sessions.



Link Planner login to Service Employee

Configure Service employee (planner) linked to the login code using the Employees (bpmdm0601m000) session.



Configure User Profile

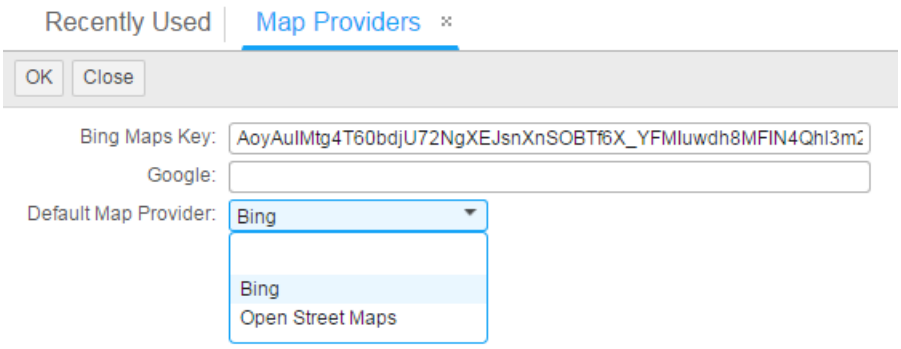
Configure the user profile using the Service User Profiles (tsmdm1150m000) session. In the service user profile, link the departments to the employee using the References menu -> Service Departments by User Profile.

Note

The system uses the department, defined for the service user data and the departments of the linked User Profile, to retrieve the service date from Infor LN to the workbench.

Map Provider Setting

You can select a map provider from the Map Providers (ttaad7132m000) session. A valid Bing map key must be provided if the selected provider is Bing. In all the other cases, by default, the Open Street Map is the default map.



Note

Scheduler workbench requires an internet connection as Maps are used.

Adding Employee Picture

From Infor LN 10.4 onwards, a picture of the employee can also be added to the Employees – General (tccom0101m000) session.

Note

The guidelines for pictures:

- The employee picture that is uploaded to the application must be have 500x500 dimension at the least.
- The picture must be of portrait orientation; landscape pictures are displayed horizontally.
- Resolution must be 300 dpi and above. Lesser Dpi can scatter the image.
- The applicable extensions are .jpg, .gif, or .png.

Bing License key for Map

You can also use the COM Parameters (tccom5000m000) session to specify the Bing License Key. The Bing license key is required to draw routes on the map. Also, the travel time durations are calculated using Bing or Google. When a key is not inserted, the Open Street Maps are displayed.

The Bing license key is required to draw routes on the map. Also, the travel time durations are calculated using Bing or Google.

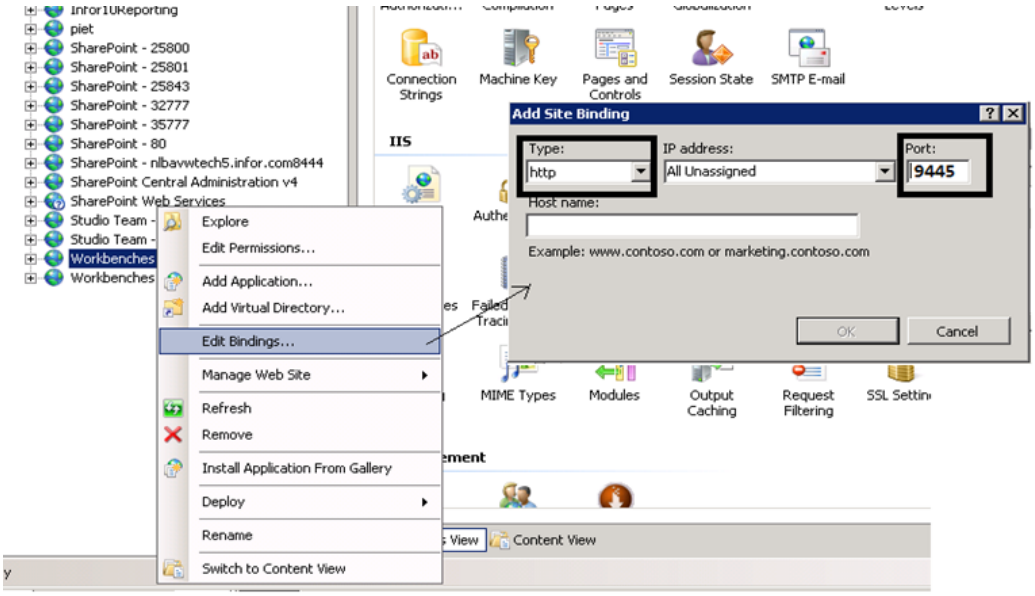
When a key is not inserted; the Open Street Maps are displayed.

http setting for Open Street Map

This is applicable only for version 10.4 and below. To configure the ‘http’ (not https) connection, when using Open Street Maps (not https):

- Open IIS Manager

- In the Connections pane, expand the Sites node, and select the workbench site for which you must add the http binding.



- In the Add Site Binding dialog box, specify the binding information (Type= http) and the new port number of your choice and click OK.
- Start the Infor LN Workbench Web Server (ttaad7530m00) session, and specify the modified Desk Web Server URL with the http as the binding and the new associated port number.

Introduction to Material Availability

Material Availability Check

Three types of checks can be performed to identify material availability during the various phases of order processing.

All three checks-are depend (partly) on the Planned Inventory Transactions (whinp1500m000) (PIT). For all different origins, expected receipts and issues are listed in this session.

- ATP check (Long term): Available to Promise (ATP) is 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 inventory. This is the inventory quantity arrived at, based on the current inventory, planned inventory transactions (actual orders with status planned) and the planned inventory movements (planned but not yet created orders).
- Planned Available inventory (Medium Term) : Current On-Hand inventory minus PIT issues plus PIT receipts.
- On Hand Inventory check (Short Term) : Current On Hand inventory minus PIT issues.

Material Availability

When planning orders (Field service or Depot Repair) in Service, the planner checks for the availability of the material for the job. All the material must be available before the order can be released and executed. The type of material availability check depends on the time available for executing the order.

The On Hand Inventory check is the most definitive of the three checks, calculating what is now available in the Warehouse minus the planned issues for the orders. The Planned Available check is a less definitive as this check also consider the planned receipts and their is no certainty that such a receipt is actually delivered. ATP check is the least definitive as this check also consider planned movements along with planned issue and planned receipt.

Usually, ATP check is performed in the planning phase (optional). An On Hand check is conventionally performed when releasing the order. For example: Orders scheduled for release in the coming two days. The Planned Inventory check is performed in this interim period. However, it is also possible to perform the Planned Available and On Hand inventory check when planning the orders.

If there is a shortage for the Material Availability:

- Set the **Scope of Inventory Check** from **Current Warehouse Only** to **All Warehouses in Planning Cluster** in the Check Material Availability (tstdm2220m000) session: You must check the warehouse assigned to you as well as all the warehouse in the same cluster. If available, generate a transfer order for the warehouse assigned to you. Else, change the warehouse specified for the order material line.
- Create extra supply: Call your supplier, generate a rush order or increase the production.
- Execute your order at a later date: Use the Update options in the Check Material Availability (tstdm2220m000) session. Delaying your order can be automated. But resetting your order to the original date must be performed manually. When setting the Update options without the Check options, Infor LN considers the available date (ATP date or Planned Available date) of the previous check to make the updates. Hence, it is possible to first perform the check on a wide range of orders, investigate the results and update only specific orders based on the investigation.

Note

Delaying an order with a big demand, can have an impact on the Material Availability of another order.

Inventory levels are constantly changing (due to demand and supply), so the material availability for service, work and maintenance sales orders can be checked at any moment, using the Check Material Availability (tstdm2220m000) session. For an individual order or a range of orders, the ATP, Planned Available and On Hand inventory can be checked, independent of each other. The result of these inventory checks can be viewed in the Service Material Availability (tstdm2520m000) session. This session also displays summary of order data and order activity data which helps identify shortage at the order or activity level.

Summarizing availability from material level to order or activity level:

- For dates (Check On Dates and Available Dates): If a material line is available, the latest date of the material lines belonging to the order or activity is considered.
- For Availability: If a material line is not available, the whole order or activity is also not available.

Material Issue Constraints

Shipping material

- **Material Issue Constraint**
  The **Material Issue Constraint** domain is added to the various parameter, order and activity sessions. Following are the possible values:
  - **None**: No shipping constraint for the warehouse order.
  - **Activity Complete**: The warehouse orders are generated with **Ship Set Complete** check box selected in the WMS Interface Parameters (whwmd2105m000) session. The shipping set number is populated with the activity line number. The Material lines that are linked to an order, are populated with a shipping set number zero.
  - **Order Complete**: The warehouse orders are generated with **Ship Set Complete** check box selected in the WMS Interface Parameters (whwmd2105m000) session. The material on the order has the same shipping set number. Only warehouse orders for material issue are added to the set. Hence, this is not applicable for receipts or warehouse orders that are not material lines, for example, warehouse lines, belonging to subassemblies or required to ship the material to be repaired.

  If **Material Issue Constraint** for the order is modified to **Order Complete** or another value, all the activities are also modified. If the **Material Issue Constraint** for an order activity is modified, all the material warehouse orders linked to this activity are also modified. If a warehouse order cannot be modified anymore, the material issue constraint also cannot be modified.

  A new material line can only be added if the warehouse orders with the same shipping set number is not completely processed. When a new material line is added (with a new warehouse order), this order must be processed like the other warehouse orders with the same set number.

Note

For warehouse orders with **Ship Set Complete** check box selected in the WMS Interface Parameters (whwmd2105m000) session, a warehouse process can be performed only if all the previous process step for the orders with the same set number, are completed.

- **Service Orders**
  Warehouse issue orders are created for service order material lines with **Delivery Type** set to:
  - **From Warehouse**
  - **From Warehouse in Car**
  - **From Car**
  - **From Warehouse by Transport**
  - **From Service Kit**
  - **By Purchase Order**

  For delivery types **From Warehouse in Car** and **From Warehouse by Transport**, a transfer order is generated before the Warehouse (issue). The shipping complete is applicable for the

transfer orders and not for the issue after the transfer (from the Car or from the customer warehouse). So, warehouse orders for delivery type **From Warehouse** and **By Purchase Order** and the transfer orders for delivery type **From Warehouse in Car** and **From Warehouse by Transport** are added to the set.

Note

The warehouse orders for delivery type **From Car** and **From Service Kit** are not part of the 'Material Issue Constraint'.

- **Work Order**
  Warehouse issue orders are created for work order material lines with **Delivery Type** set to:
  - **From Warehouse**
  - **Via Purchase**
  - **From Kit**

The Shipping Complete is applicable for **Delivery Type** set to **From Warehouse** and **Via Purchase**.

Check Material Availability

The material availability can be determined for the service orders, work orders and maintenance sales part delivery and part loan lines, for the defined selection range using the Check Material Availability (tstdm2220m000) session. The results of the ATP, Planned Inventory and On Hand Inventory check are registered in material availability lines, at order, activity and material level. These result can be viewed in the Service Material Availability (tstdm2520m000) session. The results are also displayed on the order, activity and material line.

Note

The material availability check is not performed for orders with status set to 'Free'. The availability lines are removed for closed and canceled orders.

ATP Inventory availability

Available-to-Promise inventory is the item quantity that is currently available and considered for calculating the ATP planned inventory movements such as planned purchase orders. To calculate ATP for an item, the item **Order System** must be set to **Planned** in the Items (tcibd0501m000) session.

The ATP check indicates if the required quantity for the given item and the required date and warehouse are available. If there is sufficient inventory, a planned inventory issue transaction must be created to ‘allocate’ the inventory to the order. This planned inventory transaction consumes the planned ATP inventory in the Item Order Plan. If sufficient inventory is not available, Infor LN allocates inventory for the components of the given item or critical work centers.

ATP check can only be performed during planning of the orders. You can perform the check by selecting the **Check ATP Inventory** check box in the Service Order Resource Planning (tssoc2260m000) and

the Plan Work Orders (tswcs3200m000) session. This check box is also available in the Release Service Orders (tssoc2200m000) session but is used only when orders are released without first planning. The planning step is performed implicitly.

The results of the ATP inventory availability check in the Service Material Availability (tstdm2520m000) session are:

- If the **Check ATP Inventory** check box is selected, ATP inventory check is performed for this material.
- If the **ATP Inventory Available** check box is selected, ATP inventory is checked and available on the required delivery date.
- The **ATP Date** indicates when the material is expected to be available. This can be the required delivery date when the material is available or a later date when the material is not available.
- If the **ATP Checked on Date** is specified, indicates the date and time of the last performed ATP check.

Planned Inventory and On Hand Inventory Availability

The Planned Inventory and On Hand Inventory check is performed when the **Check Planned Inventory** and the **Check On Hand Inventory** check boxes are selected in the Check Material Availability (tstdm2220m000) session or during planning or releasing of the order.

Calculating the availability of the On Hand quantity for a specified item:

- When the ‘scope of inventory’ is selected, the On Hand quantity for an item in the current warehouse only or for all warehouses in the same cluster is considered.
- When ‘skip blocked inventory’ is selected, the blocked quantity is subtracted from the On Hand quantity.

Depending on the selected ‘scope of inventory’ the Item planned inventory transactions (PIT) for the current warehouse only or for all warehouses in the same cluster are selected.

When calculating the Planned Availability or On Hand Availability for a particular order, the quantities in planned inventory transaction for orders with a higher priority are deducted from the On Hand available quantity. The order priority is determined by:

1. Non service orders
2. Released orders by order type based on the Order Type Priority set in the **Material Availability** group box in the General Service Parameters (tsmdm0100m000) session.
3. Planned orders by order type based on the Order Type Priority set in the **Material Availability** group box in the General Service Parameters (tsmdm0100m000) session.
4. Planned Delivery Date
5. Order Date

For the On Hand Inventory check, the Current On Hand inventory minus PIT issues is calculated.

For the Planned Available inventory check, the Current On-Hand inventory minus PIT issues plus PIT receipts is calculated.

Material is available when:

1. On Hand available quantity minus / plus PIT quantity for all orders with higher priority, is positive.
2. On Hand available quantity minus / plus PIT quantity for orders with earlier Planned Delivery date and higher priority, is positive

Note

Released orders have priority over planned orders. So releasing an order may solve material availability shortage for one order, but causes a shortage on another not yet released order.

Create Material Availability lines

Inventory Availability

- **Create Material Availability lines**
  When orders are planned, Material Availability lines are created:
  - When the **Check Material Availability** check box is selected in the Service/Work/Maintenance Order Parameters (tssoc0100m000) session, and
  - For the items for which **Critical for Inventory Check** check box is selected in the Items - Service (tsmdm2100m000) session, and
  - When the relevant **Delivery Type** is selected.

  The lines are removed if the order is closed or canceled

Update Planned Delivery Times

the ATP Date and/or Planned Available Date are calculated, implying a shortage, the planned delivery date of the order material/part delivery line can be updated with the ATP Date and/or Planned Available Date, using the following options in the Check Material Availability (tstdm2220m000) session:

- **Synchronize Materials with Latest Planned Material Line**
- **Update Planned Delivery Time of Material Lines**
- **Update Activities and Orders with Latest Planned Material Line**

When the Planned Available Inventory is checked and a shortage is identified, Planned Available Date is calculated and this date is used to update the order data. If only a check on the ATP inventory is performed and a shortage is identified, the ATP Date is used to update the order data. If the **Update Planned Delivery Time of Material Lines** check box is selected, the planned inventory transactions for this material line are updated.

Service/Work Order Resource Planning/Releasing

The three levels of material availability checks can be performed in the Service Order Resource Planning (tssoc2260m000), Release Service Orders (tssoc2200m000) and Plan Work Orders (tswcs3200m000) sessions. Based on the result of these checks, the applicable material availability data is updated in the Service Material Availability (tstdm2520m000) session.

Based on the result, the planned delivery time of the related material lines can be updated and you can also block the order from being planned/released, in case of a material shortage.

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 Order 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:

- **Sales AmountGoodwill**
- **Invoice SalesAmount**

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 SalesAmount** 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 **Field Change Order** 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 SalesAmount** 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 **Sales AmountGoodwill** 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 Line** are defined in Contract Quote 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 Fixed Prices (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 Order 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 Maintenance Sales Order - Part Lines (tsmsc1110m000) session.

For part maintenance lines with pricing method set to **Fixed Order 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 Maintenance Sales Order - 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 Maintenance Sales Order - 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 is changed, 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 Activity 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 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 Activity 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 (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 (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. 78)*. 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 (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 (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 (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 (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.

Impact of the Project Link on a Service Order/Activity

You can link a service order activity to a project. If a project is linked to a service order activity line, LN defaults the value in the **Project** field in the Service Order Activities (tssoc2110m000) session from Service Orders (tssoc2100m000) session.

When you modify the value in the **Project** field in the Service Orders (tssoc2100m000) session, LN modifies the value in the **Project** field in the Service Order Activities (tssoc2110m000) session, and a new record is created in the Service Orders Links to Project (tppss6120m000) session. You can modify the data in this session.

