IBM Maximo for Aviation MRO
Version 7 Release 6

Guide

Note
Before using this information and the product it supports, read the information in "Notices" on page 185.

This edition applies to version 7, release 6 of IBM Maximo for Aviation MRO and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

Chapter 1. IBM Maximo for Aviation MRO product overview

With Maximo® for Aviation MRO, aviation companies can efficiently schedule and manage aircraft maintenance to maintain regulatory compliance and minimize periods when an aircraft is grounded.

The efficient maintenance, repair, and overhaul (MRO) of aircraft increases flight availability and extends the life of airframes, engines, and other components of an aircraft. Airlines can manage MRO services internally, purchase some or all of these services from MRO providers, and offer MRO services to other airlines.

Plan and organize maintenance

Maintenance planning involves monitoring the condition of assets and scheduling work at suitable repair locations where the necessary tools, materials, and labor skills are available.

Task cards and master task cards specify regular maintenance work that is required for assets, including frequency intervals when work becomes due that are based on meter readings, calendar dates, or both.

You associate task cards with job cards, work orders, and work packages that provide a detailed description of the work that is required. Work packages group related work orders and task cards.

Configure MRO locations to define the physical location, classification, and capabilities and to associate work packages with the location. Perform capacity planning to schedule assets to MRO locations for the full duration of required work, for months or years in advance. Graphically assign work orders to labor within a hangar for a period of time, such as 2 weeks.

Manage regulatory compliance

Configure maintenance steering group (MSG-3) inspection programs and progressive inspection programs. Build a maintenance task library for use with maintenance planning documents and operator maintenance programs. In technical records, you can record the maintenance actions taken in response to airworthiness directives.

Configure aircraft assets

Define engineering models for aircraft assets and asset subassemblies that have build positions that are associated with configuration-managed (CM) parts. Models can include mechanical, electrical, electronic, and software assets.

When you create configuration-managed assets and asset assemblies, and associate them with CM parts, the configuration rules for the model apply to them. When an aircraft is operational, changes to the assets are validated against the rules that are defined in the engineering model. This validation is important for aircraft that contain field-loadable software assets.

Manage customers and suppliers

Manage customer agreements, service delivery, customer billing, and supplier contracts. You can manage assets and services for external customers or manage assets and services within an enterprise and bill for those services internally.

Request quotations, create purchase requisitions and purchase orders, and record the locations and capabilities of vendors and repair locations.

Manage warranties for assets and parts and create warranty claims.

Mobile work management

The product package includes the IBM® Maximo Anywhere Work Execution for Complex Assets app that supports mobile work management, including searching for assets to install, remove, or replace. You can install and deploy the IBM Maximo Anywhere Work Execution for Complex Assets app on IBM Maximo Anywhere, version 7.5.1.2.

Chapter 2. Planning to deploy Maximo for Aviation MRO

IBM Maximo for Aviation MRO 7.6 can be installed and configured on a single administrative workstation.

You can also install the IBM Maximo Anywhere Work Execution for Complex Assets mobile app as an optional component on a computer where IBM Maximo Anywhere 7.5.1.2 is installed.

Before you begin, plan the deployment and designate one or more computers for the installation.

If you intend to install IBM Maximo Anywhere Work Execution for Complex Assets, read the planning and installation information for IBM Maximo Anywhere in the IBM Knowledge Center.

System requirements for IBM Maximo for Aviation MRO

Before you install Maximo for Aviation MRO, your environment must meet all of the hardware and software requirements.

Administrative user rights are required for the installation of Maximo for Aviation MRO and the Work Execution for Complex Assets component.

IBM Maximo for Aviation MRO administrative workstation

When you install Maximo for Aviation MRO, Maximo Asset Management 7.6.0.1 and the middleware components are also deployed.

The middleware components that are deployed are IBM DB2®, and IBM WebSphere® Application Server.

IBM Maximo Anywhere Work Execution for Complex Assets

As part of the Work Execution for Complex Assets app installation, you must deploy some required components on the Maximo for Aviation MRO administrative workstation. The required components include OSLC object structures and licenses that enable a set of applications in Maximo Asset Management.

Next, you install IBM Maximo Anywhere 7.5.1.2 and the Work Execution for Complex Assets app on a designated computer.

Because you deployed the required components on the Maximo for Aviation MRO administrative workstation already, you are not required to deploy the required components that are delivered with Maximo Anywhere.

A complete list of hardware and software requirements is available in the System Requirements section of the Maximo Asset Management wiki.

Related information:

Maximo Asset Management system requirements wiki

Maximo Anywhere system requirements wiki

Chapter 3. Installing Maximo for Aviation MRO

The Maximo for Aviation MRO deployment includes Maximo Asset Management and the related middleware.

Before you begin

If you intend to perform a silent installation of the product later, see the information about installing Maximo for Aviation MRO silently.

Procedure

1. Download the Maximo for Aviation MRO product software for your operating system from IBM Passport Advantage® and extract the installation images to a local directory.
2. Start the launchpad by double-clicking the `launchpad` file. If your computer is a Windows system, use the `launchpad64.exe` file. If your computer is a UNIX or Linux system, use the `launchpad.sh` file.
3. On the Install IBM Maximo for Aviation MRO pane, select the check boxes for **IBM DB2**, **IBM WebSphere Application Server**, and **IBM Maximo for Aviation MRO**, and click **Install**.
4. Complete the installation program. The configuration program starts automatically.
5. Configure the installed components:
   a. On the configuration operations panel, click **Configure a New Deployment**.
   b. In the Define Deployment Environment panel, specify information about the your database and application server, in this example, DB2® and WebSphere® Application Server Network Deployment servers that you installed and prepared. Select Create and configure the database to automatically configure WebSphere Application Server Network Deployment and DB2. After you define your deployment environment, click Finish.
   c. In the Configure General Product Information panel, review summary details about the product components that you are installing. Specify the appearance and navigation features for your product, add an e-mail address to receive workflow messages, and choose whether or not to deploy sample data.
   d. In the Configure the DB2 Instance panel, specify information about the DB2 instance to create for Maximo for Aviation MRO.
   e. In the Configure the DB2 Database panel, specify information about the DB2 database to create for Maximo for Aviation MRO.
   f. In the Configure the Application Server panel, specify information for the WebSphere Application Server Network Deployment server that you installed. If you chose to persist messages, indicate whether you want to store JMS messages that originate from the integration adapter.
   g. In the Configure Application Security panel, choose a security model for Maximo for Aviation MRO. If you choose a security model that includes a directory server, specify information about the directory for the virtual member manager. Enter the user names and passwords for users that must be created for Maximo for Aviation MRO. Do not use the user name as a password value.

h. Choose the base language and any additional languages you want to install.
i. In the Apply Deployment Operations panel, select all available deployment operations, and then click Finish.

6. When the installation is complete, verify that the Maximo for Aviation MRO component was installed. Log in to Maximo Asset Management and view the system information from the **Help** menu.

Installing the IBM Maximo Anywhere Work Execution for Complex Assets app

The installation process involves running the installation and configuration programs on one or more computers.

Before you begin

Before you can build and deploy mobile apps, your system requires either the Android development tools or the iOS development tools. For more information, see the IBM Knowledge Center (www.ibm.com/support/knowledgecenter/SSPJLC_7.5.1/com.ibm.si.mpl.doc_7.5.1/install/t_install_android_dev_tools.html).

About this task

The following procedure describes how to install the Work Execution for Complex Assets app on a designated build computer where IBM Maximo Anywhere 7.5.1.2 is installed.

Because IBM Maximo Anywhere is required at fix pack level 7.5.1.2, you can add repositories in IBM Installation Manager to perform a simultaneous deployment of IBM Maximo Anywhere 7.5.1 and 7.5.1.2.

A set of required components must be installed on the administrative workstation to extend Maximo for Aviation MRO for IBM Maximo Anywhere Work Execution for Complex Assets.

Because you deploy the required components for IBM Maximo Anywhere Work Execution for Complex Assets, you are not required to deploy the required components that are delivered with Maximo Anywhere.

Procedure

1. On the computer where Maximo for Aviation MRO 7.6 is installed, extract the `AnywhereCA_7.5.1.2_launchpad.zip` file.
2. From the extracted zip file, start the launchpad.
3. On the Install IBM Maximo for Aviation MRO Required Components pane, click **Install** and complete the installation wizard. The configuration program starts automatically.
4. On the configuration program home screen, select **Update Database and Build and Deploy Application EAR Files** and complete the configuration wizard.
5. To install the Work Execution for Complex Assets app on a designated build computer, copy the compressed `AnywhereCA_7.5.1.2_launchpad.zip` file to the target computer.
6. On the designated computer, download IBM Maximo Anywhere 7.5.1 from IBM Passport Advantage, and extract the `Max_Anywhere_WM_V751.zip` file to a

local directory. For example, create a directory that is called *install_home*\maximoAnywhere\Max_Anywhere_WM_V751.

7. Download IBM Maximo Anywhere fix pack 7.5.1.2 from IBM Fix Central, and extract the Max_Anywhere_WM_V7512.zip file into a local directory. For example, create a directory that is called *install_home*\maximoAnywhere\Max_Anywhere_WM_V7512.
8. Start IBM Installation Manager and select **File** > **Preferences**.
9. In the Preferences window, select the **Repositories** tab and click **Add Repository**.
10. Add repositories by browsing to the following directories and clicking **OK** > **Apply** after each new entry:
    - *install_home*\maximoAnywhere\Max_Anywhere_WM_V751\Install\Worklight\disk1\diskTag.inf
    - *install_home*\maximoAnywhere\Max_Anywhere_WM_V751\Install\MaximoAnywhereAllIMRepos.zip
    - *install_home*\maximoAnywhere\Max_Anywhere_WM_V7512\Install\WorklightHotfix\disk1\diskTag.inf
    - *install_home*\maximoAnywhere\Max_Anywhere_WM_V7512\Install\AnywhereComp7512.zip
11. On the Installation Manager home page, click **Install** and complete the installation wizard.
12. From the extracted AnywhereCA_7.5.1.2_launchpad.zip file, start the launchpad.
13. On the Install IBM Maximo Anywhere Work Execution for Complex Assets pane, click **Install**.
14. Complete the installation wizard.
15. Build and deploy the Work Execution for Complex Assets app by following the instructions in the IBM Knowledge Center (www.ibm.com/support/knowledgecenter/SSPJLC_7.5.1/com.ibm.si.mpl.doc_7.5.1/build_deploy/t_ctr_build_deploy_apps.html).

Installing Maximo for Aviation MRO silently

A silent installation is useful for installing Maximo for Aviation MRO on any computers that are configured in the same way. Instead of using the installation programs, you run commands by using either a generated response file from the initial installation of Maximo for Aviation MRO, or by using a sample response file.

Before you begin

To create a response file during the installation of Maximo for Aviation MRO, open a command prompt and set the record environment variable. Then, start the Maximo for Aviation MRO launchpad. The response file is generated in the home directory of the user ID that started the program.

Alternatively, you can modify one of the sample response files that are provided in the installation image. The sample files are called ResponseFile_AviationMRO_Install_Windows.xml and ResponseFile_AviationMRO_Install_Unix.xml.

Ensure that the values in the response file are valid for the target system. If you update the value for the **installLocation** parameter, you must also provide a new value for the **profile id** parameter.

Procedure

1. Copy the response file and the compressed installation image to the target computer.
2. On the target computer, open a command prompt and change directory to the location of the Installation Manager program.

Option	Description
Windows	`cd C:\SMP\IBM\InstallationManager\ eclipse\tools\`
Linux and UNIX	`cd /opt/IBM/InstallationManager/eclipse/ tools/`

3. Silently start Installation Manager by running the following command:

   ```
   imcl -input responsefilename
   -log logfilename-acceptLicense
   ```

   The **-input** parameter determines the path to the response file and the **-log** parameter determines the path to where the log files are written. The **-acceptLicense** parameter is used to accept the license automatically. For example, on Windows, run the following command:

   ```
   imcl -silent -input C:\tmp\ResponseFile_AviationMRO_Install_Windows.xml
   -log C:\tmp\silent_install_log.xml -acceptLicense
   ```

Results

The installation proceeds silently with the values that you provided in the response file. By using different response files as input, you can silently install middleware on separate systems.

Related information:

Silent installation

Chapter 4. Configuring Maximo for Aviation MRO

After you install Maximo for Aviation MRO, you must complete several configuration tasks. Other tasks are optional and vary depending on your implementation.

Defining values in dynamic value lists (DVL)

A dynamic value list (DVL) contains configuration-managed (CM) values that are used as the predefined and selectable values for field lookups. A DVL is defined at the part set level. Fields that use a DVL record can display only the records that are in the associated part set.

Values in dynamic value lists (DVL)

You can create and manage configuration-managed (CM) value records and define the CM values that are included in a dynamic value list (DVL). A dynamic value list is a group of CM values that share the same type value.

The CM values that you add to a dynamic value list become the predefined and selectable values for field lookups. The selectable field lookup values are filtered according to the CM value types. The name of the CM value type typically identifies the field name for which the dynamic value list applies.

For example, a dynamic value list with a CM value type of SYMPTOMS contains a list of values that can help you to define the **Symptom** field value on an event record. You can track asset event symptoms according to the detailed information that is on the CM value record that you have selected from the dynamic value list.

The CM value records that you create in the DVL Setup application can also include the following information that relates to the defined CM value type:

CM value findings
: The information about the CM position code of an asset configuration manager or label system. The CM value findings can also include the information about the zone, condition, and the disruption index for the CM position.

CM value applicability
: The information about the series, or the model group and the specific model within a series. The selectable series and model values are filtered according to the selected CM position value. The CM value applicability can also include the information about the variation, build item, and CM part for the selected model.

How findings data is used with configuration-managed (CM) values

You can add findings data to a configuration-managed (CM) value record to define the CM position information that relates to the defined CM value type. The CM position is the code of the build position record that is associated with the dynamic value list record. The CM value findings can also include the information about the zone, condition, and the disruption index for the selected CM position.

The association between a CM position and a CM value is essential in capturing and tracking the detailed event information in the Events Management application. Event symptoms, failures, and actions can be tracked according to the defined CM position, series, and part information that you define on a CM value record.

For example, you can use the following CM value finding data to track the symptoms of a build position on an event record in the Events Management application:

- CM value - Engine problem
- Type - SYMPTOMS
- CM position - Engine
- Zone - Fan belt
- Condition - Used
- Disruption index - 1 (minor disruption)

Applicability values for configuration-managed (CM) values

You can add applicability values to a configuration-managed (CM) value record to define the series and model information that relates to the defined CM value type. The CM value applicability values can also include the information about the variation, build item, and CM part for the selected model.

The association between the series, model information, and a CM value is essential in capturing and tracking the detailed event information in the Events Management application. Event symptoms, failures, and actions can be tracked according to the defined CM position, series, and part information that you define on a CM value record.

For example, you can use the following CM value applicability values to track the symptoms of a build position on an event record in the Events Management application:

- CM value - Electrical problem
- Type - SYMPTOMS
- CM position - 2410
- Series - Boeing
- Model - 757
- Variation - 200
- Build item - Battery
- CM part - 123456

Creating configuration-managed (CM) values

You can create a configuration-managed (CM) value record to define the values that are part of a dynamic value list (DVL). The CM values and dynamic value lists that you create can be used throughout Maximo for Aviation MRO . The CM values that are on a dynamic value list become the selectable information for field lookups.

About this task

The CM value records are stored at the part set level. The selectable field lookup values are filtered according to the CM value types. The name of the CM value type identifies the field name for which the dynamic value list applies.

The CM value records can also include the findings and applicability information that relate to the CM value type. The CM value findings define the information about the CM position code of an asset configuration manager or label system. The CM value applicability defines the information about the series, or the model group and the specific model within a series.

Procedure

1. In the DVL Setup application, click the **New DVL Setup** icon.
2. Specify values for the type, value, and description.
3. Save the record.

Configuring a start center portlet to display BDI information

You use the Result Set portlet to define that assets must be displayed with the BDI color coding, BDI status value, date and time.

Procedure

1. Add the **ACM Result Set** portlet to the Start Center.
2. On the portlet setup, select the **BDI_ASSETS** query.
3. On the **Column Display** tab, select the columns you want the portlet to display. You have to select the **PLUSARBDICOLOR** column to display the assets with the BDI color coding.
4. Save the setup.

Related information:

Start Center portlets

Maintaining fleet definitions

To effectively manage your assets, you can create fleet definitions, which group similar assets together for the purpose of managing and performing tasks, such as updating meters.

Fleet definitions

To manage your business assets effectively, you can group your configuration-managed assets into logical groups called fleets and can define fleet attributes.

You can add, view, modify, or delete fleet definitions. The following information can be included in a fleet definition:

- Fleet name
- Model
- Configuration
- Class
- Fleet meters
- Fleet attributes

Meter usage loads for fleets

To simplify entering metadata, you can create and manage the meter usage loads of predefined fleets in the system. You can then view the fleets and their relevant meter records and can update the meter records in a single tab.

Before you use this application, you must create fleet definitions and optionally set default fleet meter types in the Fleet Management application.

After the fleet usage load record is created, it is in the Draft state. You can then enter meter readings on the Fleet Assets tab. After you have entered all of the meter readings, you can change the status of the record to Approved. All of your new meter readings are updated to the individual asset records that are included in the fleet.

Creating fleet definitions

A fleet definition logically groups related assets for the purposes of meter reading entry and preventive maintenance tasks. This grouping of assets can be shared by model, variation, or asset attribute values. For example, you can create a fleet of aircraft engines to enable rapid entry of meter reading values in the Fleet Usage Load application.

Before you begin

Before you create a fleet definition, you must set the asset attributes in the Models and Asset Attributes Setup applications.

Procedure

1. In the Fleet Management application, on the toolbar, click the **New Fleet Management** icon.
2. Specify a unique identifier for the fleet.
3. Specify any other required information for the fleet.
4. Specify values for model and variation.
5. Optional: To provide specific attributes for an asset fleet, in the Fleet Definition Attributes table, add as many rows as required and select the values for the fields.
6. Optional: If you want to specify meters for the fleet, in the Fleet Utilization table, add as many rows as required and select the values for the fields. Each combination of utilization value and utilization by period must be unique.
7. Save the record.

Updating fleet definitions

If you change the fleet definition and must have the changes updated immediately, you can evaluate the fleet definitions without waiting for the cron task. You can opt to evaluate all fleet definitions or only the current fleet definitions.

Procedure

1. In the Fleet Management application, select a fleet definition record.
2. Update the fleet definitions:
   - To update only the active fleet definitions, from the **Select Action** menu, select **Evaluate Current Fleet Definition**
   - To update all fleet definitions, **Select Action** menu, select **Evaluate Fleet Definition**

Scheduling the updating of fleet definitions

You can schedule and run a cron task to periodically check for any changes to all the fleets and the associated assets. For example, if you add a new meter to a fleet, the cron task identifies the new meter and adds it to all affected assets in the fleet. The cron task runs every three hours.

Procedure

1. In the Cron Task Setup application, on the toolbar, click the **New Cron Task Definition** icon.
2. On the **Cron Task** tab, set the cron task name to "`EvalFleets`" and specify "`Evaluate ALL Fleets`" as the cron task description.
3. Set the class to `psdi.plusa.app.plusafleet.PlusACMEvaluateAllFleetsCronTask`.
4. Set the access level to FULL.
5. In the Cron Task Instances table, set the cron task instance name to "`ALL Fleets`".
6. Specify "`3h,*,0,*,*,*,*,*,*,*`" as the schedule for the cron task instance.
7. Keep the default values for the **Run as User** field and the **Active** check box.
8. Save the record.

Creating fleet usage loads

To simplify data entry and manage assets in a highly regulated industry, you can create fleet usage load records to manage the meter life usage of asset fleets. After you create a fleet usage load record, you can then update meters for the entire fleet using a single tab in the application.

Before you begin

Before you create fleet usage loads, you must create fleet definitions in the Fleet Management application.

Procedure

1. In the Fleet Usage Load application, click the **New Fleet Usage Load** icon.
2. Select the fleet name.
3. If you did not set default fleet values in the Fleet Management application, specify the values for the **Meter 1**, **Meter 2**, **Reading Type 1**, and **Reading Type 2** fields.
4. Save the record.

Setting up asset attributes

Asset attributes records define the status of an asset in relation to its meter life use and configuration on a specified date. You use the Asset Attributes application to create asset attribute set up records.

Asset attribute records

Asset attributes define the status of an asset in relation to its meter life use and configuration on a specified date. Asset attribute values can also change throughout the life of an asset to reflect the changing status of the asset.

You create and manage attributes and their associated values for an asset. You can also determine whether all the child assets inherit the asset attribute values that are associated to a parent asset record.

When an attribute change is saved, all previously defined values for the selected attribute are written to history for future reference and analysis. You associate the attribute values and attribute changes to an asset in the Asset Attributes application.

Creating asset attribute setup records

An asset attribute setup record defines asset attributes and their associated values. You use asset attributes to define the status of an asset in relation to its meter life use and configuration on a specified date.

Procedure

1. In the Asset Attributes Setup application, click **New Asset Attributes Setup**.
2. Specify a name and description for the asset attribute.
3. Optional: Specify a site or an organization. You can define an asset attribute record at the system, organization, or site level. If you specify a site, the value for the organization is automatically specified.
4. Optional: If you do not want child assets to inherit the asset attribute values that are associated with an asset record, clear the **Overwrite Subs** check box.
5. Optional: If you want the asset attribute record to be replicated in the target site when an asset is transferred to that site, select the **Transfer on Site Move** check box. An asset attribute record is transferred to the target site only both the attribute and attribute value are valid in the target site. For example, an asset attribute record is defined at the site level in the BEDFORD site. If you transfer the asset to the NASHUA site, the asset attribute cannot be replicated in the NASHUA site.
6. In the Attribute Values table, add a row and specify a value for the asset attribute.
7. Optional: Specify whether the attribute value is visible for selection in the Asset Attributes application.
8. Optional: Specify whether the attribute value is used as the default attribute setup value.
9. Specify values for associated values that are used in reporting.
10. Save the record.

Configuring customers and billing services

After you install the product, you must complete several configuration tasks to enable customer and billing services.

Configuring customers, customer objects, and related data

After you install the product, you must specify several system settings and configure customers and customer object records. Review the configuration tasks before you implement them.

Procedure

1. Create customers in the Customers application.
2. Grant or restrict access to customer-level information in the Customer Objects application. The customer data objects and conditions, and the customer authorization settings for a security group, determine the customer-level information that users can access.
3. Specify security groups and policies to complement the data objects and conditions that you set up for customer objects.
4. Create reference data for the applications that are listed for each customer. You can restrict access to records in these applications with the customer access permissions that you specified previously.
   - Classifications

- People, Locations, Assets, and Configuration Items
- Companies, Parts, Tools, and Service Items
- Job cards
- Price Books
- Bulletin Board communications and Solutions
- Domains, Service Level Agreements, and Response Plans

What to do next

Configure additional system settings as needed. For example, specify how bills are created, how service level agreements are applied and used, and how service addresses are managed and used.

Then, you can define the customer agreements and terms for customers. Terms of agreement include the details of the customer agreement, the actions in the response plans, the prices of services in price schedules and billing schedules, and the service level agreements.

Configuring system settings

After installation, you perform system configuration tasks to ensure that your installation functions according to your service provider business needs.

Specifying SLA options

You can configure options for the way that service level agreements (SLAs) are applied and used.

About this task

All of the configuration settings are optional. All settings except for SLA Hold are set per site.

Procedure

1. In the Organizations application, select the organization for which you want to set service level agreement options.
2. From the menu, select **SLA Options**.
3. To allow SLAs on tickets to be put on hold, select the **Allow SLA Hold to be Applied on SLAs** check box. This setting applies to all organizations. If you select this check box, SLAs for tickets can be put on hold, which adds time to the resolution target and stops any escalation activities. Typically, tickets are placed on SLA hold when the service desk analyst is waiting for a response from the individual who submitted the ticket. Not all installations have the SLA Hold function. If your installation does not have SLA Hold function, this check box is not editable.
4. In the SLA Options window, select the site to which you want the remaining settings to apply.
5. Select from the following options:

Option	Description
Allow Application of One SLA	To apply one matching SLA to a record, select this option. The matching SLA with the highest ranking value is applied. The highest ranking is 1 and the lowest ranking is 99999.

Option	Description
Allow Application of Multiple SLAs	To apply all matching SLAs to a record, select this option. If you select this option, you can configure other options.
Apply Multiple SLAs Based on Ranking	If you apply all matching SLAs to a record, select this option to have the SLA with the highest ranking update the target dates on the record.
Apply Multiple SLAs Based on Commitment Stringency	If you apply all matching SLAs to a record, select this option to have the SLA with the most stringent commitment times update target dates on the record.
Use Calendar for Calculating Escalation Point Condition	To specify that calendars are used if the escalation originated from an SLA, select this option.
Disable Calendar for Calculating Escalation Point Condition	To specify that calendars are not used if the escalation originated from an SLA, select this option.

6. Repeat for each site that you want to configure settings for and click **OK** when you are finished.

Configuring service addresses

Service addresses provide a way to find assets and locations. Before a service address can be used, you must configure options for the way your organization uses service addresses.

Procedure

1. In the Organizations application, select your organization.
2. Select the **Service Address Options** action and select the options for your organization.

Bill batch copy options

You can add schedules to customer agreements that create bill batches for all price schedules on the agreement. You also can use a cron task to copy bill lines for work orders, tickets, and sales orders to existing bill batches. Or you can copy bill lines in the background or foreground immediately.

Automated billing of all price schedules

You can set up automated billing of all price schedules on a customer agreement. Specify a billing schedule that creates bill batches for all price schedules on a customer agreement. You can specify that bill batches are grouped by order number, customer purchase order number, customer cost center, or the reporting user. Schedules can be set up by calendar or by financial period.

The PLUSPBILLPSGENCRONTASK cron task runs on the schedule that you specify.

Automated copy of bill lines to a bill batch

You can schedule a cron task to regularly copy bill lines for work orders, tickets, and sales orders to an existing customer bill batch. The scheduled task runs as a background process.

To set up the scheduled task, open the PLUSPCOPYBILLLINESCRONTASK record in the Cron Task Setup application. By default, the schedule is set up to run once a month. In most cases, you replace only the *customer* variable with the customer name from the bill batch.

Immediate copy of bill lines to a bill batch

When you copy bill lines to a bill batch in the Customer Billing application, the option to copy lines in the background is displayed. If you copy in the background, you can specify one or more email addresses for notification when copying finishes. While lines are being copied to a batch, you cannot select or copy bill lines or modify the record.

After each 100th bill line is processed, records are committed to the database.

If a copy process failed and must be restarted, select the action to start the copy again. Do not restart the process unless there is a failure, such as a server failure. The action erases all copy history and starts the copy process again.

Copying bill lines to a bill batch with a background process:

You can set up a scheduled task to copy bill lines for work orders, tickets, and sales orders to an existing customer bill batch. The scheduled task runs as a background process. It does not require anyone to be logged in to the system.

About this task

The cron task does not automate the process to create the bill batch for a customer.

Procedure

1. In the Cron Task Setup application in the Platform Configuration module, open the PLUSPCOPYBILLLINESCRONTASK record.
2. In the Cron Task Parameters window, modify the WHERE clause to replace the *customer* variable with the customer on the bill batch. Do not modify other values in the WHERE clause unless you have expert billing system knowledge.
3. Ensure that the provided schedule matches your requirements. The provided schedule runs the cron task on the first day of the month at 12:01 a.m. If you modify the schedule, allow enough time for the batch process to complete before it runs again. Start with at least a six-hour lapse between scheduled task runs.
4. Select the **Active**? check box and reload the request to activate the cron task.

Configuring access to restart the copy process for bill batches:

You can configure security settings to allow members of a security group to restart the copy process for a bill batch that is in progress.

About this task

Authorized users can restart the process to copy bill lines to a bill batch in a background mode with the **Reset Copy in Progress** action in the Customer Billing application.

You enable user access to this action by associating its signature option with one or more security groups. Then, you associate a conditional expression with the signature option. The conditional expression to be associated with the signature option is configured for you.

Users who select this action are warned to not restart a copy in progress unless the process failed, such as with a server failure. Restarting the copy process deletes all history for the copy that was in progress.

Procedure

1. In the Security Groups application, select the security group to configure.
2. On the **Applications** tab, in the applications list, select Customer Billing . In the Options for Customer Billing section, select the Reset Bill Batch signature option.
3. In the Details section, grant access to this signature option and associate the PLUSPBBRESET condition with the signature option.
4. Save the record. Log off from the system to complete the configuration.

What to do next

Test that the**Reset Copy in Progress** action is only available to authorized users. Test as a user who does not have access to the action and as a user who has access.

Setting billing options

You can specify the status at which completed work can be added to a bill batch. You also can specify whether to display a message about an existing open bill batch when you create a new batch for the same customer agreement.

About this task

When you specify billing status for work orders, including activities, changes, and releases, the option does not apply to work orders that are linked to a price schedule that has the **Bill Approved Work** option selected. On these types of work orders, approved transactions are selected for billing on open work orders.

Procedure

1. In the Organizations application, select the organization for which you want to set billing options.
2. Select **Service Provider Options** > **Billing Options**. For each record type, select that status at which that record is billable. Billing objects are selected for a bill batch based on the status and the date they were completed.
3. Optional: If you do not want to display a message about an existing bill batch when a new batch is created for the same customer agreement, select **Service Provider Settings** > **Customer Billing Options** and deselect the check box.
4. Save your changes.

Configuring ticket options

You can configure the product to filter ticket owners by the customer that is associated with an asset, location, or reporting user on the ticket.

Procedure

1. In the Organizations application, select **Service Provider Settings** > **Ticketing Options**.

2. To filter the ticket owners by the customer that is associated with an asset, location, or reporting user on the ticket, select the check box.

Activating automated billing

The PLUSPBILLGENCRONTASK cron task initiates the processing of automated billing schedules. Cron tasks are behind-the-scene jobs that run automatically and on a fixed schedule. You activate the PLUSPBILLGENCRONTASK cron task if you want to be able to create customer bills that are based on billing schedules.

Procedure

1. In the Cron Task Setup application, select the PLUSPBILLGENCRONTASK cron task.
2. In the Cron Task Instances section, select the **Active** check box for the PLUSPBILLGENCRONTASK cron task.
3. Reload the cron task by selecting the **Reload Request** action.
4. In the Reload Request window, select the PLUSPBILLGENCRONTASK instance that you want to reload.
5. Click **OK**.
6. Save the changes to the cron task.

Configuring organization options for models

When you create models for configuration-managed assets, you specify values such as the label system and meters. Configure this data before you start defining models.

Procedure

1. In the Organizations application, select an organization and then select the **CM Options** action.
2. In the CM Options window, specify the default label system that you plan to use.
3. Optional: Select the following check boxes if you want to enable that functionality:
   a. **Record Meter Offsets**
   b. **Update Asset Location on Installation**
   c. **Manage Fuel, Replenishments, and Munitions in the Inventory Applications**
4. Click **OK**.
5. Select the **System Settings** action.
6. In the System Settings window, specify whether configuration-managed task cards are included in Maximo Asset Management Scheduler and whether warnings are displayed when configuration-managed task cards are rescheduled by Maximo Asset Management Scheduler.
7. Click **OK**.

Related concepts:

Organizations application
You use the Organizations application to set up the organizations and sites. In Maximo for Aviation MRO, you must define at least one organization and one site with their respective default label systems, label width, and position code width. You can also specify whether you use record offsets to meter usage.

Warranty options

You can specify information about how you want warranties to be used in your organization. For most options, you specify choices on the Warranty Options window in the Organizations application. An item warranty option is controlled by a property in the System Properties application.

Display of messages for possible warranty situations

You can select or clear the check boxes in the Warning Messages section to specify the conditions under which possible-warranty-situation messages are displayed. Possible-warranty-situation messages can alert the user that generation of warranty claims might be appropriate.

You can specify that a possible-warranty-situation message is to be displayed when saving the record for each of four types of records:

- Work orders
- Purchasing records: PRs (purchase requisitions), POs (purchase orders), and RFQs (requests for quotations)
- Labor reporting
- Inventory issues

You can specify that possible-warranty-situation messages are to be displayed on status change for each of two types of records:

- Work orders
- Purchasing records

A message is displayed if the check box is selected and the associated record references an asset that is under warranty.

Warranty expiration validation method

To determine whether warranty coverage is valid, date and meter durations can be evaluated in one of two ways:

- Warranty coverage expires when the first duration period expires. For example, warranty coverage expires after three years or 36,000 miles, whichever occurs first. Select **When First Duration Expires** to use this expiration validation method. When the first duration expires is the default expiration validation method.
- Warranty coverage expires only when all duration periods have expired. For example, warranty coverage expires when both these conditions are met: three years have passed and 36,000 miles have been recorded on the asset. Select **When All Durations Expire** to use this method.

Work type for expiration notifications

Enter a valid work type in the **Work Type** field in the Expiration Notification Type section. The specified work type is for work orders that are generated to notify you of a warranty expiration.

PO type and invoice type for warranty claim reimbursements

Use the fields in the Claim Reimbursement section to specify the **Type** value for purchase orders and invoices that are created for warranty claim reimbursements.

Initial status for new warranty claims

Select the **Generate Approved Claims** check box to specify that new warranty claim records are to be generated with an initial status of Approved (APPR). If the check box is cleared (the default setting), new warranty claim records are generated with an initial status of Waiting for approval (WAPPR).

Warranty validation exclusions

You can exclude some records from the process of warranty validation by listing specific reason-for-repair codes and work types in the Validation Exclusions tables. Any record that specifies a reason-for-repair code or a work type that is listed in one of the Validation Exclusions tables is excluded from warranty validation. The **Possible Warranty** field on the record is set to N.

Click **New Row** to add a reason-for-repair code or a work type to the Validation Exclusions table.

Limiting the number of possible-warranty-situation transactions that are created for items under warranty

In the System Properties application, the property mxe.plust.itemwarranty.uselatesttransaction can be set to limit the number of possible-warranty-situation transactions that are created. The property is set to 0, No, by default. This setting means that, for an item under warranty that is in a position on an asset, or that has no position specified, a possible-warranty-situation transaction is created for every registered item under warranty. You can set the property to 1, Yes, to limit the creation of possible-warranty-situation transactions for that item and position to one, for the latest transaction date only.

Example

The left front tire on a vehicle fails. A new tire is issued from inventory for the work order to replace the tire. The replacement tire is associated with an item warranty contract that specifies a six-month warranty. When the tire is issued to the work order, the tire warranty is registered to the asset on the work order.

A month later, the replacement left front tire fails. Again, a new tire is issued from inventory for the work order to replace the tire. It is associated with the same warranty. When the second tire is issued to the work order, the tire warranty is again registered to the asset on the work order. Because the tire that is being replaced has warranty coverage, a possible-warranty-situation transaction is recorded and a possible-warranty-situation message is displayed.

Two months later, the second replacement left front tire fails.

If the mxe.plust.itemwarranty.uselatesttransaction property is set to 0, the default, two possible-warranty-situation transactions are created, and a possible-warranty-situation message is displayed. Two possible-warranty-situation transactions are created because both the first replacement tire and the second replacement tire in the left front position are registered as having warranty on the vehicle.

If the mxe.plust.itemwarranty.uselatesttransaction property is set to 1, only the most recent registered item, the tire that is used in the second replacement, results in a possible-warranty-situation transaction and message. Any earlier registered

warranty for the same item in the same position is ignored.

Chapter 5. Security

You can use the Security Groups application to set restrictions on who can access records. For example, you can limit the viewing of models to technical and maintenance personnel. You must configure security restrictions to control access to customer data.

Related information:

Security groups and access to sites and applications

Combination of security groups - rules for data restrictions

Predefined security groups

Maximo for Aviation MRO includes predefined security groups that restrict access to applications based on user roles and responsibilities. When you add users to a predefined security group, their application access is restricted to the applications that they require to perform their work.

A list of the predefined security groups, the roles that they support, and the applications that they provide access to is available at http://www-01.ibm.com/support/docview.wss?uid=swg21903205.

Restricting access to assets and models

You can restrict the access of users to assets, related records, and models, by setting restrictions for user groups based on the user group type or asset attributes.

Before you begin

To restrict access based on an asset attribute or to restrict access to models, the **Security Restriction** check box for the attribute or model must be selected in the Asset Attributes Setup application.

Procedure

1. In the Security Groups application, on the **List** tab, select a user group.
2. On the **ACM Restrictions** tab, in the Asset Attribute Restrictions table, specify attributes and values to allow the user group access to assets with these attributes and values.
3. In the Model Restrictions table, specify the models that the user group can access.
4. In the Entity Restrictions table, define an SQL statement.
5. Save the user group.

Restricting access to customer information

You must configure security to ensure that only authorized users can view information about customers.

Access to customer-level data

You can provide access to customer records by defining authorization levels and data restrictions in the Security Groups application. You can define the levels of access to security groups with different customer-level information.

The customer-level objects that can be restricted according to customer, and their restriction conditions, are defined in the Customer Objects application. The level of customer authorization determines the level of access to these objects. Customer-level data provides information that directly refers to a customer or is indirectly associated with a customer. Customer-level data restrictions work within the larger set of application restrictions and with other object, attribute, and collection restrictions to form the overall security profile of a security group and its users. A person record can list other customers to which the person has access, in addition to the person's employer. If the person is an employee of the service provider and can access all of the customers of the provider, that user's person record would list all of the customers.

Some customer-level data is unrestricted because it is not associated with a customer. For example, assets that belong to the service provider, instead of its customers, do not have customer associations. Any users can see these assets if they belong to a security group that allows access to unrestricted data.

Levels of customer authorization

You use customer authorization settings in the Security Groups application to set the level of access a security group has to customer-level information.

You can assign each security group one of five levels of customer authorization. The selected level of authorization applies to all users in the security group. If a user requires more than one type of authorization, create additional security groups and assign the user to each of them. His or her customer-level data restrictions are based on the combination of settings for all of the groups.

You can assign a security group one of the following levels of access:

- Access to all customer-level information
- Access to customer-level information that is not associated with a customer
- Access to information only about a user's employer
- Access to information only about a user's assigned customer list
- Access to information about specific customers

Access to all customer-level information

You can authorize a security group to access all customer-level information. Users with this level of customer authorization can access information that is associated with any customer and any customer-level information that is not associated with a customer.

For example, Hamed is the director of operations for a service provider. He is responsible for all maintenance activities for all customers of the service provider

and requires access to all customer agreements and transactions. As a result, Hamed belongs to a security group that is authorized to access all customer-level information.

Access to customer-level information that is not associated with a customer

You can authorize a security group to access only unrestricted customer-level information. Users with this level of customer authorization can access all information that is not associated with a customer.

For example Best Services owns the fire extinguishers that its customers use, so no customers are associated with those assets. Josh is responsible for checking all of the fire extinguishers on behalf of Best Services. He has no customer responsibilities. Josh is in a security group with access to unrestricted customer-level information only, so that he can view details about the fire extinguishers, but not about any assets that the customers own.

Access to information only about a user's employer

A security group can allow its users access to customer-level information for the users' employers only. A user in a group with this level of customer authorization can access customer-level information for one customer; the company in the Customer/Vendor field on his or her person record in the People application. These users typically are restricted to using only the Self Service applications and the Bill Review application.

Users with this level of customer authorization cannot access unrestricted customer-level information, except for unrestricted (global) classifications and attributes.

For example, Maria works for the International Sailing Association (ISA), a customer of the service provider Best Services. Maria's person record in the People application has the value ISA in the Customer/Vendor field, because ISA is her employer. She belongs to a security group that has access to a user's employer. As a result, she can view all customer-level information for ISA. She cannot view customer-level information for any other customers of Best Services, nor can she view any customer-level information that is not associated with a customer, except for unrestricted classifications and attributes.

