



Supply Planning in Microsoft Dynamics NAV 2013

Technical White Paper

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SUPPLY PLANNING IN MICROSOFT DYNAMICS NAV 2013

This documentation provides detailed technical insight to the concepts and principles that are used within the Supply Planning features in Microsoft Dynamics NAV 2013.

It explains how the planning system works and how to adjust the algorithms to meet planning requirements in different environments. It first introduces central solution concepts and then describes the logic of the central mechanism, supply balancing, before proceeding to explain how inventory planning is performed with the use of reordering policies.

IN THIS SECTION

[Central Concepts of the Planning System](#)

[Balancing Demand and Supply](#)

[Handling Reordering Policies](#)

[Planning Parameters](#)

[Demand at Blank Location](#)

[Transfers in Planning](#)

CENTRAL CONCEPTS OF THE PLANNING SYSTEM

The planning functions are contained in a batch job that first selects the relevant items and period to plan for. Then, according to each item's low-level code (BOM position), the batch job calls a code unit, which calculates a supply plan by balancing supply-demand sets and suggesting possible actions for the user to take. The suggested actions appear as lines in the planning worksheet or the requisition worksheet.

Warning	No.	Action Message	Accept Action Mes...	Original Due Date	Due Date	Starting Date-Time	Ending Date-Time	Description	Original Quantity	Quantity	Ref. Order Type
	1700	New	☒		27-06-2014	26-06-2014 08:00	26-06-2014 23:00	Brake		100	Prod. Order
	1001	Resched. & Chg. Qty.	☒	24-09-2014	24-12-2014	22-12-2014 14:15	23-12-2014 16:00	Touring Bicycle	3	8	Prod. Order
	1001	Change Qty.	☒		01-09-2014	27-08-2014 11:15	29-08-2014 16:00	Touring Bicycle	17	20	Prod. Order
	1001	Change Qty.	☒		01-12-2014	28-11-2014 11:45	28-11-2014 16:00	Touring Bicycle	10	2	Prod. Order
Attention	1924-W	New	☐		23-01-2014	08-01-2014 08:00	22-01-2014 23:00	CHAMONIX Ba...		13	Assembly
	1100	New	☒		15-11-2014	06-11-2014 13:30	14-11-2014 09:10	Front Wheel		100	Prod. Order
	1850	New	☒		23-07-2014	22-07-2014 08:00	22-07-2014 23:00	Saddle		100	Purchase

The planner of a company, such as a purchaser or a production planner is presumed to be the user of the planning system. The planning system assists the user by performing the extensive but rather straightforward calculations of a plan. The user can then concentrate on solving the more difficult problems, such as when things differ from normal.

The planning system is driven by anticipated and actual customer demand, such as forecast and sales orders. Running the planning calculation will result in the program suggesting specific actions for the user to take concerning possible supply from vendors, assembly or production departments, or transfers from other warehouses. These suggested actions could be to create new supply orders, such as purchase or production orders. If supply orders already exist, the suggested actions could be to increase or expedite the orders to meet the changes in demand.

Another goal of the planning system is to ensure that the inventory does not grow unnecessarily. If demand decreases, the planning system will suggest that the user postpone, decrease in quantity, or cancel existing supply orders.

MRP and MPS, Calculate Net Change Plan, and Calculate Regenerative Plan are all functions within one code unit that contains the planning logic. However, the supply plan calculation involves different sub systems.

Note that the planning system includes no dedicated logic for capacity leveling or fine scheduling. Therefore, such scheduling work is performed as a separate discipline. The lack of direct integration between the two areas also means that substantial capacity or schedule changes will require that the planning is rerun.

PLANNING PARAMETERS

Planning parameters that the user sets for an item or a group of items control which actions the planning system will suggest in the various situations. The planning parameters are defined on each item card to control when, how much, and how to replenish.

Planning parameters can also be defined for any combination of item, variant, and location by setting up a stockkeeping unit (SKU) for each needed combination, and then specifying individual parameters.

For more information, see [Handling Reordering Policies](#) and [Planning Parameters](#).

PLANNING STARTING DATE

To avoid a supply plan that incorporates open orders in the past and suggests potentially impossible actions, the planning system treats all dates before the planning starting date as a frozen zone where the following special rule applies:

All supply and demand before the starting date of the planning period will be considered a part of inventory or shipped.

In other words, it assumes that the plan for the past is executed according to the given plan.

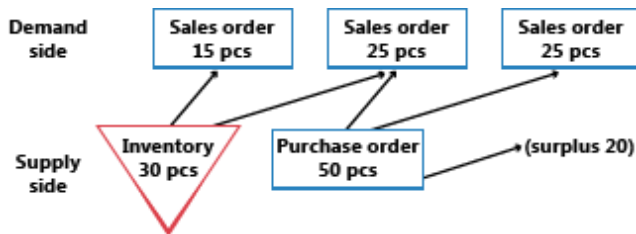
For more information, see [Dealing with Orders Before the Planning Starting Date](#).

DYNAMIC ORDER TRACKING (PEGGING)

Dynamic Order Tracking, with its simultaneous creation of action messages in the planning worksheet, is not a part of the supply planning system in Microsoft Dynamics NAV. This feature links, in real-time, the demand and the quantities that could cover them, whenever a new demand or supply is created or changed.

For example, if the user enters or changes a sales order, the dynamic order tracking system will instantly search for an appropriate supply to cover the demand. This could be from inventory or from an expected supply order (such as a purchase order or a production order). When a supply source is found, the system creates a link between the demand and the supply, and displays it in view-only windows that are accessed from the involved document lines. When appropriate supply cannot be found, the dynamic order tracking system creates action messages in the planning worksheet with supply plan suggestions reflecting the dynamic balancing. Accordingly, the dynamic order tracking system offers a very basic planning system that can be of help both to the planner and other roles in the internal supply chain.

Accordingly, Dynamic Order Tracking can be considered a tool that assists the user in assessing whether to accept supply order suggestions. From the supply side, a user can see which demand has created the supply, and from the demand side, which supply should cover the demand.



For more information, see [Reservation, Order Tracking, and Action Messaging](#).

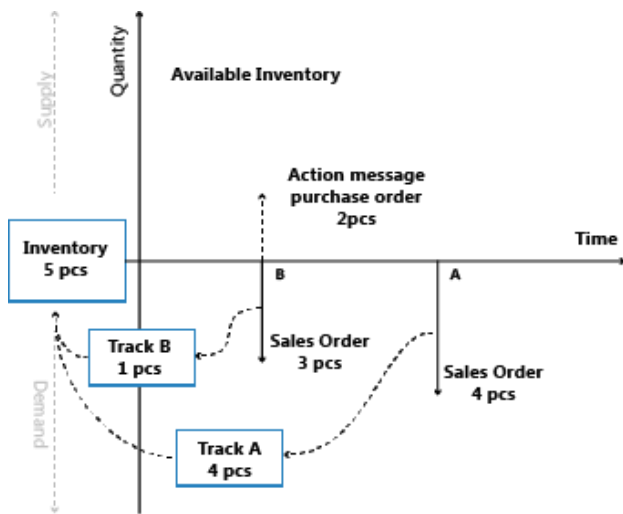
In companies with a low item flow and less advanced product structures, it may be adequate to use the Dynamic Order Tracking as the main means of supply planning. However, in busier environments, the planning system should be used to ensure a properly balanced supply plan at all times.

DYNAMIC ORDER TRACKING VERSUS THE PLANNING SYSTEM

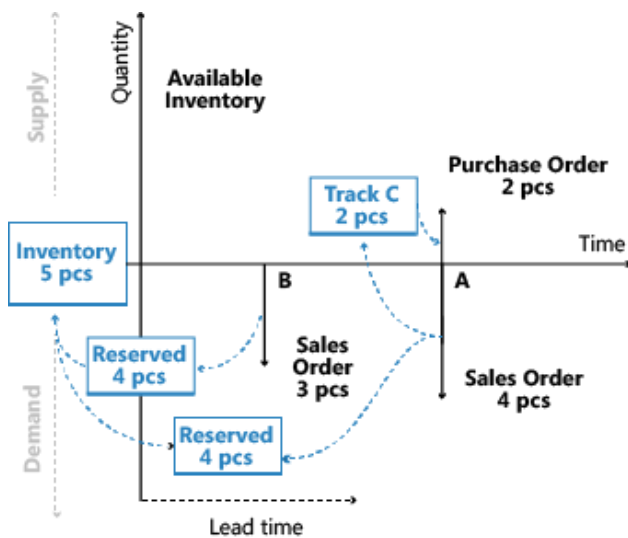
At a quick glance, it may be difficult to differentiate between the planning system and Dynamic Order Tracking. Both features display output in the planning worksheet by suggesting actions that the planner should take. However, the way this output is produced differs.

The planning system deals with the entire supply-demand pattern of an item through all levels of the BOM hierarchy along the time line, whereas Dynamic Order Tracking only addresses the situation of the order that activated it. When balancing demand and supply, the planning system creates links in a user-activated batch mode, whereas Dynamic Order Tracking creates the links automatically and on the fly, whenever the user enters a demand or a supply in the program, such as a sales order or purchase order.

Dynamic Order Tracking establishes links between demand and supply when data is entered, on a first-come/first-served basis. This may lead to some disorder in priorities. For example, a sales order entered first, with a due date next month, may be linked to the supply in inventory, while the next sales order due tomorrow may cause an action message to create a new purchase order to cover it, as illustrated below.



In contrast, the planning system deals with all demand and supply for a particular item, in prioritized order according to due dates and order types, that is, on a first-needed/first-served basis. It deletes all order tracking links that were created dynamically and reestablishes them according to due date priority. When the planning system has run, it has solved all imbalances between demand and supply, as illustrated below for the same data.



After the planning run, no action messages remain in the Action Message Entry table, because they have been replaced by the suggested actions in the planning worksheet

For more information, see Order Tracking Links during Planning in [Balancing Supply with Demand](#).

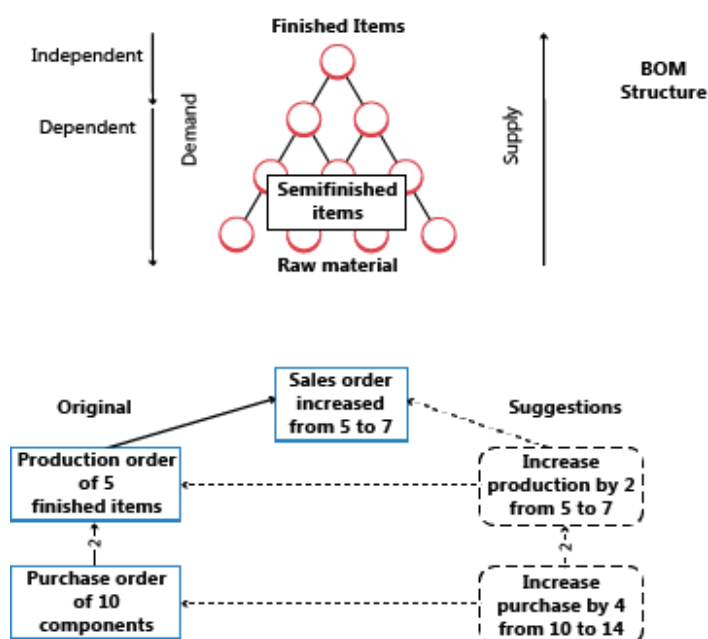
SEQUENCE AND PRIORITY IN PLANNING

When establishing a plan, the sequence of the calculations is important to get the job done within a reasonable timeframe. In addition, the prioritization of requirements and resources play an important role in obtaining the best results.

The planning system in Microsoft Dynamics NAV is demand-driven. High-level items should be planned before low-level items, because the plan for high-level items might generate additional demand for the lower-level items. This means, for example, that retail locations should be planned before distribution centers are planned, because the plan for a retail location may include additional demand from the distribution center. On a detailed balancing level, this also means that a sales order should not trigger a new supply order if an already released supply order is can cover the sales order. Likewise, a supply carrying a specific lot number should not be allocated to cover a generic demand if another demand requires this specific lot.

ITEM PRIORITY / LOW-LEVEL CODE

In a manufacturing environment, the demand for a finished, sellable item will result in derived demand for components that comprise the finished item. The bill-of-material structure controls the component structure and can cover several levels of semi-finished items. Planning an item at one level will cause derived demand for components at the next level, and so on. Eventually, this will result in derived demand for purchased items. Consequently, the planning system plans for items in order of their ranking in the total BOM hierarchy, starting with finished saleable items at the top level and continuing down through the product structure to the lower level items (according to the low-level code).



The figures illustrates in which sequence the system makes suggestions for supply orders at the top level and, assuming that the user will accept these suggestions, for any lower-level items as well.

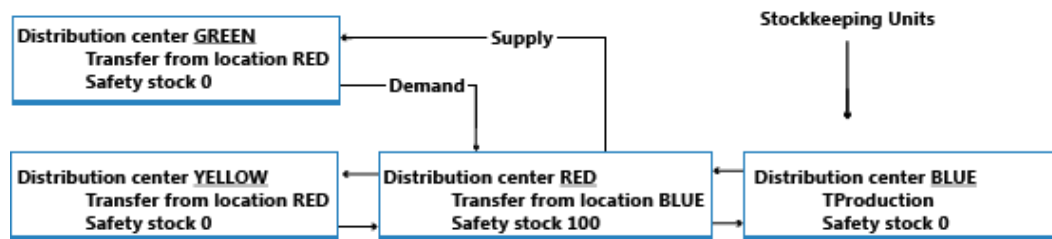
For more information about manufacturing considerations, see [Loading the Inventory Profiles](#).

LOCATIONS / TRANSFER-LEVEL PRIORITY

Companies that operate at more than one location may need to plan for each location individually. For example, an item's safety stock level and its reordering policy may differ from one location to another. In this case, the planning parameters must be specified per item and also per location.

This is supported with the use of SKUs, where individual planning parameters can be specified at the SKU level. An SKU can be regarded as an item at a specific location. If the user has not defined a SKU for that location, the program will default to the parameters that have been set on the item card. The program calculates a plan for active locations only, which is where there is existing demand or supply for the given item.

In principle, any item can be handled at any location, but the program's approach to the location concept is quite strict. For example, a sales order at one location cannot be fulfilled by some quantity on stock at another location. The quantity on stock must first be transferred to the location specified on the sales order.



For more information, see [Transfers in Planning](#).

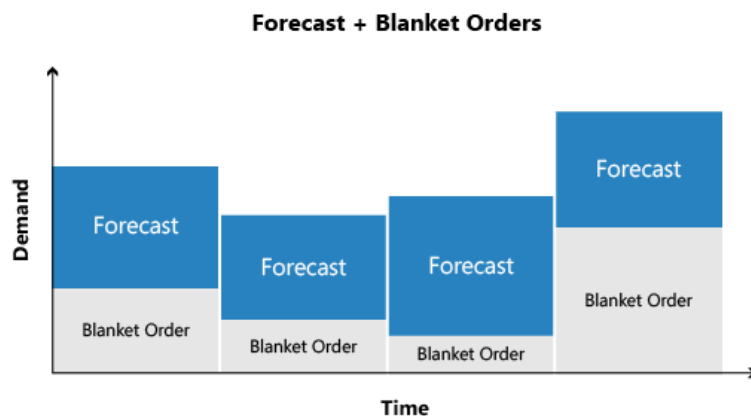
ORDER PRIORITY

Within a given SKU, the requested or available date represents the highest priority; the demand of today should be dealt with before the demand of the coming days. But apart from this some kind of priority, the different demand and supply types are sorted according to business importance to decide which demand should be satisfied before satisfying another demand. On the supply side, the order priority will tell what source of supply should be applied before applying other sources of supply.

For more information, see [Prioritizing Orders](#).

PRODUCTION FORECASTS AND BLANKET ORDERS

Forecasts and blanket orders both represent anticipated demand. The blanket order, which covers a customer's intended purchases over a specific period of time, acts to lessen the uncertainty of the overall forecast. The blanket order is a customer-specific forecast on top of the unspecified forecast as illustrated below.



For more information, see the "Forecast Demand is Reduced by Sales Orders" section in [Loading the Inventory Profiles](#).

PLANNING ASSIGNMENT

All items should be planned for, however, there is no reason to calculate a plan for an item unless there has been a change in the demand or supply pattern since the last time a plan was calculated.

If the user has entered a new sales order or changed an existing one, there is reason to recalculate the plan. Other reasons include a change in forecast or the desired safety stock quantity. Changing a bill-of-material by adding or removing a component would most likely indicate a change, but for the component item only.

The planning system monitors such events and assigns the appropriate items for planning.

For multiple locations, the assignment takes place at the level of item per location combination. If, for example, a sales order has been created at only one location, the program will assign the item at that specific location for planning.

The reason for selecting items for planning is a matter of system performance. If no change in an item's demand-supply pattern has occurred, the planning system will not suggest any actions to be taken. Without the planning assignment, the system would have to perform the calculations for all items in order to find out what to plan for, and that would drain system resources.

The full list of reasons for assigning an item for planning is provided in [Planning Assignment Table](#).

The planning options in Microsoft Dynamics NAV are:

- Calculate Regenerative Plan – Calculates all selected items, whether it is necessary or not.
- Calculate Net Change Plan – Calculates only those selected items that have had some change in their demand-supply pattern and, therefore, have been assigned for planning.

Some users believe that net change planning should be performed on the fly, for example, when sales orders are entered. However, this could be confusing because dynamic order tracking and action messaging are also calculated on the fly. Besides, Microsoft Dynamics NAV offers real-time available-to-promise control, which provides pop-up warnings when entering sales orders if the demand cannot be fulfilled under the present supply plan.