When you change the value in the **Project** field in Service Orders (tssoc2100m000) session, the related cost lines are also modified. If you link a blank project (project code is not specified), the sales price and sales amount related fields in the cost line sessions are disabled. When a project is not linked, the sales price and sales amount related fields, in cost line sessions, are enabled.

Adding a Cost Line to an Already Linked Service Order or Activity

If a cost line is added to a service order or service activity and the **Project** is defined in the Service Orders (tssoc2100m000) or the Service Order Activities (tssoc2110m000) sessions, LN creates a record in the Service Orders Links to Project (tppss6120m000) session. If the **Status** of the service order or activity in the Service Order Activities (tssoc2110m000) session is not set to **Released**, the **Link Status** is set to **Free** in the Service Orders Links to Project (tppss6120m000) session. If the **Status** of the service order or activity is set to **Released**, the **Link Status** is set to **Actual**.

Releasing the Service Order / Activity

When you release the service order, the **Link Status** of the related cost lines is set to **Actual** in the Service Orders Links to Project (tppss6120m000) session. When you release the service order, LN verifies the record in the Service Orders Links to Project (tppss6120m000) session. If the record is not available for the cost line, LN generate the record in this session with the **Link Status** set to **Actual**.

Closing the Service Order / Activity

When the service order or activity is processed for invoicing, the service order or activity status is set to **Costed** and the **Link Status** of the related cost lines is set to **Final** in the Service Orders Links to Project (tppss6120m000) session.

Maintaining the Link

When you can create or delete cost lines, the related cost line record is created or deleted in the Service Orders Links to Project (tppss6120m000) session. The **Status** of the service order is set to **Free** or **Released**.

Service Engineer Assignment - CRM Appointment Synchronization

The Service assignment and CRM appointment are integrated so that service assignments are visible as appointments in CRM. Consequently, the (planned) visits made to the customer and the new task assigned to the service engineer is visible to the CRM representative. The schedule of the service employee can also be synchronized with the Outlook, through the CRM appointments.

Create Service Engineer Assignment

To process service engineer assignment in CRM:

- **Appointment**
  When a service engineer assignment is manually created using the Service Engineer Assignments (tssoc2505m000) session or generated from the orders session and the **Create CRM Appointments for Service Assignments** check box is selected in the Resource Management Parameters (tcrac0100m000) session, an activity of the **Type** **Appointment** is created in the Activities (tccom6100m000) session. The appointment related data is populated in the activities session, with the information such as **Subject**, **Location**, **Status**, **Start Date**, **End Date**, **Show Time As**, **Information** and **Business Partner**.

Note

- The planned start time and planned finish time is synchronized with CRM as the start date and end date.
- The value in the CRM appointment **Business Partner** field in the Activities (tccom6100m000) is defaulted from the sold-to business partner of the service order/MSO.

- **Attendees**
  The value in the meeting **Organizer** field in the Activities (tccom6100m000) session is defaulted from the **Organizer of CRM Appointments** field in the Resource Management Parameters

(tcrac0100m000) session. The engineer linked to the assignment acts as the meeting attendee. When the engineer of the assignment is the meeting **Organizer**, only one attendee record is created in the Attendee (tccom6105m000) session.

Each service engineer assigned to the same order activity is also added as appointment attendee. The email address of these co-workers are not specified in the Attendee (tccom6105m000) session, so that appointments are not displayed in the Outlook, twice.

Note

If the **Include Sold-to Contact as Appointment Attendee** check box is selected in the Resource Management Parameters (tcrac0100m000) session, the Sold-to BP contact of the order is also added as the meeting attendee.

- **References**
  As an appointment reference, the attributes identifying the service assignment, order number, activity line number and assignment number, are specified according to the following mapping in the References by Activity (tccom6115m000) session.
  - **Type**
  - **Sequence**
  - **Remark**

  For an appointment reference, the planned finish time of the service order/work order is displayed as an Appointment Due Date in the Activities (tccom6100m000) session .
- **Order Relations**
  When the appointment is created successfully, the link between the service assignment and the appointment is created in the Related Orders (tsmdm4500m000) session.

Update Service Engineer (Activity) Assignment

You can change the assignment data and the order activity line data. Therefore, these changes must be synchronized to the related CRM appointment. The appointments generated from a service assignment can only be updated from Service. A change in the planned dates in Service always overwrite the CRM appointment dates.

When another engineer is assigned to an existing order assignment, the changes are updated in the Attendee (tccom6105m000) session. The previous engineer is removed as meeting attendee and the new engineer is added as attendee.

The CRM appointments are synchronized if the information on the order header and order activity that is relevant to the CRM appointment is modified. If, on the order header information such as sold-to BP, Ship-to BP, contact or address, is modified, all the related CRM appointments are synchronized. The same applies to the data modified on the activity level. The information about the related appointment is available in the Related Orders (tsmdm4500m000) session.

The changes on the header and activity can trigger an update to multiple CRM appointments. Most of these changes are displayed in the appointment **Information** field in the Appointment (tccom6600m100) session.

Note

When the **Assignment Status** for the service engineers is set to **Completed** in the Service Engineer Assignments (tssoc2505m000) session, the **Status** of the meeting in CRM is set to **Held** in the Activities (tccom6100m000) session.

Delete Service assignment

When a service assignment is deleted, the related CRM appointment is also deleted, if the **Status** of the service or work order is other than **Completed**, **Costed** or **Closed**.

Synchronize CRM Appointment update to Service assignment

The start and end date of the CRM appointment is updated, if meeting organizer modifies the outlook appointment.

When the **Update Service Assignments with CRM Appointment Dates** check box is selected in the Resource Management Parameters (tcrac0100m000) session, the changed appointment start and end date are synchronized to the originating service assignment.

Handling Serialized Item during Service Order creation/generation

A service order can be created manually or can be generated from several origins and the serialized item is processed, accordingly.

Creating Service Order manually

When you create a service order manually, using the Service Orders (tssoc2100m000) session, you can specify the **Installation Group** and/or the serialized **Item** only if the service order **Status** is set to **Free** or **Planned**. You can also generate the serialized item using the **Generate** option, from the Action menu.

If the **Installation Group** is specified for the service order header, you can only use a serialized item that is related to the **Installation Group** of the Service Order Activities (tssoc2110m000) session. If you specify the serialized **Item** in the Service Order Activities (tssoc2110m000) session and the **Installation Group** is not specified on the service order header, the installation group is defaulted with the related **Installation Group** of the **Serialized Item**, defined in the Serialized Items (tscfg2100m000) session.

The value of the **Sold-to Business Partner** field specified in the Service Orders (tssoc2100m000) session is defaulted from the **Serialized Item**/ **Installation Group** defined in the Serialized Items (tscfg2100m000) session; however you can modify the value. If you update the value of the serialized **Item**/ **Installation Group** in the Service Orders (tssoc2100m000) session, the value of the sold-to business partner is updated, accordingly.

If the serialized item or the installation group is modified in the Serialized Items (tscfg2100m000) session, and the sold-to business partner is not the same as the sold-to business partner of the service order header, the Infor LN notifies the user.

Generating Service Order

- **Project**
  The item and the serial number are not specified for the service order header or the service order activity. The value in the Installation Group field on the service order header, is defaulted from the Project.
- **Planned Activities**
  Planned activities can be grouped together:
  - For the same service order (based on department, business partner, service contract, planned start time, and so on).
  - By item, i.e. activities having the same item, same sold-to-BP of the serialized item, same contract and the same planned start time, are grouped into one service order.
  - By activity group, i.e. activities having the same reference activity group, same sold-to-BP of the serialized item, same contract and the same planned start time are grouped into one service order.
  - By location (address), i.e. activities having the same planned start time, same sold-to-BP of the serialized item, same contract and the same location (either of the installation group or of the serialized item) are grouped into one service order.
  - By difference in start time, i.e. activities within the time difference mentioned and are grouped accordingly, with the first planned activity.

  The value of the (serialized) item is defaulted on the service order header based on the grouping of planned activities. The serialized item is specified on the service order header if the planned activities are not grouped or if the planned activities are grouped by item and serial. If the planned activities are grouped by item, the item is specified on the service order header and the serialized item is specified on the service order activities. If the planned activities are not grouped by item or serial, the serialized item is not specified on the service order header.
- **Call**
  The item and serial number are specified on the service order header, although the call and the service order are linked at the service order activity level. When a call is transferred to a service order, Infor LN prompt the user to link the call to the existing service order based on the sold-to business partner.
- **Field Change Order**
  The item and the serial number are specified for the service order header and the service order activity. For each FCO line, a service order is created.

  Note

  The **Service Type** field in the Service Orders (tssoc2100m000) session is defaulted from the **Field Change Orders** field defined in the **Service Type** tab in the Service Order Parameters (tssoc0100m000) session.

- **Maintenance Notifications**
  For a maintenance notification, a new service order can be created or a new follow-up activity can be created (only for maintenance notifications originated from work order or service order). The item and serial number is specified on the service order header.

  A maintenance notification can be linked to an existing planned activity, service order activity, work order activity or maintenance sales quotation line.

  Note The **Service Type** is defaulted from the **Inspections** field on the **Service Type** tab, in the Service Order Parameters (tssoc0100m000) session.

- **Tool Refurbishment**
  When a service order is generated from a Tool Numbers (titrp0102m000) session, the item and serial number is defaulted on the service order header and on the service order activity. One service order can be generated for one tool and this service order can have multiple activities (defined in the maintenance scenario defined for the tool) linked.

  Note The **Service Type** is defaulted from the **Tool Refurbishment** field on the **Service Type** tab, in the Service Order Parameters (tssoc0100m000) session.

- **Service Quotation**
  When a service order is generated from a Service Order Quote Configuration Lines (tsctm1110m400) session, the **Item** and **Serial Number** of the service quotation line are defaulted on the service order activity. The item and serial number cannot be defined on the service quotation header, Therefore, the item and serial number are not defaulted on the service order header, when generating a service order for a service order quotation.

- **Serialized Item**
  The service order can be generated from Serialized Item 360 (tscfg2100m100) session, using the **Create Service Order Activity** option. This option is used to create a new order and the **Item** and **Serial Number** specified for the Serialized Item 360 (tscfg2100m100) is defaulted on the service order header and on the service order activity.

  Note The service type is defaulted, based on the serialized item data.

  When creating a service order from the Serialized Item (tscfg2600m000) session, the serialized item can be defaulted on the service order header. This serialized item must be considered, when filtering the service orders.

- **Remote Engineer (Field Service Engineer Assignment – Remote)**
  The user can specify an item and a serial number in the Create Service Order (tssoc2202m000) session This item and serial number is available on the service order header and the service order activity.

- **Reference Activities**
  The new service order activities can be generated for master routing . In this process, the item and serial number is defaulted on the service order activity, from an existing service order.

Copy service order

When you copy a service order header, the installation group, item and serial number are also copied.

The warranty data for the service header is defaulted based on the service type; (serialized) item and coverage time. This is because the coverage time is set to current time when you copy the service order.

Handling Serialized Item (Repair Warranty, Sold-to BP, Physical Breakdown)

Repair Warranty

If the serialized item is covered by a repair warranty, the **Service Type** specified for the Service Orders (tssoc2100m000) session is considered. This **Service Type** is defaulted from the **Repair Warranty** (service type tab) field in the service order parameter (tssoc0100m000) session.

Sold-to Business Partner

The sold-to business partner is based on the installation group and/or serialized item. If the sold-to business partner is already specified for the service order header and this sold-to business partner is not the same as the sold-to business partner of the serialized item or the installation group, Infor LN displays a warning before the sold-to business partner is overwritten.

If the sold-to business partner is not specified on the service order header and the service order is linked to a TP-project, the sold-to business partner is defaulted from the TP-project.

The sold-to business partner can be modified if:

- the service order is not retrieved from a service quotation
- the **Status** of the service order is **Free** or **Planned**
- the customer owned material is not defined.

Preferred Engineer and Location Address

The preferred engineer for the service order header can be defaulted with the preferred engineer of the installation group and the serialized item. When planning the service order during Global SRP, the serialized item is present on the service order header, so defaulting the preferred engineer on the service order header is not required.

You can use the Update Engineer and Location Address (tscfg2700m000) session to insert or update the preferred engineer and the location address. The item and serial number data is saved in the Search Results - Update Engineer and Location Address (tscfg2120m000) session.

Determine Duration, Times & Calendars

The serialized item is specified on the service order header, hence, the order duration can be calculated based on the Availability Type of the service type, the preferred engineer, the installation group, the serialized item and the service department.

For the service order header, Infor LN considers the (serialized) item of the service order header to determine the applicable calendar. For the service order activity, Infor LN considers the (serialized) item of the activity to determine the applicable calendar.

Infor LN uses the following search logic to determine the duration, planned start/finish times or calendars in Service Order Control:

1. Serialized item
2. Installation Group
3. Preferred Engineer
4. Service Center
5. Company

The company calendar is considered as the last option. So, this calendar must always be available.

Physical Breakdown and Serial Status

The serial status can only be defined on the service order activity. The repair work performed for a serialized item, is specified for the service order activity. Hence, the status of the serialized item after repair, is managed at the service order activity level. The physical breakdown and serialized item changes are also managed at the service order activity level.

You can use the **Physical Breakdown** option on the Action menu in the Service Orders (tssoc2100m000) session, to display the physical breakdown of the serialized item.

Pricing Contract and Pricing Method

To define a fixed price per order, you can set the value of the **Pricing Method** field to **Fixed Order Price** in the Service Orders (tssoc2100m000) session. The **Pricing Method** field can be set to **Fixed Activity Price** only in the Service Order Activities (tssoc2110m000) session, because the repair work performed for a serialized item is specified for the service order activity.

In the pricing contract, the **Pricing Method** for the serialized item can be set to **Fixed Activity Price** or **Time and Material**. When the pricing method is **Fixed Activity Price**, the price for the repair work can be specified.

Dummy Serialized Item

The user can define a dummy serialized item for the service order header that must be replaced with the actual serialized item, prior to the completion of the service order.

Handling Serialized Items (Sales Prices/Costs on Invoice Lines and Cost Lines)

Cost Lines

- **Sales Price**
  When sales price agreements are defined for a pricing contract and the cost line is linked to the service order header, the pricing contract must be checked.

  The (serialized) item on the service order header must be considered when:

  - (re-)pricing is performed for a labor cost line and
  - calculating the travel distance that impacts the sales price.

  If a cost line, which is linked to the service order header, is released to Invoicing the (serialized) item of the header, is displayed on the billable line.
- **Coverage**
  If the (serialized) item; warranty type or warranty, is modified on the service order header, the cost line coverage must be recalculated for the lines that are linked to the service order header.

  The serialized item; warranty type and warranty must be considered, when (re)calculating the cost coverage line.

  The warranty transaction is logged when committing all the warranty coverage allocations that are based on the warranty, defined for the service order header.

  Note When creating or updating inspections, cost coverage is recalculated.

Service Order Fixed Prices

Sales Prices

If the invoice lines related to the service order header are costed, the (serialized) item on the service order header must be considered when releasing the invoice lines to Central Invoicing.

Tooling

The Tools can be refurbished, using an internal service order, that includes multiple activities (defined in the maintenance scenario defined for the tool).

If the serialized item of a service order is of type Tool, tool requirements are created and planned in the Tool Requirement Planning (TRP).

If the user releases a service order, the status of the Tool is set to ‘In Refurbishing’.

If the user completes or costs a released service order, the tools data, such as refurbishing point; number of time refurbished and the actual usage after refurbishment, is updated. The status is reset to ‘Available’.

If the user cancels the service order, the status of the tool is reset to ‘Available’.

When checking the availability of the tools in Tools Requirement Planning, the service order header must be checked to determine if the tool is planned for refurbishing or if service orders are already present for refurbishing.

Travelling

If the **Travel Planning Method** is set to **Order Based** in the Service Orders (tssoc2100m000) session, the item and serial number are considered when defaulting the **Travel Distance** and **Travel Duration** fields, on the Service Orders (tssoc2100m000) session.

The (serialized) item data must be considered when:

- creating estimated travel cost lines (manually or when planning the service order)
- recalculation of travel cost lines or when planning the order (setting order status to Planned)
- checking if a call out charge is applicable when handling travel cost lines: getting the description of the travel line; updating the total travel line; equating actual travel lines with the estimated travel lines).
- checking if sales price is populated on a travel line (when creating; generating or updating a travel line).

Service Order Header / Activity Line Synchronization

When you change the (serialized) item; the generic warranty data or the coverage time specified on the service order header, this data can be synchronized with the service order activities.

When the user save the data after modification, in the service order header session, the Service Order - Lines - Synchronization (tssoc0280m000) session is started, wherein the user can select the data to be synchronized.

If the (serialized) item; generic warranty data or coverage time on the service order activity are synchronized, the coverage contract data and the pricing contract data of the service order activity, are updated accordingly.

Generate Supplier Claim Requests from Service Orders

When generating a supplier claim request for a cost line linked to the service order header, the serialized item of the supplier claim header is populated with the serialized item from the service order header.