The users in this group are typically employees of a service provider's customers, and have limited access to data and applications. For example, these users typically can access only the self service and bill review applications.

Access to information only about a user's assigned customers

A security group can be authorized so that its users can access all of their assigned customers. A user in a group with this level of customer authorization can access customer-level information for all of the customers that are listed on the Customer Access List in the People application.

Users can also access all information that is not associated with a customer.

For example, Edouard is a customer service agent who is assigned to support Acme Products and Alpha Industries. The customer access list on the person record for Edouard lists these two customers, and he belongs to a security group

with access to any customer on the user's customer access list. As a result, Edouard can view all customer-level information for these two companies.

Because a co-worker is absent, Edouard must also handle calls from the XYZ Corporation for today. Regina is the service desk manager and has access to XYZ corporation, in addition to Acme Products and Alpha Industries. Instead of changing Edouard' security profile, Regina uses the People application to add XYZ Corporation to Edouard's customer access list. Edouard can now work with Acme Products, Alpha Industries, and XYZ Corporation for the duration of his shift. Regina can remove XYZ Corporation from Edouard's customer access list at the end of his shift.

Access to information about specific customers

You can authorize a security group can so that its users can access information about specific customers. A user in a group with this level of customer authorization can access all customer-level information for all of the customers that are listed in the Individual Customer Authorization list for the security group.

Users can also access all information that is not associated with a customer.

For example, Elena and Max are service desk agents who work for a service provider. Elena has responsibility for Acme Products and General Manufacturing. Max has responsibility for Alpha Industries and XYZ Corporation. If either Elena or Max is away, the other takes on responsibility for his or her customers. Elena and Max belong to a security group that gives them access to the customers listed in the Individual Customer Authorization list. Acme Products, General Manufacturing, Alpha Industries, and XYZ Corporation are all in the list for the security group so that both Elena and Max, and any other service desk agents in the same security group, can access all four customers as necessary.

Customer access lists

The security profile for a person can provide access to any customers on the customer access list for that person. With this type of security profile, the customer access list shows all the customers that a person can work with.

When a person must work with a different list of customers, for example, when responsibilities change, you can change the customers on the customer access list. You do not need to create a security profile for that person. You view and change customer access lists for a person on the **Customer Access** tab of the People application.

Example of temporary changes to a customer access list

Eduard is a customer service agent assigned to support Acme Products and Alpha Industries. The customer access list on the person record for Eduard lists these two customers. He belongs to a security group with access to any customer on the customer access list of the user. As a result, Eduard can view all customer-level information for these two companies.

Because a co-worker is absent, Eduard must also handle calls from the XYZ Corporation for today. Regina is the service desk manager and has access to XYZ corporation, in addition to Acme Products and Alpha Industries. Instead of changing Eduard's security profile, Regina uses the People application to add XYZ Corporation to Eduard's customer access list. Eduard can now work with Acme Products, Alpha Industries, and XYZ Corporation for the duration of his shift.

Regina can remove XYZ Corporation from Eduard's customer access list at the end of his shift.

Customer data objects and restriction conditions

You use customer data objects and restriction conditions to grant or restrict access to customer-level information. The customer data objects and conditions, and the customer authorization settings for a security group, determine the customer-level information that users can access. The objects and restriction conditions apply to all security groups in the Security Groups application.

Customer data objects are listed in the All Customer Objects table window in the Customer Objects application. The list shows all of the data objects for which customer-level data restrictions have been set up.

The restrictions are defined in the Restriction Condition table window.

You can add or remove objects and conditions or change the default conditions. You can refresh the list to its original state, with the full set of conditions for all customer-level objects, using the Create Default Conditions action.

You can also view all conditions created in the Customer Objects application in the Conditional Expression Manager application.

For example, if it is specified that a group has access to the Customer object if the customer is ABC Corporation, then members of this group can see the ABC Corporation customer record in the Customer application. For users in this group also to see work orders for ABC Corporation, the security group must also have access to the Work Order object for that customer.

For all of the default customer objects, the restriction conditions are set up already. If you add customer-level objects using the Database Configuration application, create a customer data object restriction for each main object that refers to a customer to ensure that access to the customer is fully restricted to the appropriate security groups. A main object is the main record within an application, such as Location object in the Locations application.

Restriction types

Restrictions can be one of the following types:

- Qualified:

  Qualified restrictions prevent access to a main object. Only main object data that meets the condition qualifies to be seen or accessed. Qualified restrictions do not apply to child records or attributes.
- Hidden

  Hidden restrictions assert that descriptive information about the object is hidden rather than being displayed in detail on another object.

For example, in the Asset application, Asset is the main object. A qualified restriction on Asset restricts access, according to customer, to assets in the Assets application. In the Locations application, assets are shown on the Assets tab. The main object in this application is Location, not Asset, so the qualified restriction on the Asset object does not restrict access to the asset information shown in the Locations application. However, a hidden restriction for the Asset object would prevent the asset from being shown in the Locations application. So, to restrict

access to all asset information in all applications, based on customer, both qualified and hidden restrictions are applied to the Asset object.

Each object can have up to ten assigned conditions-one for hidden restrictions combined with each of the five levels of customer authorization in the Security Groups application, and one for qualified restrictions combined with each of the five levels of customer authorization.

Default customer objects and restriction conditions:

Default conditions are standard customer objects and the restriction conditions for those objects, used when you set up customer authorization for security groups in the Security Groups application. These objects and conditions are set up by default in the Customer Objects application, but you can modify or remove them, and you can add other objects and conditions.

You typically add objects or conditions to the default list only if you create your own customer-level objects using the Database Configuration application.

If you modify or remove objects or conditions, you can use the **Create Default Conditions** action to refresh the lists so that the original items and settings are specified. You can choose to keep any new objects and conditions that you added.

The default conditions created in the Customer Objects application are shown in the Conditional Expression Manager application with a prefix of BMXAQ and with a description that indicates the customer object that the condition is applied to. This enables you to identify the default Customer Objects conditions when you use the Conditional Expression Manager to manage all of your system-wide conditions.

All customer objects and restriction conditions that you create or modify are applied to all security groups. If you refresh the lists to use the default objects and conditions, the default objects and conditions are applied to all security groups.

Securing customer information

Use security groups, customer data objects, and security policy settings to ensure that customer information can be viewed only by users who have access to that customer.

Related concepts:

"Levels of customer authorization" on page 24
You use customer authorization settings in the Security Groups application to set the level of access a security group has to customer-level information.

Applying default customer objects and restriction conditions to security groups

You can remove or modify customer default objects or restriction conditions. Default conditions are standard customer objects and their restriction conditions that are applied based on the authorization settings in security groups.

About this task

This action refreshes the lists so that the original objects and conditions are applied to all security groups.

You can choose whether to keep any new objects or conditions you have added, or to revert completely to the default list of objects and conditions that were set up for you.

Procedure

1. In the Customer Objects application, select the **Create Default Conditions** action. Objects that are related to the service provider are listed.
2. If you added customer objects or restrictions, confirm that you want to keep them in the message window.

Conditional expression syntax:

You enter conditional expressions with a syntax that is similar to Structured Query Language (SQL) with some additional variables.

To define a variable in a conditional expression that you are creating, use a colon (:). The colon is used to avoid ambiguity when you create expressions that relate the current record to a different, specific record.

You can have subselect in an expression,

`exists (select 1 from workorder where wonum=:wonum).`

The first *wonum* is the *wonum* attribute on the work order object. At run time, the second *wonum* is replaced with the value of the *wonum* attribute for the current record.

Replacement variables

Syntax	Description	Comments
`:yes`	true	Logically true, 1 if stored in the database
`:no`	false	Logically false, 0 if stored in the database
`:&date&`	Current date	
`:&datetime&`	Current date and time	
`:&user&`	Logged in user	For example, if a user is signed in as Smith, `:owner.id=&user&` converts to `:ownerid='SMITH'`
`:&personid&`	Person ID of logged in user	For example, if a user is logged in as Smith, `:reportby=&personid&` converts to `:reportby='SMITH'`
`:&appname&`	Application name	For example, in the Work Order Tracking application, `:&appname& = WOTRACK` converts to `WOTRACK = WOTRACK`. This variable is useful for setting different behavior for different copies of an application.

Syntax	Description	Comments
:&mboname&	Name of the current business object	For example, in the work order object, object = :&mboname& converts to object = WORKORDER
:&ownername&	Name of the owner business object	For example, in the Work Order Tracking application, :&ownername &.jobplan.priority> &ownername&.priority converts to workorder.jobplan.priority >workorder.priority

Bind variables

Syntax	Description	Examples
:<relationshipname> .<attrname>	Value of an attribute of a related business object of the current business object	:location.description
:&owner&.<attrname>	Value of an attribute of the owner business object	When you apply a job card to a work order, the system copies the priority of the job card to the child work order. The condition can be: :&owner&.jobplan.priority> :&owner&.priority. In this example, the system copies this information if the job card has a higher priority than the parent work order.
:&owner &.<relationship_name> .<attrname>	Value of an attribute of the related business object of the owner business object	See the example for :&owner&.<attrname>
:&old_<attrname>	The initial value from the database of the attribute	For example, you can change the value of a field from 1 to 2 and then from 2 to 3 and then from 3 to 4. The original value is 1.

Conditional expressions examples

- :wostatus='APPR'
- :type='EM'
- :ownerid=:&user&
- :supervisor!=:&personid&
- :asset.assettype = 'IT' and :&personid&=:owner
- :reportby=:&personid&
- :assetspec.classstructureid = 122
- :po.poline.receivedqty=0
- :&owner&.jobplan.priority>:&owner&.priority
- :owner&.po.$old_description like '%Turbin%'

Samples: Conditional class files:

Sample condition class files are stored in a folder under the root directory of the product installation. You can use the sample files when you create class-type conditions.

To use a sample condition class, enter the file name in the **Class** field in the Conditional Expression Manager application.

- Evaluates to true: `psdi.common.condition.AlwaysTrue`
- Evaluates to false:`psdi.common.condition.AlwaysFalse`

Specifying customer authorization conditions

You can add customer data objects and restriction conditions. The Security Groups application uses these objects and restrictions for customer authorization to determine the customer-level information that users can access.

About this task

You can add up to ten conditions for each object that you add; one for each combination of one of the two types of restrictions and one of the five levels of customer authorization in the Security Groups application.

Procedure

1. In the Customer Objects application, All Customer Objects table window **New Row** .
2. Specify the object that you want to add for customer authorization.
3. Add a restriction condition to the object.
   a. Open a new restriction condition.
   b. Specify the restriction option to indicate the level of customer authorization the condition applies to.
   c. Optional: Modify the assigned condition number.
   d. Enter an expression to specify the condition type.
   e. Enter the type of restriction.
4. Save the customer object.

Configuring access to the Bill Review application

If you want to allow customers to review billing information in the Bill Review application, you need to configure security access to the application.

Procedure

1. In the Security Groups application, create a security group for users who can access only the Bill Review application.
2. Optional: If you want the access rights of this group to not be combined with other security groups, select the **Independent of Other Groups** check box.
3. In the **Default Application** field, specify `PLUSPPBILL`.
4. On the **Sites** tab, specify the sites for users that can access the application. Either select the **Authorize Group for All Sites** check box or add sites to the Sites table.
5. On the **Applications** tab, select the row for the Bill Review application. In the **Grant Listed Applications** list, select the access level to grant.

6. In the Options sections, select the **Grant Access** check box for the signature options that you want to enable or select all options with the **Grant Listed Options for This Application** check box. You can specify conditions for each option.
7. Save the record.

What to do next

Add users to this group. You can add users in this application or you can associate this security group with users in the Users application.

Chapter 6. Planning for regulatory compliance

Maintenance activities on aircraft are highly-regulated and must comply with the standards set down by the maintenance steering group (MSG-3) for the airline industry. Maximo for Aviation MRO provides applications for defining operator maintenance programs and importing task cards from manufacturer maintenance planning documents. You can also design progressive inspection programs and create technical records to manage unusual or critical incidents.

MSG-3 compliance

Maintenance Steering Group-3 (MSG-3) is a standard for developing scheduled maintenance tasks and intervals that are acceptable to regulatory authorities, operators, and manufacturers. The MSG-3 standard outlines the general organization and decision processes for the efficient scheduling of maintenance for an aircraft or powerplant.

MSG-3 inspections

Scheduled maintenance includes inspections that are designed to detect damage or potential points of failure on an aircraft. MSG-3 compliance also involves the identification of parts that are important to the maintenance or structural integrity of the aircraft.

MSG-3 inspection types

The MSG-3 domain defines the MSG-3 inspection types. You can modify the inspection types to meet the requirements of your organization. You select the MSG-3 inspection type on task card records, master task card records, job cards, and work orders. The following MSG-3 inspection types are defined by default:

Lubrication-Servicing (LU-SV)
A group of maintenance tasks that involve lubricating or servicing a part. These tasks are designed to maintain the safety and reliability of the aircraft.

Operational-Visual Check (OP-VC)
A visual check to observe a part and determine whether the part is fulfilling its intended purpose.

Inspection-Functional Check
A quantitative check to determine whether a part is performing within specified limits.

General visual inspection (GVI)
A visual examination of an interior area, exterior area, installation, or assembly to detect obvious damage, failure, or irregularity. A general visual inspection typically is made under the normally available lighting conditions. The inspection might require the use of stands, ladders, or platforms to reach the area that is under inspection.

Detailed inspection (DET)
An intensive examination of a specific part, installation, or assembly to detect damage, failure, or irregularity. The inspection typically involves more lighting sources. Surface cleaning or elaborate access procedures might also be required.

Special detailed inspection (SDI)
An intensive examination that involves the extensive use of specialized inspection techniques or equipment. Intricate cleaning, substantial access, or disassembly procedures might also be required.

Restoration
The work that is required to return a part to a serviceable standard. For example, an engine part might require a thorough cleaning.

Discard
The removal of a part after it reaches a specified limit. For example, an engine part might be discarded after 1000 flight hours.

MSG-3 inspection details

Some MSG-3 fields are specific to a position on a model. The following position-specific fields can be applied in the Models application, New Asset Assemblies application, New Asset Assemblies - Receiving application, Master Task Cards application, Task Cards application, Job Cards application, Work Order Tracking application, and the Assets application:

Maintenance significant item (MSI)
A part whose failure might have serious consequences for the safety and operation of the aircraft.

Structurally significant item (SSI)
A detail, element, or assembly that contributes significantly to carrying flight, ground, pressure, or control loads. The failure of a structurally significant part might affect the structural integrity that is necessary for the safety of the aircraft.

The following MSG-3 information is specified on task card records, master task card records, job cards, and work orders to indicate details that are important for the performance of maintenance activities on the aircraft:

Access defined inspections
Indicates whether significant removal or displacement procedures are necessary to complete the maintenance task. Knowing whether access is required to complete a maintenance task allows for more efficient scheduling of maintenance. For example, a scheduled maintenance task requires the removal of an engine. You can schedule the task to coincide with regularly scheduled quarterly maintenance in which the engine is removed as part of the procedure.

Corrosion prevention and control programs (CPCP)
A routine collection of maintenance tasks that maintain the resistance of an aircraft to corrosion caused by age and chemical or environmental interaction.

Maintenance effects
Indicates the primary aim of the maintenance: safety, operational, or environmental. The list of values is stored in the Maintenance Effects Type domain and can be modified to meet the requirements of your organization.

Zonal inspections
An inspection method that is used to inspect structurally significant items (SSI). You can create and maintain zonal inspection programs in the Zones application.

Scenario: Managing the maintenance of an engine in accordance with the MSG-3 standard

ABC Airline takes delivery of a new aircraft whose engine is scheduled for maintenance in accordance with the MSG-3 standard. The process of MSG-3 compliance includes defining model data, confirming details for the new asset assembly, and creating master task card records for the maintenance tasks.

Background

ABC Airline plans to maintain the engine of a new aircraft in accordance with the MSG-3 standard. Carlos, the planning engineer, is responsible for defining the maintenance requirements and creating the associated records for master task cards and jobcards.

Step 1: Define the MSG-3 compliance in the model data

In the Models application, Carlos creates a new record for the engine and selects the **MSG-3** check box. On the **Build Hierarchy and Position Rules** tab, Carlos defines the build items and selects the items that are structurally significant or significant for maintenance. Carlos uses the Zones application to indicate which zones are associated with the inspection.

Step 2: Create master task card records to define the maintenance tasks that are associated with MSG-3 compliance

In the Master Task Card application, Carlos creates master task card records to define the routine maintenance that is required for the engine to operate efficiently. The master task card record is associated with the CM part master record for the engine. One of the master task card records that Carlos creates is for a detailed inspection of the engine to check for signs of corrosion. After he specifies the general information for the master task card record, Carlos selects the **MSG-3** check box to see the fields that are related to MSG-3 compliance.

Carlos indicates that this position in the model is significant maintenance that it is related to a corrosion prevention and control program. Because the inspection requires the removal and disassembly of the engine, Carlos selects the **Access** check box. Carlos uses the Zones application to select the applicable engine zones. Carlos indicates that the inspection is a special detailed inspection and that the inspection has an operational effect.

Carlos adds a job card to the master task card records so that the job card is automatically copied to all the associated task card records. The task card records are created by the Build Data Interpreter (BDI) when the assets are created. Alternatively, Carlos can choose to create the associated task card records by clicking the **Create Associated Task Cards** action.

Step 3: Confirm the MSG-3 details in the new asset assembly data

In the New Asset Assemblies application, Carlos creates an asset assembly record for the engine. When he specifies the model, the MSG-3 compliance fields are automatically completed with the data that he defined for the new engine. Carlos confirms that the details are correct, and then he clicks the **Create Asset** action to create the asset record for the new engine.

Results

The task card records that Carlos created are available for the maintenance supervisor to assign. When the work is due, the work orders are automatically created by the BDI. The maintenance supervisor then assigns the work orders to qualified maintenance crew members for completion.

Planning maintenance programs for aircraft operators

Aviation authorities control the safety and airworthiness of the aircraft that are in their jurisdiction by reviewing and approving operator maintenance programs (OMPs). Aircraft operators use information from maintenance planning documents (MPDs) that aircraft manufacturers provide and other technical documents to define the OMPs that they submit for approval to aviation authorities.

Maintenance planning documents

Maintenance planning documents (MPDs) are provided by aircraft manufacturers to describe the repetitive tasks that are required to maintain their aircraft. Maintenance planning engineers use the MPD information to develop operator maintenance programs (OMPs) that are then submitted to the relevant aviation authority for approval.

Aircraft maintenance includes the tasks that are required to restore or maintain the systems, components, and structures of an aircraft in a safe and airworthy condition. Maintenance is required for regulatory compliance and also to minimize the time that an aircraft is grounded and to maximize the current and future value of the aircraft.

An MPD file from an aircraft manufacturer can contain thousands of line items, one for each recommended maintenance task. In the Maintenance Task Library (MTL) application, you can create an MTL record and then import an MPD file to populate the tasks for the record. When you import an MPD file into an MTL record, each task either adds a task card or updates an existing task card.

The elements of a task are validated during the import. If a task is invalid, an error is reported in the application, and the import process continues. The error report can help you to identify the cause of problems so that you can resolve them.

A task can be invalid, for example, because the skill that is required to perform the task is not defined in your organization. To correct the problem, define a new skill in the Crafts application. You must resolve all errors to successfully complete the import.

After the import is complete, in the MTL application, you can add or delete task cards. You can also modify the attributes of a task card, and the associated zones, access panels, qualifications, related documents, and frequency intervals. When you complete any manual changes to the task cards in the MTL record, change the status of the MTL revision to **Valid**.

You can add any valid MTL records to an OMP and then modify it to satisfy the maintenance policy that is associated with the fleet type and aircraft. You can also align tasks with models, build items, and configuration-managed parts.

After you set the status of an MTL revision to valid, it becomes read-only, but you can create more revisions and manage multiple revisions simultaneously. When

you receive an updated MPD file from the aircraft manufacturer, you can import it into a new revision of the MTL record. You then follow the same procedure to import the tasks into the new revision.

Operator maintenance programs

Aircraft operators define operator maintenance programs (OMPs) and associated maintenance checks for each type of aircraft type in their fleet. When the maintenance program is approved by the aviation authority, the OMP is activated and becomes the controlling document for maintenance of that aircraft.

In the Maintenance Task Library (MTL) application, MRO operators can import copies of OMPs that control the maintenance of aircraft that they are servicing forcustomers. The imported OMPs can be viewed and managed in the OMP application.

Aircraft operators can define and revise OMPs in the OMP application before submission to aviation authorities for approval.

An OMP record is associated with at least one model and is effective, by default, for all assets that are associated with the specified model or models. Maintenance changes to the effective assets are validated against the models to ensure continuing compliance. When an OMP is in draft status, you can remove selected assets from the effectivity list.

An OMP typically contains many hundreds of OMP tasks that have associated master task cards that group tasks. The list of OMP tasks can be compiled from one or more of the following sources:

- Maintenance Task Library (MTL) records that contain task information from maintenance planning documents (MPDs) or other sources
- Master task card records that are maintained in the Master Task Cards application

In OMPs, maintenance checks group related tasks that occur at the same intervals. In Maximo for Aviation MRO, a check is a type of master task card that you configure in the OMP application. On the **Checks** tab, when you add a check, you add OMP tasks to the check content. Because the check is a master task card, when the OMP tasks are due, work orders are generated and warnings are issued when work is about to become due.

The checks in an OMP are typically organized in a hierarchy, where A checks are the lowest, then B and C, and D checks are highest. Lower checks are, typically, frequent light checks that can be carried out at a line maintenance location. Higher checks are often heavy maintenance tasks that occur less often and require the aircraft to be in a hangar for a number of weeks.

To configure the hierarchy of checks for an OMP, on the **Checks** tab, you configure higher and lower relationships with other checks on the OMP record. For example, if you relate checks A and B, because A is the lower check, when check A runs, check B does not run. When check B runs, check A also runs.

Example check configuration

The following table shows example checks.

Table 1. Example checks

Check ID	Frequency in flight hours	Number of master task cards
A1	600	70
A2	1200	28
A3	1800	21
A4	2400	18

The following table shows when work packages are generated for the example checks:

Table 2. Work package generation for example checks

Interval flight hours	Cumulative flight hours	Work package ID	Check content	Number of master task cards
600	600	Z1	A1	70
600	1200	Z2	A1, A2	98
600	1800	Z3	A1, A3	91
600	2400	Z4	A1, A2, A4	116
600	3000	Z5	A1, A3	91
600	3600	Z6	A1, A2, A3	119
600	4200	Z7 (sequence repeates to Z12 and then starts again)	A1	70

Internal validation ensures that lower checks run only once at an interval when multiple higher checks run.

Maintenance task library

Maintenance task library records contain lists of task card records that are imported from maintenance planning documents (MPDs), operator maintenance programs (OMPs), or other technical documents. MTL records can be used to configure the tasks for OMP records.

MPDs can contain thousands of tasks that are imported as task card records. OMPs can contain hundreds of tasks that are imported as master task card records. During the import, tasks are checked to ensure that all required information is provided in the correct format. Any errors are reported, and you must resolve them to complete the import.

When you create an MTL record, a revision value of 0 is set. When you import tasks from a file, the tasks are associated with this revision. If you receive an updated version of a file, you revise the MTL record to import the new version of the file. The tasks that you import are associated with revision 1. MTL revisions enable you to simultaneously manage multiple revisions of an MPD or OMP.

Creating an operator maintenance program

An operator maintenance program (OMP) record specifies the models and the related assets that the OMP applies to. OMP tasks represent master task cards that group related tasks. Checks organize groups of OMP tasks that occur at the same interval into a hierarchy of related checks.

Procedure

1. In the Operator Maintenance Program application, create an OMP record.
2. In the **OMP** tab, in the Details section, specify values in the **Operator** and **Authority** fields.
3. In the **Models** tab, add one or more models that the OMP applies to.
4. In the **Effectivity** tab, review the assets that are associated to the models that you added, and modify the list if necessary.
5. To add a master task card, in the **OMP** tab, in the Master Task Cards section, click **New**, and specify a master task card.
6. Optional: Create a master task card that contains tasks that are imported from a maintenance planning document (MPD).
   a. Select the **Create Master Task Cards from MTL** action.
   b. In the **MTL** field, specify an MTL record.
   c. Select the task cards that you want to include the OMP task, and click **OK**.
7. In the **Checks** tab, click **New**, and specify a check.
8. To add master task cards to a selected check, in the **Check Contents** subtab, click one of the following buttons:

Option	Description
New	Select one or more OMP tasks from a list to add the associated master task cards.
Select Master Task Card	Use a combination of search terms to filter master task records and select one or more records to add them to the check content.

9. Optional: In the **Related Checks** subtab, add higher and lower checks in the appropriate subtabs. You cannot add the same check to both tabs. A related check can be higher or lower, but not both.

Importing task cards into the maintenance task library

MTL records contain lists of task cards or master task cards that apply to models and associated assets. You import task information from maintenance planning documents (MPDs), from copies of operator maintenance programs (OMPs), or from other technical documents.

About this task

You can import multiple revisions of MPD, OMP, or other technical files into an MTL record. For each file revision that you import, you create a corresponding revision of the MTL record so that you can simultaneously maintain multiple revisions of a single MTL record.

The import of a file is not complete until all lines have been processed, errors are corrected, and the status of the MTL record changes to complete.

Procedure

1. In the Maintenance Task Library application, create a record or create a revision of a selected record.
2. Select the **Import File** action.
3. Click **New File** and browse to the location of the file that you want to import.
4. Click **Process File** to start the import.
5. Optional: During processing, click **Refresh** to see how many lines remain to be processed.
6. Correct any errors and reprocess the file until all errors are resolved.

Validation of MPD data that is imported into an MTL record

When you import MPD data from a file that is provided by a manufacturer into Maximo for Aviation MRO, the data is validated to ensure that it conforms to your configurations. Validation errors are reported so that you can correct any problems.

When you process the data from an imported file, each line item that is imported represents a task card in the MTL record, and is processed in the following manner:

- If a corresponding task card record does not exist, a new task card is created.
- If a corresponding task card record exists, it is updated.
- If a task card record exists that does not have a corresponding line in the import file, the task card remains unchanged.

The following fields in the task card must contain valid values:

- Rev Code
- ATA
- Access
- Zone
- Skill Code
- JC Type
- Phase
- Station

The following fields in the task card must contain numeric values:

- Access Man Hours
- Preparation Man Hours
- Task Man Hours
- Men

The following fields in the task card must contain Yes or No as a value:

- Deferral
- Out of Phase

Managing regulatory requirements with progressive inspection programs

A progressive inspection program (PIP), which is also known as fixed-frequency maintenance, involves creating a maintenance program that is based on a fixed schedule. The schedule can be based on regulatory requirements.

Defining progressive inspection programs

A progressive inspection program (PIP) is defined by the creation of a group of master task card records that are linked together and are based on a fixed frequency, such as an interval of 50 flight hours. The PIP is a cycle that repeats after the last master task card record is completed.

About this task

A PIP is typically used to divide a large inspection into several smaller pieces of work. For example, an annual inspection might require you to ground an aircraft for two weeks to complete all of the work. Instead of performing the annual inspection once a year, you can divide the inspection into six phases, each of which is due after 300 hours.

When a master task card record is created in a PIP group, any associated task card records automatically inherit the settings for the PIP. If your maintenance program applies only to a single asset, you can define your PIP in task card records instead of in master task card records. The process of defining a PIP in task card records is the same as defining a PIP in master task card records.

You can define a PIP for meter-based frequencies and configuration-managed assets only.

Procedure

1. In the Master Task Cards application, create a master task card record.
2. Specify the fields that are required for the master task card record.
3. In the PIP Information section, select the **Fixed Frequency** check box.
4. Specify a name for the PIP group.
5. Specify the sequence number.
6. Click the **Frequency** tab, and on the **Meter Based Frequency** tab, specify the frequency, alert, and warning details. The frequency units value for each task card in the PIP sequence must be the same. For example, you can specify a frequency of 50 flight hours, an alert at 48 flight hours, and a warning at 45 flight hours.
7. Optional: On the **Sequence** tab, specify the job plan that is used for completing the tasks for this phase of the PIP. Assigning a job card to each master task card in a PIP ensures that the work is divided throughout the inspection program.
8. Create as many master task card records as your PIP requires. For example, if your PIP consists of six phases, you create five duplicate master task card records.
   a. Select the **Duplicate Master Task Card** action. The PIP information is copied, and the PIP sequence number is automatically updated with the next number in the sequence. The frequency information on the **Meter Based Frequency** tab is the copied.
   b. Optional: On the **Sequence** tab, change the job card.
9. Link each master task card record in the PIP group to the next master task card record in the sequence.
   a. Open a master task card in the PIP group.
   b. In the master task card Actions section, add a deactivate action. Set the secondary master task card record to the identification number of the

current master task card. When the associated work order is completed, the master task card record is deactivated. This deactivation completes this phase of the PIP.

c. In the master task card Actions section, add an activate action. Set the secondary master task card record to the identification number of the next master task card record in the PIP sequence. When the associated work order is completed and the original master task card record is deactivated, the next master task card record in the PIP group is activated. This activation moves the PIP to the next phase of inspection.

10. Save the record.

Progressive inspection programs

In a progressive inspection program (PIP), aircraft maintenance is divided into phases and occurs at fixed intervals. For example, an aircraft requires a maintenance inspection is completed every 300 hours. Instead of completing the entire inspection at 300 hours, the tasks are divided into six inspections that are completed consecutively at intervals of 50 flight hours.

You create a master task card for each phase of your PIP. The master task card records are collectively known as your PIP group and share a PIP group name. The PIP sequence number identifies the order in which the master task card records are completed. For each master task card record, you specify the frequency at which the inspection occurs, such as every 50 flight hours. After you create a master task card record, you can specify a job card to define the tasks that are created during the phase of the PIP.

After you create all the master task card records for your PIP, you link the records together with activation and deactivation actions. These actions ensure that only one master task card record is active at a time. After the work orders that are associated with a master task card record are completed, fixed frequency count for the master task card is increased by one, and the next master task card record in the sequence is activated. This process continues until the last master task card record, and the PIP starts over with the first master task card record.

Defining the PIP in master task card records is an efficient method of developing the maintenance program. However, if your maintenance program applies only to a single asset, you can define your PIP in task card records instead. The process of defining a PIP in task card records is the same as defining a PIP in master task card records.

When you create a PIP for a new aircraft or a new inspection process, you are able to start the PIP with the first master task card record in the PIP group. However, you might add a PIP that is already in progress. For example, you divide a maintenance inspection into a PIP that consists of six inspections that are completed every 50 hours. The first two phases of the inspection are already completed before you add the aircraft and the PIP to Maximo for Aviation MRO . You must define the entire PIP and then set the fixed frequency counters for the first twomaster task card records to 1 to indicate that those phases of the PIP are already complete.

Resetting initial PIP due counts

The initial PIP due count is used to determine when the first maintenance event is due. Subsequent maintenance events for the same task card record are then offset by the initial PIP due count. You might need to reset the initial PIP due count at any point during the aircraft lifecycle.

About this task

Only one task card record can be active in a PIP at any time.

Procedure

1. In the **List** tab of the Assets application, select the asset whose initial PIP due count you want to change.
2. Click the **Maintenance Plan** tab and select the **Set Initial PIP Due Count** icon, which is located next to the PIP group in the table row.
3. Specify the new initial PIP due count.
4. Save the record.

Results

The initial PIP due count is changed, which changes the task card record that is next due. For example, if you set the initial PIP due count to 2, the next task card record that is due is the 3rd record in the sequence.

Resetting fixed frequency counters

When a task card record in a PIP cycle is reset because the associated work order is complete, the next due point is always the point that is specified by the PIP sequence. However, you might need to reset the PIP sequence by using the **Set Fixed Frequency Counter** action in the associated PM record.

Before you begin

By default, the **Set Fixed Frequency Counter** action is not available. You must enable the action in the Security Groups application.

About this task

Only one task card record can be active in a PIP at any time.

Procedure

1. In the **List** tab of the Assets application, select the asset whose PIP you want to change.
2. In the **Maintenance Plan** tab, open the associated task card record.
3. Select the **Set Fixed Frequency Counter** action and specify the new fixed frequency count. For example, you define a PIP that is already in its third phase. You must increase the fixed frequency counters for the first two task card records by 1 to indicate that the records were completed.
4. Save the record.

Results

On the task card record, the **Fixed Frequency Count** field indicates the number of times that the work orders associated with the master task card are completed.

Creating technical records

Technical records generate critical time-dependent maintenance or design change tasks that typically apply to an entire fleet. Technical records can affect asset configurations, maintenance plans, and other reference data for a specific set of assets in one or more equipment models.

Technical records

Technical records contain information, such as airworthiness directives or customer service notices, from vendors, manufacturers, and regulatory agencies. Technical records can trigger maintenance events and affect work planning forecasts.

The Technical Records application stores technical records from manufacturers, vendors, regulatory agencies, and others. Technical records can have complex criteria to define which assets they affect. The Technical Records application tracks the following information:

- Identifying details
- Effected assets
- Maintenance plans, which include preventive maintenance (PM) records and job cards for implementing work requirements
- Status or method of compliance of each affected asset
- Related technical records

When you create a technical record, you can specify whether an upgrade is applied to multiple assets. Typically, software items are updated in this manner. You can upgrade all the software within the top-level asset at the same time, including the child assets that are in build positions that are defined on the technical record.

When you specify a maintenance plan for a technical record, you can define a range of frequency iterations so that regulatory compliance is maintained. A frequency iteration defines how many times inspections are completed to comply with the requirements of the technical record.

On the **Maintenance Plan** tab, you can define and view frequency iterations by clicking **Frequency Iterations**. When you create a frequency iteration, you can specify whether the PM records is deactivated when the last frequency iteration is completed. You can change whether the PM records is deactivated only during the last frequency iteration. If you add iterations during the last iteration, the check box for deactivated the PM records after the last frequency iteration is set to read-only.

A frequency iteration can be time-based or meter-based. You have flexibility in defining a frequency iteration, and iterations can occur at different intervals. For example, you can define a frequency iteration that consists of three meter-based iterations: the first inspection occurs every 10,000 miles for two iterations. The second inspection occurs at 25,000 miles for three iterations, and the third inspection occurs at every 50,000 miles. You can also define alert and warning intervals for each frequency iteration.

- The first and second inspections occurs after 10,000 miles each
- The third inspections occur after 25,000 miles

Technical records include the following types of records from manufacturers, vendors, and regulatory agencies:

- Airworthiness directives
- Configuration rule-change documentation
- Customer service notices
- Engineering and design publications
- Fleet-level and component-level projects

Technical records are managed at the part set level because technical records are associated with models and configuration-managed parts. When you create a technical record, you can specify an organization and a site to further limit the applicability of the technical record. For example, you can opt not to specify the site and organization so that the technical record applies to the entire part set. But if the technical record applies only to the assets that are stored at a single site, you can specify that site so that the technical record has limited applicability.

You can add a terminating action to a technical record. A terminating action defines a condition that is required in order for a recurring inspection to be terminated, for example, a certain level of physical wear is recorded. Terminating actions are useful because not every requirement in a technical record can be reduced to a series of programmable statements. Terminating records ensure compliance with the requirements of the technical record.

You can track design changes and requirements by relating technical records. A related technical record can provide information, define a relationship that requires action when maintenance events occur, or define a relationship to a modification record. Relating a technical record to a modification record creates a complete record of the engineering design standard.

Enterprises typically must maintain and report the status of their technical records to external regulatory agencies.

Examples of using technical records

The records department of your enterprise receives a new bulletin, directive, notice, or other type of publication. This publication might come from a manufacturer, vendor, regulatory body, or another authorized department in the enterprise. You create a technical record to document the new information and attach any supporting electronic documentation. You establish criteria to identify the assets that are affected by the technical record. Criteria can include position, part number, serial number range, models, or configurations of models. You can create initial PM records, task cards, and possibly follow-up PM records that establish work requirements. You can also enter task card actions to define the interaction among PM records. Other technical records might deactivate the task cards.

If your records department receives a new bulletin, directive, notice, or other publication that supersedes an existing technical record. You define the superseding technical record. Then, you open the superseded technical record and change it to point to the superseding technical record. The status of the superseded technical record is changed from Active to Superseded.

Your enterprise receives a new asset and decides that it is a configuration-managed asset. You create an asset record for it and designate it as configuration-managed. The build data interpreter identifies the technical records that the new asset must

comply with task cards and any work orders that are necessary to initiate the compliance process are generated for any technical records that the new asset must comply with.

A regulatory body or an internal audit department notifies your enterprise that it plans to investigate the incorporation status of one or more technical records. You create a report to identify the compliance of assets that are associated with the applicable technical records.

Technical record statuses

A technical record can have a status of Draft, Active, Inactive, or Superseded.

Table 3. Technical record statuses

Status	Description	Updates	Deletion	Status changes
Draft	The technical record is incomplete.	Can only update fields in the Details section.	Allowed	Can change to Active
Active	The technical record is complete. Associated task cards, schedules, and work orders are generated and tracked.	Can only update fields in the Superseded By section of the **Technical Record** tab.	Not allowed	Can change to Inactive
Inactive	The technical record is not complete and is not tracked.	Cannot be updated.	Allowed	Can change to Active.
Superseded	Another technical record replaced the original record. The original technical record is obsolete.	Can only update the **Superseding Publication** and **Recision Date** fields on the **Technical Record** tab.	Allowed	Cannot change a status to Superseded manually. The status is changed to Superseded automatically when you supersede a record on the **Technical Record** tab.

Creating technical records

A technical record identifies and tracks the technical specifications, affected assets, work requirements, and related preventive maintenance (PMs).

Procedure

1. In the Technical Records application, click the **New Technical Record** icon.
2. If the **Publication** field is empty, enter a value.
3. Enter a description in the **Title** field.
4. If the CM for multiple assets within a complex asset structure are to be updated when work is completed, select the **Apply multiple upgrades** check box.

5. Optional: To limit the applicability of the technical record, specify an organization or site.
6. Specify values for the **Type** field and the **Required By** field.
7. Enter the date when the technical record takes effect.
8. In the **Revision**, **Chapter**, **Paragraph**, and **Part** fields, enter values that correspond to the original document. The combination of these values must be unique to this technical record.
9. Optional: In the **Narrative** field, enter the details for the technical record. For example, you can add the following details to the field:
   - Objectives of the technical record
   - Requirements
   - Asset selection criteria
   - Effective date
   - Conditions when corrective action is necessary
   - Details of the work that is necessary
   - Termination conditions
10. Save the technical record.

Adding affected models and serial numbers

Because technical records can require corrective action, you can identify models and serial numbers affected by a technical record, if the status of the technical record is Draft. The build data interpreter (BDI) uses the model and serial number criteria to identify affected assets.

Procedure

1. In the Technical Records application, select the technical record for which you want to identify affected models.
2. On the **Models** tab, click **Auto Create**.
3. Optional: To change the serial range in an existing row, update the **Serial Range Expression** field.
4. Optional: To add another model or serial range expression, duplicate the row.
5. Optional: Delete any unnecessary rows.
6. Save the technical record.

Adding affected build items

Because technical records can require corrective action, you can add build items that are affected by a technical record. The build data interpreter (BDI) uses the build item criteria to identify affected assets that are associated with the build item. If the status of the technical record is Draft, you can add the build item criteria.

