

Route Management

Overview

Route Management is a web application used for managing routes in a plant using a Manufacturing Execution System (MES).

Using Route Management has the following advantages:

- You can define the end-to-end workflow of using a route, which includes the sequence of operations required to manufacture a product using the route.
- You can release the route for use in a work order.
- You can maintain a revision history of each released route.
- You can define the bill of material (BOM) to be used in each operation in a route. This allows you to keep a track of the quantity of material that is consumed while manufacturing a product.
- You can link reference documents such as standard operating procedures, circuit diagrams, and other documents required to perform each operation.

About Routes

A route defines the process and operations required to manufacture a product. It also specifies the order in which you must perform these operations.

A route contains the following components:

- Operations: The main work segment in a route. Each operation is a sequence of tasks that you must perform at a specific time to manufacture the product.
- BOM: A list of materials used in an operation, along with the quantity that is required for each item. BOMs are defined in Plant Applications Administrator. Each operation is linked to a BOM.
- Documents: A document is a reference material used to perform an operation (for example, standard operating procedure, circuit diagram).

Example: Routes in a Bicycle Manufacturing Unit

Suppose you want to create routes for a bicycle manufacturing unit. This involves manufacturing the following components and assembling them:

- Main frame
- Gear system

- Wheels

In this case, you will create the following routes:

- Main Frame: Includes turning and welding the steel rods into the required size and shape. The route can also include latest diagrams of the steel rods and information on how to weld them.
- Gear system: Includes assembling the gears and the chain to form the gear system.
- Wheels: Includes welding hoops to form rims, attaching spokes, and mounting the tyres.
- Assembly: Includes assembling the main frame, gear system, wheels, and other required parts of a bicycle to produce the final product. This route can also include painting, testing, and packaging the product.

Using Route Management, in addition to creating routes, you can copy, modify, release, archive, revise, and delete a route.

About Operations

An operation is a task that you perform on a job while producing a product (for example, drilling, turning, and painting). When you define a route, you define a set of operations that must be performed to complete the route. Each operation is associated with one or more pieces of equipment that are defined in MES.

Using Route Management, in addition to creating operations, you can copy, modify, and delete an operation.

Example: Operations in a Motor Assembly Route

Suppose you want to create a route for assembling the parts of a motor. The following tasks are involved in completing the route:

- Shell turning
- Stator and endshield assembling
- Rotor and endshield assembling
- Testing
- Painting
- Packaging

For each of these tasks, you will create an operation and associate it with one or more pieces of equipment as follows:

Operation	Equipment
Shell turning	The lathe machine
Stator and endshield assembling	The pneumatic bolt tightener
Rotor and endshield assembling	The pneumatic bolt tightener
Testing	The testing workstation
Painting	The spray paint workstation
Packaging	The packaging machine

About Bill of Material (BOM)

A Bill of Material (BOM) contains a list of items and the quantity of each item needed to produce a product. It is defined in MES and associated with a BOM formulation in Plant Applications Administrator.

Using Route Management, you can link BOMs to operations. After the route is released and used in a work order, you can provide details on the actual quantity of each item in the BOM that is used. This allows you to keep a track of the quantity of material that is consumed.

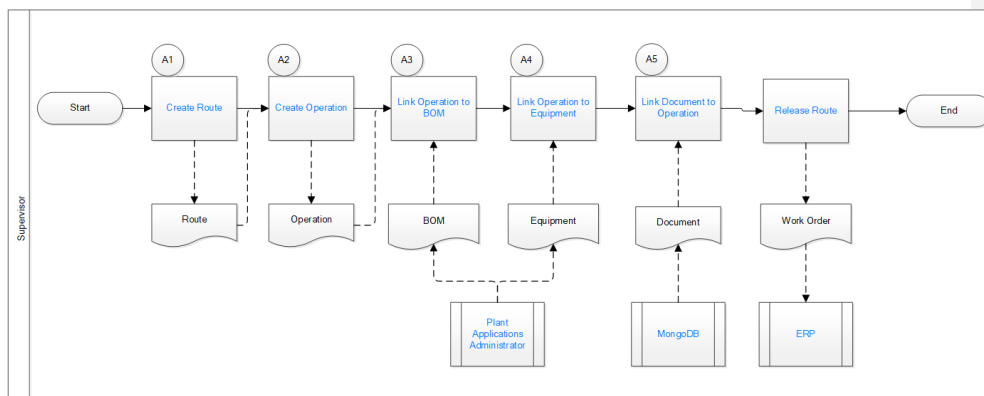
Creating a Route

About Creating a Route

When you create a route, in addition to providing the production line, material, BOM formulation, and other details of the route, you will create operations and link each operation to a BOM and documents.

