

# MODULE 10: PLANNING

## Module Overview

“Planning” describes the regenerative planning and net change planning functions in Microsoft Dynamics® NAV. It also explains order tracking and action messages. Together these functionalities contain the core of the program’s planning capabilities.

Before starting the lessons in this module, set your work date to January 23, 2014. Please perform all lessons, demonstrations, and labs in sequence.

### Objectives

The objectives are:

- Describe the general concepts of the planning system.
- Introduce the planning worksheet and related functions.
- Explain how to use regenerative planning.
- Show how to use net change planning.
- Describe how parameters affect the planning process.
- Explain how to use order tracking and actions messages.

# Planning Overview

The term “running the planning worksheet” refers to the calculation of the master production schedule (MPS) and/or material requirements planning (MRP) that is based on actual and forecasted demand.

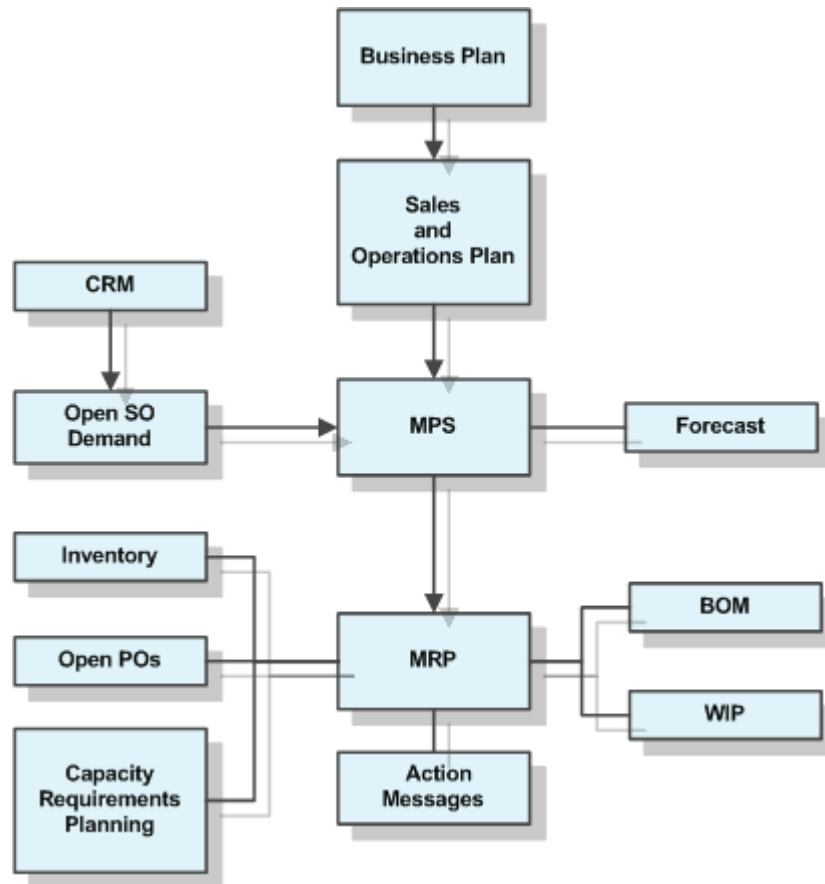
- MPS is the calculation of a master production schedule that is based on the actual demand and the production forecast. MPS plans for end items that have a forecast or sales order line.
- MRP is the calculation of material requirements that are based on actual demand for components and the components that are required by MPS planning lines. MRP plans only for items that are not MPS items.

You can run MPS or MRP separately, or you can run them together. If you run them together, MPS runs first, followed by MRP.

If you specify a forecast for a planning run, and that forecast is the only source of demand for MPS items, MRP calculates based on an explosion of the components that are required by the MPS planning lines. If any actual component demand exists on production orders, it is included in the planning calculations regardless of whether the component is classified as an MPS or MRP item.

The planning system uses the same algorithms for both MPS and MRP. In summary, the system examines the quantities of items that are required and will be required (demand), and the quantities of items that are on-hand or expected to be on-hand (supply). Then it nets demand against supply and determines whether new supply is required or if the existing supply must be changed or canceled. To communicate these findings, the system generates *action messages* and populates these messages in the planning worksheet, where they are also known as *planning lines*. Action messages are suggestions to create new supply, or to change or cancel existing supply. Possible sources of supply include production, assembly, purchase, and transfer orders.

The “Basic Planning Process in the Enterprise” diagram displays many of these planning elements.



**FIGURE 10.1: BASIC PLANNING PROCESS IN THE ENTERPRISE**

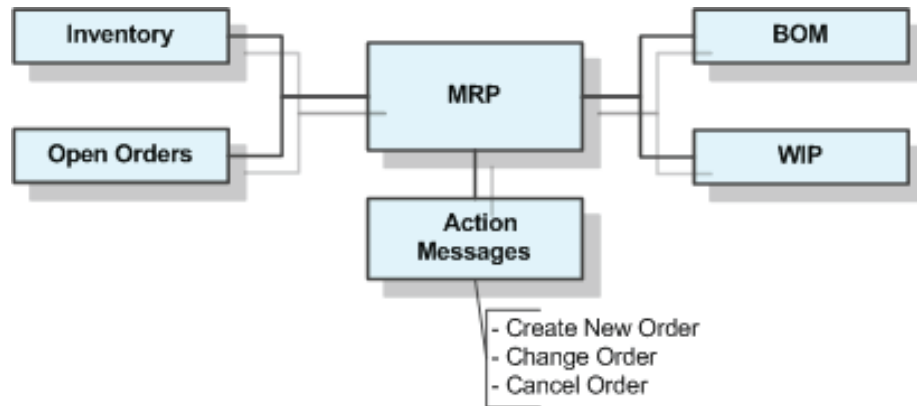
MPS is described in “Forecasting and Planning” in this training material. This module focuses more on MRP.

MRP is a tool that helps manufacturers effectively manage the following functions:

- Material planning
- Scheduling
- Purchasing

At a minimum, this involves the following:

- Item structure
- Inventory
- Open orders
- Processes leading to action messages



**FIGURE 10.2:OVERVIEW OF MRP**

The basis of the planning routine is the gross to net calculation. Net requirements drive planned order releases. These are scheduled based on the following:

- Routing information for manufactured items
- Item card lead time for purchased items and assembly items

The planning engine uses the MRP calculation to determine planned order release quantities, and then modifies these quantities based on the parameters that are set on the individual item cards. Planning parameters are described throughout the lessons in this training material.

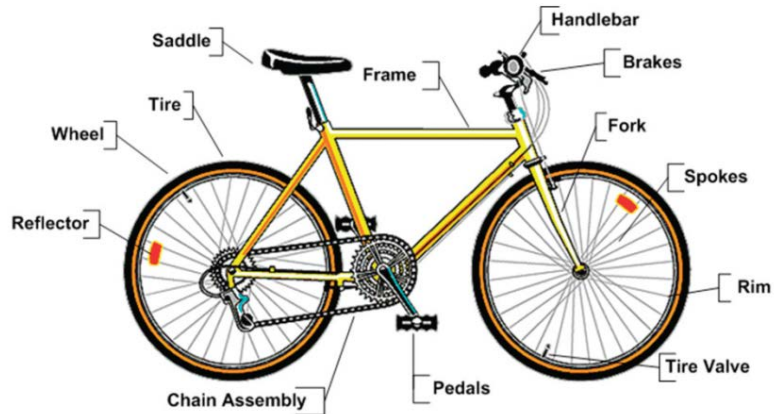
The business process that is linked to MRP starts with independent demand. Independent demand is demand for items that are sold directly to customers. It is not reliant upon another item and can be finished goods, repair parts, or subassemblies that are sold separately. It can be in the form of a production forecast, MPS planning lines, sales orders, or any combination of these.

Dependent demand is the demand for components that are required to build a higher-level assembly. Components are identified by their presence on the higher-level assembly's production or assembly bill of materials (BOM). The demand for a component depends on the demand for all the higher-level assemblies in which it participates. These higher-level assemblies can be end sales items, or they can be other components.

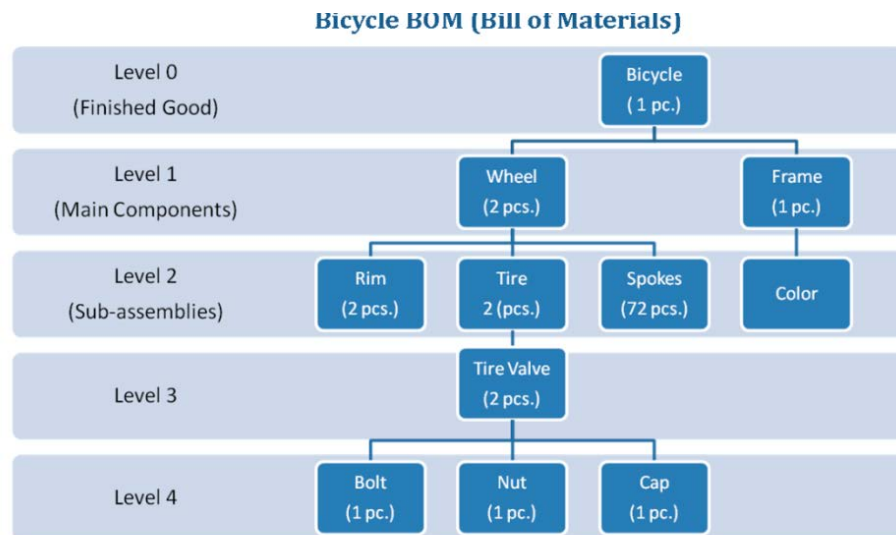
The following describes the concept of a higher-level assembly in more detail:

- BOMs are structured in levels.
- The finished good is level zero.
- The components, whether purchased items or subassemblies, are level one.
- Level one subassemblies have components. These components are level two purchased items and subassemblies, and so on until the last level. The last level consists only of purchased items.

- Microsoft Dynamics NAV can process a BOM up to 50 levels deep.



**FIGURE 10.3:DIAGRAM OF BICYCLE COMPONENTS**




**FIGURE 10.4:BIICYCLE BILL OF MATERIALS STRUCTURE**

If the **Dynamic Low-level Code** field is selected on the **Manufacturing Setup** page, the program calculates low-level codes automatically when you certify a production BOM that is attached to an item card. The program knows when to search and when to stop searching for items.

Accurate planning requires that you correctly calculate low-level codes. Decide to either check the **Dynamic Low-Level Code** in manufacturing setup, or run the **Calculate Low-Level-Code** batch job before you use the planning worksheet. Always run the **Calculate Low-Level-Code** batch job after you complete the initial setup of the company.

When you run a regenerative plan, the progress bar window shows that the program does not examine items in numeric order. It examines them based on the low-level code. The process starts with level zero (the top level). If low-level codes are calculated incorrectly, this can result in incorrect action messages.

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 **Note:** *If you certify a BOM before you attach it to an item card, the low-level codes could be incorrect. In this case, you can recertify the BOM after you assign it to an item card, or you can run the **Calculate Low-Level-Code** batch job before you use the planning worksheet.*

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The BOM explosion controls the flow of net requirements calculations for all lower-level assemblies and raw materials. The process determines the quantities that are required for each item by netting its supply and demand, and then it adjust these quantities based on the item's planning parameters. The program repeats this process as it descends through all the BOM levels.