Procedure

1. In the Technical Records application, select the technical record for which you want to identify affected build items.
2. On the **Build Items** tab, add a new row and enter a position name.
3. Optional: In the **Operative Date** field, enter the date when tracking of the build item begins.
4. Optional: In the **Mandatory Date** field, enter the date when tracking of the build item must begin. You can extend the mandatory date by entering the number of days deferred in the **Auto Deferral** field.

5. Optional: In the **Inoperative Date** field, enter the date when the build position becomes inoperative.
6. Save the technical record.

Adding affected build positions

Because technical records can require corrective action, you can identify the build positions that are affected by a technical record. Build positions identify a model, configuration, build position, and CM part. The build data interpreter (BDI) uses the build position criteria to identify affected assets.

Before you begin

The **Build Positions** tab displays build positions associated with the criteria that you identified on the **CM Parts** tab or **Build Items** tab. Before you identify build positions, save updates to the **CM Parts** or **Build Items** tab.

Procedure

1. In the Technical Records application, select the technical record for which you want to identify affected build positions.
2. On the **Build Positions** tab, add new rows or click **Auto Create** to automatically create rows based on the data on the **CM Parts** tab or **Build Items** tab.
3. Optional: Update the values in the existing rows.
4. Optional: Add model or serial range expression.
5. Optional: Delete any unnecessary rows.
6. Save the technical record.

Adding affected CM parts

Because technical records can require corrective action, you can add configuration-managed (CM) parts that are affected by a technical record if the status of the technical record is Draft. For example, you can add a CM part that must be removed from production assets because of the technical record. The build data interpreter (BDI) uses the CM part criteria to identify affected assets that are associated with the CM parts.

Procedure

1. In the Technical Records application, select the technical record for which you want to identify affected CM parts.
2. On the tab, add a new row and enter the CM part.
3. Optional: In the **Serial Range Expression** field, enter one or more serial numbers or ranges of serial numbers.
4. Optional: In the **Inoperative Date** field, enter the date that the CM part becomes inactive.
5. Optional: To supersede the CM part, specify the superseding CM part number.
6. Optional: In the **Operative Date** field, enter the date when the superseding CM part becomes effective.
7. If you plan to rework a superseded CM part to create the superseding CM part and you want to update affected assets to point to the superseding part, select the **Upgrade** check box.
8. Save the technical record.

Creating associated task card records

A task card can be associated with an active technical record. A cron task constantly checks for readiness to create task card records. You can also generate task cards immediately to schedule the work that a technical record requires.

Procedure

1. In the Technical Records application, select the technical record for which you want to create associated PMs.
2. Select the to view the affected assets for which you have not created an associated task card.
3. Select the assets for which you want to create associated task cards.
4. Click **OK** to generate associated task cards for the selected assets.

Superseding technical records

You supersede a technical record when a newer technical record renders it obsolete. After you define the new technical record, you update the original record with information about the new record. The status of both technical records must be Active.

Procedure

1. In the Technical Records application, create a technical record for the superseding publication.
2. Change the status of the technical record to Active.
3. On the **Technical Record** tab, select the older technical record.
4. In the Superseded By table, enter the recision date.
5. In the **Publication** field, specify the identifier of the superseding technical record that you created.
6. Save the technical record. The status of the original technical record is changed to Superseded. A relationship of type SUPER is created between the superseded and superseding technical records. Any associated PMs without work orders are removed.

Removing references to superseding technical records

When you want to reactivate a superseded technical record, you remove the reference to the superseding technical record. Removing the reference does not delete the superseding technical record.

Procedure

1. In the Technical Records application, select the superseded technical record.
2. In the Superseded By table, clear the **Publication** field.
3. Save the technical record. The record is saved with a status of Active.

Specifying maintenance plan requirements

Maintenance plans are used to correct issues identified by the technical records. Maintenance plans can be date-based, meter-based, or maintenance-event-based. A maintenance plan can generate multiple task card records or can indicate limitation on assets based on usage criteria. For example, an asset with fewer than 500 hours can require maintenance within 200 hours.

Procedure

1. In the Technical Records application, display the technical record for which you want to enter maintenance requirements.

2. On the Maintenance Plan tab, add a new row.
3. To enter date-based criteria, enter dates for when the work requirements are tracked and when the work requirements must be completed.
4. To enter meter-based criteria, enter a meter name and do one or more of the following:
   - To specify that maintenance is required within a specific number of flight hours, engine cycles, or engine starts, enter the number in the **Count** field.
   - To specify that maintenance is required by the time that the selected meter reading reaches a specific reading, enter the value in the **Count** field and select the **Due at Count** check box.
   - To specify that maintenance is required only on assets with a meter reading greater than a specific value, enter the value+1 in the **From Count** field. .
   - To specify that maintenance is required when the meter reading falls between two values, enter the values in the **From Count** field and the **To Count** field.
5. To enter maintenance-event-based criteria, do one or more of the following:
   - To perform the required maintenance for a scheduled task card, enter the task card number in the field.
   - To perform an inspection within a specific number of days and then a certain number of days after that, create two records. In the first record, select the **Initial** check box. In the second record, select the **Recurring** check box.
6. To enter asset limitations, enter a value in the **Limit Meter** field.
   - In the **From Count** field, enter the minimum meter reading to which the date-based, meter-based, or maintenance-event-based criteria apply.
   - In the **To Count** field, enter the maximum meter reading to which the date-based, meter-based, or maintenance-event-based criteria apply.
7. Save the technical record.

Specifying methods of compliance

Many highly regulated industries require the tracking and compliance of technical records. You can specify the method of compliance (MOC) for an asset that does not require maintenance.

Procedure

1. In the Technical Records application, display the technical record that you want to update.
2. On the **Asset Status** tab, select the asset for which you want to add the MOC.
3. In the **MOC** field, enter the method of compliance.
4. Save the technical record.

Chapter 7. Maintenance planning and management

Planning the maintenance of an aircraft involves monitoring asset conditions to determine when work is due in the short, medium, and long term. Decisions in maintenance planning are based on the availability of tools, labor, and repair locations. Efficiencies are achieved by scheduling work to make maximum use of resources when maintenance is required.

Planning maintenance locations

Planning and scheduling maintenance activities for aircraft can be complex, because often the aircraft asset that requires maintenance is not in the correct location at the correct time. Maintenance location planning involves managing and scheduling assignments, crews, and materials at MRO locations.

MRO locations overview

An MRO location represents the physical location of a facility where the maintenance, repair, and overhaul of complex assets occur. The MRO Locations application is used to schedule work packages efficiently and to define the physical location, classification, and capabilities of the site where the MRO activities occur.

The MRO Locations application is used by maintenance managers, planners, and schedulers to define MRO locations, such as bays, within an MRO location. Maintenance activities are allocated to the most suitable MRO location to maximize productivity.

An organization can have multiple MRO locations within a facility. You must create and specify an MRO location before you can schedule maintenance activities for that location. You can associate classifications, such as floor type or dimensions, with the MRO location.

A capability is a specialized task, such as EASA-certified repair, that an MRO location can perform. Capabilities can be added to an existing MRO location by using the MRO Location Capabilities table on the main tab. The capabilities of an MRO location might include, for example, approved certification procedures from the FAA and EASA.

You can define the physical relationships, such as being adjacent, between MRO locations to allocate different aircraft types to a combination of MRO locations. For example, you can combine MRO locations to accommodate a large aircraft.

A work package is a set of work that has a scheduled start and finish date. A work package can be related to only one MRO location. You assign work packages to an MRO location, which includes a scheduled start and finish date for the maintenance.

Managing MRO locations

An MRO location is a facility where assets are brought for maintenance. You can assign work to resources that are associated with the MRO location, or to the MRO location itself.

An MRO location can take many forms, including automotive bays, aircraft hangars, and workshops. Planning for these locations is done for short time periods when work emerges or becomes due simultaneously. For example, you might schedule work for an MRO location for two weeks in advance.

Planning capacity in MRO locations

In the MRO Locations Capacity Planning application, you can assign work directly to your MRO facilities based on their availability. For example, you can assign work directly to an aircraft hangar.

In the Assignment view, you review a list of all the MRO facilities within an MRO location. You can review when they are available for work and plan accordingly.

On the **Work List** tab, you can create a list of scheduled work orders and the available labor and crews for your MRO location.

The Gantt view consists of two tabs. On the **Assignment View** tab, you can review unassigned work and the MRO facilities available to do the work. You can review current assignments in your MRO locations and balance the workload. On the **Work View** tab, you can review work details, such as assets and priority. You can also modify work details, such as status, work priority, and target start and end dates.

All assignment information can be saved to the associated work records.

Creating work lists:

You can create a list of upcoming work that needs to be assigned, and assign it to MRO facilities based on their availability. Work lists can be updated or deleted only by the user who created them.

Procedure

1. In the MRO Locations Capacity Planning application, on the **Work List** tab, create a new work list.
2. Enter a name for the work list and specify calendar and shift information for when the work is to be performed.
3. Specify an MRO location.
4. Create a query based on the work records that you want to include in your work list. Resources that are required to complete the work are included in the Assignment view. MRO facilities that match your MRO location are listed.

Assigning work:

You use the Assignment view to assign upcoming work to MRO locations based on their availability.

About this task

The Assignment view displays the availability of your MRO facilities. Unavailable time appears in the Gantt view as a shaded area on the resource table.

Procedure

1. On the **Assignment View** tab, select the work record that you want to assign. An orange bar represents unassigned work. You can assign work by using one of the following methods:

- Drag the work record to the resource that you want to assign it to in the resource chart.
- Right-click on the bar representing the work that you want to assign. Select **Available Location**. In the **Available Location** window, select the labor or crew resource that you want to assign the work to. Click **OK**.

When work is properly assigned, the bar that represents the assigned work is green. If you selected a resource that does not match the work requirements, the bar is red. If an appointment is required (in the work record application), an icon indicates that an appointment has not been made. Right-click on the assignment and choose **Lock** to set the appointment. Appointments that are locked cannot be rescheduled due to optimization or manual edits. To change the scheduled time manually, right-click on it and choose **Unlock**.

2. Save the work list.

Related reference:

Record movement in the Gantt view
You can move records individually or in groups in the Gantt view. You can modify start dates, finish dates, and durations by dragging the task bars with your mouse.

Navigating the Gantt view
The MRO Locations Graphical Assignment and Capacity Planning applications display work and resources in a Gantt chart, allowing you to create assignments graphically.

Managing assignments in MRO locations

You assign work to labor and crews at your MRO location based on their skills and availability. In the MRO Locations Graphical Assignment application, you view upcoming work and assign the work graphically to the appropriate labor or crew resource.

On the **Work List** tab, you can create a list of scheduled work orders and the available labor and crews for your MRO location.

The Gantt view consists of two tabs. On the **Assignment View** tab, you can review unassigned work and the resources that are available to do the work. You see the daily availability of your crews and technicians, including shifts and breaks, and exceptions such as sick leave and vacation time. You can access resource details, such as skill, rate, and certifications. You can also see current assignments and balance the workload. You can reassign work, or split work between resources or across shifts. In the **Work View** tab, you can see work details, such as assets and priority. You can also modify work details, such as status, work priority, and target start and end dates.

All assignment information can be saved to the associated work records.

Creating work lists:

You can create a list of upcoming work that needs to be assigned, and assign it to labor and crews based on their skills and availability. Work lists can be updated or deleted only by the user who created them.

Procedure

1. In the MRO Locations Graphical Assignments application, in the **Work List** tab, create a new work list.

2. Enter a name for the work list and specify calendar and shift information for when the work is to be performed.
3. Specify an MRO location.
4. Create a query based on the work records that you want to include in your work list. Resources that are required to complete the work are included in the Assignment view. The labor and crew resources that meet the criteria you specified populate the Assignment view.

Assigning work:

You use the Assignment view to assign upcoming work to labor and crews based on their availability.

About this task

Assignments typically originate from a job card, but can be added to work records at any time. Job cards specify the crafts and crew types that are required to do the work.

The Assignment view displays labor and crew availability as it is defined in the Calendars application, where you can define calendar, shift, and break information. Non-work time appears in the Gantt view as a shaded area on the resource table. The Gantt view also shows the modified availability of the resources, including overtime, sick, and vacation time.

Procedure

1. On the **Assignment View** tab, select the orange bar representing the work record that you want to assign. Resources that match the requirements of the work exactly (both craft and skill) are shaded dark blue. Resources that partially match the requirements (craft only) are shaded light blue. A multiple skills icon indicates that the labor or crew possesses multiple skills. You can right-click on the resource and select **View Craft/Skill** to see all of its associated skills. You can assign work by using one of the following methods:
   - Drag the work record to the resource that you want to assign it to in the resource chart.
   - Right-click on the bar representing the work that you want to assign. Select **Available Labor**. In the **Available Labor** window, select the labor or crew resource that you want to assign the work to. Click **OK**.

   When work is properly assigned, the bar that represents the assigned work is green. If you selected a resource that does not match the work requirements, the bar is red. If an appointment is required (in the work record application), an icon indicates that an appointment has not been made. Right-click on the assignment and choose **Lock** to set the appointment. Appointments that are locked cannot be rescheduled due to optimization or manual edits. To change the scheduled time manually, right-click on it and choose **Unlock**.
2. Save the work list.

Related reference:

Record movement in the Gantt view
You can move records individually or in groups in the Gantt view. You can modify start dates, finish dates, and durations by dragging the task bars with your mouse.

Navigating the Gantt view
The MRO Locations Graphical Assignment and Capacity Planning applications display work and resources in a Gantt chart, allowing you to create assignments graphically.

Splitting work between people and shifts:

You can split work into multiple assignments to complete the work as efficiently as possible. For example, if a job takes more time than anticipated, you can continue it into a second shift with another labor or crew resource.

Procedure

1. In the resource chart of the Assignment view, right-click on the work record that you want to split.
2. Split the work by either segment or shift. For example, if the work duration spans more than one work shift, you can split the work by shift. If you want to break the work up into smaller segments that can be assigned simultaneously, split the work into two or three segments.
3. Assign each segment of the work.
   - Drag the work to the appropriate labor or crew resource.
   - Right-click on the bar representing the work that you want to assign. Select **Available Labor**. In the **Available Labor** window, select the labor or crew resource that you want to assign the work to. Click **OK**.
4. Save the record. To merge the assignments in the future, right-click on any segment of the assignment and select **Merge Split Assignments**.

Maintenance costs

Planning maintenance costs includes forecasting costs by using the scheduler features in Maximo Asset Management and planning and monitoring budgets in the Budget Monitoring application.

Forecast costs for preventive maintenance

When budgeting for long-term work, you need to review upcoming work and its associated costs. You can use the **Forecast Cost** tab to see upcoming preventive maintenance forecasts and the costs that are associated with each one.

You can calculate the projected costs for upcoming work by using the **Forecast Cost** tab. When you generate a PM forecast, forecasted work is displayed on the **Forecast** tab. On the Forecast Cost tab, you can click **Calculate Cost** to see the cost that is associated with each projected work order. All forecasted work is listed with the labor, material, tool, and service costs for each projected forecast. You can see a combined total for all the projected work to ensure that you budget for the work.

On the following subtabs, you can view the detailed costs for each category in the projected cost:

- On the **Labor** subtab, you can review craft, skill, and labor rate information to see how the labor costs were calculated.
- On the **Material** subtab, you can review item quantities and associated costs.
- On the **Tool** subtab, you can review tool rates and quantities for each tool that the work requires.
- On the **Service** subtab, you can review details for any service costs that are associated with the work.

Maintenance budget monitoring

Budget monitoring tracks costs on a project during a specified period of time. You configure budgets to monitor one or more focal points. Several focal points are predefined and you can configure new focal points in the Budget Monitor application.

Predefined budget focal points include assets, locations, general ledger accounts and general ledger account components. You can create focal points, for example, to track costs on check type master task cards for a specific model of aircraft.

Related information:

Budget Monitoring guide

Configuring task cards and master task cards

Task cards contain detailed information for scheduled maintenance work on assets. When tasks become due, work orders are generated. Warnings are generated when task cards meet or exceed their warning limit, to prevent the task cards becoming overdue.

Task cards can contain job card information that is copied to work orders.

You define a frequency schedule that determines when work orders are generated to perform the task. You can define frequency intervals on a task card. Or you can define frequency intervals on a master task card and associate the master task card with a task card. The frequency intervals that are defined for the master task card then apply to the associated task card.

You can enable version control of task card records to track revisions of task cards.

Associating task cards with master task cards

When you associate a task card with a master task card, the frequency schedule is managed by the master task card. When you configure schedule frequencies on master task cards, alerts and warnings are propagated to associated task cards.

Procedure

1. In the Master Task Cards application, select a master task card that has at least one entry in the CM Parts table. The CM parts must be associated with the assets for which you want to create task cards.
2. Select the **Create Associated Task Cards for Part's Asset** check box.
3. Select the **Create Associated Task Cards for CM Parts** check box.
4. Select the asset or assets with which you want to associate the task card and then click **OK**.

Frequency iterations for generating work orders from task cards

Task cards specify frequency information that determines when work becomes due. Or frequency information can be defined in a master task card and then propagated to associated task cards.

Maintenance planning documents (MPDs) from manufacturers include frequency information for each task card. Routine tasks become due each time a specified

number of flight hours or flight cycles is reached. These task cards can specify one calendar-based frequency interval and multiple meter-based frequency intervals.

Determining the frequency of some tasks is more complex, because they are based on the average flight time, when the ratio of flight hours to flight cycles has to be evaluated. MPDs include the following frequency information for these tasks:

- Interval and optional threshold values that are based on calendar and meter values
- A fatigue rating (FR) value that indicates how sensitive the task is to flight hours
- Adjustment factors that revise intervals and thresholds when the acceptable average flight time is exceeded

When you import task cards that are based on average flight time from an MPD into the Maintenance Task Library application, the frequency values, fatigue rating, and adjustment factors are also imported. You can modify frequency values and associated adjustment factors on imported task cards to meet your business requirements. Or you can add new task cards and master task cards and manually define frequency values and adjustment factors.

You can review and modify adjustment factors, and add new adjustment factors by selecting the **Apply Adjustment Factors** action in the Task Cards or Master Task Cards application.

Several adjustment factors can be associated with a frequency schedule. Each factor includes a condition that evaluates as either true or false, and a mathematical formula that evaluates to a number. When a condition is true, the output of the formula is used to recalculate interval and threshold values.

Formulas use the following standard notation:

- To refer to a meter that was configured in the Meters application, use angular brackets. For example, [$AFT] refers to a continuous meter that records average flight time.
- To refer to the value in a field on a business object, use a colon followed by the name of object field. For example :PLUSAFATIGUERATING refers to the value in the **FR** field.

If the acceptable value for average flight time is 5.55, when the value is less than or equal to 5.5.5, no adjustment occurs. If the average flight time exceeds acceptable limits, the interval and threshold values are revised based on the formula specified for the adjustment factor, as in the following example:

Table 4. Example adjustment factors

Adjustment factor	Condition	Formula
1	1.6/[$AFT]<=5.55	1.6/[$AFT]
2	[$AFT]>5.55	1-(([$AFT]-1.6)x:PLUSFATIGUERATING

Alert intervals and warning intervals

Alert intervals and warning intervals are used to monitor scheduled maintenance. An alert interval is the point at which a work order is generated. A warning interval is the point at which a warning is issued to inform you that a task card record is almost overdue.

You configure these intervals on the **Frequency** tab of the Task Cards application. The Assets application color-codes warnings and overdue task cards.

The alert interval and warning interval can represent a combination of one or more meter-based values and only one time-based value. Time-based values can be based on one of the following measures of time:

- The number of days after the active date of a task card.
- A percentage of elapsed time between the active date and the due date of a task card.
- The number of days before the due date of a task card.

Example of work order generation

The following example shows when the build data interpreter generates a work order for task card records with a 120-day frequency attribute and different state attributes. The default state attribute for a new record is Absolute from Active.

Table 5. Example of when work orders are generated

Frequency	Alert and warning interval state	Alert interval	When a work order is generated
120 (days)	Absolute from Active	80	80 days after the active date of the task card record.
120 (days)	Percent of Frequency from Active	66.7	After two-thirds of the time between the active date and due date of the task card has elapsed.
120 (days)	Absolute Prior to Due	40	40 days before the due date of the task card record.

You specify the state attribute and the initial alert interval and warning interval when you add a task card record. If you later update the state attribute, the build data interpreter adjusts the intervals as shown in the following examples:

Table 6. Example of changes to the alert and warning interval state values

Frequency	Original value for the alert and warning interval state	Updated value for the alert and warning interval state		Warning interval
120 (days)	Absolute from Active	-		90
120 (days)	-	Percent of Frequency from Active		75
120 (days)	-	Absolute Prior to Due		30
120 (days)	-	Absolute from Active		90

Version control of master task card records

The maintenance program for an asset consists of master task card records that are associated with a configuration-managed (CM) part, which is associated with a model record. When the master task cards for a model are aggregated with other records, such as technical records and deferred work orders, they constitute the maintenance program. Version control of the master task card records helps an organization to maintain regulatory compliance.

You can enable version control of master task card and task card records in the Organizations application. When you create a master task card record, the numbering of the versions starts. If changes to the master task card record are required, the version number of the master task card record increments by 1, and the status is changed to pending revision. After you save the changes, you can set the status of the master task card record to active. You cannot revert to previous versions.

You can opt to create the associated task card records for the master task card record. The associated task card records are created with a revision number of 0 and a status of active. You can also choose to update associated task card records with any changes that are made to the master task card record. If an update is required, then the associated task card record is duplicated, and its status is set to revised. The task card record is then updated with the changes from the master task card, and its revision number is increased by 1. You can select the **Override Updated from Master Task Card** check box on a task card record so that updates from the master task card record are not made to the task card record.

When a task card record is revised, the **Task Card Revised** check box is selected on any open work orders that are associated with the revised record. The worker who is assigned to a work order that is associated with a revised task card record can decide whether to proceed with the work order. Alternatively, the worker can cancel the work order so that a new work order is created for the revised record.

You can use the **View Revision History** action to view the version history of the master task card record to see all past revisions. The version history includes the previous maintenance history if required. The version history can support an audit after an incident or can be useful when you plan future maintenance programs.

Task card groups

You use the Task Card Groups application to classify master task card records and manage task card actions by task card groups. You also can organize master task card records and task card groups by hierarchy to be more efficient when managing and controlling task card actions.

Task card records are grouped by operation type, and these groups are task card groups. By using the Task Card Groups application, you can manage relationships between task card records that are in the same task card group and between task card records that are in different groups. To manage the relationships between these records, you can create actions, such as COMPLETE, between the following groups and records:

- A master task card group that relates to another master task card group
- A master task card group that relates to a master task card record
- A master task card record that relates to a master task card group
- A master task card record that relates to another master task card record

The Task Card Groups application provides a v-tree control to manage relationships between task card records and task card groups. You can use the v-tree control to define and view master task card records and task card actions within the hierarchy. You can specify the task card group number and reset the job plan sequence in the Task Card Groups application and the Master Task Cards application.

When a task card action is created between two master task card groups, a task card action is created for each task card record on the target group for every existing task card record in the source group. A master task card must be able to initialize a task card group COMPLETE action.

A task card group consists of members and actions:

Members
The task card records that belong to the group. Master task card records also show associated task card records as child records.

Actions
The task card actions that are run against the task card records that are in the **Action** node in the v-tree hierarchy.

If you are building a task card group of master task card records, only master task card records and master task card groups are available for selection. If the task card group relates to task card records only, then task card records and task card groups are available for selection.

Task card groups are unique per each pair of site and task card record. However, a master task card or task card record can be a member of more than one task card group, which can result in a circular reference.

To add a task card action to a master task card record, you use the **Create Associated Actions** action in the Task Card Groups application. All task card groups and associated actions that are created in a v-tree hierarchy update when the related master task card and task card records are saved.

You can select and add actions to task card groups in the v-tree hierarchy by right-clicking on the v-tree node. The same actions are available also on the **Action** menu of the Task Card Groups application.

The actions that are available are different for the **Members** and **Actions** nodes in the v-tree hierarchy:

Table 7. Task card group actions that are available in the v-tree hierarchy

Node	Available task group action	Description
Actions	Activate	Select this action when the primary task card record is complete.
	Complete	Select this action for claims when the primary task card record is complete.
	Create WO	Select this action when the work order is already created for the primary task card record.
	Deactivate	Select this action when the primary task card record is complete.
	Off-Activate	Select this action when the related asset is removed from the task card record.
	Off-Deactivate	Select this action when the related asset is removed from the task card record.
	On-Activate	Select this action when the related asset is installed in the task card record.
	On-Deactivate	Select this action when the related asset is installed in the task card record.

Managing maintenance work

Managing maintenance work involves configuring job cards, work packages, and work orders to provide the detailed information that is required to perform maintenance.

Job cards

A job card is a detailed description of work that is performed for a work order. You use the Job Cards application to create and manage job cards.

When you create a job card, you specify planning and scheduling information that can be used by the Task Cards and Work Order Tracking applications. You can specify the maintenance review board (MRB) number, capability, class, and category for the job card. You can also specify the task number, work station, phase, CMR, and customer for the job card.

You can populate a job card from a task list in a maintenance planning document (MPD) that is provided by a manufacturer. Use the Maintenance Task Library (MTL) application to create MTL records, import MPD job card data into them, and manually add job cards. Or you can manually configure information in a job card in the Job Cards application, by using the look up actions on fields to locate the related information from database records and domain values.

Tasks that are on the job card include information that is gathered from other applications and describe the following aspects of the work:

- Labor is defined in the Labor application and can include information about skill sets and labor costs that are calculated for the time that it takes to perform the task.
- The materials that are required to complete the work include parts that are available from the Inventory application and spare parts that are defined in the Assets application.

- Service items that are required to complete the work are available from the Service Items application, which can include unit costs and vendor information if they are available.
- The tools required to complete the work and their costs are available from the Tools application.
- Access items that must be opened and closed to provide access for the work are available from the Models application.
- Information that indicates the aircraft zones where the work occurs are available from the Zones application.

When you associate a job card with either an asset, a CM part, a location, or a part, the job card becomes effective for that record. You can also associate a safety plan with a job card and specify the sites and organizations for which it is effective. The **Operators Maintenance Program Details** action enables you to view information about OMPs and associated master task cards that are related to the job card.

You can duplicate a job card to use as a template for a new job card, and you can create a revision of a job card that is in active status. When you create a revision, the record is copied into a new job card, and the revision number is incremented by 1. The original job card status remains in the active status, and the new job card is set to pending revision. When the new job card is activated, the original job card status is set to revised.

You can apply job card records to task card records and work orders. After a job card becomes a work plan on a work order, you can change the work plan without affecting the job card.

You also can create a job card from a work plan that you use frequently.

Configuring work packages

A work package is a set of work orders and task cards that define work that can be completed during the same maintenance period in the same repair location. By configuring work packages, you can combine scheduled and non-scheduled work to achieve resource efficiencies when work is performed.

Work packages

A work package defines a set of maintenance tasks that are performed on an aircraft during a specified maintenance period. Work packages include details about the tools, materials, labor, skills, and repair locations required to perform the work. You can associate a work package with a customer and a related customer agreement.

When you create a work package, you must add the main work order. The work order must be associated with an aircraft asset, must be in the open status, and cannot be associated with another work package. The following values are set in the work package from values that are provided by the main work order:

- Scheduled start and end dates for performing the work which you can modify
- Read-only values in the **Start No Earlier Than**, **Start No Later Than**, and **Duration** fields

After you add the main work order, you can add the following information to the work package:

- You specify the aircraft that the work package applies to.
- You can specify an MRO location where the work is to be performed.

- If the work package is for a customer, you can specify a customer and customer agreement.
- You can modify the scheduled start and end dates.

After you add the main work order, you can use the **Add Tasks and Work Orders to Work Package** action to add any combination of valid work orders and task cards to the work package. A valid work order or task card satisfies the following conditions:

- It is related to the aircraft to which the work package applies.
- It has a relationship to the customer, if a customer is specified.
- It is not associated with another work package.

You can use the Maximo Integration Framework to import a set of work orders that a customer provides. You can then create a work package with these work orders and validate the work package against a copy of an OMP that a customer provides.

Creating work packages

When you create a work package, you specify the main work order and then add valid work orders and task cards to construct the package. You specify the aircraft that the work package applies to, the scheduled start and end dates for the work, and the MRO location where the work is carried out.

Procedure

1. In the Work Packages application, create a record.
2. Specify the main work order.
3. Specify the aircraft that the work package applies to.
4. Specify the start and end dates for the work.
5. Specify the MRO location where the work is carried out.
6. Optional: Specify a customer and a customer agreement.
7. Select the **Add Tasks and Work Orders to Work Package** action to search for valid task cards and work orders to add to the work package.
8. Select the **Generate Work Orders** action to create work orders for any task cards that do not have work orders associated with them.
9. Save the record.

Adding customer work packages

MRO operators can import a set of work orders that a customer provides and compare imported work orders with existing job card records to construct a work package.

Procedure

1. Use the Maximo Integration Framework to import a set of work orders that are arranged in a hierarchy.
2. In the Work Orders application, open the parent work order of the set of work orders that you imported.
3. Select the **Match Job Cards to Work Orders** action and select the associations that you require. Task numbers on work orders are compared to task numbers on job cards to identify records that match.
4. Optional: Review the entries in the Work Card With No Matching Entries section and assign job cards where appropriate.
5. Save the record.

Managing work orders

A work order specifies a particular task and the labor, materials, services, and tools that are required to complete the task. You can also associate configuration-managed (CM) parts with work orders and create work orders that are a result of the cannibalization process.

Creating work orders

You can create work orders to specify the required work for a particular asset and location.

Cannibalization process overview:

To meet operational requirements and to dispatch an asset, you must replace a defective component, but your inventory balance might be zero. By using the cannibalization process, you can remove the component from a serviceable asset and install it on another.

The regular maintenance procedure is completed by issuing a replacement component from inventory, installing it, completing the work and releasing the asset into service. However, you might have zero balance available from inventory and the lead time to obtain a replacement exceeds the operational schedule requirements.

In this case, a cannibalization (robbery) process can be authorized. The required component is removed from a designated asset (the donor asset), inspected, and installed on the unserviceable asset (the receiver asset). You can use the cannibalization process at any point until the work order is completed, closed, or canceled.

When the work is completed, the asset is dispatched into service. A work order is issued against the donor asset to generate the demand against inventory by following regular procedure. Any reservations that are made against the receiver asset must be canceled or transferred to the donor asset.

The cannibalization process is a relatively common practice that must be rigorously managed and controlled to maintain regulatory and safety compliance. Efficiency is also a priority, because the cannibalization process is typically applied under operational pressure and tight deadlines.

You use the **Materials** tab, under the **Plans** tab of the Work Order Tracking application, to specify and approve a cannibalization process. The cannibalization details show on the **Robbery details** section, when you select the **Robbery** check box. You can have a robbery action for each item line.

You might consider using the cannibalization process in the following situation:

- If you specify an item number and the availability check shows that there is no stock, and
- If you have the asset under the AOG status.

This validation is not enforced, and the **Robbery** check box is available for selection despite of these conditions.

Example of the cannibalization process

A passenger aircraft is due to depart at 13:00 with 250 fare-paying passengers. Two hours prior to departure, an essential component for flight operations fails. The

mechanics investigate and conclude that a replacement part is required. An interrogation of available inventory reveals that there is a delivery of the required component in 12 hours time.

The decision is made by maintenance control – the flight must not be delayed. A replacement component is removed from an aircraft that is not scheduled to fly until the next day. The component is inspected and installed in the faulty aircraft. A work order is issued against the donor aircraft to be completed before the flight time, on the next day.

Cannibalization statuses:

Using the cannibalization (robbery) process, you can remove a component from a serviceable asset and install it on another. The cannibalization process can assume different statuses while procedures are applied.

A regular maintenance procedure is completed by issuing a replacement component from inventory, installing it, completing the work and releasing the asset into service. However, you might have zero balance available from inventory and the lead time to obtain a replacement exceeds the operational schedule requirements.

In this case, a cannibalization (robbery) process can be authorized. The required component is removed from a designated asset (the donor asset), inspected, and installed on the unserviceable asset (the receiver asset).

During the procedure, the cannibalization process can assume different statuses:

Table 8. Statuses of the cannibalization (robbery) process

Status	Description	Validation
PENDG (pending)	The default status when the robbery action is created.	You can specify this status if the **Robbery** check box is not selected.
NAPPR (not approved)	The robbery action is not approved, and all other fields are read only.	None
APPR (approved)	The robbery action is approved.	You cannot specify this status if the **Robbery** check box is not selected.
COMP (complete)	The robbery action is complete, and the donor asset is available to be issued to the receiver asset.	You must specify all fields. You cannot specify this status if the **Robbery** check box is not selected.
CANC (canceled)	The robbery action is no longer required. The user is responsible for canceling any associated work orders, purchasing records, and others.	You cannot specify this status if the **Robbery** check box is not selected.

Installing and removing assets

When completing the work required in a work order, you must remove and install the assets specified in the work orders.

Installation and removal of assets:

When performing maintenance work orders, you must install or remove the assets associated with those work orders. For example, you have to install an asset when it comes back from maintenance, because the engine that was corrected has to be reinstalled in an airplane.

You can use the **Install/Remove Asset** action in the Work Order Tracking application or the **Install Asset** button on the **Materials** subtab of the **Actuals** tab to install an asset. In both cases, the corresponding build position must be serialized.

The following information applies if you access the Install/Remove window through the **Materials** subtab on the **Actuals** tab:

- On the **Materials** subtab, in the **Rotating Asset** field, you can specify a rotating asset that is also a CM part, which is used as the value for the child asset.
- On the **Materials** subtab, you can specify a value in the **Actual Date** field to use as the transaction date.
- You can install the child asset only to a build position that is valid for the CM part associated with the asset.

To record meter offsets, select the **Record Meter Offsets** check box in the CM Options window in the Organizations application. You access that window through the **CM Options** action in the Organizations application.

Installing assets:

You have to install assets whenever they were removed for maintenance or replacement. For example, you have an engine removed and sent to maintenance. When the engine is ready, you have to install it back on the airplane.

Procedure

1. In the Work Order Tracking application, select the work order for the asset that you want to install.
2. From the **Select Action** menu, select **Install/Remove Asset**.
3. Select the node that contains the build position to which you want to install the asset, and click **OK**.
4. If the **Transaction Date** field is empty, specify the date and time of the installation.
5. If the **Asset** field in the Installation Details table is empty, specify the child asset.
6. Optional: Update the value in the **Actual Count** field.
7. Click **OK**.

Results

The application saves the record and triggers the build data interpreter (BDI). If you installed the asset to a position where an asset is installed already, the BDI creates a position and installs the asset to the new position.

Removing assets:

You can remove an asset associated with a work order, as long as the corresponding build position is serialized. For example, you have a work order set for maintenance on an engine. Before you start the work, you need to remove it from the airplane.

Procedure

1. In the Work Order Tracking application, select the work order for the asset that you want to remove.
2. From the **Select Action** menu, select **Install/Remove Asset**.

3. Select the node that contains the build position from which you want to remove the asset, and click **OK**.
4. If the **Transaction Date** field is empty, specify the date and time of the removal.
5. Select the **Remove Asset** check box.
6. If you plan to move the asset to a new location, specify a value in the **Remove to Location** field.
7. If the removed asset requires additional work, specify a value in the **Follow on Work Type** field.
8. Optional: Update the value in the **Actual Count** field.
9. Click **OK**.

Deferring work orders

When you are unable to complete a work order, you can defer the work order. For example, if you did not have the required materials for the work order, you can defer the work order and set a status for it.

Status of deferrals:

You may need to defer a work order if, for example, the material required to perform the service did not arrive on time. In this case, you would set a deferral for the work order and assign a status to it.

Deferrals can have the following status values:

Status	Additional information
Active	• A work order can have only one active deferral. • All fields except **Status** become read-only. • If you select the **Adjust** check box that corresponds to the deferral, the application sets the scheduled completion date of the work order to the deferred date. • You can add extensions to the deferral. • The application changes the status of all previous deferrals and extensions to Superseded.
Cancelled	• If extensions exist, you cannot change the deferral status to Cancelled. • All fields become read-only. • The application changes the status of the original deferral and all extensions to Cancelled. • You can delete a canceled deferral.
Pending	• You cannot create an extension for a pending deferral. • The application changes the status of all previous deferrals to Superseded. • You can delete a pending deferral.
Superseded	• If extensions exist, you can change the deferral status to Superseded. • All fields become read-only. • You can delete a superseded deferral.

Deferring work orders:

You can defer a work order or extend a deferral to a work order that is not canceled, closed, or completed. For example, you have to defer a work order if the material required to complete the work did not arrive on time.

Procedure

1. In the Work Order Tracking application, select a work order.
2. From the **Select Action** menu, select **Deferrals**.
3. In the Deferrals table, add a row and specify values for the type, reason, and source of the work order.
4. In the **Duration** field, specify the length of the deferral (in days).
5. To change the scheduled completion date of the work order to the deferred date, select the **Adjust** check box. The date changes when you change the status of the work order to Active.
6. Optional: Change the status of the work order to Active.
7. Save the work order, then click **OK**.

Extending deferrals:

You can create one or more extensions to a work order deferral, for example, in case you have a lack of resources or materials. The status of the most recent extension must be active.

Procedure

1. In the Work Order Tracking application, select a work order.
2. From the **Select Action** menu, select **Deferrals**.
3. Select the deferral that you want to extend.
4. In the Deferral Extensions table, add a row and specify values for the type, reason, and source of the work order.
5. In the **Duration** field, specify the length of the deferral (in days).
6. To change the scheduled completion date of the work order to the deferred date, select the **Adjust** check box. The update occurs when you change the status of the work order to Active.
7. Save the record, then click **OK**.

Changing the status of extensions:

You can change the status of an extension to a deferral if the deferral is not canceled, closed, or completed.

About this task

A deferral can have only one active extension. If you create a second active extension, the application changes the status of the first active extension to superseded.

Procedure

1. In the Work Order Tracking application, select a work order.
2. From the **Select Action** menu, select **Deferrals**.
3. In the Deferrals table, select the deferral that you want to update.
4. In the Deferral Extensions table, select the extension that you want to update.

5. Click the **Change Status** icon.
6. Select the new status.
7. Click **OK**.

Recording meter readings

When you record meter readings for configuration-managed assets, you can record the actual or delta values.

Specifying meter readings:

You can add meter readings to a work order asset and location. You specify meter readings as either actual or delta values. You can specify meter readings for any date and time starting on the date and time when the asset was created

Before you begin

Before you add meter readings to a work order asset and location using the Work Order Tracking (CM) application, you must set the initial readings on the related asset.

Procedure

1. In the Work Order Tracking application, on the **List** tab, select a work order record.
2. From the **Select Action** menu, select **Enter Meter Readings**.
3. Select a meter name and a meter reading type.
4. Select a value for count date and time.
5. Specify a meter value.
6. Add a location meter reading and specify any related information.
7. Click **OK** and save the record.

Modifying offsets to meter usage:

You can correct offsets to meter usage. The meter must be related to an asset that you installed or removed.

Procedure

1. In the Work Order Tracking application, select the work order associated with the asset that you want to update.
2. From the **Select Action** menu, select **Install/Remove Asset**.
3. Select the node that contains the build position that you want to update and click **OK**.
4. If the **Transaction Date** field is empty, specify a value.
5. Update the value in the applicable **Actual Count** field.
6. Click **OK**.

Managing events

You can record data on events, which can be planned activities, such as regular maintenance, or unplanned occurrences, such as a fuel leak. Capturing the data can assist in the process of improving asset performance and reliability.

Events in the configuration management process

You can record information about events that are related to your assets. An event can be planned, such as scheduled maintenance, or unplanned, such as a fuel leak.