In addition to these considerations, the planning system only plans for those items that the user has prepared with appropriate planning parameters. Otherwise, it is assumed that the user will plan the items manually or semi-automatically by using the Order Planning feature.

For more information about the automatic planning procedures, see [Balancing Demand and Supply](#).

ITEM DIMENSIONS

Demand and supply can carry variant codes and location codes that must be respected when the planning system balances demand and supply.

The system treats variant and location codes as item dimensions on a sales order line, inventory ledger entry, and so on. Accordingly, it calculates a plan for each combination of variant and location as if the combination were a separate item number.

Instead of calculating any theoretical combination of variant and location, the program calculates only those combinations that actually exist in the database.

For more information on how the planning system deals with location codes on demand, see [Demand at Blank Location](#).

ITEM ATTRIBUTES

Apart from general item dimensions, such as item number, variant code, location code, and type of order, each demand and supply event can carry additional specifications in the form of serial/lot numbers. The planning system plans these attributes in certain ways depending on their level of specification.

An order-to-order link between demand and supply is another type of attribute that affects the planning system.

SPECIFIC ATTRIBUTES

Certain attributes on demand are specific and must be matched exactly by a corresponding supply. The following two specific attributes exist:

- Demanded serial/lot numbers that require specific application (specific tracking setup).
- Links to supply orders created manually or automatically for a specific demand (order-to-order links).

For these attributes, the planning system applies the following rules:

- Demand with specific attributes can only be fulfilled by supply with matching attributes.
- Supply with specific attributes can also satisfy demand that does not ask specifically for those attributes.

Accordingly, if a demand for specific attributes cannot be met by inventory or projected supplies, the planning system will suggest a new supply order to cover this specific demand with no regard of planning parameters.

NON-SPECIFIC ATTRIBUTES

Serial/lot-numbered items without specific item tracking setup may carry serial/lot numbers that do not need to be applied to the exact same serial/lot number, but can be applied to any serial/lot number. This gives the planning system more freedom to match, for example, a serialized demand with a serialized supply, typically in inventory.

Demand-supply with serial/lot numbers, specific or non-specific, are considered high priority and are therefore exempt from the frozen zone, meaning that they will be part of planning even if they are due before the planning starting date.

For more information, see the "Serial/Lot Numbers are Loaded by Specification Level" section in [Loading the Inventory Profiles](#).

For more information about how the planning system balances attributes, see the "Serial/Lot Numbers and Order-to-Order Links are Exempt from the Frozen Zone" in [Dealing with Orders Before the Planning Starting Date](#).

ORDER-TO-ORDER LINKS

Order-to-order procurement means that an item is purchased, assembled, or produced to exclusively cover a specific demand. Typically it relates to A-items and the motivation for choosing this policy can be that the demand is infrequent, the lead-time is insignificant, or the required attributes vary.

Another special case that uses order-to-order links is when an assembly order is linked to a sales order in an assemble-to-order scenario.

Order-to-order links are applied between demand and supply in four ways:

- When the planned item uses the reordering policy Order.
- When using the manufacturing policy Make-to-Order to create multi-level or project-type production orders (producing needed components on the same production order).
- When creating production orders for sales orders with the Sales Order Planning feature.
- When assembling an item to a sales order. (Assembly Policy is set to Assemble-to-Order).

In these instances, the planning system will only suggest to order the required quantity. Once created, the purchase, production, or assembly order will continue to match the corresponding demand. For example, if a sales order is changed in time or quantity, the planning system will suggest that the corresponding supply order is changed accordingly.

When order-to-order links exist, the planning system does not involve linked supply or inventory in the balancing procedure. It is up to the user to evaluate if the linked supply should be used to cover other or new demand and, in that case, delete the supply order or reserve the linked supply manually.

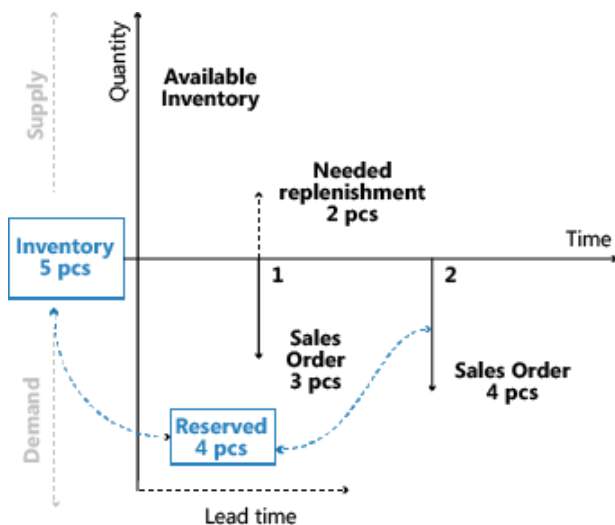
Reservations and order tracking links will break if a situation becomes impossible, such as moving the demand to a date earlier than the supply. However, the order-to-order link adapts to any changes in the respective demand or supply and thereby the link is never broken.

RESERVATIONS

The planning system does not include any reserved quantities in the calculation. For example, if a sales order has been totally or partially reserved against the quantity in inventory, the reserved quantity in inventory cannot be used to cover other demand. The planning system does not include this demand-supply set in its calculation.

However, the planning system will still include reserved quantities in the projected inventory profile because all quantities must be considered when determining both when the reorder point has been passed and how many to reorder to reach and not exceed the maximum inventory level. Consequently, unnecessary reservations will lead to increased risks that inventory levels run low because the planning logic does not detect reserved quantities.

The following illustration shows how reservations can hinder the most feasible plan.



For more information, see [Reservation, Order Tracking, and Action Messaging](#).

WARNINGS

The first column in the planning worksheet is for the warning fields. Any planning line created for an unusual situation will display a warning icon in this field, which the user can click for additional information.

Supply on planning lines with warnings will normally not be modified according to planning parameters. Instead, the planning system only suggests a supply to cover the exact demand quantity. However, the system can be set up to respect certain planning parameters for planning lines with certain warnings. For more information, see the description of these options for the **Calculate Plan - Plan. Wksh.** batch job and the **Calculate Plan - Req. Wksh.** batch job respectively.

The warning information is shown in the **Untracked Planning Elements** window, which is also used to show order tracking links to non-order network entities. The following warning types exist:

- Emergency
- Exception
- Attention

The screenshot displays the Microsoft Dynamics NAV 2013 interface. The main window is titled 'Edit - Planning Worksheet - DEFAULT - Default Journal Batch'. It features a ribbon with tabs for 'Home' and 'Actions'. The 'Home' tab includes icons for 'Delete', 'Get Action Messages...', 'Calculate Regenerative Plan...', 'Refresh Planning Line...', 'Get Error Log', 'Order Tracking', 'Carry Out Action Message...', 'Item Availability by', 'Reserve Dimensions', and 'Routing'. The 'Actions' tab includes icons for 'Item Tracking Lines', 'Components', and 'Routing'. Below the ribbon, there is a 'Name' dropdown set to 'DEFAULT'. The main area contains a table with columns: 'Warning', 'No.', 'Action Message', 'Accept Action Mes...', 'Original Due Date', 'Due Date', 'Starting Date-Time', 'Ending Date-Time', and 'Description'. The table lists several planning lines, including three 'Touring Bicycle' entries and two 'CHAMONIX Base Storage Unit' entries. One entry for 'CHAMONIX Base Storage Unit' has a warning icon in the 'Warning' column. An inset window titled 'View - Untracked Planning Elements' is open, showing a table with columns: 'Source', 'Parameter Value', and 'Untracked Quantity'. The table lists 'Emergency Order' with a parameter value of '13,00' and an untracked quantity of '0,00'. The window also displays a message: 'Emergency: The projected available inventory is -13 on the planning starting date 20-02-14.' The window has a 'Close' button at the bottom right. The main window has an 'OK' button at the bottom right.

Warning	No.	Action Message	Accept Action Mes...	Original Due Date	Due Date	Starting Date-Time	Ending Date-Time	Description
	1001	Resched. & Chg. Qty.	☒	24-09-2014	24-12-2014	22-12-2014 14:15	23-12-2014 16:00	Touring Bicycle
	1001	Change Qty.	☒		01-09-2014	27-08-2014 11:15	29-08-2014 16:00	Touring Bicycle
	1001	Change Qty.	☒		01-12-2014	28-11-2014 11:45	28-11-2014 16:00	Touring Bicycle
Emergency	1924-W	New	☐		19-02-2014	04-02-2014 08:00	18-02-2014 23:00	CHAMONIX Base Storage Unit
	1100	New	☒		05-07-2014	26-06-2014 13:30	04-07-2014 09:10	Front Wheel

Source	Parameter Value	Untracked Quantity
Emergency Order		13,00
Emergency: The projected available inventory is -13 on the planning starting date 20-02-14.		0,00

EMERGENCY

The emergency warning is displayed in two situations:

- When the inventory is negative on the planning starting date.
- When back-dated supply or demand events exist.

If an item's inventory is negative on the planning starting date, the planning system suggests an emergency supply for the negative quantity to arrive on the planning starting date. The warning text states the starting date and the quantity of the emergency order. For more information, see [Handling Projected Negative Inventory](#).

Any document lines with due dates before the planning starting date are consolidated into one emergency supply order for the item to arrive on the planning starting date.

EXCEPTION

The exception warning is displayed if the projected available inventory drops below the safety stock quantity. The planning system will suggest a supply order to meet the demand on its due date. The warning text states the item's safety stock quantity and the date on which it is violated.

Violating the safety stock level is considered an exception because it should not occur if the reorder point has been set correctly. For more information, see [The Role of the Reorder Point](#).



Note

The planning system may have consumed the safety stock intentionally and will then replenish it straight away. For more information, see [Safety Stock May Be Consumed](#).

ATTENTION

The attention warning is displayed in three situations:

- The planning starting date is earlier than the work date.
- The planning line suggests changing a released purchase or production order.
- The projected inventory exceeds the overflow level on the due date. For more information, see [Staying under the Overflow Level](#).



Note

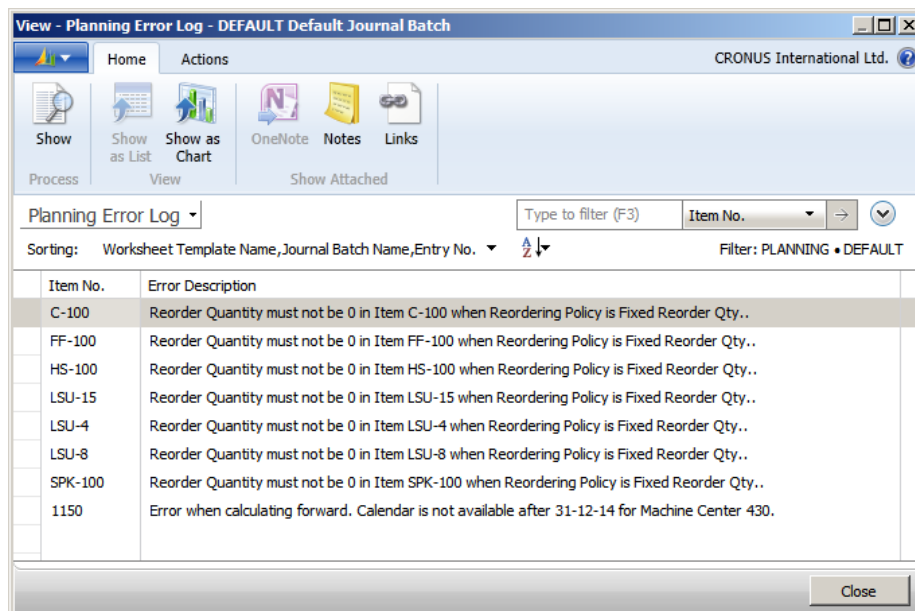
In planning lines with warnings, the **Accept Action Message** field is not selected, because the planner is expected to further investigate these lines before carrying out the plan.

ERROR LOGS

In the Calculate Plan request page, the user can select the **Stop and Show First Error** field to have the planning run stop when it encounters the first error. At the same time, a message is displayed with information about the error. If an error exists, only the successful planning lines that were made before the error was encountered will be presented in the planning worksheet.

If the field is not selected, the Calculate Plan batch job will continue until it has completed. Errors will not interrupt the batch job. If one or more errors exist, the program will display a message after completion saying how many items are affected by errors.

The **Planning Error Log** window then opens to provide more details about the error and to provide links to the affected documents or setup cards.



PLANNING FLEXIBILITY

It is not always practical to plan an existing supply order, such as when production has started or extra people are hired on a specific day to do the job. To indicate whether an existing order can be changed by the planning system, all supply order lines have a Planning Flexibility field with two options: Unlimited or None. If the field is set to None, the planning system will not try to change the supply order line.

The field can be manually set by the user, however, in some cases it will be set automatically by the system. The fact that planning flexibility can be manually set by the user is important, because it makes it easy to adapt the usage of the feature to different workflows and business cases.

For more information about how this field is used, see [Transfers in Planning](#).

ORDER PLANNING

The basic supply planning tool represented by the **Order Planning** window is designed for manual decision making. It does not consider any planning parameters and is therefore not discussed further in this document. For more information on the Order Planning feature, refer to Help in Microsoft Dynamics NAV.



Note

It is not advisable to use Order Planning if the company already uses the planning or requisition worksheets. Supply orders created through the **Order Planning** window may be changed or deleted during the automated planning runs. This is because the automated planning run uses planning parameters and these may not be considered by the user who made the manual plan in the Order Planning window.

FINITE LOADING

Microsoft Dynamics NAV is a standard ERP system, not a dispatching or shop floor control system. It plans for a feasible utilization of resources by providing a rough-cut schedule, but it does not automatically create and maintain detailed schedules based on priorities or optimization rules.

The intended use of the Capacity-Constrained Resource feature is 1): to avoid overload of specific resources and 2): to ensure that no capacity is left unallocated if it could increase the turn-around time of a production order. The feature includes no facilities or options to prioritize or optimize operations as one would expect to find in a dispatching system. However, it can provide rough-cut capacity information useful to identify bottlenecks and to avoid overloading resources.

When planning with capacity-constrained resources, the system ensures that no resource is loaded above its defined capacity (critical load). This is done by assigning each operation to the nearest available time slot. If the time slot is not big enough to complete the entire operation, then the operation will be split into two or more parts placed in the nearest available time slots.



Note

In case of operation splitting, the setup time is only assigned once because it is assumed that some manual adjustment is done to optimize the schedule.

Dampener time can be added to resources to minimize operation splitting. This enables the system to schedule load on the last possible day by exceeding the critical load percent slightly if this can reduce the number of operations that are split.

This completes the outline of central concepts relating to supply planning in Microsoft Dynamics NAV. The following sections investigate these concepts deeper and place them in the context of the core planning procedures, balancing demand and supply as well as the use of reordering policies.

SEE ALSO

[Transfers in Planning](#) | [Planning Parameters](#) | [Planning Assignment Table](#) | [Handling Reordering Policies](#) | [Balancing Demand and Supply](#)

RESERVATION, ORDER TRACKING, AND ACTION MESSAGING

The reservations system is comprehensive and includes the interrelated and parallel features of Order Tracking and Action Messaging.

At the core of the reservation system is the linking of a demand entry and a corresponding supply entry, either through reservation or order tracking. A reservation is a user-generated link, and an order tracking record is a system-generated link. An item quantity that is entered in the reservation system is either reserved or order tracked, but not both at the same time. How the systems handle an item depends on how the item is set up.

The reservation system interacts with the planning system by creating action messages on planning lines during planning runs. An action message can be considered an appendage to an order tracking record. Action messages, whether created dynamically in order tracking or during the planning run, provide a convenient tool for efficient supply planning.



Note

Reserved quantities are ignored by the planning system, that is, the hard link that is made between supply and demand cannot be changed through planning.

The reservations system also forms the structural foundation for the item tracking system. For more information, see the Item Tracking in Microsoft Dynamics NAV 2013 white paper.

For more detailed information about how the reservation system works, see the Reservation Entry Table white paper.

RESERVATION

A reservation is a firm link that connects a specific demand and a specific supply to each other. This link directly affects the subsequent inventory transaction and ensures the proper application of item entries for costing purposes. A reservation overrides the default costing method of an item. For more information, see "Costing Methods".

The **Reservation** window is accessible from all order lines of both demand and supply type. In this window, the user can specify which demand or supply entry to create a reservation link to. The reservation consists of a pair of records that share the same entry number. One record has a negative sign and points to the demand. The other record has a positive sign and points to the supply. These records are stored in the **Reservation Entry** table with status value **Reservation**. The user can view all reservations in the **Reservation Entries** window.

OFFSETTING IN RESERVATIONS

Reservations are made against available item quantities. Item availability is calculated in basic terms as follows:

available quantity = inventory + scheduled receipts - gross requirements

The following table shows the details of the order network entities that are part of the availability calculation.

	Field in T27	Source table	Table filter	Source field
Inventory	Inventory	Item Ledger Entry	N/A	Quantity
Scheduled receipts	FP Order Receipt (Qty.)	Prod. Order Line	=Firm Planned	Remaining Qty. (Base)
	Rel. Order Receipt (Qty.)	Prod. Order Line	=Released	Remaining Qty. (Base)
	Qty. on Assembly Order	Assembly Header	=Order	Remaining Qty. (Base)
	Qty. on Purch. Order	Purchase Line	=Order	Outstanding Qty. (Base)
	Trans. Ord. Receipt (Qty.)	Transfer Line	N/A	Outstanding Quantity

	Field in T27	Source table	Table filter	Source field
Gross requirements	Qty. On Sales Order	Sales Line	=Order	Outstanding Qty. (Base)
	Scheduled Need (Qty.)	Prod. Order Component	<>Simulated	Remaining Qty. (Base)
	Qty. on Asm. Component	Assembly Line	=Order	Remaining Qty. (Base)
	Trans. Ord. Shipment (Qty.)	Transfer Line	N/A	Outstanding Quantity

For more information, see “Availability in the Warehouse”.

