TEAMCENTER

PLM for Machine Builders

Teamcenter 2412

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1. PLM for Machine Builders overview

What is PLM for Machine Builders

PLM for Machine Builders is a solution for industrial machinery customers that is used to manage the program and engineering data from the start of a customer order to the release of the order to production. You can add pre-configured content and templates to Active Workspace. This content is tailored to the machine building process. The solution provides you with a foundation for your machinery orders that can be expanded and customized to meet your needs.

Specifically, you can:

- Maximize the reuse of modularized platform design, libraries, and bill of materials (BOM).
- Drive technical specification requirements, which can be associated to an order or to general product requirements.
- Synchronize the release of engineering parts, assemblies, and drawings to improve the clarity in the manufacturing process.
- Use programs to track the project's status and provide a timeline for release that satisfies the customer machine requirements.
- Integrate with Change Management to improve the quality and speed of engineering design changes.

> Note:
>
> In addition to this documentation, online training is also available for the PLM for Machine Builders solution.

PLM for Machine Builders prerequisites

Before you begin using the PLM for Machine Builders solution, make sure you meet the following prerequisites:

- You are familiar with general PLM terminology, methods, and the general industrial machinery business process.
- You have completed the basic training courses for Active Workspace and NX.

User roles in PLM for Machine Builders

There are multiple user roles in the PLM for Machine Builders solution. These roles include a variety of users from engineers and project managers who work on the new machine order to the electronic

computer aided design (ECAD) users who may be involved if a new or updated part is required for the machine order.

User roles for the machine project

The table below describes the user roles and tasks these users complete during the different phases of the PLM for Machine Builders business process.

Role	Phases and tasks
Application Engineer	**Machine design phase:** Adds module-level specifications, identifies and reuses existing components, creates new design content, and creates or revises installation assemblies. **Machine specification and planning phase:** Reviews the specifications and executes the machine cloning operation. **Document management phase:** Changes engineering documents.
Advanced Engineer	**Machine specification and planning phase:** Defines technical requirements. **Document management phase:** Releases parts, drawings, and installation assemblies. **Change management phase:** Approves and releases change orders.
Project Manager	**Program planning phase:** Initiates the program and establishes the schedule. **Document management phase:** Monitors and controls the program throughout its lifecycle, releases the machine, and closes the program when it is completed.
Manager	**Program planning phase:** Ensures the engineering department implements the program by approving the customer requirements. **Machine specification and planning phase:** Approves the requirements. **Document management phase:** Approves change requests.

User roles for ECAD requests

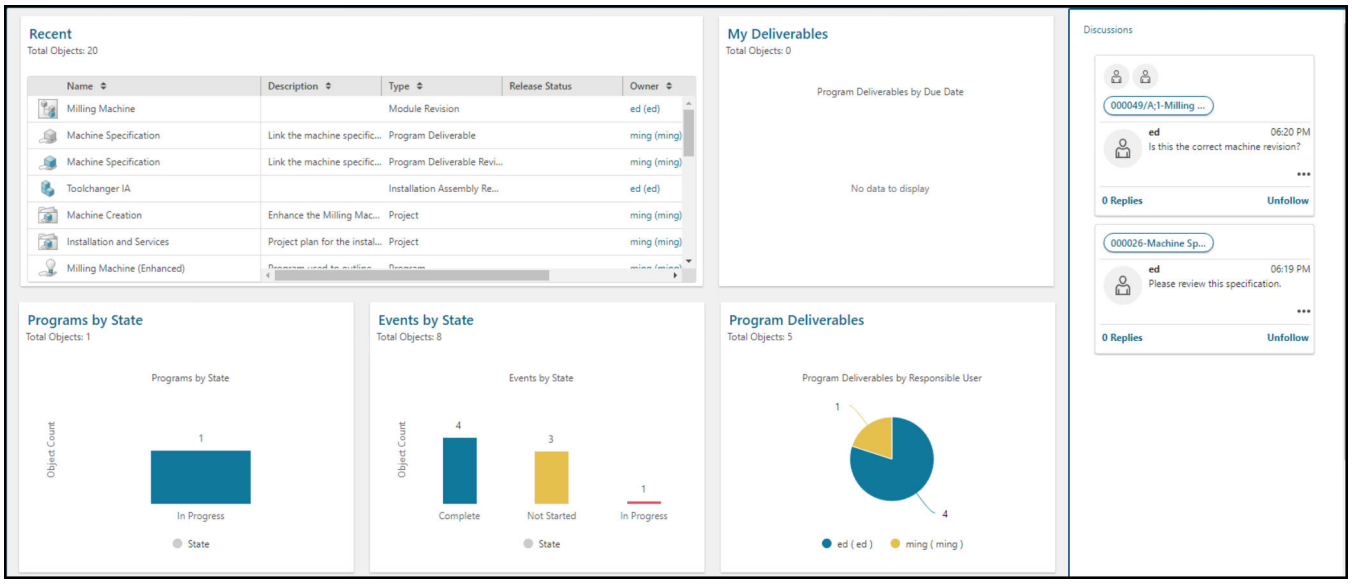
The table below describes the user roles involved when an ECAD request is made during a PLM for Machine Builders project.

Role	Phases and tasks
ECAD Manager	Reviews and approves the requests for ECAD-related objects. These requests are received as part of the ECAD workflows.
ECAD Engineer	Creates the ECAD assembly in Active Workspace using existing parts or starts the workflow to request a new part.
Component Library Manager	Accepts or rejects the requests for new ECAD components from the ECAD Engineer. If the request is accepted, this user then adds the new component and ensures it is ready to be used in the ECAD assembly by the ECAD Engineer. Note: When the Component Library Manager completes the workflow task requesting the new component, the new part is set to the **Component Released** status.

The PLM for Machine Builders dashboard

The Dashboard

The PLM for Machine Builders dashboard provides you with all the information you need for the machine project in one location. The dashboard contains a list of recently accessed or created objects, your orders, charts for programs, events, program deliverables, and deliverables assigned to you. Discussions between engineers and other users that relate to the machine are also displayed.



Discussions

The **Discussions** panel shows the discussions between members of the machine builder project. These discussions can be about program deliverables, the program itself, parts, and all other aspects of the machine project. It is a place to get input, make requests, or collect feedback from your team members.

From the panel, you can:

- Click on the attached object to view what the discussion is related to.
- Click the **Replies** link to view the replies from other users or add a reply of your own.
- Click **...** to edit your original message.
- **Unfollow** the discussion because it is no longer relevant. When you unfollow the discussion, it no longer appears in your **Discussions** panel.

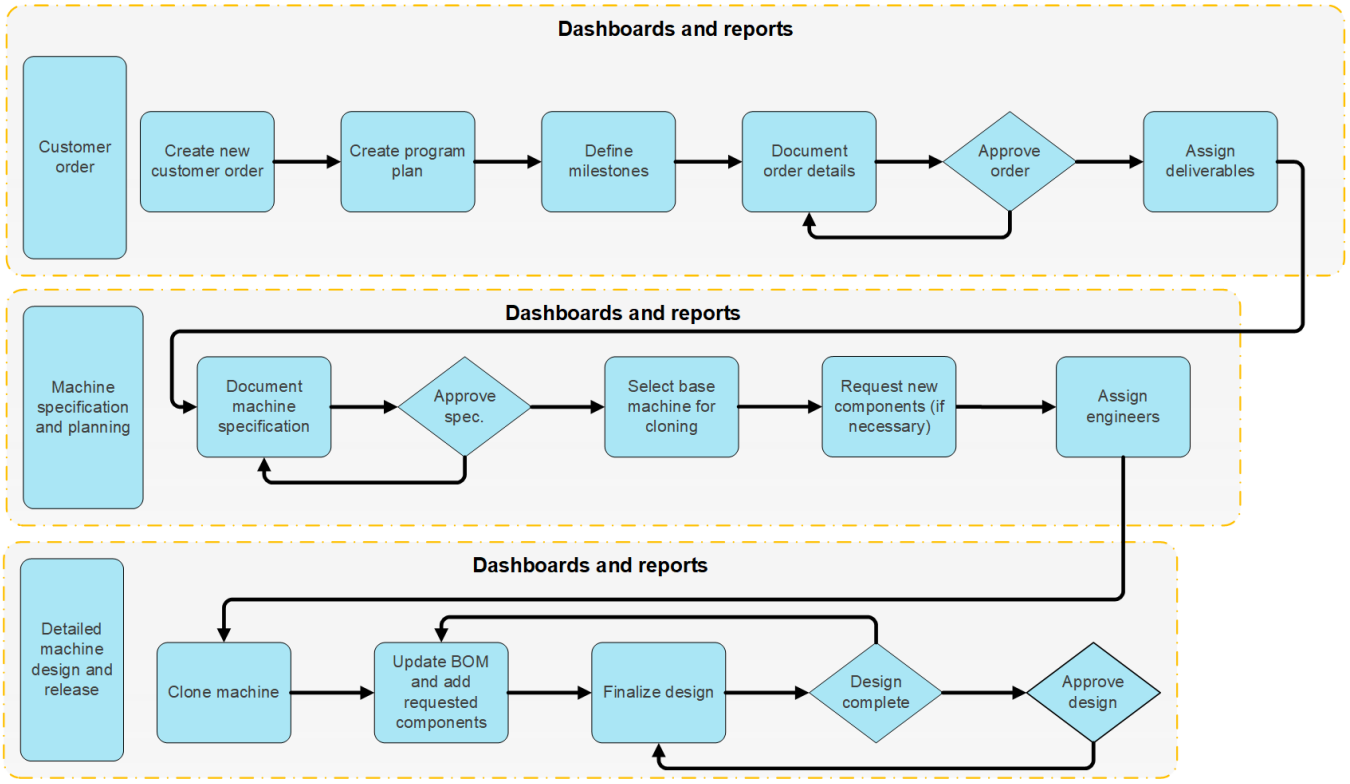
Workflows in PLM for Machine Builders

When working with program objects, machine parts, specifications, and other machine data, you must often send the object through a workflow to get signoffs and approvals to release the object. Depending on the type of object you are sending to a workflow, Active Workspace assigns the appropriate default workflow template to the object. This helps you save time and takes the guess work out of choosing the correct template for the object. You can also change the assigned workflow template, if necessary, but in most cases, you can use the workflow template that is automatically assigned when you submit the object to a workflow.

Understanding the PLM for Machine Builder business process

About the PLM for Machine Builders business process

The graphic that follows shows the PLM for Machine Builders business process. This process is commonly followed in the industry for managing the program and engineering data from the beginning of the project to its release to production. The business process is a baseline for your machine orders and can be expanded and customized as needed.