Events provide in-service event capture data that is used to improve asset performance and reliability. Recording and analyzing events is a vital to providing services to clients and to increasing profitability of associated contracts. Recording events is relevant for large fleet operators and original equipment manufacturers (OEM), who provide service contracts for maintenance, repair, and overhaul activities.

Events capture data that provide information on how assets are used and when assets require maintenance. Analysis of events data can reveal the possible impact of failure and how asset design can be improved to increase reliability and safety. Events information includes all the attributes associated with the event, including life usage, asset configuration, operator, location, actions associated with service restoration and associated findings.

An event is a planned or unplanned occurrence that resulted in an action being taken. An event can include the following information:

- A symptom that describes the incident or problem, such as high vibration or cockpit warning message.
- A reaction that describes the action taken in response to the symptom, such as shutting down an engine or turning back to the airport.
- One or more subsequent actions that describe the activities taken to diagnose and recover from the event, such as details of repaired parts.

You use the Events Management application to record information about events that are related to assets. You can also add information about the actions that are taken in response to an event, and about the findings related to the event or its actions. You can add information about maintenance messages, such as Flight Deck Effects, that are related to an event. You cannot delete an event if it has related events, or if the event is listed as a related event on another record.

Creating events

An event is a planned or unplanned event, such as a yearly inspection or a fuel leak, that results in an action. The information recorded in events can be used to improve asset performance and reliability. An event typically consists of symptoms, reactions, actions, and findings.

Procedure

1. In the Events Management application, click the **New Event** icon.
2. Select the asset to which this event is related.
3. Enter a title for the event.
4. Optional: Edit the event date and time.
5. Select the event type and category.
6. Optional: Enter information related to the event, for example, the location or event owner.
7. Optional: Add further information about the event on the other tabs.
8. Save the event.

Adding findings to an event

When you research an event, you can record your analysis and solutions as a finding. You can enter information about findings that are related to the main event or to its actions. You can use findings for analysis and decision-making, such as trying to improve the performance of the asset.

Procedure

1. In the Events Management application, select the event for which the action occurred.
2. On the **Findings** tab, from the **Select Action** menu, select **Findings Navigator**.
3. Select the findings you want to add.
4. Click **Return**.
5. Optional: Mark one finding as the primary finding for the event by selecting the **Primary** check box.
6. Save the event.

Adding maintenance messages to an event

You can add information about maintenance messages that are related with an event, for example, Flight Deck Effects.

Procedure

1. In the Events Management application, select the event for which you want to add the maintenance message.
2. In the**Maintenance Messages** tab, add a new row and select the type of message.
3. Select the message number.
4. Save the event.

Adding actions to an event

An action is triggered by the reporting of a planned event, such as a yearly inspection, or an unplanned event, such as a fuel leak. You can add information about actions that were taken. For example, an action after a yearly inspection might include the issuing of a service bulletin.

Procedure

1. In the Events Management application, select the event for which the action occurred.
2. On the **Actions** tab, add a new row and select a value for the action.
3. Enter any relevant information.
4. Save the event.

Associating related event tickets with events

To improve event management, you can add information about other event tickets that are related to the main event.

Procedure

1. In the Events Management (CM) application, select the event for which the action occurred.
2. On the **Event Matrix** tab, click **Select Tickets**.
3. On the Select Ticket window, select the tickets you want to associate with the event and click **OK**.
4. Save the event.

Chapter 8. Defining reference data for aviation assets

When you receive an asset, such as an aircraft, you must create engineering reference data for it. The reference data specifies the configurations that are allowed for the asset and how the asset is maintained. During day-to-day operations, the build data interpreter (BDI) uses the reference data to ensure that any changes to the asset are valid.

Defining models

A model defines the allowable configuration of an asset and is used to validate assets. You create models in the Models application.

Models of configuration-managed assets

A model is a blueprint of the engineering reference data for an asset. A model contains a collection of build items and their associated configuration-managed (CM) parts, configurations, and configuration rules. The build data interpreter (BDI) validates changes to a configuration-managed asset to ensure that operational changes to the asset comply with the design blueprint.

Build items

A model can represent a top-level asset, such as an airplane or a train, or it can represent a subassembly, such as an engine or a locomotive. A model contains one or more build items which represent a group of part numbers that are related by function.

For example, in a model that represents an airplane, a build item for the engine can contain the CM parts that make up the engine. Another build item for wing parts can contain CM parts that make up the wing. CM parts are organized in a hierarchy, from the top level down through lower levels.

Configurations

Each model has a default configuration with a configuration type of variant. You can create additional configurations at the sibling or child level, for example to track a new derivative of an existing engine. These configurations are also variant types.

The OMP application creates configurations with a configuration type of OMP. OMP configurations are associated with the operator maintenance program for the model that is approved by your aviation authority. You can view OMP configurations in the Models application, but you cannot change their statuses. You can simultaneously associate an asset with a variant configuration type and an OMP configuration type.

Build positions

A build position indicates the location at which you can install a build item. You can define build positions at a sibling level to the build item or at a child level beneath it. When you specify a build position, you can configure the following features for it:

- Provide position information to support regulatory compliance.
- Add formulas for calculated meters that are created in the Meters application.
- Add spare parts for the position.
- Add measurement points for condition monitoring.
- Associate the position with warranty contracts.
- Configure information about the access items that must be opened and closed to work on this position.
- Associate the position with the zone or zones where the build item is located.

You can move the positions of build items in the hierarchy tree. When you move a node, the LCN is recalculated. The logistics support analysis record (LSAR) control number (LCN) indicates where a node is within the build hierarchy. For example, an engine that is attached to an aircraft has an LCN code of L0008, which means that the engine is on the eighth build position under the airframe. The following table describes the moves that you can make when you right-click a node in the hierarchy tree:

Action	Description	Application action
Move up	Move the selected LCN up one position.	Subtracts 1 from LCN suffix. All subpositions inherit the move. If an LCN with the new value exists, it is moved down.
Move down	Move the selected LCN down one position.	Adds 1 to the LCN suffix. All subpositions inherit the move. If an LCN with the new value exists, it is moved up.
Push up	Move the selected LCN up one position.	Subtracts 1 from LCN suffix. All subpositions inherit the move. If an LCN with the new value exists, it is pushed up.
Push down	Move the selected LCN down one position.	Adds 1 to the LCN suffix. All subpositions inherit the move. If an LCN with the new value exists, it is pushed down.

Associated engineering reference data

When you specify engineering reference data in a number of other applications, you can associate those records with specific build positions. You can view the following associated records for builds position in the Models application:

- CM parts
- Master task cards
- Meter records
- Labels
- Zones

Configuration rules

Configuration rules define which build positions and CM parts are valid for a specific model or configuration. In the Models application, you select which of the primary configuration rules apply to the following data:

- Minimum equipment list (MEL) rules for a model
- Build positions
- CM parts
- Labels
- Maintenance plans
- Formulas

In addition to the primary predefined rules, you can create secondary rules that apply to primary rules to specify additional conditions to use when an asset is validated. You specify secondary rules in the form of Boolean expressions in the **Advanced** tab of the Models application.

Model revisions

A revision is a snapshot of a model and its configuration rules at a specific time. After you create a revision, you can update the model without affecting the revision. The BDI monitors revisions that are in the active status, and only active revisions are used to validate the configurations of assets. The status of a revision is set according to the following rules:

- The revision is set to a status of pending if there is an active date set for the revision that is in the future.
- The revision is set to a status of inactive if there is an inactive date for the revision and the active date is in the past.
- The revision is set to active when the active date is current.

When you create a revision on the **Configurations** tab, you can select whether to permit different automatic upgrade options for assets.

Series of related models

You can group related models together into a series and define event groups that affect all models in the series. For example, for a series of related aircraft engines, if a fuel leak occurs in one model in the series, you can check other models in the series for the symptoms of the fuel leak.

You can associate a series with models, build positions, and dynamic value list (DVL) values.

Configuration-managed (CM) build positions

You can create and manage a configuration-managed (CM) build position record that contains a position code that is associated with a system and series combination. A CM build position record also contains information about the associated model and CM parts.

CM build position records can include the following information:

- The series that defines a group of models
- The position code that defines the hierarchical build position of the model

- The associated CM part number and zone values

The values that you associate with the CM build position record can help support the following asset configuration capabilities:

- The ability to capture failure modes and causes for unrelated assets
- The use of dynamic value lists
- Event-reporting capabilities for the asset

You can use a CM build position record in a CM value record in the DVL Setup application. When you create a CM value record, the finding and applicability values that are available for selection are filtered by the selected CM build position. When you associate a CM build position and a CM value, you can capture detailed event information for an asset. Event symptoms, failures, and actions can be tracked according to the defined CM build position, series, and part information that is on a CM value record.

Aircraft zones

Zones are designated physical areas of an aircraft that identify where maintenance activities occur. A maintenance task can span multiple zones.

In the Zones application, you can create, delete, or activate zones on an aircraft. You can create and duplicate a hierarchy of zones by specifying parent or children zone records. All zone hierarchies must be linked to an aircraft model. The Zone application stores information at the item set level, which facilitates associating a zone hierarchy to a model.

After zones are specified in the Zones application, you are required to identify zones that are associated with maintenance tasks in the Maintenance Planning Document application. The specified zone information is used to group and schedule maintenance.

Configuration of maintenance events for models

Events can automate maintenance activities for models, which are based on rectification periods for minimum equipment list (MEL) items, rework levels, and formulas that calculate meter events on build positions.

Rectification periods for MEL items

The category of a minimum equipment list (MEL) item determines how long maintenance can be deferred on a MEL item after it is reported for rectification or maintenance. The following table describes the predefined categories:

Table 9. Categories that the define the rectification periods of MEL items

Category	Consecutive days	Description
A	1	Items in this category must be rectified within one day after discovery.
B	3	Items in this category must be rectified within three days after the day of discovery.
C	10	Items in this category must be rectified within ten days after the day of discovery.
D	120	Items in this category must be rectified within one hundred and twenty days after the day of discovery.

The category determines the time elapsed, in consecutive days, between the day of discovery and the date the MEL item must be available for use again. The day of discovery is the date when the MEL item was reported for maintenance.

Rework levels for maintenance events on models

Tracking rework levels, such as the number of hours since the most recent overhaul or the number of cycles since the asset was new, provides a detailed and efficient way to manage maintenance activities. Maintenance plans are based on a number of different criteria, including the life usage that was consumed after a maintenance activity was performed.

Your company can track different criteria for different assets, depending on their use and construction. You can set rework levels for a model to customize the maintenance events and criteria that are tracked to assist in the management and upkeep of your assets.

In the Models application, use the **Rework Level Dialog** action to specify rework levels. Examples of rework levels include inspection, overhaul, repair, and modification.

Formulas for calculated meters

You can create a formula to calculate specific instances of a meter that you must track for maintenance purposes. For example, you can track when inspections are required after a specified number of engine starts. Formulas are defined at the system-level.

You use the **Formulas** subtab in the Models application to create a mathematical formula to apply to a meter value.

Example of creating a formula

You want to track maintenance requirements for an inspection that is cycled on every 1.5-meter starts. In the Meters application, you create a meter named S1 to represent engine starts. The pilot records engine starts after every flight. The inspection is due every 30 cycles. The formula is a simple mathematical formula with the name of the meter enclosed in brackets. For this example, you create the following formula for the build position that contains the master task card for the inspection: [S1] * 1.5

Because the inspection is due every 30 cycles, the inspection is due every 20 engine starts (20 * 1.5 = 30).

Example of creating a dynamic formula

You want a way to track engine hours that takes into account the fact that some engines run for some time before the flight takes off. Some models require a formula of Engine Hours = 1.1* Flight Hours , but other models require a formula of Engine Hours = 1.2* Flight Hours.

The name of a dynamic meter begins with a $ character. When a search is made for a dynamic meter, the search is for both the dynamic meter and the model ID of the asset that is associated with it. In the Meters application, you create a dynamic meter that is named $EH to represent the engine hours. In the Models application,

you create a dynamic formula that is named $EH and enter [FLTHRS] * 1.2 in the **Formula** field.

Examples of defining models

A model contains the reference data that describes an allowable build configuration for an asset. Complex assets, such as airplanes, might require the creation of multiple models to capture the various allowable configurations, such as different revisions and variations.

Example of a new model

An enterprise receives a new piece of equipment, for example, a new aircraft. The IBM Maximo for Aviation MRO applications manage the configuration of the new model.

You define the model in the Models application. Defining the model includes defining a hierarchy of positions, allowable part numbers for each position, and a maintenance policy for each part number. The new model is the base configuration of the model.

Example of new configuration of a model

An enterprise receives or requires a new configuration of a model of equipment, for example, a new configuration of an aircraft or engine. The model exists in the Models application.

You create a configuration from the base configuration or any combination of configuration and revision. Initially the new configuration is the same as the configuration or revision from which you create it. You then modify the configuration as needed.

Example of new revision of a model

An enterprise requires a new revision of a model. You create a revision, which is a snapshot of the model, its configurations, and its configuration rules, at a particular time. You then can change the model without affecting previous revisions.

Example of a change to the structure of a model

An enterprise decides to modify the logistics support analysis record (LSAR) control number (LCN) structure of a model. This action might be because of changes to standards or to allow the spacing of LCN codes by 10 or 100.

You change the LCN structure field on the model record, and the application updates all existing LCNs as needed. If assets were already created based on the model, you can add an LCN only to the end of the node or subnode hierarchy. The asset history is associated with the LCN number; if an LCN number is changed, then the asset history is corrupted.

Example of a new build position

An enterprise must track an additional build position on a model position hierarchy. This action might be because of a procedural change or a requirement from an external regulatory body.

You add the new build position to the build position hierarchy. If assets were already created based on the model, you can add a build position only to the end of the node or subnode hierarchy. The asset history is associated with the LCN number and build item. If an LCN number and build item are changed, then the asset history is corrupted.

Example of removal of an applicable build position from one or more configurations

An enterprise wants to stop tracking a build position on a model position hierarchy. This action might be because of a procedural change or a requirement from an external regulatory body.

You can complete one of the following actions:

- Specify that the build position does not apply to one or more or all configurations.
- Delete the build position from the configurations to which it does not apply. If you delete build items and positions from a model after assets are created that are based on the model, the deletions can affect the assets.

Example of new allowable CM part number

An enterprise wants use a new CM part number in a model position hierarchy. This action might be because of a manufacturing change or a requirement from an external regulatory body.

You add the new CM part number to the appropriate build item. Then, you specify whether the part number applies to one, more, or all configurations.

Example of removal of an applicable part number from one or more configurations

An enterprise wants to disallow the use of a CM part number in a model position hierarchy. This action might be because of a manufacturing change or a requirement from an external regulatory body.

You specify that the CM part number does not apply to one, more, or all configurations. You might create a technical record to apply this change.

Example of change to a preventive maintenance requirement

An enterprise wants to add to or change the maintenance policy for a CM part number, possibly within a specific use context. This action might be because of a manufacturing change or a change in requirements from an external regulatory body.

You enable or disable configuration rules to specify the context in which the maintenance policy is valid.

Example of an inter-position or inter-part number rule

In a complex configuration definition, you must describe compound rules. For example, you can install Part A to Part B if you install Part C to Part D. One rule is dependent upon one or more other rules.

You create one or more secondary configuration rules and define the dependency between or among the applicable rules.

Example of change to a serial number effectivity

An enterprise wants to add to or change the applicability of a build position, CM part number, or maintenance policy for a CM part number, to a set of serial numbers for another part. Typically, the latter part is a higher-level part. This action might be because of a manufacturing change or a change in requirements from an external regulatory body.

You enable or disable configuration rules to specify the context in which the build position, part number, or maintenance policy is valid.

Example of adding spare parts to a model

An enterprise maintains an inventory of spare parts for an engine. Some spare parts are used in multiple places, such a 2-inch nut that is required for a motor and for the motor housing.

You can use spare parts to define a bill of materials for an asset. The bill of materials specifies the spare parts that are required for the asset. For example, you add the 2-inch nut as a spare part in the build position that represents the motor and also in the build position that represents the motor housing. When you create an asset that is based on the model, the 2-inch nuts are automatically associated with the asset as spare parts.

Example of adding measurement points to a model

An enterprise wants to monitor the condition of certain engine parts and perform preventive maintenance on the engine when certain conditions occur, such as a temperature, pressure, or characteristic observation, such as oil color.

You can define measurement points for the build positions on the model that represent the parts. For example, on an engine model, you can define a temperature measurement point for the build position for the exhaust gas temperature (EGT) sensor. When an asset is created that is based on the engine model, measurement points are automatically created. When the meter reading for the EGT sensor meets or exceeds the temperature that is defined in the measurement point, work orders are automatically generated.

Example of adding warranty contracts to a model

In the Warranty Contracts application, you define the warranty contract. In the Models application, you associate the warranty contract with the applicable position in the model. When an asset that is based on the model is created, the warranty contracts are automatically associated with the asset.

Creating models

The fundamental building block of your configuration management system is the model. A model defines the allowable configuration of an asset and is used to validate assets.

Before you begin

Before you start to define models, you must configure options, such as the default label system, the label width, the position code width, EBNF control, recorded meter offsets, and predicted life. Use the **CM Options** action in the Organizations application to configure the options.

Procedure

1. In the Models application, click the **New Model** icon and specify a name in the **Model** field.
2. Specify the label system of the model.
3. Specify values for the logistics support analysis record (LSAR) control number (LCN) structure and the top-level LCN.
4. Optional: If you want to install this model on another model, select the **Installable** check box.
5. Add additional information for the model:
   a. Add build items.
   b. Add values for the label system, label, and default positions.
   c. Add CM part.
6. Save the model.

Adding build positions

A build position indicates the location at which you can install a build item, which represents a group of part numbers that are related by function. A new sibling build position is at the same level as the selected node while a new child build position is a level beneath the selected node.

Procedure

1. In the Models application, select a model and then click the **Build Hierarchy and Position Rules** tab.
2. In the **Hierarchy Tree** subtab, right-click the node to which you want to add the build position and select either **New Child** or **New Sibling**.
3. Specify the build item name.
4. Specify the build item type.
5. Optional: Select a position for the build item.
6. Optional: Specify additional information on the subtabs.

Option	Description
Position List	Specify regulatory items.
Formulas	Add a formula for a calculated meter.
Spare Parts	Add spare parts.
Condition Monitoring	Add measurement points.
Warranty	Associate warranty contracts with the build position.
Access Panels	Add information about access items, including the time it takes to open them and close them.
Zones	Add the zone or zones where the build position is located and set a primary zone is more than one zone exists.

7. Save the record.

Related information:

Creating measurement point records

Creating build position master records

You can create a CM build position record to define a position code and its associated system and series combination. You can also create a build position record to define the CM part numbers and the zones that are associated with the CM build position record.

Procedure

1. In the Build Position Master application, click the **New Build Position Master** icon.
2. Specify values for the **System** and **Position Code** fields.
3. Optional: Specify the series to which the build position belongs.
4. Optional: If you want the CM build position to capture failure modes and causes for unrelated assets, select the **Phantom Position** check box.
5. In the Part Numbers table, add a new row and specify a CM part value.
6. In the Zones table, add a new row and specify the zone value that is associated with the CM part.
7. Save the build position master.

Creating configurations of models

A configuration is a version of the model that is based on an existing model, but has a different composition or different attributes. Configurations can track similar but different complex assets, such as different versions of an aircraft engine.

Procedure

1. In the Models application, select a model.
2. On the **Configurations** tab, right-click the node for which you want to create a configuration and select either **New Child** or **New Sibling**.
3. In the **Configuration** field, specify a value.
4. If the configuration is an abstract configuration, select the **Abstract** check box.
5. Click **OK**.
6. Save the model.

Grouping related models in a series

A series record groups related models. You can associate a series with models, definition value list (DVL) values, and configuration-managed (CM) build positions. You can define event groups for a series, which establishes common reporting criteria.

Procedure

1. In the Series application, click the **New Series** icon.
2. Enter a name for the new series.
3. Optional: Specify description, comments, or a message to be included in reports.
4. On the **Series** tab, in the Event Group table, add a new row and specify a name for the new event group.
5. Select the event group type, and specify which reports can be configured for group events based on a group name.

6. In the Group Contents table, add a new row and select a code type and a code. Include a new row for each code that you want to add to the event group.
7. Save the series.

Related concepts:

Groups of related models in a series
You can group related models together into a series. You can also define event groups for the series, which provides the capability for identifying events that may affect all models in a series. For example, you can group all related aircraft engines together into a series. If a fuel leak occurs in one model type in the series, then you can check other model types for the symptoms of the fuel leak.

Defining secondary configuration rules

To specify additional conditions to use when a primary configuration rule is used to validate an asset, you can create secondary configuration rules. You add Boolean expressions to the existing rules, which are then used as dependencies when the rules are applied to assets.

Procedure

1. In the Models application, select the model.
2. On the **Advanced** tab, in the CM Rules table, select a rule.
3. In the **Secondary Expression** field, specify a Boolean expression.
4. Click **Compile**.
5. Save the model.

Configuring CM parts

A configuration-managed (CM) part is a part number that is under configuration-management control. A default CM part is created when you define a model. You configure CM parts and create new ones in the CM Part Master (CM) application.

Configuration-managed parts

Configuration-managed (CM) parts are generated automatically when you create models. You can also view and create CM parts in the Part Masters application. You also manage CM parts in your inventory and issue them to work orders, locations, and assets.

Inventory of CM parts

CM parts are available in the Inventory application, where you can record storeroom balance, condition, inventory costs, reorder details, and other management information for CM parts.

The following activities help to manage CM parts:

- Identify and track rotating assets that are associated with a rotating part.
- Identify and track parts that have a related CM part record.
- List all assets for which a is CM part is listed as a subassembly or a spare part.
- Create default parts for fuel, replenishments, and munitions if you plan to manage these items in your inventory.

Issue and transfer of CM parts

In the Issues and Transfers application, you can issue CM parts and tools to a work order, to a location, to an asset, or against a general ledger account either within a site or across sites within an organization. You can define the CM part, the model, and the configuration that is associated with an asset that you issue.

You can transfer CM parts and tools from one storeroom to another, either within the same site, across sites in an organization, or across organizations. When you transfer CM parts between storerooms, the storeroom balances are adjusted automatically. You can also return CM parts and tools to a storeroom, but only if they are in the same site. You can perform transfers within your organization without an internal purchase order. Transfers to a different organization require an internal purchase order, and the organizations must share the same item set.

CM part masters

In the Part Master application, you can create CM parts and associate them with parts, master task cards, and items in Maximo Asset Management. You also specify the format of the serial numbers for the part, and you can specify serial number ranges that use this format.

The Models application uses the serial numbers and serial range expressions to establish configuration rules for models and configurations of models. The Assets application uses the serial numbers and serial range expressions to validate asset configurations by using those configuration rules.

Examples of serial formats

To specify the format for a serial number, the letter A represents alphabetic characters, the number 9 represent numbers, and any special characters can represent separators. The following examples show a valid format and an invalid format:

- A-9999 is a valid serial format.
- X-9999 is not a valid serial format because it contains the letter X.

Examples of serial range expressions

All serial numbers in a serial range must be in a valid serial format. You can specify multiple serial numbers and serial ranges at the same time by using the following construction:

- To specify multiple individual serial numbers, separate them with a comma and no space, such as A-0001,A-0100,A-2020.
- To specify a range of serial numbers, separate the first and last number of the range with two periods and no spaces, such as A-2001..A-2999.
- To specify a combination of individual numbers and ranges, separate the entries with a comma and no space. You can enter numbers and ranges in any order, such as A-0001,A-0100,A-2001..A-2999,A-4001..A-4999.

Examples of defining CM parts

A configuration-managed (CM) part is a part that has a catalog number. CM parts are associated with the model that is used to validate operational changes to assets. You can cross-reference a CM part to an IBM Maximo Asset Management item master.

Maximo for Aviation MRO maintains a cross-referenced catalog of part records for the following purposes:

- For creating and managing system-generated parts that represent models and configurations of models
- For creating temporary or locally-tracked items, such as parts that are procured locally on a temporary basis
- For achieving specific goals, such as changing the part number of an item retrospectively or adding a local part to the catalog

Example of a new model

You company receives a new model of aircraft. You configure the model in the Models application. The Models application generates a new CM part and its identifier corresponds to the identifier of the model. You can change the identifier of the model at any time, for example, to correct the original identifier or rename the model. The Models application changes the identifier of the CM part to match the new identifier of the model.

Example of a new configuration of a model

You company needs a new configuration of an aircraft. You add the configuration in the Models application. The Models application generates a new CM part and its identifier corresponds to the identifier of the configuration. If you change the identifier of the configuration, the Models application changes the identifier of the CM part to match it.

Example of local parts

Your company procures a locally-manufactured part and plans to serialize the part and install it on a parent asset. You do not know whether your company plans to procure the part in the future. You do not know whether the person who procured the part has permission to add the part to Maximo Asset Management. You add the part in the CM Part Master (CM) application and you can cross-reference the CM part with an existing item in Maximo Asset Management.

Example of a change to a Maximo Asset Management item number

Because of a technical record or a user error, you must change an outdated or incorrect Maximo Asset Management item number. You cannot change the item master, but you can change the CM part. You change the part in the CM Part Master application and you can change the cross-reference to an item record in Maximo Asset Management.

Example of the addition of a local item to the Maximo Asset Management Item catalog

Your company decides to use conventional means to procure and stock a temporary part. You use the **Add to Part Master** action in the CM Part Master application to add the part to the Item catalog in Maximo Asset Management. You also create or update a cross-reference between the CM Part and Item Master records.

Example of a software part

As a configuration engineer for a national rail operator, you are responsible for defining and managing the configuration of complex assets. You can create a CM part that is identified as a software item so that you can effectively manage the configuration of the train to ensure safety and regulatory compliance. In the CM Part Master application, you create a CM part and specify that the category of the item is software. The category is copied from the CM part master to the build item category in the model. In the Models application, you can open the **Build Hierarchy and Position Rules** tab and view the software item. The value of the **Indicator** field is W, which indicates that the CM part is software. You can select the **Software** icon to view the software-associated items.

Related information:

Inventory application

Creating item master records

Configuring CM parts

A default configuration-managed (CM) part is created when you define a model. You create and modify CM parts in the CM Part Master application.

Before you begin

Before you can create a CM part, you must first create the related model in the Models application, create master task cards for the CM part in the Master Task Cards application, and create an asset assembly in the New Asset Assemblies application.

Procedure

1. In the CM Part Master application, click the **New CM Part** icon.
2. In the **Part** field, specify a value.
3. Optional: Specify a revision to the part.
4. Specify the format of known serial numbers that are associated with the part.
5. In the **Item** field, specify the value of the corresponding IBM Maximo Asset Management item number.
6. If the CM part is for software, in the **Category** field, select **Software**.
7. In the Serial Ranges for CM Part table, add a new row and specify values in the **Serial Range UOC** and **Serial Range Expression** fields.
8. In the Master Task Cards for CM Item table, add a new row and specify a value for the master task card.
9. Save the CM part.

Creating part masters from CM parts

You can associate a configuration-managed (CM) part with one or more assets which are automatically defined as rotating parts.

About this task

The Part Master application adds the part as if you added it by using the Item Master application. If you plan to use the new part in applications other than the Maximo for Aviation MRO applications, add information in additional fields as needed.

Procedure

1. In the Part Master application, select the CM part.
2. Select the **Add to Part Master** action.
3. Click **OK**.

Chapter 9. Maintaining production assets

When working with your production assets, you create and maintain operational in-service data. This data refers to the information you need to complete your daily tasks, such as creating an asset, installing it to build positions, creating asset assemblies, adding meter readings, creating task card records, and managing history.

Creating assets

Production assets are the actual physical builds of complex assets, such as airplanes or locomotive engines. You can validate production assets according to configuration rules and the reference data in models.

Related information:

Assets application

Configuration-managed assets

The information for the physical builds of aircraft and other complex configuration-managed (CM) assets are stored in asset records. Assets are tracked and can be validated according to configuration rules and the reference data in models.

Using the Assets application, you can perform the following tasks:

- Search for asset records.
- View, modify, add, or delete production assets.
- Create the asset hierarchy and view the subassemblies and parts of an asset.
- View, modify, add, or delete safety records for an asset.
- View or add metering information for an asset.
- View the initial (anchor), indirect (derived), and direct readings for each meter installed on an asset.
- Add, view, modify, or delete unplanned maintenance events that were open on a date that you specify. Unplanned maintenance is related to problems recorded on trip logs.
- View and download all of the task card records and technical records that are associated with an end item and all of its child assets.
- Specify or view the specification for the asset as recorded in the Classifications application.
- View the history of the asset, alerts, and warnings that are issued by the build data interpreter.
- Change the registration number, serial number, or CM part for the asset. For example, you can change the tail number of an aircraft.

Configuration rules

Configuration rules define which build positions, CM parts, and other elements are valid and not valid for a configuration. The build data interpreter (BDI) uses the configuration rules to determine whether an asset complies with the reference data in the corresponding model.

Configuration rules exist for the following elements:

- Build positions
- CM parts
- Labels
- Maintenance plans
- Formulas

Configuration rules can be positive or negative. A positive rule indicates that the corresponding build position, CM part, or other element is valid for the corresponding model or variation and build position. A negative rule indicates that the build position, CM parts, or other element is not valid.

A rule is positive if the corresponding check box on the applicable subtab is selected, and a rule is negative if the check box is clear. You enable and disable configuration rules on the subtabs of the **Position Rules** tab in the Models application.

If an asset does not comply with the rules for the corresponding configuration, the build data interpreter (BDI) identifies the unusable asset in the Assets application. For example, the build data interpreter identifies an asset that contains a CM parts where the configuration rule is disabled for that model.

Configuration rules can be primary or secondary. You can enable or disable a primary rule on the subtabs of the **Position Rules** tab. A secondary rule is dependent on a primary rule. You create secondary rules, in the form of Boolean expressions, on the **Advanced** tab of the Models application.

Converting assets to new configurations:

After you check the build data interpreter (BDI) status of an alternative configuration for an asset, you can convert the asset to the new configuration. Converting to a new configuration can result in the creation or removal of maintenance events or positions.

About this task

When you use the BDI to convert assets, the following actions are performed:

- Primary and secondary configurations are converted.
- The new configurations that you convert become the current configurations.
- Any required maintenance events or build positions are created.
- Details about any noncompliant components are listed in the Problems table.

Procedure

1. In the Assets application, select an asset and click the **View** tab.
2. Specify the date on which you want to use the configuration for the asset.
3. Select **BDI Status** action.
4. In the Alternative Configurations tab, select alternative configuration options from the list of configurations that are available for assets with the current model. The available configurations are grouped by type and you can select just one configuration for each type.
5. Click **Validate Configuration**. The Configurations Status for Selected Configurations table refreshes and lists any problems with the alternative configuration.

6. Click **Apply Configuration** to convert to the alternative configuration or click **Reset** to restore the original configuration.
7. Click **OK** and save the asset.

Updating the status of asset configurations:

You can update the status of any asset configuration. When you update the status of the current configuration, the application creates any required maintenance events and build positions for the current configuration.

Procedure

1. In the Assets application, select the asset and click the **View** tab.
2. In the **As Of Date** field, specify a past date or the current date.
3. From the **Select Action** menu, select **BDI Status**.
4. Select the configuration you want to update.
5. To prevent the build data interpreter (BDI) from updating the asset to the latest allowed revision,
   a. Specify the required revision number in the **Revision** field.
   b. Select the **Hold Revision** check box.
6. Click **Validate Configuration**. The BDI checks the selected configuration and provides details about any noncompliant assets in the Problems table.
7. Save the asset.

Downloading all and technical records for CM parts

You can download a snapshot of your maintenance program from any date for any configuration-managed part. Downloading the records and technical records that comprise your maintenance program can help ensure correct maintenance and adherence with regulatory requirements.

About this task

If you have large maintenance program, you can download the snapshot of the maintenance program asynchronously in the background to limit any potential issues with system performance. To download in the background, specify an email address and use the **Download via Email** button. After the download of the maintenance program is completed, a notification email that contains an attachment is sent to the specified email address.

Procedure

1. In the Assets application, on the **View** tab, open the **Maintenance Plan** tab for the asset, and click **Display All**.
2. In the Maintenance Program dialog box, specify the filter criteria to identify which task card records that you want to download. The **As of Date** field is used to determine which task card records were active for the asset hierarchy at the specified time.
3. Click **Refresh**.
4. Click **Download**.

Build data interpreter (BDI)

The build data interpreter (BDI) checks aircraft and other configuration-managed assets, position by position. The BDI ensures that assets comply with the configuration rules in the models for the assets.

The BDI Status window shows noncompliant assets, their problem code, and the reason for noncompliance. Other windows and tabs in the Assets application are color-coded to indicate the severity of noncompliant assets. You access the BDI Status window by using the **BDI Status** action in the Assets application.

The following table lists the status information that the build data interpreter generates.

Color of text	Problem code	Error or informational message	Cause of error
Red	AOG	Aircraft is AOG	An open aircraft on ground (AOG) work order exists for the asset.
Red	BMR	Invalid position	The build data interpreter cannot find a valid configuration-managed (CM) build for the asset.
Red	EBD	Event overdue	An open maintenance event exceeds the due date or meter reading.
Red	ENR	Event needs review	Someone must validate the active date on a maintenance event that the build data interpreter created.
Red	ISR	Invalid install/remove history	Overlapping installation or removal history exists for the asset or a position on the asset.
Red	SEI	Empty mandatory position	An existing mandatory build position is empty.
Red	SIR	Invalid part installed	Because of the established configuration rules, the part installed in the build position is not valid for the model, variation, or revision.
Red	SMM	Missing mandatory position	A mandatory build position is missing. If the build data interpreter updates or converts the configuration, a position is created and the status becomes an empty mandatory position (SEI).
Red	SSR	Duplicate part/serial	Multiple assets have the same CM part and serial number.
Red	XDP	Invalid part installed	The part that is installed in the build position is not valid because of a cross-structural or higher part check in the established configuration rules.
Amber	EBW	Event beyond warning	An open maintenance event exceeds the warning date or meter reading.
Amber	NAD	Non-AOG discrepancy	An open non-aircraft on ground incident exists.
Green	BMD	Empty extra position	According to the configuration rules, an existing empty build position is unnecessary. When the build data interpreter updates or converts the configuration, the build position is removed.
Green	EID	Extra event	According to the configuration rules, an existing maintenance event is unnecessary. If no associated work order exists, the build data interpreter removes the maintenance event when the configuration is updated or converted.
Green	EMC	Event missing	A required maintenance event is missing. When the build data interpreter updates or converts the configuration, it creates the maintenance event.
Green	SMO	Missing optional position	An optional build position, which the configuration rules require, is missing. When the build data interpreter updates or converts the configuration, it creates the build position.
Blue	SEO	Empty optional position	Empty optional positions exist, but they are valid.
Black	EBA	Event beyond alert	An open maintenance event exceeds the alert date or meter reading.

Color of text	Problem code	Error or informational message	Cause of error
Black	SED	Empty mandatory deferred position	An existing mandatory build position is empty, but an associated deferred work order exists.

You can use the **BDI Status** action to check compliance at any time.

Related tasks:

"Installing assets in non-serialized build positions" on page 96
A non-serialized asset is a representation of a part, such as a screw or bolt, that does not have a serial number but is required by the designed model. You can track non-serialized assets by specifying the minimum and maximum quantity required in a non-serialized build position.

"Installing assets in serialized build positions" on page 95
When you have assets that have serial numbers and are classified as rotating , you can install the assets in serialized build positions.

"Removing assets from non-serialized build positions" on page 97
You can remove assets from non-serialized build positions. To remove assets entirely, enter a negative value. For example, if you have a non-serialized build position that contains 12 bolts that hold a fuel pump assembly in place, enter -1 if you removed all of the bolts.

"Removing assets from serialized build positions" on page 96
You can remove assets from serialized build positions. For example, if maintenance needs to be done on an asset, you can remove the asset to perform the maintenance.

Color-coding in the Assets application:

Various windows and tabs in the Assets application are color-coded to indicate the severity of noncompliant assets. You can see at a glance which assets are compliant and which have problems.

The BDI Status window lists the status and cause of noncompliance. You access this window through the **BDI Status** action in the Assets application.

The following table lists the subtabs and windows that contain color-coded data:

Tab, subtab, or window	Access through
List tab	-
View tab (display of asset structure)	-
Maintenance Plans subtab	**View** tab
Maintenance History subtab	**View** tab
Select Value (**Asset** field) icon	**Install/Remove** > **Install/Remove** action
Build Data Interpreter Status window	**Build Data Interpreter Status** action

The following table lists the meaning and general status of color-coded data:

Color of text	Description	Status of asset
Red	Indicates a serious problem.	INVALID

Color of text	Description	Status of asset
Amber	Indicates a maintenance problem that can lead to a serious problem if no one corrects it.	WARNING
Green	Indicates that the build data interpreter found a missing maintenance event or build position when it checked the status of an alternate (non-current) configuration. When the build data interpreter converts the configuration, it creates the missing record.	CONVERSIONS PENDING
Blue	Empty optional position, but configuration is valid.	OK
Black	No problem.	OK

BDI queue status:

The BDI Queue Status application is used to monitor the processing of assets by the build data interpreter (BDI). The statuses of the assets and the long description for eventual errors in processing are displayed for analysis and correction.

The statuses can be one of the following values:

COMPLETE
The BDI has finished processing the asset.

ERROR
The BDI found an exception during processing. The error message and Java™ stack trace are displayed to the user. This section is collapsed by default.

Cost accumulation

Costs are accumulated whenever you create a work order to maintain an asset. Costs are also transferred in the hierarchy to the parents of the asset being maintained.

For example, if you have a hierarchy of three assets in which asset one is the parent of asset two and asset two is the parent of asset three, costs for work on asset three are transferred to asset two and asset one.

Creating production assets

Production assets are the actual physical builds of complex assets, such as airplanes or engines. A production asset is validated by using the positions, items, and configuration rules that are recorded in the model on which the asset assembly is based.

About this task

To create production assets, use the Assets application or the New Asset Assemblies application. To create configuration-managed assets, use the New Asset Assemblies application. For all other assets, use the Assets application.

Procedure

1. In the Assets application, click the **New Asset** icon.
2. Specify a value for the asset.
3. Specify values for the position, CM part, and rotating part.
4. If the asset is an end item and you entered a CM part, specify values for the registration, model, configuration, and revision.
5. Save the asset.

Adding direct readings to assets

You can add actual or delta meter readings for an asset. You can specify meter readings for any date and time after an asset is created. The asset life is calculated based on the date that you specify for the meter reading.

Before you begin

Before you add meter readings to an asset in the Assets application, you must set the initial readings on the related asset.

Procedure

1. In the Assets application, on the **List** tab, select an asset record.
2. On the **Direct** subtab of the **View** tab, specify a meter reading for the parent asset or child asset.
3. Specify a meter name and a meter reading type.
4. Specify a count date and time.
5. Specify a meter value. If you specify an actual meter reading, the system calculates the delta meter reading and vice versa.
6. Click **OK** and save the record.

Editing asset life offsets

Life offsets affect the calculation of meters and can result in different meter readings. The end item count at installation and end item count at removal are life offsets. You can edit the life offset of child assets.

Procedure

1. In the Assets application, on the **List** tab, select an asset record.
2. On the **View** tab, specify the as of date information.
3. On the asset V-tree, right-click the node that you want to edit and select **Edit Offsets**.
4. Specify values for the actual count for the end item count at installation and at removal.
5. Click **OK** and save the record.

Installing assets in serialized build positions

When you have assets that have serial numbers and are classified as rotating , you can install the assets in serialized build positions.