MANUAL RESERVATION

When a user intentionally creates a reservation, the user gains full ownership of and responsibility for these items. This means that the user must also manually change or cancel a reservation. Such manual changes may cause automatic modification of the involved reservations.

The following table shows when and which modifications may occur:

User action	System reaction
Decreasing the reserved quantity	The related quantity fields are updated.
Changing date fields	The related date fields are updated.  Note If the due date on a demand is changed to precede the shipment date or due date of the supply, then the reservation is canceled.
Deleting the order	The reservation is canceled.
Changing location, bin, variant, serial number, or lot number	The reservation is canceled.



Note

The Late Binding functionality may also change reservations without informing the user, by reshuffling nonspecific reservations of serial or lot numbers. For more information, see “Item Tracking and Reservations”.

AUTOMATIC RESERVATIONS

The item card can be set up to always be reserved automatically from demand, such as sales orders. In that case, reservation is made against inventory, purchase orders, assembly orders, and production orders. A warning is issued if supply is insufficient.

In addition, items are automatically reserved by various planning functions to keep a demand linked to a specific supply. The order tracking entries for such planning links contain **Reservation** in the **Reservation Status** field in the **Reservation Entry** table. Automatic reservations are created in the following situations:

- A multilevel production order where the **Manufacturing Policy** field of the involved parent and child items is set to **Make-to-Order**. The planning system creates reservations between the parent production order and the underlying production orders to ensure that they are processed together. Such a reservation binding overrides the item’s default costing and application method.
- A production, assembly, or purchase order where the **Reordering Policy** field of the involved item is set to **Order**. The planning system creates reservations between the demand and the planned supply to ensure that the specific supply is created. For more information, see [Order](#).
- A production order created from a sales order with the **Sales Order Planning** function is linked to the sales order with an automatic reservation.

- An assembly order created automatically for a sales order line to fulfill the quantity in the **Qty. to Assemble to Order** field. This automatic reservation links the sales demand and the assembly supply so that sales order processors can customize and promise the assembly item to the customer directly. In addition, the reservation links the assembly output to the sales order line through to the shipping activity that fulfills the customer order.

In the case of supply or demand that is not allocated, the planning system automatically assigns a reservation status of type **Surplus**. This could result from demand that is due to forecasted quantities or user-entered planning parameters. This is legitimate surplus, which the system recognizes, and it does not give rise to action messages. Surplus could also be genuine, excess supply or demand that remains untracked. This is an indication of an imbalance in the order network, which causes the system to issue action messages. Note that an action message that suggests a change in quantity always refers to type **Surplus**. For more information, see the “Example: Order Tracking in Sales, Production, and Transfers” section in this topic.

Automatic reservations that are created during the planning run are handled in the following ways:

- They are applied against item quantities that are part of the availability calculation, as are manual reservations. For more information, see the “Offsetting in Reservations” section in this topic.
- They are included and potentially changed in subsequent planning runs, as opposed to manually reserved items.

ORDER TRACKING

Order Tracking helps the planner maintain a valid supply plan by providing an overview of the offsetting between demand and supply in the order network. The order tracking records serve as the foundation for creating dynamic action messages and planning line suggestions during planning runs.



Note

The order tracking system offsets available stock as orders are entered into the order network. This implies that the system does not prioritize orders that may be more urgent in terms of their due date. It is therefore up to the logic of the planning system or the wisdom of the planner to rearrange these priorities in a meaningful way.

THE ORDER NETWORK

The order tracking system is based on the principle that the order network must always be in a state of balance, in which every demand that enters the system is offset by a corresponding supply and vice versa. The system provides this by identifying logical links between all demand and supply entries in the order network.

This principle implies that a change in demand results in a corresponding imbalance on the supply side of the order network,. Conversely, a change in supply results in a corresponding imbalance on the demand side of the order network. In reality, the order network is in a state of constant flux as users enter, amend, and delete orders. Order Tracking processes orders dynamically, reacting to each change at the time that it enters the system and becomes a part of the order network. As soon as new order tracking records are created, the order network is in balance, but only until the next change occurs.

To increase the transparency of calculations in the planning system, the **Untracking Planning Elements** window displays untracked quantities, which represent the difference in quantity between known demand and suggested supply. Each line in the window refers to the cause of the excess quantity, such as **Blanket Order**, **Safety Stock Level**, **Fixed Reorder Quantity**, **Minimum Order Qty.**, **Rounding**, or **Dampener**.

OFFSETTING IN ORDER TRACKING

In contrast to reservations, which can only be made against available item quantities, order tracking is possible against all order network entities that are part of the net requirements calculation of the planning system. The net requirements are calculated as follows:

net requirements = gross requirements + reorder point - scheduled receipts - planned receipts - projected available balance



Note Demand that is related to forecasts or planning parameters is not order tracked.

EXAMPLE: ORDER TRACKING IN SALES, PRODUCTION, AND TRANSFERS

The following scenario shows which order tracking entries are created in the **Reservation Entry** table as results of various order network changes.

Assume the following data for two items that are set up for order tracking.

Item 1	Name	"Component"
	Availability	100 units in RED location 30 units of LOTA 70 units of LOTB
Item 2	Name	"Produced Item"
	Production BOM	1 qty. per of "Component"
	Demand	Sale for 100 units at BLUE location
	Supply	Released production order (generated with the Sales Order Planning function for the sale of 100 units)
Manufacturing Setup	Components at Location	RED

The following order tracking entries exist in the **Reservation Entry** table based on the data in the table.

Entry No.	Positive	Item No.	Location Code	Quantity	Reservation Status	Description	Lot No.	Source Type	Source ID	Binding
8	☒	COMPONENT	RED	-70	Tracking	Component		5407	101004	
8	☒	COMPONENT	RED	70	Tracking	Component	LOTB	32		
9	☐	COMPONENT	RED	-30	Tracking	Component		5407	101004	
9	☒	COMPONENT	RED	30	Tracking	Component	LOTA	32		
10	☐	PRODUCED ITEM	BLUE	-100	Reservation	Produced Item		37	1001	Order-to-Order
10	☒	PRODUCED ITEM	BLUE	100	Reservation	Produced Item		5406	101004	Order-to-Order

ENTRY NUMBERS 8 AND 9

For the component need for LOTA and LOTB respectively, order tracking links are created from the demand in table 5407, **Prod. Order Component**, to the supply in table 32, **Item Ledger Entry**. The **Reservation Status** field contains **Tracking** to indicate that these entries are dynamic order tracking links between supply and demand.

Note The **Lot No.** field is empty on the demand lines, because the lot numbers are not specified on the component lines of the released production order.

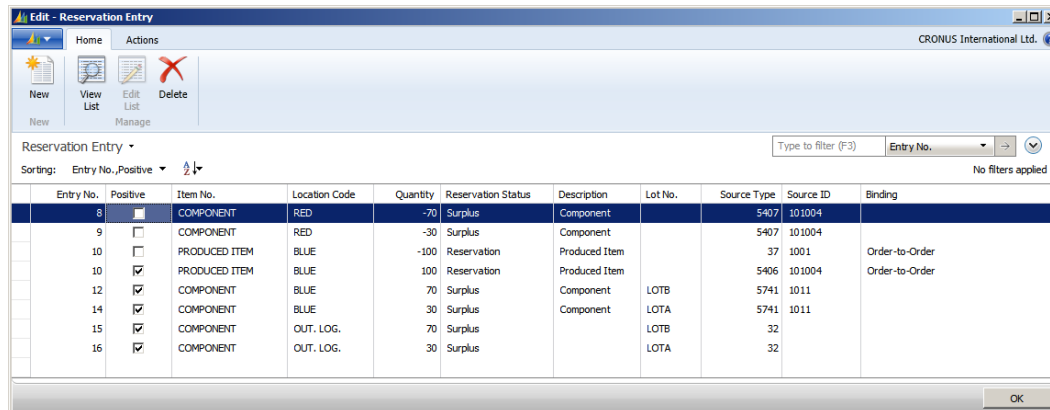
ENTRY NUMBERS 10

From the sales demand in table 37, **Sales Line**, an order tracking link is created to the supply in table 5406, **Prod. Order Line**. The **Reservation Status** field contains **Reservation**, and the **Binding** field contains **Order-to-Order**. This is because the released production order was generated specifically for the sales order and must remain linked unlike order tracking links with a reservation status of **Tracking**, which are created and changed dynamically. For more information, see the "Automatic Reservations" section in this topic.

At this point in the scenario, the 100 units of LOTA and LOTB are transferred to BLUE location by a transfer order.

 **Note** Only the transfer order shipment is posted at this point, not the receipt.

Now the following order tracking entries exist in the **Reservation Entry** table.



Entry No.	Positive	Item No.	Location Code	Quantity	Reservation Status	Description	Lot No.	Source Type	Source ID	Binding
8	☒	COMPONENT	RED	-70	Surplus	Component		5407	101004	
9	☒	COMPONENT	RED	-30	Surplus	Component		5407	101004	
10	☒	PRODUCED ITEM	BLUE	-100	Reservation	Produced Item		37	1001	Order-to-Order
11	☒	PRODUCED ITEM	BLUE	100	Reservation	Produced Item		5406	101004	Order-to-Order
12	☒	COMPONENT	BLUE	70	Surplus	Component	LOTB	5741	1011	
13	☒	COMPONENT	BLUE	30	Surplus	Component	LOTA	5741	1011	
14	☒	COMPONENT	OUT. LOG.	70	Surplus	Component	LOTB	32		
15	☒	COMPONENT	OUT. LOG.	30	Surplus	Component	LOTA	32		
16	☒	COMPONENT	OUT. LOG.	30	Surplus	Component	LOTA	32		

ENTRY NUMBERS 8 AND 9

Order tracking entries for the two lots of the component reflecting demand in table 5407 are changed from a reservation status of **Tracking** to **Surplus**. The reason is that the supplies that they were linked to before, in table 32, have been used by the shipment of the transfer order.

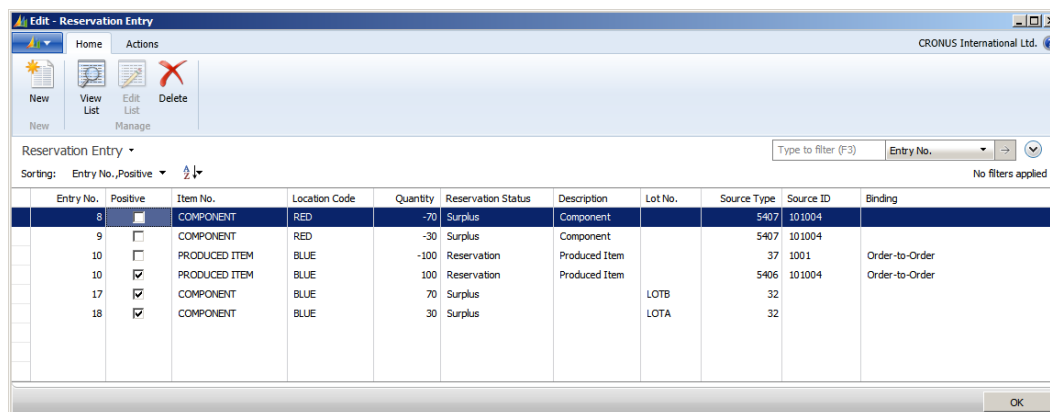
Genuine surplus, as in this case, reflects excess supply or demand that remains untracked. It is an indication of imbalance in the order network, which will generate an action message by the planning system unless it is resolved dynamically.

ENTRY NUMBERS 12 TO 16

Because the two lots of the component are posted on the transfer order as shipped but not received, all related positive order tracking entries are of reservation type **Surplus**, indicating that they are not allocated to any demands. For each lot number, one entry relates to table 5741, **Transfer Line**, and one entry relates to the item ledger entry at the in-transit location where the items now exist.

At this point in the scenario, the transfer order of the components from BLUE to RED location is posted as received.

Now the following order tracking entries exist in the **Reservation Entry** table.



Entry No.	Positive	Item No.	Location Code	Quantity	Reservation Status	Description	Lot No.	Source Type	Source ID	Binding
8	☒	COMPONENT	RED	-70	Surplus	Component		5407	101004	
9	☒	COMPONENT	RED	-30	Surplus	Component		5407	101004	
10	☒	PRODUCED ITEM	BLUE	-100	Reservation	Produced Item		37	1001	Order-to-Order
11	☒	PRODUCED ITEM	BLUE	100	Reservation	Produced Item		5406	101004	Order-to-Order
12	☒	COMPONENT	BLUE	70	Surplus	Component	LOTB	5741	1011	
13	☒	COMPONENT	BLUE	30	Surplus	Component	LOTA	5741	1011	
14	☒	COMPONENT	OUT. LOG.	70	Surplus	Component	LOTB	32		
15	☒	COMPONENT	OUT. LOG.	30	Surplus	Component	LOTA	32		
16	☒	COMPONENT	OUT. LOG.	30	Surplus	Component	LOTA	32		
17	☒	COMPONENT	OUT. LOG.	70	Surplus	Component	LOTB	32		
18	☒	COMPONENT	OUT. LOG.	30	Surplus	Component	LOTA	32		

The order tracking entries are now similar to the first point in the scenario, before the transfer order was posted as shipped only, except entries for the component are now of reservation status **Surplus**. This is because the component need is still at RED location, reflecting that the **Location Code** field on the production order component line contains **RED** as set up in the **Components at Location** setup field. The supply that was allocated to this demand before has been transferred to BLUE location and can now not be fully tracked unless the component need on the production order line is changed to BLUE location.

At this point in the scenario, the **Location Code** on the production order line is set to **BLUE**. In addition, in the **Item Tracking Lines** window, the 30 units of LOTA and the 70 units of LOTB are assigned to the production order line.

Now the following order tracking entries exist in the **Reservation Entry** table.

Entry No.	Positive	Item No.	Location Code	Quantity	Reservation Status	Description	Lot No.	Source Type	Source ID	Binding
10	☒	PRODUCED ITEM	BLUE	-100	Reservation	Produced Item		5406	101004	Order-to-Order
21	☒	PRODUCED ITEM	BLUE	100	Reservation	Produced Item		5406	101004	Order-to-Order
21	☒	COMPONENT	BLUE	-70	Tracking	Component	LOTB	5407	101004	
22	☒	COMPONENT	BLUE	70	Tracking	Component	LOTB	5407	101004	
22	☒	COMPONENT	BLUE	-30	Tracking	Component	LOTA	5407	101004	
22	☒	COMPONENT	BLUE	30	Tracking	Component	LOTA	5407	101004	

ENTRY NUMBERS 21 AND 22

Since the component need has been changed to BLUE location, and the supply is available as item ledger entries at BLUE location, all order tracking entries for the two lot numbers are now fully tracked, indicated by the reservation status of **Tracking**.

The **Lot No.** field is now filled in the order tracking entry for table 5407, because the lot numbers were assigned to the production order component lines.

For more examples of order tracking entries in the **Reservation Entry** table, see the Reservation Entry Table white paper.

ACTION MESSAGING

When the order tracking system detects an imbalance in the order network, it automatically creates an action message to notify the user. Action messages are system-generated calls for user action that specify the details of the imbalance and the suggestions about how to restore balance to the order network. They are displayed as planning lines in the **Planning Worksheet** window when you choose **Get Action Messages**. In addition, action messages are displayed on planning lines that are generated by the planning run to reflect the planning system's suggestions about how to restore balance to the order network. In both cases, the suggestions are run on the order network, when you choose **Carry Out Action Messages**.

An action message addresses one BOM level at a time. If the user accepts the action message, this may give rise to additional action messages at the next BOM level.

The following table shows the action messages that exist.

Action message	Description
Change Qty.	Changes the quantity on an existing supply order to cover a changed or new demand.
Reschedule	Reschedules the due date on an existing order.
Resched. & Chg. Qty.	Reschedules the due date and changes the quantity on an existing order.
New	Creates a new order if demand cannot be fulfilled by either of the previous action messages.
Cancel	Cancels an existing order.

The order tracking system always attempts to resolve an imbalance in the existing order network. If this is not possible, it issues an action message to create a new order. Following is the prioritized list that the order tracking system uses when it determines how to restore balance. If an additional demand has entered the order network, the system seeks to order track through the following checks:

1. Check for any excess supply in the existing order tracking record for this demand.
2. Check for planned and scheduled receipts in order of receipt date. The latest possible date is selected.
3. Check for available stock.
4. Check if a supply order exists in the current order tracking record. If so, the system issues an action message of type **Change** to increase the order.
5. Check that no supply order exists in the current order tracking record. If so, the system issues an action message of type **New** to create a new order.

An open demand passes through the list and offsets the available supply at each point. Any remaining demand is always covered by check 4 or check 5.

If a decrease in demand quantity occurs, the order tracking system attempts to resolve the imbalance by performing the previous checks in reverse order. This means that existing action messages could be modified or even deleted, if necessary. The order tracking system always presents the net result of its calculations to the user.

ORDER TRACKING AND PLANNING

When the planning system runs, it deletes all existing order tracking records and action message entries and recreates them as planning line suggestions according to supply/demand pairs and priorities. When the planning run has finished, the order network is in balance.

PLANNING SYSTEM VERSUS ORDER TRACKING AND ACTION MESSAGING

The following comparison shows the differences between the methods that are used by the planning system to create planning line suggestions and the methods that are used by the order tracking system to create order tracking records and action messages.