A new supplier claim header is created based on the grouping criteria and the existence of supplier claims for the data, used as grouping criteria. If a new supplier claim header has to be created, the installation group and the serialized item of the service order header are defined for the supplier claim header.

Subcontracting with material flow in field service

For a service order, when an activity is subcontracted with material flow, the possible scenarios are:

- Material resources are delivered to subcontractor
- Material resources are delivered to location address or customer address
- No material is delivered (subcontractor uses own material)

In Scenario One and Two, the components which are required for the repair are either sent to the customer or to the location address. The subcontractor sends an invoice to the manufacturer with information related to the used materials, hours and so on. These costs have to be “transferred” to the related service order.

In scenario 3, components are not sent to either the customer or the location address. Material is managed by the subcontractor. The subcontractor sends an invoice to the manufacturer with information related to the used materials, hours and so on. These costs have to be “transferred” to the related service order.

The service order can have one or more lines (activities). For subcontracting, the following scenarios are possible:

1. Service Order and one activity which is subcontracted – no materials defined
2. Service Order and one activity which is subcontracted – materials are defined
3. Service Order with multiple activities and one or more are subcontracted – no materials defined
4. Service Order with multiple activities and one or more are subcontracted – materials defined

Service Order and one activity which is subcontracted – no materials defined

In this scenario, only one line (activity) is linked to the service order. The **Subcontracted** checkbox is selected and the **Reference Activity** is not specified in the Service Order Activities (tssoc2110m000) session. The user can specify the Buy-from business partner (**Subcontractor**) and the **Item Subcontracting**.

The service engineer cannot select the Buy-from BP but can specify the **Item Subcontracting**. The Buy-from BP is or can be defaulted from the item-purchase data of the service/cost item. When ERP LN does not default the buy-from BP:

- a purchase order cannot be generated
- a purchase requisition is generated; if the **Requisition Mandatory** check box (in the **Service Subcontracting** group box) is selected in the Items - Purchase (tdipu0101m000) session.

Note

Scenario 3 and scenario 1 are similar. However, in scenario 3, multiple activities are linked to the service order.

Service Order and one activity which is subcontracted – materials are defined

In this scenario, the functionality is similar to that explained in the previous scenario, in addition to which estimated material is also specified. This material has to be transferred to the subcontractor. You must also specify if the material is **Company Owned** or **Customer Owned**.

Note

Scenario 4 and scenario 1 are similar. However, in scenario 4, multiple activities are linked to the service order.

Order and Activity based Pricing (Reference Activities, Master Routing and Routing Options)

For an installation, the fixed contract price defined for an order can be different from the fixed contract price defined for the activity. The fixed sales price is used for the maintenance activities. In addition to this fixed sales price, the sales price additional costs, such as material, labour and other expenses can be charged.

Fixed contract price defined for an installation must not be applied to both, orders and activities. Therefore, there must be a clear distinction between the configuration lines, for which activity price is defined and the lines for which a fixed order price is defined.

The ‘Fixed Repair Price’ option for the **Pricing Method** is renamed to **Fixed Activity Price** and the value, **Fixed Order Price** is introduced. The values for the **Pricing Method** are:

- **Time and Material**
- **Fixed Order Price**
- **Fixed Activity Price**
- **Not Applicable**

Reference Activities, Master Routing and Routing Options

You can set the **Fixed Activity Price** and **Fixed Order Price** sales price in the reference activities, master routings and routing options.

Note

The **Fixed Activity Price** can be defined using reference activities only. The **Fixed Order Price** can be defined using master routing and routing options only.

You can define the sales prices for the orders/activities, reference activities, master routings and routing options using the **Use Fixed Price** check box and **Sales Price** field.

If the **Use Fixed Price** check box is selected and the reference activity, master routing or routing option are used for a service order, service order activity or part maintenance line; the **Pricing Method** is set to **Fixed Order Price** or **Fixed Activity Price** and the sales price specified is considered as the 'fixed' (default) sales price.

By default, the **Use Fixed Price** check box is cleared. Effectively, the **Pricing Method** for the related objects, by default, is always set to **Time and Material**.

- **Sales Price**
  If the **Use Fixed Price** check box is selected, you must specify the **Sales Price** and the **Currency**. To have an indication of the sales price, the **Calculated Sales Price** field is included.
  - For a reference activity, the **Calculated Sales Price** is calculated based on the sales price and the quantities of all the related resource requirements.
  - For a master routing, the **Calculated Sales Price** is the total of the sales prices of all the related reference activities. The calculated sales price for a routing option is the total of the sales prices of the selected reference activities of the routing option.
- **Estimated Sales Price**
  The calculated sales price of a reference activity is the total of the estimated sales price of the resource requirements. To indicate the sales price for each reference activity resource requirement, the **Estimated Sales Price** field is included in the Resource Requirements (tsacm2120m000) session. The **Estimated Sales Price** is the product of quantity and the calculated price for the item, labor rate, tool and so on.

  This estimated sales price is included to provide an indication of the expected price only. As the business partner or the other order related information is not available for the reference activity; the estimated price determined for the activity can differ from the price specified for the order.

  These sales prices (of the order and the activity) can be expressed in different currency, therefore recalculation is required during aggregation.

  The currency is defaulted with the local currency and is mandatory when a sales price is entered. The system date is used to retrieve the price and currency information. The sales 'exchange rate type' is used for currency conversion, if required.

Order and Activity based Pricing (Field Service)

In the field service module; for the service order and the service activity:

- Contract is Linked based on the Reference Activity, Master Routing or Routing Option - For more information refer to Order and Activity based Pricing (Contract (quotation) configuration lines).
- Pricing contract linked to both the header and activity - For more information refer to *Order and Activity based Pricing (Reference Activities, Master Routing and Routing Options) (p. 95)*.
- Fixed Order / Activity prices is linked from Reference Activity, Master Routing or Routing Option
- Adding additional activities is linked to a 'Fixed Order Price' service order.

Fixed Order / Activity prices from Reference Activity, Master Routing or Routing Option

To default a **Fixed Order Price** for the (entire) service order, the **Master Routing** and the **Routing Option** fields are specified on the Service Orders (tssoc2100m000) session. To default the **Fixed Activity Price**, **Reference Activity** is available on the Service Order Activities (tssoc2110m000) session.

If a contract is linked to the order or the activity for which **Fixed Price** and **Time and Material Price** is not defined, Infor LN searches for the fixed sales price, based on master routing, routing option or reference activity. If specified, the **Pricing Method** for the order or activity is set to **Fixed Order Price**/ **Fixed Activity Price**.

Additional activities

You can add the activities that have **Pricing Method** set to **Time and Material** or **Fixed Activity Price** to the Service Order Activities (tssoc2110m000) session even if the **Pricing Method** is set to **Fixed Order Price** in the Service Orders (tssoc2100m000) session.

The total service order amount can be a combination of **Fixed Order Price**, **Fixed Activity Price** and **Time and Material** prices. To specify this amount, **Estimated Order Amount** and the **Actual Order Amount** are introduced in the service order (header) sessions.

Fixed Repair Price for installation

You can setup installation based fixed prices at the order and activity level. For each reference activity, master routing, routing option or installation, a fixed order or an activity price is specified. The price is based on the value specified in the **Price Level** field in the Fixed Price Terms (tsctm1111m000) session.

Price Origin

If a pricing contract is linked to the order (header) or the activity and the sales price is retrieved from that contract, the **Price Origin** is set to **Service Contract** in the Service Orders (tssoc2100m000) session.

Note

If the sales price is retrieved from the master routing, the **Price Origin** is set to **Service Contract**.

If the sales price is retrieved from a reference activity, master routing or routing option, the **Price Origin** is set to **Reference Activity** or **Master Routing** or **Routing Option**.

In all the other scenarios, the **Price Origin** is set to **Other**. If the price is modified manually, the **Price Origin** is set to **Manual**.

Fixed Order or Fixed Activity Price editing

You can specify the **Sales Price** in the service order header and activity sessions, allowing the user to modify the price from the service order and activity.

Service Order Online Margin Control

In the Service Order Online Margin Control (tssoc4500m000) session, the Fixed Order Price is displayed with the **Cost Type** set to **Order** and fixed activity prices is displayed with **Cost Type** set to **Activity**. This data is included in the report printed using the Print Service Order Online Margin (tssoc4400m000) session.

Estimates in Service Order Control

You can maintain the estimated sales and cost amounts for the service orders, activities and the cost lines before the service order or the activity is released (estimated phase). You can compare these estimated amounts with the actual amounts.

To implement the Estimates functionality, you must select the **Use Coverage Calculation for Estimates** check box in the Service Order Parameters (tssoc0100m000) session.

The impact of the estimates functionality

For Service Orders

When estimates functionality is implemented and a service order is created, LN selects the **Use Coverage Calculation for Estimates** check box in the Service Orders (tssoc2100m000) session.

In the estimated phase, LN defaults the **Sales Price** amount as the **Estimated Sales Price** for the service order, activities and the related cost lines.

Note

You can modify the **Sales Price** if the **Pricing Method** is set to **Fixed Order Price** and **Fixed Activity Price**.

When you create a copy of the existing service order, the **Use Coverage Calculation for Estimates** check box setting and the related estimated cost lines are not copied for the new service order.

For Service Order Cost Lines

If a cost line is created during the estimated phase (before the order or the activity is released), LN selects the **Estimated Cost Line** check box for the line.

When a service order cost line is created in the estimated phase, LN creates a related estimated cost line.

If these cost lines for a service order are generated based on a reference activity, a planned activity or a quotation during the estimated phase, LN creates a related estimated cost line.

If the cost line data is modified manually, LN updates the related estimated cost line. Conversely, if the estimated cost line data is modified manually, LN updates the related cost line.

When a service order or activity is released, the estimated cost line values are defaulted on the actual cost lines (if the estimates are applicable). However, if the cost line data is modified in the actual phase, LN does not update the estimated cost line.

LN allows you to change the service order activity line number of a cost line in the estimated and actual phase. If the activity line number of a cost line is modified in the estimated phase, the estimated cost line is updated. If the activity line number of a cost line is modified in the actual phase, the related estimated cost line is deleted (based on the **Allow to Delete Estimates** parameter setting).

For warranty and coverage

In the estimated phase, for a service order or activity, if the **Serialized Item Warranty** or the **Generic Warranty** is modified, all the amounts on the estimated and actual cost lines are updated accordingly. LN updates the estimated and actual cost lines similarly, if the **Warranty** or the **Coverage Contract** is modified based on these modified values for a service order or an activity:

- Installation Group
- Item
- Coverage Type
- Time

For recalculation of the prices and discounts

In the estimated phase, for a service order or activity, if the **Pricing Method** is modified, the sales values are recalculated on all the cost lines and the related estimated cost lines. The discount amount that is modified manually (**Discount Origin** field is set to **Manual**) is recalculated only if the **Overwrite Manual Discounts** check box is selected in the Price and Discount Recalculation (tssoc2240m000) session.

Deleting a Service Order Cost Line

You cannot delete a service order cost line in the actual phase if the cost line is created in the estimated phase and the **Allow to Delete Estimates** field is set to **No** in the Service Order Parameters (tssoc0100m000) session. If a cost line is deleted (when allowed), the related estimated cost line is also deleted. The estimated cost lines are also deleted when the related service order or the activity is deleted.

Project pegging in Field Service

In Service, you can implement project pegging in the Field Service module. You can peg the service cost to a project, element, and/or an activity.

To peg a project in Service, specify the project, element, and/or activity information for the service order quote, quote line(s), service order (activity), related material, labor and other cost lines. You must select the **Mandatory Project Peg** check box in the Items (tcibd0501m000) session, if defining the project peg data is mandatory to peg the cost of the service item to the project.

To implement project pegging in Field Service, you must select the **Use Project Pegging in Field Service** check box in the Service Order Parameters (tssoc0100m000) session. If this check box is cleared, the existing project-service integration functionality is implemented.

The **Project Peg Origin** is displayed for service order (activities) and the material, labor and other cost lines.

Project pegging for Service Order Quotation

You must select the **Use Project Pegging in Field Service** check box is selected in the Service Order Parameters (tssoc0100m000) session to implement project pegging for service order quotes.

Project pegging for Service Order Quote

You can specify the project pegging data in the Service Order Quotes (tssoc1100m000) session only when the quote status is set to **Free**. Infor LN defaults the project peg from this session to the Service Orders (tssoc2100m000) session when the project peg is transferred from the quote to a service order.

Project pegging for Service Order Quote Configuration Line

The project peg in the Service Order Quote Configuration Lines (tsctm1110m400) session is defaulted from the Contract Configuration Lines (tsctm1110m300) session if the serialized item specified for the quote line is linked to a service contract. Else, the project peg is defaulted from the Service Order Quotes (tssoc1100m000) session.

If the **Mandatory Project Peg** check box is selected in the Items (tcibd0501m000) session, the project peg must be specified for the service order quotation line.

Note

The project peg can be added and changed manually when configuration line is linked to a service order quote and the quote status is set to **Free**.

Infor LN defaults the project peg from the Service Order Quote Configuration Lines (tsctm1110m400) session to the Service Order Activities (tssoc2110m000) session when the project peg is transferred from the quote line to a service order activity.

Copying Service Order Quotation

When you create a copy of an existing service order quote using the Copy Service Order Quote (tssoc1280m000) session, you can select the **Project Pegs** check box to copy the project peg from the existing service order quote to the new quote.

Project pegging for Service Order and Activities

You must select the **Use Project Pegging in Field Service** check box in the Service Order Parameters (tssoc0100m000) session to implement project pegging for service orders. If this check box is cleared, the existing project-service integration functionality is implemented.

You can specify the project peg:

- When creating a new service order.
- For a service contract. When the service contract is linked to the service order, Infor LN defaults the project peg from the service contract to the service order. However, you can modify the peg data.

If a service order is project pegged, the service order costs are linked to the project when the costs are logged on the service order WIP.

If the serialized item specified for a service order is linked to a service contract configuration line, Infor LN defaults the project pegging data in the Service Orders (tssoc2100m000) and the Service Order Activities (tssoc2110m000) sessions from the Service Contracts (tsctm3100m000) session.

If the **Costing Breaks** check box is selected in the Implemented Software Components (tccom0100s000) session, the **Project Peg Origin** field in the Service Orders (tssoc2100m000) session is set to:

- **Top Demand**, for the service order generated from a project.
- **Manual**, for the service order created manually.

Project pegging for service orders

When you create a service order, if the **Use Project Pegging in Field Service** check box is selected in the Service Order Parameters (tssoc0100m000) session, the project pegging data in the Service Orders (tssoc2100m000) session is defaulted from the originating object. However, you can modify this value for service orders with the **Status**, **Free**.

If the **Manual Project Peg Modification** check box is selected in the Project Pegging Parameters (tcpeg0100m000) session, you must specify a reason code when you modify the project pegging data on the service order header.

Note

- When a service order is generated from a project, the project pegging data is transferred from the project to the service order.

- When a service order is generated from a call, the project pegging data is transferred from the call to the service order.

Project pegging for service order activities

When you create a service order activity, the project pegging data in the Service Order Activities (tssoc2110m000) session is defaulted from:

- The Costing Breaks - Service Activities (tppdm3116m000) session.
- The Service Orders (tssoc2100m000) session
- The Service Contracts (tsctm3100m000) session.

You cannot modify the project pegging data for a service order activity.

Project pegging for service order cost lines

When you create service order cost lines (material, labor or other), the project pegging data is defaulted from the Service Order Activities (tssoc2110m000) session, the Service Orders (tssoc2100m000) session or from:

- The Costing Breaks - Service Material (tppdm3103m000) session for the material cost line.
- The Costing Breaks - Service Labor (tppdm3104m000) session for the labor cost line.
- The Costing Breaks - Service Other Cost (tppdm3105m000) session for the other cost line.

Project pegging for a service order while creating a copy

When you create a copy of an existing service order, the project pegging data is also copied if the **Project Pegs** check box is selected in the Copy Service Order (tssoc2280m000) session. If the project pegging data of the existing order is modified manually, and this data must be copied to the new service order, you must specify the **Change Reason** in the Copy Service Order (tssoc2280m000) session.

Project pegging for service order material cost line while planning and releasing

If the Project Pegged Inventory check box is selected in the Service Order Estimated Material Costs (tssoc2120m000) session:

- At the time of planning a service order, the project pegging data defined on the estimated service order material cost line is considered for the planned inventory transactions created for the estimated material cost lines.
- At the time of releasing the service order, the project pegging data defined on the service order material cost line is considered for the warehouse orders created for the estimated material cost lines.

- At the time of performing ATP check, the project pegging data defined on the service order material cost line is considered to check the availability of the project inventory.

Project pegging when subcontracting a service order activity

If a service order activity is subcontracted, a service order other cost line of **Cost Type** **Subcontracting** is created, when the service order is planned. The project pegging data is defaulted from the Costing Breaks - Service Material (tppdm3103m000) session if the **Costing Breaks** check box is selected in the Implemented Software Components (tccom0100s000) session. Else, the project pegging data is defaulted from the linked service order activity.