The process populates the planning worksheet with lines known as *action messages*. These are suggestions to create, change, or cancel the following:

- Production orders, planned or firm planned
- Assembly orders
- Purchase orders or purchase requisitions
- Transfer orders or transfer requisitions

These proposed actions represent the production plan. The planning worksheet does not automatically carry out these action messages. This is the job of the production planner, who can change the action messages before executing them.

### Factors that Drive the Planning Engine

The planning process starts with independent demand. Sources of independent demand include the following:

- Finished goods
- Spare parts and repair
- Overhaul requirements

Independent demand can be in the form of one or more of the following:

- Sales orders (including blanket sales orders)
- Production forecasts

In a make-to-order (MTO) environment, the following is true:

- You might be unable to identify independent demand until you receive a customer order.
- For manufactured items, you create firm planned production orders to drive the planning process.
- Some MTO clients decide to plan for future production by entering a production forecast or a master production schedule only for those items that receive bookings.
- Or, you can create a forecast or master production schedule at the component or subassembly level. This gives you the flexibility to produce many final products from the few standard items that make up the forecast or master production schedule.

Make-to-stock (MTS) environments typically deliver products from finished goods inventory in a short time. A production forecast and a master production schedule that are based on the expected sales of products are required for planning in this environment.

### Reorder Point and Reordering Policies

A *reorder point* represents demand during lead time. When the projected inventory passes below the inventory level that is defined by the reorder point, it is time to order more stock. 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 suggests 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 reorder cycle. Therefore, the planning system must constantly monitor the projected available inventory.

To include an item in the planning process, it must have a reordering policy. Otherwise, you must plan it manually. You set the reordering policy for an item in the **Reordering Policy** field on the **Planning** FastTab of the item card.


The following table describes the reordering policies and their effect on order quantity.

Reordering Policy	Description
<b>Fixed Reorder Qty.</b>	<p>Uses the quantity that is specified in the <b>Reorder Quantity</b> field as the standard lot size. The planning system can adjust this quantity to meet additional requirements or the specified inventory level. You typically use a reorder point with this reordering policy.</p> <p>This policy is suitable for a fixed demand setup for items that are inexpensive to produce, purchase, or assemble, and that have a low risk of obsolescence.</p>
<b>Maximum Qty.</b>	<p>Uses the quantity that is specified in the <b>Maximum Inventory</b> field to determine the maximum lot size. The planning system can adjust this quantity to meet additional requirements or the specified inventory level. You typically use a reorder point with this reordering policy.</p> <p>This policy is suitable for a fixed demand setup for items that are inexpensive to produce, purchase, or assemble, and that have a low risk of obsolescence.</p>
<b>Order</b>	<p>Generates an order for each requirement and does not use the planning period. Also creates an automatic reservation between the requirement and the corresponding replenishment order proposal. This preserves the customized information on the relevant orders, and links them for inventory and costing purposes.</p> <p>Or, you can create a manual reservation to set aside items in inventory and designate them for use in a specific order.</p> <p>Typically, you use the Order reordering policy in an MTO environment.</p>



Reordering Policy	Description
<b>Lot-for-Lot</b>	<p>Generates an order proposal with a quantity that meets the sum of the requirements that are due in the planning period.</p> <hr/> <p> <b>Note:</b> When you use the reorder point with this option, it can result in surplus replenishment order proposals.</p> <hr/>
<b>Blank</b>	Does not calculate order proposals for this item. You must manually plan for the item.

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 **Note:** When you change from one reordering policy to another policy, it can result in the program disabling some planning parameter fields that were previously active. These fields keep their most recent values.

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## Production Planning Process

Most companies use a specific process to generate a production plan. This includes the planning method, frequency, and parameters. You must consider these issues during the setup and implementation stage.

You can calculate plans by using the following functions:

- **Calculate Regenerative Plan** – Calculates a plan for all selected items, regardless of changes since the previous planning run. You calculate a regenerative plan when there are changes to master data or capacity, such as shop calendars, that affect all items and therefore the whole supply plan.
- **Calculate Net Change Plan** – Calculates a plan only for those selected items that had the following types of changes to their demand-supply pattern since the previous planning run:
  - Changes to demand for the item, such as forecast, sales, or component lines.
  - Changes in master data or in planned supply for the item. These can be changes to the BOM or routing, changes to planning parameters, or unplanned inventory differences.

- **Get Action Messages** – Generates and displays action messages for the selected items. Action messages can be created due to any of the following:
  - New or changed sales orders
  - New or changed supply orders
  - Changed component lines



**Note:** *The calculation of a plan uses significant system resources and locks some tables. Therefore, you should run the planning functions during periods when users are not accessing inventory or bill of materials records. You do not have to recalculate the whole plan every time that you run the planning routines. If you select only those items that have experienced changes in their demand stream, or changes to their item definition that affect the material requirements, consider using net change planning instead of regenerative planning. This reduces the processing load on the system and significantly shortens the time that is required to calculate a plan.*

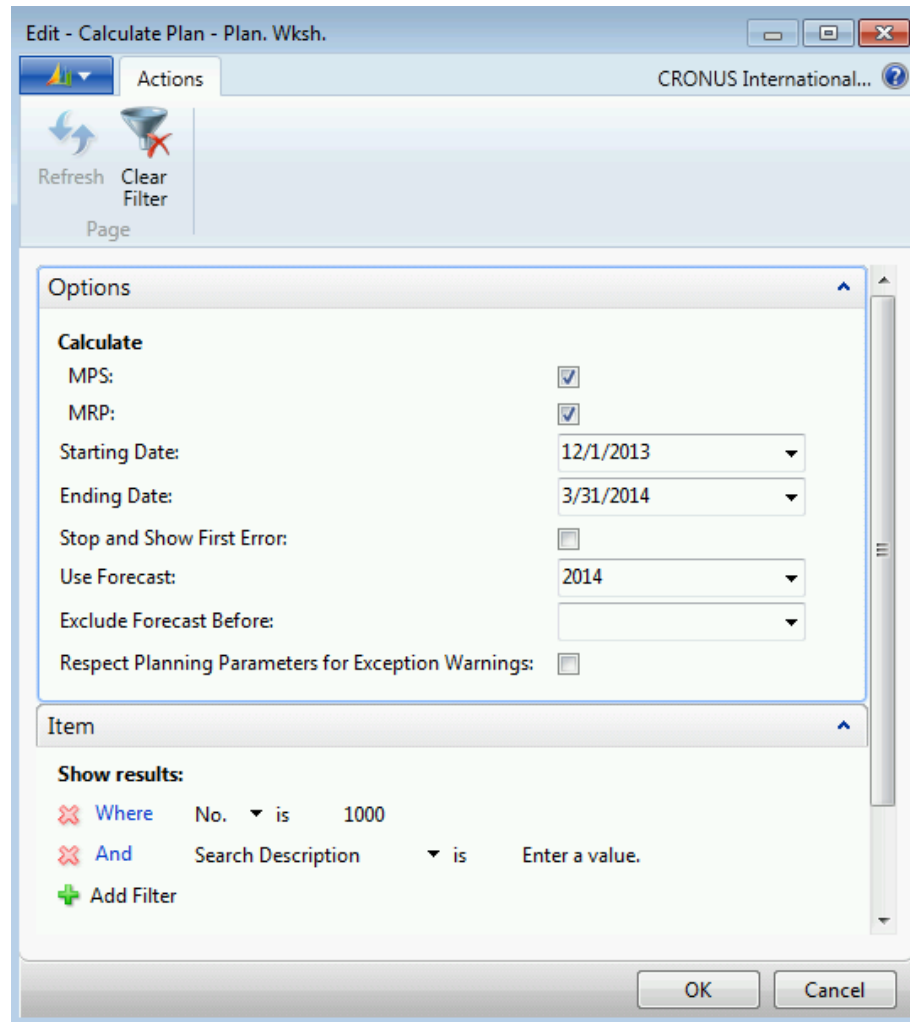
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### Calculate Plan - Plan. Wksh. Page

The **Calculate Plan – Plan. Wksh.** page is the request page that is used for both the **Calculate Regenerative Plan** and the **Calculate Net Change Plan** functions.

To open the **Calculate Plan – Plan. Wksh.** page, follow these steps.

1. In the **Search** box, type “planning worksheets”, and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
2. On the **Home** tab of the planning worksheet, click **Calculate Regenerative Plan**. Or, on the **Actions** tab, click **Calculate Net Change Plan**.



**FIGURE 10.5: CALCULATE PLAN – PLAN. WKSH. REQUEST PAGE**

The **Calculate Plan – Plan. Wksh.** page has the following two FastTabs:

- **Options** FastTab – Specifies the type and horizon of the planning run. Also specifies the forecast to use, and two check boxes that control the batch job’s behavior related to errors and exceptions.
- **Item** FastTab – Specifies filter fields to limit the items that participate in the planning run, or to limit the totals that are used for those items based on location, date, and so on.

## Manufacturing in Microsoft Dynamics® NAV 2013

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The following table describes the fields in the **Options** FastTab:

Field	Description
<b>MPS</b>	Specifies whether to calculate a master production schedule (MPS) based on independent demand. Items on a sales order line or production forecast line participate in this run.
<b>MRP</b>	Specifies whether to calculate MRP. This calculates dependent demand based on the actual demand for components and the demand for components that are required by MPS planning lines. MRP is calculated only for items that are not MPS items.
<b>Starting Date</b>	<p>Specifies the date to use for any new orders. The planning system uses this date to evaluate inventory. If the inventory is below the reorder point, then the system forward schedules the replenishment order from this date.</p> <p>The planning system only considers supply and demand events with due dates on or after the starting date. Any events with due dates before the planning start date are combined into one emergency supply order for the item to arrive on the planning starting date. Also, the planning system ignores any unconsumed forecast quantity before the starting date.</p>
<b>Ending Date</b>	Specifies the date that the planning period ends. Demand beyond this date is not included.

Field	Description
<p><b>Stop and Show First Error</b></p>	<p>Specifies whether to stop the planning run when it encounters an error. If the planning run stops, then the program displays a message that has information about the first error. If an error occurs, then only the planning lines that are created before the error are included in the planning worksheet.</p> <p>If you do not select this field, then the planning run continues regardless of errors until it finishes. The <b>Planning Error Log</b> page then opens to provide more details about the error and links to the affected item card or cards.</p>
<p><b>Use Forecast</b></p>	<p>Specifies a forecast to include as demand when calculating the plan.</p>
<p><b>Exclude Forecast Before</b></p>	<p>Specifies the amount of the selected forecast to include in the planning run by entering a date before which forecast demand is not included.</p>
<p><b>Respect Planning Parameters for Exception Warnings</b></p>	<p>Typically, supply planning lines with exception warnings are not changed to reflect planning parameters. Instead, the planning system only suggests a supply to cover the exact demand quantity. However, if you select this field, the planning lines with exception warnings respect the following planning parameters on the item or SKU card:</p> <ul style="list-style-type: none"> <li>• Reorder Point</li> <li>• Reorder Quantity</li> <li>• Maximum Inventory</li> <li>• Minimum Order Quantity</li> <li>• Maximum Order Quantity</li> <li>• Order Multiple</li> </ul>

The **Item** FastTab works the same as other batch job filter FastTabs. The filter fields in the Show results section restrict the list of planned items. For example, if a filter is set for item 1000, then a plan calculates only for item 1000. You can also filter by any other field on the item card.

The fields in the Limit totals for section restrict the demand and supply quantities that are used in the planning run. For example, you can use the **Location Filter** field in this section to limit planning calculations to a specific location.