- The planning system deals with the entire supply and demand pattern of a particular item, whereas order tracking deals with the order that activated it.
- The planning system deals with all levels of the BOM hierarchy, whereas order tracking deals with one BOM level at a time.
- The planning system establishes links between demand and supply according to the prioritized due date. Order tracking establishes links between demand and supply according to the order entry sequence.
- The planning system takes planning parameters into account, whereas order tracking does not.
- The planning system creates links in a user-activated batch mode when it balances demand and supply, whereas order tracking creates the links automatically and dynamically as the user enters orders.

SEE ALSO

[Central Concepts of the Planning System](#) | [Supply Planning](#)

BALANCING DEMAND AND SUPPLY

To understand how the planning system works, it is necessary to understand the prioritized goals of the planning system, the most important of which are to ensure that:

- Any demand will be met by sufficient supply.
- Any supply serves a purpose.

Generally, these goals are achieved by balancing supply with demand.

IN THIS SECTION

[Demand and Supply](#)

[The Concept of Balancing in Brief](#)

[Dealing with Orders Before the Planning Starting Date](#)

[Loading the Inventory Profiles](#)

[Prioritizing Orders](#)

[Balancing Supply with Demand](#)

[Closing Demand and Supply](#)

SEE ALSO

[Central Concepts of the Planning System](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

DEMAND AND SUPPLY

Demand is the common term used for any kind of gross demand, such as a sales order and component need from a production order. In addition, the program allows more technical types of demand, such as negative inventory and purchase returns.

Supply is the common term used for any kind of positive or inbound quantity, such as inventory, purchases, assembly, production, or inbound transfers. In addition, a sales return may also represent supply.

To sort out the many sources of demand and supply, the planning system organizes them on two time lines called inventory profiles. One profile holds demand events, and the other holds the corresponding supply events. Each event represents one order network entity, such as a sales order line, an item ledger entry, or a production order line.

When inventory profiles are loaded, the different demand-supply sets are balanced to output a supply plan that fulfills the listed goals.

Planning parameters and inventory levels are other types of demand and supply respectively, which undergo integrated balancing to replenish stock items. For more information, see [Handling Reordering Policies](#).

SEE ALSO

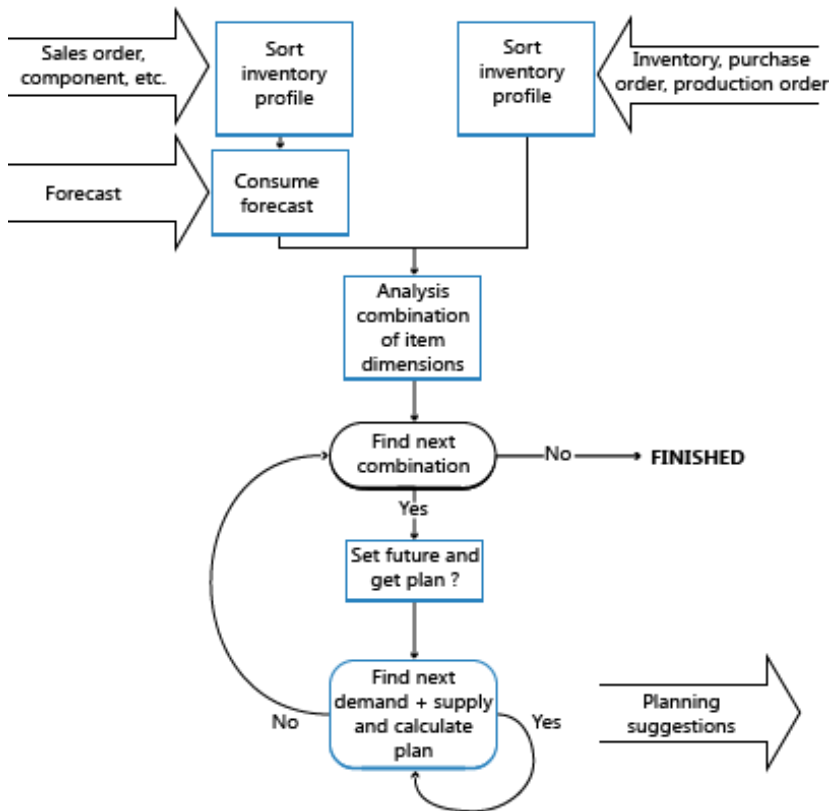
[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#)

THE CONCEPT OF BALANCING IN BRIEF

Demand is given by a company's customers. Supply is what the company can create and remove to establish balance. The planning system starts with the independent demand and then tracks backwards to the supply.

The inventory profiles are used to contain information about the demands and supplies, quantities, and timing. These profiles essentially make up the two sides of the balancing scale.

The objective of the planning mechanism is to counterbalance the demand and supply of an item to ensure that supply will match demand in a feasible way as defined by the planning parameters and rules.



SEE ALSO

[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#)

DEALING WITH ORDERS BEFORE THE PLANNING STARTING DATE

To avoid that a supply plan shows impossible and therefore useless suggestions, the planning system regards the period up until the planning starting date a frozen zone where nothing is planned for. The following rule applies to the frozen zone:

All supply and demand before the starting date of the planning period will be considered a part of inventory or shipped.

Accordingly, the planning system will not, with a few exceptions, suggest any changes to supply orders in the frozen zone, and no order tracking links are created or maintained for that period.

The exceptions to this rule are as follows:

- If the projected available inventory, including the sum of supply and demand in the frozen zone, is below zero.
- If serial/lot numbers are required on the backdated order(s).
- If the supply-demand set is linked by an order-to-order policy.

If the initial available inventory is below zero, the planning system suggests an emergency supply order on the day before the planning period to cover the missing quantity. Consequently, the projected and available inventory will always be at least zero when planning for the future period begins. The planning line for this supply order will display an Emergency warning icon and additional information is provided upon lookup.

SERIAL/LOT NUMBERS AND ORDER-TO-ORDER LINKS ARE EXEMPT FROM THE FROZEN ZONE

If serial/lot numbers are required or an order-to-order link exists, the planning system will disregard the frozen zone and incorporate such quantities that are back-dated from the starting date and potentially suggest corrective actions if demand and supply is not synchronized. The business reason for this principle is that such specific demand-supply sets must match to ensure that this specific demand is fulfilled.

SEE ALSO

[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#)

LOADING THE INVENTORY PROFILES

To sort out the many sources of demand and supply, the planning system organizes them on two timelines called inventory profiles.

The normal types of demand and supply with due dates on or after the planning starting date are loaded into each inventory profile. When loaded, the different demand and supply types are sorted according to overall priorities, such as due date, low-level codes, location, and variant. In addition, order priorities are applied to the different types to ensure that the most important demand is fulfilled first. For more information, see [Prioritizing Orders](#).

As previously mentioned, demand could also be negative. This means that it should be treated as supply; however, unlike the normal types of supply, negative demand is considered fixed supply. The planning system can take it into account, but will not suggest any changes to it.

In general, the planning system considers all supply orders after the planning starting date as subject to change in order to fulfill demand. However, as soon as a quantity is posted from a supply order, it can no longer be changed by the planning system. Accordingly, the following different orders cannot be replanned:

- Released production orders where consumption or output has been posted.
- Assembly orders where consumption or output has been posted.
- Transfer orders where shipment has been posted.
- Purchase orders where receipt has been posted.

Apart from loading demand and supply types, certain types are loaded with attention to special rules and dependencies that are described in the following.

ITEM DIMENSIONS ARE SEPARATED

The supply plan must be calculated per combination of the item dimensions, such as variant and location. However, there is no reason to calculate any theoretical combination. Only those combinations that carry a demand and/or supply need to be calculated.

The planning system controls this by running through the inventory profile. When a new combination is found, the program creates an internal control record that holds the actual combination information. The program inserts the SKU as the control record, or outer loop. As a result, the proper planning parameters according to a combination of variant and location are set, and the program can proceed to the inner loop.



Note

The program does not require the user to enter a SKU record when entering demand and/or supply for a particular combination of variant and location. Therefore, if a SKU does not exist for a given combination, the program creates its own temporary SKU record based on the item card data. If Location Mandatory is set to Yes in the Inventory Setup window, then either a SKU must be created or Components at Location must be set to Yes. For more information, see [Demand at Blank Location](#).

SERIAL/LOT NUMBERS ARE LOADED BY SPECIFICATION LEVEL

Attributes in the form of serial/lot numbers are loaded into the inventory profiles along with the demand and supply that they are assigned to.

Demand and supply attributes are arranged by order priority as well as by their level of specification. Because serial/lot number matches reflect the level of specification, the more specific demand, such as a lot number selected specifically for a sale line, will seek a match before less specific demand, such as a sale from any lot number selected.



Note

There are no dedicated prioritization rules for serial/lot-numbered demand and supply, other than the level of specification defined by their combinations of serial and lot numbers and the item tracking setup of the involved items.

During balancing, the planning system regards supply that carries serial/lot numbers as inflexible and will not try to increase or reschedule such supply orders (unless they are used in an order-to-order relation. See Order-to-Order Links are Never Broken). This protects the supply from receiving several, possibly conflicting, action messages when a supply carries varying attributes—such as a collection of different serial numbers.

Another reason that serial/lot numbered supply is inflexible is that serial/lot numbers are generally assigned so late in the process that it would be confusing if changes are suggested.

The balancing of serial/lot numbers does not respect the [Frozen Zone](#). If demand and supply is not synchronized, the planning system will suggest changes or suggest new orders, regardless of the planning starting date.

ORDER-TO-ORDER LINKS ARE NEVER BROKEN

When planning an order-to-order item, the linked supply must not be used for any demand other than what it was originally intended for. The linked demand should not be covered by any other random supply, even if, in its present situation, it is available in time and quantity. For example, an assembly order that is linked to a sales order in an assemble-to-order scenario cannot be used to cover other demand.

Order-to-order demand and supply must balance precisely. The planning system will ensure the supply under all circumstances without regarding order sizing parameters, modifiers, and quantities in inventory (other than quantities relating to the linked orders). For the same reason, the system will suggest decreasing excess supplies if the linked demand is decreased.

This balancing also affects the timing. The limited horizon that is given by the time bucket is not regarded; the supply will be rescheduled if the timing of the demand has changed. However, dampener time will be respected and will prevent order-to-order supplies from being scheduled out, except for the internal supplies of a multi-level production order (project order).



Note

Serial/lot numbers can also be specified on order-to-order demand. In that case, the supply is not regarded inflexible by default, as is normally the case for serial/lot numbers. In this case, the system will increase/decrease according to changes in demand. Furthermore, if one demand carries varying serial/lot numbers, such as more than one lot number, one supply order will be suggested per lot.



Note

Forecasts should not lead to creating supply orders that are bound by an order-to-order link. If the forecast is used, it should only be used as a generator of dependent demand in a manufacturing environment.

COMPONENT NEED IS LOADED ACCORDING TO PRODUCTION ORDER CHANGES

When handling production orders, the planning system must monitor the needed components before loading them into the demand profile. Component lines that result from an amended production order will replace those of the original order. This ensures that the planning system establishes that planning lines for component need are never duplicated.

SAFETY STOCK MAY BE CONSUMED

The safety stock quantity is primarily a demand type and is therefore loaded into the inventory profile on the planning starting date.

Safety stock is an inventory quantity set aside to compensate for uncertainties in demand during the replenishment lead time. However, it may be consumed if it is necessary to take from it to fulfill a demand. In that case, the planning system will ensure that the safety stock is quickly replaced by suggesting a supply order to replenish the safety stock quantity on the date it is consumed. This planning line will display an Exception warning icon explaining to the planner that the safety stock has been partly or fully consumed by means of an exception order for the missing quantity.

FORECAST DEMAND IS REDUCED BY SALES ORDERS

The production forecast expresses anticipated future demand. While actual demand is entered, typically as sales orders for produced items, it consumes the forecast.

The forecast itself is not actually reduced by sales orders; it remains the same. However, the forecast quantities used in the planning calculation are reduced (by the sales order quantities) before the remaining quantity, if any, enters the demand inventory profile. When the planning system examines actual sales during a period, both open sales orders and item ledger entries from shipped sales are included, unless they are derived from a blanket order.

A user is required to define a valid forecast period. The date on the forecasted quantity defines the start of the period, and the date on the next forecast defines the end of the period.

The forecast for periods prior to the planning period is not used, regardless of whether it was consumed or not. The first forecast figure of interest is either the date on or the closest date prior to the planning starting date.

The forecast can be for independent demand, such as sales orders, or dependent demand, like production order components (module-forecast). An item can have both types of forecast. During planning, the consumption takes place separately, first for independent demand and then for dependent demand.

BLANKET ORDER DEMAND IS REDUCED BY SALES ORDERS

Forecasting is supplemented by the blanket sales order as a means of specifying future demand from a specific customer. As with the (unspecified) forecast, actual sales should consume the anticipated demand, and the remaining quantity should enter the demand inventory profile. Again, the consumption does not actually reduce the blanket order.

The planning calculation considers open sales orders linked to the specific blanket order line, but it does not consider any valid time period. Nor does it consider posted orders, since the posting procedure has already reduced the outstanding blanket order quantity.

SEE ALSO

[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#) | [Planning Parameters](#)

PRIORITIZING ORDERS

Within a given SKU, the requested or available date represents the highest priority; the demand of today should be dealt with before the demand of next week. But in addition to this overall priority, the planning system will also suggest which type of demand should be fulfilled before fulfilling another demand. Likewise, it will suggest what source of supply should be applied before applying other sources of supply. This is done according to order priorities.

Loaded demand and supply contribute to a profile for the projected inventory according to the following priorities:

PRIORITIES ON THE DEMAND SIDE

1. Already shipped: Item Ledger Entry
2. Purchase Return Order
3. Sales Order
4. Service Order
5. Production Component Need
6. Assembly Order Line
7. Outbound Transfer Order
8. Blanket Order (that has not already been consumed by related sales orders)
9. Forecast (that has not already been consumed by other sales orders)

 **Note** Purchase returns are usually not involved in supply planning; they should always be reserved from the lot that is going to be returned. If not reserved, purchase returns play a role in the availability and are highly prioritized to avoid that the planning system suggests a supply order just to serve a purchase return.

PRIORITIES ON THE SUPPLY SIDE

1. Already in inventory: Item Ledger Entry (Planning Flexibility = None)
2. Sales Return Order (Planning Flexibility = None)
3. Inbound Transfer Order
4. Production Order
5. Assembly Order
6. Purchase Order

PRIORITY RELATED TO THE STATE OF DEMAND AND SUPPLY

Apart from priorities given by the type of demand and supply, the present state of the orders in the execution process also defines a priority. For example, warehouse activities have an impact, and the status of sales, purchase, transfer, assembly, and production orders is taken into account:

1. Partly handled (Planning Flexibility = None)
2. Already in process in the warehouse (Planning Flexibility = None)
3. Released – all order types (Planning Flexibility = Unlimited)
4. Firm Planned Production Order (Planning Flexibility = Unlimited)
5. Planned/Open – all order types (Planning Flexibility = Unlimited)

SEE ALSO

[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#)

BALANCING SUPPLY WITH DEMAND

The core of the planning system involves balancing demand and supply by means of suggesting user actions to revise the supply orders in case of imbalance. This takes place per combination of variant and location.

Imagine that each inventory profile contains a string of demand events (sorted by date and priority) and a corresponding string of supply events. Each event refers back to its source type and identification. The rules for counterbalancing the item are straightforward. Four instances of matching demand and supply can occur at any point of time in the process:

1. No demand or supply exists for the item => the planning has finished (or should not start).
2. Demand exists but there is no supply => supply should be suggested.
3. Supply exists but there is no demand for it => supply should be canceled.
4. Both demand and supply exist => questions should be asked and answered before the system can ensure that demand will be met and supply is sufficient.

If the timing of the supply is not suitable, perhaps the supply can be rescheduled as follows:

- a. If the supply is placed earlier than the demand, perhaps the supply can be rescheduled out so that inventory is as low as possible.
- b. If the supply is placed later than the demand, perhaps the supply can be rescheduled in. Otherwise, the system will suggest new supply.
- c. If the supply meets the demand on the date, the planning system can proceed to investigate whether the quantity of the supply can cover the demand.

Once the timing is in place, the adequate quantity to be supplied can be calculated as follows:

- a. If the supply quantity is less than the demand, it is possible that the supply quantity could be increased (or not, if limited by a maximum quantity policy).
- b. If the supply quantity is greater than the demand, it is possible that the supply quantity can be decreased (or not, if limited by a minimum quantity policy).

At this point, either of these two situations exists:

- a. The current demand can be covered, in which case it can be closed and planning for the next demand can start.
- b. The supply has reached its maximum, leaving some of the demand quantity uncovered. In this case, the planning system can close the current supply and proceed to the next one.

The procedure starts all over with the next demand and the current supply or vice versa. The current supply might be able to cover this next demand as well, or the current demand has not yet been fully covered.

RULES CONCERNING ACTIONS FOR SUPPLY EVENTS

When the planning system performs a top-down calculation in which supply must fulfill demand, the demand is taken as a given, that is, it lies outside the control of the planning system. However, the supply side can be managed. Therefore, the planning system will suggest creating new supply orders, rescheduling existing ones, and/or changing the order quantity. If an existing supply order becoming superfluous, the planning system will suggest that the user cancels it.

If the user wants to exclude an existing supply order from the planning suggestions, he can state that it has no planning flexibility (Planning Flexibility = None). Then, excess supply from that order will be used to cover demand, but no action will be suggested.

In general, all supply has a planning flexibility that is limited by the conditions of each of the suggested actions.