Procedure

1. In the Assets application, select the top-level asset, and click the **View** tab.
2. In the **As Of Date** field, enter the date on which you want to install the asset.
3. Right-click the node that contains the build position to which you want to install the asset and select **Install/Remove**.

4. Specify the installation details.
5. Optional: Specify the associated work order and end item count.
6. Save the asset.

Results

The application updates the record. If you installed the asset to a position where an asset was already installed, the build data interpreter (BDI) creates a position. The BDI then installs the assets in a new position.

Installing assets in non-serialized build positions

A non-serialized asset is a representation of a part, such as a screw or bolt, that does not have a serial number but is required by the designed model. You can track non-serialized assets by specifying the minimum and maximum quantity required in a non-serialized build position.

About this task

In the Assets application, the non-serialized build positions are identified in pink within the asset V-tree hierarchy. For example, a fuel pump mounting is a tracked asset that has a serial number. The 12 bolts that secure the pump to the structure are vital to the integrity of the asset but they are not tracked as serialized parts. The 12 bolts are defined as a non-serialized position with a maximum quantity of 12 and a minimum quantity of 12. When the asset is validated, the quantity of bolts installed is evaluated.

Procedure

1. In the Assets application, select the top-level asset and select the **View** tab.
2. In the **As Of Date** field, enter the date on which you want to install the asset.
3. Right-click the node that contains the build position and select **Non-Serialized Build Position**.
4. Add a new row.
5. Specify the installation details.
6. Specify the number of assets that you installed in the build position, the date and time when you installed the assets in the build position, and the work order associated with the installation.
7. Optional: Add comments about the installation in the **Memo** field.
8. Click **OK** and save the asset.

Removing assets from serialized build positions

You can remove assets from serialized build positions. For example, if maintenance needs to be done on an asset, you can remove the asset to perform the maintenance.

Procedure

1. In the Assets application, select the top-level asset and select the **View** tab.
2. In the **As Of Date** field, specify date on which you want to remove the asset.
3. Right-click the node that contains the build position where the asset is installed and select **Install/Remove**.
4. Select the **Remove Asset** check box.
5. If you plan to move the asset to a new location, specify a value in the **Remove to Location** field.

6. If the removed asset requires additional work, specify a value in the **Follow on Work Type** field.
7. Save the asset. If necessary, a work order is created for follow up.

Removing assets from non-serialized build positions

You can remove assets from non-serialized build positions. To remove assets entirely, enter a negative value. For example, if you have a non-serialized build position that contains 12 bolts that hold a fuel pump assembly in place, enter -1 if you removed all of the bolts.

Procedure

1. In the Assets application, select the top-level asset and click the **View** tab.
2. In the **As Of Date** field, specify the data on which you want to remove the asset.
3. Right-click the node that contains the build position and select **Non-Serialized Build Position**.
4. Add a new row.
5. Specify the removed asset information.
6. In the **Quantity** field, specify the number of assets that remain in the build position or specify a negative number if you removed all of the assets from the build position.
7. Specify the date and time when you removed the asset in the build position and the work order associated with the removal.
8. Optional: Add any comments you need about the removal in the **Memo** field.
9. Click **OK**.
10. Save the asset.

Managing assets in your inventory

You can manage assets as part of your inventory from within the Assets application. For example, you can change part numbers, issue parts from a storeroom, and apply part assembly structures to assets.

Updating the history of child and parent assets

If you must change the date that an asset was installed or removed, you can update the history of child and parent assets.

Procedure

1. On the **View** tab in the Assets application, in the **As Of Date** field, specify the current date or a past date.
2. Locate the node and asset that you want to update.
3. On either the **Parent History** subtab or the **Child History** subtab, change or remove the installation date or removal date.
4. Save the asset.

Creating asset assemblies

To facilitate management of complex assets, you can create an asset assembly to define a new asset and generate virtual asset records for its components and subassemblies.

New asset assemblies

Aviation assets can have thousands of tracked components and it can take days to identify and initialize the component data. To facilitate management of complex assets, virtual assets are created for the corresponding models.

With the New Asset Assemblies application, you can add, view, or modify subassemblies of a new asset assembly. You can perform the following actions:

- Generate a virtual asset from the corresponding model.
- Assign asset numbers and serial numbers to subassembly components.
- Assign meters to the end item and its subassemblies.

A new asset assembly remains separate from production assets until you confirm that the assembly is ready for production. This process is also known as phase in or induction.

Related tasks:

"Creating asset assemblies for assets" on page 99
To speed up the initialization process of assets, you can create an asset assembly to define a new asset and generate virtual asset records for its components and subassemblies. You can also model an existing production asset and generate virtual asset records for its components and subassemblies.

Creation of production assets

After you create an asset assembly and generate its meters and subassemblies, you can modify the assembly asset as needed. When the asset data is verified and ready for production, you can then create the production asset or create asset records for the components of an existing production asset.

You can perform these activities using the **Create Asset** action in the New Asset Assemblies application. This action checks all the data in the new asset assembly, then generates an asset record for the end item and its components. Depending on the complexity of the asset, this action can take a long time to finish. The newly created assets are then available in the Assets application.

You can create a production asset only if the status of the new asset assembly is Active. Also, the status of any IBM Maximo Asset Management part masters that are associated with CM parts must be Active. After you change the status of a new asset assembly to Active, you cannot update the record.

System-generated asset numbers and serial numbers

To speed up the identification and initialization process, system-generated asset numbers and serial numbers can be assigned to subassembly components.

The generated values are shown on the **Sub Assembly Details** tab. The **Create Sub Assemblies from CM Build** action uses the following values from the **New Asset** tab to generate prefixes and serial numbers:

Field	Data type	Maximum character length of concatenated prefix and suffix
Asset Prefix	Alphanumeric	12
Asset Suffix	Integer	12
Serial Prefix	Alphanumeric	15
Serial Suffix	Integer	15

The asset prefix value is used for every asset number that it generates. The asset suffix value is used for the first asset number that it generates. The value is then increased by 1 for subsequent suffixes. For example, if you enter `A-` in the **Asset Prefix** field and `0001` in the **Asset Suffix** field, the following asset numbers are generated: A-0001, A-0002, A-0003, and so on.

Likewise, the serial prefix value is used for every serial number that it generates. The serial suffix value is used for the first serial number that it generates. The value is then increased by 1 for subsequent suffixes.

Multiple new asset assemblies

Some complex assets, such as aviation asset assemblies, have thousands of tracked components, which can take days to identify and initialize the component data. To facilitate receiving of multiple complex assets at a time, you can use the New Asset Assemblies - Receiving application. The application features the receipt of either a single asset (and subassemblies, if appropriate) or multiple assets within a single session.

With the New Asset Assemblies - Receiving application, you can add, view, or modify subassemblies of various asset assemblies at a time. Use the **Multiple assets** and **Apply to all** check boxes to specify the multiple receipt of these assets.

New asset assemblies remains separate from production assets until you confirm that the assemblies are ready for production. This process is also known as phase in or induction.

Related tasks:

"Creating asset assemblies for assets"
To speed up the initialization process of assets, you can create an asset assembly to define a new asset and generate virtual asset records for its components and subassemblies. You can also model an existing production asset and generate virtual asset records for its components and subassemblies.

Creating asset assemblies for assets

To speed up the initialization process of assets, you can create an asset assembly to define a new asset and generate virtual asset records for its components and subassemblies. You can also model an existing production asset and generate virtual asset records for its components and subassemblies.

Procedure

1. In the New Asset Assemblies application, click the **New Asset Assembly** icon.
2. Create an asset assembly from a new asset or from an existing asset.
3. Specify the configuration-managed (CM) part and model of the asset.
4. Specify the status that you want to assign to the production asset when the asset is generated.
5. Specify a receipt date.
6. Specify the spare parts, measurement points and warranty contracts that are automatically created when the asset is created
7. Generate the asset numbers and serial numbers:
   - To generate asset numbers for the subassembly components, specify values in the **Asset Prefix** and **Asset Suffix** fields.
   - To generate serial numbers for the subassembly components, specify values in the **Serial Prefix** and **Serial Suffix** fields.

8. Save the asset assembly. The application saves the new asset assembly with a Draft status.

Related concepts:

Relationships between PM groups and records
Preventive maintenance (PM) records are grouped by operation type and these groups are named PM groups. Using the PM Groups (CM) application, you can manage relationships between PM records within the same PM group and between PM records of different groups.

Specifying initial meter readings

After you generate a list of meters, you can assign an initial reading to a meter. Specifying the initial meter readings provides more data when the assembly becomes ready for production. You can perform this procedure only if the status of the new asset assembly is Draft.

Procedure

1. In the New Asset Assemblies application, select the new asset assembly that you want to update.
2. In the **New Asset** tab, in the **Meters** tab, select the meter that you want to update.
3. Specify a date for the initial reading.
4. Specify a value for the initial count.
5. Specify the average calculations information. You can only use continuous or delta meters.

Option	Description
To use all readings to calculate the average:	Specify **All**.
To use a specific number of days to calculate the average:	Specify **Sliding Days**. In the **Sliding Window Size** field, specify the number of days.
To use a specific number of readings to calculate the average:	Specify **Sliding Readings**. In the **Sliding Window Size** field, specify the number of readings.
To set the average reading and never recalculate it:	Specify **Static**. In the **Average Units/Day** field, specify the value to use to calculate the average.

6. Save the asset assembly.

Specifying subassembly details

You can add, view, modify, or delete the components, meters, and initial readings associated with a subassembly. You can update this information only if the status of the new asset assembly is Draft.

Procedure

1. In the New Asset Assemblies application, select the new asset assembly that you want to update, and click the **Sub Assembly Details** tab.
2. Optional: Specify or update values in the Sub Assemblies table.
3. To show the meters and initial readings associated with a subassembly, select the subassembly from the Sub Assemblies table.
4. Optional: Specify or update values in the Initial Readings table.
5. Save the asset assembly.

Generating meters for new asset assemblies

To increase efficiency and reduce risk of error when setting up new asset assemblies for complex assets, you can generate a list of meters. The meter information is retrieved from the corresponding model.

Procedure

1. In the New Asset Assemblies application, select the new asset assembly for which you want to generate a list of meters.
2. From the **Select Action** menu, select **Create Meters from CM Build**.
3. Save the asset assembly.

Assigning meters to end items or subassemblies

You can assign a meter to an end item or a subassembly only if the meter is associated with a maintenance plan. You can force the application to assign a meter to an end item or subassembly. You also can assign an initial reading to a meter.

About this task

This procedure applies only if the status of the new asset assembly is Draft.

Procedure

1. In the New Asset Assemblies application, on the **New Asset** tab, select the new asset assembly.
2. Assign the meters:
   - To assign a meter to the end item, select the corresponding **Copy to End Item** check box in the Initial Readings table.
   - To assign a meter to every subassembly in the new asset assembly, select the corresponding **Force Copy to Sub Assemblies** check box.
3. Save the asset assembly. The **Sub Assembly Details** tab shows the meters that apply to subassemblies.

Generating subassemblies

To increase efficiency and reduce risk of error when you are setting up new asset assemblies for complex assets, you can generate subassemblies for a new asset assembly. You can perform this action only if the status of the new asset assembly is Draft.

Procedure

1. In the New Asset Assemblies application, select the new asset assembly for which you want to generate subassemblies.
2. On **New Asset** tab, specify the asset numbers or serial numbers.
3. From the **Select Action** menu, select **Create Sub Assemblies from CM Build**.
4. Save the asset assembly.

Creating asset attribute change records

Asset attribute change records provide the ability to track and report on changes throughout the life of the asset.

Asset attributes

Asset attributes define the status of an asset in relation to its meter life value and configuration on a specified date. Asset attributes can change throughout the life of

an asset. When the attribute change record is saved, the values for the selected attribute are written to history for future reference and analysis.

You create asset attributes in the Asset Attributes Setup application. You use the Asset Attributes application to create asset attribute change records, which create, manage, and assign an attribute change that is applied to an asset. You also can add new asset meter values when an attribute change record is created. Asset attribute change records provide the ability to track and report on changes throughout the life of the asset.

You can view the asset attributes and the attribute changes in the Assets application. The asset attribute, the attribute change, and the meter values for the asset are shown according to the selected **As of Date** field value.

Meter reading values are recorded in the Life at Asset Attribute Change window. The asset meter readings and the attribute values are used to update the meter life value of an asset.

Related tasks:

"Creating production assets" on page 94
Production assets are the actual physical builds of complex assets, such as airplanes or engines. A production asset is validated by using the positions, items, and configuration rules that are recorded in the model on which the asset assembly is based.

Asset meter life

Highly regulated and safety-critical environments track and manage complex assets. Typically, multiple asset meter readings, also known as meter life values, are recorded to track asset meter use. An asset meter can record flying hours, cycles, miles traveled, or engine starts.

Two types of meter readings are used to track assets:

- An actual or hard count records the current asset meter reading.
- Delta or soft count records the difference between the last asset meter reading and the current asset meter reading.

Creating asset attribute change records

An asset attribute change record applies an attribute change to an asset. Asset attributes define the status of an asset in relation to its meter life use and configuration in a specified time period. Asset attribute change records provide the ability to track and report on changes throughout the life of the asset.

Before you begin

To ensure that asset attributes are available for selection, you first must create attribute values in the Asset Attribute Setup application.

About this task

When you save an attribute change record, it becomes read-only and cannot be modified. You can view the asset attributes and the asset attribute changes in the Assets (CM) application. The attributes and the attribute changes are listed according to the selected **As of Date** field value.

Procedure

1. In the Asset Attributes application, click the **New Asset Attribute** icon.
2. Specify the asset, attribute name, value, and change date.
3. Optional: In the **Comments** field, specify notes that are associated with the attribute change.
4. Save the attribute.

Updating meter readings for assets

To maintain accurate records and update any incorrect meter readings, you can change initial or direct meter readings for assets retrospectively.

Procedure

1. In the Assets application, select the top-level asset and click the **View** tab.
2. In the **As Of Date** field, specify the current date or a past date. The application displays the asset structure as it existed on the specified date.
3. Click the node that you want to update.
4. Click the type of meter you want to update.
5. In either the **Initial** subtab or **Direct** subtab, add a meter reading or change the date of the meter reading.
6. Save the asset.

Chapter 10. Maintaining aircraft by using flight log books

Similar to paper-based log books, flight log books provide an electronic record of flight information and maintenance operations for aircraft and aircraft training devices. When maintenance is required, you can log discrepancies and corrective actions.

Flight log books

A flight log book holds information for one aircraft only. During the lifecycle of the aircraft, the same flight log book is used to record and maintain information about that specific aircraft. The flight log book includes information about the aircraft and its flight data, discrepancies, maintenance, and personnel.

Flight log book setup records

Flight log books are used by the defense and commercial aircraft sectors to report aviation quality and maintenance. The number of engines, fuel tanks, and replenishment types for an aircraft can vary. To accommodate these variations, you create flight log book setup records that are used as templates to report your type of aircraft maintenance.

A flight log book setup record is a template for the specified model and variation. For example, you create a flight log book setup record for the x_jet model. This fighter jet has two engines, three fuel tanks, and two types of munitions. A flight log book that is created for an x_jet aircraft automatically shows and collects data for the two engines, three fuel tanks, and two types of munitions. If you do not specify a variation, then the flight log book setup record applies to all variations of the model.

Flight log book records

Flight log books provide an intuitive way for pilots, mechanics, and flight engineers to view and record data that is related to aircraft serviceability. When flight log books are in the active status, you can add flight data records to document information about flight data, personnel, replenishments, and munitions.

A flight log book tracks an aircraft through its lifecycle by displaying and collecting information that is related to the following statuses:

Flight log book status
: Indicates that status of the flight log book record, such as draft, active, inactive, or locked. When you create a flight log book, it is in the draft status. You cannot add flight data records until you change the status of the flight log book to active. The status of the flight log book is not linked to the serviceability of the aircraft.

Aircraft status
: Indicates the current condition of the aircraft, such as grounded, limited release to service, or released to service. The aircraft status is directly linked to open discrepancies. Only one aircraft status is associated with each flight log book record.

Discrepancy status

Indicates whether faults exist that affect the serviceability of the aircraft. If there are multiple discrepancy records, the one with the most severe status is linked to the aircraft status. For example, a flight log book has two discrepancy records. One discrepancy relates to a broken light, and the aircraft is allowed to fly under certain conditions. The other discrepancy relates to a crack in the fuselage, which requires immediate attention. Because of the severity of the second discrepancy, the status of the aircraft is grounded.

Deferral status

Indicates the status of a discrepancy that is deferred for later action. A deferral is a formal process for delaying the completion schedule of maintenance items. A deferral might be required for reasons such as the inability to obtain spare parts, accessibility, or operational imperatives.

You create flight data records to store the details that are associated with the aircraft's flights, such as departure and arrival times, meter values, personnel details, and replenishments. Only one flight data record can be active at a time.

You can use the inventory applications to track replenishments and munitions by using the inventory issues and returns processes. For non-rotating returns, you can select the default part for a replenishment. For configuration managed munition assets, you can select from the list of candidate parts based on the configuration rules that are associated with the build item.

If you are tracking munitions in the inventory applications, you can track the loading of munitions, expending of munitions, and unloading of munitions on active flight log book records. You can track both rotating parts, such as air-to-air missiles, and non-rotating parts, such as cannon rounds. The tracking of non-rotating parts stops after they are expended.

When you are tracking munitions, you add a row in the **Munitions** tab, select an option from the **Type** field for the process that you are tracking: LOAD, EXPENDED, or UNLOAD. You then select the build item. You are then able to enter data into the fields based on whether the munition is rotating or non-rotating, and the total quantities are automatically calculated. After you save the record for a rotating munition, the transaction is validated and the asset move occurs. For example, if you are recording a loading of an air-to-air missile, you select the serial number and can optionally select a work order. When the record is saved, the missile is installed on the asset, because it was previously issued from the storeroom to the asset, location, or work order.

Flight log books provide a way to track maintenance issues through the creation of discrepancy records. When the flight log book is active, you can create discrepancy records that are related to a flight data record. You can define post-flight inspection procedures in the flight log book setup record. Then, when you create a flight data record, a discrepancy is automatically created to ensure completion of the post-flight inspection.

Discrepancy records require corrective action to ensure that the aircraft is maintained according to regulatory requirements. The discrepancy record includes a code for the planned corrective action. When you save the discrepancy record, the discrepancy status is grounded. Depending on your security profile, you can change the status of the discrepancy record to allow usage of the aircraft. For example, if the fault does not affect the structural and mechanical integrity of the

aircraft, you can change the status to limited release to service in accordance with regulatory requirements.

Revision of flight log book setup records

If changes to the template are required, the flight log book setup record is raised in revision and the status is changed to pending revision. After you save the changes, you can set the status of the flight log book setup record to active.

You can change the flight log book type for a specific flight log book and apply the latest revision of the flight log book setup record. For example, a new munition type is added to the flight log book setup record of the x_jet model. You can open a flight log book for a specific x_jet aircraft and change the flight log book type to the latest revision. Then, the flight log book of the x_jet aircraft includes information for this new munition type.

You can apply this action to multiple flight log books by selecting the same flight log book setup record from the **List** tab of the Flight Log Book application.

Enabling the inventory management process for flight log books

The inventory issue and returns process can be used for replenishments and for the loading and unloading of munitions in the Flight Log Book application. When you track replenishments and munitions in the inventory applications, you can more accurately manage your inventory and can conduct replenishment and munitions firing analysis for your entire fleet.

Procedure

1. In the Organizations application, select an organization, and then select **Select Action** > **CM Options**.
2. Select the check box for managing fuel, replenishments, and munitions in the inventory applications.
3. In the Part Master application, create default CM parts for the fuel, replenishments, and munitions that your fleet uses.

Creating flight log book setup records

The flight log book setup record provides the flexibility to create a flight log book record that is tailored to an aircraft and the regulations that are required in the country of registration of the aircraft. You create a flight log book setup record to configure how the flight log book record displays and collects information for a specific aircraft.

Procedure

1. In the Flight Log Book Setup application, click the **New Record** icon, and specify the type of the flight log book setup record.
2. In the **Flight Log Book Setup** tab, specify the model and configuration. The combination of model and configuration must be unique for each active flight log book setup record. If the flight log book setup record applies to all configurations of the selected model, do not specify the configuration.
3. Optional: In the **Details** section, specify whether munitions are used.
4. Optional: Specify whether status symbols are displayed in the flight log book record. Default symbols identify the statuses of the flight log book setup

records and the flight log book records. If your implementation requires different symbols, you must provide the icons in a `.gif` file for each of the statuses.

5. Optional: Specify whether post-flight inspections are required. If post-flight inspections are required, add a job plan to the record.
6. Specify engines, meters, fuel tanks, and replenishments that represent the build items in the associated model and configuration.
7. Optional: Specify the munitions details.
8. Change the status of the record to ACTIVE.

What to do next

In the Flight Log Book application, create flight log book records for the aircraft in your fleet. The flight log book record is automatically based on the flight log book setup record that exists for the aircraft model and configuration.

Managing flight log book records

After you create a flight log book record, you can then create flight data records, discrepancies, and deferrals that are associated with the flight log book.

Creating flight data records

After a flight is completed, you create a flight data record to store information on the flight's arrival and departure times, meter readings, personnel, aircraft status, and replenishments. Any discrepancies that are discovered during the flight are associated with the flight data record.

Before you begin

Only one flight data record can be active at a time. If an existing flight data record is active, you must change the status to closed before you can save a new flight data record.

Procedure

1. In the Flight Log Book application, open the aircraft's flight log book.
2. On the **Flight Record** tab, add a new row and specify the departure and arrival times.
3. Add meter readings to record the flight hours.
4. On the **Personnel** tab, specify the information for the flight crew.
5. On the Replenishments tab, specify the information for fuel, oil, and any other necessary replenishments, such as oxygen or munitions.
6. Save the flight data record.

Creating discrepancies and corrective actions

Depending on the overall aircraft status, you can report discrepancies and change the aircraft status. You can resolve the discrepancy by recording the corrective action and completing the discrepancy. If more work is needed to complete the discrepancy, you can generate the corresponding work orders.

Procedure

1. In the **List** tab of the Flight Log Book application, select a record.

2. To report the discrepancy and its corrective action, click the **Aircraft Inspection and Maintenance** tab and specify the details of the discrepancy:
   a. Specify the discrepancy information and the corrective action. The default discrepancy status is GROUNDED, but you can change it to another status.
   b. Optional: To create a work order to complete the correction, click the **Create WO**. icon The work orders that you create are linked to the discrepancy records that you created.
   c. Optional: To defer the corrective actions, click the **Create Deferral** icon.
3. Save the record.

Creating deferrals from discrepancy records

If a corrective action for a discrepancy cannot be completed, you can defer the action.

About this task

You create a deferral from a discrepancy record. When the discrepancy is deferred, the deferral record remains open until the corrective action is completed. Work order records are generated for the corrective actions that you log for the aircraft.

Work orders are always associated with deferrals, and corrective actions are recorded in the work order. When the work order is complete, the deferral status is also changed to complete. The deferral record that is associated with the flight log book is also completed by using the details from the completed work order.

Procedure

1. In the Flight Log Book application, select a discrepancy record and click the **Create Deferral** icon. The discrepancy is transferred to the **Deferral** tab and a work order is created to complete the deferral.
2. In the Deferral dialog box, specify the details of the deferral, including time and the meter-based deferral period.
3. Change the status of the deferral record to active. The active deferral updates the extended due points, which are the meter reading or dates at which inspections or maintenance tasks are due. The information for the extended due points from the flight log book deferral record is shown on the **Maintenance Planning** tab of the Assets application.

Chapter 11. Managing customers, agreements, and billing

Managing customers involving creating customer records, defining terms of agreements with customers, managing service requests from customers, and managing billing services.

Creating customer records

You create customer records in the Customers application and associate the customers with objects in other applications to give the customer users access to those objects.

Procedure

1. In the Customers application, click **Create Customer** on the toolbar.
2. Type the name or identifier of the customer.
3. Select the currency that the customer uses.
4. Specify financial and address details on the customer record.
5. Add customer contacts on the **Contacts** tab. Contacts are created in the People application. You can configure security settings to restrict the information that the customer contacts can access.

What to do next

After you have created a customer record, you can enter physical locations where assets will be managed for the customer, using the Service Address application. You can then set up security groups and restrictions for the customer and associate the customer with customer objects. You can proceed to set up the inventory, locations for services, and assets that are managed for the customer.

Customer-specific records

When customers are associated with other records, those records become specific to the customer. You can limit the visibility of customer records to specific users. Also, certain field filters show results that are based on the associated customer.

Customers can be associated with many types of records, including customer agreements and price schedules, service level agreements (SLAs), response plans, job cards, tickets, work orders, sales orders, assets, locations, inventory, and billing records.

For example, when a customer is specified on a work order, only customer agreements, price schedules, job cards, response plans, and SLAs for this customer can be applied to the work order.

Customer agreements

You create customer agreements that specify the services that you provide, the terms, conditions, prices, and fees for services, and how you bill for services. You can revise customer agreements as needed.

Customer agreements are created in the Customer Agreements application. On an agreement, you specify the customer, specify agreed terms and conditions, billing details, price and billing schedules, and can define scoped work for specific assets.

You can define parts pools that the customer participates in and is billed for. You also can view total billed and revenue amounts in your currency and a different customer currency.

Create customer agreements by specifying the following information as required:

- Associate customers with customer agreements and specify customer specific references such as assets, locations, and job cards.
- Specify billing and payment terms and periods. For pool agreements, specify such details as the No Fault Found (NFF) rate and the responsible party for transportation of repair parts.
- Specify work scope information for specific items or assets, including work tasks and work related dates.
- Specify maintenance parts pools and items.
- Add billing schedules for recurring fees and services.
- Add price schedules for transactions and fees on completed work.
- Specify terms and conditions by adding existing terms from a library or creating them. You can specify that certain terms are visible on customer bills, work orders, tickets, or sales orders.

Service level agreements (SLAs) and response plans

Service level agreements (SLAs) and response plans can be associated with one or more customers. SLAs specify a committed level of service agreed to by the provider and customer. Response plans ensure predictable and repeatable responses to similar work requests.

If you associate a customer with an SLA or response plan, the SLA or response plan can be applied only to tickets, work orders, and sales orders for that customer. If you do not associate a customer with an SLA or response plan, the SLA or response plan can be applied to tickets, work orders, or sales orders for any customer.

Activation and revision

After you create an agreement, you change the status to make it active. During the life of an agreement, you might change the status for other reasons. For example, you might revise it and update the revision to extend the agreement end date.

Related concepts:

"Customer MRO agreements" on page 147
On customer agreements for maintenance, repair, and overhaul (MRO) work, you can specify scope of work (SOW) details. Details include work activity dates, assets to be worked on, and work activities. Activity dates are copied to the work plan as target dates and can be used to schedule the work.

Service level agreements

You can create service level agreements (SLAs) to document the commitments that you plan to fulfill for your customers. A commitment is a level of service that is agreed upon between the service provider and the customer that can be measured in a qualitative or quantitative way. SLAs are applied to many types of records, including tickets and work orders.

You create SLAs in the Service Level Agreements application. You can restrict service level agreements to the organization or site level. If you specify values for organization or site field, users only can view or apply that service level agreement within the specified organization or site.

You can specify the following kinds of information on an SLA. Some of the information is matched to the same information on the target record to determine whether the SLA can be applied.

- Specify a ranking value. The ranking value chooses an SLA when more than one SLA is applicable to a record. A lower numerical value takes precedence over a higher one
- Specify effective start dates, end dates, and review dates. These dates can be specified in workflow processes
- Associate vendors and contracts
- Associate customers so that the SLA applies only to records for the specified customer
- Specify a calendar that calculates target date values
- Specify the commitments that are related to the type of record that the SLA applies to
- Specify the conditions under which a service level agreement applies, such as classification, services, and other criteria
- Associate related service level agreements
- Specify assets, locations, configuration items, or parts pools on the target record that the SLA applies to
- Specify key performance indicators (KPIs) that track performance over time
- Specify escalations, actions, and notifications to support the SLA commitments

Defining response plans and actions

You can create response plans to ensure predictable and repeatable responses to similar work requests. You can apply a response plans to tickets, work orders, sales orders, workflows, or escalations.

About this task

After you create response plans, they can be applied when certain information on the ticket, work order, or sales order matches the same information that is defined on the response plan. Response plans can be applied to records manually or by workflows or escalations.

Procedure

1. In the Response Plans application, insert a response plan.
2. Specify a ranking value. If more than one response plan is applicable to a record, the ranking value is used to select a plan. A lower number in the **Ranking** field takes precedence over a higher number.
3. Specify the type of record that the response plan applies to. Optionally, specify an administrator and the type of date that the response plan applies to.
4. Specify the effective and renewal dates.
5. Optional: In the **Applies To Calendar** section, specify the organization, calendar, and shift. Specified values are part of the matching logic; the response plan is applied only to records reported during this calendar and shift.

6. Specify conditions, locations, assets, configuration items, or parts pools that the response plan matches on the records that it can be applied to. The less specific that you make the response plan, the more records it can be applied to.
7. Specify the response actions and notifications. For example, you can specify actions or action groups that create related records, change record statuses, or specify information on other records. You can associate a communication template with a response action to automate response notifications.
8. Optional: To specify that the response plan is applied only for work or services for one or more customers, select the action to associate customers with the response plan. Response plans that do not have customers specified can be applied to records for any customer.
9. Save the response plan.

What to do next

To make the response plan active, change the status. An active response plan can be applied to other records. If you want to modify the response plan, you must change the status to inactive.

Related concepts:

Conditional expression syntax

Response plans on work orders
Response plans ensure standard responses to work orders. It specifies the actions and notifications that are performed for the work order. It can also assign an owner and vendor and apply a job plan to the work order.

Response plans on tickets
You apply response plans to tickets to ensure predictable and repeatable actions and notifications for similar tickets. Response plans also can assign certain data to tickets such as owners, vendors, and ticket templates.

"Condition matching on price schedules, SLAs, and response plans" on page 141
A price schedule, service level agreement (SLA), or response plan can be applied to a ticket, work order, or sales order if fields and conditions on the price schedule, SLA, or response plan match the same information on the ticket, work order, or sales order.

Managing customer inventory

You can manage inventory for customers. Inventory includes items, services, and tools. You can associate customers with inventory and optionally, manage prices in price books. Price books can specify different kinds of pricing for use of items, services, and tools.

Managing the list prices of recurring items, services, and tools using price books:

With price books, you can manage the list prices of recurring items, services, and tools, and provide different pricing levels for different customers and situations.

Customers on work orders

The customer that is associated with a work order determines the classifications, attributes of classifications, assets, locations, and CIs that are processed with the work order. The customer also determines which users can access the work order record.

A customer must be assigned to a work order for you to apply a customer agreement, price schedule, and other customer-specific information to a work order.

When you create customer records, you create detailed customer agreement and pricing information for the customer, and the services that you provide. You can associate customers with assets, locations, and CIs in the Assets, Locations , and Configuration Items applications.

When you associate customers with work orders, you can also keep the work order records restricted to the users who have permission to access the data of a particular customer. You associate customers with users in the Security Groups application.

When you create a work order, information from the customer about the location, asset, or CI is copied to the work order. The combination of location, asset, and customer on the work order is used to determine the best matches when a service desk agent or workflow process searches for service level agreements, price schedules and response plans.

You can create a work order for a location, asset, or CI. These items must be associated with an active customer in order for the customer information to be copied to the work order. The lowest level of these items on a work order determines the customer on the work order:

Table 10. Record types that determine the customer on a work order

Record type	Rank
CI	If a CI has a customer associated with it, the CI customer data is copied into the work order.
Asset	If there is no CI data, then the customer associated with an asset record is copied into the work order. The cost center and customer charge account from the asset are copied to the work order.
Location	If there are no CI or asset data, then the customer associated with the location record are copied into the work order. The cost center and customer charge account from the location are copied to the work order.
None	If the work order is not associated with a CI, asset, or location, you can add a customer to it.

Adding, changing, or removing a customer on a work order can affect how it is classified. However, classifications and attributes are never automatically removed from or added to a work order when you change a customer association. You change the customer on a work order by changing the value in the customer field directly, or by changing the location, asset, or CI that determines the customer on the work order. If you do so, you should first remove any classifications from the work order, and then re-apply the appropriate classifications after the new customer is selected.

Related concepts:

Work orders
In the Work Order Tracking application, you create and manage work orders for assets and locations. A work order specifies a particular task, and the labor, materials, services, and tools needed to complete the task.

Customer-specific job cards

You can associate one or more customers with a job card so that the job card is available only for work that is done for those customers.

Job cards are applied to work order records, task card records, route stops, and measurement point records. When job cards are associated with customers, they are only available to be applied to records when certain record elements match.

Adding work assets to job cards

To add work assets to a job card, some information must match. Either the customers on the job card match the customers on work assets or the work assets do not have associated customers. When an asset or location that has associated customers is added to the job card, the primary customer for the asset or location must be a customer that is associated with the job card. When an item is added to the job card, any customer for the item can be a customer that is associated with the job card.

Adding classifications to job cards

Classification information on a job card is not matched to a customer on the job card. However, when a job card is applied to a work order, the classification is applied only if the customer on the classification matches the customer on the work order.

Adding tasks to job cards

Tasks that have nested job cards can be added to customer-specific job cards if certain information matches. The nested job card either must be associated with customers on the main job card or the nested job card must not be associated with any customers. For example, if the main job card is associated with customer A, a task with a job card that either is associated with customer A or is not associated with any customer can be added. If the main job card is associated with customer A and customer B, a task with a nested job card for customer A or for customer B can be added. A task with a job card that is associated with no customer can be added. A task with a job card that is associated with customer C cannot be added.

Applying job cards to work orders

A job card that is associated with customers can be applied to a work order if one of the customers on the job card matches the primary customer for the asset, location, or configuration item on the work order. If there is an association between the job card and a safety plan when the job card is used on the asset or location, the safety plan is copied to the work order. If there is an association between the asset on the work order and the point name on the job card, a single measurement point is copied to the work order.

For example, a work planner creates a work order for an asset that is named Boiler1 and wants to select a job card. The boiler is associated with customer A1 as the primary customer. The planner clicks the **Select Value** icon next to the **Job Card** field. In the Select Value window, the planner sees only job cards for customer A1 that apply to the asset Boiler1 and job cards that are associated with no customers.

Applying job cards to task cards

A job card that is associated with customers can be applied to a task card if one of the customers matches the primary customer for the asset or location on the task card. If the task card is associated with a route, a job card can be added to a route stop if one of the job card customers is the primary customer for the asset or location on the route stop.

Associated task cards for master task cards

When task cards are created from a master task card, the list of available assets and locations depends on a match between a primary customer of the asset or location and the customer on the first job card in the job card sequence. If no customer is associated with the first job card in the sequence, no match needs to be made.

Applying job cards to route stops

A job card that is associated with customers can be applied to a route stop if one of the customers is the primary customer for the asset or location on that route stop. If this route is used on work orders that are generated from task cards, the job card is copied from this route stop. If the field is empty, the job card is copied from the task card.

Applying job cards to measurement points for condition monitoring records

A job card that is associated with customers can be applied to a measurement point if one of the customers is the primary customer for the asset or location to be measured.

Related concepts:

Job plans

Customer agreements

You create customer agreements that specify the services that you provide, the terms, conditions, prices, and fees for services, and how you bill for services. You can revise customer agreements as needed.

Customer agreements are created in the Customer Agreements application. On an agreement, you specify the customer, specify agreed terms and conditions, billing details, price and billing schedules, and can define scoped work for specific assets. You can define parts pools that the customer participates in and is billed for. You also can view total billed and revenue amounts in your currency and a different customer currency.

Create customer agreements by specifying the following information as required:

- Associate customers with customer agreements and specify customer specific references such as assets, locations, and job cards.
- Specify billing and payment terms and periods. For pool agreements, specify such details as the No Fault Found (NFF) rate and the responsible party for transportation of repair parts.
- Specify work scope information for specific items or assets, including work tasks and work related dates.

- Specify maintenance parts pools and items.
- Add billing schedules for recurring fees and services.
- Add price schedules for transactions and fees on completed work.
- Specify terms and conditions by adding existing terms from a library or creating them. You can specify that certain terms are visible on customer bills, work orders, tickets, or sales orders.

Service level agreements (SLAs) and response plans

Service level agreements (SLAs) and response plans can be associated with one or more customers. SLAs specify a committed level of service agreed to by the provider and customer. Response plans ensure predictable and repeatable responses to similar work requests.

If you associate a customer with an SLA or response plan, the SLA or response plan can be applied only to tickets, work orders, and sales orders for that customer. If you do not associate a customer with an SLA or response plan, the SLA or response plan can be applied to tickets, work orders, or sales orders for any customer.

Activation and revision

After you create an agreement, you change the status to make it active. During the life of an agreement, you might change the status for other reasons. For example, you might revise it and update the revision to extend the agreement end date.

Related concepts:

"Customer MRO agreements" on page 147
On customer agreements for maintenance, repair, and overhaul (MRO) work, you can specify scope of work (SOW) details. Details include work activity dates, assets to be worked on, and work activities. Activity dates are copied to the work plan as target dates and can be used to schedule the work.

Specifying pricing and billing schedules for services

You can set up automated billing schedules for the services that you provide on a recurring basis. You can set up manual or automated price schedules for work transactions and fees. Billing and price schedules are set up in the Customer Agreements application. You review or create bills in the Customer Billing application. If you allow customers to review bills, they review them in the Bill Review application.

Billing schedule types

You can create different types of billing schedules to bill recurring costs.

Related concepts:

"Price books" on page 142
A price book is a catalog of list prices for items, tools, or services. It contains the published base price, or list price, which can vary depending on the customer and the situation. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services. Price books prices are used in the calculation of prices for materials, services, or tools on work orders in price schedules, and in the calculation of recurring costs on billing schedules.

Related tasks:

"Creating billing schedules for recurring costs" on page 124
To bill customers for recurring costs, you can add billing schedules to the customer agreement. The billing schedule automatically adds costs to bill batches when the billing schedule cron task runs.

Fixed fee billing schedules:

A billing schedule can include billing for fixed fees, such as quarterly service fees for a fixed amount of space that is leased to tenants.

For example, a service company provides building maintenance services to the offices of a law firm. The customer agreement for the customer and services specifies that the law firm is charged $4500 a month for general maintenance work. This amount is entered as a fixed fee on the customer agreement billing schedule.

When a bill batch is created for the billing schedule, the fixed fee is copied to a sales order and the sales order is copied to the bill batch. The law firm is automatically billed $4500 on the 15th of each month.

Example: Billing for fixed monthly fees:

In this example, the A1 Services Company provides building maintenance services to the offices of the law firm of Stein, Brown, and Roberts (SBR). They agree to a monthly billed fee of $3500.00 to be billed at the end of each month. They plan to review the agreement in 12 months. Arthur is a customer account manager at A1 Services Company (A1). He works with William, a billing manager at A1.

Step 1: Create a customer agreement

In the Customer Agreements application, Arthur creates an agreement for the maintenance services that A1 provides to SBR. Arthur can create agreements only for customers that he works with. Arthur specifies the agreement start date as the beginning of the current month. Arthur adds terms that are related to prices and taxes. He verifies the contact information for this customer and saves the record.

Step 2: Define the billing schedule

On the **Billing Schedule** tab, Arthur inserts a row for a new billing schedule. He specifies a monthly billing period for a term of 12 months. A1 sends its bills on the 15th of each month. Today is the 5th day of the month, so Arthur specifies a first bill date of the 15th day of the current month. Because A1 reviews all bills before the customer previews them, Arthur sets the initial status of all bills for this agreement to In Progress. If A1 prefers not to review the bills before their customers review them, they can set the status of generated bills to Prebill. If they set the status to Prebill, the record is added to the billing review for the customer to approve, and the initial review by A1 is bypassed.