It is sometimes difficult for planners to decide on the planning horizon for a planning run (the time that the plan covers). If the horizon is too short, items with a longer lead time might not be ordered on time. If the horizon is too long, you can waste time calculating and reviewing changes before they are required. One possibility is to set one planning horizon for production and one for purchases. Whatever strategy you follow, the planning horizon must cover the cumulative lead time for components.

To avoid having a supply plan show impossible and therefore useless suggestions, the planning system considers the period before the planning starting date as a frozen zone where no planning occurs. It views all supply in this frozen zone as part of inventory, and all demand as shipped. Therefore, with a few exceptions, the planning system does not suggest any changes to supply orders in the frozen zone. Also, order tracking links are not 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 to cover the missing quantity. This emergency supply order is due on the day before the start of the planning period. Therefore, the projected and available inventory is always at least zero when planning for the future period starts. The planning line for this supply order displays an emergency warning. You can obtain additional information by clicking the warning.

After the system calculates a plan, it populates the resulting action messages into the planning worksheet. Then you can change or delete the action messages, or even manually add new action messages. You ultimately control which action messages the system carries out by selecting or clearing the **Accept Action Message** field, and then clicking the **Carry Out Action Message** function on the **Home** tab. This opens the **Carry Out Action Msg. - Plan** request page. This request page lets you apply filters to further restrict the list of action messages to carry out. It also lets you specify several options about how to carry out the action messages. **The Carry Out Action Msg. – Plan** request page is described in detail in the “Carry Out Action Msg. – Plan Page” topic in the “Order Tracking and Action Messages” lesson.

## Demonstration: Create a Demand Stream

**Scenario:** In order to continue his experiments with the planning worksheet, Eduardo, the production planner at CRONUS, creates a new product and a demand stream for that product. This lets him test the planning worksheet without interference from other activity.

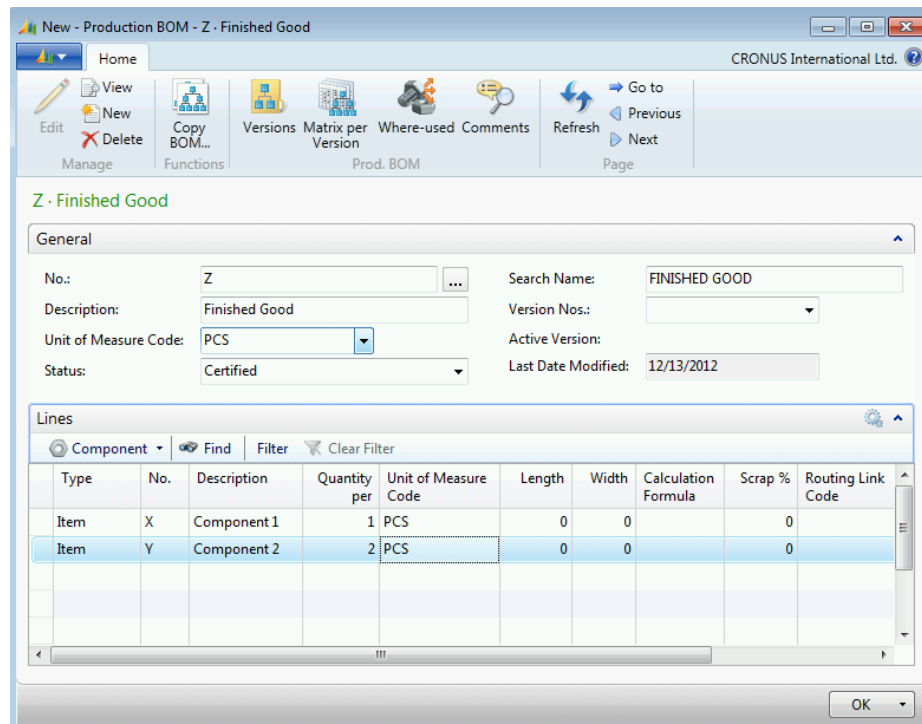
### Demonstration Steps

1. Create a new item and set its replenishment and planning parameters.
  - a. Close all open pages.
  - b. In the **Search** box, type "items", and then select the related link.
  - c. On the **Home** tab of the **Items** list page, click **New**.
  - d. On the **General** FastTab of the item card, in the **No.** field, type "Z".
  - e. In the **Description** field, type "Finished Good".
  - f. Click the down arrow in **Base Unit of Measure** field, and then click **New**.
  - g. On the **Item Units of Measure** page, in the **Code** field, select PCS, and then click **OK** to close the page.
  - h. Expand the **Invoicing** FastTab.
  - i. In the **Gen Prod. Posting Group** field, select RETAIL.
  - j. In the **Inventory Posting Group** field, select FINISHED.
  - k. Expand the **Replenishment** FastTab.
  - l. In the **Replenishment System** field, select Prod. Order.
  - m. In the **Manufacturing Policy** field, select Make-to-Order.
  - n. Expand the **Planning** FastTab.
  - o. In the **Reordering Policy** field, select Order.
  - p. Click **OK** to close the item card.
  
2. Make a new component item. Call the item "X".
  - a. On the **Home** tab of the **Items** page, click **New**.
  - b. On the **General** FastTab of the item card, in the **No.** field, type "X".
  - c. In the **Description** field, type "Component 1".
  - d. Click the down-arrow in **Base Unit of Measure** field, and then click **New**.
  - e. On the **Item Units of Measure** page, in the **Code** field, select PCS, and then click **OK** to close the page.
  - f. Expand the **Invoicing** FastTab.
  - g. In the **Gen Prod. Posting Group** field, select RETAIL.

- h. In the **Inventory Posting Group** field, select FINISHED.
    - i. Expand the **Replenishment** FastTab.
    - j. In the **Replenishment System** field, select Purchase.
    - k. In the **Vendor No.** field, type "10000".
    - l. In the **Manufacturing Policy** field, select Make-to-Order.
    - m. Expand the **Planning** FastTab.
    - n. In the **Reordering Policy** field, select Lot-for-Lot.
    - o. In the Lot-for-Lot Parameters section, select the **Include Inventory** check box.
    - p. In the **Lot Accumulation Period** field, type "1W" for one week.
    - q. Click **OK** to close the item card.
  3. Make a second new component item. Call the item "Y".
    - a. On the **Home** tab of the **Items** page, click **New**.
    - b. On the **General** FastTab of the item card, in the **No.** field, type Y".
    - c. In the **Description** field, type "Component 2".
    - d. Click the down arrow in the **Base Unit of Measure** field, and then click **New**.
    - e. On the **Item Units of Measure** page, in the **Code** field, select PCS, and then click **OK** to close the page.
    - f. Expand the **Invoicing** FastTab.
    - g. In the **Gen Prod. Posting Group** field, select RETAIL.
    - h. In the **Inventory Posting Group** field, select FINISHED.
    - i. Expand the **Replenishment** FastTab.
    - j. In the **Replenishment System** field, select Purchase.
    - k. In the **Vendor No.** field, type "10000".
    - l. In the **Manufacturing Policy** field, select Make-to-Order.
    - m. Expand the **Planning** FastTab.
    - n. In the **Reordering Policy** field, select Lot-for-Lot.
    - o. In the Lot-for-Lot Parameters section, select the **Include Inventory** check box.
    - p. In the **Lot Accumulation Period** field, type "1W" for one week.
    - q. Click **OK** to close the item card.
  4. Create a BOM for item Z.
    - a. In the **Search** box, type "production bom", and then select the related link.
    - b. On the **Home** tab of the **Production BOM** list page, click **New**.
    - c. On the **General** FastTab of the **Production BOM** page, in the **No.** field, type "Z".



- d. In the **Description** field, type "Finished Good".
- e. In the **Unit of Measure Code** field, select PCS.
- f. On the **Lines** FastTab, in the **Type** field, select Item.
- g. In the **No.** field, type "X".
- h. In the **Quantity per** field, type "1".
- i. On the second line, in the **Type** field, select Item.
- j. In the **No.** field, type "Y".
- k. In the **Quantity per** field, type "2".
- l. On the **General** FastTab, in the **Status** field, select Certified.



**FIGURE 10.6: PRODUCTION BOM FOR ITEM Z**

- m. Click **OK** to close the **Production BOM** page.
5. Link the production BOM to item Z.
    - a. In the **Search** box, type "items", and then select the related link.
    - b. On the **Items** list page, double-click the line for item Z to open the item card.
    - c. Expand the **Replenishment** FastTab.
    - d. In the **Routing No.** field, type "1000" to select the Bicycle routing.
    - e. In the **Production BOM No.** field, type "Z".
    - f. Click **OK** to close the item card.

6. Calculate low-level codes.
  - a. In the **Search** box, type “calculate low-level code”.
  - b. On the request message, click **Yes**.



**Note:** You must run the **Calculate Low-Level Code** function here because you certified the production BOM before you attached it to an item. For more information, read the lesson overview.

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7. Create independent demand for item Z in the form of sales orders.
  - a. In the **Search** box, type “sales orders”, and then select the related link.
  - b. On the **Home** tab of the **Sales Orders** list page, click **New**, and then click **Enter**.
  - c. On the **General** FastTab of the sales order card, in the **Sell-to Customer No.** field, type “10000”.
  - d. Expand the **Shipping** FastTab.
  - e. Delete the value from the **Location Code** field, if present.
  - f. Set the **Shipment Date** field to January 28, 2014.
  - g. On the **Lines** FastTab, in the **Type** field, select Item.
  - h. In the **No.** field, type “Z”.
  - i. In the **Quantity** field, type “10”. Accept any messages.
  - j. Click **OK** to close the sales order card.
  - k. Repeat steps b to j, but change the shipping date to February 24, 2014, and change the quantity to 7.

## Regenerative Planning

Regenerative planning calculates a new plan for all selected items, regardless of changes since the previous planning run. You calculate a regenerative plan when there are changes to master data or capacity. An example is changes to shop calendars that affect all items and therefore the whole supply plan. The calculation incorporates all changes into the new plan. This includes the changes that are addressed by net change planning.

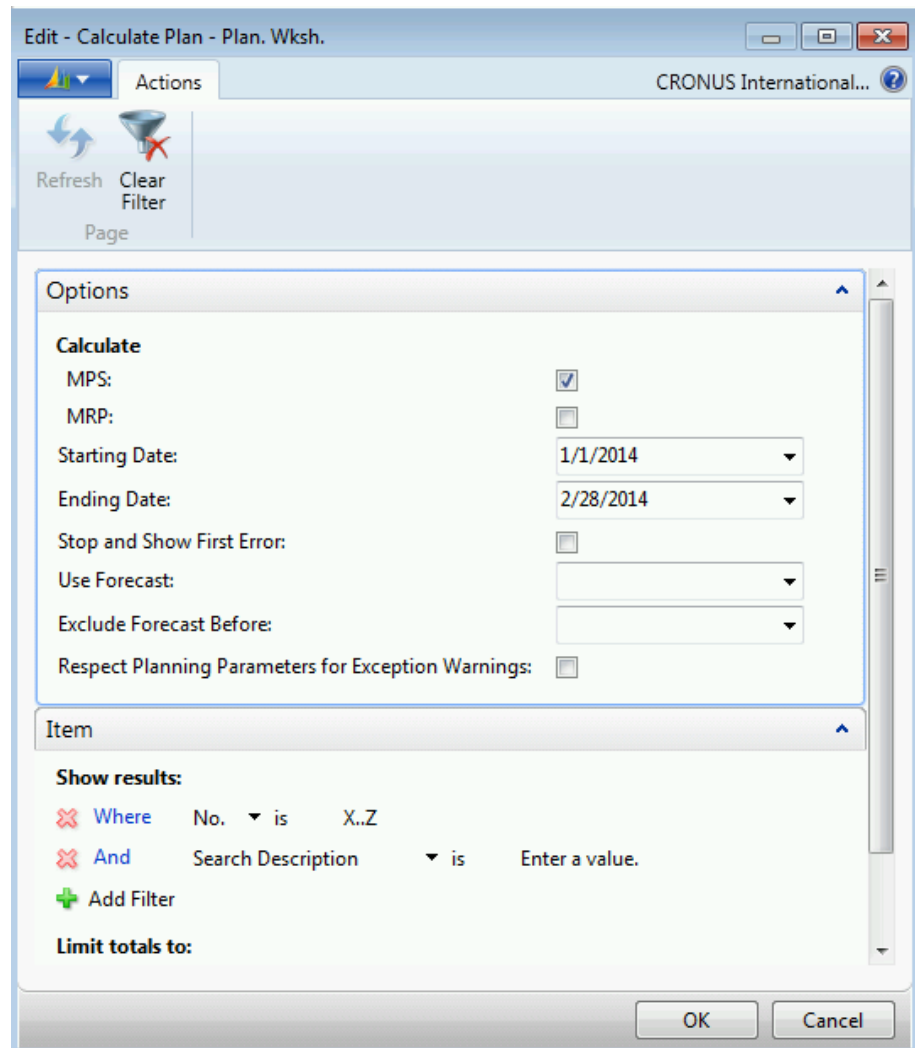
### Demonstration: Calculate a Regenerative Plan for MPS

This is a continuation of the “Create a Demand Stream” demonstration.