- **Reschedule Out:** The date of an existing supply order can be scheduled out to meet the demand due date unless:
 - It represents inventory (always on day zero).
 - It has an order-to-order linked to another demand.
 - It lies outside the reschedule window defined by the time bucket.
 - There is a closer supply that could be used.
 - On the other hand, the user may decide not to reschedule because:
 - The supply order has already been tied to another demand on a previous date.
 - The needed rescheduling is so minimal that the user finds it negligible.
- **Reschedule In:** The date of an existing supply order can be scheduled in, except in the following conditions:
 - It is linked directly to some other demand.
 - It lies outside the reschedule window defined by the time bucket.



Note

When planning an item using a reorder point, the supply order can always be scheduled in if necessary. This is common in forward-scheduled supply orders triggered by a reorder point.

- **Increase Quantity:** The quantity of an existing supply order can be increased to meet the demand unless the supply order is linked directly to a demand by an order-to-order link.



Note

Even though it is possible to increase the supply order, it may be limited due to a defined maximum order quantity.

- **Decrease Quantity:** An existing supply order with a surplus compared to an existing demand can be decreased to meet the demand.



Note

Even though the quantity could be decreased, there may still be some surplus compared to the demand due to a defined minimum order quantity or order multiple.

- **Cancel:** As a special incident of the decrease quantity action, the supply order could be canceled if it has been decreased to zero.
- **New:** If no supply order already exists, or an existing one cannot be changed to meet the necessary quantity on the demanded due date, a new supply order is suggested.

DETERMINING THE SUPPLY QUANTITY

Planning parameters defined by the user control the suggested quantity of each supply order.

When the planning system calculates the quantity of a new supply order or the quantity change on an existing one, the suggested quantity may be different from what is actually demanded.

If a maximum inventory or fixed order quantity are selected, the suggested quantity may be increased to meet that fixed quantity or the maximum inventory. If a reordering policy uses a reorder point, the quantity may be increased at least to meet the reorder point.

The suggested quantity may be modified in this sequence:

1. Down to the maximum order quantity (if any).
2. Up to the minimum order quantity.
3. Up to meet the nearest order multiple. (In case of erroneous settings, this may violate the maximum order quantity.)

ORDER TRACKING LINKS DURING PLANNING

Concerning order tracking during planning, it is important to mention that the planning system rearranges the dynamically created order tracking links for the item/variant/location combinations.

There are two reasons for this:

- The planning system must be able to justify its suggestions; that all demand has been covered, and that no supply orders are superfluous.
- Dynamically created order tracking links need to be rebalanced regularly.

Over time, dynamic order tracking links become out of balance since the entire order tracking network is not rearranged until a demand or supply event is actually closed.

Before balancing supply by demand, the program deletes all existing order tracking links. Then during the balancing procedure, when a demand or supply event is closed, it establishes new order tracking links between the demand and supply.



Note

Even if the item is not set up for dynamic order tracking, the planned system will create balanced order tracking links as explained above.

SEE ALSO

[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#)

CLOSING DEMAND AND SUPPLY

When the supply balancing procedures have been performed, there are three possible end situations:

- The required quantity and date of the demand events have been met and the planning for them can be closed. The supply event is still open and may be able to cover the next demand, so the balancing procedure can start over with the current supply event and the next demand.
- The supply order cannot be modified to cover all of the demand. The demand event is still open, with some uncovered quantity that may be covered by the next supply event. Thus the current supply event is closed, so the balancing act can start over with the current demand and the next supply event.
- All of the demand has been covered; there is no subsequent demand (or there has been no demand at all). If there is any surplus supply, it may be decreased (or canceled) and then closed. It is possible that additional supply events exist further along in the chain, and they should also be canceled.

Last, the planning system will create an order tracking link between the supply and the demand.

CREATING THE PLANNING LINE (SUGGESTED ACTION)

If any action – New, Change Quantity, Reschedule, Reschedule and Change Quantity, or Cancel – is suggested to revise the supply order, the planning system creates a planning line in the planning worksheet. Due to order tracking, the planning line is created not only when the supply event is closed, but also if the demand event is closed, even though the supply event is still open and may be subject to additional changes when the next demand event is processed. This means that when first created, the planning line may be changed again.

To minimize database access when handling production orders, the planning line can be maintained in three levels, while aiming to perform the least demanding maintenance level:

- Create only the planning line with the current due date and quantity but without the routing and components.
- Include routing: the planned routing is laid out including calculation of starting and ending dates and times. This is demanding in terms of database accesses. To determine the ending and due dates, it may be necessary to calculate this even if the supply event has not been closed (in the case of forward scheduling).
- Include BOM explosion: this can wait until just before the supply event is closed.

This concludes the descriptions of how demand and supply is loaded, prioritized, and balanced by the planning system. In integration with this supply planning activity, the system must ensure that the required inventory level of each planned item is maintained according to its reordering policies.

SEE ALSO

[Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#) | [Supply Planning](#)

HANDLING REORDERING POLICIES

For an item to participate in supply planning, a reorder policy must be defined. The following four reordering policies exist:

- Fixed Reorder Qty.
- Maximum Qty.
- Order
- Lot-for-Lot

Fixed Reorder Qty. and Maximum Qty. policies relate to inventory planning. Although inventory planning is technically simpler than the balancing procedure, these policies must coexist with the step-by-step balancing of supply and order tracking. To control the integration between the two, and to provide visibility into the involved planning logic, strict principles govern how reordering policies are handled.

IN THIS SECTION

[The Role of the Reorder Point](#)

[Monitoring the Projected Inventory Level and the Reorder Point](#)

[The Role of the Time Bucket](#)

[Staying under the Overflow Level](#)

[Handling Projected Negative Inventory](#)

[Reordering Policies](#)

SEE ALSO

[Planning Parameters](#) | [Planning Assignment Table](#) | [Central Concepts of the Planning System](#) | [Balancing Demand and Supply](#) | [Supply Planning](#)

THE ROLE OF THE REORDER POINT

In addition to the general balancing of supply and demand, the planning system must also monitor inventory levels for the affected items to respect the defined reordering policies:

A reorder point represents demand during lead time. When the projected inventory passes below the inventory level defined by the reorder point, it is time to order more quantity. Meanwhile, the inventory is expected to decrease gradually and possibly reach zero (or the safety stock level), until the replenishment arrives.

Accordingly, the planning system will suggest a forward-scheduled supply order at the point when the projected inventory passes below the reorder point.

The reorder point reflects a certain inventory level. However, inventory levels can move significantly during the time bucket and, therefore, the planning system must constantly monitor the projected available inventory.

SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

MONITORING THE PROJECTED INVENTORY LEVEL AND THE REORDER POINT

Inventory is a type of supply, but for inventory planning, the planning system distinguishes between two inventory levels:

- Projected inventory
- Projected available inventory

PROJECTED INVENTORY

Initially, projected inventory is the quantity of gross inventory, including supply and demand in the past even if not posted, when starting the planning process. In the future, this becomes a moving projected inventory level that is maintained by gross quantities from future supply and demand because those are introduced along the time line (whether reserved or in other ways allocated).

The projected inventory is used by the planning system to monitor the reorder point and to determine the reorder quantity when using the Maximum Qty. reordering policy.

PROJECTED AVAILABLE INVENTORY

The projected available inventory is the part of the projected inventory that at a given point in time is available to fulfill demand. The projected available inventory is used by the planning engine when monitoring the safety stock level.

The projected available inventory is used by the planning system to monitor the safety stock level, since the safety stock must always be available to serve unexpected demand.

TIME BUCKETS

Having a tight control of the projected inventory is crucial to detect when the reorder point is being crossed and to calculate the right order quantity when using the Maximum Qty. reordering policy.

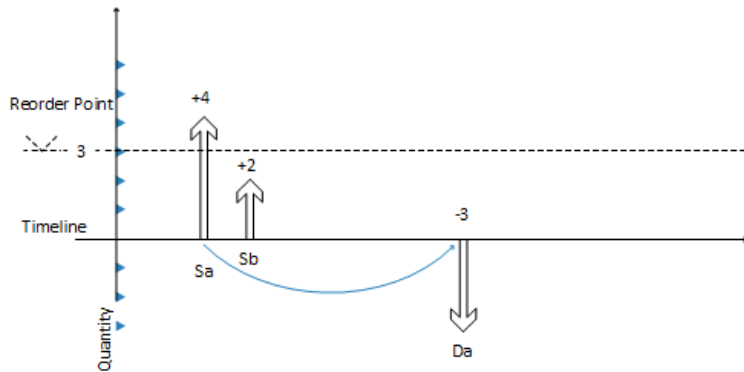
As stated earlier, the projected inventory level is calculated at the start of the planning period. It is a gross level that does not consider reservations and similar allocations. To monitor this inventory level during the planning sequence, the system monitors the aggregated changes over a period of time, a time bucket. The system ensures that the time bucket is at least one day since it is the most precise unit of time for a demand or supply event.

DETERMINING THE PROJECTED INVENTORY LEVEL

The following sequence describes how the projected inventory level is determined:

- When a supply event, such as a purchase order has been totally planned, it will increase the projected inventory on its due date.
- When a demand event has been fully satisfied, it will not decrease the projected inventory right away. Instead, it posts a decrease reminder, which is an internal record that holds the date and quantity of the contribution to the projected inventory.
- When a subsequent supply event is planned and placed on the time line, the posted decrease reminders are investigated one by one up until the planned date of the supply while updating the projected inventory. During this process, the reorder point level of the internal increase reminder may be passed.
- If a new supply order is introduced, the system checks if it is entered before the current supply. If it is, the new supply becomes current supply and the balancing procedure starts over.

The following shows a graphical illustration of this principle:



1. Supply **Sa** of 4 (fixed) closes Demand **Da** of -3.
2. CloseDemand: Create a decrease reminder of -3 (not shown).
3. Supply **Sa** is closed with a surplus of 1 (no more demand exists).
This increases the projected inventory level to +4, while the projected available inventory becomes -1.
4. The next supply **Sb** of 2 (another order) has already been placed on the timeline.
5. System checks if there is any decrease reminder preceding **Sb** (there is not, so no action is taken).
6. System closes supply **Sb** (no more demand exists)—either A: by reducing it to 0 (cancel) or B: by leaving as is.
This increases the projected inventory level (A: $+0 \Rightarrow +4$ or B: $+2 \Rightarrow +6$).
7. System makes a final check: Is there any decrease reminder? Yes, there is one on the date of **Da**.
8. System adds the decrease reminder of -3 reminder to the projected inventory level, either A: $+4 -3 \Rightarrow 1$ or B: $+6 -3 \Rightarrow +3$.
9. In case of A, the system creates a forward-scheduled order starting on date **Da**.
In case of B, the reorder point is not crossed and no new order is created.

SEE ALSO

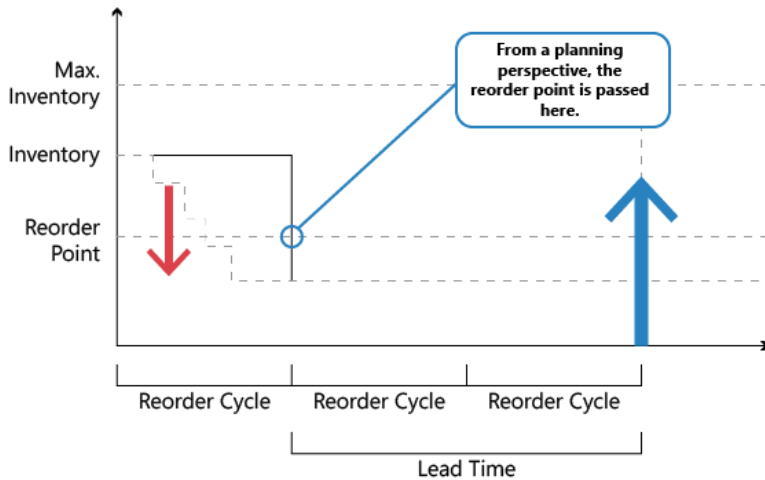
[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

THE ROLE OF THE TIME BUCKET

The purpose of the time bucket is to collect demand events within the time window in order to make a joint supply order.

For reordering policies that use a reorder point, you can define a time bucket. This ensures that demand within the same time period is accumulated before checking the impact on the projected inventory and whether the reorder point has been passed. If the reorder point is passed, a new supply order is scheduled forward from the end of the period defined by the time bucket. The time buckets begin on the planning starting date.

The time-bucketed concept reflects the manual process of checking the inventory level on a frequent basis rather than for each transaction. The user needs to define the frequency (the time bucket). For example, the user gathers all item needs from one vendor to place a weekly order.



The time bucket is generally used to avoid a cascade effect. For example, a balanced row of demand and supply where an early demand is canceled, or a new one is created. The result would be that every supply order (except the last one) is rescheduled.

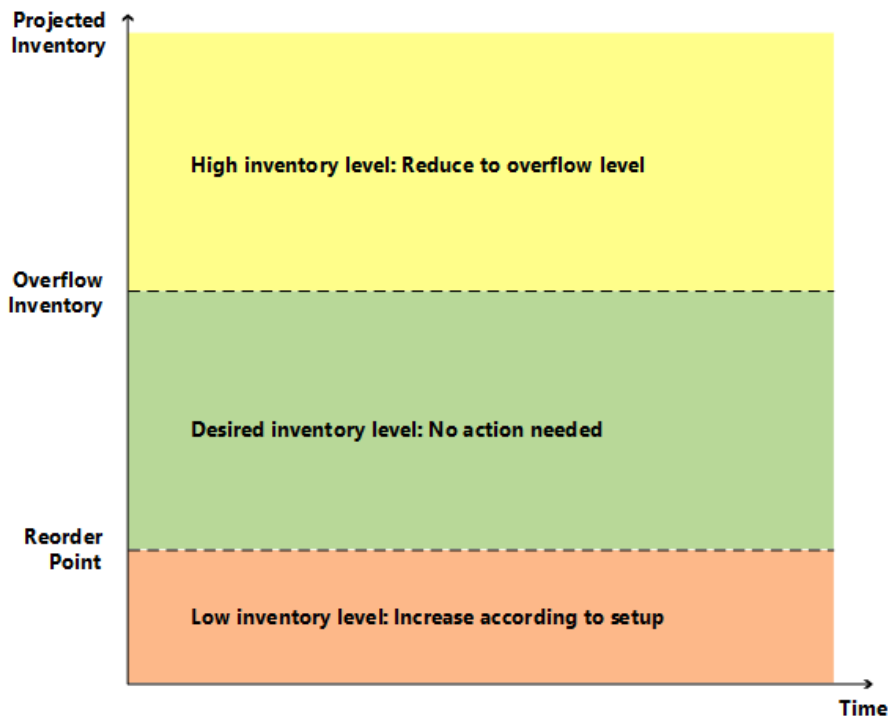
SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

STAYING UNDER THE OVERFLOW LEVEL

When using Maximum Qty. and Fixed Reorder Qty., the planning system focuses on the projected inventory in the given time-bucket only. This means that the planning system may suggest superfluous supply when negative demand or positive supply changes occur outside of the given time bucket. If, for this reason, a superfluous supply is suggested, the planning system calculates which quantity the supply should be decreased to (or deleted) to avoid the superfluous supply. This quantity is called the "overflow level." The overflow is communicated as a planning line with a Change Qty. (decrease) or Cancel action and the following warning message:

Attention: The projected inventory [xx] is higher than the overflow level [xx] on the Due Date [xx].



CALCULATING THE OVERFLOW LEVEL

The overflow level is calculated in different ways depending on planning setup.

MAXIMUM QTY. REORDERING POLICY

Overflow level = Maximum Inventory



Note

If a minimum order quantity exists, then it will be added as follows: Overflow level = Maximum Inventory + Minimum Order Quantity.

FIXED REORDER QTY. REORDERING POLICY

Overflow level = Reorder Quantity + Reorder Point



Note

If the minimum order quantity is higher than the reorder point, then it will replace as follows: Overflow Level = Reorder Quantity + Minimum Order Quantity

ORDER MULTIPLE

If an order multiple exists, then it will adjust the overflow level for both Maximum Qty. and Fixed Reorder Qty. reordering policies.

CREATING THE PLANNING LINE WITH OVERFLOW WARNING

When an existing supply causes the projected inventory to be higher than the overflow level at the end of a time bucket, a planning line is created. To warn about the potential superfluous supply, the planning line has a warning message, the **Accept Action Message** field is not selected, and the action message is either Cancel or Change Qty.

CALCULATING THE PLANNING LINE QUANTITY

Planning Line Quantity = Current Supply Quantity – (Projected Inventory – Overflow Level)



Note

As with all warning lines, any maximum/minimum order quantity or order multiple will be ignored.

DEFINING THE ACTION MESSAGE TYPE

- If the planning line quantity is higher than 0, then the action message is Change Qty.
- If the planning line quantity is equal to or lower than 0, then the action message is Cancel

COMPOSING THE WARNING MESSAGE

In case of overflow, the Untracked Planning Elements window displays a warning message with the following information:

- The projected inventory level that triggered the warning
- The calculated overflow level
- The due date of the supply event.

Example: "The projected inventory 120 is higher than the overflow level 60 on 28-01-11"

SCENARIO

In this scenario, a customer changes a sales order from 70 to 40 pieces between two planning runs. The overflow feature sets in to reduce the purchase that was suggested for the initial sales quantity.