Project pegging when registering service order actual costs

When the actual costs are registered, project pegging data is linked to the existing financial transactions, to log costs to the appropriate PCL. The integration elements of each financial transaction are extended with the project pegging data.

When the actual costs are registered for the service order material costs and the service order other costs, these costs are logged on the PCL. If the item is specified on the service order material cost line or service order other costs line, this item is used to identify the project cost type. Else, the cost component is used to identify the project cost type. The cost component is identified using the Cost Mappings (tcmcs0149m000) session. However, when hours are logged in LN Service, LN People log the cost on the PCL and to book the project peg on the Labor lines of the service order, a project peg is transferred from LN People.

Project pegging when costing service order actual costs

When costing the service order actual cost lines, the invoice is created in LN Central Invoicing. If the service order is linked by the project peg to a project in LN Project (or by the old Service Order links by Project (tppss65m000)), costs are rolled up to the project:

- **Sales Invoice in LN Central Invoicing**
  If the invoice is created in LN Central Invoicing, the invoice is not changed. The revenues and costs are booked to the corresponding Project Cost Ledger (PCL). LN Central Invoicing receives the related project pegs for the actual costs for appropriate booking of the costs. To receive this project pegging data, LN Service creates a Service Order/Approved for Invoicing Project instead of the regular Service Order/Approved for Invoicing.
- **Costs rolled up to the project in LN Project**
  If costs are rolled up to the project , then LN Project receives the related project pegs for the actual costs for appropriate booking of costs. In case of internal service orders, internal Costs are logged as Service Order / Transfer to Project WIP, in case of project pegging.

Note

If costs are covered by a contract, (repair) warranty, field change order costs or goodwill, these costs are not rolled up to the project.

Project pegging when closing service orders

When closing a service order, the service order data can be copied to history. The project pegging data of the service order, activities and the cost lines is also copied to history.

When project pegging data is specified in Field Service, the project can be closed if all related service orders are closed. When project pegging data is not specified in Field Service, the project can be closed if all the service orders linked to the Project have the status Final (that is, if all costs are rolled up to the project).

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

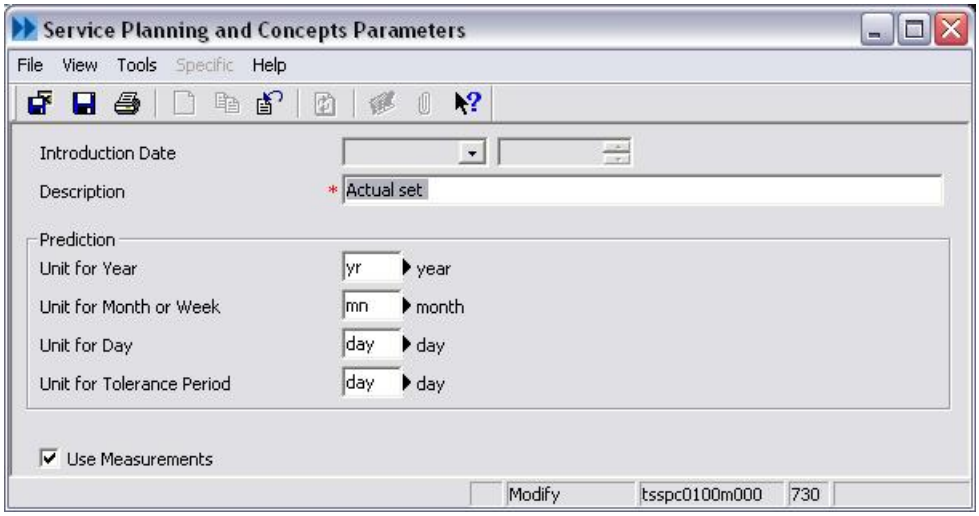
Enter the Planning and Concepts data in the following sessions:

- 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.

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.

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 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 recalculate amounts of planned maintenance

You can recalculate the cost amounts for a planned activity in the Planned Activity - Costs Overview (tsspc2513m000) session. Three situations are possible:

- The amounts are stored by Installation group. The **Installation Group** and the **Cost Type** fields must be filled. The other fields remain empty.
- The amounts are stored by planned activity. The **Installation Group**, the **Activity**, the Activity Number and the **Cost Type** fields must be filled. The other fields remain empty.
- The amounts are stored by serialized item. The **Installation Group**, the **Item**, the **Serial Number** and the **Cost Type** fields must be filled. The other fields remain empty.

The cost type is used for the **Material** values, **Labor**, and **Other**.

If a requirement line is added, deleted, or modified, LN calculates and updates the amounts for the related activity and the related Installation groups and serialized items.

If an activity is added or deleted to an Installation group, LN recalculates and updates the amounts of that Installation group and the possible related serialized items.

If the **Item** field is changed for a planned activity, LN updates the amounts of that serialized item and the related Installation group.

If you choose **Recalculate Amounts** on the appropriate menu, all records of this table are updated (when applicable).

The cost changes in the following sessions affect the cost amounts:

- Item - Costing (ticpr0107m000)
- Labor Rate Codes (tcppl0190m000)
- Tasks (tsmdm0115m000)
- Service Offices (tsmdm1100m000)
- Planned Activities (tsspc2100m000)

- Planned Activity - Material Requirements (tsspc2110m000)
- Planned Activity - Labor Requirements (tsspc2111m000)
- Planned Activity - Other Requirements (tsspc2112m000)
- Planned Activity - Costs Overview (tsspc2513m000)

To specify resource requirements

To specify the resource requirements for a reference activity, complete the following steps:

1. In the Reference Activities (tsacm1101m000) session, select the appropriate reference activity line.
2. On the appropriate menu, choose **Resource Requirements**.
3. In the Resource Requirements (tsacm2120m000) session, click the Add a New Record button. The details session appears.
4. In the **Resource Type** field, enter one of the following:
   - **Material**
   - **Labor**
   - **Tool**
   - **Subcontracting**
   - **Other**
5. Specify other required data.

Note

If you run the Generate Maintenance Plan (tsspc2200m000) session, the requirement lines that are linked to the reference activity are copied to the following sessions:

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

If you run the Transfer Planned Activities to Field Service (tsspc2220m000) session, the requirement lines that are linked to the planned activity are copied to the following sessions:

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

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:

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 Order 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 Order 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.

Generating 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.

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 Field Change Order 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.

To unblock calls, service orders, and sales orders

To unblock calls, service orders, and maintenance sales orders, you can use the Blocking Reasons (tsmdm1101m000) session.

To unblock:

1. Select the blocking line In the Blocking Reasons (tsmdm1101m000) session.
2. On the appropriate menu, click **Release**. LN ERP fills in the **Time of Release** field automatically.

The call or order is unblocked and you can continue processing the call or order.

To use reference activities

The reference activity, which is a basic element of a maintenance concept, can be used as a reference to define the predicted activities.

Procedure

- Link resource requirements to a reference activity in the Resource Requirements (tsacm2120m000) session.
- Link measurements to a reference activity in the Reference Activity - Measurement Types (tsacm3160m000) session.

Note

To display the cost amounts of a reference activity, use the Reference Activity - Costs Overview (tsacm2525m000) session.

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 Field Change Order 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 Field Change Order 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 Field Change Order 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 Field Change Order Lines (tssoc5210m000) session.

To transfer planned activities to service orders

Use this process to create planned activities and transfer the planned activities to service order.

Step 1:

Define Preventive Maintenance Scenario and Preventive Maintenance Line

Use the Preventive Maintenance Scenarios (tsspc1130m000) session to maintain preventive maintenance scenarios based on which a maintenance plan, consisting of planned activities, is generated. Use the Preventive Maintenance Scenario (tsspc1630m000) session to create or maintain preventive maintenance scenario lines. You can list the reference activities that constitute an item's maintenance scenario in the Preventive Maintenance Scenario (tsspc1630m000) session. Scenarios can be:

- Usage Based (Usage Based Scenario Line (tsspc1131m100)). Example: execute maintenance after 10000 km or after profile of the tire is below 3 mm.
- Time Based (Time Based Scenario Line (tsspc1131m200)). Example: 12 times a year. Based on time according to a predefined pattern. Example perform minor maintenance after two months, extensive maintenance after three months, minor maintenance after five months.

Step 2:

Generate Activity Pattern

Use the Generate Activity Pattern (tsspc1232m000) session to generate an activity pattern for a range of items based on the reference activities linked for the items.

Step 3:

Rule Book for Maintenance Scenario

Use the Rule Book for Maintenance Scenarios (tsspc1135m000) session to create and maintain preventive maintenance scenario assignment rules. When generating maintenance plans these maintenance scenario assignment rules determine the valid maintenance scenario based on which planned activities are generated. Use this session to link the **Service Item Group**, **Serialized Item Group** and **Installation Group** to the Generate Activity Pattern (tsspc1232m000) session.

Step 4:

Generate Planning

Use the Generate Maintenance Plan (tsspc2200m000) session to generate maintenance planning for a range of installation group.

Step 5:

Transfer Planning to Service Order

Use the Transfer Planned Activities to Field Service (tsspc2220m000) session, to transfer planned activities to a service order.

The planned activities must meet the following conditions:

- The Service Order field must be e1mpty.
- The status of the planned activity must be Released or Final.
- The Planned Start Time must be in the specified range.

Note

- To start the Transfer Planned Activities to Field Service (tsspc2220m000) session, you must define defaults for your login in the Service User Profiles (tsmdm1150m000) session.
- If a service contract is linked to the planned activity by means of the Installation group, and the contract is active for that Installation group, a warning message appears.

To generate service orders for FCOs

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

Use Generate Orders (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 **Planned 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.

Creating 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.

Step 1:

Define Service Order Quotations

Use the Service Order Quotes (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 Quote 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 Quote Traveling Terms (tsctm1130m400)
- Service Order Quote Material Terms (tsctm1131m400)
- Service Order Quote Labor Terms (tsctm1132m400)
- Service Order Quote Other Terms (tsctm1136m400)

Step 4:

Define coverage phase

Define the coverage phase in the Service Order Quote 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 Quote 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 Quote 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 Quotes (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 Quotes (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 Quotes (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 Quote Material Terms (tsctm1131m400)
- Service Order Quote Labor Terms (tsctm1132m400)
- Service Order Quote Traveling Terms (tsctm1130m400)
- Service Order Quote 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 Quotes 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:

- Service Order Quote History (tssoc8510m000)
- Service Order History (tssoc8551m000)
- Service Order Activities History (tssoc8552m000)
- Service Order Material Cost History (tssoc8555m000)
- Service Order Labor Cost History (tssoc8556m000)
- Service Order Other Cost History (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 Planned Activities to Field Service (tsspc2220m000) session.
- Transfer service order quotations in the Process to Service Orders (tssoc1200m000) session.
- Transfer the field change orders in the Generate Orders (tssoc5220m000) session.
- Transfer calls from the Call (tsclm1100m000) session by means of the Transfer to Service Order command.

Defining 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, 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 (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 Service Order Resource Planning (tssoc2260m000) session to carry out SRP for a service order.

Preliminary conditions

To run 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.

SRP actions

When you run 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 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 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 Service Order Resource Planning (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 **Default Preferred Engineer during Planning** check box in the Service Order Parameters (tssoc0100m000) session is selected.
- The service 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 Service Order Resource Planning (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 SRP was carried out successfully.

Purchase

- In Service, only 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 (Items - Purchase Business Partner (tdipu0110m000).
  c. The buy-from business partner of the item purchase data (Items - 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, 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 Items (tcibd0501m000) 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 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 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:

- **Default Preferred Engineer during Planning**

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.

Completing service order activities

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

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 (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:

- **For Delivery Type: From Warehouse**.
- **For Delivery Type: From Warehouse by Transport**.
- **For Delivery Type: By 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 Service Order Resource Planning (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 (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:

- Service Order History (tssoc8551m000)
- Service Order Activities History (tssoc8552m000)
- Service Order Material Cost History (tssoc8555m000)
- Service Order Labor Cost History (tssoc8556m000)
- Service Order Other Cost History (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 Date** 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:

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

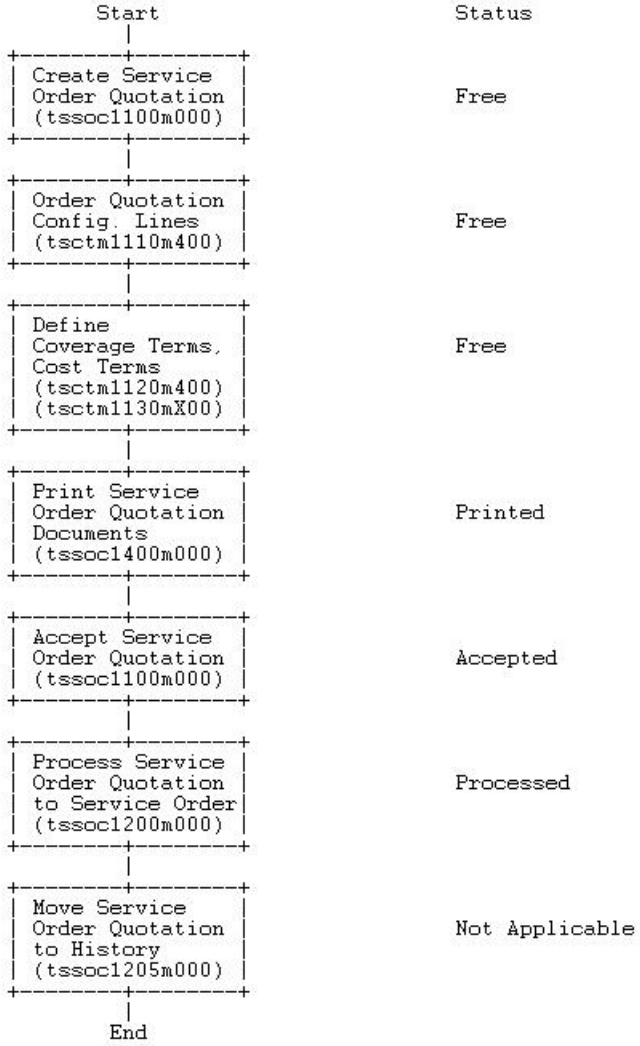
Detailed information:

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
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 are available. 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 must 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 the 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

The groups, group sets, and activity lines 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 broadly be classified into these steps:

1. Generate group planning : You can generate group planning using the Generate Plan (tsspc3200m000) session. You can create groups, group sets, and activity lines for the activities such as service order activities, work order activities, or planned 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 updated.
2. View and update group planning : After you generate the group planning you can view it for each activity using the respective sessions. For example, for service order activities, you can view the group planning using Groups for Service Orders (tsspc3100m000) session or Groups for Service Orders - Dashboard (tsspc3600m300) session; for project activities, you can use the Groups for Projects - Dashboard (tsspc3600m600) session. You can also view the groups and activities based on the characteristics and assigned resources using the Group Planning Planboard (tsspc3260m000) (Gantt chart) session.
3. Plan groups and activity sets: Using the Plan Groups and Activity Sets (tsspc3220m000) session you can plan activities in group planning and you can also set the **Level** for group planning.
4. Release group planning: You can release group planning using the Release Plan (tsspc3240m000) session. 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 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

You can generate group planning for these activities:

- Service Order
- Work Order
- Planned Activity
- Project
- Production Order (JSC)
- Project (PCS)
- Corrective Action Plan
- Non-conformance

The group planning process includes these steps:

Step 1:

Infor LN populates the activities in the group planning based on the planning attributes.

- The group planning populates the selected activities in the groups. For example, service activities are grouped into activity sets and groups, project activities are grouped into activity sets and groups, based on the planning attributes. Activity sets are part of a group.
- Activity groups are planned in parallel with time and activity sets. And the activities 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, Infor LN does not allow you to add orders to an existing activity, but new orders can be manually added to an activity set. Infor 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.

Infor 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.

Infor LN plans the sorted activities, taking 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.

Infor LN allows you to modify the plan at two levels:

- At group level: Moves activity sets from one group to another
- Within a group:
  - Modifies 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
  - Modifies 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.

You can use the Group Planning Planboard (tsspc3260m000) (Gantt chart) session to view and modify the planning data such as planned start and finish time. You can also use the sessions for the respective activities to modify the planning data. For example, to modify the planning data for work order activities, you can use the Group for Work Orders (tsspc3600m100) session.

Step 5:

Assign resources.

You can assign engineers to the activity:

- Manually
- Automatically

You can define up to 20 skills for an activity. The activity skills you define must match with the skills of 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 to be executed, that can be assigned to an employee/resource.

Infor 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 cleaners, dishwashers, and maintenance men are classified in 3 groups. Cleaners: Marc, John and, Hank; Dishwashers: Peter, Dave; Maintenance Men: Marco. Infor LN assigns the resource if the characteristics of the group and the employee are similar. If multiple resources are similar, Infor LN displays the list of employees and the planner can manually select one of the engineers. If a single resource is similar, Infor LN assigns the resource. Alternately, resources can be assigned based on the priority rule. For more information, refer to *Priority Rule (p. 174)*.
- 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 modified on the service order.