**Scenario:** Eduardo, the production planner at CRONUS, decides to calculate a regenerative plan for MPS for items X, Y, and Z.

### Demonstration Steps

1. Calculate a regenerative plan for MPS for items X, Y, and Z.
  - a. In the **Search** box, type "planning worksheets", and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
  - b. If any planning lines currently exist in the planning worksheet, click the cell in the upper-left corner of the table section of the worksheet. This selects all planning lines. Then, on the **Home** tab, click **Delete**. On the request message, click **Yes** to confirm the deletion. All the planning lines disappear. This leaves the planning worksheet empty.
  - c. On the **Home** tab of the planning worksheet, click **Calculate Regenerative Plan**.
  - d. On the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page, select the check box for the **MPS** field, and clear the check box for the **MRP** field.
  - e. Set the **Starting Date** field to January 01, 2014.
  - f. Set the **Ending Date** field to February 28, 2014.
  - g. In the **Use Forecast** field, delete the existing value.
  - h. On the **Item** FastTab, in the **No.** filter field, type "X..Z". This limits the planning calculations to items X, Y, and Z.
  - i. Clear all other filter fields (you may have to scroll down to see them).



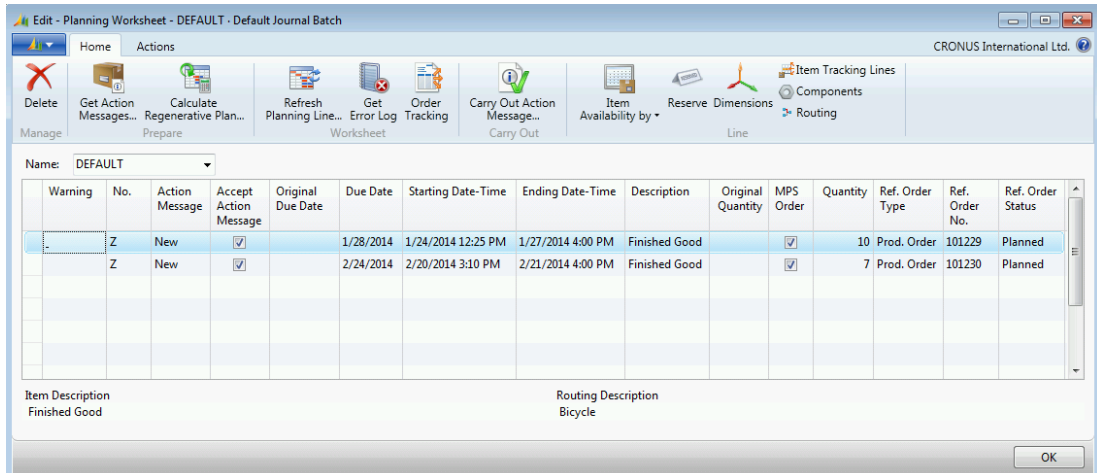
**FIGURE 10.7: CALCULATE PLAN – PLAN. WKSH. PAGE FOR MPS FOR ITEMS X, Y, AND Z**

- j. Click **OK** to calculate the plan.

## The Planning Worksheet

This is a continuation of the “Calculate a Regenerative Plan for MPS” demonstration.

Notice that after you click **OK** to calculate a plan, the planning system creates two planning lines in the worksheet, one for each sales order for item Z that you created earlier. It does not create any planning lines for items X or Y because those items are not MPS items.



**FIGURE 10.8: PLANNING WORKSHEET RESULTS FOR REGENERATIVE PLAN FOR MPS FOR ITEMS X, Y, AND Z**

The following table describes the main fields in the planning worksheet.

Field	Description
<b>Warning</b>	<p>A warning text displays in this field for any planning line that is created for an unusual situation. You can drill down into the text for more information.</p> <p>The possible warning types are Emergency, Exception, and Attention.</p> <p><b>Emergency</b></p> <p>The emergency warning displays in the following two situations:</p> <ul style="list-style-type: none"> <li>The inventory is negative on the planning start date.</li> <li>Back-dated supply or demand events exist.</li> </ul> <p>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.</p> <p>Any document lines with due dates before the planning start date are combined into one emergency supply order so that the item arrives on the planning start date.</p>

Field	Description
	<p>The planning start date is specified in the <b>Starting Date</b> field on the <b>Options</b> FastTab of the <b>Calculate Plan – Plan. Wksh.</b> request page.</p> <p><b>Exception</b></p> <p>The exception warning is displayed if the projected available inventory drops below the safety stock quantity. The planning system suggests a supply order to replenish the safety stock quantity. The warning text states the item's safety stock quantity, and the date on which the projected available inventory drops below that quantity.</p> <p>Violating the safety stock level is considered an exception because it should not occur if the reorder point is set correctly.</p> <p><b>Attention</b></p> <p>The attention warning displays in the following two situations:</p> <ul style="list-style-type: none"> <li>• The planning start date is earlier than the work date.</li> <li>• The planning line suggests a change to a released supply order.</li> </ul>
<b>No.</b>	The item number.
<b>Action Message</b>	<p>The action to take to rebalance supply and demand. The following actions are possible:</p> <ul style="list-style-type: none"> <li>• <b>New</b> – Create a new order.</li> <li>• <b>Change Qty.</b> – Change the quantity on an existing order.</li> <li>• <b>Reschedule</b> – Reschedule the due date on an existing order.</li> <li>• <b>Resched. &amp; Chg. Qty.</b> – Reschedule the due date and change the quantity on an existing order.</li> <li>• <b>Cancel</b> – Cancel an existing order.</li> </ul>
<b>Accept Action Message</b>	<p>Check box that determines whether to carry out the suggested action when you click the <b>Carry Out Action Message</b> function. This lets you select those actions that you want to carry out, and to clear those that you do not.</p>

Field	Description
<b>Original Due Date</b>	The current due date for an existing supply order when an action message suggests rescheduling the order.
<b>Due Date</b>	The date when you can expect to receive the items if you carry out the suggested action. For an existing supply order, this is the revised due date.
<b>Starting Date-Time</b>	The starting date and time for the suggested order. If this is an existing order, the starting date and time represent the revised starting date and time.
<b>Ending Date-Time</b>	The ending date and time for the suggested order. If this is an existing order, the starting date and time represent the revised ending date and time.
<b>Description</b>	The item description.
<b>Original Quantity</b>	The original quantity for an existing supply order when an action message suggests a change to the order.
<b>MPS Order</b>	Check box that specifies whether the planning line is an MPS order, that is, whether it is linked to a production forecast or a sales order line. The program places a checkmark in this box only when you run MPS alone. You can also check this field when you manually edit the line.
<b>Quantity</b>	The proposed quantity for the line. For an existing supply order, this is the revised quantity.
<b>Ref. Order Type</b>	The order type. Indicates whether the supply order is a purchase, production, assembly, or a transfer order.
<b>Ref. Order No.</b>	The document number for the supply order. If the suggested action is New, this is the number that is assigned to the order.

Field	Description
<b>Ref. Order Status</b>	The status of the production order. The options are Planned, Firm Planned, or Released.

The **Item Description** and **Routing Description** fields are provided at the bottom of the planning worksheet



**Note:** There are more fields in the planning worksheet than are described here. To view the other fields, use the **Choose Columns** function. When a field is displayed in the planning worksheet, you can select it, and then press the **F1** button to access Help for the field.

## Demonstration: Calculate a Regenerative Plan for MRP

This is a continuation of the “Calculate a Regenerative Plan for MPS” demonstration.

**Scenario:** Having confirmed that MPS plans only for the finished goods item Z, Eduardo, the production planner for CRONUS, decides to run MRP.

### Demonstration Steps

1. Calculate a regenerative plan for MRP for items X, Y, and Z.
  - a. On the **Home** tab of the planning worksheet, click **Calculate Regenerative Plan**.
  - b. On the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page, select the check box for the **MRP** field, and clear the check box for the **MPS** field.
  - c. In the **Use Forecast** field, delete the existing value.
  - d. Accept all other existing field values, and then click **OK** to calculate the plan.

## Regenerative Plan Results

This is a continuation of the “Calculate a Regenerative Plan for MRP” demonstration.

The planning worksheet now includes the requirements for the lower level subassemblies and raw materials that are required to produce the two production orders that are suggested by the MPS planning run.



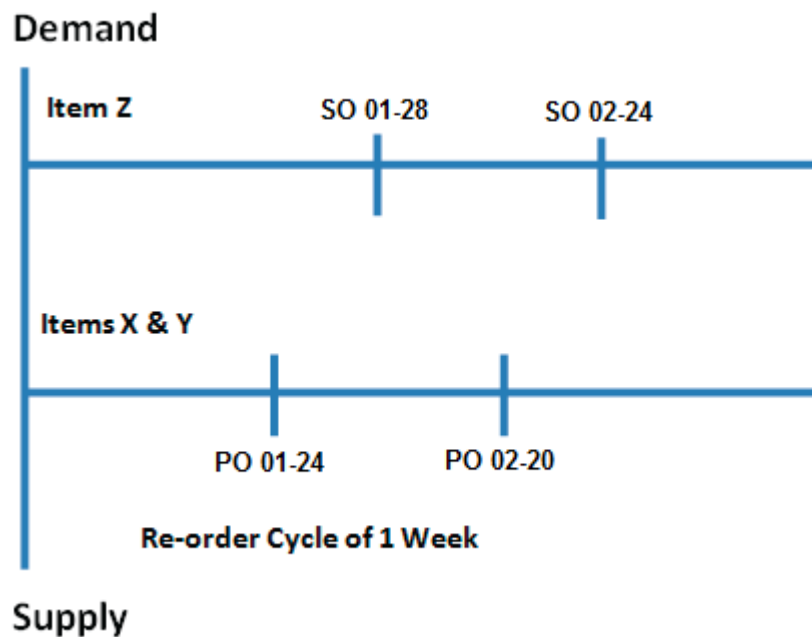
Warning	No.	Action Message	Accept Action Message	Original Due Date	Due Date	Starting Date-Time	Ending Date-Time	Description	Original Quantity	MPS Order	Quantity	Ref. Order Type	Ref. Order No.
	Z	New	<input checked="" type="checkbox"/>		1/28/2014	1/24/2014 12:25 PM	1/27/2014 4:00 PM	Finished Good		<input checked="" type="checkbox"/>	10	Prod. Order	101259
	Z	New	<input checked="" type="checkbox"/>		2/24/2014	2/20/2014 3:10 PM	2/21/2014 4:00 PM	Finished Good		<input checked="" type="checkbox"/>	7	Prod. Order	101260
	X	New	<input checked="" type="checkbox"/>		1/24/2014	1/23/2014 8:00 AM	1/23/2014 11:00 PM	Component 1		<input type="checkbox"/>	10	Purchase	
	X	New	<input checked="" type="checkbox"/>		2/20/2014	2/19/2014 8:00 AM	2/19/2014 11:00 PM	Component 1		<input type="checkbox"/>	7	Purchase	
	Y	New	<input checked="" type="checkbox"/>		1/24/2014	1/23/2014 8:00 AM	1/23/2014 11:00 PM	Component 2		<input type="checkbox"/>	20	Purchase	
	Y	New	<input checked="" type="checkbox"/>		2/20/2014	2/19/2014 8:00 AM	2/19/2014 11:00 PM	Component 2		<input type="checkbox"/>	14	Purchase	

**FIGURE 10.9: PLANNING WORKSHEET RESULTS FOR BOTH THE MPS AND MRP PLANNING RUNS**

The following events produced these results.