ITEM SETUP

Reordering Policy	Maximum Qty.
Maximum Order Quantity	100
Reorder Point	50
Inventory	80

SITUATION BEFORE SALES DECREASE

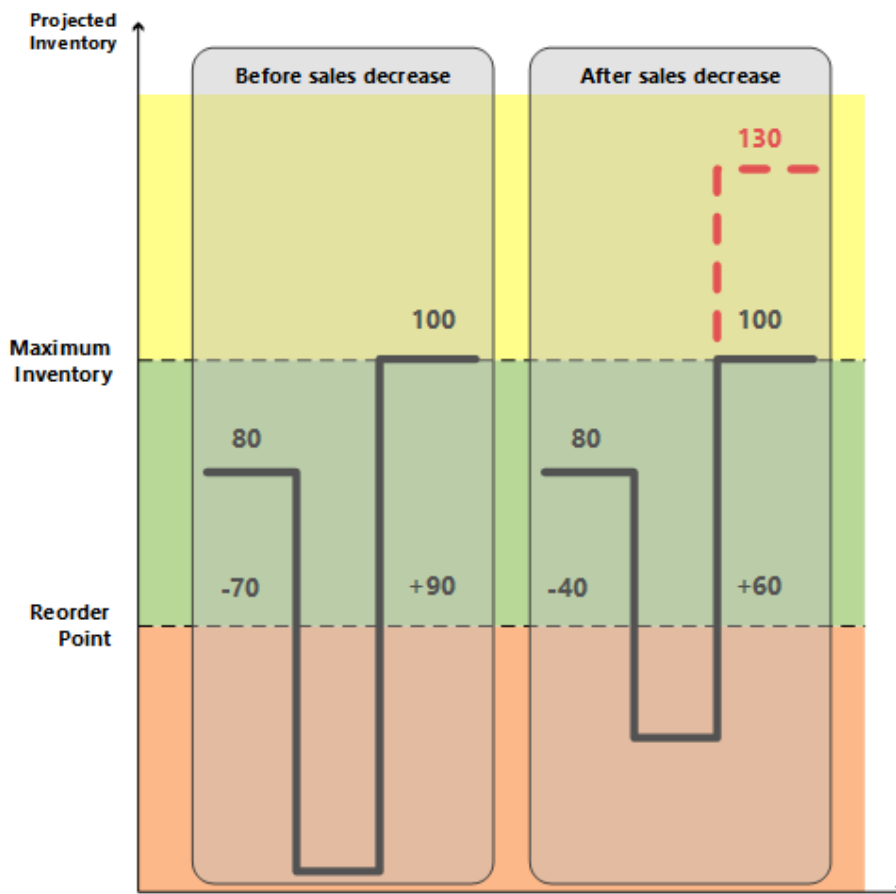
Event	Change Qty.	Projected Inventory
Day one	None	80
Sale	-70	10
End of time bucket	None	10
Suggest new purchase order	+90	100

SITUATION AFTER SALES DECREASE

Change	Change Qty.	Projected Inventory
Day one	None	80
Sale	-40	40
Purchase	+90	130
End of time bucket	None	130
Suggest to decrease purchase order from 90 to 60	-30	100

RESULTING PLANNING LINES

One planning line (warning) is created to reduce the purchase with 30 from 90 to 60 to keep the projected inventory on 100 according to the overflow level.



Note

Without the Overflow feature, no warning is created if the projected inventory level is above maximum inventory. This could cause a superfluous supply of 30.

SEE ALSO

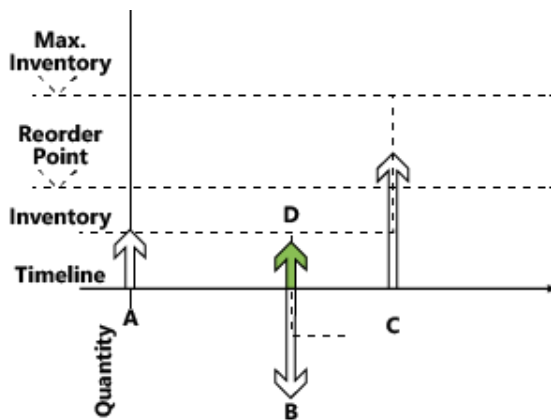
[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

HANDLING PROJECTED NEGATIVE INVENTORY

The reorder point expresses the anticipated demand during the lead time of the item. When the reorder point is passed, it is time to order more. But the projected inventory must be large enough to cover the demand until the new order is received. Meanwhile, the safety stock should take care of fluctuations in demand up to a targeted service level.

Consequently, the planning system considers it an emergency if a future demand cannot be served from the projected inventory, or expressed in another way, that the projected inventory goes negative. The system deals with such an exception by suggesting a new supply order to meet the part of the demand that cannot be met by inventory or other supply. The order size of the new supply order will not take the maximum inventory or the reorder quantity into consideration, nor will it take into consideration the order modifiers Maximum Order Quantity, Minimum Order Quantity, and Order Multiple. Instead, it will reflect the exact deficiency. The planning line for this type of supply order will display an Emergency warning icon, and additional information will be provided upon lookup to inform the user of the situation.

In the following illustration, supply D represents an emergency order to adjust for negative inventory.



1. Supply **A**, initial projected inventory, is below reorder point.
2. A new forward-scheduled supply is created (**C**).
(*Quantity = Maximum Inventory – Projected Inventory Level*)
3. Supply **A** is closed by demand **B**, which is not fully covered.
(Demand **B** could try to schedule Supply **C** in but that will not happen according to the time-bucket concept.)
4. New supply (**D**) is created to cover the remaining quantity on Demand **B**.
5. Demand **B** is closed (creating a reminder to the projected inventory).
6. The new supply **D** is closed.
7. Projected Inventory is checked; reorder point has not been crossed.
8. Supply **C** is closed (no more demand exists).
9. Final check: No outstanding inventory level reminders exist.

 **Note** Step 4 reflects how the system reacts in versions earlier than Microsoft Dynamics NAV 2009 SP1.

This concludes the description of central principles relating to inventory planning based on reordering policies. The following section describes the characteristics of the four supported reordering policies.

SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

REORDERING POLICIES

Reordering policies define how much to order when the item needs to be replenished. Four different reordering policies exist.

IN THIS SECTION

[Fixed Reorder Qty.](#)

[Maximum Qty.](#)

[Order](#)

[Lot-for-Lot](#)

SEE ALSO

[Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

FIXED REORDER QTY.

The Fixed Reorder Qty. policy is related to inventory planning of typical C-items (low inventory cost, low risk of obsolescence, and/or many items). This policy is usually used in connection with a reorder point reflecting the anticipated demand during the lead time of the item.

CALCULATED PER TIME BUCKET

If the planning system detects that the reorder point has been passed in a given time bucket (reorder cycle) – above or at the reorder point at the start of the period, and below at the end – it will suggest to create a new supply order of the specified reorder quantity and forward schedule it from the first date after the end of the time bucket.

The bucketed reorder point concept reduces the number of supply suggestions. This reflects a manual process of frequently walking through the warehouse to check the actual contents in the various bins.

CREATES ONLY NECESSARY SUPPLY

Before suggesting a new supply order to meet a reorder point, the planning system checks if supply has already been ordered to be received within the item's lead time. If an existing supply order will solve the problem by bringing the projected inventory to or above the reorder point within the lead time, the system will not suggest a new supply order.

Supply orders that are created specifically to meet a reorder point is excluded from ordinary supply balancing, and will not in any way be changed afterwards. Consequently, if an item using reorder point is to be phased out (not replenished), it is advisable to review outstanding supply orders manually or change the reordering policy to Lot-for-Lot, whereby the system will reduce or cancel superfluous supply.

COMBINES WITH ORDER MODIFIERS

The order modifiers, Minimum Order Quantity, Maximum Order Quantity, and Order Multiple, should not play a big role when the fixed reorder quantity policy is used. However, the planning system still takes these modifiers into account and will decrease the quantity to the specified maximum order quantity (and create two or more supplies in order to reach the total order quantity), increase the order to the specified minimum order quantity, or round the order quantity up to meet a specified order multiple.

SHOULD NOT BE USED WITH FORECAST

Because the anticipated demand is already expressed in the reorder point level it is not necessary to include a forecast in the planning of an item using a reorder point. If it is relevant to base the plan on a forecast, use the lot-for-lot policy.

MUST NOT BE USED WITH RESERVATIONS

If the user has reserved a quantity, for instance a quantity in inventory, for some distant demand, the planning foundation will be disturbed. Even if the projected inventory level is acceptable in relation to the reorder point, the quantities might not be available. The system may try to compensate for that by creating exception orders; however, it is recommended that the Reserve field is set to Never on items that are planned using a reorder point.

SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

MAXIMUM QTY.

The Maximum Quantity policy is a way to maintain inventory using a reorder point.

Everything regarding the Fixed Reorder Qty. policy also applies to this policy. The only difference is the quantity of the suggested supply. When using the maximum quantity policy, the reorder quantity will be defined dynamically based on the projected inventory level and will therefore usually differ from order to order.

CALCULATED PER TIME BUCKET

The reorder quantity is determined at the point of time (the end of a time bucket) when the planning system detects that the reorder point has been crossed. At this time, the system measures the gap from the current projected inventory level up to the specified maximum inventory. This constitutes the quantity that should be reordered. The system then checks if supply has already been ordered elsewhere to be received within the lead time and, if so, reduces the quantity of the new supply order by already ordered quantities.

The system will ensure that the projected inventory at least reaches the reorder point level – in case the user has forgotten to specify a maximum inventory quantity.

COMBINES WITH ORDER MODIFIERS

Depending on the setup, it may be best to combine the Maximum Quantity policy with order modifiers to ensure a minimum order quantity or round it to an integer number of purchase units of measure, or split it into more lots as defined by the maximum order quantity.

SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

ORDER

In a make-to-order environment, an item is purchased or produced to exclusively cover a specific demand. Typically it relates to A-items, and the motivation for choosing the Order reordering policy can be that the demand is infrequent, the lead-time is insignificant, or the required attributes vary.

The program creates an order-to-order link, which acts as a preliminary connection between the supply, a supply order or inventory, and the demand that it is going to fulfill.

Apart from using the Order policy, the order-to-order link can be applied during planning in the following ways:

- When using the Make-to-Order manufacturing policy to create multi-level or project type production orders (producing needed components on the same production order).
- When using the Sales Order Planning feature to create a production order from a sales order.

Even if a manufacturing company considers itself as a make-to-order environment, it might be best to use a Lot-for-Lot reordering policy if the items are pure standard without variation in attributes. As a result, the system will use unplanned inventory and only accumulates sales orders with the same shipment date or within a defined time bucket.

ORDER-TO-ORDER LINKS AND PAST DUE DATES

Unlike most supply-demand sets, linked orders with due dates before the planning starting date are fully planned for by the system. The business reason for this exception is that specific demand-supply sets must be synchronized through to execution. For more information about the frozen zone that applies to most demand-supply types, see [Dealing with Orders Before the Planning Starting Date](#).

SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

LOT-FOR-LOT

The lot-for-lot policy is the most flexible because the system only reacts on actual demand, plus it acts on anticipated demand from forecast and blanket orders and then settles the order quantity based on the demand. The lot-for-lot policy is aimed at A- and B-items where inventory can be accepted but should be avoided.

In some ways, the lot-for-lot policy looks like the Order policy, but it has a generic approach to items; it can accept quantities in inventory, and it bundles demand and corresponding supply in lot accumulation periods defined by the user.

The **Lot Accumulation Period** field contributes to define the company's reorder cycle together with the **Rescheduling Period** field. From the date of the first demand, all demands are accumulated in the following lot accumulation period into one supply order, which is placed on the date of the first demand. Demand that is outside the lot accumulation period is not covered by the supply order.

The lot-for-lot policy can also include a dampener period and dampener quantity to reduce order rescheduling.

Because the supply order quantity is based on the actual demand it can make sense to use the order modifiers: round the order quantity up to meet a specified order multiple (or purchase unit of measure), increase the order to a specified minimum order quantity, or decrease the quantity to the specified maximum quantity (and thus create two or more supplies to reach the total needed quantity).

SEE ALSO

[Reordering Policies](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Supply Planning](#)

PLANNING PARAMETERS

This topic describes the different planning parameters that you can use in Microsoft Dynamics NAV.

The way in which the planning system controls item supply is determined by various settings on the item card or SKU, and settings in manufacturing setup. The following table shows how these parameters are used for planning.

Purpose	Parameter
Define if the item is to be planned	Reordering Policy = Blank
Define when to reorder	Time Bucket Reorder Point Safety Lead Time
Define how much to reorder	Safety Stock Quantity Reordering Policy: • Fixed Reorder Qty. plus Reorder Quantity • Maximum Qty. plus Maximum Inventory • Order • Lot-for-Lot
Optimize when and how much to reorder	Rescheduling Period Lot Accumulation Period Dampener Period
Modify the supply orders	Minimum Order Quantity Maximum Order Quantity Order Multiple
Delimit the planned item	Manufacturing Policy: • Make-to-Stock • Make-to-Order

DEFINE IF THE ITEM WILL BE PLANNED

To include an item/SKU in the planning process, it must have a reordering policy otherwise it must be planned manually, for example, with the Order Planning feature.

DEFINE WHEN TO REORDER

Reorder proposals are generally released only when the projected available quantity has fallen below a given quantity. This quantity is defined by the reorder point. Otherwise, it will be zero. Zero can be adjusted by entering a safety stock quantity. If the user has defined a safety lead time, it will cause the proposal to be delivered in the period prior to the required due date.

The **Time Bucket** field is used by reorder point policies (**Fixed Reorder Qty.** and **Maximum Qty.**), where the inventory level is checked after each time bucket. The first time bucket begins on the planning starting date.

The default safety lead time, in the **Manufacturing Setup** window, should be set to at least one day. The due date of the demand may be known, but not the due time. The planning schedules backward to meet gross demand, and, if no safety lead time is defined, the goods may arrive too late to meet the demand.

Three additional reorder period fields, **Rescheduling Period**, **Lot Accumulation Period**, and **Dampener Period**, also play a role in defining when to reorder. For more information, see [Optimize When and How Much to Reorder](#).

DEFINE HOW MUCH TO REORDER

If the planning system detects the need to reorder, the selected reordering policy is used to determine when and how much to order.

Independent of the reordering policy, the planning system usually follows this logic:

1. The quantity of the order proposal is calculated to meet the specified minimum inventory level of the item, usually the safety stock quantity. If nothing is specified, the minimum inventory level is zero.
2. If the projected available inventory is below the safety stock quantity, a backward-scheduled supply order is suggested. The order quantity will at least fill the safety stock quantity, and can be increased by gross demand within the time bucket, by the reordering policy, and by the order modifiers.
3. If the projected inventory is below the reorder point (calculated from aggregated changes within the time bucket) and above the safety stock quantity, a forward-scheduled exception order is suggested. Both the gross demand to be met and the reordering policy will determine the order quantity. At minimum, the order quantity will meet the reorder point.
4. If there is more gross demand due before the ending date of the forward-scheduled order proposal, and this demand brings the currently calculated projected available inventory below the safety stock quantity, the order quantity is increased to make up the deficit. The suggested supply order is then scheduled backward from the due date of the gross demand that would have violated the safety stock quantity.
5. If the **Time Bucket** field is not filled in, only the gross demand on the same due date will be added.

The following reorder period fields also play a role in defining how much to reorder: **Rescheduling Period**, **Lot Accumulation Period**, and **Dampener Period**. For more information, see [Optimize When and How Much to Reorder](#).

REORDERING POLICIES

The following reordering policies affect the quantity that is being reordered.

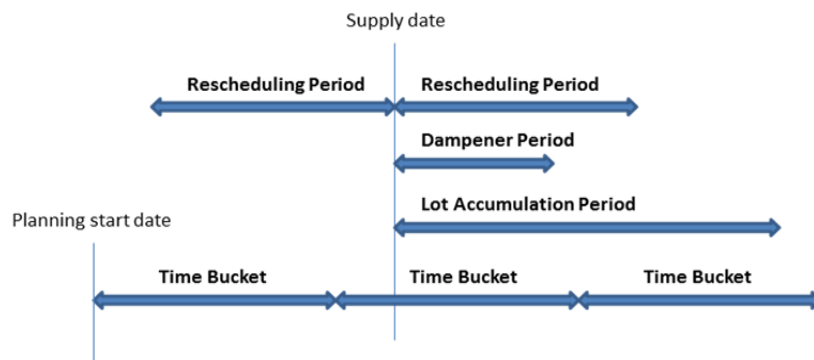
Reordering policy	Description
Fixed Reorder Qty.	At a minimum, the order quantity will be equal to the reorder quantity. It can be increased to meet the demand or the desired inventory level. This reordering policy is usually used with a reorder point.
Maximum Qty.	The order quantity will be calculated to meet the maximum inventory. If quantity modifiers are used, then maximum inventory can be violated. We do not recommend that you use the time bucket together with maximum quantity. The time bucket will usually be overruled. This reordering policy is usually used with a reorder point.
Order	The order quantity will be calculated to meet each single demand event and the demand-supply set will remain linked until execution. No planning parameters are considered.
Lot-for-Lot	The quantity is calculated to meet the sum of the demand that comes due in the time bucket.

OPTIMIZE WHEN AND HOW MUCH TO REORDER

To obtain a rational supply plan, a planner will fine-tune planning parameters to limit rescheduling suggestions, accumulate demand (dynamic reorder quantity), or to avoid insignificant planning actions. The following reorder period fields help optimize when and how much to reorder.