What is Program Planning in PLM for Machine Builders?

PLM for Machine Builders uses Active Workspace Program Planning to coordinate the work activities from the planning stages to the release of the machine. The program tracks the release of the product using an expanded tree view that contains events, risks, deliverables, and other program data.

The Project Manager is responsible for the creation and monitoring of the program, which includes performing the following actions:

- Creating the program with the required information for the machine project by using the provided template or your own template.
- Establishing the program by adding program objects, such as events and deliverables.
- Monitoring the program and its objects and updating them as necessary.
- Closing the program once all activities are complete.

Managing requirements and specifications

Requirements and specifications are an integral part of the PLM for Machine Builders solution. While often used interchangeably in the industry, there are specific distinctions for each item within the solution.

Specifications

Specifications are performance attributes, commonly derived from the customer requests, which ensure that the released product meets the needs of the end user. Specifications define the capabilities of the unique industrial machines, including information on the features that contribute to the machine's performance. Because these features vary between machines, specifications play an important role in describing the machine features.

For example, the specifications for a milling machine include features such as spindle orientation, axis travel, spindle speed, and horsepower. These specifications indicate the performance capabilities of the milling machine.

- The mill spindle can be either horizontal or vertical.
- Axis travel is the distance that the machine can move on each axis.
- The spindle speed indicates how fast the spindle can rotate and is measured in revolutions per minute (RPM).
- Horsepower is the amount of power the spindle can exert during cutting.

Requirements

Requirements are the internal attributes the engineering team requires to meet the needs defined in the machine specifications. In the context of the example above, the engineering team expands on the specifications for the spindle speed and horsepower by adding engineering attributes for machine reliability, such as planned life expectancy and cost targets. The engineering team turns the speed and power specifications into maximum acceptable stress levels and bearing life.

Managing the requirements and specifications

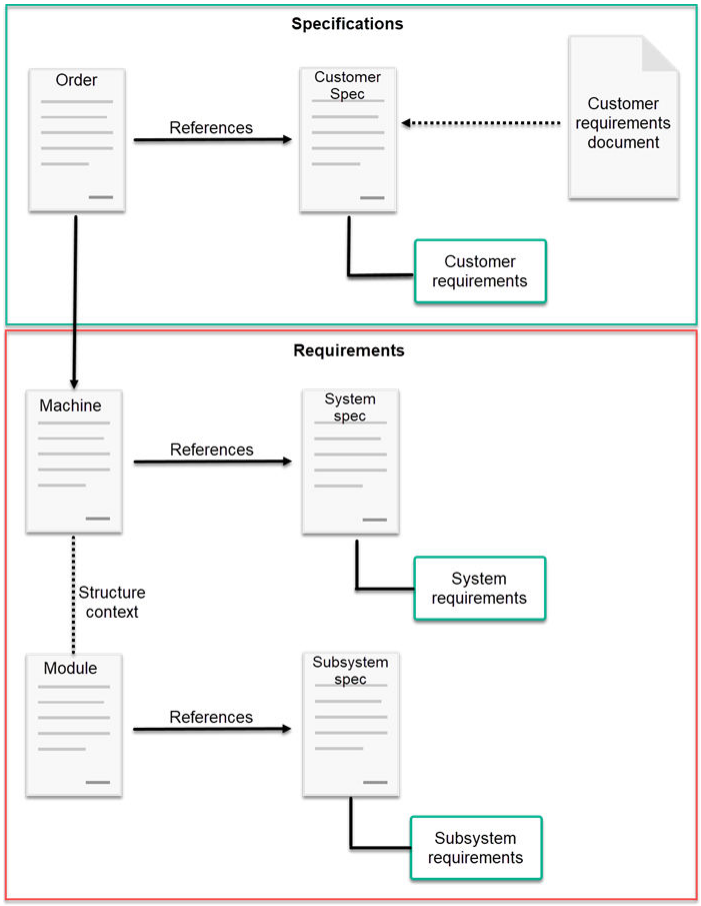
The PLM for Machine Builders solution uses Active Workspace requirements management to manage the requirements for the project to ensure that the requirements documents are attached to the order, machines, and modules. This provides traceability throughout the design process.

To use requirements for the solution, keep the following assumptions in mind:

- The design requirements are managed at the specification level and not at an individual requirement level.

- Traceability is maintained between a specification and the corresponding item attached to the specification.

The graphic below shows how requirements and specifications are associated and managed in the PLM for Machine Builders solution.



The PLM for Machine Builders engineering process

The PLM for Machine Builders solution is designed to meet the typical business scenarios for the machinery industry. The scenarios listed below define the engineering process used by the solution.

Machine design and engineering

The PLM for Machine Builders solution focuses on the following engineering processes for machine development and order fulfillment.

- **Platform Design.** The advanced engineering group designs and manages a common platform for the product family. The design is structured for maximum data reuse and program execution by configuring selections and options in a platform bill of materials (BOM).

  > Note:
  >
  > This is also referred to as modularized machinery design.

- **Engineering to Order (ETO).** The Project Manager creates a program from a received customer order for a machine and creates a program to manage the design and development of the new machine.

Most of these orders are based on an existing machine platform, but customization is possible and requires specialized design of the machine modules to meet the customer requirements.

A large portion of the new machine design reuses the existing designs. The design engineers perform further engineering work to comply with the customer-specific requirements.

- **Configure to Order (CTO).** CTO engineering processes require a robust platform design and strict adherence to the options and selection capabilities of the platform to satisfy the customer orders. The customer machine design is completed by selecting compatible modules within the machine platform. In some instances, custom engineering is required to complete the order, but most of the machine (around 90 percent) it is derived from the platform.

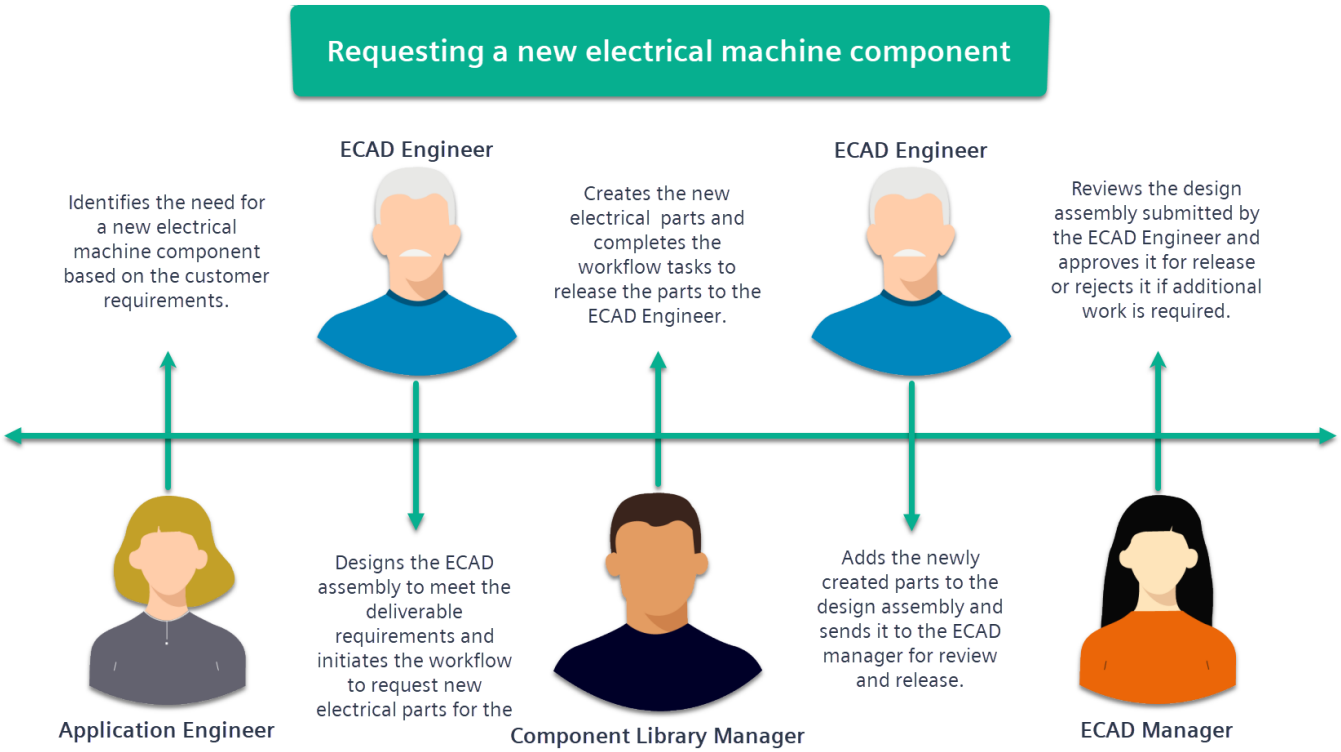
Manage new electrical machine components

During the **machine specification and planning** phase of the **machine builder business process**, you might want to request a new electrical machine component to meet the needs of the machine order and requirements. To start this process, a program deliverable is created for the new component, any relevant objects are attached, and the deliverable is assigned to the ECAD Engineer.

The ECAD Engineer creates the new electrical design assembly in Active Workspace. If needed, the engineer uses the **Request New Machine Component** workflow to request a new electrical machine component and attaches any relevant parts or specifications as a reference object. For example, the engineer can attach a part that is similar and specify that the new part requires different dimensions. This sends a new ECAD Component workflow task to the Component Library Manager. This user approves the request and then creates the new part in the ECAD authoring tool.

As the ECAD work progresses, other workflows such as the **Machine Builder Concept Design Release Process** and **Machine Builder Part/Design Concept Design Release Process** are used to approve the conceptual designs of the new component. When the work on the new component is complete, the Component Library Manager closes the workflow task to release the part to the ECAD Engineer.

The new component can now be added to the existing machine bill of materials (BOM) during the **detailed machine design and release** phase of the business process.



Document Management in PLM for Machine Builders

Document Management is a Teamcenter solution for managing documents and drawings for a product design by gathering design information, choosing templates and formats, generating the documents and drawings, managing the revisions, and releasing the documents and drawings when work on them is completed.

In the PLM for Machine Builders solution, there are two different approaches for a design release: part-centric approach and drawing-centric approach. The following table shows the differences between these approaches.

Part-centric approach	Drawing-centric approach
The part design is the specification, and the drawing is an attachment.	The drawing is the specification.
The drawing revision is driven by the part design revision.	The drawing can be revised independent of the part design.
Changes and effectivity are applied to the part design.	Changes and effectivity are applied to the drawing.