- The MPS planning run created planning lines that suggested a new production order for each sales order that you created in the “Create a Demand Stream” demonstration. The planning system suggested two separate production orders because you specified a reordering policy of Order for item Z. The Order reordering policy does not use a planning period to combine supply orders. Instead, it instructs the planning system to generate an order for each requirement.
- When you ran MRP, the planning system examined the component requirements for the suggested production orders for the two MPS planning lines. One item X and two item Y components are required for each item Z. Both item X and item Y use a reordering policy of Lot-for-Lot, and both are replenished by purchase order. Under the correct circumstances, the planning system therefore tries to combine the two requirements for item X into one purchase order, and the two requirements for item Y into a second purchase order. However, in the “Create a Demand Stream” demonstration, you specified a lot accumulation period of one week for each item. This means that the planning system only tries to combine purchase requirements for item X if the requirements occur within one week of one another. The same is true for item Y. Because the two sales orders for item Z are almost one month apart, their requirement for components is similarly spaced. Therefore, the planning system does not try to combine the purchase orders for either item X or item Y. Instead, the planning system creates two purchase orders for each item. The planning system schedules one set of purchase orders to supply the first MPS production order, and a second set of purchase orders to supply the second MPS production order.

The “Replenishments Timeline for Items X, Y, and Z” diagram shows the timing of these events.



**FIGURE 10.10: REPLENISHMENTS TIMELINE FOR ITEMS X, Y, AND Z**

The exact timing is based on the following:

- The due dates for the proposed production orders for item Z are set to equal the shipment dates for the sales orders that represent the demand for item Z.
- The planning system then backward schedules the two suggested production orders to determine when they must start in order to meet their due dates. These required starting dates and times are recorded in the **Starting Date-Time** fields for each Z planning line.
- The due dates for the suggested purchase orders for items X and Y are set to equal the suggested starting date and times for the production orders that require items X and Y as components.
- Because you have not defined a safety lead time for item X or item Y, the planning system applies the default safety lead time that is defined in manufacturing setup. This is one day. Therefore, the planning system schedules the purchase orders to “start” one day before they are due.

To verify the supply-demand relationship between the MPS production orders and the sales orders that you created in the “Create a Demand Stream” demonstration, follow these steps.

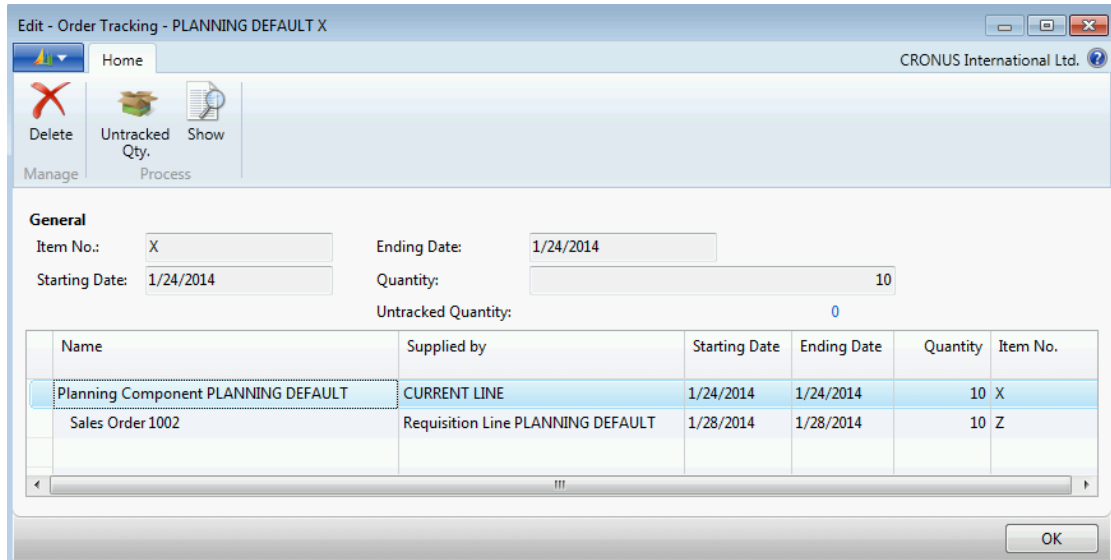
1. Select the planning line for the first MPS production order.
2. On the **Home** tab, click **Order Tracking**. On the **Order Tracking** page, notice that the planning line for the first MPS production order is tracked to the first sales order that you created for item Z.

Name	Supplied by	Starting Date	Ending Date	Quantity	Item No.
Sales Order 1002	CURRENT LINE	1/28/2014	1/28/2014	10	Z

**FIGURE 10.11:ORDER TRACKING FOR AN MPS PRODUCTION ORDER**

To verify the supply-demand relationship between the MRP purchase orders and the MPS production orders, follow these steps.

1. Click **OK** to close the **Order Tracking** page.
2. On the planning worksheet, select the planning line for the first MRP purchase order for item X.
3. On the **Home** tab, click **Order Tracking**. On the **Order Tracking** page, notice that the planning line for the first MRP purchase order for item X tracks to a planning line. The planning line in turn tracks to the first sales order that you created for item Z.



**FIGURE 10.12:ORDER TRACKING FOR AN MRP PURCHASE ORDER**

## Demonstration: Change Planning Parameters

This is a continuation of the “Calculate a Regenerative Plan for MRP” demonstration.

**Scenario:** Confident of the basic functioning of the planning worksheet, Eduardo, the production planner at CRONUS, decides to alter the safety stock and order multiple parameters to see the effect that they have on planning calculations.

### Demonstration Steps

1. Change the safety stock and order multiple parameters for item X.
  - a. Close all open pages.
  - b. In the **Search** box, type “items”, and then select the related link.
  - c. On the **Items** list page, double-click the line for item X to open the item card.
  - d. Expand the **Planning** FastTab.
  - e. In the **Safety Stock Quantity** field, type “5”.
  - f. In the **Order Multiple** field, type “2”.
  - g. Click **OK** to close the item card.
2. Rerun MRP.
  - a. In the **Search** box, type “planning worksheets”, and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
  - b. On the **Home** tab of the planning worksheet, click **Calculate Regenerative Plan**.

- c. On the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page, select the check box for the **MRP** field, and clear the check box for the **MPS** field.
- d. In the **Use Forecast** field, delete the existing value.
- e. Leave all other fields as they are, and then click **OK** to calculate the plan.

### MRP Results from Changed Parameters

This is a continuation of the “Change Planning Parameters” demonstration.

When there are MPS and MRP planning lines in the planning worksheet, and you run regenerative planning for MRP only, the planning system does the following:

- Deletes the existing MRP lines.
- Leaves the existing MPS lines.
- Calculates new MRP lines that are based on the existing MPS lines and any existing actual demand.

The “Planning Worksheet Results after Changes to Planning Parameters” image displays the results for the “Change Planning Parameters” demonstration.

Warning	No.	Location Code	Variant Code	Action Message	Accept Action Message	Original Due Date	Due Date	Starting Date-Time	Ending Date-Time	Description	Original Quantity	MPS Order	Quantity	Ref. Order Type
	Z			New	<input checked="" type="checkbox"/>	1/28/2014	1/24/2014	12:25 PM	1/27/2014 4:00 PM	Finished Good		<input checked="" type="checkbox"/>	10	Prod. Order
	Z			New	<input checked="" type="checkbox"/>	2/24/2014	2/20/2014	3:10 PM	2/21/2014 4:00 PM	Finished Good		<input checked="" type="checkbox"/>	7	Prod. Order
Exception	X			New	<input type="checkbox"/>	1/1/2014	12/31/2013	8:00 AM	12/31/2013 11:00 ...	Component 1		<input type="checkbox"/>	5	Purchase
	X			New	<input checked="" type="checkbox"/>	1/24/2014	1/23/2014	8:00 AM	1/23/2014 11:00 PM	Component 1		<input type="checkbox"/>	10	Purchase
	X			New	<input checked="" type="checkbox"/>	2/20/2014	2/19/2014	8:00 AM	2/19/2014 11:00 PM	Component 1		<input type="checkbox"/>	8	Purchase
	Y			New	<input checked="" type="checkbox"/>	1/24/2014	1/23/2014	8:00 AM	1/23/2014 11:00 PM	Component 2		<input type="checkbox"/>	20	Purchase
	Y			New	<input checked="" type="checkbox"/>	2/20/2014	2/19/2014	8:00 AM	2/19/2014 11:00 PM	Component 2		<input type="checkbox"/>	14	Purchase

**FIGURE 10.13: PLANNING WORKSHEET RESULTS AFTER CHANGES TO PLANNING PARAMETERS**

The following two changes to the MRP lines occurred:

- One additional planning line suggests a purchase order for five units of item X. These five units provide the five units that you specified in the **Safety Stock Quantity** field on the **Planning** FastTab of the item card for item X. Notice that the suggested due date for this purchase order equals the **Starting Date** field on the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page. This is because the safety stock level is already five units short as of the starting date for the planning calculations. Therefore, the planning system suggests replenishment on the earliest possible date.
- The quantity for the purchase order for item X that is due on February 20, 2014 is changed from seven units to eight units. This is because you specified a value of two for the **Order Multiple** field on the **Planning** FastTab of the item card for item X. Because seven is not a multiple of two, the planning system increases the purchase order quantity to the next nearest multiple of two, or eight.

Also notice the exception warning in the extreme left column of the new planning line for item X (the one that suggests a purchase order of five units of item X). To see the warning, drill down on the word "Exception".

Source	Parameter Value	Untracked Quantity
Exception: The projected available inventory is below Safety Stock Quantity 5 on 01/01/14.		0.00
Attention: The Starting Date 12/31/13 is before the work date 01/23/14.		0.00

**FIGURE 10.14:UNTRACKED PLANNING ELEMENTS PAGE**

The **Untracked Planning Elements** page explains why the planning system created the planning line. It also informs you that the starting date for the proposed order is before the current work date.