The workflow diagram provides the following information:

- The sequence of performing the steps to create a route
- The role of the person who will perform each task (for example, supervisor)
- The artifacts that are generated from each step
- The artifacts that are used in each step
- The source and destination of each artifact



Create a Route

Before You Begin

Ensure that the production line, material, and BOM formulation for the route are created. To do so, in Plant Applications Administrator:

- Create the production line, and link it to a single virtual unit.

- Define the material for the production line.
- Define the BOM formulation for the material.

Procedure

1. In the upper-right corner of the **Route Management** page, select **+**.

The **Create Route** window appears. The **REVISION** box is disabled and populated with the value 1 because this is the first draft of the route.

2. Provide values as specified in the following table.

Field	Description
NAME	Enter a name for the route. A value is required, must be unique, and must not exceed 100 characters.
DESCRIPTION	Enter a description for the route. The description must not exceed 1000 characters.
PRODUCTION LINE	Select a production line to which the route belongs. This box contains a list of production lines defined in Plant Applications Administrator. A value is required in this field.
MATERIAL	<p>Select the material that you want to use in the route. This box is enabled after you select a value in the PRODUCTION LINE box. It contains a list of materials defined for the production line in Plant Applications Administrator.</p> <p>When you enter at least three characters in the MATERIAL box, a filtered list of materials that contains the characters appears.</p>
BOM FORMULATION	Select the BOM formulation that you want to use in the route. This box is enabled after you select a value in the MATERIAL box. It contains a list of BOM formulations configured for the material in Plant Applications Administrator.

3. Select **Next**.

The route is created and is in the draft state.

Next Steps:

[Add an operation to the route.](#)

Copy a Route

A copied route is in the draft state by default, regardless of the state of the original route. When you copy a route, the operations, BOMs, and documents in the route are also copied.

Procedure

1. In the **Route Management** page:
 - If you want to copy a route in the draft state, select the route that you want to copy. The **Edit Route** page appears.
 - If you want to copy a route in the released or archived state, select the **Released** or **Archived** tab, respectively, and then select the route that you want to copy. The **View Route** page appears.

2. In the upper-right corner of the page, select <menu icon>, and then select **Duplicate**.

The **Copy Route** window appears.

- The **NAME** box contains a value in the following format: Copy of <name of the original route>
 - The **REVISION** box is disabled and populated with the value 1, regardless of the value in the **REVISION** box of the original route. This is because this is the first draft of the copied route.
 - The remaining boxes are populated with the corresponding values in the original route.
3. Modify the value in the **NAME** box. A value is required, must be unique, and must not exceed 100 characters.
 4. As needed, modify values in the remaining boxes, and then select **Copy**.

The route is copied. The **Edit Route** page appears, allowing you to add or remove operations, BOMs, or documents.

Create an Operation

When you create an operation, you can set a priority and select the equipment used for that operation. You can create operations in a route that is in the draft state. Therefore, if you want to create an operation in a released or archived route, you must first [revise the route](#).

Before You Begin

[Create a route](#).

Procedure

1. In the **Route Management** page, select the route in which you want to create an operation.

The **Edit Route** page appears, displaying the **Overview** section, which contains a list of operations in the route.

2. In the left pane, select **+**.

A blank row appears in the **Overview** section.

3. Provide values as specified in the following table.

Column	Description
PRIORITY	<div>Enter the sequence number of the operation. By default, the value in this column is 1. If multiple operations must be performed simultaneously, provide the same priority number.</div> <div>When setting the priorities, provide a gap in their values so that you can easily add new operations between other operations. For example, if the priority of the first operation is 1, set the priority for the second operation to 10. This allows you to add new operations, as needed, between these two operations without the need to modify the priorities of all the operations.</div>
NAME	Enter a name for the operation. The name must be unique and should not exceed 100 characters.
DESCRIPTION	Enter a description for the operation. The description should not exceed 1000 characters.

Column	Description
EQUIPMENT	<p>Select the equipment (that is, the machine) that is used to perform the operation. You can select multiple pieces of equipment for the same operation, and you can select the same piece of equipment for multiple operations.</p> <p>You can also select the equipment used in an operation by accessing the Resources section.</p>

The operation is created and added to the route.

Next Steps

[Link a BOM to the operation.](#)

Link a BOM to an Operation

You can link a BOM either to a single operation or to all the operations in a route. If a BOM is assigned to an operation, you cannot assign another BOM to the same operation.

Before You Begin

- Ensure that the route is linked to the BOM formulation that is associated with the BOM that you want to assign. To do so, in the **Edit Route** window of the route, select the appropriate value in the **BOM Formulation** box.
- [Create an operation in the route.](#)

Procedure

1. Access the route that is linked to the operation to which you want to assign a BOM.

The **Edit Route** page appears, displaying a list of operations linked to the route.