The part-centric approach

In this approach, the design release process releases the part design, and the drawings are bundled with the design. This guarantees consistency between the part design and the drawing in the release process.

PLM for Machine Builders focuses on a part-centric approach but also supports the drawing-centric approach, which allows releasing of the drawings independently from the parts.

PLM for Machine Builders also includes preconfigured translators to convert NX drawings to different formats. This is accomplished by using workflow handlers during the drawing release workflow. A custom configuration of the Dispatcher service allows for releasing of drawings in different formats.

Change Management in PLM for Machine Builders

A baseline for the machine builder project is typically created when the Project Manager creates the program for the machine. As work is performed on the machine, changes are often required to the engineering documentation. These changes are submitted using the *simple change* functionality of Active Workspace.

These engineering changes are managed using an industry standard workflow that ensures members of the change team and impacted business roles are involved in the design change. The steps below outline a high-level overview of the out-of-the-box change management workflow.

1. A user initiates the change.

2. The manager approves the change request.

3. The engineer performs the engineering changes required for the change request.

4. The engineer reviews and releases the engineering change.

> Note:
>
> The change management workflow for the PLM for Machine Builders solution can be customized to meet your needs.

Manage the release process

The release process for program deliverables, such as the machine specifications, machine parts, BOM assemblies, and CAD drawings, involves submitting these target objects to a workflow that requires the assigned users to approve the object. The PLM for Machine Builders solution contains multiple preconfigured workflow templates that automate this process using industry standard workflows.

The following steps outline a high-level overview of the out-of-the-box release process workflow.

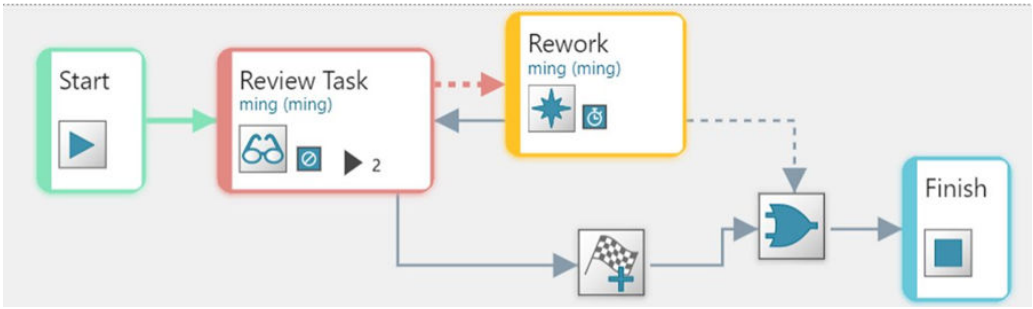
1. An engineer or another team member is assigned as the owner of a deliverable object by the project manager. These deliverables are part of the overall program and are assigned to the program events.

2. The responsible user for the deliverable starts the required work. This may be creating the machine specifications, creating the bill of materials (BOM) for the new machine, or creating a CAD drawing for a new part.

3. Once the work is completed, the responsible user submits the work to the appropriate workflow template and assigns the users responsible for approving the work for release.

4. The assigned reviewers approve or reject the work. If approved, the program deliverable's target object is released. If rejected, the target deliverable is sent back to the user who submitted the workflow so that work can be done to address the reasons why it was rejected and not released.

The following graphic is an example of a workflow template in PLM for Machine Builders.



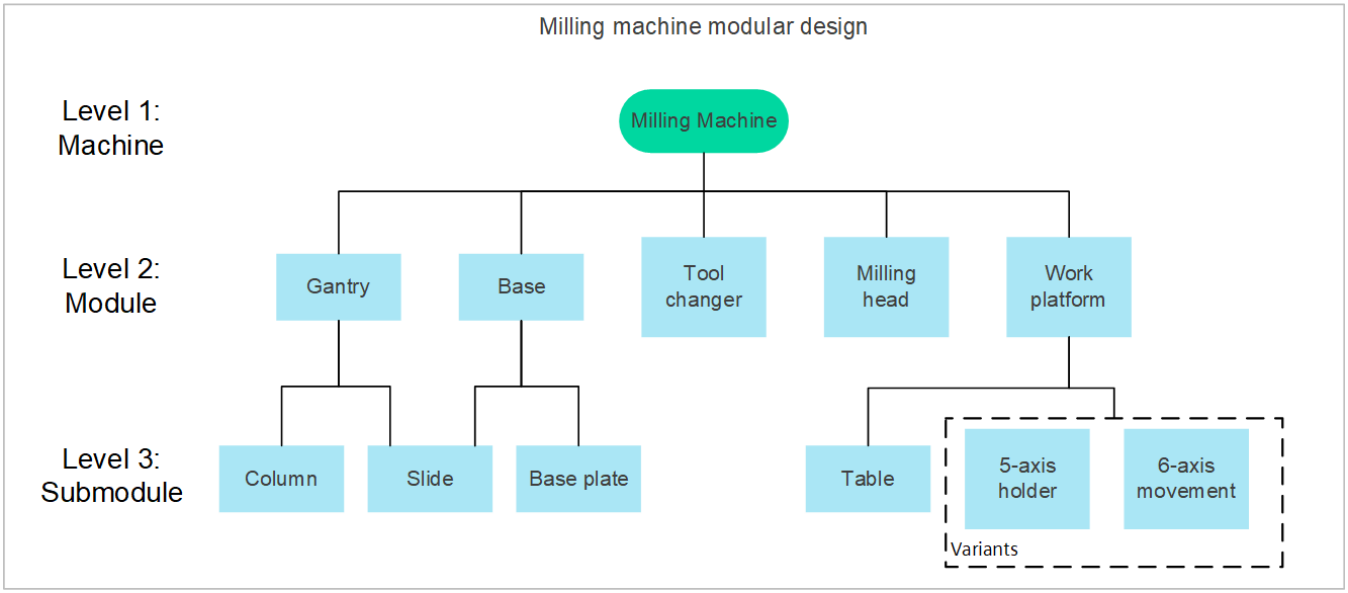
2. Modular machine design

Modular Machine Design overview

The modular design approach is commonly used in the machinery industry to design machines from modular architectures. Once a group of modules is defined, they can be chosen and combined into a predetermined group. These designs can then be used to design and manufacture a machine with the required dimensions, performance, and functionality specifications. The defined modules must also be able to implement specific functions and meet certain design principles, such as being interchangeable, standardized, and self-contained.

A modular approach for designing the machine platforms allows for the reuse of components across different variants of machines. PLM for Machine Builders supports the modular design approach by using a modular data model.

The following graphic shows a modular bill of materials (BOM) architecture for a milling machine.



The machine is divided into independent modules, such as tool changer, milling head, and work platform. These modules can be further subdivided into submodules to create a hierarchy of modules. Different modules can also use the same sub-module. There can also be variants of modules. In the milling machine example, the 5-axis work piece holder and the 6-axis rotational work piece holder are variants of the work platform module.

In addition, with a modular approach, submodules, such as the column or slide, can be positioned differently to meet the requirements for the new machine.

Note:

A modular design can also include an **installation assembly** level.

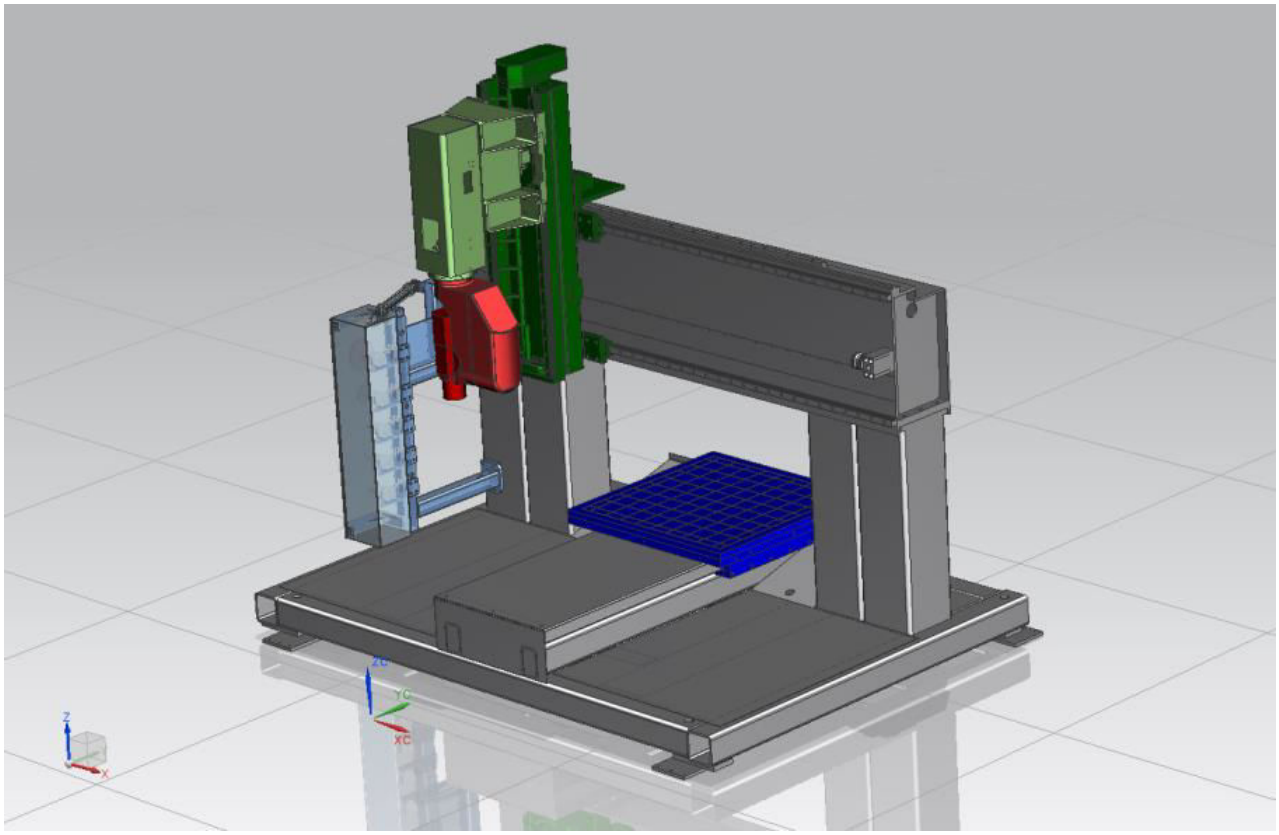
Modular machine design example

Consider that a machinery company wants to manage its existing milling machine designs for the use in a future machine design. The requirement is to clone from the existing base machine design for reuse in custom machine orders.