## Demonstration: Change the Reorder Cycle

This is a continuation of the “Change Planning Parameters” demonstration.

**Scenario:** Satisfied that he understands the safety stock quantity and order multiple planning parameters, Eduardo, the production planner at CRONUS, experiments with the reorder cycle.

### Demonstration Steps

1. Change the lot accumulation period for item Y.
  - a. Close all open pages.
  - b. In the **Search** box, type “items”, and then select the related link.
  - c. On the **Items** list page, double-click the line for item Y to open the item card.
  - d. Expand the **Planning** FastTab.
  - e. Change the value in the **Lot Accumulation Period** field from “1W” to “1M”.
  - f. Click **OK** to close the item card.
  
2. Rerun MRP.
  - a. In the **Search** box, type “planning worksheets”, and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
  - b. On the **Home** tab of the planning worksheet, click **Calculate Regenerative Plan**.
  - c. On the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page, select the check box for the **MRP** field, and clear the check box for the **MPS** field.
  - d. In the **Use Forecast** field, delete the existing value.
  - e. Leave all other fields as they are, and then click **OK** to calculate the plan.

## MRP Results from Changed Reorder Cycle


This is a continuation of the “Change the Reorder Cycle” demonstration.


The “Planning Worksheet Results after a Change to the Reorder Cycle” image displays the results of the change to the reorder cycle for item Y.

Warning	No.	Action Message	Accept Action Message	Original Due Date	Due Date	Starting Date-Time	Ending Date-Time	Description	Original Quantity	MPS Order	Quantity	Ref. Order Type	Ref. Order No.
	Z	New	<input checked="" type="checkbox"/>		1/28/2014	1/24/2014 12:25 PM	1/27/2014 4:00 PM	Finished Good		<input checked="" type="checkbox"/>	10	Prod. Order	101263
	Z	New	<input checked="" type="checkbox"/>		2/24/2014	2/20/2014 3:10 PM	2/21/2014 4:00 PM	Finished Good		<input checked="" type="checkbox"/>	7	Prod. Order	101264
Exception	X	New	<input type="checkbox"/>		1/1/2014	12/31/2013 8:00 AM	12/31/2013 11:00 ...	Component 1		<input type="checkbox"/>	5	Purchase	
	X	New	<input checked="" type="checkbox"/>		1/24/2014	1/23/2014 8:00 AM	1/23/2014 11:00 PM	Component 1		<input type="checkbox"/>	10	Purchase	
	X	New	<input checked="" type="checkbox"/>		2/20/2014	2/19/2014 8:00 AM	2/19/2014 11:00 PM	Component 1		<input type="checkbox"/>	8	Purchase	
	Y	New	<input checked="" type="checkbox"/>		1/24/2014	1/23/2014 8:00 AM	1/23/2014 11:00 PM	Component 2		<input type="checkbox"/>	34	Purchase	

**FIGURE 10.15: PLANNING WORKSHEET RESULTS AFTER A CHANGE TO THE REORDER CYCLE**

The only change to these results compared to the results from the “Change Planning Parameters” demonstration is that the two planning lines for item Y, previously for 20 units and 14 units, are combined into one planning line for 34 units. Because you set the lot accumulation period for item Y to one month, the second component demand for item Y falls within one month of the first demand.

 **Note:** The value in the **Lot Accumulation Period** is only one contributor to the reorder cycle in lot-for-lot planning. The other contributor is the value in the **Rescheduling Period** field.

 **Note:** In most industries, an inverse relationship exists between the reorder cycle and the item cost (the greater the cost, the shorter the reorder cycle). One common application is fasteners (screws, bolts, and nuts) that have a reorder cycle of one month. The final assembly that uses fasteners could have a reorder cycle as low as one day. This is driven by inventory investment (carrying costs). Companies accept keeping low-cost items for longer periods, but want to produce smaller lots of subassemblies and finished goods with schedules that mirror demand. The program provides the flexibility for users to determine how they want to manage their reorder cycles and ultimately their inventory investment.



## Other Planning Parameters

There are many fields and parameters on the item card and the stockkeeping unit card that affect the behavior of the planning system. For a complete description of these fields and parameters, refer to the "Manufacturing-related Fields on the Item Card" and "Manufacturing-related Fields on the Stockkeeping Unit Card" topics in "System Setup" in this training material. You can also use Help. Then conduct experiments that are similar to those in the "Change Planning Parameters" and "Change the Reorder Cycle" demonstrations.

## Net Change Planning

Net change planning monitors changes in master data, planned supply, and direct changes in demand requirements. These include the following:

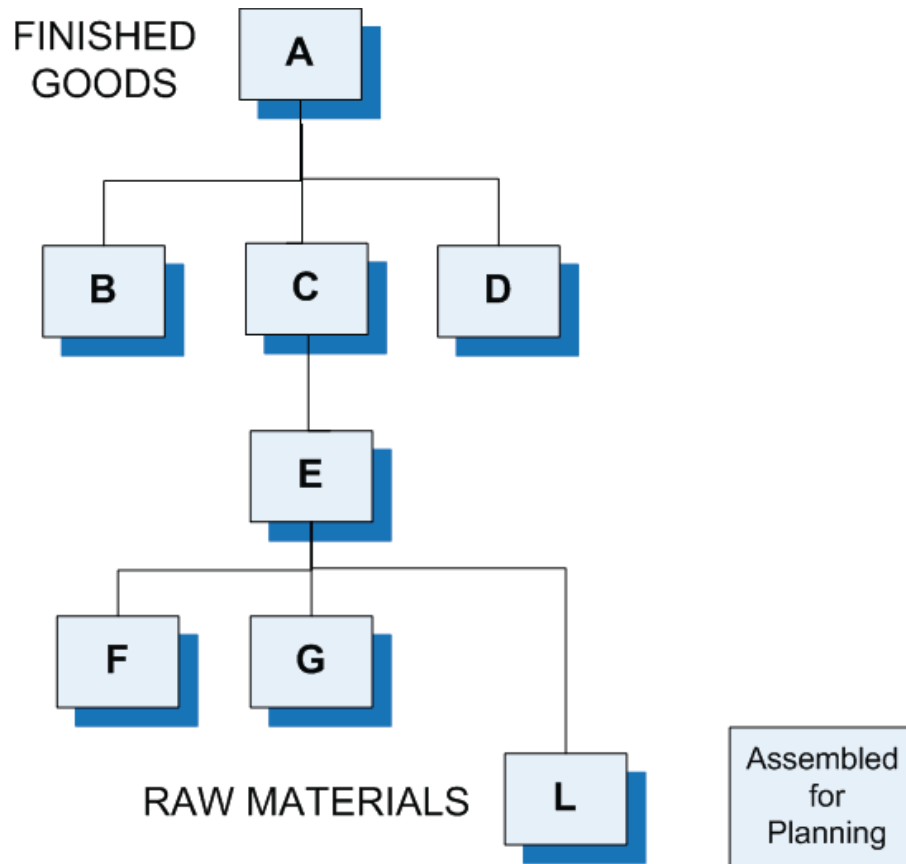
- Demand-type changes in the planning fields and parameters for the item (reorder point or safety stock)
- Changes in BOMs where the item is used
- Changes in routings where the item is used
- Unplanned consumption, deviations in stocktaking, and any other unplanned change of inventory
- Receipt of quantities other than planned

The benefits of net change planning include the following:

- Faster calculations because the program only considers the relevant changes since the last plan generation.
- The planning system only deletes planned orders that are not required because of changes in demand.

Even though one action, such as a change to a BOM, could involve several items, this is not a reason to calculate all items in a regenerative plan. It is more appropriate to let those items participate in the next net change planning process.

The "Sample BOM Diagram for Net Change Planning" image is used to help explain some of these net change principles.



**FIGURE 10.16: SAMPLE BOM DIAGRAM FOR NET CHANGE PLANNING**

These principles include the following:

- First, a sales order (or another type of demand) causes the system to assign item A for planning. To this point, no other BOM items are assigned for planning.
- When the net change planning process runs, it causes a changed (or new) production order for item A. This causes changes to the component requirements for items B, C, and D. Therefore, the planning system assigns these three items for planning.
- The planning system works by the order of the low-level code. Therefore, it must examine the BOM structures for items B, C, and D.
- Because items B and D do not have a BOM, the planning for those branches of the product structure ends here. However, the changed requirement for item C results in a new production order for that item.
- Because item C has a BOM, it is exploded. This causes a new requirement for item E. The planning system also assigns item E for planning.

- This process continues down through F, G, and L. Because there is new demand from item E for all three of these components, they are all assigned for planning. But because there is sufficient stock for items F and G, no new replenishment order is required for them. Therefore, you do not have to explode their BOMs or assign any of their components to planning.
- Item L is a raw material. Therefore, while you might have to issue a new replenishment order for item L, it has no BOM and therefore no components.

The net change planning cycle then is finished.

Some changes to master data or capacity, such as shop calendars, potentially affect many items. In these cases, you must carry out planning for all items by using regenerative planning.

### Demonstration: Calculate Net Change Planning

This is a continuation of the “Change the Reorder Cycle” demonstration.

**Scenario:** To understand the functionality of net change planning, Eduardo, the production planner at CRONUS, decides to carry out all action messages that are still in the planning worksheet from the “Change the Reorder Cycle” demonstration. At this point, he knows that supply and demand are in balance for items X, Y, and Z. He then changes one of the sales orders for item Z, and runs both MPS and MRP for items X, Y, and Z.

### Demonstration Steps

1. Carry out the action messages from the “Change the Reorder Cycle” demonstration.
  - a. Make sure that the planning worksheet is still open. Otherwise, open it.
  - b. On the planning worksheet, select the **Accept Action Message** check box for all planning lines.
  - c. On the **Home** tab, click **Carry Out Action** Message.
  - d. On the **Options** FastTab of the **Carry Out Action Msg. – Plan.** request page, in the **Production Order** field, select Firm Planned.
  - e. In the **Purchase Order** field, select Make Purch. Orders.
  - f. Click **OK** to start the batch job. After the batch job is finished, notice that all the planning lines disappear from the planning worksheet.

2. To verify that there are no demand-supply changes currently unplanned, calculate a net change plan for items X, Y, and Z.
  - a. On the **Actions** tab of the planning worksheet, click **Calculate Net Change Plan**. Notice that the same **Calculate Plan – Plan. Wksh.** request page is displayed as when you calculate a regenerative plan. Also notice that some values that you used to calculate your last regenerative plan remain populated in their fields.
  - b. On the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page, select the check boxes for both the **MPS** and **MRP** fields.
  - c. In the **Use Forecast** field, delete the existing value.
  - d. Leave all other fields as they are, and then click **OK** to calculate the net change plan. Notice that the planning system does not create any planning lines. This verifies that there are no currently unplanned demand-supply changes.
  - e. Click **OK** to close the planning worksheet.
  
3. Change demand for item Z.
  - a. In the **Search** box, type “sales orders”, and then select the related link.
  - b. On the **Sales Orders** list page, double-click the first sales order for item Z. This order has a sell-to customer of 10000 and a shipment date of January 28, 2014. Scroll to the right to see the **Shipment Date** field.
  - c. On the **Lines** FastTab of the sales order card, on the sales line for item Z, change the value in the **Quantity** field from 10 to 30. Accept any messages.
  - d. Click **OK** to close the sales order card.
  
4. Calculate net change planning for items X, Y, and Z.
  - a. In the **Search** box, type “planning worksheets”, and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
  - b. Repeat step 2. Notice that this time the planning system creates five planning lines. These lines are explained in the “Net Change Planning Results” topic.