In the billing schedule details, Arthur adds a fixed maintenance management fee of $3500.00 and saves the record.

The A1 Services customer account manager reviews the agreement and approves it. The approval causes a workflow-enabled notification to go to the A1 billing manager.

Step 3: Review the generated bill

Near the end of the month, William, the billing manager, confirms with the system administrator that the PLUSPBILLGENCRONTASK cron task is active. A1 scheduled this cron task to poll records every day. For every active customer agreement, the cron task can create a bill batch for billing schedule items on the date that is specified as the next bill date. Sales orders are created for the fixed fee charges, items, service items, tools, and scheduled usage charges on the billing schedule. For SBR, the cron task creates a bill batch for the maintenance fee on the customer agreement. It creates and copies a sales order line for the fixed fee to a new bill batch.

In the Customer Billing application, William reviews the monthly maintenance bill for SBR. The bill is accurate and he changes the status to Prebill. A1 allows authorized customers to review bills before they are sent. A bill with a Prebill status is available for customer review in the Bill Review application. If there is an inaccuracy on a bill line, the reviewer can hold or remove it and the line does not advance to bill review.

Eileen is the purchasing manager for SBR and is named on the customer agreement as a contact. Eileen is authorized to review bills for SBR. On the last day of the month, she logs in to A1's system and can see limited billing information for SBR. She reviews the bill batch that contains the line for the maintenance fee. Eileen approves the line and changes the status of the bill batch to indicate that it is reviewed. On bills with several lines, she can approve all lines that are waiting approval and then change the status of the bill.

William completes the review for A1 and changes the status of the bill to indicate that it is billed to the customer. The bill batch is complete.

If Eileen disputes a fee, William can review her comments and adjust the bill if he agrees with the comment.

Step 4: Issue the fixed fee bill

The bill batch is issued through the A1 accounts payable system. The billed amount is added to the revenue shown on the customer agreement.

Item billing schedules:

A billing schedule can include billing for items, such as the fees for the maintenance of customer assets. The item charges are copied to sales orders when a bill batch is created for the billing schedule. The sales orders are copied to the bill batch.

Item billing schedules include the price book that is used as the source of the item default list price. The billing schedules list equipment that the customer requires service for. The equipment can include assets or items. The assets can include serial numbers.

If the customer agreement is in Draft, WAPPR, or PNDREV status, you can set the item prices to their default value, which is the value from the appropriate price book revision. The appropriate price book revision is based on the price effective date, the customer agreement start date, and the next bill date. If no matching price book is found, the billing schedule price is not changed.

Example of billing for after-market maintenance services

The Acme Manufacturing Company sells medical devices to hospitals and healthcare providers. They also sell maintenance service agreements for the equipment that they sell.

The customers receive scheduled preventive maintenance, and on-call repair services from Acme service technicians. Customers who receive these services sign a service level agreement that specifies a monthly maintenance charge for each piece of equipment, or item, being maintained.

The agreement billing schedule lists, by serial number, each piece of equipment being maintained, the monthly charge for the maintenance services, and the number of months that Acme agrees to provide the services at the guaranteed fee. The agreement also provides for on-call and on-demand repair services at a stated time and material price structure. The terms of this agreement allow occasional revisions. The revisions allow equipment to be added or removed from the agreement, and for the prices to be increased or decreased.

The billing process for the identified assets that are being maintained consists of billing the listed charges on the current revision of the billing schedule on the day that is specified on the billing schedule time interval.

Related tasks:

"Specifying list prices with price books" on page 141
You can create price books to specify and manage the list prices of items, services, and tools. You can specify different pricing levels for different customers and situations. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services.

Service item billing schedules:

You can bill for service items on a billing schedule. Service items are typically a set of services, such as materials, labor, and tools, that are provided together and billed as a fixed cost.

Service items can be supplied by internal or external vendors. If service items are used on work order plans or actuals and are supplied by an internal vendor, you are not required to go through a purchasing process.

Service item prices are calculated according to pricing rules that are defined for the billing schedule. If a price book is associated with service items, the recurring price of the service item in the price book becomes the default list price for the service item. The price book can also specify condition-based prices that are based on a characteristic of an asset or location for the provided service. The primary customer that is associated with the asset or location must be the customer on the customer agreement.

Example of billing for services

The XYZ Service Company provides grounds maintenance service to hospitals and healthcare providers. The customers receive scheduled service and on-call services. Customers who receive these services sign a service level agreement that specifies a monthly charge for services.

The agreement billing schedule lists each regular service, such as lawn care, the monthly charge for the service, and the number of months that XYZ agrees to provide the services at the guaranteed fee. The agreement also provides for on-call and on-demand services, such as snow plowing, at a stated time and material price structure. The terms of this agreement allow occasional revisions. The revisions allow services to be added or removed from the agreement, and for the prices to be increased or decreased.

The billing process for the identified services consists of billing for the listed charges on the current revision of the billing schedule on the day that is specified on the billing schedule. A cron task copies service item prices to a sales order at a regular interval. The sales orders are copied to the bill batch.

In another example, janitorial service prices for a hotel can be based on a list price plus a price that is based on the number of square feet of the location. Square footage is a characteristic of the location.

Related tasks:

"Specifying list prices with price books" on page 141
You can create price books to specify and manage the list prices of items, services, and tools. You can specify different pricing levels for different customers and situations. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services.

Scheduled usage billing schedules:

A billing schedule can include scheduled usage fees, such as rental fees for space in a building. The usage fees are copied to sales orders when a bill batch is created for the billing schedule. The sales orders are copied to the bill batch.

Example of scheduled usage billing

Greenacre Leasing Company provides a fixed amount of space for lease to a customer, and the agreement includes some maintenance services. The customer pays a fixed amount for each square meter of space for the duration of agreement. The customer agreement lists the space and the amount charged. A billing schedule is set up for the fixed space so that the customer is automatically billed each month for the space rental.

Actual usage billing schedules:

You can create billing schedules to bill actual usage fees, such as for such as actual disk storage space that was used or building rental space that was used. Actual usage is billed by the financial period that is associated with the usage dates.

Actual usage billing schedules enable you to bill for asset usage that changes over time. For example, a customer might use more or less space each month, so the amount billed to the customer varies each month.

Usage meters specify the types of usage and measurement units. They are added to the **Actual Usage** tab of a billing schedule along with the unit price that is associated with each usage range. The usage meter is associated with an asset or location record. On that record, it can be associated with one or more customers.

Actual usage is measured on the asset or location. A financial period is associated with each date of actual asset or location usage. If the associated financial period for a measurement date is closed, the next open financial period is used.

On a billing schedule, you can specify to bill all previously unbilled usage or only unbilled usage for the prior financial period. For example, if you generate a bill batch in the month of July for June usage, you can choose to include or exclude usage that has occurred to date in July.

A sales order is created for unbilled usage that you include for the asset or location. Prices are calculated from the pricing rules in the billing schedule. The unit price is the price that is within the range of the total count of all of the usage for that usage meter and for that customer. Actual usage charges are copied to sales orders when a bill batch is created for the billing schedule. The sales orders are copied to the bill batch.

Example

ABC Management Inc. is a facilities management company that provides building and office maintenance services. They charge each client a monthly fee in addition to a custodial fee. The monthly fee is fixed, but the custodial fee is calculated based on the size of the space that is actually maintained. It can change from month to month as customers increase or decrease their occupancy space. The billing schedule contains the fixed monthly fee, and a list of the spaces that are used, with the rate per square foot for each space. ABC Management creates financial periods for each month. They bill actual usage that occurred during the previous financial period.

Each month, the usage fee is calculated by multiplying the occupied square footage by the price on the billing schedule. From the occupied locations, the space usage, in square feet, are collected for the measurement dates and the usage rate is calculated. The usage dates are associated with the financial period for that month. Usage fees are billed by calculating the space used for the financial period to be billed and calculating the price for that usage from the billing schedule.

Managed assets billing schedules:

A billing schedule can include billing for managed assets, such as servers and workstations. Managed assets billing includes charges for both assets and configuration items. The managed assets charges are copied to sales orders when a bill batch is created for the billing schedule. The sales orders are copied to the bill batch.

Billing schedules for managed assets enable service providers to bill customers for fees that are based on the number of assets they are managing. However, this number can change during a billing period. You can bill for managed assets by time period or by financial period.

The **Managed Asset** tab in the Billing Schedules tab of the Customer Agreements application lists the classifications that are to be used to bill for assets or configuration items and the unit price for each asset or configuration item.

The unit price for the asset classification is based on the total number of assets being managed. For example, there may be one unit price that is specified for a

range of 1 to 25 assets that are being managed, and another unit price that is specified for a range of 26 to 200 assets. If there is no range pricing, you can specify an exact price.

To be included in a bill, a managed asset must be associated with a customer and the status of the asset must be operational. Configuration items that have the same customer and are in the same organization as the agreement are billed. System-level configuration items are not billed.

A sales order is created for each operational asset or configuration item, in the organization for the customer, that is classified with one of the listed classifications. Each asset is billed on a single sales order. The price for the asset is the sum of the unit price for the classification of the asset, and the price for each of the features of the asset, as detailed in the asset specifications or the related configuration item specifications.

Example of recurring billing of managed assets

Excell Support Systems (ESS) provides IT support for their clients. ESS bills each of their clients a monthly fee. The fees for managing IT assets depend on the type of asset that is being managed, and the features or configuration of the asset. Additionally, ESS provides services to their clients and bills the clients based on the usage of those services. For example, for email services or storage services, clients are billed based on the amount of storage space that is used. For backup and restore services, clients are billed based on the backup file size, the frequency of backups, and the number of generations of backups stored.

Creating billing schedules for recurring costs

To bill customers for recurring costs, you can add billing schedules to the customer agreement. The billing schedule automatically adds costs to bill batches when the billing schedule cron task runs.

Procedure

1. In the Customer Agreements application, open the customer agreement that you want to add the billing schedule to.
2. In the Billing Schedule section, add the schedule details.
3. In the Billing Schedule Detail section, enter the details of the costs to be included on bill batches that are created when the billing schedule is run. You can bill for fixed fee charges, items, service items, tools, and scheduled usage. Items and service items can be priced by an associated price book.
4. Save the billing schedule.

Results

If the customer agreement is approved and active, the billing schedule is run at the appropriate time based on the specified dates and terms. Sales orders are created for costs on the billing schedule. A bill batch is created, and the sales orders are copied to the bill batch.

Related concepts:

"Condition-based pricing of items and service items" on page 145
You can specify condition-based prices for items and service items in price books. In item price books, you can specify the condition rate and fixed price for condition-enabled items. In service item price books, you can specify the price of services that are based on characteristics of an asset, location, or configuration item (CI) that work is done on.

"Sales orders"
You create sales orders to bill for services such as management fees, trip charges, SLA penalties and credits, warranty claim credits, project milestones, and IT asset performance fees.

Related tasks:

"Billing schedule types" on page 118
You can create different types of billing schedules to bill recurring costs.

Sales orders

You create sales orders to bill for services such as management fees, trip charges, SLA penalties and credits, warranty claim credits, project milestones, and IT asset performance fees.

Fees and charges

Sales orders are created automatically when a billing schedule is run at its specified schedule. You can set up billing schedules for recurring costs for items, services, fixed fee charges, and actual and scheduled usage. You also can bill for assets that you manage. The assets are associated with classifications and additional prices are specified for the attributes of the classification. When the billing schedule runs at its scheduled time, sales orders are created for the costs that are associated with the billing schedule. The sales orders are then applied to a bill batch for the billing schedule and the customer is billed for the recurring costs.

If you create a sales order to bill for IT asset performance, you specify information about the KPI that references the assets. You apply the agreement and price schedule and the system calculates billing prices.

Project milestones

Sales orders are created automatically for price schedules that specify project milestone billing. You set up the milestone bill amounts and project details on the price schedule. When the price schedule is approved, a sales order is created for each milestone. When the work that is matched to the price schedule is complete, the bill batch for the sales order can be created.

Service level agreement (SLA) penalties and credits

To bill for penalty fees for breaches of SLA commitments, you review breaches and create sales orders for them in the SLA Breach application. Pricing rules for breaches of SLA commitments are specified on an associated customer agreement and price schedule.

To bill for credit amounts if you breach an SLA commitment, create a sales order in the Sales Orders application.

Warranty claim credits

On sales orders, you can reimburse your customers for work that is billed and paid but is covered by a warranty contract. Since the associated work order is closed, the delivery manager can specify information about the warranty credit, but cannot change the financial transactions.

The sales order for the credit indicates that this is a credit for a warranty claim, and specifies the work order identifier. In the fees and charges section, the credit amount is specified.

Related tasks:

"Creating billing schedules for recurring costs" on page 124
To bill customers for recurring costs, you can add billing schedules to the customer agreement. The billing schedule automatically adds costs to bill batches when the billing schedule cron task runs.

Price schedules on customer agreements

Price schedules on a customer agreement describe services that you provide, assets, and locations that are entitled to services, conditions under which you provide services, and the pricing rules that you apply to transactions for completed work. You can apply price schedules to work plans so that you can provide price estimates to customers for proposed work. You also can specify fixed fees that you bill for reaching a milestone in a project.

A customer agreement contains one or more price schedules that are subject to the terms, conditions, and other criteria that you specify on the agreement. The customer agreement is the parent to its child price schedules. Since each schedule specifies billing rules, you create an additional schedule when there are new billing rules or other criteria.

You can apply most price schedules to tickets, work orders, and sales orders. Price schedules that bill for project milestones are applied only to sales orders. Price schedules that bill for use of parts from parts pools are applied only to tickets and work orders.

You can set up price schedules that manually or automatically create bill batches. If you specify automatic billing of price schedules, you can group bill lines into bill batches that are based on a grouping attribute that you specify in the automated billing settings. You can group the bill lines by order number, customer cost center, customer PO, or reporting user.

Billing and pricing details and rules

When you create a price schedule, you specify billing and pricing details and rules. You can specify the following information:

- A ranking value, which is used when more than one schedule matches the criteria on the target record
- A calendar or shift to which the pricing is applicable
- Whether price quotes can be used. Price quote details are specified on the work order
- Whether a PO is required for billable work
- Whether approved work transactions on open work orders can be billed
- Fixed fees that are billed when a project milestone is reached
- Classification, included services, and additional conditions and criteria that you can specify
- Locations, assets, configuration items, and pool items to match on the target record
- Included and minimum price amounts for labor, materials, tools, and services
- Pricing rules, such as markups, discounts, list prices, and performance-based prices. Pricing rules apply to actual labor, materials, services, tools, and KPIs (key performance indicators).
- Other fixed fees, incentives, or penalties billed each billing cycle

Applying agreements and price schedules

The price schedule is applicable to records with values that match conditions that you specify on the price schedule. For example, you can specify locations, assets, configuration items, classification, priority, services, and other conditions that you define. The less specific the price schedule, the more records to which it is potentially applicable, and vice versa. When you apply a price schedule to a ticket, work order, or sales order, the system matches fields on both records and selects the applicable price schedule based on the best match. If more than one price schedule is applicable, the ranking value on the price schedule is used; a lower ranking number takes precedence over a higher number.

You apply an agreement and price schedule to a record with the **Apply Customer Agreement** action. This action is available in multiple applications.

When you apply an agreement to a work order, any tasks that are on the work order inherit the price schedule. Child work orders and follow-up work orders do not inherit the price schedule. However, you cannot apply a price schedule to the following types of work orders:

Removing and applying price schedules

In some cases, you can deselect an applied price schedule. Optionally, apply a different price schedule. If you remove a price schedule, you remove all prices from the record and remove the record from its bill batch.

Automated and grouped billing from price schedules:

You can specify the automatic billing of price schedules on a customer agreement. You also can specify that certain types of bill lines are grouped on different bill batches. Both of these features can make billing and reviewing more efficient.

Automated price schedule billing

Automated billing settings that you specify in the Customer Agreements application apply to all price schedules on the agreement. You can specify the schedule for automated bills with the **Billing Cycle** and **Billing Interval** fields. After you specify the schedule, you can preview the billing dates to ensure that the settings are correct.

If a billing cycle is monthly, you can bill on the last day of the month. You also can bill on any day up to the 30th day, which you indicate with the first bill date. In future months, a bill is created on the same day of the month. If you bill monthly on the 29th or 30th day, in February, the bill is created on the last day of the month.

If the billing cycle is by financial period, you can specify the number of days after a period ends that the bill is created. By default, if financial period billing is selected, approved work order transactions are included if they occur before or during the financial period for the bill batch. You can modify this setting.

After you set up an automated billing schedule, a bill batch is created on the next bill date that is specified on the customer agreement. All eligible tickets, work orders, and sales orders are copied to the new bill batch. The bill batch has the status that is specified in the customer agreement.

In the customer agreement, the last copy status and history values are updated. The bill batch end date is set to the next bill date of the agreement. The next bill date that is set by the cron task is not affected by a manually created bill batch.

If you bill by financial period and the agreement does not specify any valid financial periods, then bill batches are not created. You can either specify more financial periods or bill manually.

The next bill date that is set by the cron task cannot be later than the customer agreement end date.

If the copy process fails, for example, due to a server failure, you can create the bill manually.

Grouped work order, ticket, and sales order transactions on bill batches

If you automate price schedule billing, you can specify that certain bill lines are grouped on bill batches. You can specify the grouping by order number, customer cost center, customer purchase order, or the reporting user.

Bill lines that do not meet the grouping criteria are added to a separate bill batch.

Bill batches for a customer agreement can be grouped in one of the following ways:

Order number
A bill batch is created for each work order, ticket, and sales order that is associated with the price schedule. A separate bill batch is created for all bill lines that do not contain an order number.

Customer purchase order
A bill batch is created for each customer purchase order (PO) that is associated with the price schedule. Customer POs can be specified on work orders, tickets, and sales orders. For example, if three customer POs are specified on five work orders and two tickets, three bill batches are created for those bill lines. A separate bill batch is created for all bill lines that do not contain a customer PO.

Customer cost center
A bill batch is created for each customer cost center that is associated with the price schedule. Customer cost centers can be specified on work orders, tickets, and sales orders. For example, if two customer cost centers are specified on 100 tickets and 20 sales orders, two bill batches are created for those bill lines. A separate bill batch is created for all bill lines that do not contain a customer cost center.

Reporting user
A bill batch is created for each reporting user who is associated with the price schedule. The reporting user is identified in the **Reported By** field on work orders, tickets, and sales orders. For example, if four reporting users are specified on 10 work orders, four bill batches are created for those bill lines. A separate bill batch is created for all bill lines that do not contain a reporting user.

Milestone billing of projects:

You can bill for project work by milestones that you define with your customer. When each milestone is reached, your customer is billed for part of the total

amount of the project work. You might define and bill by project milestones for services that involve multiple work orders and resources that are delivered over a long time.

Milestone billing setup and process

You bill for project milestones on customer agreement price schedules. For each milestone, specify that the price schedule applies to sales order objects. Then, enter the fixed fee amount for the milestone, and specify the schedule type as milestone.

When the customer agreement is approved, a sales order for each milestone schedule is created. After the sales order is created, the ranking value of the price schedule is set to 1, and the **Condition** field is filled with information about the linked sales order. This information overwrites any existing information in those fields, and the fields cannot be edited.

The new sales order has a status of waiting approval and the line price can be updated, for example, by a revised price schedule. When the sales order is approved, completed, or closed, the associated price schedule cannot be revised.

The following actions can create the bill for the sales order:

- Manual copy the sales order to the bill
- Set up automated billing for the price schedule and an escalation to bill the sales order. After you set up automated billing, the price schedule line is copied to a sales order. Set up an escalation that monitors conditions that indicate that the milestone is met and then sets the sales order to a billable status.

You can view information about all sales orders for a customer agreement in the View Sales Orders window. For example, you can view which milestones were billed and which milestones are pending billing.

Continuous billing of work for price schedules:

To optimize revenue collection and billing efficiency, you can continuously bill customers for work that is associated with a customer agreement price schedule. You can bill for work on a customer agreement even if an existing bill batch for the same customer agreement is not completed or closed.

Ensuring that duplicate lines are not billed

The following controls are in place to prevent duplicate lines from being billed:

- Bill lines that are disputed or on hold can be copied to a new bill batch if the original bill batch is billed or canceled. This rule applies to work orders that are set up for partial billing. *Partial billing* means that completed work is included in a bill batch even if the status of the work order is not Complete.
- Bill lines that are being copied to a bill batch or are part of a failed copy process cannot be copied to another bill batch. You should allow the copy process to finish, or restart a failed bill copy process.

Special pricing: fixed price quotes and not-to-exceed price quotes

The following rules apply to bill lines to ensure that the customer is not billed more than once for the price that is on a price quote:

- Transactions on work orders that specify amounts from price quotes cannot be in multiple open bill batches. Transactions that are added to a work order during

the bill review cycle can be copied only to an existing bill batch. If transactions are not added to an existing bill batch during the review cycle, they can be added to a new batch only when the previous bill is billed or canceled.

- After a fixed price quote work order is billed, new transactions show a bill price and price quote amount of zero. The customer is billed the full amount of the price quote with the first billed work order.
- After a work order with a not-to-exceed (NTE) price quote is billed, new transaction prices are totaled. This result is subtracted from the remaining NTE price quote balance.
  - If the new total is a negative amount, the new total (a credit) is billed.
  - If the new total is greater than the NTE price quote, then the billed amount is the NTE amount minus the previously billed amount. The billed amount is zero dollars if the difference is less than 0.
  - If the previously billed amount plus the new total is less than or equal to the NTE price quote, then the new total is billed.
- If the type of quote or the quoted amount changes after the work order is completed but before it is billed, the total price on the work order is compared to the NTE price quote. If the total price on the work order is less than the NTE price quote, the total price is billed. If the total price is more than the NTE price quote, the NTE price quote is billed.

Removal of price schedules

If the price schedule is removed from its association with a work order and bill batches are open for the work order, bill batch totals are recalculated to remove the work order prices. The status on the bill lines in the bill batch is set to Removed.

Related concepts:

"Bills for completed work on open work orders" on page 131
You can specify that partial billing is allowed for a price schedule. Partial billing means that completed work on a work order is included in a bill batch, even if the work order remains open. Work can be billed as soon as the transactions are recorded on the work order. This means that a work order can be kept open for the duration of a project. Project-related costs can be billed as they are reported.

"Billable work orders, tickets, and sales orders" on page 153
Work orders, tickets, and sales orders are eligible to be billed on a bill batch if they meet certain criteria.

Price schedules on work orders:

You apply a customer agreement and its price schedule to a work order in the work order application. The price schedule can apply pricing rules to the costs of labor, materials, tools, and services transactions on the work order. The schedule can specify that certain work comprises a milestone for a project and the milestone is billed when that work is completed. The schedule also can specify additional fees and charges for work, such as management, incentive, or penalty fees.

Customers on work orders

A customer must be associated with a work order before you can associate a customer agreement with a work order. The customer that is associated with the work order can be the customer who is responsible for the location, asset, or configuration item on the work order, or you can add a customer directly to the work order.

Special billing

You can specify that partial billing of work order transactions is allowed for a price schedule. Partial billing means that completed work on a work order is included in a bill batch, even if the work order remains open. For work orders that are not partially billed, you can specify included or minimum pricing thresholds or pricing from price quotes.

Related concepts:

"Pricing rules on price schedules" on page 136
You can specify pricing rules on a customer agreement price schedule that calculate transaction prices for components of work orders and tickets. Pricing rules specify how discounts and markups to list prices impact the actual prices that customers are charged for work. The list prices for materials, services, and tools can come from an associated price book.

"Condition-based pricing of items and service items" on page 145
You can specify condition-based prices for items and service items in price books. In item price books, you can specify the condition rate and fixed price for condition-enabled items. In service item price books, you can specify the price of services that are based on characteristics of an asset, location, or configuration item (CI) that work is done on.

Bills for completed work on open work orders:

You can specify that partial billing is allowed for a price schedule. Partial billing means that completed work on a work order is included in a bill batch, even if the work order remains open. Work can be billed as soon as the transactions are recorded on the work order. This means that a work order can be kept open for the duration of a project. Project-related costs can be billed as they are reported.

For example, work orders for both small and large projects are closed when the work is accepted by a customer. Project work orders include labor, material, and services that are added to the project work order when the purchase order is processed. Often, charges are applied to a work order after billing is completed. Therefore, when an approved transaction is added to a work order that is billed, the transaction is included in the next bill batch.

You indicate that partial billing is allowed for work orders associated with a price schedule by selecting **Bill Approved Work** on the price schedule. You cannot bill for completed work on open work orders if special pricing (included pricing, minimum pricing, or price quotations) is used on the price schedule.

If **Bill Approved Work** is selected, when you create a bill batch you can choose to bill open transactions based on financial period. In this case, you specify the financial period for the bill batch. Then, the bill batch includes work order transactions if the financial period on the transactions is earlier than or equal to the financial period specified.

If you choose not to bill by financial period, there is no date check on the work order transactions. In this case, transactions are billed as they are entered and approved. If a transaction is added to a work order after it is billed, that transaction is billed separately in the next bill batch.

The billing history of a work order shows the amount billed for the work order in each bill batch that included transactions from that work order.

A price schedule cannot be removed from a work order after any transactions on the work order are billed.

A transaction on a work order is considered billed when the following criteria are met:

- The bill batch that the transaction is included in has a status of Billed.
- The bill line of the transaction is approved or resolved.

Example

Blackacre, Inc. is a facilities management company that provides building and office maintenance services, including custodial services and minor repairs. Blackacre Inc. also manages medium-size to large-size construction projects. Many of the projects are tracked with a single work order for all of the work on the project. The work order is kept open for the entire project. The customer is billed by week or by financial period for the transactions that are recorded in that week or financial period.

Related concepts:

"Continuous billing of work for price schedules" on page 129
To optimize revenue collection and billing efficiency, you can continuously bill customers for work that is associated with a customer agreement price schedule. You can bill for work on a customer agreement even if an existing bill batch for the same customer agreement is not completed or closed.

"Billable work orders, tickets, and sales orders" on page 153
Work orders, tickets, and sales orders are eligible to be billed on a bill batch if they meet certain criteria.

Examples: Partial billing for project work:

You can specify that partial billing is allowed for a price schedule. Partial billing means that completed work on a work order is included in a bill batch, even if the work order remains open. Work can be billed as soon as the transactions are recorded on the work order. This means that a work order can be kept open for the duration of a project. Project-related costs can be billed as they are reported.

Example of partial billing each week

Blackacre, Inc. is a facilities management company that provides building and office maintenance services, including custodial services and minor repairs. Blackacre Inc. also manages medium-size to large-size construction projects.

Many of the projects are tracked with a single work order for all of the work on the project. The work order is kept open for the entire project. The customer is billed every week for the labor, materials, services, tools, and fees that are recorded for the project that week. The customer is billed on one bill batch for project-related work. This bill batch is separate to the bill batch used to bill the customer for non-project related work orders, tickets, and sales orders.

The billing administrator creates two bill batches for this customer. The first contains only the project work order. After that bill batch is moved to the BILLED status, the second bill batch includes all other work orders, tickets, and sales orders that are linked to the customer agreement.

Example of partial billing by financial period

Blackacre Inc. is managing a construction project for a customer. As in the previous example, all of the project work is tracked with a single work order that is kept open for the entire project. However, this customer requires that open work orders for this project are billed by a designated financial period. The customer is billed for the labor, materials, services, tools, and fees that are recorded during or before that financial period. Project work order is billed on a one bill batch. Non-project related work orders, tickets, and sales orders is billed on a separate bill.

Specifying special pricing on a price schedule:

Special pricing rules can be specified on price schedules. You can specify included or minimum pricing thresholds to indicate whether some work is to be included. You can specify that pricing comes from price quotes. Special pricing can be added to price schedules if you do not intend to bill for completed work on open work orders.

Procedure

1. In the Customer Agreements application, select the customer agreement that you want to add special pricing to.
2. Select a price schedule in the **Price Schedules** table.
3. On the Price Schedule subtab of the **Price Schedules** tab, add the special pricing details to be applied to the selected price schedule. You can enter either included pricing, or minimum pricing, or price quotes.
4. Save the price schedule.

Results

The special pricing parameters are applied to costs when the price schedule is applied to work orders. The costs are recalculated based on the special pricing before the customer is billed for the work.

Included and minimum pricing thresholds:

Pricing thresholds are limits that determine if some work on work orders is included in the charge to the customer or if the customer is charged a minimum amount regardless of the amount of work completed.

You can specify included pricing thresholds or minimum pricing thresholds. You cannot use pricing thresholds with price quotes, and you can use only one of included or minimum pricing on a price schedule. The included and minimum pricing values are calculated when the customer agreement that contains the price schedule is applied to a work order. The calculated cost becomes the actual cost that is charged to the customer.

Included pricing

With including pricing, you specify the amount of the cost of work to be included automatically without a charge to the customer. You can set included pricing thresholds for the cost of an entire work order, or for the cost of labor, services, materials, or tools on the work order. The customer is billed only for the amount that the total price on a work order exceeds the amount specified as the included amount.

For example, the total included amount for a work order, based on the terms of agreement between the service provider and the customer, is $400. If the total calculated price on the work order is $600, then the customer is billed $200, the amount that exceeds the included amount.

Minimum pricing

With minimum pricing, you specify a minimum cost for work that results in charges to customers. You can set minimum pricing thresholds for the cost of an entire work order, or for the cost of labor, services, materials, or tools on the work order. If the total price for the work order is less than the amount specified as the minimum amount, then the customer is billed the minimum amount. If the total for the work order is more than the minimum amount, then the customer is billed the work order total.

For example, the minimum amount charged for a work order, based on the terms of agreement between the service provider and the customer, is $400. If the total calculated price for the work order is $250, then the customer is charged $400.

Price quotes:

Price quotes can be applied to work or services that you provide and bill for.

Quoted prices can be one of the following types:

- Fixed price quotes can be greater than or less than the total of line prices for completed work
- Not-to-exceed (NTE) price quotes set an upper limit on the bill amount for completed work

Price schedules

The price schedule that is associated with the work order specifies whether you can apply a price quote to a work order. If the price schedule on the work order allows price quotes, the price quote is considered when the bill is calculated. To allow price quotes for work, the **Allow Price Quotes** check box on the associated price schedule must be selected. View the price schedule in the Customer Agreements application. To modify a price quote, you add or modify the quote type and the quote price with the **View/Update Price Quote** action in the work order application.

Billing with fixed price quotes

If the work order contains a fixed quote and quote price, and the applied price schedule allows price quotes, the quote price is billed for the completed work. The quote price can be less than or greater than the total of the line prices on the work order.

If the applied price schedule does not allow use of price quotes, the calculated costs and prices are billed. This amount is in addition to the listed markup prices.

Billing with not-to-exceed price quotes

If a work order contains a not-to-exceed (NTE) quote and quote price, the quote price for the completed work is billed only if it is less than the actual costs and prices. The applied price schedule must allow use of price quotes. If it does not, the calculated costs and prices are billed.

Viewing price quote information

When you create a bill batch that includes work orders with price quotes, you can see the following information on the line detail for each bill line:

- Cost
- Agreed price
- Quote type
- Quoted price
- Billed price

Customer pool agreements:

Customer pool agreements are customer agreements that are used with the delivery, pricing, and billing of services for maintenance, exchange, and repair of pool items.

Pool agreements specify the pool items, participation fees, prices that are charged for pool services, and billing options. Pool agreements can be applied and matched to tickets and work orders for pool services. Pool agreements can be referenced on service level agreements (SLAs) that define the service delivery commitments and related credits and penalty fees. Agreements can also be referenced by response plans that define repeatable service responses and actions.

Price schedules for pool services

You specify pool information on price schedules that apply to work orders and tickets for exchanges or replacement of pool items. Other types of price schedules cannot be associated with item pools.

On the **Scope of Work** tab of the customer agreement, you specify the pool identifier and items that the pool can contain. On the **Pool Items** subtab of price schedule, add items from the specified pool to this agreement. Either specify individual pool items or select the option to include all items from the pool.

When the agreement is applied to work orders or tickets for this customer, the pool and pool items on each record are part of the matching logic that selects the correct price schedule. A price schedule that specifies one item in a pool can be matched only to work orders or tickets for that item. A price schedule that specifies all items in a pool can be matched to work orders or tickets for any of those items.

Work orders and tickets for pool services

On work orders and tickets for customers, you can specify a pool item that is used in exchange or repair services. When the customer agreement is applied to the ticket or work order, the pool and item is included in the matching criteria. The matching criteria for the pool and item is applied like the matching criteria for assets, locations, and configuration items.

If information on the ticket or work order matches information on a price schedule, the price schedule can be applied to the ticket or work order. A price schedule with specific values is more restricted than a price schedule with fewer or more general values. If more than one price schedule matches, the ranking value on the price schedule is used to select one.

Response plans and SLAs for pool services

You can create SLAs to specify the expected service levels and commitments that are related to pool services. When you specify a pool and item on an SLA, they are used as part of the matching criteria for applying an SLA to a ticket or work order. A matching SLA sets target dates on the work order or ticket that are based on the SLA commitments.

For example, you might establish a commitment to replace a part and deliver the asset within a certain amount of time. Another commitment might be for the customer to deliver the item to you for repair or replacement within a certain amount of time. If a commitment is not met, a penalty fee or a credit can be applied when services are billed.

Similarly, you can create response plans that are related to item repairs or exchanges. Response plans specify predictable and repeatable responses to similar work requests. When you specify a pool and item on a response plan, they are used as part of the matching criteria when the response plan is applied to a ticket or work order. A matching response plan applies the plan responses and actions. The matching logic is the same as the logic for applying price schedules.

Pricing rules on price schedules:

You can specify pricing rules on a customer agreement price schedule that calculate transaction prices for components of work orders and tickets. Pricing rules specify how discounts and markups to list prices impact the actual prices that customers are charged for work. The list prices for materials, services, and tools can come from an associated price book.

Related concepts:

"Price schedules on work orders" on page 130
You apply a customer agreement and its price schedule to a work order in the work order application. The price schedule can apply pricing rules to the costs of labor, materials, tools, and services transactions on the work order. The schedule can specify that certain work comprises a milestone for a project and the milestone is billed when that work is completed. The schedule also can specify additional fees and charges for work, such as management, incentive, or penalty fees.

Services pricing rules:

Service pricing rules are used to create billing transactions for services reported on a ticket, work order, or sales order to which the price schedule is applied. You add services pricing rules to a customer agreement price schedule in the Customer Agreements application.

Specify pricing rules on the **Services** subtab of the **Pricing Rules** subtab, on the **Price Schedules** tab. Default calculation percentages are added to reported costs for service groups and services. A service calculation percentage overrides a service group calculation percentage. You can enter a positive or negative percentage value to apply a markup or discount to the standard service cost or price. You can enter a positive or negative percentage value to apply a markup or discount to the service cost. You specify the price book to be used for the service list price.

You can also apply a zero additional charge for any service. If you select this choice on a revised agreement when the original had a markup or discount, the markup or discount information in the revised record is deleted.

Related concepts:

"Price books" on page 142
A price book is a catalog of list prices for items, tools, or services. It contains the published base price, or list price, which can vary depending on the customer and the situation. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services. Price books prices are used in the calculation of prices for materials, services, or tools on work orders in price schedules, and in the calculation of recurring costs on billing schedules.

Tools pricing rules:

You specify pricing rules for a customer agreement price schedule in the Customer Agreements application. These pricing rules are used to create billing transactions for tools used on a ticket or work order to which the price schedule is applied.

Specify tools pricing rules on the **Tools** subtab of the **Pricing Rules** subtab, on the **Price Schedules** tab.

Default markups

Create a default markup percentage that is added to reported costs for tools. This percentage is added to reported tool costs when you have not created specific tool markups. You can enter a positive or negative percentage value to apply a markup or discount to the tool cost or price. You specify the price book to be used for the tool list price.

Tool markups

Create tools markup percentages that are added to reported costs for commodity groups or for commodity groups and commodities. Commodity markups override commodity group markups. Commodity group markups override default markups. Create the following types of markups:

- Specify the markup percentage and a commodity group. The markup is applied only to commodities in this group. Commodities in other groups receive the default markup.
- Specify the markup percentage, a commodity group, and a commodity. The markup is applied only to this commodity in this group. Other commodities in the group receive the default markup.

No charge

You can apply a zero additional charge for any reported tool use. A markup is not applied to a reported commodity or group. If you select this choice on a revised agreement when the original had markups or percentages, the markup and percentage data are deleted in the revised record.

Related concepts:

"Price books" on page 142
A price book is a catalog of list prices for items, tools, or services. It contains the published base price, or list price, which can vary depending on the customer and the situation. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services. Price books prices are used in the calculation of prices for materials, services, or tools on work orders in price schedules, and in the calculation of recurring costs on billing schedules.

Material pricing rules:

Material pricing rules apply to materials transactions on tickets and work orders. You specify material pricing rules on price schedules that can be applied to tickets and work orders.

Pricing rules for materials are specified on the **Materials** subtab of the **Pricing Rules** subtab of a customer agreement price schedule.

You can specify several types of pricing rules. When more than one type of pricing rule is specified and is applicable to material that is used on a work order or ticket, precedence rules are applied, as explained in the following sections.

Customer supplied items or rotating assets
: If a customer supplies items or rotating assets that you use when you provide services, they are listed and priced in the Material Pricing table of the price schedule. The **Customer Provided** check box is selected. When the item is used on a transaction, select that check box on the transaction to apply the material pricing. If the check box is not selected in either record, but the item matches, the material pricing is applied. This pricing overrides any other specified price rules.

  If an item quantity is specified here, only the quantity that is specified is priced by the value in this table. If more items are used, they are subject to all other pricing rules.

Item commodities
: You can specify a markup or a discount value to be applied to certain commodities in the Material Markup table. The markup or discount is applied if the transaction item is associated with that commodity or commodity group. If a zero value is specified for a markup, the cost of the item or material is charged as the price. If a zero value is specified as the discount, the list price is charged as the price. The markup for the commodity item overrides the item price from a price book.

Items in price books
: If an item price book is active for the item on a transaction, and the price book is associated with the price schedule, the price book amount overrides the default markup or discount.

Items in other categories
: If none of the previous pricing rules apply, then the prices are applied by the default markups or discounts on the price schedule. Discount amounts are specified by entering negative values in the fields.

Related concepts:

"Price books" on page 142
A price book is a catalog of list prices for items, tools, or services. It contains the published base price, or list price, which can vary depending on the customer and the situation. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services. Price books prices are used in the calculation of prices for materials, services, or tools on work orders in price schedules, and in the calculation of recurring costs on billing schedules.

Labor pricing rules:

You specify labor pricing rules on a price schedule for a customer agreement. These pricing rules are used when you bill transactions that are created for labor that is used on a ticket or work order to which the price schedule is applied. Labor prices are calculated by the craft that is associated with the labor. A craft can have premium pricing applied.

For billable work, the labor cost is calculated either from the default markup percentage, the craft markup percentage. or the craft price. If more than one rule is specified, a craft price overrides a craft markup, and a craft markup overrides a default markup. If specified, and if premium hours are reported, a craft price might be modified by premium pay rules.

Specify pricing rules on the **Labor** subtab of the **Pricing Rules** subtab, on the **Price Schedules** tab of the customer agreement.

Default markups

Create default markup percentages that are added to reported costs for internal and external crafts. These percentages are added to reported costs when you have not created specific craft markups or craft prices for those costs.