First, a unified modular architecture is defined for the milling machines to ensure that all the machine designs follow the same architecture. This also enables the reuse of design components at the modular level instead of the component level. The CAD assembly for each module is managed to guarantee the consistency and traceability of the design data for different revisions of modules for different machines.

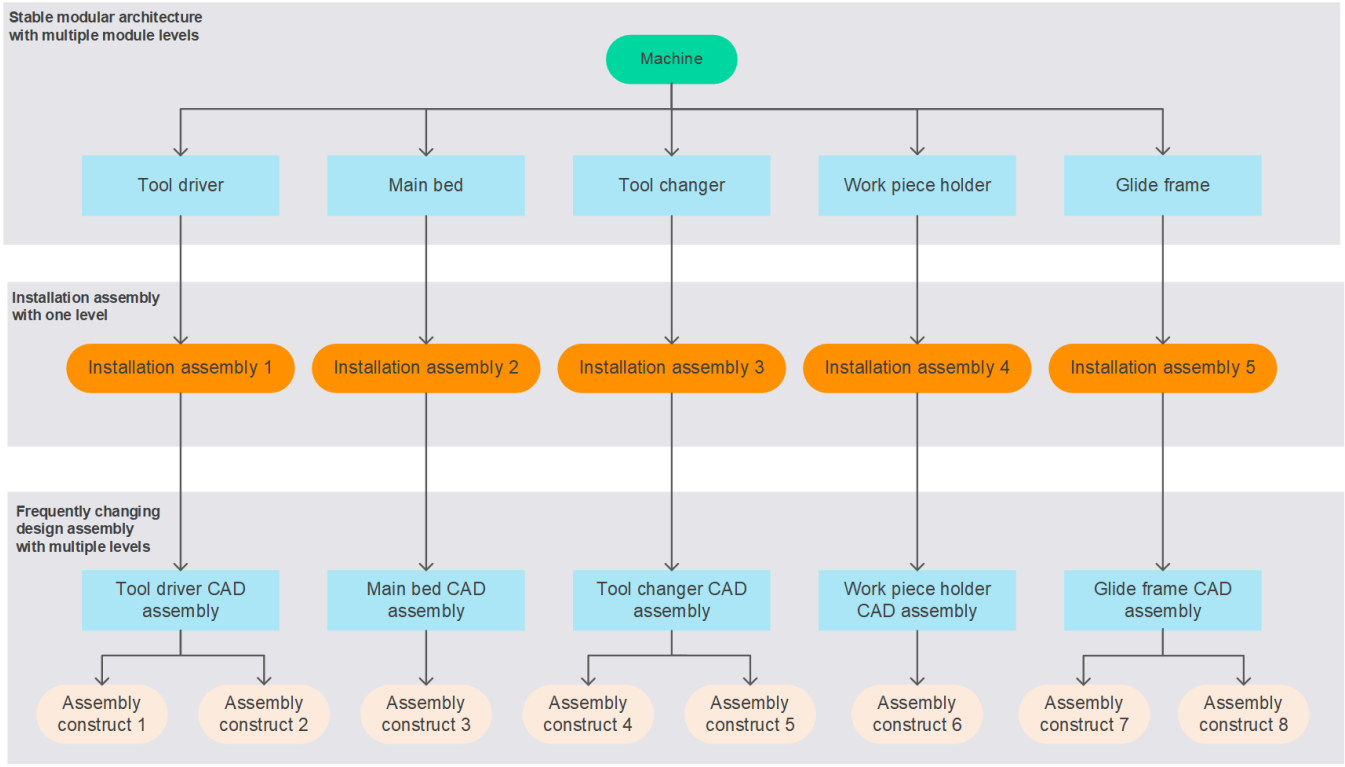
When a customer order is received for a new machine, the engineer searches all existing base machines to find a machine with the configuration closest to the customer order. This machine data is reused by modifying some of the machine modules. The engineer can also search through appropriate modules from the existing base machines and add them to the new machine design, further reusing existing module data.

The following graphic shows a 3D model of the milling machine used in the dataset in the PLM for Machine Builders solution.



Modular bill of materials structure

The following graphic shows an example modular BOM structure for a SMIC 6-axis milling machine.



The top node of the BOM is the **Machine** item. It consists of machine modules, such as the main bed and tool changer. In a modular design, each module consists of the **Installation assembly** items instead of a CAD assembly. Each **Installation assembly** consists of a CAD assembly of mechanical parts.

The installation assemblies are added to stop revisions from directly affecting the parents in the BOM. Revision management requires revisions to components at the lower level in the BOM and must be captured as revisions to the parent items. Without the installation assembly, revising a small component would require revising multiple levels of the BOM structure, which may include the modules or platforms. Using the installation assembly ensures that only the installation assembly. which is the highest level, needs to be revised when revising a CAD assembly. This keeps the modular structure above the installation assembly intact.

Reusing data and cloning machines

About data reuse and machine cloning

Bill of materials (BOM) configuration is the process of managing the engineering BOM (eBOM) and configuration for CAD designs. PLM for Machine Builders uses a single unified engineering BOM for both the part and design BOMs.

The structure context is used to save the complete configuration context for a machine unit BOM as the revision rule. The data structure of the structure context contains the assembly of the machine and the configuration context and also includes the revision rule applied in the BOM configuration.

PLM for Machine Builders focuses on revision effectivity. This specifies when a particular revision of an item is in effect. There are two types of revision effectivity: one specified using effective start and end dates and the other, using the unit number effectivity. PLM for Machine Builders uses date effectivity to determine the appropriate configured structure based on the effective date. Because a CAD assembly can be referenced in various cloned platform assemblies, using the unit number effectivity may become ambiguous.

Machine design reuse approaches

There are different approaches for reusing existing machine designs in a new machine that are based on the customer need and the size of the machinery company. The following are the common reuse approaches used in the machinery industry:

- **Cloning approach.** This approach uses an existing machine chosen from a set of base machines and duplicates the machine design. The duplicated machine is the starting point for meeting the customer requirements.

  Keep the following rules in mind when using this approach:

  - All reused components are referenced in the new design. No new items are created. Only links to the original items are created.
  - Only modified components are copied. New items are created.
  - Components that are not required are ignored.
  - The default cloning action per object can be changed if necessary.

- **Copy approach.** This approach makes a copy of an existing machine design. All components of the machine are copied, and a new item is created. The copied design is then modified to meet the customer requirements.

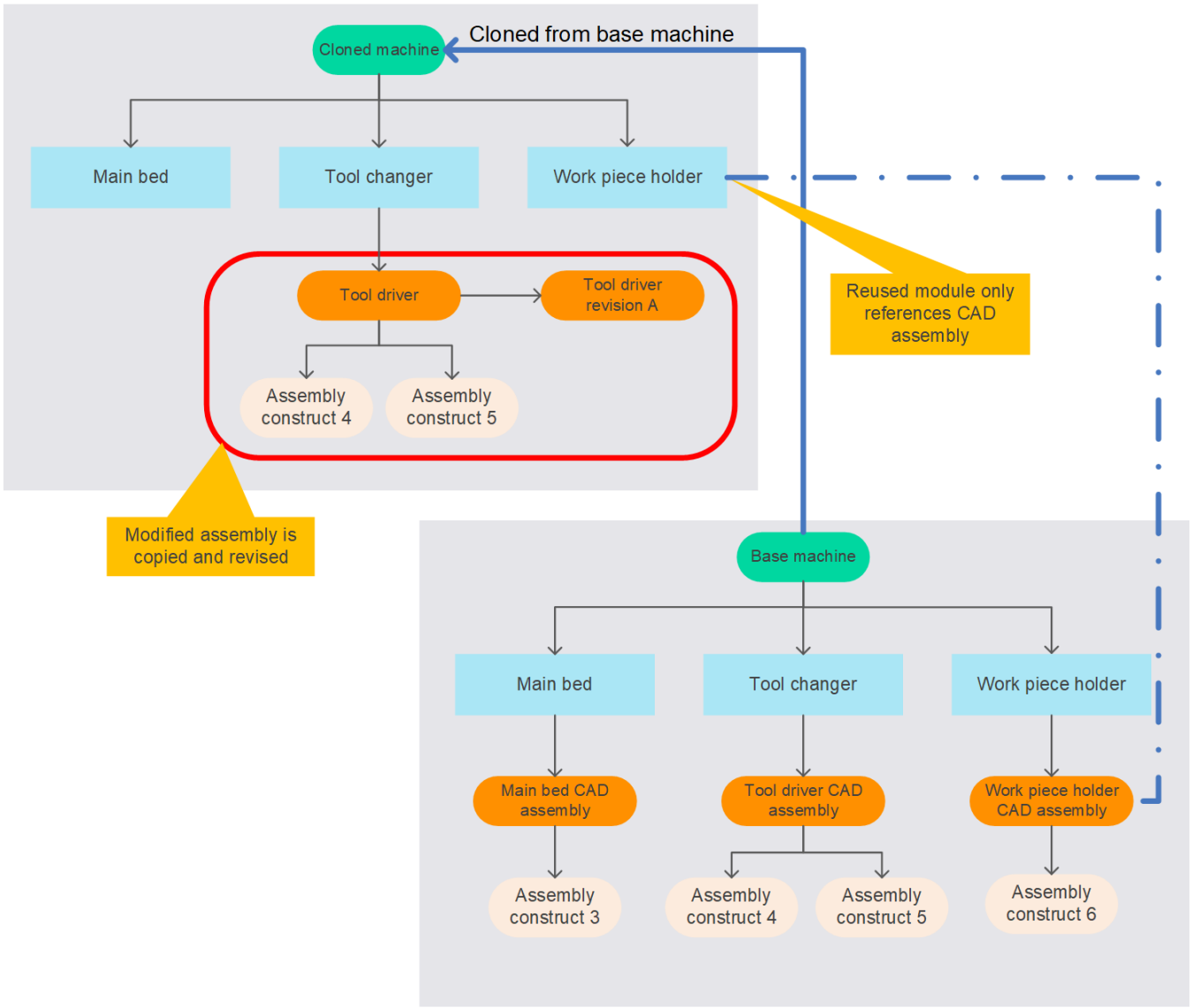
- **Bottom-up approach.** This approach reuses modules from an existing machine design to build a new machine design.

Cloning approach example

In this example scenario, a machine company starts an engineering-to-order project for a SMIC 6-axis milling machine design. The application engineer starts the project by using a base machine design of an existing 5-axis milling machine. Based on the configuration required for the new design, the engineer chooses the Mach-5LEA3O base machine, which is similar to the new machine requirement.