## Net Change Planning Results

This is a continuation of the “Calculate Net Change Planning” demonstration.

The “Planning Worksheet Results after Net Change Planning” image displays the planning lines that are created by the net change planning calculations.

Warning	No.	Location Code	Variant Code	Action Message	Accept Action Message	Original Due Date	Due Date	Starting Date-Time	Ending Date-Time	Description	Original Quantity	MPS Order	Quantity	Ref. Order Type
Attention	Z			Change Qty.	<input type="checkbox"/>	1/28/2014	1/22/2014	1/22/2014 10:05 AM	1/27/2014 4:00 PM	Finished Good	10	<input type="checkbox"/>	30	Prod. Order
Attention	X			New	<input type="checkbox"/>	1/22/2014	1/22/2014	1/21/2014 8:00 AM	1/21/2014 11:00 PM	Component 1		<input type="checkbox"/>	30	Purchase
	X			Cancel	<input checked="" type="checkbox"/>	1/24/2014	1/23/2014	1/23/2014 12:00 AM	1/23/2014 12:00 AM	Component 1	10	<input type="checkbox"/>	0	Purchase
Attention	Y			New	<input type="checkbox"/>	1/22/2014	1/21/2014	1/21/2014 8:00 AM	1/21/2014 11:00 PM	Component 2		<input type="checkbox"/>	74	Purchase
	Y			Cancel	<input checked="" type="checkbox"/>	1/24/2014	1/23/2014	1/23/2014 12:00 AM	1/23/2014 12:00 AM	Component 2	34	<input type="checkbox"/>	0	Purchase

**FIGURE 10.17: PLANNING WORKSHEET RESULTS AFTER NET CHANGE PLANNING**

The explanation for each planning line is as follows:

- The first planning line is a suggested change in quantity from 10 units to 30 units for the first production order for item Z. This reflects the same change that you made in the sales order. Because the suggested change to the production order makes it larger, it takes more time to manufacture. Therefore, the planning system pushes the starting date for the production order back from January 24, 2014 to January 22, 2014 so that it still finishes on time to fulfill the sales order.
- The third planning line is a cancellation of the purchase order for 10 units of item X. It is replaced by the second planning line for a replacement purchase order of 30 units with a due date of January 22, 2014. This is scheduled to supply the component demand for the changed production order for item Z.
- The fifth line is a cancellation of the purchase order for 34 units of item Y. That purchase order supplied the needs for both of the original production orders of item Z. Two units of item Y are required to produce each unit of item Z. Because you increased the first production order for item Z by 20 units, the purchase order for item Y must be increased by 40 units. This results in the fourth planning line for a replacement purchase order of 74 units.



**Note:** In this scenario, the planning system would have suggested exactly the same changes if you had run the **Calculate Regenerative Plan** function instead of the **Calculate Net Change Plan** function. The difference is that net change planning is much faster and greatly reduces the processing load on the system. Because of this, you can run net change planning when the system is too busy to run regenerative planning.

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## Order Tracking and Action Messages

Order tracking traces the connection of a supply to its corresponding demand. The planning system creates tracking entries every time that you calculate a plan. You can use these entries to identify the original demand that led to creating supply orders or to creating action messages in the planning worksheet.

The planning system creates action messages when it detects a problem or a potential problem in the balance of supply and demand. The following points are true of action messages:

- The planning system creates an action message every time balance is not obtainable within the existing supply or demand order network.
- Action messages identify the need for user intervention to correct a current or potential supply problem.
- Action messages are created as an appendix to a tracking record. They hold information about the changes that are required to achieve a balance in the order network.
- Action messages are generated one level at a time in accordance with each item's low-level code. This makes sure that all items that experience or can experience changes in supply or demand are considered.
- When you process action messages, they reestablish equilibrium between supply and demand.

To avoid unimportant action messages, you can establish *dampeners*. The dampeners serve to restrict the generation of action messages to only those changes that exceed a defined quantity or that occur outside a defined period. For more information about dampeners, refer to the "Dampeners" topic in this lesson.

You can also "freeze" a particular supply order so that it does not participate in action messaging. To do this, you can change the planning flexibility to None on the following types of order lines:

- Production order
- Purchase order
- Transfer order
- Planning worksheet line

However, setting the planning flexibility to None can result in action messages that suggest creating new supply to meet demand. This occurs when the planning system cannot change existing supply to meet demand. The planning system's only option is to create new supply.

In response to any supply or demand imbalances, the system generates the following action messages:

- New
- Change Quantity
- Reschedule
- Resched. and Change Qty.
- Cancel

These messages can apply to purchase, production, assembly, and transfer orders.

The following table provides a description of each type of action message.

Field	Description
<b>New</b>	<p>If demand cannot be fulfilled by suggesting Change Qty., Reschedule, or Resched. and Change Qty. action messages on existing supply orders, the planning system suggests a new supply order by creating a New action message.</p> <p>In addition, the planning system issues the New action message if there are no existing supply orders within the reorder cycle of the item in question. The definition of an item's reorder cycle depends on the reordering policy that is defined for the item.</p>

Field	Description
<b>Change Qty.</b>	<p>When demand that is tracked to a supply order experiences a quantity change, the planning system creates a Change Qty. action message to suggest that the related supply should be changed to reflect the change in demand.</p> <p>If new demand emerges, the system searches for the nearest existing unreserved supply order within the reorder cycle and issues a Change Qty. action message for that order.</p>
<b>Reschedule</b>	<p>When a supply or demand order experiences a date change that causes an imbalance in the order network, the system issues a Reschedule action message. If there is a one-to-one relationship between demand and supply, the system issues an action message to reschedule the supply order to match the shipment date of its corresponding demand. If the supply order covers demand from more than one sales order, the supply order is rescheduled to equal the shipment date of the earliest demand.</p>
<b>Resched. and Change Qty.</b>	<p>If both the dates and quantities of an order must be changed, the planning system issues a Resched. and Chg. Qty. action message to restore balance to the order network.</p>
<b>Cancel</b>	<p>If a demand that is covered on an order-to-order basis is deleted, the system issues a Cancel action message to cancel the related supply order(s). If the relationship is not order-to-order, the planning system generates a Change Qty. action message to reduce the supply. The system can also issue a Cancel action message to address over-supply situations that are caused by other factors, such as inventory adjustments.</p>



When demand changes, the order tracking system seeks to reestablish balance in the order network. This is achieved by one of the following two methods:

- Creating action messages to urge the user to make specific changes to the order network
- Automatically changing the tracking without involving the user (dynamic tracking)

Creating dynamic tracking entries is not dependent on the planning routines. Instead, the planning system automatically creates appropriate order tracking entries every time that you enter a new requirement into the database. For more information about dynamic tracking, refer to the “Dynamic Order Tracking and Action Messaging” topic in this lesson.

### **Demonstration: Generate Additional Action Messages**

This is a continuation of the “Calculate Net Change Planning” demonstration.

In that demonstration, the planning system generated the New, Cancel, and Change Qty. action messages. The “Net Change Planning Results” topic explained why the system issued those messages. This demonstration focuses on the remaining two types of action messages: Reschedule and Resched. and Change Qty.

**Scenario:** Curious about the response of the planning system to multiple types of changes, Eduardo, the production planner at CRONUS, decides to change both the quantity and due date for the second sales order for item Z.

### **Demonstration Steps**

1. Carry out the action messages from the “Calculate Net Change Planning” demonstration.
  - a. Make sure that the planning worksheet is still open. If not, open it.
  - b. On the planning worksheet, select the **Accept Action Message** check box for all planning lines.
  - c. On the **Home** tab, click **Carry Out Action Message**.
  - d. On the **Options** FastTab of the **Carry Out Action Msg. – Plan.** request page, in the **Production Order** field, select Firm Planned.
  - e. In the **Purchase Order** field, select Make Purch. Orders.
  - f. Click **OK** to start the batch job.
  - g. When the batch job is finished, click **OK** to close the planning worksheet.

2. Change the quantity and due date for the second sales order for item Z.
  - a. In the **Search** box, type "sales orders", and then select the related link.
  - b. On the **Sales Orders** list page, double-click the second sales order for item Z. This order has a sell-to customer of 10000 and a shipment date of February 24, 2014.
  - c. On the **Lines** FastTab of the sales order card, on the sales line for item Z, increase the value in the **Quantity** field from 7 to 17. Accept any messages.
  - d. Change the value in the **Shipment Date** field from February 24, 2014 to February 15, 2014. Accept any messages.
  - e. Click **OK** to close the sales order card.
  
3. Calculate net change planning for items X, Y, and Z.
  - a. In the **Search** box, type "planning worksheets", and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
  - b. On the **Actions** tab of the planning worksheet, click **Calculate Net Change Plan**.
  - c. On the **Options** FastTab of the **Calculate Plan – Plan. Wksh.** request page, select the check boxes for both the **MPS** and **MRP** fields.
  - d. In the **Use Forecast** field, delete the existing value.
  - e. Leave all other fields as they are, and then click **OK** to calculate the net change plan. Notice the Resched. & Chg. Qty. action message that is created for item Z. This is in direct response to your changes to the quantity and due date for the second sales order for item Z. If you had changed only the due date and not the quantity, the planning system would have created a Reschedule action message instead.

### Carry Out Action Msg. – Plan Page


After a planning system calculates a plan, it populates the resulting action messages in the planning worksheet. You then can change or delete the action messages, or even manually add new action messages. You ultimately control which action messages are carried out by selecting or clearing the **Accept Action Message** field on the planning worksheet, and then clicking the **Carry Out Action Message** function on the **Home** tab. This opens the **Carry Out Action Msg. - Plan** request page.

**FIGURE 10.18: CARRY OUT ACTION MSG. – PLAN REQUEST PAGE**

The **Carry Out Action Msg. - Plan** request page gives the planning system instructions to carry out the action messages for which you have selected the **Accept Action Message** field. For example, you can instruct the planning system to create firm planned production orders instead of planned production orders. You also can apply additional filters to the planning lines. This reduces the list of action messages that are carried out.

The following table describes the fields in the **Carry Out Action Msg. - Plan** request page.

Field	Description
<b>Production Order</b>	Specifies whether to create production orders for items that use the Prod. Order replenishment system. You can create either planned or firm planned production orders. If you select firm planned, you can also print the new order documents.
<b>Assembly Order</b>	Specifies whether to create assembly orders for items that use the Assembly replenishment system. You can also print the new order documents.
<b>Purchase Order</b>	Specifies whether to create purchase orders for items that use the Purchase replenishment system. You can also print the new order documents.  Instead of creating purchase orders, you can copy the purchase order planning lines from the planning worksheet to the requisition worksheet. You use this approach when one person uses the planning worksheet for overall planning, and another person uses the requisition worksheet for purchase planning.
<b>Req. Wksh. Template and Req. Wksh. Name (Purchase Order)</b>	These two fields let you specify the names of the requisition template and the requisition worksheet where you want to copy planning lines for purchase orders. This applies only if you select the Copy to Req. Wksh option in the <b>Purchase Order</b> field.