Craft markups

Create craft markup percentages that are added to reported costs for internal and external crafts. Craft markups override default markups. After specifying the craft, specify whether the markup is for an internal or external craft. If the markup is for an internal craft, you specify the markup percentage. If the markup is for external crafts, select one of the following options:

- Specify the markup percentage and a vendor for the craft. The markup is applied only to this craft from this vendor.
- Specify the markup percentage and do not specify a vendor for the craft. The markup is applied to this craft from all vendors.

Craft prices

Create craft prices, or hourly rates, that are applied to reported hours for internal and external crafts or craft and skill combinations. For each craft or craft and skill, you specify whether the price is for internal or external crafts. Craft prices override craft markups and default markups. If you specify both a craft and a skill, the price is applied only to this skill level for the craft. Other skill levels for the craft receive the default internal or external markup. You also specify whether the price is for internal or external crafts or crafts and skills. If the price is for an internal craft, you specify the markup price. If the price is for external crafts, select one of the following options:

- Specify the vendor and the price to charge for this craft or craft and skill from this vendor. The price is applied only to this craft or craft and skill from this vendor.
- Specify the price and do not specify a vendor. The price is applied to this craft or craft and skill from all vendors.

Premium craft prices

A craft can be associated with premium pay rules. When the price schedule is created, you can specify that the craft prices are modified by premium pay rules when premium work hours are reported. The premium pay type can be an hourly difference, an increment, or a multiplier. For example, an electrician apprentice is associated with a premium pay rule that specifies a pay rate of 2 and a rate type of multiplier when work is done on a holiday. The base pay is $30.00 per hour. This craft is listed on a price schedule and premium billing is allowed. The electrician apprentice completes 6 hours of emergency work on a holiday. For these 6 hours, the craft price is billed at $60.00 per hour.

No additional charge

You can apply a zero additional charge for any reported craft usage. No markup or special price is applied to reported crafts. If you select this choice on a revised agreement, when the original had markups or percentages, the markup and percentage data are deleted in the revised record.

IT asset performance-based price schedules:

You can bill for the performance of IT assets that are measured with key performance indicators (KPIs).

You create KPI pricing rules on the **KPI** tab of the **Pricing Rules** tab of the price schedule. Specify the KPI by which you measure and price performance, then specify a price for a measurement that falls within each KPI range:

- Price when the measurement is in the target range for this KPI
- Price when the measurement is in the caution range for this KPI
- Price when the measurement is in the alert range for this KPI

Prices can be positive for incentive revenue or negative for penalty payments.

Fee transactions on sales orders contain the name of the KPI and the KPI measurement. The total fee price on the sales orders is calculated by comparing the measurement on the sales order to the measurement ranges that are specified for the KPI pricing rules on the price schedule. The price that corresponds to the measurement range is added to the sales order. A sales order can have only one fee for a KPI.

Related concepts:

"Sales orders" on page 125
You create sales orders to bill for services such as management fees, trip charges, SLA penalties and credits, warranty claim credits, project milestones, and IT asset performance fees.

Condition matching on price schedules, SLAs, and response plans:

A price schedule, service level agreement (SLA), or response plan can be applied to a ticket, work order, or sales order if fields and conditions on the price schedule, SLA, or response plan match the same information on the ticket, work order, or sales order.

If more than one price schedule, SLA, or response plan can be applied to another record, the **Ranking** value on the price schedule, SLA, or response plan is used to select one. A low numerical ranking value takes priority over a higher numerical value.

The price schedule, SLA, or response plan is applied to a ticket, work order, or sales order if all the following conditions are met:

- The ticket, work order, or sales order matches the classification and internal priority that you specify in the conditions criteria.
- The ticket, work order, or sales order refers to one of the services or service groups that you specify as included.
- The ticket, work order, or sales order meets all the conditions that you specify in the conditions section.
- The ticket, work order, or sales order refers to the location, asset, configuration item (CI), and parts pool or pool item that are specified. It is best to specify only one type of resource. Otherwise, a match is difficult to achieve because a match must be made for the values on all specified resources.

Applying price schedules, SLAs, or response plans

Price schedules, SLAs, and response plans can be applied to tickets, work orders, or sales orders with workflow or escalation processes, or by manually selecting an action to apply them from the recipient record. In some cases, you can deselect an applied record and apply a different one.

Related tasks:

"Defining response plans and actions" on page 113
You can create response plans to ensure predictable and repeatable responses to similar work requests. You can apply a response plans to tickets, work orders, sales orders, workflows, or escalations.

Specifying list prices with price books

You can create price books to specify and manage the list prices of items, services, and tools. You can specify different pricing levels for different customers and situations. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services.

Related concepts:

"Item billing schedules" on page 120
A billing schedule can include billing for items, such as the fees for the maintenance of customer assets. The item charges are copied to sales orders when a bill batch is created for the billing schedule. The sales orders are copied to the bill batch.

"Service item billing schedules" on page 121
You can bill for service items on a billing schedule. Service items are typically a set of services, such as materials, labor, and tools, that are provided together and billed as a fixed cost.

Price books:

A price book is a catalog of list prices for items, tools, or services. It contains the published base price, or list price, which can vary depending on the customer and the situation. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services. Price books prices are used in the calculation of prices for materials, services, or tools on work orders in price schedules, and in the calculation of recurring costs on billing schedules.

You create and revise price books in the Price Books application in the Inventory module. A price book list price is the starting point for prices involving items, tools, or services. Discounts and markups specified in customer agreement price schedules and billing schedules are applied to the list price in a price book to calculate the actual price that the customer is charged. For example, a price schedule might specify that in most situations, under this agreement, a customer receives a 15 % discount from the list price, and in special situations, the customer receives a 30% discount. For example, if the service is required at a location that is close to the service provider, then the discount might be increased to 30% when the price is calculated. If the call is at night, then the discount might be decreased to 10% when the price is calculated. You can have multiple price books as starting points. The actual prices for customers are calculated based on the list prices in the price books and any applicable markups or discounts according to price schedules or billing schedules in the customer agreements.

Each customer typically has at least three price books. There might be a price book for tools, a price book for items, and a price book for services. Additional price books can be created in each of these categories as well. For example, you might have a gold-level tool pricing and a silver-level tool pricing.

With a price book, you can easily increase or decrease the prices of all of the items, tools, and services included in an agreement. For example, if you want to increase your prices for holidays, you might create a price book for that type of time period. You might increase all of your prices in that book by 5%. All of the discounts and markups specified in customer agreements would still be applied, but the base price used in the calculations would be 5% higher. You can also select individual items, tools, or services to mark up or discount the prices for.

You can add items, tools, or services to a price book, depending on the price book type. A price book is in effect when it is approved and during the time specified by the effective date and end date.

The **Customer Agreement** tab shows all of the customer agreements that reference the selected price book. The **Price Schedules** tab shows all of the customer agreements that have price schedules that reference the select price book. The **Billing Schedules** tab shows all of the customer agreements that have billing schedules that reference the selected price book.

Related concepts:

"Condition-based pricing of items and service items" on page 145
You can specify condition-based prices for items and service items in price books. In item price books, you can specify the condition rate and fixed price for condition-enabled items. In service item price books, you can specify the price of services that are based on characteristics of an asset, location, or configuration item (CI) that work is done on.

"Material pricing rules" on page 138
Material pricing rules apply to materials transactions on tickets and work orders. You specify material pricing rules on price schedules that can be applied to tickets and work orders.

"Services pricing rules" on page 136
Service pricing rules are used to create billing transactions for services reported on a ticket, work order, or sales order to which the price schedule is applied. You add services pricing rules to a customer agreement price schedule in the Customer Agreements application.

"Tools pricing rules" on page 137
You specify pricing rules for a customer agreement price schedule in the Customer Agreements application. These pricing rules are used to create billing transactions for tools used on a ticket or work order to which the price schedule is applied.

Related tasks:

"Billing schedule types" on page 118
You can create different types of billing schedules to bill recurring costs.

Creating price books:

You can create price books of prices for items, tools, and services and specify the price books in the billing and pricing schedules of customer agreements. The price books are referenced when the prices for work or services are calculated.

Procedure

1. In the Price Books application, insert a new price book.
2. Select the type of price book. You can create price books for tools, items, and service items. Items that are condition-enabled can specify fixed-condition or condition rate prices. Service items can be priced based on the attribute of an asset or location that the service is associated with.
3. Enter the effective date for the price book. The effective date must be later than the current date and later than the effective date of the previous revision of this price book.
4. Add items, service items, or tools to the price book. The types of items you can select is determined by the type of price book you are creating.
5. Specify prices for each line. You specify a list price when the item is used on a work order. You can specify a recurring price to charge a price at regular intervals.
6. If the item price book lists condition-enabled items, specify the condition pricing type. If the service item price book lists conditionally priced services for assets or locations, specify the asset or location, its characteristics, and the price for each characteristic.
7. Save the price book after you make all changes. While the price book is in Draft status, you can add and remove items. You also can adjust the prices of items with the **Adjust Prices** action.

What to do next

You can change the price book status. For example, you can approve the price book so that it becomes effective on the effective date of the customer agreement. A price book must be approved before it can be applied to items, materials, and tools.

Price book statuses:

Price books records have a status to indicate where the record is in a price book life cycle. A new price book has a Draft status. You change the status of a price book with the **Change Status** action. You also change the status when you revise it.

Price books can have one the following status values:

Table 11. Price book status values

Status	Description
APPR	The price book record is approved. From this status, you can change the price book status to EXPIRED as long as there are no revisions of the price book that are in PNDREV status. You can also change the status of an approved price book to PNDREV by revising the approved price book.
DRAFT	The price book is a draft. In this status, you can edit the price book details. From this status, you can change the record status to CANCEL or APPR.
CANCEL	The price book has been canceled. The status of canceled price books cannot be changed.
EXPIRED	The end date for the price book has passed so the price book has expired. You cannot modify the details of a price book record that has this status value. From this status, you can change the price book status to APPR as long as the end date is a date in the future. You can also change the status from EXPIRED to PNDREV by revising the expired price book. You can revise an expired price book if the expiration date is in the future.
PNDREV	The price book is a pending revision of an existing price book. You only can edit some of the price book fields when the price book is in this status. From this status, you can change the price book status to CANCEL or APPR.
REVISED	The price book is revised. When a pending revision is approved, the prior revision is changed to REVISED status. You cannot modify anything on this price book record or change its status.

Price adjustments:

You can adjust the prices of one or more items in a price book that has a draft or pending review status. You can adjust recurring and nonrecurring prices on billing schedules, and list prices of selected items.

The **Adjust Prices** window in the Price Books application shows all of the items in a price book and includes the recurring price, nonrecurring price, and list price for each item. You can filter the list of price book lines by commodity group or commodity code or by any of the values in the table columns. Select the lines you want to adjust and enter a positive or negative percentage in the price adjustment fields.

A price adjustment preview is applied to all selected lines on all pages in the window. The changes are not made to the price book until you accept them.

Price book revisions:

You can revise price books when your list prices for items, tools, or services change. For example, you might revise price books for different seasons. All of the items, tools, or services in the original price book are copied to the revision.

You can revise a price book if it is approved and if no other revisions are in PNDREV status. Revise approved price books in the Price books application. A price book that has not been revised has a revision value of 0. The value increases by 1 each time that the price book is revised. Only one revision can be active.

The effective date of a price book revision must be a future date and must be later than the effective date of the previous revision. When a revision is approved, the end date of the price book revision is set to be one day before the effective date of the next revision.

You can view revision history, including effective and end dates of each revision.

Condition-based pricing of items and service items:

You can specify condition-based prices for items and service items in price books. In item price books, you can specify the condition rate and fixed price for condition-enabled items. In service item price books, you can specify the price of services that are based on characteristics of an asset, location, or configuration item (CI) that work is done on.

The primary customer of the asset or location must be the customer on the customer agreement.

Conditionally priced recurring service items

Recurring services can be priced based on a characteristic of an asset, location, or CI that the service is provided for. In the price book, you specify the service, the asset, location, or CI and characteristic of the asset, location, or CI. Specify a list price for the service and other charges that are based on one or more characteristics of the asset, location, or CI. When the service and asset, location, or CI and its characteristic are specified on a billing schedule, the price of the service is a combination of the list price plus the price of the characteristic of the asset, location, or CI.

For example, lawn maintenance company bills its customers each month for trimming the grounds. This service has a base price of $100 on the billing schedule. An extra $50 per acre is added to the base price when the service is billed. The number of acres is a characteristic of the lawn trimming service. A customer with 15 acres is charged $100 + (15 acres at $50) for a total of $850 per month.

Conditionally priced work order items

Items that are condition-enabled can be priced by fixed condition or by condition rate in a price book. When a condition-enabled item is used on a work order, the list sales price of a fixed-condition item comes from the price book on the price schedule. The list sales price of a condition-rated item comes from the condition rate that is applied to the list price of the item at 100% condition.

For example, a transportation maintenance company bills its customers different prices that are based on the condition of the material that is used to fulfill a work order.

- Air filters are fixed-condition items and the price book lists the prices for various conditions of the item. If a new air filter is used in a repair work order, the price is $100. If a used air filter is used, the price is $50.
- Steer tires are condition-rated items. If a new tire is used to fulfill a work order, the full price condition rate applies and the price is $100. If a worn tire is used, the 60% condition rate applies and the price is $60.

Conditionally priced work order service items

Work order services can be priced based on a characteristic of an asset, location, or CI that the service is provided for. In the price book, you specify the service, the asset, location, or CI, and characteristic of the asset, location, or CI. Specify a list price for the service and other charges that are based on one or more characteristics of the asset, location, or CI. When the price schedule is applied to the work order, the service price is calculated from the list price plus the price of the asset, location, or CI characteristic.

For example, janitorial services for a hotel can be based on a list price plus a price that is based on the characteristic of square feet of the location.

Related concepts:

"Price books" on page 142
A price book is a catalog of list prices for items, tools, or services. It contains the published base price, or list price, which can vary depending on the customer and the situation. You can specify that some prices are calculated based on the characteristics or attributes of the provided services. You can easily modify prices without having to maintain prices for each potential configuration of services. Price books prices are used in the calculation of prices for materials, services, or tools on work orders in price schedules, and in the calculation of recurring costs on billing schedules.

"Price schedules on work orders" on page 130
You apply a customer agreement and its price schedule to a work order in the work order application. The price schedule can apply pricing rules to the costs of labor, materials, tools, and services transactions on the work order. The schedule can specify that certain work comprises a milestone for a project and the milestone is billed when that work is completed. The schedule also can specify additional fees and charges for work, such as management, incentive, or penalty fees.

Related tasks:

"Creating billing schedules for recurring costs" on page 124
To bill customers for recurring costs, you can add billing schedules to the customer agreement. The billing schedule automatically adds costs to bill batches when the billing schedule cron task runs.

Condition matching on price schedules, SLAs, and response plans

A price schedule, service level agreement (SLA), or response plan can be applied to a ticket, work order, or sales order if fields and conditions on the price schedule, SLA, or response plan match the same information on the ticket, work order, or sales order.

If more than one price schedule, SLA, or response plan can be applied to another record, the **Ranking** value on the price schedule, SLA, or response plan is used to select one. A low numerical ranking value takes priority over a higher numerical value.

The price schedule, SLA, or response plan is applied to a ticket, work order, or sales order if all the following conditions are met:

- The ticket, work order, or sales order matches the classification and internal priority that you specify in the conditions criteria.
- The ticket, work order, or sales order refers to one of the services or service groups that you specify as included.
- The ticket, work order, or sales order meets all the conditions that you specify in the conditions section.
- The ticket, work order, or sales order refers to the location, asset, configuration item (CI), and parts pool or pool item that are specified. It is best to specify only one type of resource. Otherwise, a match is difficult to achieve because a match must be made for the values on all specified resources.

Applying price schedules, SLAs, or response plans

Price schedules, SLAs, and response plans can be applied to tickets, work orders, or sales orders with workflow or escalation processes, or by manually selecting an action to apply them from the recipient record. In some cases, you can deselect an applied record and apply a different one.

Related tasks:

"Defining response plans and actions" on page 113
You can create response plans to ensure predictable and repeatable responses to similar work requests. You can apply a response plans to tickets, work orders, sales orders, workflows, or escalations.

Customer MRO agreements

On customer agreements for maintenance, repair, and overhaul (MRO) work, you can specify scope of work (SOW) details. Details include work activity dates, assets to be worked on, and work activities. Activity dates are copied to the work plan as target dates and can be used to schedule the work.

These contract details are specified on the **Scope of Work** tab of the customer agreement. Information that you specify applies to the customer agreement, and is not directly related to any pricing or billing schedule on the agreement. However, the agreement can apply pricing and billing information to associated work orders or packages.

Specify the type of agreement as MRO, and then you can specify information about the work to be delivered to the customer. Specify information about the item or asset to be worked on and the agreed work activities. Specify related work orders or work packages.

The activity window for work dates can be fixed or flexible. Specify fixed dates if work requires a specified start and end date. Specify flexible dates if work can be done any time with a range of dates.

Related concepts:

"Customer agreements" on page 111
You create customer agreements that specify the services that you provide, the terms, conditions, prices, and fees for services, and how you bill for services. You can revise customer agreements as needed.

Customer pool agreements

Customer pool agreements are customer agreements that are used with the delivery, pricing, and billing of services for maintenance, exchange, and repair of pool items.

Pool agreements specify the pool items, participation fees, prices that are charged for pool services, and billing options. Pool agreements can be applied and matched to tickets and work orders for pool services. Pool agreements can be referenced on service level agreements (SLAs) that define the service delivery commitments and related credits and penalty fees. Agreements can also be referenced by response plans that define repeatable service responses and actions.

Price schedules for pool services

You specify pool information on price schedules that apply to work orders and tickets for exchanges or replacement of pool items. Other types of price schedules cannot be associated with item pools.

On the **Scope of Work** tab of the customer agreement, you specify the pool identifier and items that the pool can contain. On the **Pool Items** subtab of price schedule, add items from the specified pool to this agreement. Either specify individual pool items or select the option to include all items from the pool.

When the agreement is applied to work orders or tickets for this customer, the pool and pool items on each record are part of the matching logic that selects the correct price schedule. A price schedule that specifies one item in a pool can be matched only to work orders or tickets for that item. A price schedule that specifies all items in a pool can be matched to work orders or tickets for any of those items.

Work orders and tickets for pool services

On work orders and tickets for customers, you can specify a pool item that is used in exchange or repair services. When the customer agreement is applied to the ticket or work order, the pool and item is included in the matching criteria. The matching criteria for the pool and item is applied like the matching criteria for assets, locations, and configuration items.

If information on the ticket or work order matches information on a price schedule, the price schedule can be applied to the ticket or work order. A price schedule with specific values is more restricted than a price schedule with fewer or more general values. If more than one price schedule matches, the ranking value on the price schedule is used to select one.

Response plans and SLAs for pool services

You can create SLAs to specify the expected service levels and commitments that are related to pool services. When you specify a pool and item on an SLA, they are used as part of the matching criteria for applying an SLA to a ticket or work order. A matching SLA sets target dates on the work order or ticket that are based on the SLA commitments.

For example, you might establish a commitment to replace a part and deliver the asset within a certain amount of time. Another commitment might be for the customer to deliver the item to you for repair or replacement within a certain amount of time. If a commitment is not met, a penalty fee or a credit can be applied when services are billed.

Similarly, you can create response plans that are related to item repairs or exchanges. Response plans specify predictable and repeatable responses to similar work requests. When you specify a pool and item on a response plan, they are used as part of the matching criteria when the response plan is applied to a ticket or work order. A matching response plan applies the plan responses and actions. The matching logic is the same as the logic for applying price schedules.

Customer agreement revisions

To modify a customer agreement with a status of approved or expired, create a revision of it and modify fields in the revision. For example, you can extend the end date of an expired customer agreement.

You revise a customer agreement in the Customer Agreements application. When you revise a customer agreement, all information, including the price schedule, is copied from the original agreement to the revision. You can edit certain fields in the revision, including price schedule information.

To prevent bills from being generated for any version of an agreement that is being revised, select the **Suspend bill processing while revision is pending** check box when you create a revision. If the check box is selected, the current approved version is suspended and no bills are generated for any version of the agreement. When the agreement under revision is approved, the previous version that was suspended becomes a revised agreement.

Revision values

The value in the **Revision** field indicates the current revision of this agreement. A customer agreement that is not revised has a value of 0 (zero). The first revision of an agreement has a value of 1; a revision to the first revision has a value of 2, and so on. For each revision, you can specify a revision description.

Revision statuses

When you revise an agreement, you can keep the original agreement active or you can suspend it. While an agreement is suspended, no bills are generated for any version of the agreement.

If you revise an agreement but do not suspend the original, the status of the original record does not change. The status of the revision is pending revision (PNDREV).

If you revise an agreement and suspend the original, the status of the original record is suspended (SUSPEND). The status of the revision is pending revision (PNDREV).

After a revision is approved, the status of the original agreement changes to revised (REVISED). The status of the revised agreement is set to approved (APPR) if the start date is the current date. The status of the revised agreement is set to

waiting to start (WSTART) if the start date is in the future. The status changes from waiting to start to approved when the current date is the start date.

A canceled revision has a status of canceled (CANCEL). A revision to that agreement that is approved has a status of approved (APPR).

Customer bills

A revised customer agreement is a history record and you cannot modify it. However, you can process customer bills against a revised customer agreement. Costs and revenue accumulate against the revision for which a transaction was created. They are also posted against the latest revision, ensuring that total committed costs and revenue on the most current version are accurate.

A suspended customer agreement is suspended from billing activity. The agreement is not applied to work orders, tickets, or sales orders until a new version is approved.

Billing for services

In the Customer Billing application, you can create, modify, or view bill batches for your customers. For each billing period in the customer agreement, create a bill batch for completed or closed work and other fees and charges for the customer and agreement. You can review transactions before you send the bills to customers. You can allow customers to review bills in the Bill Review application.

Price schedules can be set up to create bill batches for a billing period on a schedule or you can manually add eligible bill lines to a bill batch. An automated price schedule can specify that bill lines on bill batches are grouped by order number, customer cost center, customer PO, or the reporting user.

Automated billing schedules create bill batches for recurring charges that are not part of transactional work on a work order or ticket. These bill batches are separate from the bill batches with transaction charges, but you can review and approve them with the same processes.

You cannot delete bill batches, but you can cancel them. The canceled bill batch is a history record.

"Reviewing and completing bill batches" on page 152

Manually adding bill lines to a bill batch

To manually add bill lines from price schedules to a bill batch, use one of the options to copy or select work orders, tickets, and sales orders. Unbilled, closed, resolved, or completed work orders, tickets, and sales orders are copied to the table. Eligible records have a completed or resolved date on or before the bill end date. Records can be added to a batch when they reach the status that is specified in the billing options settings in the Organizations application.

If partial billing is allowed for a price schedule, completed work on a work order is included in a bill batch, even if the work order remains open. Work can be billed as soon as the transactions are recorded on the work order.

The billing lines might be added to a bill batch for the first time, or they might be lines from the previous bill batch that were disputed or on hold.

Work orders, tickets, and sales orders that can be added to bill batches

Adjusting bill prices

You can adjust bill prices in several ways:

- You can change original transactions in the work orders, tickets, or sales order. Changes that you make to transactions in those applications might result in a recalculated agreed price.
- You can adjust the billed price value. If you change the billed price, the agreed price is not changed, but the price that is billed to the customer is changed.
- You can reduce bill line prices by a percentage to reduce the bill total price without modifying the bill line transactions. You can set a bill line price to zero by reducing the bill line percentage by 100%. User and history information is retained for the most recent adjustment.

Reducing bill line prices by percentages

Sales tax

The Customer Billing application has fields where you can add custom tax calculations. You can also connect with a product that calculates sales tax. Sales tax is often calculated by using information such as the type of revenue and the address where the service is rendered. The product does not calculate sales tax.

Sales tax calculations

Changing line and batch status

After you review a bill batch for accuracy and completeness, change the status of lines as needed and change the status of the batch to Prebill. If the bill batch contains lines you do not want to bill, change the status of the line to Hold. The batch now is available to the customer to review in the Bill Review application.

Bill batch line and Bill batch statuses

Customer reviews

You can provide your customers with access to their bills in the Bill Review application. The customer does not see bill lines with a status of Hold or Removed.

The customer can change line status. Disputed lines require remarks by the reviewing customer. Lines with the Reviewed status are available for your review and final bill tasks.

"For customers: Reviewing bill batches from your service provider" on page 158

Final review and billing

When you process a bill batch that a customer reviewed, you try to resolve any disputed lines. Change the status of these lines to Resolved or to Hold. After you complete the review, change the batch status to Billed.

In a bill batch with a Billed status, lines with an Approved or Resolved status are considered billed. You can send these bills to your accounts payable system.

In a bill batch with a Billed status, lines with a Hold or Dispute status are not billed. They are included in the next bill batch if they are eligible to be billed then.

Reviewing and completing bill batches

Recording bill payments

When a bill is fully or partly paid, you can record payment details by selecting the **Record Payment** action in the Customer Billing application and adding payment information. Multiple payment records can be added. Specify details such as the payment method, reference information, and the paid amount. All payment history is recorded.

When a bill is fully paid, select the **Paid in Full** check box. The bill status changes to Paid.

The bill contains an indicator about whether any payment is recorded for this bill.

Viewing billing, history, and revenue information

You can view several types of billing information:

- To view progress and details about lines that are copied to a bill batch, select the records on the **List** tab and select the **View Current Bill Batch Progress** action.
- To view the history of billing statuses for a bill batch, select the**View Bill Batch Status History** action on that record.
- To view the history of billing statuses for a billing line, select the **Bill Line Status History** icon on the line.
- To view work order totals and batch line status history, open the work order and select the **View** > **Customer Billing History** action.
- To view a report that summarizes all bill batches for a customer, select records for the customer in the List tab of the Billing or Bill Review application and generate the report.
- To view all revenue for a revision of a customer agreement, open the customer agreement and review the revenue details.

Working with bill batches

A bill batch includes work done for all revisions of a customer agreement in the billing period. You can have bill batches for transactional charges based on work completed, and you can have bill batches for recurring charges.

Reviewing and completing bill batches

After customers review a bill batch and set the status to Reviewed, you complete your review and finalize the bill batch in the Customer Billing application.

Procedure

1. In the Customer Billing application, select the reviewed bill batch and review all lines. Complete any of the following tasks as needed:
   - Resolve lines that the customer disputed. Disputed lines have remarks that help you resolve them. Typically, you resolve disputed lines by updating bill prices in the Customer Billing application. You also might update costs in the application that created the bill line. You cannot bill lines with a status of DISPUTE.

- Hold certain lines: You might decide to hold certain lines and bill the rest of the batch. Lines with a HOLD status are not billed or shown in the review bill.
- Advance WAPPR lines to APPR: Advance the status of these lines with the **Advance all WAPPR Lines to APPR** action.
- Initiate another customer review: To initiate a new customer review, change the status of the bill batch to PREBILL again.

2. When you are ready to bill lines in this bill batch, change the status of the bill batch to BILLED. All lines in a billed bill batch with an APPROVED or RESOLVED status are considered billed. You can send these bills to your accounts payable system. Lines in a billed bill batch with a HOLD or DISPUTE status are not copied to a new bill batch unless the previous bill batch is billed or canceled.

Related concepts:

"Price adjustments to bill lines" on page 155
You can reduce bill prices by reducing bill line prices by a percentage amount.

Billable work orders, tickets, and sales orders

Work orders, tickets, and sales orders are eligible to be billed on a bill batch if they meet certain criteria.

Billable work orders

Work order records include work orders, activities, changes, and releases. Some work orders allow *partial billing*, which means that unbilled, approved work on an open work order can be billed. Partial billing might be specified for large projects. Partial billing is allowed when the **Bill Approved Work** check box is selected on the price schedule that is associated with the work orders.

You can view billing status, billed costs and prices, and other details for a work order in the associated work order applications.

Bill lines that were billed previously and were on hold or were disputed are added to a new bill batch only if the original bill is billed or canceled.

Work orders cannot be in more than one open bill batch. A work order that is associated with the agreement is billable if it meets any one of the following conditions:

- The work order is associated with a price schedule that does not allow partial billing and it has the following characteristics:
  - It was closed or completed on or before the bill end date. The status that it must reach is specified in the Service Provider billing options of the Organizations application.
  - It contains no unapproved labor transactions.
- The work order is associated with a price schedule that allows partial billing and it has the following characteristics:
  - It reached the approved or later status on or before the bill end date.
  - It can contain unapproved labor transactions. Only approved transactions are copied to the bill batch.
- The work order was billed in a previous bill batch, but new, approved, transactions are added to the work order.

You can select transactions on approved work orders for the bill batch that is based on financial period. In this case, you specify the financial period for the bill batch. Then, the bill batch includes work order transactions if the financial period on the transactions is earlier than or equal to the financial period specified.

New transactions on a work order that is in a bill batch can be added to that bill if you use one of the Copy options in the Customer Billing application. If you add transactions, the bill line totals and work order price totals are updated.

If transactions are added to a work order that was billed, the new transactions are billed in a subsequent bill batch.

Billable tickets

Tickets include service requests, incidents, and problems. A ticket that is associated with the agreement is billable if it meets all the following criteria:

- It is in the status that is specified in the billing options. The minimum status that it must reach is specified in the Service Provider billing options of the Organizations application.
- It was completed on or before the bill end date.
- It contains no unapproved labor transactions.

Billable sales orders

A sales order that is associated with the agreement is billable if it meets the following criteria:

- It is in the status that is specified in the billing options. The minimum status that it must reach is specified in the Service Provider billing options of the Organizations application.
- It was completed on or before the bill end date.

Related concepts:

"Continuous billing of work for price schedules" on page 129
To optimize revenue collection and billing efficiency, you can continuously bill customers for work that is associated with a customer agreement price schedule. You can bill for work on a customer agreement even if an existing bill batch for the same customer agreement is not completed or closed.

"Bills for completed work on open work orders" on page 131
You can specify that partial billing is allowed for a price schedule. Partial billing means that completed work on a work order is included in a bill batch, even if the work order remains open. Work can be billed as soon as the transactions are recorded on the work order. This means that a work order can be kept open for the duration of a project. Project-related costs can be billed as they are reported.

Manual copy of work orders, tickets, and sales orders to bill batches

When you prepare a bill batch manually, you can specify that all billable work orders, tickets, and sales orders are copied to the bill batch. You also can select specific billable work orders, tickets, or sales orders to be copied to the bill batch.

You use the **Copy WOs, Tickets, and SOs** option in the Customer Billing application to copy all billable work orders, tickets, and sales orders to an open bill batch.

If you do not want to bill all of the work orders, tickets, and sales orders on one bill batch, you can use **Select Work Orders**, **Select Tickets**, or **Select Sales Orders** options. Then, you can select the individual items to be included on a bill batch. For example, you have a bill batch for project work that includes work orders for that project. You can have a separate bill batch for work orders or tickets that are not related to the project.

Price adjustments to bill lines

You can reduce bill prices by reducing bill line prices by a percentage amount.

In the Customer Billing application, you can reduce a bill price to an agreed price by adjusting the bill line prices of a bill batch. You do not need to adjust each transaction on the bill line; you can reduce a bill line by a percentage. You can set a bill line price to zero by reducing the bill line percentage by 100%.

Select the **Bill Line Percentage Adjustment** action to adjust the bill line. All adjustments require descriptive text about the change. The logged-in user that adjusts the bill line is recorded. History information about the last manual price change and date of change is also recorded.

The action is available when the bill line status is Waiting Approval or Disputed.

If new transactions are copied to a bill line after a percentage adjustment is made, the same adjustment is made to the new transactions.

You cannot adjust a negative bill price with this feature.

Related tasks:

"Reviewing and completing bill batches" on page 152
After customers review a bill batch and set the status to Reviewed, you complete your review and finalize the bill batch in the Customer Billing application.

Sales tax calculations

Sales tax rates and the rules for calculating sales tax differ from region to region and change frequently. Many service providers have tax calculation processes in their accounting systems or have interfaces between their accounting systems and commercial products that calculate tax.

The Customer Billing application has fields that you can use to add custom tax calculations. You can also connect with a product that calculates sales tax. Sales tax is often calculated by using information such as the type of revenue and the address where the service is rendered. The product includes data fields that you can use to manage this information but it does not perform sales tax calculations.

A service provider might be responsible for calculating a city tax with one tax rate, and a county tax with a different tax rate. In such situations, commercial products that calculate tax often include address validation. Address validation ensures that sales tax is calculated correctly. When addresses are validated, a code is often provided to indicate the various taxing jurisdictions. This code is used to calculate the total tax to be charged to the customers and to facilitate storage of the tax liability for each jurisdiction. In the product, this code is the geocode. The geocode is part of the service address.

Because the service address is copied to the ticket or work order, the geocode is also included on all detail transactions that are sent to the accounting system. These detail transactions include the price that was calculated according to the

price schedule for the customer agreement. These detail transactions include additional fields that can store calculated taxes for up to six tax jurisdictions for each transaction.

Tax calculations are performed after the transactions are entered in the accounting system. Each transaction has the following information that is used in the calculation:

- taxing geographical code
- the type of revenue:
  - labor (including labor type)
  - material (including commodity)
  - service (including type of service)
  - tool usage (including commodity)

After the taxes are calculated, the results of the calculation can be stored in the additional tax fields in the detail records.

Bill batch line status

Bill batch lines can have various status values, depending on the stage in the billing process. You can change the line status, view a history of all status changes made to the line, and view a summary of the lines that require review or other action before the bill batch status can be changed.

The following table shows the bill batch line status values:

Table 12. Bill batch line status values

Status	Description
WAPPR	Waiting for approval is the status of a new bill line when it is added to a bill batch. You review lines with this status to ensure accuracy. The customer then reviews these lines and typically advances the lines to APPROVED. Bill prices for lines with this status are included in the pre-tax total of the bill batch. Reviewers also can change lines with this status to HOLD or DISPUTE. A customer performing the review can change the status to DISPUTE or APPROVED. Bill batch lines in WAPPR status are included in the pre-tax total of bills.

Table 12. Bill batch line status values (continued)

Status	Description
HOLD	Hold from billing. You assign this status to lines to prevent the line from being billed until you can take further action. The customer cannot view lines with this status in the Bill Review application. Bill prices for lines with this status are not included in the pre-tax total of the bill batch. Lines with this status can be included in the next bill when the original bill either has a status of BILLED or CANCELED. Reviewers can change lines with this status to WAPPR, DISPUTE, RESOLVED, or APPROVED.
APPROVED	Approved by customer. The customer has reviewed and approved this bill line. Bill lines with this status are included in the bill batch when the status of the bill batch is BILLED. Bill prices for lines with this status are included in the pre-tax total of the bill batch. Reviewers can change lines with this status to HOLD or back to WAPPR. Bill batch lines in WAPPR status are included in the pre-tax total of bills.
DISPUTE	Customer disputes. The customer disputes the validity or price of a bill line. Each bill line with this status must contain remarks or a memo in the **Memo** field. Bill prices for lines with this status are not included in the pre-tax total of the bill batch. Lines with this status can be included in the next bill when the original bill either has a status of BILLED or CANCELED. Reviewers can change lines with this status to RESOLVED, HOLD, or WAPPR.
RESOLVED	Resolved for billing. A line with a DISPUTE or HOLD status has been resolved. Lines in RESOLVED status are included in the bill batch when it is billed. Bill prices for lines with this status are included in the pre-tax total of the bill batch. Reviewers can change lines with this status to HOLD or to back to DISPUTE.
REMOVED	Removed from bill batch. The customer agreement and prices have been cleared from the work order, ticket, or sales order and that record is no longer associated with the bill batch. Bill prices for lines with this status are not included in the pre-tax total of the bill batch.

Bill batch statuses

Bill batches have various statuses as they progress through the billing and payment cycle.

Table 13. Bill batch statuses

Status	Description
INPROGRESS	Initial status of bill batch. You can change the status to Prebill.
PREBILL	The batch is available for customer review in the Bill Review application. The customer can change the status to Reviewed. You can change the status to Reviewed, In Progress, or Canceled.
REVIEWED	The bill is reviewed by the customer.
BILLED	The bill batch is billed and closed. This is the final bill statement sent to the customer. When full payment for the bill is recorded, the bill status can be changed to Paid. If partial payment for the bill is recorded, the bill status can be set to Partial payment.
CANCEL	The bill is canceled. The bill batch was created in error. All associated billing lines in this batch are eligible for the next created bill batch. You cannot change this status.
PAID	The bill is paid in full.
PARTPMT	The bill is partially paid. When the bill is paid in full, the status can be set to Paid.

For customers: Reviewing bill batches from your service provider

Your service provider can enable you to review bill batches before a final bill is sent. You review bill lines and approve them or request changes to them. When the review is complete, change the status of the bill to Reviewed.

Procedure

1. In the Bill Review application, on the **List** tab, select the bill to review.
2. From the **Bill Review** tab, select one of the following options to approve or dispute bill lines:
   - To approve all lines, select the **Advance all WAPPR Lines to APPR** action.
   - To approve or dispute individual lines, on each line, click the **Change Status** icon and specify a new status. If you dispute a bill line, add information to the **Memo** field.
3. After all bill lines are reviewed, change the status of the bill. From the menu, select **Change Status**, and change the status to **Reviewed by Customer**.

Results

The reviewed bill is available for further processing by your service provider. Approved lines become part of the next bill statement. Disputed lines are sent to the service provider for further review. All unbilled transactions are carried forward for potential inclusion in the next bill batch.

Customer bill batch reviews

Customers can review bill batches to resolve questions before a final bill is sent.

Bill batches are reviewed in the Bill Review application. Each bill batch for a customer agreement contains unbilled transactions that occurred during the billing period. A bill batch might also include transactions from earlier review bills that you disputed and the service provider reviewed and resolved.

Each bill batch line can contain bill prices for the following transactions and fees:

- Labor
- Materials
- Services
- Tools
- Fees and charges

As you review price details for a batch line, you approve or dispute the line prices by changing the status of the line. After you review all batch lines, you change the status of the review bill to reviewed. Approved lines on reviewed bills become part of the next bill statement. Disputed lines are sent to the service provider for further review. All unbilled transactions are carried forward for potential inclusion in the next bill batch.

Terms and conditions from the associated customer agreements are printed with the final bill. You can view terms and conditions that are associated with the agreement on the **Terms and Conditions** tab.

Viewing costs on bills

Some customers can view costs for lines in a bill batch that they are reviewing. Your service provider must enable this view on your customer agreement.

Procedure

1. In the Bill Review application, on the **List** tab, select the bill batch.
2. On the **Bill Review** tab, select the action to **View Costs**.
3. Click **OK** to close the window.

Exchange orders

You use the Exchange Orders application to manage requests from customers as part of a customer pool management agreement. You can track the request, and receive and fulfill orders for parts that you supply from a pool. For example, you might receive a request to supply a replacement for an airplane cabin sensor that malfunctioned.

In the Exchange Orders application, you can track all stages of the exchange order process. For example, an exchange order might consist of the following stages:

- An airline orders a part from the pool manager.
- The pool manager sends the airline a replacement part.
- The airline returns the defective part to the pool.
- The pool manager sends out the defective part for repair.
- The part is fixed and returned to the pool.
- The airline is billed a transaction fee and the cost to repair the part.

The owner of an exchange order is responsible for managing the exchange order to completion. You can assign the ownership of an exchange order to another person or a workgroup. You can take ownership of the exchange order and complete it yourself.

You, or the assigned owner, can update the exchange order as more details are known about it. For example, you can identify the priority of the exchange order and how fast the replacement part needs to be shipped to the customer. You can specify who the exchange order is escalated to if issues arise during fulfillment, and you can change the status of the exchange order. You can apply service level agreements so that related legal and contact information is readily available. Customers can enter feedback on the delivered part. All communication that is related to the exchange order can be stored in the log to provide a clear history.