2. Select **BOM**.

The **BOM** workspace appears, displaying a list of BOMs in the **PRODUCT DESCRIPTION** column. The **SEQUENCE**, **PRODUCT CODE**, **QT PER**, and **UOM** columns are populated with the sequence number of the BOM, the product code, the quantity needed per operation, and the units of measure, respectively, of the associated BOM Formulation; you cannot modify these values.

3. In each row containing the BOM that you want to link to an operation, select values in each column as described in the following table:

Column	Description
OPERATION	Contains a list of operations that you have added to the route. Select the operation that you want to assign to the BOM. You can select just one of the operations or all of them. If a BOM is already assigned to an operation, the operation does not appear in the list.
MANDATORY	Identifies whether the BOM is mandatory to perform the operation. By default, the value in this box is No .

4. Select **Save**.

Each BOM is linked to the selected operations.

Next Steps

Link a document to the route.

Modifying a Route in the Draft State

About Modifying a Route

You can modify a route only if it is in the draft state. You can perform one or more of the following tasks to modify a route:

- Modify the details of a route
- Modify the details of an operation
- Link a different BOM to an operation
- Create an operation
- Copy an operation
- Delete an operation

Modify a Route


Procedure

1. In the **Route Management** page, select the route.

NOTE:

By default, the **Route Management** page contains only the latest revision of each route. If you want the list to contain all the revisions of each route or if you want to add or remove the default columns, modify the settings in Plant Applications Administrator.

The **Edit Route** page appears.

2. In the upper-right corner of the page, select  .
The **Edit Route** window appears.
3. As needed, modify values in the **NAME**, **DESCRIPTION**, and **BOM Formulation** boxes, and then select **Update**.
The changes made to the route are saved.

NOTE:

You cannot modify values in the **REVISION**, **PRODUCTION LINE**, and **MATERIAL** boxes.

Modify an Operation

Procedure

1. In the **Route Management** page, select the route that contains the operation that you want to modify.

The **Edit Route** page appears, displaying the **Overview** section. It contains a list of operations in the route.

2. As needed, modify values in the available columns, and then select **Save**.
The changes made to the operation are saved.

Copy an Operation

Procedure

1. In the **Route Management** page, select the route in which you want to copy an operation.

The **Edit Route** page appears, displaying the **Overview** section.

2. In the left pane, in the row containing the operation that you want to copy, select <copy icon>.

A new row for the copied operation appears in the **Overview** section.

- The name of the copied operation is in the following format: Copy <name of the original operation>
 - The remaining columns are populated with the corresponding values in the original operation.
3. Modify the value in the **NAME** column. A value is required, must be unique, and must not exceed 100 characters.
 4. As needed, modify values in the other columns, and then select **Save**.

The operation is copied.

Next Steps

[Link a BOM to the operation.](#)

Delete an Operation

Before You Begin

A route must contain at least one operation. Therefore, if a route contains only one operation, you cannot delete it.

Procedure

1. In the **Route Management** page, select the route for which you want to delete an operation.

The **Edit Route** page appears, displaying the **Overview** section.

2. In the left pane, in the row containing the operation that you want to delete, select <delete icon>.

A message appears, asking you to confirm that you want to delete the operation.

3. Select **Yes**.

The operation is deleted.

NOTE:

The equipment linked to the operation is not deleted.

Releasing a Route

About Releasing a Route

When you release a route, it is available for use in a work order. The following conditions apply when you release a route:

- You can release a route only if it is in the draft state. You cannot release a route that is in the archived state.
- You cannot modify a route that is released; however, you can revise or copy the route after it is released.
- The route must contain at least one operation.
- Each operation in the route must be associated with at least one piece of equipment and a BOM.

Release a Route

Procedure

1. In the **Route Management** page, select the route that you want to release.

The **Edit Route** page appears.

2. In the upper-right corner of the page, select <menu icon>, and then select **Release**.

A message appears, specifying that the action cannot be reversed, and asking you to confirm that you want to release the route.

3. Select **Release**.

The route is released.

Next Steps

Use the route in a work order.

Commented [PS(D1)]: To be linked to the corresponding topic in Order Management.

Archiving a Route

About Archiving a Route

If you no longer want to use a route, you can archive it. An archived route is not available for use in a work order. The following conditions apply when you archive a route:

- You can archive a route that is in the released state. You cannot archive a route that is in the draft state.
- You cannot modify an archived route. However, you can revise or copy the route after it is archived.

Archive a Route

Procedure

1. In the **Route Management** page, select the route that you want to archive.

The **Edit Route** page appears.