Next, the engineer clones this base machine design to generate the BOM for the new 6-axis milling machine. Because the engineer used a cloning approach, the original BASE machine BOM is not impacted by the new design, but it does retain the traceability of the reused components from the original BOM.

During the detailed design phase, the initial BOM is updated with the new design components to generate the BOM for the new milling machine. The following graphic shows the process described in this example.



Note:

Base machines may need to be updated occasionally. After the new machine is released, it can be added to the base machines for future reuse. The base machine BOM must be managed to maintain the integrity and consistency of the data.

3. Installing PLM for Machine Builders

PLM for Machine Builders installation overview

PLM for Machine Builders can be installed into an existing environment that is running a supported version of Teamcenter. The solution can be installed using the **Teamcenter Environment Manager** or **Deployment Center** tools. All required templates, data, and additional features, such as Program Planning in Active Workspace are installed with the PLM for Machine Builders solution.

Install PLM for Machine Builders with Deployment Center

You can install the PLM for Machine Builders solution from Deployment Center to an existing Teamcenter environment running Active Workspace.

Procedure

1. Open the Deployment Center home page from a web browser and log in with your administrator account.
2. Click on **Environments**.
3. Select the environment where you want to install the PLM for Machine Builders solution.

   The **Deploy Software** panel opens.
4. Click the **Applications** tab.
5. In the upper right corner of the panel, click **Edit Selected Applications** ⊕.
6. From the list of available applications, select **Machine Builder** and **Machine Builder Active Workspace**.
7. Click **Update Selected Applications**.
8. Click the **Deploy** tab.
9. Click **Generate Install Scripts**.

   The scripts are generated, and the **Deploy Instructions** panel opens.
10. In the **Deploy Instructions** panel, scroll down to the **Deploy Script Directory** section. This displays where the deploy scripts are located once generated.
11. Navigate to the directory displayed in step 10 and do the following:

- Unzip the installation scripts to a new folder in this directory.
- Open the **Deploy Instructions** HTML file in a browser window. This file contains the command arguments you must use when deploying.

12. Open a command prompt as an administrator and navigate to the deployment directory created when you unzipped the installation files.

13. Run **deploy.bat** with the command line arguments specified in the **Deploy Instructions** HTML file.

The deployment starts. You can monitor the status of the deployment from the command prompt window.

Install PLM for Machine Builders with Teamcenter Environment Manager

You can install the PLM for Machine Builders solution from Teamcenter Environment Manager to an existing Teamcenter environment running Active Workspace. Installation of the PLM for Machine Builders solution requires the following clients to either already be installed or be installed with the solution: **Active Workspace Client**, **Active Content**, **Reporting Client**, **Active Collaboration Client**, and the **Program Schedule Manager Client**.

Procedure

1. Navigate to the *TcRoot* install directory location on the machine where you want to install PLM for Machine Builders.

   For example, *C:\apps\PLM\TcRoot\install*

2. Right-click the **tem.bat** file and select **Run as Administrator**.

   The Teamcenter Environment Manager opens.

3. Select **Configuration Manager** as the type of maintenance you want to perform and then click **Next**.

4. Select **Perform maintenance on an existing configuration** and then click **Next**.

5. Select the existing configuration for the Teamcenter environment that you want to contain the PLM for Machine Builders solution and then click **Next**.

6. Under **Teamcenter**, select **Add/Remove Features** and then click **Next**.

7. From the list of available and installed features, do the following:

a. Expand **Extensions** and then select **Industrial Machinery**. **Order Management** is automatically selected as it is a required feature for the solution.

b. Expand **Base Install** > **Active Workspace** > **Client** and then select **Machine Builder**, **Program Planning**, and **Order Management**.

c. Once all the features are selected click **Next**.

> Note:
>
> If a feature you need to select is grayed out, you can hover over it to see which other features must be selected in order to enable installation of the feature.

8. Continue clicking **Next** until you can click **Start** to begin the installation of PLM for Machine Builders.

4. Program Planning in PLM for Machine Builders

Program Planning Overview

Program Planning enables organizations to efficiently coordinate the various work activities of multiple functional teams in the PLM environment. It provides enterprise-wide visibility into top-level projects and their major event dates. With Program Planning, all stakeholders involved in the successful delivery of products, including the managers, project managers, team members, and engineers, can plan and coordinate work across the enterprise using a structured and flexible tool.

The elements of a program

There are many elements that make up a program in the PLM for Machine Builders solution. Some programs may include all of these elements, while others may only contain a few. This depends on the customer order and the requirements for the new machine.

The program elements are defined in the following table.

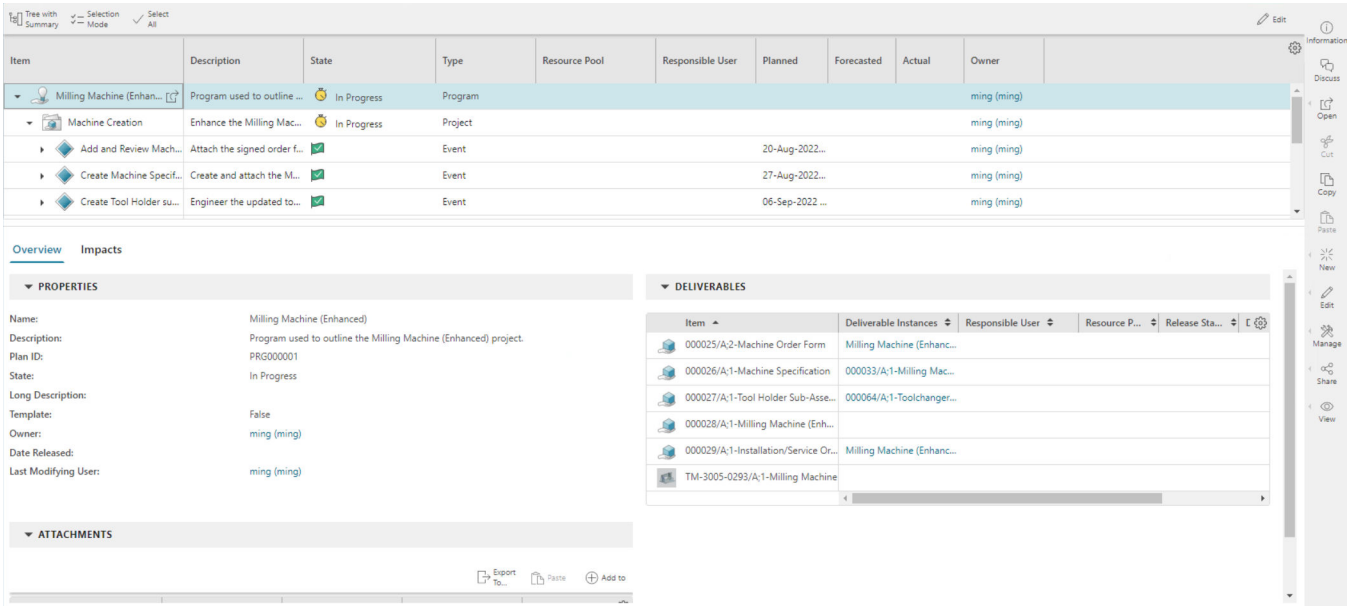
Program element	Definition
Project or subproject	Organizational or functionally oriented decompositions of the program, which may have line of business, top-level subassembly, or end-product orientation.
Event	A significant point in time for the program, project, or subproject.
Program deliverable	A work product that is created or modified in the context of the program, project, subproject, or event.
Program deliverable instance	The actual work product, such as an item, part, or document, that needs to be completed for the program, project, subproject, or event.
Risks	Future events that can impact the success of a program either through cost, schedule, or performance.
Issues	Risks that have occurred or are certain to occur, or issues specific to the plan level.
Opportunities	Potential future benefits that may affect the program's cost, schedule, or performance.

The machine builder program template

The PLM for Machine Builders solution has a preconfigured program template that you can use to create the program for the new machine order. The program template includes example events and deliverables that are common in the industrial machinery industry. Some of these events already have the program deliverable created, such as the machine specifications and purchase order events.

Some examples of these events and their deliverables include:

- Adding and reviewing the machine order with the purchase order attached as the deliverable.
- Creating the machine specifications with the requirements specification attached as the deliverable.
- Creating the revised machine object with the module revision attached as the deliverable.
- Cloning the machine and updating the BOM to include the new machine object.
- Reviewing and releasing the machine.
- Installing the machine at the customer site.
- Verifying that the machine is running correctly in the customer's environment.



When you create the new program, you **open the program template and then save it as the new program**. This preserves the out-of-the-box template and allows you to then modify the program as necessary.

> Note:
>
> Once a machine order is added to the program, a link is automatically created from the program to the machine order so it can be easily accessed when viewing the program.

Default workflow templates for objects in programs

PLM for Machine Builders allows you to specify default workflow templates for specific objects, such as a design object, change, or requirement. When an object is sent to a workflow, the correct template for the object type is automatically assigned. This takes the guess work out of which workflow template to choose for your object in a machine project. If you do not want to use the automatically assigned workflow template, you can select a different workflow template before submitting the object to a workflow.

Mark up files during review

As the project manager, you may have to send the customer requirements and other objects related to the machine order to a workflow for review and sign-off. The PLM for Machine Builders solution includes commonly used workflow templates to help with this process.

When you assign reviewers to signoff on the requirements, they can use the markup features of Active Workspace to review and add their comments in the documents. Files can be marked up in various ways, including:

- Highlighting text
- Adding freehand drawings
- Using predefined shapes

> Note:
>
> You can view the About marking up files topic in the Active Workspace Document Management help to learn more about using markups in Active Workspace.

Using schedules with programs

Although not part of the out-of-the-box PLM for Machine Builders solution, you can include schedules in your programs to help plan and track work related to the overall project. Schedules contain schedule tasks and milestones that can be viewed from the program tree and can help ensure your project is completed on time.

Managing programs

Create a new program

As the project manager, you can quickly create a new machine builder program using the provided program template. When you set the prime event date for the new program, all the event dates are automatically adjusted.

Procedure

1. Search for the machine builder program template.
2. Select the template from the results and then open it.

   The program template is displayed. The template includes a project with an example customer order deliverable, a deliverable instance, and various events.
3. From the primary toolbar, click **New** > **Save As**.

   The **Save As** panel opens.
4. Enter the details and specify a **Prime Event Date** for the new program.
5. Click the **Include Deliverables** checkbox to include all the deliverables that are part of the template.
6. Click **Save**.