Related concepts:

"Customer pool agreements" on page 135
Customer pool agreements are customer agreements that are used with the delivery, pricing, and billing of services for maintenance, exchange, and repair of pool items.

Creating exchange orders

You create exchange orders to receive and fulfill orders that arise from a customer pool agreement. Unserviceable parts are replaced and sent for repair, and the customer is billed.

Procedure

1. In the Exchange Orders application, click **New Exchange Order**.
2. Enter the customer information and delivery details.
3. On the **Part** subtab, enter the details for the serviceable part. If the customer is willing to accept an alternate part if the identical part is unavailable, select the **Accept Alternate** check box.
4. On the **Counterpart** subtab, enter details about the unserviceable part that is being sent from the customer for repair. Enter age, warranty, and route information on the subtabs for the counterpart.
5. Save the record.

What to do next

When the customer receives the serviceable part, enter the information in the **Receiving Details** window. Click the **Receiving Details** icon to access the window from the line items on the **Shipments** tab.

Related information:

Ticket statuses

Tracking shipments for exchange orders

You can manage and track the movement of parts as they are shipped from customers, warehouses, storerooms, and repair locations. The **Shipments** tab in the Exchange Orders application contains all the shipping details for each part that is involved in an exchange order transaction.

About this task

Each segment of a part's journey can be tracked and logged for audit purposes. You use the **Shipments** tab to record all shipping transactions that are related to the exchange order. For example, an exchange order might consist of the following shipment transactions:

- A pool manager sends a serviceable part to a customer site.
- The customer returns the unserviceable part to the pool warehouse.
- The warehouse sends the unserviceable part to a repair facility.
- The repair facility fixes the part, then returns it to a storeroom at the pool manager's location.

The details for each shipping transaction can be monitored and recorded. You record each transaction in a separate line item on the **Shipments** tab.

Procedure

1. On the **Shipments** tab of the Exchange Orders application, click **New Row**.
2. In the Ship To section, select the type of destination. You can choose from the following types:
   - **Customer**
   - **Repair Location**
   - **Storeroom**
   - **Vendor**

   The ship to address will default based on the selection. The address can be modified if necessary.
3. Select the type of part that you are shipping. You can choose **Part** or **Counterpart**.
4. In the Ship From section, select the type of destination. The ship from address will default based on the selection. The address can be modified if necessary.
5. In the Shipment Details section, enter the transport company, package and billing information, and dates for the shipment. You can also enter any commercial terms that are associated with the transaction, for example, Incoterms®.
6. If it is an international shipment, in the Customs Details section, enter the customs broker, value, and customs codes.
7. Save the record.

What to do next

The receipt details for each shipping transaction can be recorded in the **Receiving Details** window. Click the **Receiving Details** icon to access the window from the line item on the **Shipments** tab.

Estimating prices for customer work

You can provide price estimates for work that is requested by your customers. When a customer requests a service on an exchange order, you can plan your costs and prices, and then provide a price estimate that the customer can accept before work begins.

About this task

In a typical scenario, an order desk agent in your enterprise receives a service request, and then forwards details to a planner for more action. However, in some cases, you might want the agent to provide an estimate. If so, the agent adds a log entry for the price estimate to the service request, and it is visible to the customer. A price estimate that was added to an exchange order is not visible on any work order.

Procedure

1. Open the exchange order for the customer. The customer can create an exchange order or contact your order desk to create one.
2. Add detail to the exchange order that describes the work that is necessary, and then create a follow-up work order for it. The plan on the work order is the basis for the price estimate.
3. In the work order plan, add details about planned tasks and costs, and then apply a price schedule.
4. Select one of the following actions, depending on whether you want to specify price quotes in the estimate:
   - If you do not want to include price quotes on the estimate, select the **View Costs and Prices** action.
   - If you want to include price quotes on the estimate, select the **View / Update Price Quote** action.
5. To create an estimate from either window, click **Customer Price Estimate**. The Customer Price Estimate window shows any existing estimates. If an existing estimate was accepted, and you create a new estimate, the status of the earlier estimate is set to reworked.
6. Optional: To create another estimate, click **New Customer Estimate**. You also can view and create estimates from the **Customer Estimate Log** tab of the work order.
7. Optional: If price quotes are not used with bills for this work, you can modify the calculated price estimate before you provide it to the customer. When included or minimum pricing is used, transactions are calculated individually, unless total included or minimum amounts are specified. Price estimates are calculated in the following ways:
   - If minimum pricing is used, and the minimum amount for a transaction or total is more than the estimated price of a transaction or total, the minimum amount is used. If the minimum amount is less than the estimated price, the estimated price is used. Any fees are part of the estimated total price. The total is editable.
   - If included pricing is used, and the included amount for a transaction or the total is more than the estimated price of a transaction or total, then the estimated total price is set to zero. The total is editable. If the included amount is less than the estimated price, then the included amount is subtracted from the estimated price and the result is editable.
   - If fixed price quotes are used, the estimate is the quoted price. If not to exceed (NTE) price quotes are used, and the estimated price is less than the quoted price, the estimated price is used. Otherwise, the quoted price is used. Quoted prices cannot be edited.
8. Specify details about the estimate, such as a summary and the last date that the estimate is valid.

Results

When the record is saved, a log entry is added to original exchange order to specify the price and details that were added to the estimate. The order desk agent or planner can provide a more detailed estimate for each work order with the Customer Estimate report that is available from work.

On the exchange order, the customer can accept or reject the estimate by changing the status of the log entry.

Service level agreements (SLAs) on exchange orders

A service level agreement (SLA) between a service provider and its customers specifies service commitments that the service provider agrees to meet. An applied service level agreement specifies commitments to meet and the escalation actions or notifications for each commitment.

Each SLA specifies such criteria as commitment and actions, ranking value, type of record that the SLA applies to, and whether the SLA is for an external customer, internal customer, or vendor. It can also include information about the effective dates, priority, affected person, classification, service or service group, and so on.

For each commitment, you specify escalation actions or notifications that occur if the commitment is not met. Escalation processes can monitor all activities and send notifications or take other actions. For example, you might have a commitment for a Priority 1 ticket for a notebook asset that belongs to a senior executive. The commitment specifies a response time of 5 minutes and resolution time of 15 minutes. If the response time is not met, an email is sent to the ticket owner.

Applying SLAs to exchange orders

There are several ways in which SLAs are applied to exchange orders:

- An SLA might be applied by workflow or escalation process, or by another SLA.
- Select the **Apply SLA** action. An SLA is chosen and applied based on matching criteria.
- Select an SLA with the **Select/Deselect SLA** action.

One or more SLAs might be applied to an exchange order. Your system administrator determines whether you can apply multiple SLAs and which SLA updates the target time fields. SLAs can be chosen based on rank or on commitment stringency.

Matching SLAs to exchange orders

The SLA is applicable to records with values that match values on the SLA. The less specific the SLA, the more records to which it is potentially applicable, and vice versa. For example, if there is no customer specified on an SLA, the SLA can be matched to an exchange order for any customer. When you apply an SLA to a ticket, an SLA is selected based on the following cumulative information on both the SLA and the exchange order:

- Record type
- Customer
- Service or service groups
- Conditions

- Organization, site, a location, or a location within a specified location hierarchy
- Asset type, asset, or an asset within a specified asset hierarchy
- Key performance indicators and
- Parts pools

Response plans on exchange orders

You apply response plans to exchange orders to ensure predictable and repeatable actions and notifications for similar tickets. Response plans also can assign certain data to tickets such as owners, vendors, and ticket templates.

You apply response plans to exchange orders with the **Apply Response Plan** action. A response plan also can be applied by a workflow or escalation process.

A response plan is selected based on conditions that match information in the exchange order. Each response plan specifies criteria such as customer, internal priority, service groups, services, parts pool, and classification that is matched to information on the exchange order. If more than one response plan is applicable, the ranking value on the response plan is used to select one.

An applied response plan can overwrite the **Owner**, **Owner Group**, and **Vendor** fields on the exchange order.

After a response plan is applied, the actions and notifications that are specified on the response plan are run.

If an attempt is made to add a response plan with a restricted ticket template to a work order, the system either applies the response plan without the exchange order template, or it does not apply the response plan. This action is controlled by the setting in the **Stop Response Plan if Job Plan or Ticket Template cannot be applied** check box of the response plan.

Chapter 12. Managing the purchasing process

To ensure your purchasing process complies with the standards and regulations of your industry, you can create capability records and maintain vendor information for maintenance locations.

Capability records

Capability records contain specialist information about a vendor, manufacturer, or location. A capability is often, but not necessarily, indicated by a license or certificate, signifying proficiency in a particular skill or skills. Some certificates have expiration dates and individuals who hold the certificates must renew them periodically.

You use the Capability application to create capabilities and certification requirements for capabilities. Using their maintenance location records, you can associate companies with a capability. You can also view capabilities associated with a particular maintenance location record and can renew and change the status of their capabilities.

You can search for capability records; create, modify, view, or delete capabilities; and add, update, or view the maintenance location records associated with a capability. You can renew the certificate and change its status for each company which holds a certificate. You can also view historical capability information for each company for a specific capability.

Capabilities and purchasing records

Capabilities refer to the approvals, certificates, and other formal records that define the ability of the organization to provide goods and services. Certain industries maintain assets that are subject to regulatory control, and require traceability for parts and services relating to maintaining these assets.

You define capability records in the Capabilities application. A capability is often, but not necessarily, a license or certificate that signifies proficiency in a particular skill or skills. A governing board can award a certificate. Some certificates have expiration dates and individuals who hold the certificates must renew them periodically.

After capability records are created, you can add capabilities to the following types of purchasing records:

- Purchase orders
- Purchase requisitions
- Requests for quotations

To add a capability to a purchasing record, you must first select the **CM Capability** check box on the **Lines** tab. Then you can use the **Select Capability** button on the **Terms and Conditions** tab to select the specific capability.

Status changes

When you no longer need to use a capability, you can change the status of that record to inactive. You can change the status for a capability record or can change

the status for an individual maintenance record. For example, if a certain maintenance location loses its certification, you can change the capability for only that location to inactive. Other locations and vendors can still have the capability.

Capability status changes

If you change the status of a capability to inactive, that capability cannot be associated with a maintenance location. However, maintenance location records that are already associated with the capability are unaffected by this change in capability status.

In the Capability application, you use the **Change Status** action to change the status of capabilities.

Capabilities status changes for maintenance locations

You can change the status of a capability associated with a maintenance location record. The status change of the capability is applicable only for that maintenance location record; the overall status of the capability is not changed.

Purchase requisitions

You use the Purchase Requisitions application to create and manage purchase requisitions for configuration-managed (CM) parts, for supplies, or for services. You can also use this application to create purchase orders from purchase requisitions.

A purchase requisition (PR) is a written request issued internally to a purchasing department to order parts or services.

You can create two types of purchase requisitions:

- Internal purchase requisitions: requesting the transfer of materials from another company storeroom.
- External purchase requisitions: requesting the purchase of the necessary materials from an outside vendor. You can specify the vendor.

Purchase orders

You use the Purchase Orders application to create and manage purchase orders for configuration-managed (CM) parts. A purchase order is an authorized order from a purchasing agent or department to an internal supplier or external vendor.

With this application, you can create change orders. You can also generate internal purchase orders against another storeroom. A storeroom-to-storeroom purchase can be thought of as a transfer order or an internal purchase order since the product uses the Purchase Orders application and the Issues and Transfers application to track these types of part movements.

You can create purchase orders using the following methods:

- From the Purchase Orders application
- From the Purchase Requisitions application
- From a request for quotation (RFQ) in the Request for Quotation application
- From the Inventory application using the inventory reorder actions
- From the Purchase Contracts application by creating a release

Receipts

In a large enterprise, you can have a centralized purchasing department for several sites. Each individual site receives its own materials and services. The Receiving application allows both materials and services, including configuration-managed parts, to be received and recorded in the database when they are delivered to a site.

You can perform the following tasks using the Receiving application:

- You can add a conversion factor, for example, from case to each, to the database.
- You can add a unit of measure, for example, feet or gallons, to the database.
- You can receive configuration-managed parts.
- You can approve the receipt of a part that requires inspection.
- You can bookmark a record so that you can view it at a later time.
- You can enter asset numbers and other asset data when receiving rotating parts.
- You can modify a conversion factor.
- You can modify a unit of measure.
- You can run reports.

Request for quotations

You use the Request for Quotations application to create and manage request for quotations (RFQ) for configuration-managed (CM) parts. Based on the quotations, you can assess the vendor who best meets your needs.

An RFQ is a request that you send out to one or more potential vendors. To list a vendor on the Request for Quotations application, the vendor must have a record in the Companies application. In the Request for Quotations application, you can specify line items, required delivery dates, and other conditions that you want the vendor to meet for the delivery of a part or a service.

You can create an RFQ for any of the following conditions:

- The stock count of a part is less than a certain level, and you must place another bulk order.
- A requisition is received for a part or for a service that requires a quotation each time because of price or other requirements.
- Someone at your site requests a quote for a part or for a service. It can be for a stocked part or for a non-stocked part, such as a special order.
- You need to do commodity bulk buying for a certain period of time. This is typically for many items with common commodity codes. The quotation might not be copied to a purchase order immediately, but the pricing is set.

When you receive the quotations from the vendors, you insert them into the Request for Quotations record one line at a time. At the end of the process, you review the quotations and award one quotation for each line. The quotations are then converted to one or more purchase orders or contracts, depending on the procurement flow within your organization.

Creating capabilities

To track qualifications and ensure that vital maintenance and vending are supplied by qualified individuals, you can create capabilities and certification requirements for capabilities.

Procedure

1. On the toolbar, click the **New Capability** icon and specify a unique identifier in the **Capability** field. This identifier must be unique within an organization.
2. Specify a description and the type of capability.
3. If a certificate is required for the capability, select the **Certificate Required** check box.
4. Optional: You can specify the duration period and the required use period for the certificate.
5. Optional: You can specify class and category, which are prerequisites for the capability in the Class/Category table.
6. Save the capability.

Extending or renewing capabilities

If a location renews its certification, you can extend or renew the existing capability associated with a maintenance location record.

Procedure

1. In the Capability application, select the record and click the **Associated Maintenance Locations** tab.
2. In the **Maintenance Locations** table window, view the details for the maintenance location code for the capability that you want to extend or renew.
3. Click **Extend/Renew Capability**.
4. Specify the dates when the certificate was validated.
5. Specify the date when the extension or renewal becomes effective.
6. Click **OK**.

Adding configuration-managed capability to purchase requisitions

The configuration-managed (CM) capability refers to the approvals, certificates, and other formal records that a company holds. These records define the ability of the organization to provide goods and services as detailed in the capability records. Certain industries maintain assets that are subject to regulatory control, and require traceability for parts and services relating to maintaining these assets.

Procedure

1. In the Purchase Requisitions application, select the PR record and open the **PR Lines** tab.
2. Select a CM part.
3. In the **Capability** field, proceed with one of the following options:
   - If no capability is defined for terms and conditions, leave this field blank.
   - If capability is defined for terms and conditions but is not valid, specify `N`. For example, specify `N` if the vendor defined on the PR does not hold the capability or the capability is expired.
   - If capability is defined for terms and conditions and is valid, specify `Y`. For example, specify `Y` if the vendor defined on the PR holds the capability and the capability is not expired.
4. On the **PR** tab, if the vendor holds valid capability, select the **CM Capability** check box in the Vendor table.
5. On the **Terms and Conditions** tab, specify a sequence, capability, and line item.

6. Save the purchase requisition.

Adding configuration-managed capability to purchase orders

The configuration-managed (CM) capability refers to the approvals, certificates, and other formal records that a company holds. These records define the ability of the organization to provide goods and services as detailed in the capability records. Certain industries maintain assets that are subject to regulatory control, and require traceability for parts and services that are related to maintaining these assets.

Procedure

1. In the Purchase Orders application, select the PO record and open the **PO Lines** tab.
2. Select or add a configuration-managed part.
3. In the **Capability** field, proceed with one of the following options:
   - If no capability for terms and conditions is defined, leave this field blank.
   - If capability for terms and conditions is defined but is not valid, specify `N`. For example, specify `N` if the vendor defined on the PO does not hold the capability or if the capability is expired.
   - If capability for terms and conditions is defined and valid, specify `Y`. For example, specify `Y` if the vendor defined on the PO holds the capability and the capability has not expired.
4. On the **PO** tab, if the vendor holds valid capability, select the **CM Capability** check box in the Vendor table.
5. On the **Terms and Conditions** tab, specify a sequence, capability, and line item.
6. Save the purchase order.

Adding configuration-managed capability to RFQs

The configuration-managed (CM) capability refers to the approvals, certificates, and other formal records that a company holds. These records define the ability of the organization to provide goods and services as detailed in the capability records. Certain industries maintain assets that are subject to regulatory control, and require traceability for parts and services relating to maintaining these assets.

Procedure

1. In the Request for Quotations application, select the RFQ record and open the **RFQ Lines** tab.
2. Select or add a CM part.
3. In the **Capability** field, proceed with one of the following steps:
   - If no capability is defined for terms and conditions, leave this field blank.
   - If capability is defined for terms and conditions but is not valid, specify `N`. For example, specify `N` if the vendor defined on the RFQ does not hold the capability or if the capability is expired.
   - If capability is defined for terms and conditions and is valid, specify `Y`. For example, specify `Y` if the vendor defined on the RFQ holds the capability and the capability has not expired.
4. On the **RFQ** tab, if the vendor holds valid capability, select the **CM Capability** check box in the Vendor table.
5. On the **Terms and Conditions** tab, specify the sequence, capability, and line item.

6. Save the record.

Adding CM parts to purchase requisition lines

To specify that a purchase requisition (PR) line item is related to a configuration-managed (CM) part, you use the **CM Details** section of the **PR Lines** tab. This procedure allows you to associate CM attributes with the line item within the PR.

Procedure

1. In the Purchase Requisitions application, create or list a PR and click the **PR Lines** tab. The status of the PR must be WAPPR (Waiting for approval).
2. In the PR Lines table, select or add a new PR line.
3. In the Line Item table, select the **CM Part** check box. This check box indicates that the line item is to be managed by Maximo for Aviation MRO.
4. In the CM Details table, in the **CM Part** field, specify a value.
5. Optional: Specify the model, variation, or label of the CM part.
6. Optional: Add a CM capability.
7. Save the purchase requisition.

Adding CM parts to purchasing records

You can improve the efficiency and compliance of your purchasing process by associating a configuration-managed (CM) parts with a line item within the purchasing record. The CM parts is then used for validation of the purchasing record

Procedure

1. In the Purchase Orders application or Purchase Requisitions application, open a record. The status of the record must be WAPPR (waiting for approval).
2. Select the line you want to edit, or add a new PO line.
3. In the Line Item table, select the **CM Part** check box.
4. In the CM Details table, specify a value, model, configuration, and label for the CM part.
5. Optional: Add a CM capability.
6. Save the purchasing record.

Adding configuration-managed parts to purchase order lines

A purchase order (PO) line item can be linked with a part managed by Maximo for Aviation MRO by associating computer-managed (CM) attributes with the line item within the PO.

Procedure

1. In the Purchase Orders application, open a PO. The status of the PO must be WAPPR (waiting for approval).
2. On the **PO Lines** tab, select the PO line you want to edit, or add a new PO line.
3. In the Line Item table, select the **CM Part** check box. This check box indicates that the line item is to be managed by Maximo for Aviation MRO.
4. In the CM Details table, specify a value to the **CM Part** field.

5. Optional: Specify the model, variation, or label for the CM part.
6. Optional: Add a CM capability.
7. Save the purchase order.

Adding CM parts to RFQ lines

To specify that an RFQ line item is related to a configuration-managed (CM) part, you associate CM attributes with the line item within the RFQ.

Procedure

1. In the Request for Quotations application, select an RFQ and open the **RFQ Lines** tab. The status of the RFQ must be INPRG (in progress).
2. In the RFQ Lines table, select or add a new RFQ line.
3. In the Line Item table, select the **CM Part** check box.
4. In the CM Details table, in the **CM Part** field, specify a value.
5. Optional: Specify the model, variation, or label of the CM part.
6. Optional: Add a CM capability.
7. Save the record.

Chapter 13. Managing warranties

You can manage warranties for assets and parts and you can manage warranty claims.

Related concepts:

"Warranty options" on page 20
You can specify information about how you want warranties to be used in your organization. For most options, you specify choices on the Warranty Options window in the Organizations application. An item warranty option is controlled by a property in the System Properties application.

Asset Warranty Contracts application

To create and view asset warranty contracts, you use the Asset Warranty Contracts application. An *asset warranty contract* defines the repairs to an asset that the warranty provider is responsible for performing or paying for. The warranty contract defines warranty durations for assets by time or meter.

Coverage

To specify the warranty coverage, including time duration and meter-based duration, you use the **Coverage** tab.

You use the Coverage table window to define a new coverage line for warranty contracts. The coverage can be for a service or a standard service. There are two types of coverage lines:

Full coverage
The entire asset is under warranty.

Component coverage
A specific component or components and optionally, their child components, are under warranty.

You also define time durations for the warranty in the Coverage table window.

You use the Meter Lines for Coverage Line table window to define the meter-based duration for the contract line that is selected in the Coverage table window.

Associated Assets

To associate assets with the contract, you use the **Associated Assets** tab. Each asset that you add inherits all coverage that is defined on the warranty contract. For each line of coverage for an asset, you can specify the start date and the start meter life-to-date reading. After you specify starting points, the end points of the coverage durations, including goodwill, are calculated.

For each asset, meter duration records are created for defined meter durations of each coverage line if the following condition is met: The unit of measure of the asset meter matches the unit of measure defined on meter durations on the warranty coverage lines.

For example, you specify a coverage line with a duration of 100,000 and a unit of measure of miles. You associate an asset with the contract. The asset has an odometer with a unit of measure of miles. A meter duration for the odometer on the asset is created for this asset and coverage line.

Terms and Conditions

To associate terms and conditions with the contract or to view applied terms and conditions, you use the **Terms and Conditions** tab. Terms and conditions can specify such information as:

- liability concerns
- shipping and handling details
- delivery time expectations

Related concepts:

Warranty contracts overview

Related tasks:

Managing warranty contracts

Creating asset warranty contracts

You create asset warranty contracts to define the repairs to assets that the warranty provider is responsible for performing or paying for. Create asset warranty contracts in the Asset Warranty Contracts application.

About this task

When you create an asset warranty contract, it has a unique contract number. You can append data to the number to differentiate it from other contracts. For example, if you have multiple sites and want to track contracts by site, you can append a site identifier to the contract number.

An asset warranty contract tracks manufacturer warranty information for multiple assets by time or meters. There might or might not be costs that are associated with the warranty.

Procedure

1. In the Asset Warranty Contracts application, click **New Warranty Contract**.
2. Enter information about the provider of the warranty in the Vendor section on the **Contract** tab. If the warranty is one that you provide a warranty to your customers for this asset, select the **Warranty for Customers** check box.
3. Specify any relevant details about the asset warranty contract properties the **Properties** tab.
4. Specify coverage details of the warranty coverage on the **Coverage** tab. You can add coverage lines only if the contract status is Draft, Pending Revision, or Waiting for Approval.
   a. Click **New Row** for a new coverage line and complete the line **Description** field.
   b. Select the **Full Coverage** check box, or specify the covered component.
   c. Define warranty duration information. For example, if you want to set the duration to one year, enter 1 in the **Duration** field and specify `YEARS` in the **Time Unit** field.
   d. Optional: Specify goodwill duration. *Goodwill* is an informal grace period that temporarily extends the warranty coverage.

e. In the **Actuals Coverage Details** section, specify whether the coverage extends to labor, materials, and services by selecting the appropriate check boxes.

f. If the coverage line is based on meter duration, such as miles or kilometers, specify the meter-duration coverage in the Meter Lines for Coverage Line table.

5. Optional: Specify any applicable terms and conditions on the **Terms and Conditions** tab.
6. From the Action menu, click **Authorize Sites** to authorize one or more sites to use the asset warranty contract. You must authorize the warranty contract for at least one site before you can approve the contract.
7. Save the asset warranty contract and then approve it. You must approve the warranty contract before you can specify the assets that are covered.
8. On the **Associated Assets** tab, specify the assets that are covered by the asset warranty contract.
9. Save the asset warranty contract.

Extending warranty coverage

You can manually extend an asset's warranty coverage based on certain situations, such as asset condition changes.

Procedure

1. In the Assets application, open the record that you want to extend warranty coverage for.
2. On the **Warranties** tab, extend the warranty.

Option	Description
For time-based coverage	Use the Coverage for Contract table
For meter-based coverage	Use the Meters for Coverage Line table

3. Enter a value in the **Coverage Extension** field.
4. Enter the reason for the extension.
5. Save the record.

Warranties for customers

You might provide customers with warranties that are covered by your company, rather than through a manufacturer or vendor. A warranty for customers is provided directly by your company to your customers.

You can track these warranties for customers in the Assets Warranty Contracts application. You can specify warranty duration and coverage details. A full audit trail of all warranty transactions is maintained. You can designate a contract as a warranty that is provided directly to customers by selecting the **Warranty for Customers** check box.

Item Warranty Contracts application

To create and view item warranty contracts, you use the Item Warranty Contracts application. An item warranty contract defines the warranty coverage for specific items or for a group of items.

A warranty contract can cover an item or a group of similar items that have the same component code. The warranty specifies a length of time or a meter duration for which coverage applies. For each item warranty contract, you identify the vendor and define the coverage and, where applicable, the meter duration for the coverage.

You use the **Coverage** tab to specify the warranty coverage, including time and meter durations. Use the Coverage table window to define item coverages that have time durations. Use the Meter Lines for Coverage table window to define the meter-related duration for the coverage line that is selected in the Coverage table window.

After item warranty contracts are created and approved, warranties can be identified when they apply to:

- items on invoices
- inventory issues and transfers
- purchase orders
- purchase requisitions
- requests for quotations
- work orders

Depending on your system configuration, when a potential warranty situation exists, you receive a warranty notification message.

Related concepts:

Warranty contracts overview

Related tasks:

Managing warranty contracts

Creating item warranty contracts

You create item warranty contracts to specify the warranty coverage for items or groups of items. Create item warranty contracts in the Item Warranty Contracts application.

About this task

When you create an item warranty contract, it has a unique contract number. You can append data to the number to differentiate it from other contracts. For example, if you have multiple sites and want to track contracts by site, you can append a site identifier to the contract number.

Procedure

1. In the Item Warranty Contracts application, click **New Warranty Contract**.
2. Enter information about the provider of the warranty in the Vendor section on the **Contract** tab.
3. Specify any relevant details about the item warranty contract properties the **Properties** tab.
4. On the **Coverage** tab, specify the item or items that the warranty covers. Click **New Row** then specify a value in one of the following fields:

Field	Coverage
Item	The coverage line applies only to items with this item identifier.

Field	Coverage
Component	The coverage line covers all items that are associated with this component code in the Item Master application.

5. Define warranty duration information. For example, if you want to set the duration to one year, enter 1 in the **Duration** field and specify YEARS in the **Time Unit** field.
6. Optional: Specify goodwill duration. *Goodwill* is an informal grace period that temporarily extends the warranty coverage.
7. If the coverage line is based on meter duration, such as miles or kilometers, specify the meter-duration coverage in the Meter Lines for Coverage table.
8. Optional: Specify any applicable terms and conditions on the **Terms and Conditions** tab. Terms and conditions can contain information such as liability concerns, shipping and handling details, and delivery-time expectations.
9. From the Action menu, select **Authorize Sites** to authorize one or more sites to use the item warranty contract. You must authorize the warranty contract for at least one site before you can approve the contract.
10. Save the item warranty contract then approve it.

Warranty Claims application

To generate warranty claims based on warrantable transactions, such as labor use and material use, you use the Warranty Claims application. You can also enter ad hoc warranty claims.

Use the **Claim** tab to view warranty, vendor, and other information about a warranty claim and to create new claims. You can view the current meter readings for the listed asset in the Current Meter Readings table.

Use the **Claim Lines** tab to view the detailed claim information for generated claims. Claims have claim lines only if they have been generated by using the **Generate Warranty Claims** action. The value in the Claimed Amount column can be edited until the claim is approved.

Warranty claim processes

If items or assets get damaged, you can seek to repair or replace the items and assets. You can make warranty claims that are based on warrantable transactions or based on ad hoc requirements.

Generated warranty claims

You can generate warranty claims based on warrantable transactions. A warrantable transaction is a transaction that meets defined warranty criteria and that might be included on a warranty claim, for example, labor use or material use on a work order to repair an asset that is under warranty. You can claim a warrantable transaction only once. Depending on your organization's requirements, you are alerted when warranty claims might exist in following situations:

- When you change work orders
- When you change purchase requisitions
- When you change purchase orders
- When you change requests for quotations

- When you change labor transactions
- When you change inventory issues

Warranty claims for assets that are under warranty are generated based on incident. For example, if your car breaks down twice, the first time because the steering pump failed and the second time because the alternator failed, these failures are recorded as separate incidents. Therefore, these incidents are two separate claims. A work order is created for each repair job and you are alerted that possible warranty situations exist. When you generate a warranty claim, a warranty claim is automatically created for each incident.

After you generate a warranty claim, it might have several claim lines. For example, two people are required to repair the alternator and each work an hour apiece. The repair job also requires three parts. After you generate the warranty claim for the alternator repair job, five claim lines are automatically created for the hour worked by both people and each part.

To generate warranty claims for items and assets that are based on warrantable transactions, go to the Warranty Claims application, select the **Generate Warranty Claims** action, and specify the warranty claim details. The initial status of the warranty claim is determined by your organization's requirements.

Ad hoc warranty claims

You can create ad hoc warranty claims to save processing time and associated costs for low-cost items. For example, you have warranty coverage for air brake valves from your vendor. The air brake valve is a low-cost item. Rather than submit a warranty claim each time an air brake valve fails, you can wait until you accumulate several failed items. You can then create an ad hoc warranty claim for the entire batch of failed air brake valves.

If you have a number of items that must be replaced or repaired, you can seek reimbursement from the vendor, even if they are not covered under warranty. For example, if you have number of air brake valves that failed, you can create an ad hoc warranty claim to return the items to the vendor. Typically, a vendor might offer some reimbursement for a large volume of failed items.

You can also create ad hoc warranty claims for incidents that are not recorded in work order inventory transactions.

To create an ad hoc warranty claim, go to the Warranty Claims application, click **New Claim**, and specify the warranty claim details.

Warranty claim completion

If you submitted a warranty claim to replace an item, from the **Select Action** menu, create a no-charge purchase order. When the no-charge item on the purchase order is received, the quantity recovered on the warranty claim is set to the total quantity of the receipts. If the quantity recovered is equal to or greater than the claimed quantity, the status of the warranty claim is set to closed. A return transaction is created that credits the asset on the claim for the inventory value of the item, and the item is returned to the storeroom that is specified on the warranty claim.

If you submitted a warranty claim for refund of items or for repair costs for an asset, from the **Select Action** menu, create a credit invoice. After you create the

credit invoice, the status of the warranty claim is set to claim submitted. When the credit invoice is approved in the Invoices application, the recovered amount on the claim record is set to the total amount on the credit invoice. If the amount recovered is equal to or greater than the claimed amount, the status of the warranty claim is set to closed.

Warranty claim statuses

Warranty claims can be generated with a status of waiting for approval (WAPPR) or approved (APPR). Warranty claims can also have a status of claim submitted (CLAIM), canceled (CAN), or closed (CLOSE).

The initial status of generated claims is controlled by a setting in the Organizations application. You can only edit warranty claim information while the claim is in waiting for approval (WAPPR) status.

You typically must approve a claim before you submit it to the vendor. Use the Change Status window to approve or cancel a warranty claim and to close a completed claim.

When a credit invoice or a no-charge purchase order is generated from a warranty claim, the status of the claim is set to CLAIM. When the invoice is approved in the Invoices application, or the no-charge item on the PO is received, the claim status is set to CLOSE.

Managing warranty claims

A warranty claim is a document that identifies a repair incident that is covered under warranty. You use the warranty claim to seek reimbursement for the costs or items that were used to correct the problem.

Generating warranty claims

When you do work on assets that are covered by warranty or use items that are covered by warranty, you want to recover the cost or replace the items. You can generate warranty claims that are based on warrantable transactions, such as labor and part replacement.

About this task

A *warrantable transaction* is a transaction that is potentially covered by warranty. Warrantable transactions consist of actual labor hours, materials used, and services used in the repair of assets that are under warranty. The replacement of an item under warranty is also a warrantable transaction.

To generate warranty claims, you select from a list of eligible transaction lines. To be eligible for selection for a warranty claim, the transactions must have occurred on an asset under warranty or on an item under warranty. The transactions also must meet the warranty coverage stipulations and the transactions cannot have been claimed previously.

You can generate warranty claims from the Warranty Claims application and also from the Work Order Tracking and Quick Reporting applications. Generating warranty claims from a work order lets you generate them when you are notified that possible warranty conditions exist, when you are recording actual work data.

Procedure

1. From the Action menu, select **Generate Warranty Claims**.

2. Optional: In the **Storeroom** field, specify the default return-to storeroom for all selected item warranty transaction lines.

   The specified storeroom is where items that are recovered as a result of the warranty claim are to be returned. Credit is given to the asset that the items were used on. The storeroom can be edited on individual transaction lines.
3. Click **Select Warrantable Transactions** .

   The Select Transactions window lists warrantable transactions that have not been previously claimed.
   - If you display the window from a work order, the transactions list is initially filtered to show only transactions for the current work order.
   - If you display the window from the Warranty Claims application, the transactions list is initially unfiltered.
4. Optional: Filter the transactions list by specifying data such as asset number, warranty, and work order in the search fields.
5. Select the transaction rows that you want to generate warranty claims for and click **OK**.
6. Optional: On asset warranty transaction lines, edit the claimed amount, if necessary. The **Claimed Amount** field initially shows the line cost.
7. Optional: On item warranty transaction lines, edit the **Vendor Item #**, **Claimed Amount**, **Quantity Claimed**, and **Return to Storeroom** fields, if necessary.
8. Click **OK** to generate warranty claims.

Results

Generation of warranty claims assigns transaction lines to warranty claim records. Warranty claims for assets under warranty are generated based on incident. That is, all lines from the same work order, for the same asset, covered by the same warranty, are included on a single claim. When that is not the case, multiple claims are generated, with claim lines assigned to claims by the same criteria.

Warranty claims for items under warranty are also generated based on incident. That is, warranty claims for items contain only one transaction.

In the Warranty Claims application, you can view warranty claims on the **Claims** tab and view the claim lines on the **Claim Lines** tab. Use the **List** tab to find claims by work order, asset, warranty, or other search criteria.

In the Work Order Tracking and Quick Reporting applications, select **View Warranty Claims** from the Action menu to view the warranty claims that are associated with the current work order.

Creating ad hoc warranty claims

An *ad hoc warranty claim* is a claim against a warranty for recovery of cost or items in which no specific claim line items are identified.

About this task

You can create two types of warranty claims:

- A claim that is based on warrantable transactions, such as labor use, material use, or service use. You can only create claims against warrantable transactions by using the **Generate Warranty Claims** action. The transactions are listed as warranty claim lines.

- An ad hoc warranty claim, for incidents that are not recorded in ; therefore, no transaction details exist. No individual claim line items can be specified on an ad hoc warranty claim.

Procedure

1. On the toolbar in the Warranty Claims application, click the **New Warranty Claim** icon.
2. Specify a value in the **Claim** field.
3. The required **Incident Date** field defaults to the current date. You can edit the date.
4. In the **Contract** field, specify the warranty contract that you are making a claim against.
5. Enter a value in the **Asset** field.
6. If a work order is associated with the claim, specify the work order number.

   If the work order records actual labor use or actual material, use **Generate Warranty Claims** rather than creating an ad hoc claim. Using the **Generate Warranty Claims** action, you can select the labor and material use transactions for which you are seeking reimbursement.
7. Optional: Specify additional information, such as a component code or vendor contact, as necessary.
8. In the **Cost Amount** field, enter the cost for the warrantable incident.
9. In the **Claimed Amount** field, enter the amount that you are claiming. This amount can be the same as the cost amount. The claimed amount can also be higher than the cost amount, if you claim a markup for repair of an asset under warranty or replacement of items under warranty.
10. Save the warranty claim.

Creating credit invoices

You can create a credit invoice for reimbursement of costs that are incurred for repair of an asset that is under warranty. You can also create a credit invoice for reimbursement for items that are under warranty.

About this task

Creating a credit invoice is one of the two ways to complete the warranty claim process. You can also create a no-charge purchase order (PO).

Procedure

1. In the Warranty Claims application, display the warranty claim for which you want to create a credit invoice.
2. On the claim record, confirm that all of the following conditions are true:
   - The status of the claim is approved (APPR).
   - There is a vendor in the **Vendor** field.
   - There is an asset identifier in the **Asset** field.
   - There is a nonzero amount in the **Claimed Amount** field.
   - There is not already a number in the **Invoice** field or the **PO** field.
   - There is either a fully specified GL account in the **GL Account** field, or else the field is empty (null). If there is a partially specified GL account in the field, you cannot create an invoice.
3. From the Action menu, select **Create Credit Invoice**.

Results

If any of the specified conditions are not met, you are notified that an invoice cannot be created.

If all the conditions are met, a message notifies you that the invoice has been generated, and provides the invoice number.

After the claim generates the credit invoice, the status of the claim is set to CLAIM (claim submitted). When the invoice status is changed to APPR (approved) in the Invoices application, the recovered amount on the claim record is set to the total amount on the credit invoice. If the amount recovered is equal to or greater than the claimed amount, the claim status is set to CLOSE (closed).

Creating no-charge purchase orders

You can create a no-charge purchase order (PO) for replacing items under warranty for a warranty claim.

About this task

Creating a no-charge PO is one of the two ways to complete the warranty claim process. You can also create a credit invoice.

Procedure

1. In the Warranty Claims application, display the warranty claim for which you want to create a no-charge PO.
2. On the claim record, confirm that all of the following conditions are true:
   - The status of the claim is approved (APPR).
   - There is a vendor in the **Vendor** field.
   - The value in the **Contract Type** field is ITEMWARRANTY.
   - There is an asset identifier in the **Asset** field.
   - There is an item identifier in the **Item** field.
   - There is a storeroom in the **Return to Storeroom** field.
   - There is a nonzero quantity in the **Claimed Quantity** field.
   - There is not already a number in the **Invoice** field or the **PO** field.
3. From the Action menu, click **Create No-Charge PO**.

Results

If any of the specified conditions are not met, you are notified that a PO cannot be created.

If all conditions are met, a message notifies you that the PO has been generated, and provides the PO number. The **Status** field of the warranty claim now reads CLAIM (claim submitted).

When the no-charge item on the PO is received, the quantity recovered on the claim is set to the total quantity of the receipts. If the quantity recovered is equal to or greater than the claimed quantity, the claim status is set to CLOSE (closed). The system then creates a return transaction that credits the asset on the claim for the inventory value of the item. The return transaction directs the return of the item to the storeroom that is specified on the claim.

Chapter 14. Release notes for Maximo for Aviation MRO 7.6

Known problems are documented in individual technotes in the IBM Support knowledge base. When product issues are discovered and resolved, the Support team updates the knowledge base. By searching the knowledge base, you can find workarounds or solutions to problems.

Use the following links to search the Support knowledge base for technotes for your product. If no information is available, the searches return no results.

- Technotes documenting installation issues.
- Technotes documenting product issues.

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