2. In the upper-right corner of the page, select <menu icon>, and then select **Archive**.

A message appears, specifying that the action cannot be reversed, and asking you to confirm that you want to archive the route.

3. Select **Archive**.

The route is archived.

Modifying a Route in the Released or Archived State

About Modifying a Route in the Released or Archived Route

After you release or archive a route, you cannot modify it. However, if you want to update the route (for example, remove an operation or change the BOM formulation), you can revise it. The following conditions apply when you revise a route.

- You can revise a route that is in the released or archived state. You cannot revise a route in the draft state.
- You can revise only the latest version of a route.
- You cannot modify the name, description, production line, material, or BOM formulation when you revise a route; you can only add, modify, or remove an operation, resource, BOM, or a document.

Revise a Route

1. In the **Route Management** page:

- If you want to revise a released route, select **Released**.
- If you want to revise an archived route, select **Archived**.

2. Select the route that you want to revise.

The **View Route** page appears.

3. In the upper-right corner of the route, select <menu icon>, and then select **Revision**.

The **Revise Route** window appears, displaying the route details. These details are copied from the previous revision of the route. You cannot modify these details.

4. Select **Next**.

The **Edit Route** page appears. The operations, BOMs, and documents linked to the route are the same as that of the previous version of the route.

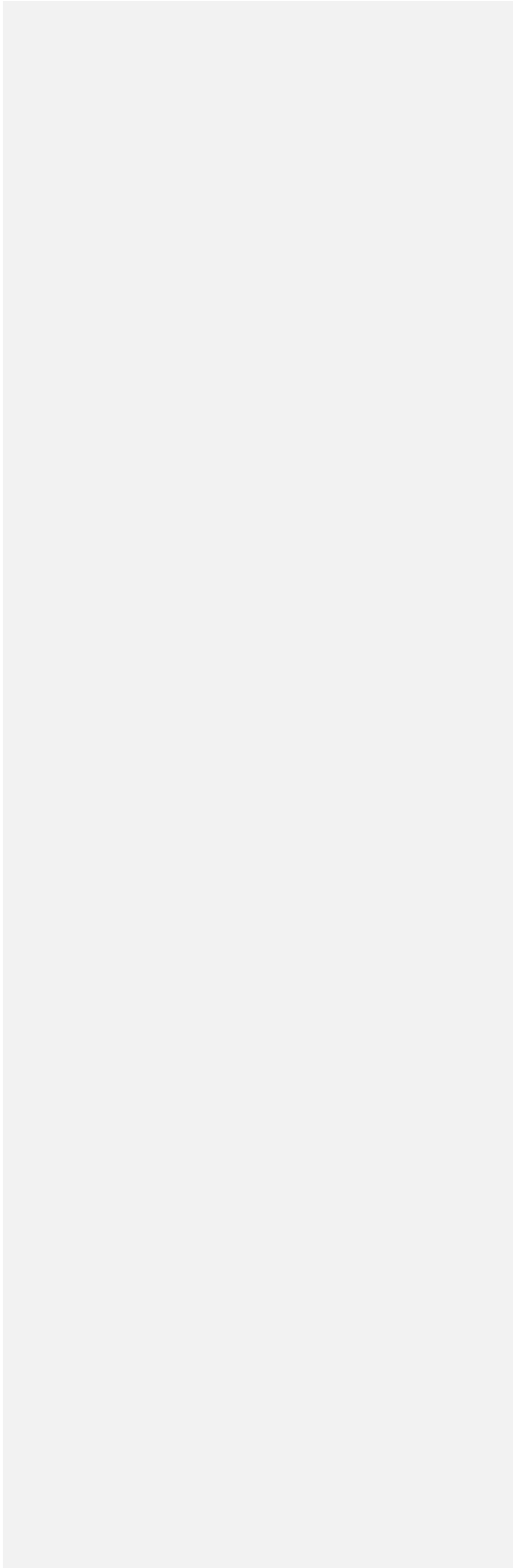
5. As needed, add, modify, or remove operations, BOMs, or documents.

6. Select **Save**.

The route is revised and is in the draft state. The value in the **REVISION** box is incremented by 1.

TIP:

To access the revision history of the route, in the **Released** or **Archived** section, in the row containing the route, select <revision icon>.



Deleting a Route

About Deleting a Route

The following conditions apply when you delete a route:

- You cannot delete a route that is released or archived; you can only delete a route that is in the draft state.
- The operations, BOMs, and documents used in the route are not deleted.

Delete a Route

1. In the **Route Management** page, select the route that you want to delete.

The **Edit Route** page appears.

2. In the upper-right corner of the page, select <more icon>, and then select **Delete**.

A message appears, asking you to confirm that you want to delete the route.

3. Select **Delete**.

The route is deleted.