Note Infor 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.

Infor 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.. For service orders, the updated travel date/time fields are also copied. Use the Release Plan (tsspc3240m000) session to release the group plan.

Note Infor 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, (Infor 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. 174)*). 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. Infor LN allows you to allocate resources to a group, using various sessions, example, Allocate Resources to Planning Groups (tsspc3280m000) session, Group - Proposed Resources (tsspc3104m000) session and so on. Infor 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 the Attribute Group - Preferred Resources (tsspc0120m100) session, you can maintain the groups of resources based on specific attribute / attribute value combinations. Infor 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

Infor 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, Infor 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 (Set) - Attribute Values (tsspc3101m000) session. Infor LN searches attribute groups for the set of attributes / attribute values, considering 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 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, Infor LN displays all the resources on proposed resources for the group.

- **Note**: When Infor 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 Group - Proposed Resources (tsspc3104m000) session to indicate that the resource is allocated to the Planning Group. For Planning Groups with activity origin set to **Service Order**, one or more resources can be selected. For Planning Groups with activity origin set to **Work Order**, or **Planned Activity**, only one resource can be selected. When the **Automatically if only one found** check box is selected in the Resource Planning Parameters (tsspc0101m000) session, LN selects the **Allocate Resource to Planning Group** check box in the Group - Proposed Resources (tsspc3104m000) when only one resource is proposed.

When more than one resource is proposed, and the **Automatically highest priority** check box is selected, in the Resource Planning Parameters (tsspc0101m000) session, Infor 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 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, Infor LN merges proposed and/or allocated resources. This is applicable only for Groups with activity origin set to **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.

Introduction to Territory Planning Workbench

The territory planning functionality enables you to perform territory and preferred engineer simulations. The objective is to reduce travel time by clustering the interchangeable work in geographical areas.

You can select, using the defined selection criteria, the serialized items that must be serviced (required capacity) in a certain geographical area. The Infor LN calculates the required capacity based on historical and/or known data. To check the available capacity, the user can referred to the existing service engineers, as well as engineers retrieved from the simulation process. This provides more flexibility from the planning prospective. If the calendar and availability type of an engineer is specified, the Infor LN calculates the available capacity. The user can use the simulation results, to modify the preferred engineer for the serialized item and/or the territory.

Positioning

The Territory Planning Workbench is positioned with Service Planning modules. The modules that are part of the Service Planning are Territory Planning, Preventive Maintenance Planning, and Group Planning. 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.

Launching the Workbench

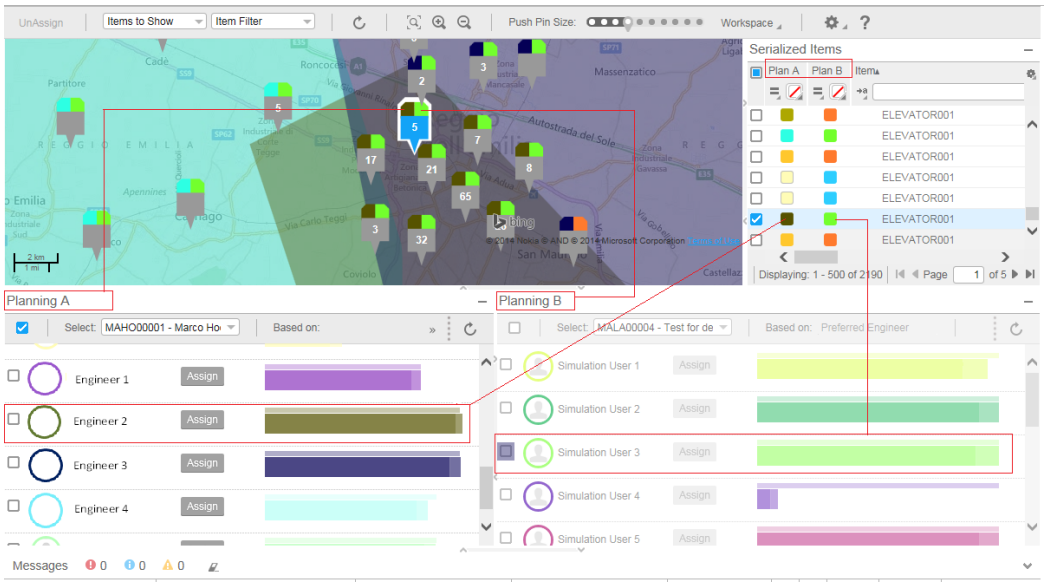
To access workbench, you must select a plan in the Territory and Preferred Engineer Planning (tsspc4100m000) session and select the **Territory Planning Workbench** option. The selected plan is uploaded in the Territory Planning Workbench (tsspc8351m000) session.

Layout

Use the workbench to perform territory and preferred engineer simulations, taking into account the various constraints such as reference points, service engineer location, center of gravity, serialized item and so on.

When the workbench is accessed, all the data related to the serialized item, preferred engineer, reference points is populated.

The workbench includes these sections:



- Serialized Items : This section list provides the list of serialized items for which service activities have to be performed. The items can be listed individually or collectively for both the Planning A or Planning B.
- Graph : This section provides the graphical view of the resource capacity (territory/preferred engineer).
- Map : This section provides the pictorial/geographical representation of the serialized items, preferred engineers, reference points and so on, using various icons.
- Planning A and Planning B : This sections are used to view and compare the plans. The planning can be performed based on the territory or preferred engineer. The information in the graph is based on the option selected in the 'Based on' field.
- Message Section : This section displays error / warning / information messages.

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:

- 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.
- Allocate serials to the territory: LN allocates serials to the territory according to the second best algorithm.
- 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.
- 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.
- 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 360 (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

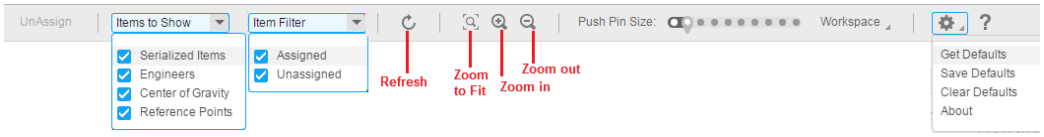
When the territory engine is run, you can recalculate the travel time, because the travel time used by the engine is based on the center of gravity. However, the center of gravity is typically, not the home address of the engineer. Therefore, there can be a discrepancy between the calculated and the 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:

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

Workbench Navigation

Toolbar

The following option are available:



- Unassign : You can use this option to un-assign an engineer from the selected serialized item.
- Items to show: This displays a list of map layers. When you select/unselect an item, the item hides/displays the respective layer on the map. By default, all the layers are selected.
- Item Filter: This value can be set to Assigned and/or Unassigned. By default both Assigned and Unassigned are selected. When the user unselects an item, for example Assigned, only the unassigned items are visible on the workbench (on map and also on Grid).

- Refresh: Refreshes the data for the selected territory plan(s).
- Zoom To Fit: This option allows you to increase the map size to the optimum level, so that all the serial items on the map are visible.
- Zoom in, Zoom out : This option is used to zoom in and zoom out the map.
- Pushpins size: This is used to increase and decrease the size of the pushpins on the map.
- Workspace Menu: This includes various menus relating to the UI layout of the workbench.
- Settings and Help: The settings menu includes options related to default settings and layout settings.

Territory Planning Icons

The following icons are used in the territory planning workbench.

Icon	Explanation
	This icon represents the location of the engineer (if specified in territory planning). All the serialized items assigned to the engineer are in the same colour and the icon must have the color of the serialized items that are assigned to the engineer. **Note** This icon also displays the picture of the engineer, if available. You can add a picture using the drag-and-drop option.
	This icon represents the reference point that is specified for the engineer. This reference point must have the same color as that of the engineer assigned.
	This icon represents the center of gravity of the items that belong to the same territory.
	This icon indicates a serialized item ■ The amber colour part indicates that the item is linked to a territory planning specified in the Plan A and is assigned to either a territory or a preferred engineer. ■ The blue colour indicates that the item is linked to a territory planning specified in the Plan B and is assigned to either a territory or a preferred engineer.

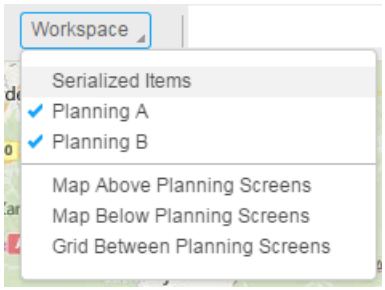
	This icon represents the serialized item specified in the Plan A of the work bench. The serialized item is not linked to a preferred engineer or territory in Plan B.
	This icon represents the serialized item, with only one territory planning is selected either in the Plan A or in the Plan B.

Note

The guide lines for images are as follows:

- The employee image that is uploaded must have a 500x500 dimension
- Resolution must be 300 dpi and above. A Lesser Dpi can scatter the image.
- The images can have these extensions: .jpg, .gif, or .png.

Workspace Menu



The Serialized items, Planning A and Planning B are the various sections in the workbench. The toggle menu and the docking control, allows you to minimize or maximize these sections.

The other options are the default layouts for the workbench. For example, when you select the Map Above Planning Screen option, the map is placed above the planning A and B section and the serialized items grid is placed on the right side of the map. You can further customize this view by arranging the section using the drag and drop options of the docking control. The user can save the new setting using the Save Settings option in the Settings Menu . The same view is available every time you access the workbench.

Multi-Screen scenario and Default views

The Workspace menu provides three default views. With the help of these views, users can build their settings. For example, if you want to have a multi-screen environment and the map must be placed on one monitor and the rest of the planning screens on a second monitor, you must:

- Select a default view.

- Customize the view as per your requirement
- Save the view using the Save Settings option.
- Next time when you open the workbench, the last saved view is available.
- You can resizes the browser and stretches it to the width such that one portion appears on monitor 1 and the second one appears on monitor 2.

Planned Inventory Transaction for Planned Activities

You can plan required material resources for a planned activity, when the planned activity is transferred to a Service Order or a Work Order and that order is subsequently planned. If the lead time for the required items is long, you can plan and purchase the required materials in advance, without creating the Service Order or Work Order.

To implement this functionality, you must select the **Create Planned Inventory Transactions** check box in the Service Planning Parameters (tsspc0100m000) session.

You can select the **Create Planned Inventory Transactions for Planned Activities** check box in the Items - Service Defaults (tsmdm2105m000) session, for the selected item group for which you want to generate the planned inventory transactions. This value is defaulted to the **Create Planned Inventory Transactions** check box in the Planned Activity - Material Requirements (tsspc2110m000) session. However, you can clear this check box manually.

Note

By default the check box is selected in the Items - Service Defaults (tsmdm2105m000) session, if the **Create Planned Inventory Transactions** check box is selected in the Service Planning Parameters (tsspc0100m000) session and the **Item Type** is set to **Purchased** or **Manufactured**.

When a new item is created in the Items - Service (tsmdm2100m000) session, the **Create Planned Inventory Transactions for Planned Activities** check box is selected/cleared based on the Items - Service Defaults. This default setting is based on the value set for the **Item Type** in the Items - Service Defaults (tsmdm2105m000) session.

Note

When you modify the **Create Planned Inventory Transactions for Planned Activities** check box for a selected item, you can use the **Update Planned Activities** option from the Action menu to update all existing material requirements with the new value of the **Create Planned Inventory Transactions for Planned Activities** check box.

Planned Activities - Material Requirement

When new material requirements are created for planned activities (manually, by Infor LN or by generating maintenance plan) in the Planned Activity - Material Requirements (tsspc2110m000) session, the value of the **Planned Inventory Transactions Created** check box is defaulted from the Items - Service (tsmdm2100m000) session, however you can modify this value.

Because a warehouse is required to create Planned Inventory Transactions, you must specify the value in the **Warehouse** field, if the **Create Planned Inventory Transactions** check box is selected and the value in the **Delivery Type** field in the Planned Activity - Material Requirements (tsspc2110m000) session is set to:

- **From Warehouse**
- **From Warehouse in Car**
- **From Car**
- **From Warehouse by Transport**
- **By Purchase Order**
- **To Warehouse**
- **To Warehouse by Transport**
- **From Service Kit**

Infor LN defaults the warehouse based on the following scenarios:

- If the value in the **Activity Use** field in Planned Activities (tsspc2100m000) session is set to **Field Service**, Infor LN uses the following search sequence to default the warehouse:
  - User Template
  - Item / Serial
  - SO header (main or reference item)
  - Determine default estimated or actual warehouse
- If the value in the **Activity Use** field in Planned Activities (tsspc2100m000) session is set to **Depot Repair**, Infor LN uses the following search sequence to default the warehouse:
  - Item / Serial
  - Work Order Department
  - Work Order Activity Work Center
  - Item Warehouse for ordering data)
  - Service Kit
- If the value in the **Activity Use** field in Planned Activities (tsspc2100m000) session is set to **General**, Infor LN uses the following search sequence to default the warehouse:
  - Warehouse linked to the Service Department
  - Item Ordering Data

Releasing Planned Activity

There are a number of ways to ‘release’ the Planned Activity:

- You can start the Generate Maintenance Plan (tsspc2200m000) session using the **Generate Maintenance Plan...** option from the Action menu in the Planned Activities (tsspc2100m000) session, to set the **Status** of the new Planned Activities to **Released**.
- You can manually change the **Status** of the planned activity from **Free** to **Released** in the Planned Activities (tsspc2100m000) session or Planned Activity (tsspc2600m000) session.

- You can release a planned activity using the Switch Status Maintenance Plan (tsspc2201m000) session. This session can be accessed directly or using the **Switch Status...** option from the Action menu in the Planned Activity (tsspc2600m000) session.
- For a Planned Activity, you can manually enter a Planned Activity - Material Requirements line in the Planned Activity - Material Requirements (tsspc2110m000) session with **Activity Status** set to **Released** and the **Create Planned Inventory Transactions** check box selected.

Note

- When the Released **Status** of the planned activity is reverted to **Free** or changed to **Canceled** in the Planned Activities (tsspc2100m000) session / Planned Activity (tsspc2600m000) session or using the Switch Status Maintenance Plan (tsspc2201m000) session, the existing PIT is deleted.
- Planned inventory transaction is not created for the planned activity material requirements, if the **Delivery** type field in the Planned Activity - Material Requirements (tsspc2110m000) session is set to:
  - **From Service Inventory**
  - **From Dealer's Inventory**
  - **To Scrap**

Preventive Maintenance via Field Service

When the planned activities are transferred to Field Service and the resulting Service Order is subsequently planned using the Service Order Resource Planning (tssoc2260m000) session, the PIT originally created with **Create Planned Inventory Transactions** check selected in the Planned Activity - Material Requirements (tsspc2110m000) session, is removed. After the planned activity PIT is removed, the **Planned Inventory Transactions Created** check box is cleared.

Preventive Maintenance via Depot Repair

When a planned activity is transferred to Depot Repair, a part Maintenance Line with a work order (activity) linked to it, is generated. When the work order activity is planned, before the PIT is created, a check is to be performed for existing PITs for the planned activity that the work order activity originate from. If available, the existing Planned Inventory Transaction linked to the planned activity must be cleared first, before the PIT for the Work Order Material Resource line is created.

Update ‘Create PIT’ on Planned Activity Material Requirements

When the **Create Planned Inventory Transactions for Planned Activities** check box is modified (selected/cleared) in Items - Service (tsmdm2100m000) session, a range of Planned Activity Material Requirements containing the modified item can be updated using **Update Planned Activities** option from the Action menu.

You can access the Set 'Create Planned Inventory Transactions' on Planned Activities (tsspc2210m000) session using **Update Planned Activities** option from the Action in the Planned Activity (tsspc2600m000) session.

Warehouse Transfer Orders

As part of handling logistic for work orders, warehouse orders and planned inventory transactions are generated. The warehouse transfer orders are generated for the following scenarios:

- For the Maintenance Sales Order - Part Maintenance Lines (tsmsc1110m100):
  - **Receipt Warehouse** to **Work Order Warehouse**.
  - **Work Order Warehouse** to **Warehouse**.
- For the Work order generated using the **Generate Work Order** option from the Action menu in the Service Order Actual Material Costs (tssoc2121m000) session: **Actual Warehouse** in the Service Order Actual Material Costs (tssoc2121m000) to **From Warehouse** in the Work Orders (tswcs2100m000) session.
- For the follow-up Work order generated using **Transfer to Department** option from the Action menu on Work Orders (tswcs2100m000) session : **To Warehouse** of the original Work Order to the **From Warehouse** of the follow up Work Order.
- For the Work Order Outgoing Subassemblies (tswcs4150m000): When Action is **To Department** a follow up work order is created for the subassembly item. Transfer order is from **Warehouse** in the Work Order Outgoing Subassemblies (tswcs4150m000) to the **From Warehouse** in the follow up Work Orders (tswcs2100m000).
- For the Work Order Incoming Subassemblies (tswcs4151m000): Incoming subassemblies are used to incorporate the subassembly again after they are disassembled by an outgoing subassembly. When follow up work order was created on the outgoing subassembly the transfer order on the related incoming subassembly is from **To Warehouse** on the follow up Work Orders (tswcs2100m000) to the **Warehouse** on the Work Order Incoming Subassemblies (tswcs4151m000).