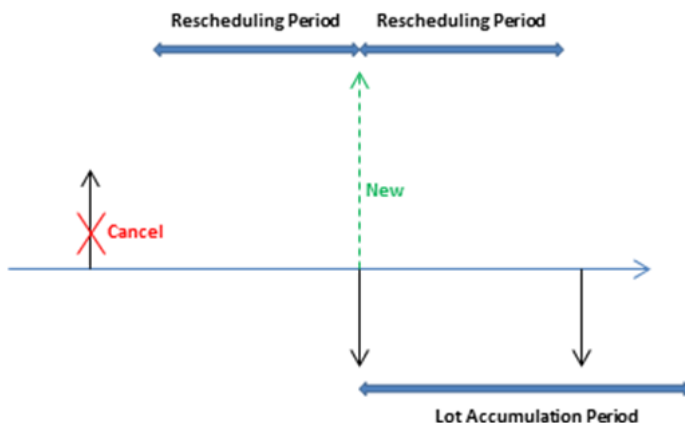
Field	Description
Rescheduling Period	This field is used to determine whether the action message should reschedule an existing order or cancel it and create a new order. The existing order will be rescheduled within one rescheduling period before the current supply and until one rescheduling period after the current supply.
Lot Accumulation Period	With reordering policy Lot-for-Lot, this field is used to accumulate multiple supply needs into one supply order. From the first planned supply, the system accumulates all supply needs in the following lot accumulation period into one supply, which is placed on the date of the first supply. Demand outside the lot accumulation period is not covered by this supply.
Dampener Period	This field is used to avoid minor rescheduling of existing supply out in time. Changes from the supply date until one dampener period from the supply date will not generate any action messages. As a result a positive delta between the suggested new supply date and the original supply date will always be larger than the dampener period.

The timing of rescheduling period, dampener period, and lot accumulation period is based on a supply date. The time bucket is based on the planning start date, as shown in the following illustration.

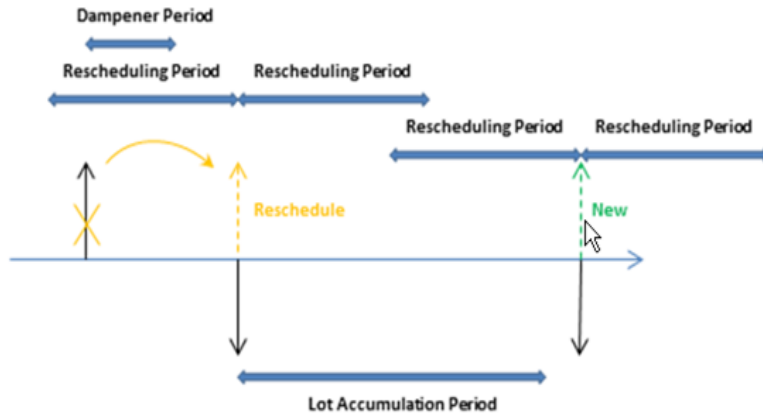


In the following examples, the black arrows represent existing supply (up) and demand (down). Red, green, and orange arrows are planning suggestions.

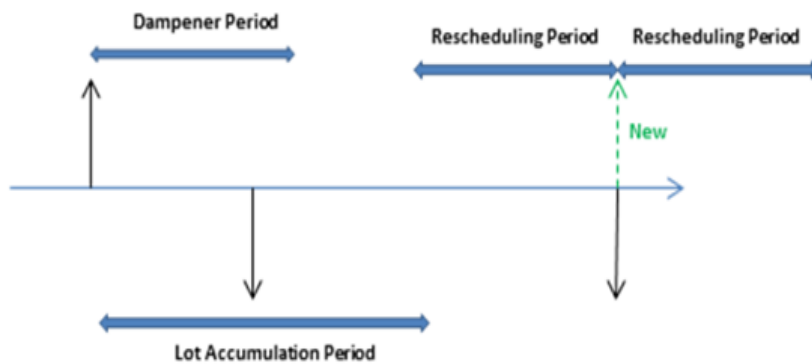
Example 1: The changed date is outside the rescheduling period, which causes the existing supply to be canceled. A new supply is suggested to cover the demand in the lot accumulation period.



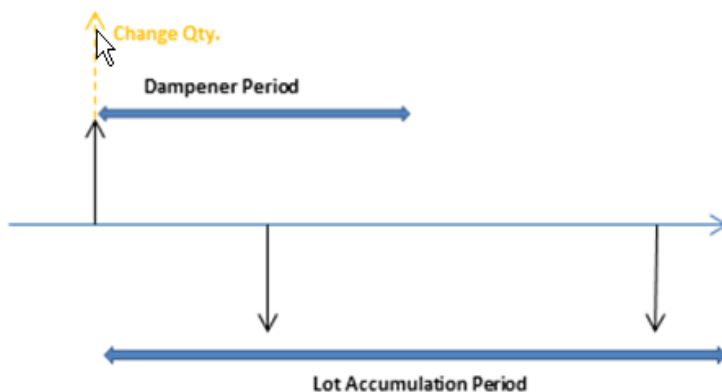
Example 2: The changed date is in the rescheduling period, which causes the existing supply to be rescheduled. A new supply is suggested to cover the demand outside the lot accumulation period.



Example 3: There is a demand in the dampener period and the supply quantity in the lot accumulation period matches the supply quantity. The next demand is uncovered and a new supply is suggested.



Example 4: There is a demand in the dampener period and the supply remains on the same date. However, the current supply quantity is not enough to cover the demand in the lot accumulation period, so a change quantity action for the existing supply order is suggested.



Default values: The default value of the **Time Bucket** field and the three reorder period fields is blank. For all fields, except the **Dampener Period** field, this means 0D (zero days). If the **Dampener Period** field is blank, the global value in the **Default Dampener Period** field in the **Manufacturing Setup** window will be used.

MODIFY THE SUPPLY ORDERS

When the quantity of the order proposal has been calculated, one or more of the order modifiers can adjust it. For example, the maximum order quantity is larger than or equal to the minimum order quantity, which is larger than or equal to the order multiple.

The quantity is decreased if it exceeds the maximum order quantity. Then, it is increased if it is below the minimum order quantity. Finally, it is rounded up so that it matches a specified order multiple. Any remaining quantity uses the same adjustments until the total demand has been converted into order proposals.

DELIMIT THE ITEM

The **Manufacturing Policy** option defines which additional orders the MRP calculation will propose.

If the **Make-to-Stock** option is used, the orders concern only the item in question.

If the **Make-to-Order** option is used, the planning system will analyze the production BOM of the item and create additional linked order proposals for those lower-level items that are also defined as make-to-order. This continues as long as there are make-to-order items in the descending BOM structures.

SEE ALSO

[Handling Reordering Policies](#) | [Balancing Demand and Supply](#) | [Central Concepts of the Planning System](#)

PLANNING ASSIGNMENT TABLE

All items should be planned for, however, there is no reason to calculate a plan for an item unless there has been a change in the demand or supply pattern since the last time a plan was calculated.

If the user has entered a new sales order or changed an existing one, there is reason to recalculate the plan. Other reasons include a change in forecast or the desired safety stock quantity. Changing a bill of material by adding or removing a component would most likely indicate a change, but for the component item only.

For multiple locations, the assignment takes place at the level of item per location combination. If, for example, a sales order has been created at only one location, the program will assign the item at that specific location for planning.

The reason for selecting items for planning is a matter of system performance. If no change in an item's demand-supply pattern has occurred, the planning system will not suggest any actions to be taken. Without the planning assignment, the system would have to perform the calculations for all items in order to find out what to plan for, and that would drain system resources.

The **Planning Assignment** table monitors demand and supply events and assigns the appropriate items for planning. The following events are monitored:

- A new sales order, forecast, component, purchase order, production order, assembly order, or transfer order.
- Change of item, quantity, location, variant, or date on a sales order, forecast, component, purchase order, production order, assembly order, or transfer order.
- Cancellation of a sales order, forecast, component, purchase order, production order, assembly order, or transfer order.
- Consumption of items other than planned.
- Output of items other than planned.
- Unplanned changes in inventory.

For these direct supply-demand displacements, the order tracking and action messaging system maintains the Planning Assignment table and states a planning reason as an action message.

The following changes in master data can also cause a planning imbalance:

- Change of status to Certified in the production BOM header (for all items using that header).
- Deleted line (child item).
- Change of status to Certified in the routing header (for all items using that routing).
- Changes in the following item card fields.
- Safety Stock Quantity or Safety Lead Time.
- Lead Time Calculation.
- Reorder Point.
- Production BOM No. (and all children of old BOM reference).
- Routing No.
- Reordering Policy.

In these cases, a new function, Planning Assignment Management, maintains the table and states the planning reason as Net Change.

The following changes do not cause a planning assignment:

- Calendars
- Other planning parameters on the item card

When calculating an MPS or an MRP, the following restrictions apply:

- MPS: The planning system checks that the item carries a production forecast or a sales order. If not, the item is not included in the plan.
- MRP: If the planning system detects that the item is being replenished by an MPS planning line or MPS supply order, the item will be left out of the planning. However, any demand from relevant components is included.

SEE ALSO

[Balancing Demand and Supply](#) | [Handling Reordering Policies](#) | [Transfers in Planning](#) | [Planning Parameters](#)

DEMAND AT BLANK LOCATION

When a user creates a demand event, such as a sales order line, the program allows the user to sometimes specify a location code and other times not, that is, use blank location.

For demand with or without location codes, the planning system operates in a straight forward way when:

- Demand lines always carry location codes and the system fully uses SKUs, including the relevant location setup.
- Demand lines never carry location codes, and the system does not use SKUs or any location setup (see the last scenario in the following section).
- However, if demand events sometimes have location codes and other times do not, the planning system will follow certain rules depending on setup.

DEMAND AT LOCATION

When the planning system detects demand at a location, it will behave in different ways depending on three critical setup values. During a planning run, the system checks for three setup values in sequence and plans accordingly.

1. Is there a check mark in the Location Mandatory field?

If yes, then:

2. Does SKU exist for the item?

If yes, then:

The item is planned according to planning parameters on the SKU card.

If no, then:

3. Does the Components at Location field contain the demanded location code?

If yes, then:

The item is planned according to planning parameters on the item card.

If no, then:

The item is planned according to: Reordering Policy = Lot-for-Lot, Include Inventory = Yes, all other planning parameters = Empty, items using Reordering Policy = Order will remain using Order along with the other settings.



Note

The exceptional planning setup that is output as the last reaction in step 3 above is referred to in the following as the “minimal alternative”. This planning setup only covers the exact demand, and all other planning parameters are ignored.

For information about variations of this planning logic, see the Scenarios section below.

DEMAND AT BLANK LOCATION

Even if the Location Mandatory field is selected, the program will allow demand lines to be created without a location code, also referred to as blank location. This is a deviation for the system because it has various setup values tuned to dealing with locations (see above) and as a result, the planning engine will not create a planning line for such a demand line.

If the Location Mandatory field is not selected but any of the location setup values exist, it is also considered a deviation, and the planning system will react by using the “minimal alternative”: The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

SCENARIOS

The following scenarios describe variations of demand at blank location and how the planning system resolves to the “minimal alternative.”

SETUP 1:

Location Mandatory = Yes

SKU is set up for RED

Components at Location = BLUE

CASE 1.1: DEMAND IS AT RED LOCATION

The item is planned according to planning parameters on the SKU card.

CASE 1.2: DEMAND IS AT BLUE LOCATION

The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

CASE 1.3: DEMAND IS AT GREEN LOCATION

The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

CASE 1.4: DEMAND IS AT BLANK LOCATION

The item is not planned because no location is defined on the demand line.

SETUP 2:

Location Mandatory = Yes

No SKU exists

Components at Location = BLUE

CASE 2.1: DEMAND IS AT RED LOCATION

The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

CASE 2.2: DEMAND IS AT BLUE LOCATION

The item is planned according to planning parameters on the item card.

SETUP 3:

Location Mandatory = No

No SKU exists

Components at Location = BLUE

CASE 3.1: DEMAND IS AT RED LOCATION

The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

CASE 3.2: DEMAND IS AT BLUE LOCATION

The item is planned according to planning parameters on the item card.

CASE 3.3: DEMAND IS AT BLANK LOCATION

The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

SETUP 4:

Location Mandatory = No

No SKU exists

Components at Location = BLANK

CASE 4.1: DEMAND IS AT BLUE LOCATION

The item is planned according to: Reordering Policy = Lot-for-Lot (Order remains Order), Include Inventory = Yes, all other planning parameters = Empty.

CASE 4.2: DEMAND IS AT BLANK LOCATION

The item is planned according to planning parameters on the item card.

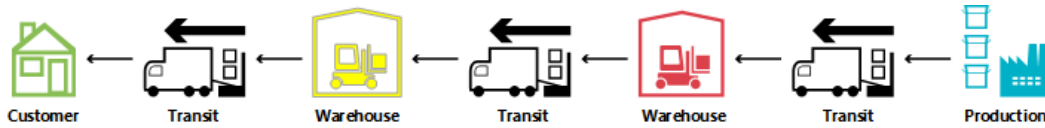
As illustrated in the last scenario, the only way to get a correct result for a demand line without a location code is to disable all setup values relating to locations. Similarly, the only way to get stable planning results for demand at locations is to use SKUs. Therefore, if companies often plan for demand at locations, they are strongly advised to use the Stockkeeping Units granule.

SEE ALSO

[Planning Assignment Table](#) | [Planning Parameters](#) | [Handling Reordering Policies](#) | [Central Concepts of the Planning System](#) | [Balancing Demand and Supply](#) | [Supply Planning](#)

TRANSFERS IN PLANNING

Transfer orders are also a source of supply when working at the SKU level. When using multiple locations (warehouses), the SKU replenishment system can be set to Transfer, implying that the location is replenished by transferring goods from another location. In a situation with more warehouses, companies might have a chain of transfers where supply to GREEN location is transferred from YELLOW, and supply to YELLOW is transferred from RED and so on. In the beginning of the chain, there is a replenishment system of Prod. Order or Purchase.



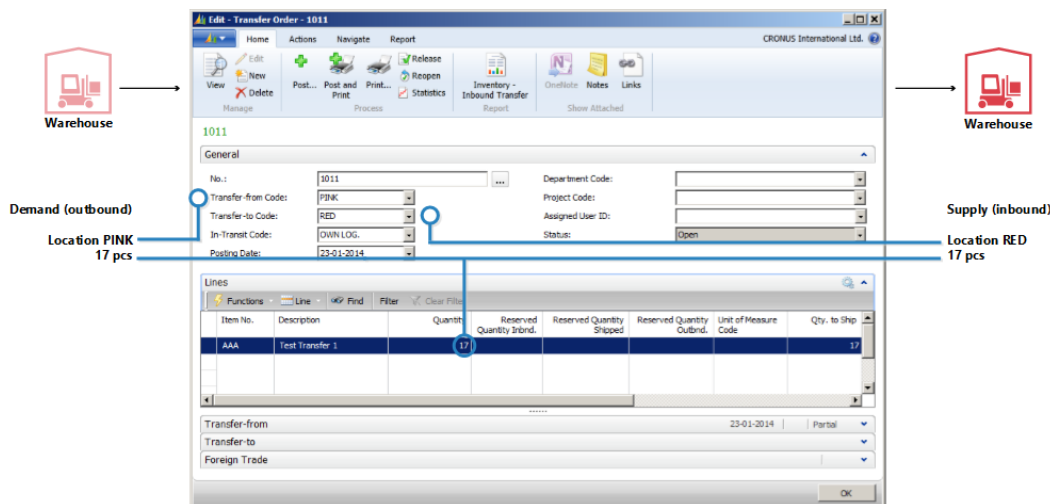
When comparing the situation where a supply order is directly facing a demand order to a situation where the sales order is supplied through a chain of SKU transfers, it is obvious that the planning task in the latter situation can become very complex. If demand changes, it might cause a ripple effect through the chain, because all transfer orders plus the purchase/production order in the opposite end of the chain will have to be manipulated to reestablish balance between demand and supply.



WHY IS TRANSFER A SPECIAL CASE?

A transfer order looks much like any other order in the program. However, behind the scene it is very different.

One fundamental aspect that makes transfers in planning different from purchase and production orders is that a transfer line represents demand and supply at the same time. The outbound part, which is shipped from the old location, is demand. The inbound part, which is to be received at the new location, is supply at that location.



This means that when the system manipulates the supply side of the transfer, it must make a similar change on the demand side.

TRANSFERS ARE DEPENDENT DEMAND

The related demand and supply has some resemblance with components of a production order line, but the difference is that components will be on the next planning level and with a different item, whereas the two parts of the transfer is situated on the same level, for the same item.

An important similarity is that just as components are dependent demand, so is the transfer demand. The demand from a transfer line is dictated by the supply side of the transfer in the sense that if the supply is changed, the demand is directly affected.

Unless the planning flexibility is None, a transfer line should never be treated as independent demand in planning.

In the planning procedure, the transfer demand should only be taken into account after the supply side has been processed by the planning system. Before this, the actual demand is not known. The sequence of the changes made is therefore very important when it comes to transfer orders.

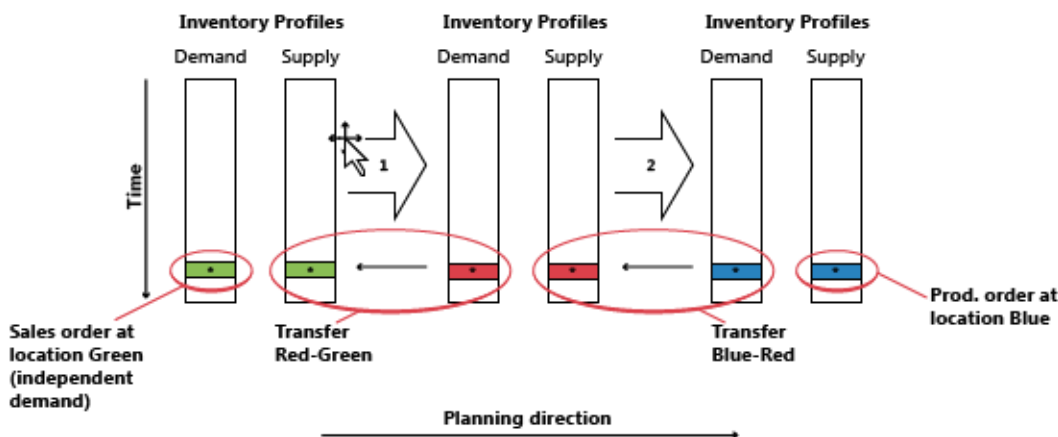
PLANNING SEQUENCE

The following illustration shows what a string of transfers could look like.