Field	Description
<p><b>Transfer Order</b></p>	<p>Specifies whether to create transfer orders for items that use the Transfer replenishment system in the SKU card. You can also print the new order documents.</p> <p>Instead of creating transfer orders, you can copy the transfer order planning lines from the planning worksheet to the requisition worksheet. You use this approach when one person uses the planning worksheet for overall planning, and another person uses the requisition worksheet for transfer planning.</p>
<p><b>Req. Wksh. Template and Req. Wksh. Name (Transfer Order)</b></p>	<p>These two fields let you specify the names of the requisition template and the requisition worksheet where you want to copy planning lines for transfer orders. This applies only if you select the Copy to Req. Wksh option in the <b>Transfer Order</b> field.</p>
<p><b>Combine Transfer Orders</b></p>	<p>Specifies whether to transfer orders with the same transfer-from and transfer-to codes into one transfer order with multiple lines.</p> <hr/> <p> <b>Note:</b> The result is the same as the default behavior when you create transfer orders that are planned in the <b>Req. Worksheet</b> page.</p> <hr/>

Field	Description
<b>Stop and Show First Error</b>	<p>Specifies whether to stop the batch job as soon as it encounters an error. The program then displays a message that has information about the error. If an error occurs, only the planning lines before the error are processed and become supply orders.</p> <p>If you do not select this field, then errors do not stop the batch job and it continues until it is finished. If one or more errors exist, the program displays a message after the batch job is completed. The message indicates how many items are affected by the errors.</p>

### Dynamic Order Tracking and Action Messaging

When demand increases, the system seeks to maintain the balance in the supply and demand through dynamic order tracking. This feature automatically tries to satisfy the increased demand by tracking against existing supply orders or unreserved inventory. Dynamic order tracking is not dependent on the planning routines. The system creates order tracking entries automatically as required. It does this in order of priority based on the following table.

Priority	Dynamic Tracking Priorities - Tracking to:
1	Any excess supply within the existing order.
2	Planned and scheduled receipts in order of receipt date.
3	Available inventory.
4	If a supply order exists within current order tracking, issue an action message to change the order.
5	If no other priorities apply, generate an action message for new supply.



**Note:** Dynamic order tracking only tracks against items that occupy identical dimensions, that is, location and bin code. The inventory location and bin code must match the demand exactly (sales order or production forecast). If they do not, the planning routines ignore the inventory.

Also, dynamic order tracking can conflict with planning if you define a reordering policy for an item and then use the planning worksheet to plan for it. You should not combine the two approaches. The planning worksheet addresses the complete planning requirements for an item. Dynamic order tracking provides only minimal planning that is based on the simple pegging of demand and supply.

### Order Tracking Policy

The value in the **Order Tracking Policy** field on an item card controls participation in dynamic tracking and action messaging. This field is located in the **Planning** FastTab of the item card.

The following table shows the possible options for the **Order Tracking Policy** field.

Option	Description
<b>None</b>	Does not automatically create dynamic order tracking entries or action messages. The planning engine continues to generate action messages when you run net change or regenerative planning.
<b>Tracking Only</b>	Creates dynamic order tracking entries only. To generate action messages, you must still run regenerative or net change planning.
<b>Tracking and Action Msg.</b>	Creates dynamic order tracking entries and action messages.

### Get Action Messages

We recommend that you process regenerative or net change planning only during periods when users are not accessing records that are used by the planning system, such as inventory and BOMs. For some companies, this might be only at night or on weekends.

The **Get Action Messages** function that is located on the **Home** tab of the planning worksheet lets the production planner quickly determine the effect of schedule changes that are made between net change or regenerative planning runs.

For example, if the order processor enters a new sales order in the morning, and you want to plan supply for the sales order before the next planning run, you can use the **Get Action Messages** function to retrieve action messages that are related to the sales item(s). However, this occurs only if the order tracking policy of the sales item(s) is Tracking and Action Msg. If an item has any other order tracking policy, the program does not generate dynamic action messages for it.

Even if you enable dynamic action messaging, the **Get Action Messages** function is not intended as a substitute for the more robust planning routines that are employed by net change and regenerative planning. However, it does let you quickly gauge the effect on the plan of changes that are made between planning runs.

### Demonstration: Get Action Messages

This is a continuation of the “Generate Additional Action Messages” demonstration.

**Scenario:** To test dynamic order tracking and action messages, Eduardo, the production planner at CRONUS, sets the order tracking policy for item Z to Tracking and Action Msg. He then makes a quantity change to the first sales order for item Z, and uses the **Get Action Messages** function to check the resulting action message.

### Demonstration Steps

1. Carry out the action messages from the “Calculate Net Change Planning” demonstration.
  - a. Make sure that the planning worksheet is still open. If not, open it.
  - b. On the planning worksheet, select the **Accept Action Message** check box for all planning lines.
  - c. On the **Home** tab, click **Carry Out Action Message**.
  - d. On the **Options** FastTab of the **Carry Out Action Msg. – Plan.** request page, in the **Production Order** field, select Firm Planned.
  - e. In the **Purchase Order** field, select Make Purch. Orders.
  - f. Click **OK** to start the batch job.
  - g. When the batch job is finished, click **OK** to close the planning worksheet.



2. Change the order tracking policy for item Z to Tracking and Action Msg.
  - a. In the **Search** box, type "items", and then select the related link.
  - b. On the **Items** list page, double-click the line for item Z to open the item card.
  - c. Expand the **Planning** FastTab.
  - d. In the **Order Tracking Policy** field, select Tracking & Action Msg.
  - e. Click **OK** to close the message about the change not affecting existing entries.
  - f. Click **OK** to close the item card.
  
3. Change the quantity for the first sales order for item Z.
  - a. In the **Search** box, type "sales orders", and then select the related link.
  - b. On the **Sales Orders** list page, double-click the first sales order for item Z. The order has a sell-to customer of 10000 and a shipment date of January 28, 2014.
  - c. On the **Lines** FastTab of the sales order card, on the sales line for item Z, change the value in the **Quantity** field from 30 to 20. Accept any messages.
  - d. Click **OK** to close the sales order card.
  
4. Use the **Get Action Messages** function to retrieve any action messages that are related to the quantity change.
  - a. In the **Search** box, type "planning worksheets", and then select the link for Planning Worksheets – Departments/Manufacturing/Planning.
  - b. On the **Home** tab of the planning worksheet, click **Get Action Messages**.
  - c. On the **Item** FastTab of the **Get Action Messages** request page, clear all filters.
  - d. Click **OK** to run the batch job. Notice the single action message that suggests that you reduce the quantity on your production order for item Z from 30 to 20. This message originates from the dynamic order tracking and action messaging system.

### Dampeners

APICS defines *dampeners* as: "User-input parameters to suppress the reporting of insignificant or unimportant

action messages that are created through the computer processing of MRP."

In Microsoft Dynamics NAV, you can specify the following types of dampeners on the item card:

- **Dampener Period** – Specifies a time during which you do not want to let the planning system propose rescheduling existing supply orders forward. The dampener period limits the number of insignificant rescheduling changes to existing supply. This applies only if the reschedule date is a later date and is within the dampener period. It does not apply if the reschedule date is a later date outside the dampener period, or if it is an earlier date. If this field is empty, then the value in the **Default Dampener Period** field in the **Manufacturing Setup** page applies.
- **Dampener Quantity** – Specifies a dampener quantity to block insignificant change proposals to existing supply if the change quantity is lower than dampener quantity. If the suggested change quantity is higher than the dampener quantity, then the suggestion is not blocked. If the field is empty, then the field in the **Default Dampener Quantity** field on the **Manufacturing Setup** page applies.



**Note:** The value in the **Dampener Quantity** field on the item card represents a quantity. The value in the **Default Dampener Quantity** field on the **Manufacturing Setup** page is a percentage.

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To clarify, the dampeners only block insignificant change. This means small changes where you have more supply than required, or where the supply is available before you must have it. It does not block changes that are required to meet demand. The goal of the dampener fields is to make the planning system less volatile. However, using dampeners is likely to result in a small temporary increase in inventory.

To experiment with dampeners, set the dampener fields for item Z, and then repeat the “Get Action Messages” demonstration by making small changes to order quantities and shipment and due dates.

### Error Messages

The **Calculate Plan – Plan. Wksh.** and **Carry Out Action Msg. – Plan** batch jobs both require that correct item setup and data relations are intact to successfully plan or create supply for every demand. Typical setup problems that can cause the batch jobs to fail include the following:

- Missing vendors on item cards
- Uncertified routings and BOMs
- Blocked items
- Missing transfer routes

To avoid searching for errors after a lengthy planning run is completed, you can select the **Stop and Show First Error** field on the **Options** FastTab of both batch job request pages.

### ***Calculate Plan – Plan. Wksh.***

If you select the **Stop and Show First Error** field for this batch job, the process stops as soon as it encounters an error. The program then displays a message that has information about the first error. If an error occurs, then only the planning lines that are created before the error are included in the planning worksheet.

If you do not select this field, then the planning run continues regardless of errors until it is finished. At the end of the planning run, if one or more errors exist, the **Planning Error Log** page opens to provide more details about the errors. This includes links to the affected item card or cards.

### ***Carry Out Action Msg. – Plan***

If you select the **Stop and Show First Error** field for this batch job, the process stops as soon as it encounters an error. The program then displays a message that has information about the error. If an error occurs, then only the planning lines before the error are processed and become supply orders.

If you do not select this field, then the batch job continues regardless of errors until it is finished. If one or more errors exist, the program displays a message after the batch job is completed. The message indicates how many items are affected by the errors.

## Module Review

This training material examines planning in Microsoft Dynamics NAV. This includes detailed explanations and demonstrations in concepts such as regenerative planning, net change planning, order tracking, and action messages.

The program's planning features are advanced and require practice and experience. The APICS organization offers additional learning resources for this specialized field.

## Test Your Knowledge

Test your knowledge with the following questions.

1. What is the basis for scheduling manufactured items?

- Lead time
- Delivery time
- Completion time per unit
- Routing information

2. What two things must you do to make sure that low-level codes calculate automatically for an item's BOM?

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3. What are the three main sources of independent demand?

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4. What are the four types of supply orders that you can create in the planning worksheet?

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5. What are the five values that you can set in the Reordering Policy field on the Planning FastTab of the item card?

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6. What are the five types of action messages?

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7. What is the main advantage of using net change planning instead of regenerative planning?

- It only deals with changes and not new supply.
- It processes faster and uses fewer system resources.
- It makes orders directly without the need to carry out action messages.
- You can schedule it to run at the same time every day.

## Test Your Knowledge Solutions

### Test Your Knowledge

1. What is the basis for scheduling manufactured items?

- ( ) Lead time
- ( ) Delivery time
- ( ) Completion time per unit
- (√) Routing information

2. What two things must you do to make sure that low-level codes calculate automatically for an item's BOM?

MODEL ANSWER:

You must select the Dynamic Low-Level Code field on the Manufacturing Setup page.

You must certify the item's production BOM after it is attached to the item.

3. What are the three main sources of independent demand?

MODEL ANSWER:

Sales orders, production forecasts, and MPS planning lines.

4. What are the four types of supply orders that you can create in the planning worksheet?

MODEL ANSWER:

Production orders (planned or firm planned), assembly orders, purchase orders, and transfer orders.

5. What are the five values that you can set in the Reordering Policy field on the Planning FastTab of the item card?

MODEL ANSWER:

Fixed Reorder Qty., Maximum Qty., Order, Lot-for-Lot, Blank (none).

6. What are the five types of action messages?

MODEL ANSWER:

New, Change Qty., Reschedule, Resched. and Change Qty., and Cancel.

7. What is the main advantage of using net change planning instead of regenerative planning?

- ( ) It only deals with changes and not new supply.
- (√) It processes faster and uses fewer system resources.
- ( ) It makes orders directly without the need to carry out action messages.
- ( ) You can schedule it to run at the same time every day.