Note

Only if the delivery and receipt warehouses are different, Infor LN creates a warehouse transfer order in the Transfer Order Attributes (tstdm3100m000) session. The session holds all the warehouse related data. When warehouses are the same, no warehouse transfer order is generated. For example, a follow up work order can be generated and the From Warehouse on the follow work order is the same warehouse as the warehouse on the original work order where the item is received, then no transfer order is required.

Defining data for transfer orders

The field **To Warehouse** is available in various Service sessions. The transfer order can be generated from these sessions. You can use the Transfer Data option from the action menu to access the Transfer Order Attributes (tstdm3100m000) session.

Note

The transfer order option is applicable only if a record is available in the Transfer Order Attributes (tstdm3100m000) session, for the related data.

Planned Delivery Date and Planned Receipt Date

The Planned Delivery Date for the transfer order is defaulted with the time and date, the item is received (or planned to be received) in the warehouse. The Planned Receipt Date of the transfer order is calculated based on the time required to transport the item from the delivery warehouse to the receipt warehouse.

Updating Warehouse Orders and PIT

If the warehouse orders are not processed, the data used for creating these Warehouse Orders can be updated.

If the warehouse is changed, the warehouse order for the existing warehouse must be deleted. Infor LN creates a warehouse order for the new warehouse. In case of transfer orders, if the ‘To Warehouse’ of the transfer order is changed to the ‘From Warehouse’, the transfer order is no longer required. When this warehouse is changed and set to a value other than the ‘From Warehouse’, a transfer order must be created again.

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, Bing Maps or Google Maps. 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 use the **Use Provider for Distance Calculations** check box in the Service Planning Parameters (tsspc0100m000) to specify a web service based GPS such as Bing Maps or Google Maps to calculate the distance.
- 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 × R × atan2(va, v(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. You can define the time constraints using the **Respect Earliest Start Time** and **Respect Latest Finish Time** check boxes in the Group for Service Orders (tsspc3600m000) 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 in the Group for Service Orders (tsspc3600m000) session. To do so:
  - Modify the sequence numbers.
  - Select the **Keep Sequence of Activity Sets** check box.
  - Re-plan the route.

  Consequently, 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.

Working with Plans

The user can select a territory plan from the 'Select' field on the planning A or planning B. The user can also view the territory plan based on the preferred engineer or territory by setting the value in the 'Based on' field.

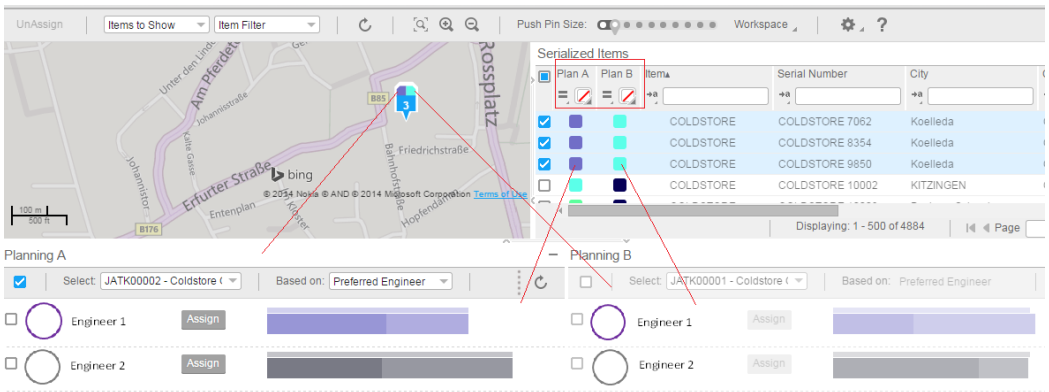
Single Plan

When a single plan is selected, the reference points, serialized item, preferred engineer, location of the engineers related to that Plan, are visible on the Map.

Comparing Plans

In a comparison scenario where both Plan A and B are selected by the user, the data on the left represents Plan A and right side represents Plan B. There are generally two such representative items:

- Serial items on map
- Serial items on grid

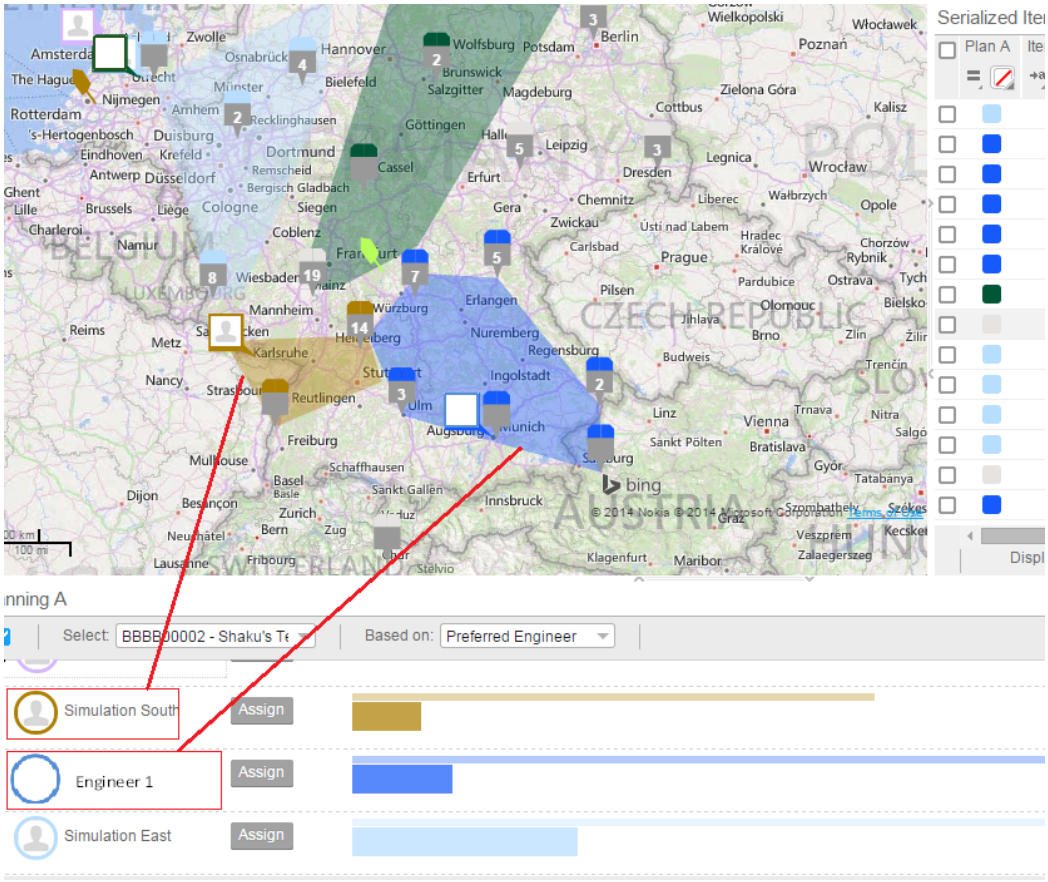


- **Role of colour in Comparing two plans**
  Colours are used predominately to identify the serialized items with an assigned engineer or a territory. All the assigned serialized items are of the same colour as the engineer/territory that the items are assigned to.

  To compare two plans:
  - Select a territory plan from planning A
  - Select a territory plan from planning B
  - Set the plan to active
  - Change the 'Based on' value as required. This changes the 'Based on' value for the other plan.
  - Based on the selected plan, the plan A and B color columns are displayed that denote the color code of the assigned engineer/territory. If the column is Not Applicable, the color column can have a 'No Color' value.

Convex Hull

The Convex hull is a geographically bound, colored area that denotes the region in which an Employee/Territory is assigned with serials. This helps the user to effectively plan and assign/unassign the serials in that area.



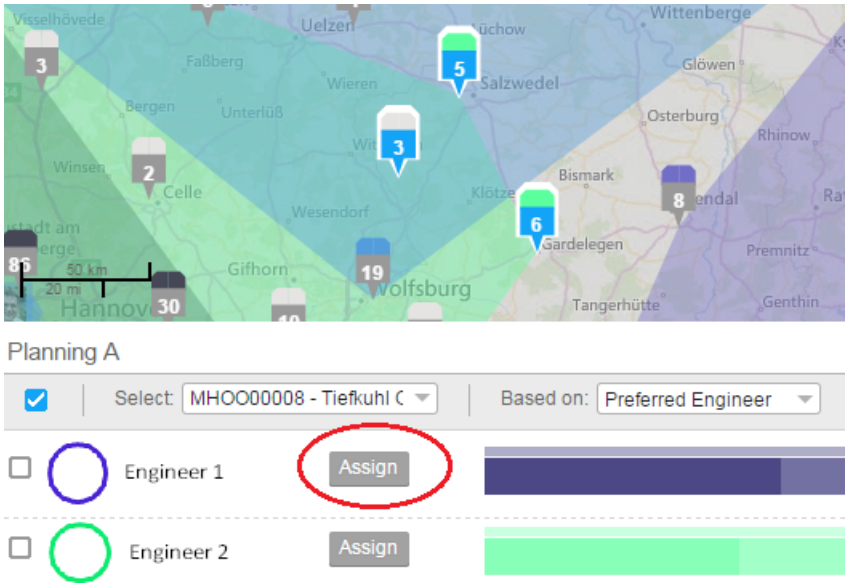
Note

The Convex Hull, the Engineers, the Reference points and the Center of gravity that are marked on the map are relating to the ‘Active’ plan. Example, When Plan B is active (the checkbox is selected), the items pertaining to the engineers in Plan B are displayed. When Plan A is activated, the Plan A data is displayed.

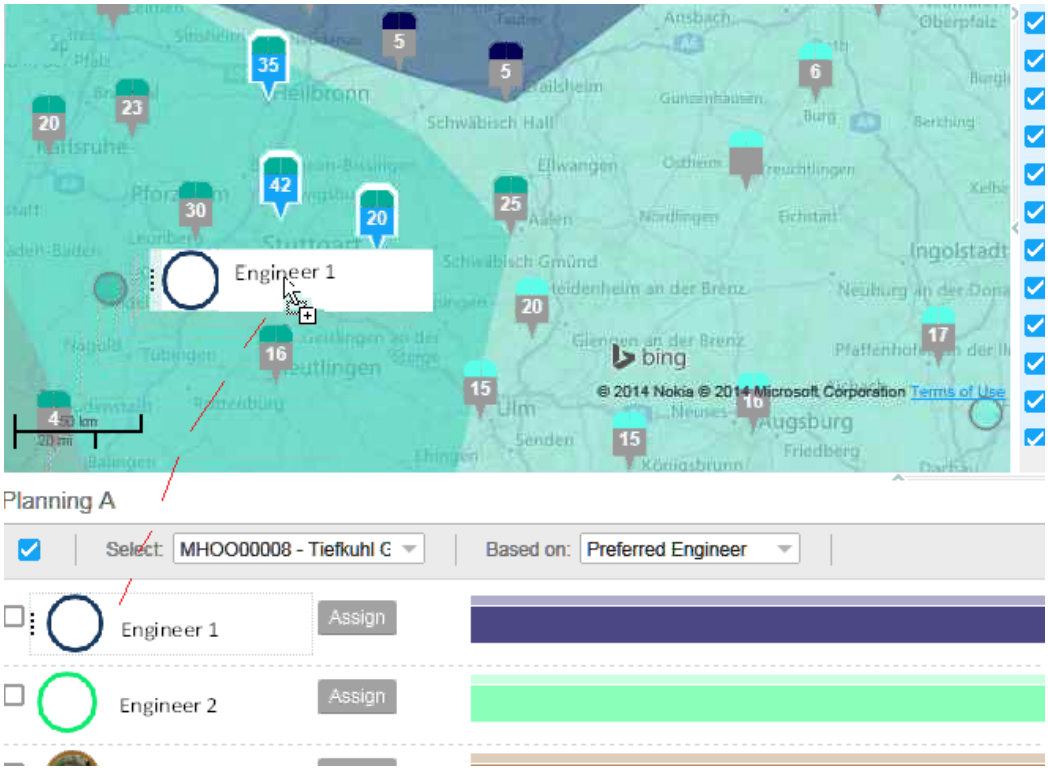
Assign/Unassign Resource and Impact Analysis

Assign Resource

User can assign a resource to a single item or a group of serialized items. The user must select the serials to be assigned to an engineer, from either the map or from the grid and assign the serials using:

- Assign Button - The user can click the Assign option provided for each resource in the resource chart.
- 

- Drag Drop - The user can drag and drop the employee from the resource chart on to the map.

- 

Unassign Resource

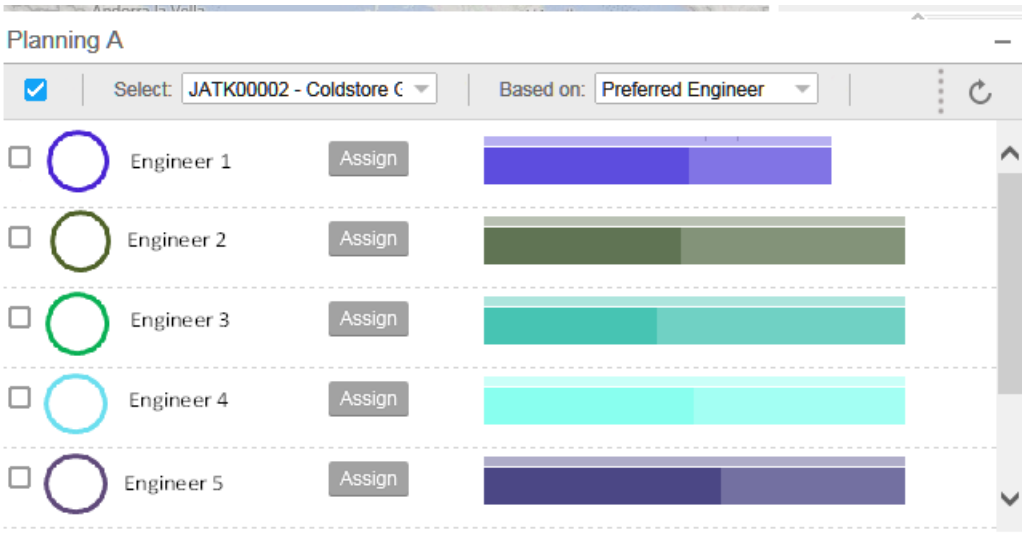
- You can use this option to un-assign an engineer from the selected serialized item. This unassign button on the toolbar is enabled:
  - When a serialized item(s) which is already assigned to an engineer is selected .
  - When the selection does not contain items from both Plan A and Plan B

Note

The Assign/unassign option is used only for the serials that belong to an active territory planning.

Working with Chart

The resource chart provides the user with a snapshot of Available capacity, Workload and travel time information, for each resource.



- Active: This check box indicates that the plan is active. Only one plan can be active, at any given point of time. When a plan is active:
  - The engineers, the center of gravity, reference points and convex hull is displayed on the map, for this plan.
  - The Assign button is enabled for the resources available in the active plan.
  - The Drag drop is enabled for the resources available in the active plan.
- Select: This field displays a list of all the territory plans. Only one plan can be selected at a time.
- Based On: You can set this field to Preferred Engineer or Territory. Based on the selected value, the workbench displays the respective data. This value can only be modified for the active plan and the same value is applicable to the inactive plan in the comparison mode.
- Refresh: The refresh button helps the user in impact analysis. For more information refer to Impact Analysis section.
- Selection: If this checkbox is selected, all the assigned items for this resource are selected on the map and grid. A user can select multiple resources.
- Graph: The graph displays the capacity for the engineer in various sections (displayed with shades of the same color). Tooltip displays the capacity type.

Impact Analysis

The user can perform an impact analysis for an assignment scenario to determine the impact on the capacity of the various engineers, in the plan. To perform this action, the user has to:

- Select the serials to be assigned from Map or grid
- Click on the Refresh button on the Planning section's toolbar.

The impacted capacity is calculated and displayed as selected capacity. If you modify the selection, the chart is reset to original capacity.

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 Resource Planning Parameters (tsspc0101m000) 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 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 Requirements (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 Resource Planning Parameters (tsspc0101m000) 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** fields in the Resource Planning Parameters (tsspc0101m000) 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 Resource Planning Parameters (tsspc0101m000) 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 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 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 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 true.

Workload leveling (scheduling)

For group planning, workload leveling is used to define the number of groups that must be generated for a combination of planning attributes scheduled in parallel. Workload leveling creates multiple groups for one combination of these attributes. For schedule-based workload leveling, the planned start and finish times of the activities are used to distribute the activities across the groups in a group set.