   Active Workspace creates the new program from the template and opens the new program.

Add additional program objects

Program objects, such as events, issues, risks, and opportunities, can be added to your program to track all known and possible variables for your program. Each of these items can have their own deliverables and deliverable instances. For example, a risk can contain a document deliverable that explains the potential impact of the risk on the program.

Procedure

1. Search for and open the program you want to add additional program objects to.
2. Do any of the following as necessary:

   - Click the **Impacts** tab to view the **RISKS**, **ISSUES**, and **OPPORTUNITIES** for the program. You can then click **Add to** in the corresponding section for the object you want to add.
   - From the primary toolbar, click **New** > **Add Event** to add a new event from the **Add Event** panel. This allows you to specify the name, state, and planned date for the new event.
   - From the primary toolbar, click **New** > **Add Plan Level** to add a new plan level (such as a project or subproject) to the program.

- In the **Overview** tab that is displayed below the program tree, click **Add to** in the **ATTACHMENTS** section to attach a file to the program. You can upload the file, select it from your palette, or search for it.

Add deliverables to the program

After creating your new program, you can add the deliverables containing the machine order and machine specifications to the program. A link is automatically created from the program to the machine order so it can be easily accessed when viewing the program. The following instructions assume that you are using the program template included with PLM for Machine Builders.

Procedure

1. Search for and open your machine builder program.

2. From the program view, choose where you want to add the deliverable. You can add the deliverable to a program, project, subproject, or event.

   For example, if your program has an event called **Add and Review Order**, you select this event and then add the order as a deliverable for this event.

3. In the **DELIVERABLES** section, click **Add to** ⊕.

   The **Add** panel opens.

4. In the **OTHER** section, select **Program Deliverable**.

5. Enter the program deliverable properties and then click **Add**.

   The program deliverable is added to the selected event, program, project, or subproject.

Add the machine order and specifications to the program deliverable

After specifying your program deliverables, you can add the machine order and specifications to the deliverables. The following instructions assume you are using the program template included with PLM for Machine Builders.

Procedure

1. Open the program that contains the deliverable that you want to add the machine order and specifications to.

2. From the program view, select the event, program, project, or subproject that contains the deliverable.

   The deliverable is displayed in the **DELIVERABLES** section of the **Overview** tab.

3. Select the deliverable and then click **Open**.

4. Click the **Deliverables** tab.

5. Click **Add to** ⊕.

6. Do one of the following as necessary:

   - If the order already exists, click the **Search** tab, enter the name of the order, and then select it from the list.

   - If you need to create the order, select **Order** from the **OTHER** section of the panel. Enter the order properties. Required fields are marked with an asterisk.

     > Note:
     >
     > If the order specifications already exist, you can click ⊕ in the **Order Specifications** field to select it from your **Palette** or search for the specification and add it to the order.

7. Click **Add** to add the machine order to the program deliverable.

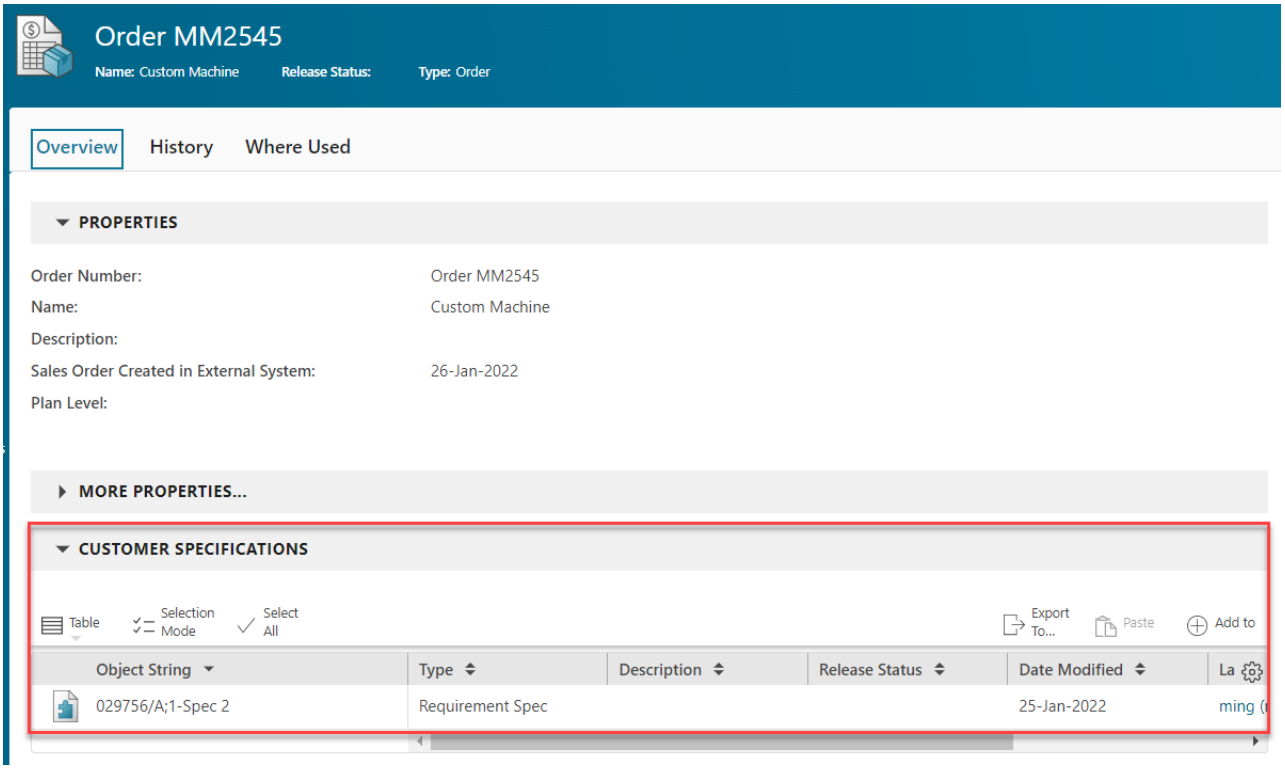
Attach the customer requirements to the order specifications

With the order and specifications added to your program deliverable, you can open the order and add the customer requirements document to the specifications as an attachment.

Procedure

1. Open the order by selecting it in the program or by searching for it.

2. Expand the **CUSTOMER SPECIFICATIONS** section to see the customer requirement specifications for the order.



3. Select the specification and open it.

4. Click the **Attachments** tab.

5. In the **FILES** section, click **Add to** ⊕.

   The **Add** panel opens.

6. Select the file you want to add. You can search for the file if it already exists in Active Workspace or upload it from your local machine.

7. Click **Add** to add the customer requirements document to the specification.

Add machines to the order

After adding the order and specifications to your program deliverable, you can open the order and add the required machines to it.

Procedure

1. Open the order by selecting it in the program or by searching for it.

2. Expand the **MACHINES** section.

3. Click **Add to** ⊕.

   The **Add** panel opens.

4. Enter the data for the industrial machine to add to the order. Required fields are marked with an asterisk.

5. Click **Add** to add the machine to the order. The newly added machine is now displayed in the **MACHINES** section of the order.

6. Repeat steps 3 through 5 as necessary to add all required machines to the order.

Managing requirements with workflows

Submit requirements to a workflow

Once you have all the necessary items attached to the customer requirements, you can send it to a workflow for review and approval by the relevant stakeholders. The following instructions assume you are using the workflow template included with PLM for Machine Builders.

Procedure

1. Open the order by selecting it in the program or by searching for it.

2. Expand the **CUSTOMER SPECIFICATIONS** section to see the customer requirement specifications for the order.

3. Select the specification and open it.

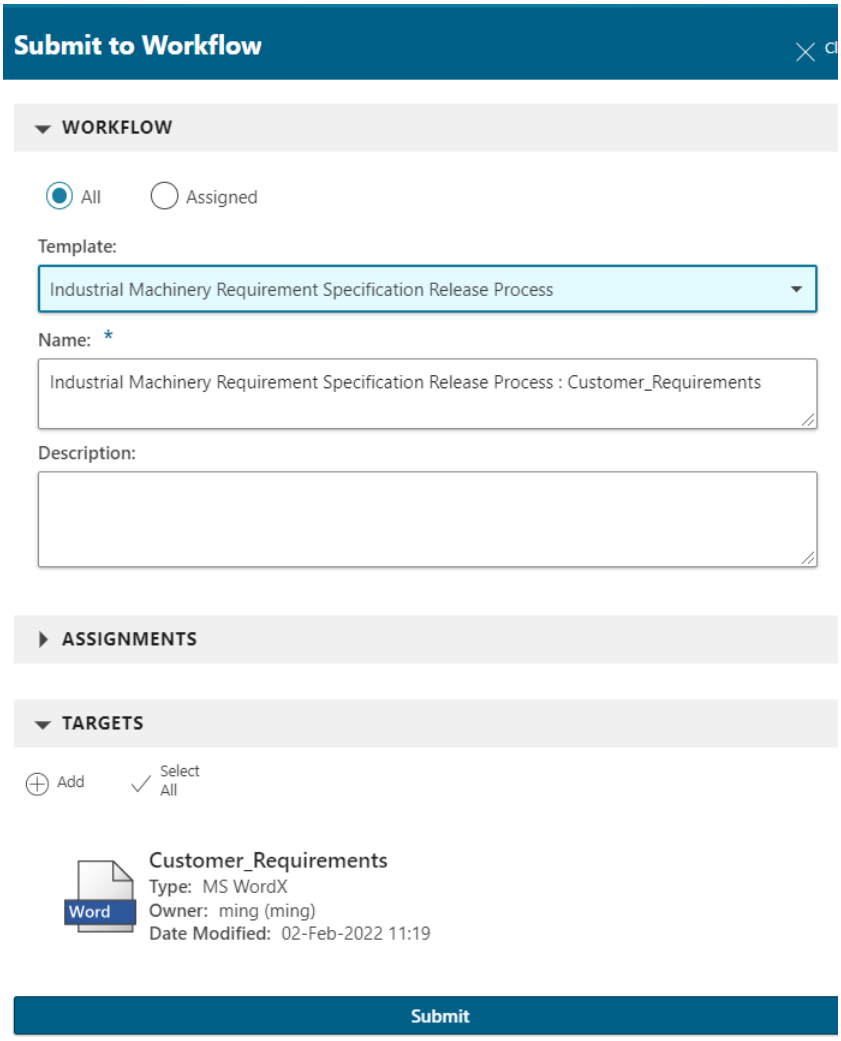
4. Click the **Attachments** tab.