In this example, a customer orders the item at location GREEN. Location GREEN is supplied through transfer from the central warehouse RED. The central warehouse RED is supplied by transfer from production on location BLUE.

In this example, the planning system will start at the customer demand and work its way backwards through the chain. The demands and supplies will be processed one location at a time.

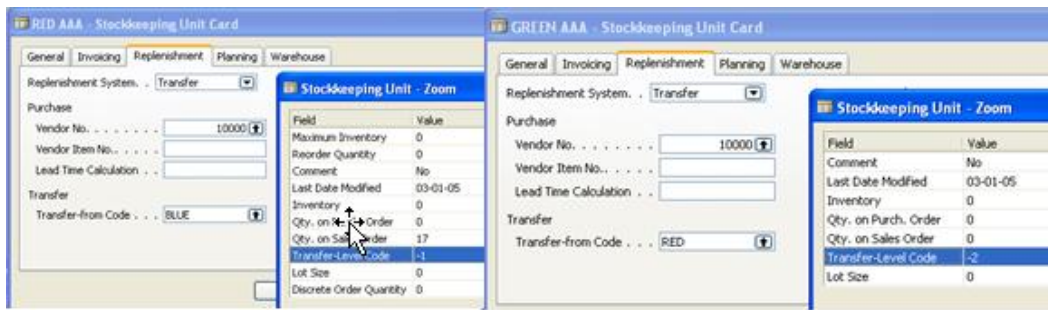


TRANSFER LEVEL CODE

The sequence in which the locations are processed in the planning system is determined by the transfer level code of the SKU.

The transfer level code is an internal field which is automatically calculated and stored on the SKU when SKU is created or modified. The calculation runs across all SKUs for a given combination of Item/Variant and uses the location code and the transfer-from code to determine the route the planning will have to use when traversing through the SKUs to ensure that all demands are processed.

The transfer level code will be 0 for SKUs with replenishment system Purchase or Prod. Order and will be -1 for the first transfer level, -2 for the second and so on. In the transfer chain described above, the levels would therefore be -1 for RED and -2 for GREEN, as shown in the following illustration.

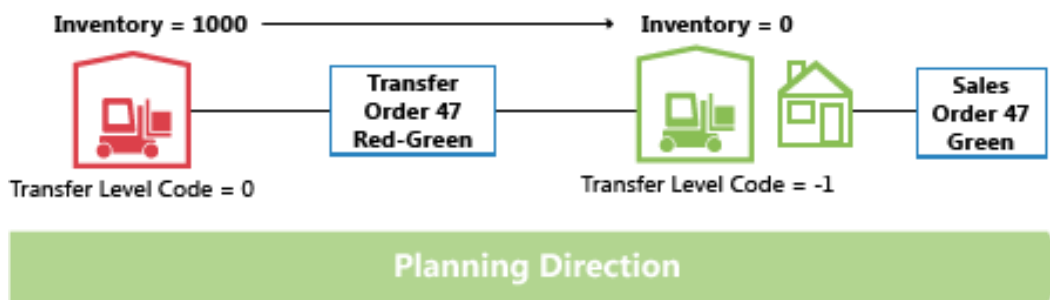


When updating a SKU, the planning system will detect if SKUs with replenishment system Transfer are set up with circular references.

Planning Transfers without SKU

Even if the SKU feature is not used, it is possible to use locations and make manual transfers between locations. For companies with less advanced warehouse setup, the planning system supports scenarios where existing inventory is transferred manually to another location, for example to cover a sales order at that location. At the same time, the planning system should react to changes in the demand.

To support manual transfers, the planning will analyze existing transfer orders and then plan the order in which the locations should be processed. Internally, the planning system will operate with temporary SKUs carrying transfer level codes.



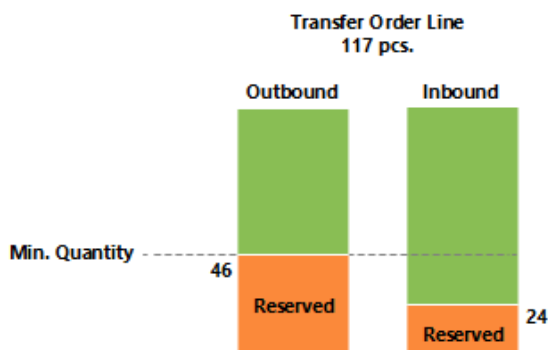
If more transfers to a given location exist, the first transfer order will define the planning direction. Transfers running in the opposite direction will be canceled.

CHANGING QUANTITY WITH RESERVATIONS

When changing quantities on existing supply, the planning system takes reservations into account in the sense that the reserved quantity represents the lower limit for how much the supply can be reduced.

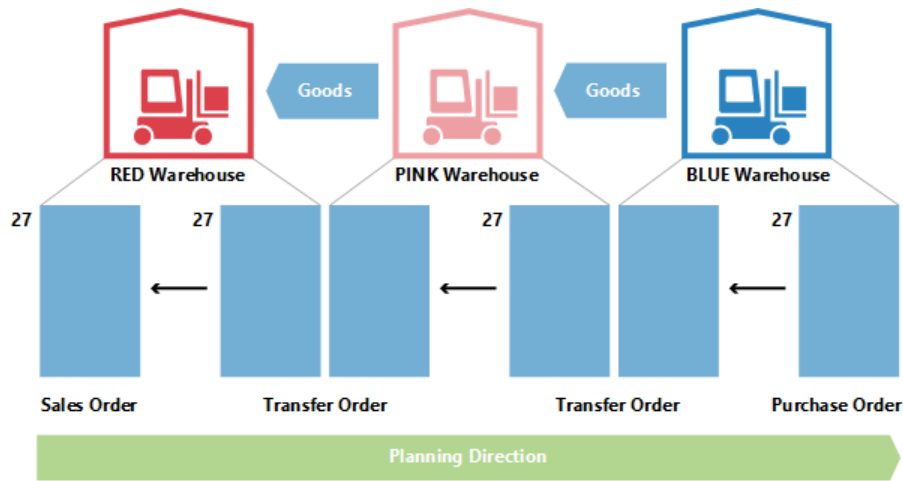
When changing the quantity on an existing transfer order line, keep in mind that the lower limit will be defined as the highest reserved quantity of the outbound and inbound transfer line.

For example, if a transfer order line of 117 pieces is reserved against a sales line of 46 and a purchase line of 24, it is not possible to reduce the transfer line below 46 pieces even though this might represent excess supply on the inbound side.

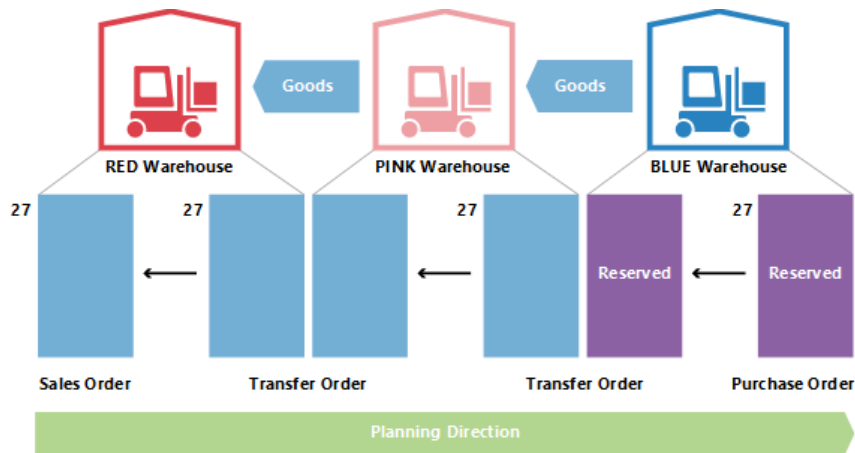


CHANGING QUANTITY IN A TRANSFER CHAIN

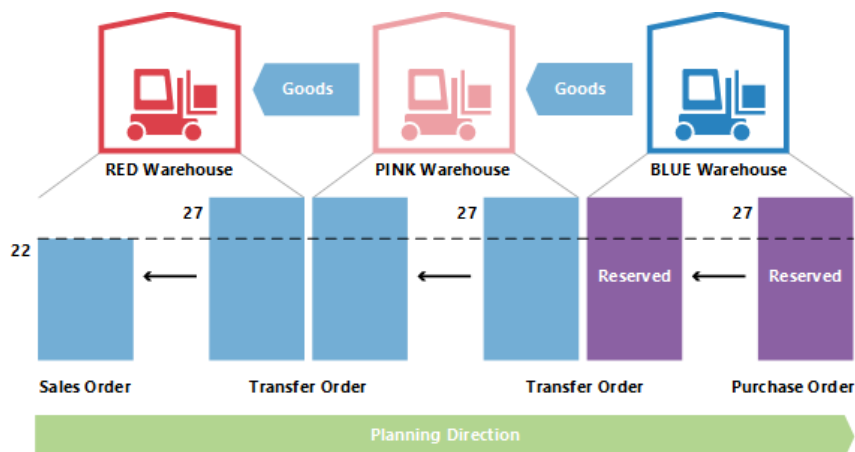
In the following example, the starting point is a balanced situation with a transfer chain supplying a sales order of 27 on location RED with a corresponding purchase order on location BLUE, transferred via location PINK. Therefore, apart from sales and purchase, there are two transfer orders: BLUE-PINK and PINK-RED.



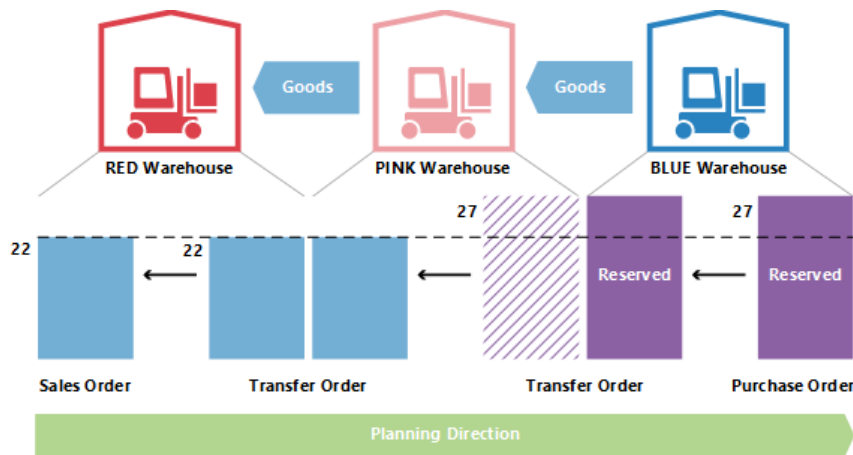
Now the planner at PINK location chooses to reserve against the purchase.



This usually means that the planning system will ignore the purchase order and the transfer demand. As long as there is balance, there is no problem. But what happens when the customer at RED location partly regrets his order and changes it to 22?



When the planning system runs again, it should get rid of excess supply. However, the reservation will lock the purchase and the transfer to a quantity of 27.



The PINK-RED transfer has been reduced to 22. The inbound part of the BLUE-PINK transfer is not reserved, but because the outbound part is reserved it is not possible to reduce the quantity below 27.

LEAD TIME CALCULATION

When calculating the due date of a transfer order different kinds of lead time will be taken into account.

The lead times that are active when planning a transfer order are:

- Outbound Warehouse Handling Time
- Shipping Time
- Inbound Warehouse Handling Time
- On the planning line, the following fields are used to provide information about the calculation.
- Transfer Shipment Date
- Starting Date
- Ending Date
- Due Date

The shipment date of the transfer line will be shown in the Transfer Shipment Date field, and the receipt date of the transfer line will be shown in the Due Date field.

The starting and ending dates will be used to describe the actual transportation period.

The following illustration shows the interpretation of the starting date-time and ending date-time on planning lines related to transfer orders.

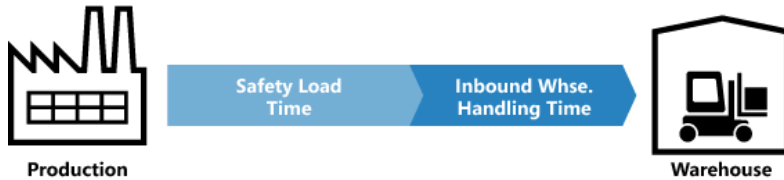


In this example, it means that:

- Shipment date + Outbound handling = Starting Date
- Starting Date + Shipping time = Ending Date
- Ending Date + Inbound Handling = Receipt Date

SAFETY LEAD TIME

The Default Safety Lead Time field in the Manufacturing Setup window and the related Safety Lead Time field on the item card will not be taken into account in the calculation of a transfer order. However, the safety lead time will still influence the total plan like it will affect the replenishment order (purchase or production) in the beginning of the transfer chain when the items are put on the location from which they will be transferred.

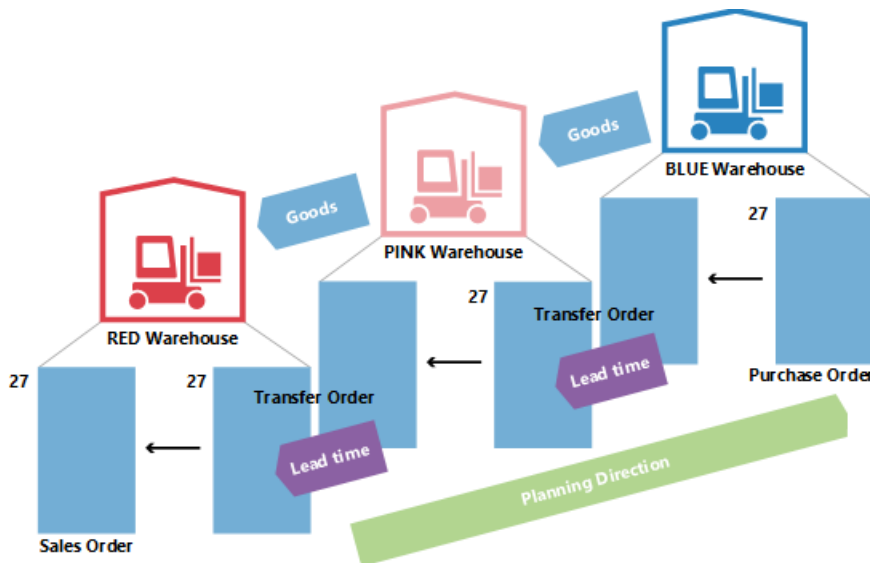


On the production order line, the Ending Date + Safety Lead Time + Inbound Warehouse Handling Time = Due Date.

On the purchase order line, the Planned Receipt Date + Safety Lead Time + Inbound Warehouse Handling Time = Expected Receipt Date.

RESCHEDULE

When rescheduling an existing transfer line, the planning system must look up the outbound part and change the date-time on this. It is important to note that if lead time has been defined, there will be a gap between the shipment and the receipt. As mentioned, the lead time can consist of more elements, such as transportation time and warehouse handling time. On a time line, the planning system will move back in time while it balances the elements.



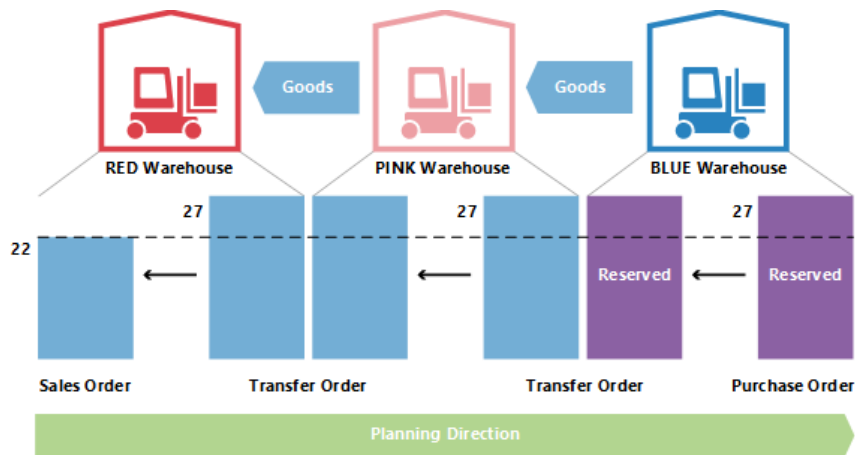
Therefore, when changing the due date on a transfer line, the lead time must be calculated in order to update the outbound side of the transfer.

SERIAL/LOT NUMBERS IN TRANSFER CHAINS

If the demand carries serial/lot numbers, and the planning engine is run, it will give rise to some directly created transfer orders. For more information about this concept, see Item Attributes. If, however, serial/lot numbers are removed from the demand, the created transfer orders in the chain will still carry the serial/lot numbers and will therefore be ignored by planning (not deleted).

ORDER-TO-ORDER LINKS

In this example, BLUE SKU is set up with the Order reordering policy, while PINK and RED use Lot-for-Lot. When a sales order of 27 is created on location RED, it will lead to a chain of transfers with the last joint at location BLUE being reserved with binding. In this example, the reservations are not hard reservations created by the planner at PINK location, but bindings created by the planning system. The important difference is that the planning system can change the latter.



If demand is changed from 27 to 22, the system will lower the quantity down through the chain, with the binding reservation also being reduced.

SEE ALSO

[Planning Parameters](#) | [Planning Assignment Table](#) | [Handling Reordering Policies](#) | [Demand at Blank Location](#) | [Central Concepts of the Planning System](#) | [Balancing Demand and Supply](#) | [Supply Planning](#)

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