Schedule-based workload leveling comprises of:

- **Selecting the activities**
  Select all the activities for which workload leveling process is to be executed. The selected activities are moved to another group for the workload leveling except:
  - Frozen and firm planned groups
  - Frozen and firm planned activity sets
  - Firm planned activities
- **Sorting the activities**
  Sort the selected activities. The first sort criterion is group set. Within each group set the activities are sorted based on start/finish dates. Activities are sorted, based on:
  - Earliest start time
  - Planned start time
  - Latest start time (calculation of the latest start time of an activity is based on the latest finish, the activity duration, applicable calendar, availability type and the time zone).
  - Planned finish time
  - Latest finish time

Note

If the start date is not specified, the value in this field is defaulted as zero. If the finish date is not specified, the maximum possible value is considered. The activities without a start date are always scheduled first in a plan and activities without a finish date are scheduled last.

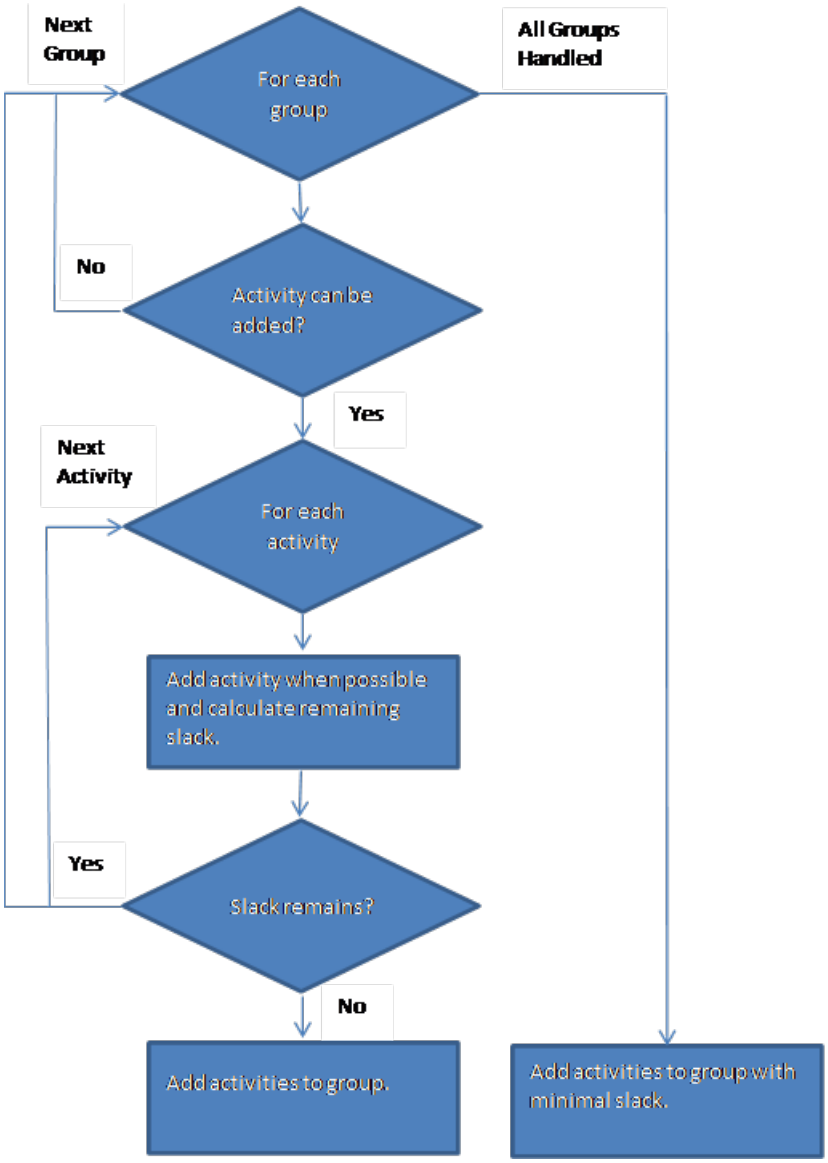
- **Distributing activities over groups**
  The selected activities are distributed across the groups in a group set. Each activity is added to the group with the earliest finish time. The finish time of the group is updated, accordingly. The process continuous until all the activities are added to a group.

  When an activity is shifted or scheduled to an earlier date/time or later date/time, the planned start time and the planned finish time is updated.

Note

If the **Respect Earliest Start Time** check boxes are selected for service order, work order and planned activities in the Resource Planning Parameters (tsspc0101m000) session, an activity can never start before the earliest start time, specified for the activity.

The process of schedule based workload leveling is:



When the **Respect Earliest Start Time** check boxes are selected for the service order, the work order and the planned activities in the Resource Planning Parameters (tsspc0101m000) session, an activity always starts at the latest finish time of the group to which the activity is added. At the time of adding activity to a group, if the earliest start time of an activity is not considered, no slack occurs. After the activity is added, the process continues for the subsequent activities.

When the **Respect Earliest Start Time** check boxes are cleared for service order, work order and planned activities in the Resource Planning Parameters (tsspc0101m000) session, an activity can be started before the earliest start time. Effectively, a slack may occur after adding the activity to a group.

Handling Slack

Handling slack is part of the workload leveling process. Slack may occur after adding an activity to a group. When the **Respect Earliest Start Time** check boxes are cleared for service order, work order and planned activities in the Resource Planning Parameters (tsspc0101m000) session, an activity can be started before the earliest start time. Effectively, slack may occur after adding the activity to a group.

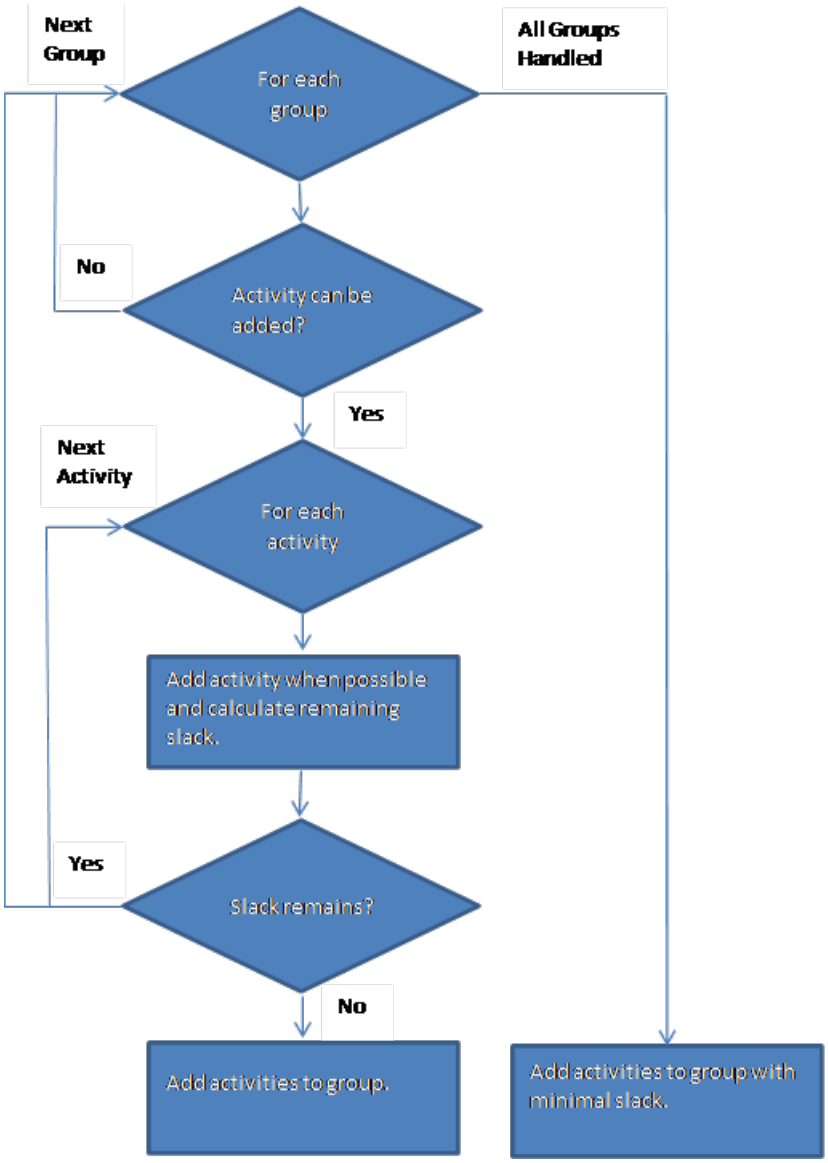
If the respect earliest start time check box is selected, the slack may occur and the slack algorithm is used to assign the activity. The algorithm manages the slack by scheduling activities that are not workload leveled. The slack algorithm is a two step process:

1. Selecting the groups to which the activities are added. The activities must start as early as possible. Therefore activities can be added to only those groups that has finish time earlier than or equal to the earliest start time of the activity.
2. Infor LN implements slack algorithm to minimize the slack for each of the selected groups. All the activities that are not yet workload leveled, are considered and for each activity Infor LN checks if the activities can minimize (partly) the slack. The slack algorithm can be considered complete when:
   - all the activities are checked and no more activities are available to minimize the slack.
   - the slack is completely filled.

Note

The slack calculation is not applicable when the **Sort Method** for service order, work order and planned activities is set to **Earliest Start** in the Resource Planning Parameters (tsspc0101m000) session. The activities are sorted by the earliest start time and hence, no activities are available to fill the slack.

The process of handling slack is:



Workload leveling and modification in the plan.

When loading a new plan

Workload leveling can be performed at the time of creating a new plan. The leveling is performed directly after the activities are loaded. With or without workload leveling, the parallel planning attributes define the groups that are created when a new plan is created. However, without workload leveling, only one group is created for each unique combination of parallel attribute values. With workload leveling, a group set and a group are created for each unique combination of parallel attribute values.

When a new plan is created in combination with workload leveling, the created groups may or may not be part of group sets. Possibly, stand-alone groups are also created. So a new plan can include one or more group sets and one or more stand-alone groups.

The modifications that must be implemented are:

- When the group for an activity is available, Infor LN tries to find a matching attribute set for the group that must be used for workload leveling.
  - When matching attribute set for the group is not available, the group set is also not available. Hence, Workload leveling is ignored.
  - When matching attribute set for the group is available, the group set is also available, Hence, Workload leveling must be performed.

Note

All the activities are currently linked to a single group. When all the activities are loaded, workload leveling is performed. The parallel planning attributes are considered for both; the group set and the group.

When adding activities to an existing plan (re-generate plan)

For a plan, the group sets with multiple groups may exist. The new activities are always added to the first group of a group set. So after loading the new activities, the plan includes existing and new activities.

When new activities are added to the existing plan, the workload leveling is different from the workload leveling performed for a new plan. Following are the possible scenarios:

- Group sets with only one group - These group sets are created when the new activities are loaded. The workload leveling process in this scenario:
  - Create new groups.
  - Distribute the activities of each group set across all groups of the group set.
- Group sets with multiple groups to which no new activities are added. No changes are made to these groups.
- Group sets with multiple groups to which new activities are added. The workload leveling process in this scenario:
  - Check whether new groups must be created for the group set.
  - Distribute the new activities in the group set across all groups of the group set.

When adding activities to an existing plan (keep existing plan)

When new activities are added to an existing plan and the existing plan is not modified (except from adding new activities), Infor LN searches for the correct group for this activities. If the group is available, Infor LN must check:

- If the group is part of a group set . The group in the group set with the earliest finish time is selected. The activity is added to this group.
- If, the group is not part of a group set. The activity is added to this group.

When planning the activities

- The activities in an activity set are sorted before the activities are planned. When workload leveling is performed, the activities can be sorted based on the earliest start time, planned start time, planned finish time and latest finish time. When activities are planned, a new sorting option, the latest start time is included. The latest start time of an activity is calculated from the latest finish time and the activity duration. When the activity is planned backwards from the latest finish time, the latest start time is available. **Note**: The calendar, availability type and time zone of an activity is used to calculate the latest start time.
- When the **Respect Earliest Start Time** check boxes for service order, work order and planned activities are not selected in the Resource Planning Parameters (tsspc0101m000) session, slack may occur between two activities. In this case, the slack algorithm must be performed to minimize the slack as much as possible. **Note**: The difference in running the slack algorithm for workload leveling and during the planning process is:
  - For the planning process, the slack is minimized using the activities in the same activity set. As a result, an activity can never be moved to another activity set or another group.
  - For workload leveling, the slack is minimized using the activities that are not yet assigned to a group. As a result an activity can be moved to another activity set or another group.

Time based work load leveling and scheduling

For time-based workload leveling, the planned start and finish times of the activities are used to distribute the activities across the groups within a set of groups.

Infor LN sorts the activities based on the latest finish time and assigns the activities with the 'earliest' end date, first.

Example

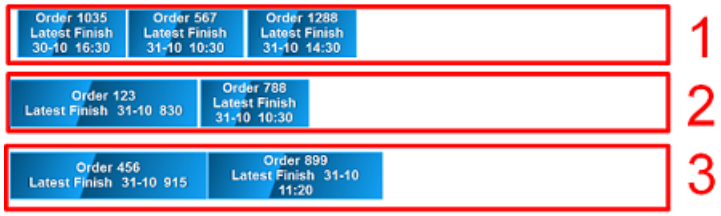
The seven activities (sorted by the latest finish time) for which workload planning must be performed. Three engineers are available to work on these activities.

Order 1035 has the earliest end date so this activity is assigned to group 1.

Activities are assigned to group 2 and 3, subsequently. Each time, an activity is assigned to a group, the end time of the group is considered.

The end time of group 1 is the earliest. Therefore, the subsequent activity is assigned to group 1.

The end time of group 2 is the earliest followed by group 3. Therefore, the subsequent activities are assigned to group 2 and 3, in that order.



Time based – scheduling with slack optimization 'respect earliest'

If the **Respect Earliest Start Time** check boxes for service order, work order and planned activity, are selected in the Resource Planning Parameters (tsspc0101m000) session, there can be a gap or slack in the plan. You can manage the slack to a minimum. At the time of adding the activities to the group, the group with the minimal slack is preferred. Therefore, the selection of the group may differ from the one specified in the above example.

Example

The activity of order 567 can be assigned to group 1,2 or 3. When the activity is assigned to group 2, the slack is less when compared to slack time for group 1 and 3. Therefore, adding the activity to group 2 is preferred.

However, this may create more slack if other possibilities are not considered. Therefore, Infor LN checks whether for the other options which can also minimize the slack. The other options are, to assign the activities at the beginning of the slack period and before

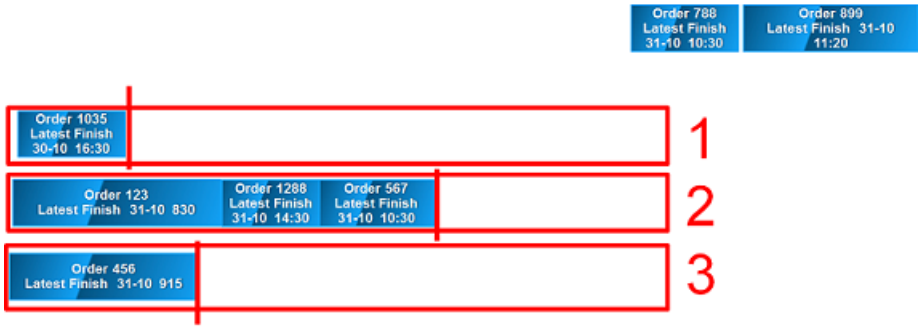
- - the earliest start moment of order 567
- - The latest start moment of order 567 in which case (latest start moment = latest finish – duration).

Consider that, the order 567 can be assigned to group 1, 2 or 3 with slack . Assume that order 567 cannot move into the future because of the latest finish time.

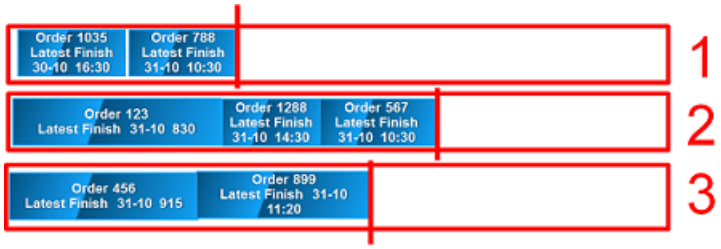
The Infor LN checks 3 options:

- The remaining slack after Infor LN fill the slack in group 1 - The remaining slack, after filling the slack period with other activities that fit in the slack period,10 minutes
- The remaining slack after Infor LN fill the slack in group 2- This is not possible to schedule 'to be planned' activities in the slack 2 period. Remaining slack is, 1 hour.
- The remaining slack after Infor LN fill the slack in group 3- Order 1288 fits exactly, making the remaining slack 0 minutes and therefore, group 3 is the preferred option for order 1288, followed

by the constrained order 567.



After minimizing the slack, the normal logic resumes:



Respect latest

The respect latest time has less influence on the planning than the respect earliest time, since the planning logic is based on “plan forward”.