5. In the **FILES** section, select the customer requirements document.

6. Click **Manage** > **Submit to Workflow.**

   The **Submit to Workflow** panel opens.

7. Select the **Machine Builder Requirement Specification Release Process** from the **Template** dropdown list.



8. Click **Submit**.

   The requirements are sent to the workflow and the necessary tasks are generated.

Select the signoff team

As the project manager, when you use a workflow template that has review and release tasks, you receive a task in your **Inbox** to select the signoff team for the workflow. If you use one of the provided machine builder workflow templates, the required role may already be listed in the **REVIEWERS** section.

Procedure

1. Open your **Inbox** and then click the **select-signoff-team** task.

2. In the **REVIEWERS** section, click **Add** next to the user role to add the required reviewer.

   The **Add** panel opens.

3. From the list of users, select the user to complete the review task and then click **Add** ⊕.

   The user is now listed in the **REVIEWERS** section.

4. Optionally, click **Add** ⊕ in the **ADDITIONAL REVIEWERS** section to add more reviewers for the task. You can also set how many of the reviewers must complete the signoff task in the **MINIMUM PARTICIPATION** section.

5. Click **Complete** to send the perform signoff workflow tasks to the specified reviewers.

Sign off on a workflow task

As a reviewer of a workflow item, such as customer requirements, you may need to markup a document, approve it, or reject it as part of the workflow process.

Procedure

1. Click **Inbox** and then open the **perform-signoffs** workflow task.

2. Do any of the following as necessary:

   - To view the document, select it from the **TARGETS** section and open or download it.
   - Add any necessary information as **Comments**.
   - If the document needs no corrections, click **Approve** to approve the document and sign off on it.
   - If the document needs corrections, click **Reject** to reject the document.

5. Machine specification and planning

Machine specification and planning overview

Machine specification and planning is a phase where the organization works to meet customer needs by **creating** and **releasing** the specifications for the new machine. It also involves making the decision to customize an existing machine or to create a completely new one.

The engineering work for the machine project must meet the required specifications, which are either developed internally or requested by the customer. To ensure that these requirements are met, as part of the program, a specification review is created to track the work on the machine. These machine specifications are also attached to the relevant program objects, such as the machine order, to ensure traceability of the work.

In general, the machine specifications:

- Document the performance attributes required by the customer to ensure that the customer needs are met.
- Describe the machine and its capabilities.
- List any additional features that contribute to the machine's performance capabilities.

Once the machine specifications are created and approved, the application engineer reviews the specifications to determine which **base machine assembly bill of materials (BOM) to clone**.

Managing machine specifications

Create machine specifications

As an advanced engineer, you may receive a workflow task in your **Inbox** to create the machine specification. This task may reference the program information and customer requirements, which you can use to help create the machine specifications. When creating the machine specifications, you create them as child objects of the requirements specifications. This allows for easier tracking and HTML editing of the specifications.

Procedure

1. Open the program deliverable that contains the customer requirement specifications for the machine order.

> Note:
>
> If you received a task to create the specifications, this deliverable may already be linked directly in the task.

2. In the **CUSTOMER SPECIFICATIONS** section, select the requirements specification object and then open it.

3. Select the requirements specification object and then click **Add** ⊕ > **Child** in the work area toolbar to add a child object.

   The **Add** panel opens.

4. Enter the name for the new child object and then click **Add**.

   The new object is added as a child of the requirements specification.

5. From the **Documentation** tab, edit the technical specifications as necessary and then click **Save Edits** when you are finished.

   The technical specifications are added, and you can start the release workflow.

Send the machine specifications to the release workflow

With the technical specifications added to the customer requirements, you can send the specifications for review and release using a workflow template. The following instructions assume that you are using the workflow template included with PLM for Machine Builders.

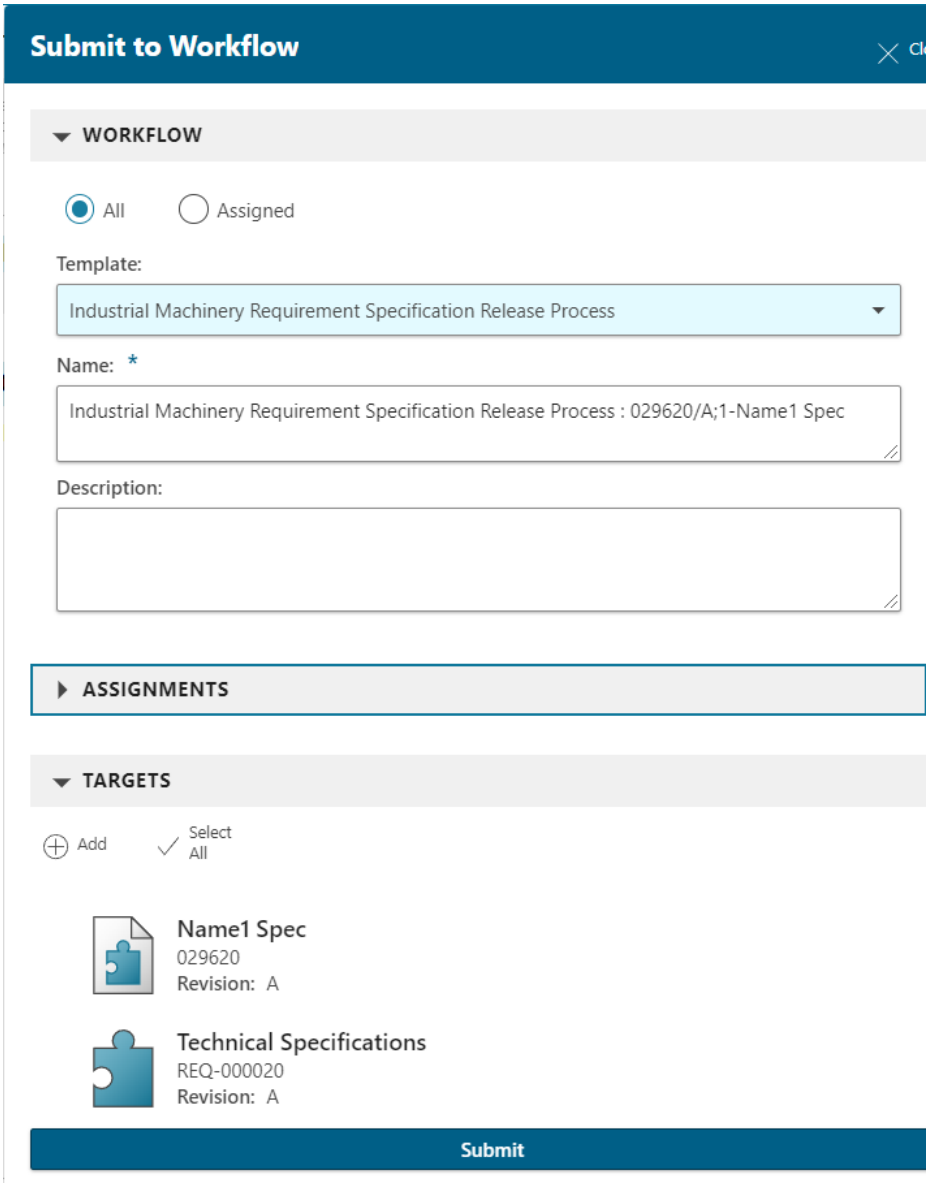
Procedure

1. Select the customer requirement specification and all additional child objects. You can **Shift + click** the first and last item in the list or choose **Select All** from the work area toolbar.

2. Click **Manage** > **Submit to Workflow.**

   The **Submit to Workflow** panel opens.

3. Select **Machine Builder Requirement Specification Release Process** from the **Template** dropdown list.



4. Click **Submit**.

   The requirements are sent to the workflow, and the necessary tasks are generated.

Cloning machines

Cloning machines overview

In most cases, you can clone an existing machine when creating the bill of materials (BOM) for the new machine. This is because many machine parts are common across different models and variants of a machine. When you clone an existing machine's BOM, you create a new BOM from the existing one instead of making it from scratch. This saves time and ensures many of the common parts are already in the BOM of your new machine.

When cloning the machine using this solution, you **duplicate an existing machine structure** and then customize it to meet the required specifications. As you work through the components on the duplicated BOM, you set different actions to determine what is included in the new machine structure. The following table describes the different actions you can perform.

Action	Description
Remove	Removes the component so it is not included in the new structure.
Replace	The component is replaced with the replacement specified in the **Replace** panel.
Save As	Saves a copy of the component to the new structure and you own the saved component. If the saved component is a structure, all its child components are only referenced in the new structure and are still owned by the user who created the original component structure. The component's **Revision Name** and **Description** can be edited as necessary.
Save As and Copy Children	Saves a copy of the component to the new structure and you own the saved component. If the saved component is a structure, its child components are copied to the new structure, and you own those as well. The component's **Revision Name** and **Description** can be edited as necessary.
No action (blank)	The component is only referenced in the new structure and continues to be owned by the user who created the original component structure.

Identify and search for the base machine to clone

As the application engineer, you may receive a workflow task to identify the base machine for cloning. You may also be assigned a program deliverable to add the new machine to once you have completed the cloning process. You can refer to the machine specifications to help you identify the features that are common to an existing machine design. You then select the base machine that matches most of the features of the new machine and needs the least design changes to meet the machine specifications.

Procedure

1. Review the machine requirements to determine which base machine to clone. These requirements are usually attached to a program deliverable.

2. Search for the machine in Active Workspace. You can also perform an Advanced search to search by the Item ID or other criteria.

3. Select the base machine from the search results and open it.

4. From the **Overview** tab in the **AVAILABLE REVISIONS** section, select the base machine revision you want to clone and open it.

   With the base machine open, you can now start the process to **clone the machine**.

Clone a base machine

As the application engineer, you can clone a base machine once you have identified the machine to clone.

Prerequisites

Make sure you **identify the base machine to clone** before you start the cloning process.

Procedure

1. With the base machine revision open, click the **Content** tab.

   The base machine bill of materials (BOM) is displayed. You can expand the modules as necessary to view the parts that make up the individual machine modules.

2. Select the machine to clone. In most cases, this is the top item listed in the BOM.

3. From the work area toolbar, click **Duplicate**.

   The **Action** column is displayed in the table and other columns such as **Revision Name** and **Description** can now be edited. You can adjust these fields as necessary.

4. Optionally, do any of the following as necessary:

   - Select modules and parts that are not needed in the new machine BOM and then click **Edit Structure** > **Remove** from the work area toolbar to remove them.

   - Select modules and parts that you want to replace in the new machine and then click **Edit Structure** > **Replace** to open the **Replace panel**.