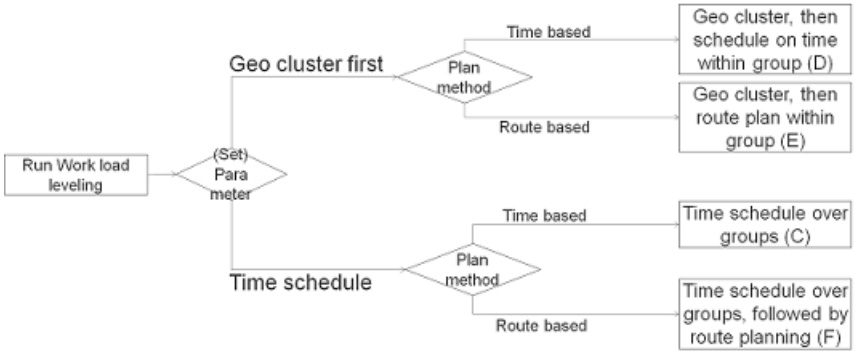
- If the **Respect Latest Finish Time** check boxes for the service order, work order and planned activity are selected in the Resource Planning Parameters (tsspc0101m000) session, Infor LN allots the activity into the plan and display a warning message when the latest finish time is exceeded.
- Infor LN allots the activity to the plan only when the latest finish time can be respected. Else, the activity is listed as exception.

Route based work load leveling and scheduling – regenerative

When the workload leveling is executed geographically, the engine calculates the length of the route, for each group.

The objective of dividing the work based on geographical area, is to divide the map first in geographical 'clusters' and later schedule or route plan within the cluster.

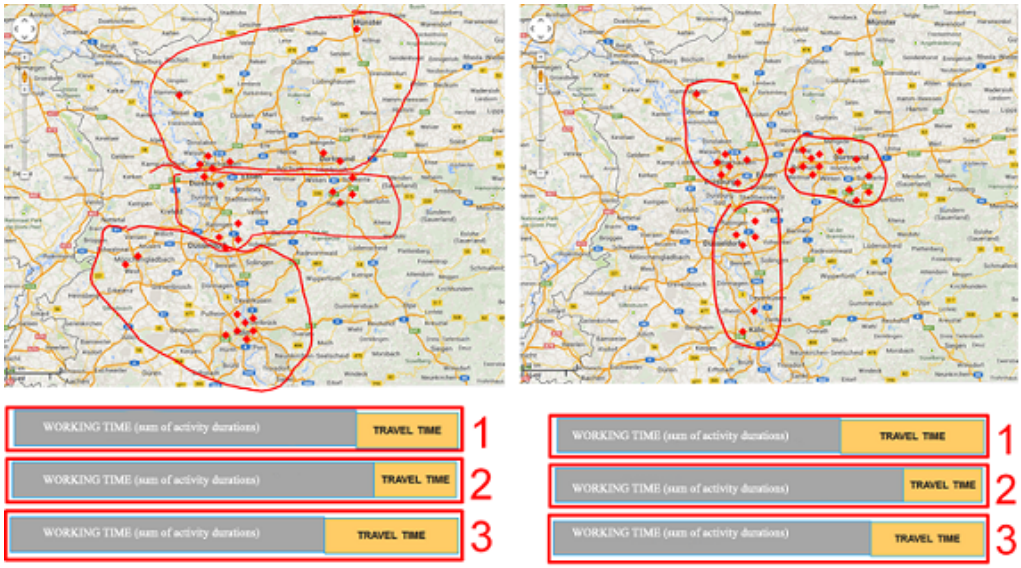
When the sequence of the time schedule is respected by route planning, the Time Schedule based and Route Based planning is not applicable. The route planning therefore continues in a 'keep sequence' mode. The distance between the activities is calculated by the route planning routine, but the sequence is NOT optimized to minimize the distance.



Geographical clustering of jobs

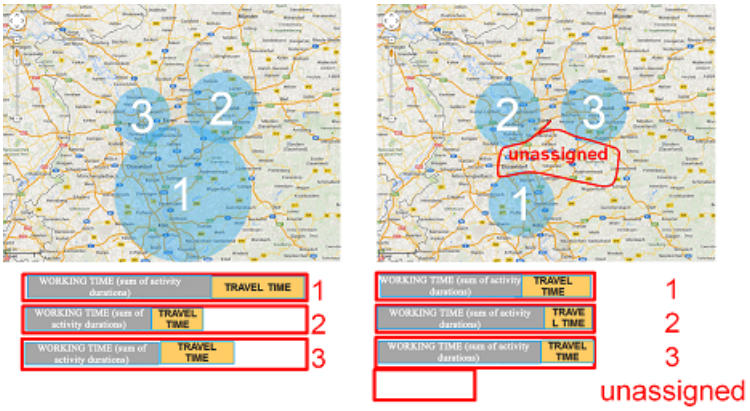
All the activities for which work must be performed are grouped together as a cluster to which the engineers are assigned.

Infor LN, calculates the cluster, dynamically. This depends on where the work load is (geographically), and which determines the composition of the cluster. The planning engine that calculates the cluster is already in use for the territory planning and is available for group planning. In the picture on the left, represents the work load for Wednesday and picture on the right, represents the work load for Thursday. The enginee calculates the various geographical clusters.



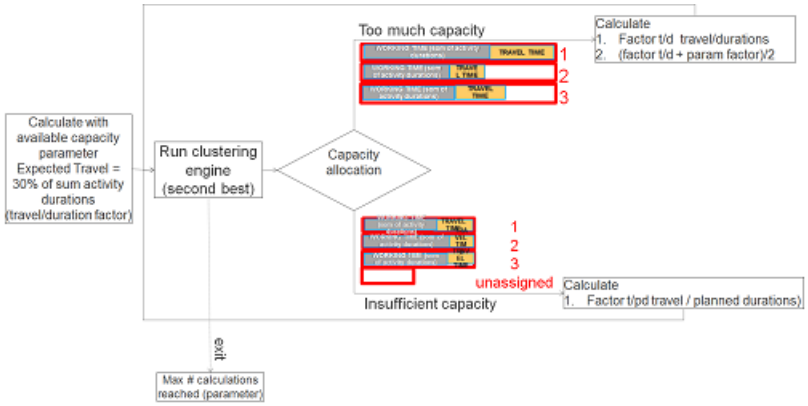
Assign to closest engineer versus work load leveling – find average available capacity for clustering engine

In the above image, the workload per group is ideally distributed over the various groups. However, the engine always tries to balance the available capacity with the minimal travel time. When capacity is infinite, the cluster engine allocates an activity to the engineer, who is closest, geographically. When sufficient capacity is not available, a number of activities remains unallocated. Both the scenarios are not the preferred solution. Therefore, the user has to manually set the allocation and influence the distribution. 

When there is more capacity (picture on the left), one group (1) may get too many activities allocated and the other groups (2,3) less. On the other hand, groups 1,2,3 can be fully booked with activities remains unassigned.(Picture on the right) 

To achieve a reasonable distribution, the engine consider the travel/duration factor. The travel time is compared to the working time (i.e. the sum of the durations). The engine uses a group setting to allocate a resource based on the estimated travel time. This may result in a over- or under-capacity situation. In an 'over capacity' situation, the engine reduces the travel duration factor using the formula (the input travel-duration ratio) + (resulting travel-duration ratio)/2. In an under capacity situation, the resulting travel-duration ratio is used as the next option. You can set the **Number of Iterations** in Resource

Planning Parameters (tsspc0101m000) session to restrict the impact on performance.



Re work load level – time based

The re-work load leveling functionality is implemented only when one set of attributes are selected.

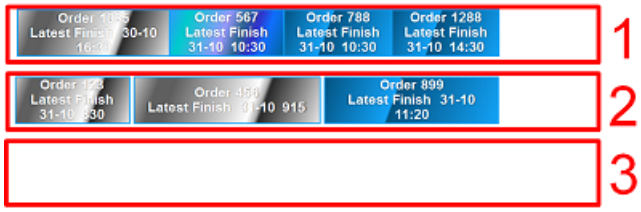
For example, the user selects one group with reference point (Essen) and skill (Support). The engine checks for non frozen groups with the same characteristics. If present, the number of non frozen groups leads to the default number of groups, as output. The number of groups input must equals the number of groups output. However, this is not mandatory. The number of parallel groups can be increased or decreased. A part of the group can be firm planned (as some part of the group is already completed). The system levels the work load from the firm planned point onwards, in the group.

Let us assume that the part of the activities is completed and marked as firm planned in the groups. However, in group 1 the activity is running late and in group 2 the order was completed earlier as expected. The planning has not been executed, so far.

When executing the work load leveling, the engine removes the not-firm planned activities from the groups and starts re-allocating the activities. The first activity to be allocated is order 567. Group 2 is available first, therefore the activity is added to group 2. The earliest end times are checked every time (or the minimal slack with respect earliest on) and this leads to the following end result.

In the image above, owing to the work load leveling, jobs allocated to group 1 and 2 are now different. Assuming an employee reports sick in the morning, the capacity must be decreased from 3 parallel tracks (groups) to 2. The firm planned activity from group 3 is manually moved to group 2.

The end result for the 2 parallel groups is:

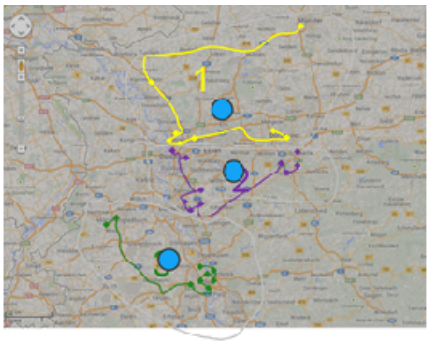
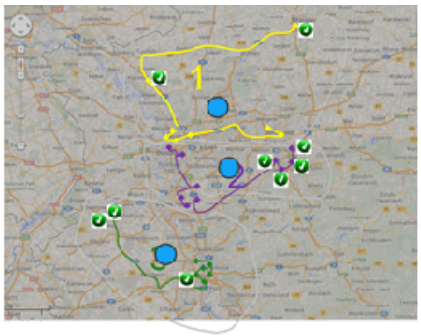


Re work load level – route based

The existing groups are executed in a specific region and in the region, the planner aims to achieve the highest possible match to the times agreed with the customer. However, the engineer is already driving in a specific area and must stay there as much as possible to avoid the travel. The area in which the service engineer is working, is marked by the Center of Gravity of the cluster calculation. This point is the average GPS longitude and latitude of the activities in the group, represented by the blue dots on the map.

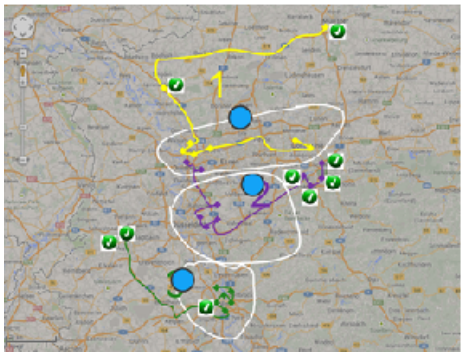
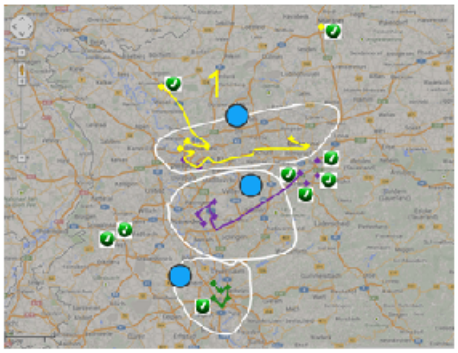
In the selected areas, routes are calculated according to the route planning algorithm. Since the plan is already in execution, generating a new plan is not considered, represented by the 'check' marks in the

picture on the right. The next activity is already frozen because the engineer has started working on the activity.

Therefore only the not-firm planned activities can be rescheduled and re-leveled. The engine considers the existing Center of Gravity to allocate the activities. When the capacity end point of the firm planned activities is roughly equal, the engine re- clusters.

This leads to the situation indicated by the white lines in the picture on the left (with the original routes for reference). After implementing route calculation, in the newly calculated clusters, the route planning connects the firm planned activities. This is shown in the picture on the right.

INCLUDE: Material Availability in Group Planning [baanerp_ts_onlinemanual_000624]

Start Travelling on Start Time

The availability of the engineer can be calculated more accurately, if the time taken by the engineer to travel to the location of the first activity is considered during the planning of the activities.

The **Start Travelling on Start Time** and the **Start Address of Route** parameters in the Resource Planning Parameters (tsspc0101m000) session determine whether engineers start the travel to the location of the activity at the specified **Planned Start Time** or travel to the location in advance and start working on the activity at the **Planned Start Time**.

Note

The **Start Travelling on Start Time** parameter can be set only if the **Plan Method** is set to **Planning Based on Route** in the Resource Planning Parameters (tsspc0101m000) session.

The start address can also be considered as the finish address if the (service) engineer returns to this address. To record the travel information from the last activity on the route to the finish address, a travel activity is created with zero activity duration with travel duration and travelling times specified.

Start Address of the Route

The **Start Address of Route** parameter defines the start location for the route of the engineer. This parameter can be set to:

- **At Company Address**
- **At Department Address**
- **At Employee Home Address**
- **At First Activity** (default value)

The possible scenario:

- **At Company Address**: The route starts at the company address. The travel time from the company to the first activity and the travel time from the last activity to the company are planned separately. Therefore, ‘travel activity’ (the time taken by the engineer to travel to the first activity) is included in this scenario.
- **At Department Address**: The route starts at the (service) department. The travel time from the department to the first activity and the travel time from the last activity to the department are planned separately. This option is applicable when the Department is an attribute of the group or activity set. **Note**: If Department is not an attribute for a group, the ‘travel activity’ is not included.
- **At Employee Home Address**: The route starts at the Employee's home address. The travel time from employee’s home to the first activity and the travel time from the last activity to the employee’s home are planned separately. **Note**: This option is applicable only when an engineer is allocated to the group, in which case, the ‘travel activity’ is included.
- **At First Activity**: The route starts at the first activity and ends at the last activity. The travel time before the first activity and travel time after the last activity are not considered for planning. The ‘travel activity is not included in this scenario.

Calculation of a route and travel times

A route is constructed based on the locations of the activities of a group. Optionally, a start address can be defined for a route. When location address is not specified or when the GPS coordinates are not defined for the location address, the activity cannot be part of the route. As a result, the activity cannot be planned.

Note

To plan a route, the start address is considered only if the GPS coordinates for the address are specified.

The **Start Travelling on Start Time** and the **Start Address of Route** parameters are used to determine the route in these ways:

- **Calculate the shortest route**
  When the **Keep Sequence of Activity Sets** and the **Respect Earliest Start Time**/ **Respect Latest Finish Time** check boxes are cleared, the shortest route between all locations is calculated without checking if the activities start before the earliest start time, or end after the latest finish time. Consequently, an activity can always be planned. This option is used when a route is planned for the first time. The shortest route is defined and all the activities starting before the earliest start or ending after the latest finish time are considered.
- **Calculate a time constrained route**
  When the **Keep Sequence of Activity Sets** check box is cleared and the **Respect Earliest Start Time** or the **Respect Latest Finish Time** check box is selected, the shortest route between all locations is calculated, considering the earliest start and latest finish time of the activities. When the activity duration is not compliant with the earliest start time and latest finish time, a message is displayed and the activity is removed from the route.
- **Calculate a route without changing the order of the activities in the group.**
  When the **Keep Sequence of Activity Sets** check box is selected, after updating the route, a planner can calculate the route again without the route being modified. This option is used when route planning is almost complete.

  In this scenario, the **Respect Earliest Start Time** or the **Respect Latest Finish Time** check box can be selected or cleared. If the **Keep Sequence of Activity Sets** check box is cleared, all the activities, including the one which starts before the earliest start time or end after the latest finish time, are planned. If the **Keep Sequence of Activity Sets** check box is selected, all the activities that start before the earliest start time or end after the latest finish time are not considered during the planning.

  Note: The time constraints are considered only when the **Respect Earliest Start Time** or the **Respect Latest Finish Time** check box is selected.

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

An activity type that specifies an appointment scheduled for a contact, business partner, opportunity, or activity that you want to track through completion. An appointment has invited atttendees.

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.

appropriate menu

Commands are distributed across the **Views**, **References**, and **Actions** menus, or displayed as buttons. In previous LN and Web UI releases, these commands are located in the *Specific* menu.

assignment

A short message, entered by a field engineer, which informs the planner or dispatcher as to whether the field engineer can be paged.

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 quote

A quote 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 standard cost, 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:

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

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 location. 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.

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

A standard measurement that consists of a measuring quantity and a measuring characteristic. The determination of the value of a certain dependent measuring quantity of an item in a specific situation.

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.

reference activity

A group activity or a single activity (directive) that is planned for a serialized item or installation group.

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.

resource requirement

The resource that is required for a reference activity. You can specify resource requirements by using one of the following resource types: **Material**, **Labor**, **Tool**, **Subcontracting**, or **Other**.

return material authorization

Expected return of material from the customer to the service provider.

Acronym: RMA

RMA

See: *return material authorization (p. 200)*

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 location.

service order

Orders that are used to plan, carry out, and control all repair and maintenance on configurations as present on customer locations 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 quote

A service-order quote 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 quote 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.

SRP

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).

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.

tolerance period

The tolerance period can be used to increase the planning period of a reference activity when it is planned.

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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