     From the panel, you can select the replacement module or part from the **Palette** tab if you have it copied to your clipboard. You can also click the **Search** tab to search for it.

   > Note:
   >
   > You can also replace or remove BOM objects after you have saved the new machine BOM.

5. Click **Save** and then select the **ID Naming Rule**. You can choose to use the **Default IDs** for the name or **ID Naming Rule** to enter your own naming rules.

6. Optionally, select the **Run in Background** checkbox if you want to run the duplication process in the background. This option is commonly used when you are duplicating a very large BOM with many modules and parts.

7. Click **Save**.

Active Workspace duplicates the BOM and clones the machine. With the machine cloned, you can **add the new machine to a program deliverable**.

View only data relevant to machine builder projects

In Active Workspace, the default view in which the machine BOM is displayed may contain several columns with data that is not necessary for your machine project. You can apply a column configuration that displays only the columns relevant to most machine projects.

Procedure

1. From the **Content** tab of the BOM assembly, click **Table Settings** in the upper-right corner of the BOM table.

2. Select **Arrange**.

   The **Arrange** panel opens.

3. Click **Column Arrangements**.

4. Select **Machine Builder Content Configuration**.

   Active Workspace applies the configuration and populates the **Table Columns** section with the appropriate columns while removing the columns that are not needed.

5. Click **Arrange** to apply the column configuration to your BOM view.

   You now see only the columns relevant for a machine builder project in your BOM.

> Note:
>
> If you want to make further modifications to the BOM view, you can follow the steps listed above and use the **Add** or **Remove** arrows to add or remove table columns from the view. When finished, you can click **Save as a new arrangement**. This allows you to enter a name for your new arrangement. It can then be selected by clicking **Column Arrangements** in the **Arrange** panel.

Add the new machine to a program deliverable

With the new machine BOM created, you can add it to a program deliverable to include the new machine design in your machine builder program.

Procedure

1. From the primary toolbar, click **Add to Program Deliverable**.

The **Add to Program Deliverable** panel opens.

2. Select the appropriate deliverable from the list.

   If you have a large number of deliverables, you can use the **Filter** box to filter the list by deliverable name.

3. Click **Add**.

   The new machine is added to the selected deliverable. You can **submit the new machine to a workflow for approval**.

Submit the new machine to a workflow for approval

With the machine cloned and the new BOM created, you can send this BOM to a workflow for approval. The following instructions assume that you are using the workflow template included with PLM for Machine Builders.

Procedure

1. From the **Content** tab of the new machine BOM, click **Select All** from the work area toolbar. You can also **Shift + click** the first and last items displayed to select all of them.

2. Click **Manage** > **Submit to Workflow.**

   The **Submit to Workflow** panel opens.

3. Select the **Machine Builder Part/Design Release Process** from the **Template** dropdown list.

4. Click **Submit**.

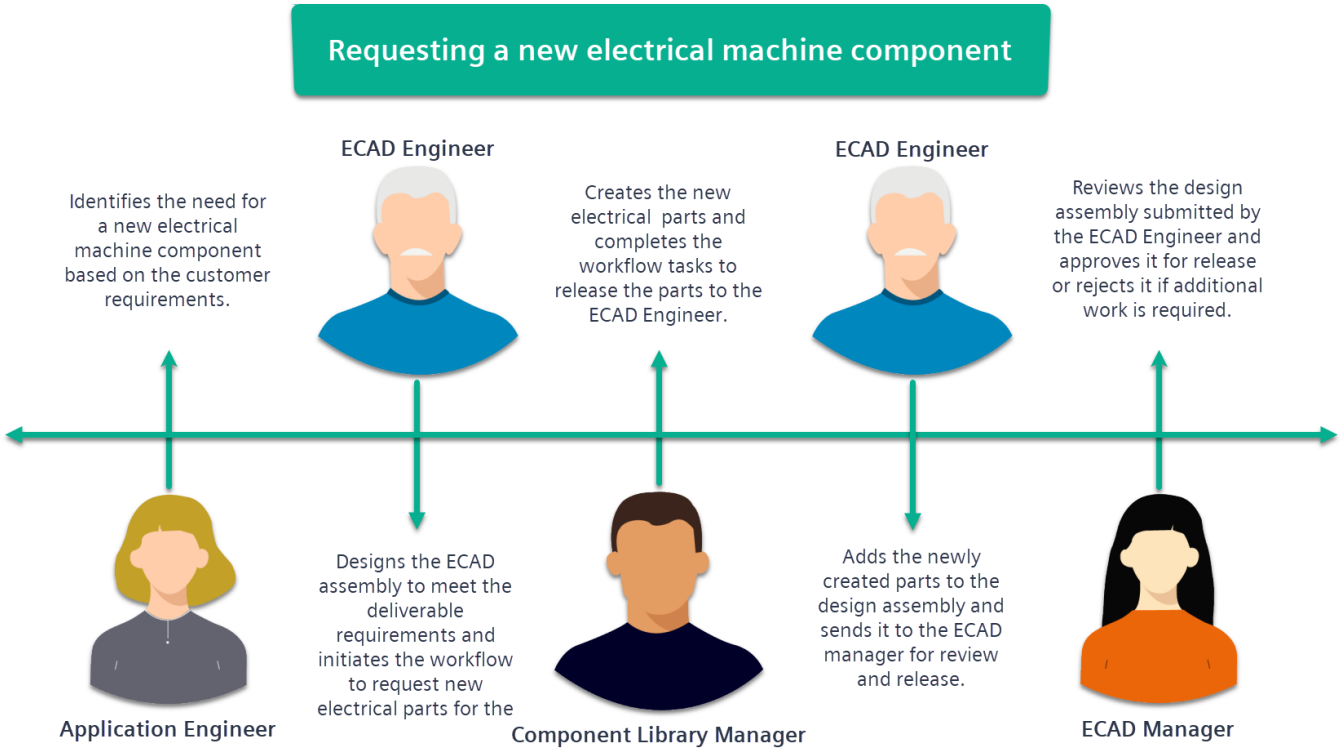
   The new machine BOM is sent to the workflow and the necessary tasks are generated.

6. Component (ECAD) design requests and workflows

About new electrical component requests and ECAD workflows

During the planning phase of the machine project, the Application Engineer may identify the need for a new machine component. To start this process, a program deliverable is created for the new component, any relevant objects are attached, and the deliverable is assigned to the ECAD Engineer.

Next, the **ECAD team members** work on the request using their own specific workflow templates as necessary. When the work is complete and the new component is released, it is added to the machine BOM.



The following ECAD workflow templates are included in PLM for Machine Builders:

- **Request New Machine Component:** This workflow template is used to request the design of a new machine component that meets the needs of the customer order and requirements.
- **Machine Builder ECAD Design Release Process:** This workflow template is used to release newly created machine objects.

- **Machine Builder Concept Design Release Process:** This workflow template is used to release module or machine concept designs. When used on a module, it is released without review. When used on a machine, reviews are required for the release process.

- **Machine Builder Part/Design Concept Design Release Process:** This workflow template is used to release concept machine objects.

- **Machine Builder IA Concept Design Release Process:** This workflow template is used to release a concept installation assembly.

Request a new electrical machine component

Some machine projects require the design of new machine components. An engineer or the project manager can create a new deliverable for the component and then assign it to the ECAD Engineer to start the work. The following instructions assume that you are using the program template included with PLM for Machine Builders.

Procedure

1. Open the machine program and select the appropriate event to view its details.

2. From the **DELIVERABLES** section, click **Add to** ⊕ and select **Program Deliverable** from the list.

3. Enter the deliverable details and then click **Add**.

   The new deliverable is added to the event.

4. Select the new deliverable and then do any of the following:

   - Click the **Deliverables** tab and add the ECAD part as a deliverable.

   - Click the **Attachments** tab and add any relevant requirements and specifications for the part.

5. Select the event that contains the deliverable you just created.

   The new deliverable for the machine component is displayed in the **DELIVERABLES** section.

6. Select the new deliverable then click **Manage** > **Assign Resource**.

   The **Assign Resource** panel is displayed.

7. Select the ECAD Engineer from the list and then click **Assign**.

   The deliverable for the new component is assigned to the ECAD Engineer.

Request new parts for the component design

As the ECAD Engineer, you may need to request a new part when designing the assembly for the newly requested machine component. For example, you may need a wiring harness with different dimensions than the one currently in the design.

Procedure

1. From the global navigation, click **Inbox**.

   Your inbox is displayed.

2. From the primary toolbar, click **New** > **Create Workflow**.

   The **Create Workflow** panel is displayed.

3. For the **Template**, select **Request New Machine Component** from the list.

4. In the **REFERENCES** section, click **Add** to attach an object, such as a document, requirements, or an existing part, to the workflow.

   > Note:
   >
   > You do not specify anything in the **TARGETS** section of the workflow. Any additional objects should be added to the **REFERENCES** section.

5. Do any of the following:

   - From the **Palette** tab, select any reference objects from your **CLIPBOARD**, **FAVORITES**, or **RECENT** objects.
   - Click the **Search** tab to search for the reference object to add to the workflow.

6. Click **Add** to add the reference object to the workflow.

7. Click **Create** to create the request for the new machine component.

   The workflow is created and the request for the new component is sent to the Component Library Manager. This user creates the new part in the ECAD authoring tool that meets the requirements specified in this workflow.

Complete the new component request and release the parts

As the Component Library Manager, you receive new component requests from the ECAD Engineer. When you receive these requests as part of the new component request workflow process, you create the new parts in the ECAD authoring tool and then complete the workflow task to release the parts.

Procedure

1. From the global navigation, click **Inbox**.

2. Click the **Team** tab to view all the tasks assigned to your team.

   Your team consists of all users defined as a Component Library Manager. The **perform sign-offs** workflow task generated from the workflow request submitted by the ECAD Engineer is accessible to every Component Library Manager user.

3. To start work on the new component, select the **perform-signoffs** task and open it.

4. Enter any **Comments** and then click **Approve**.

   When you click **Approve**, the next task in the workflow is assigned to you and the other Component Library Manager users no longer see the signoff task.

5. Click the **My Tasks** tab of your inbox.

6. Select the **Create Component** task and open it.

7. In the **TARGETS** section, click **Add to** ⊕ and add the new part as a target.

   With the new part added, you can now open it in your ECAD authoring tool, work on the electrical design, and save the design to add the ECAD dataset to the part.

   > Note:
   >
   > As you create the new parts in your authoring tool, you can submit the designs to a workflow to get approvals from other team members. The **About new component requests and ECAD workflows** topic has more information on ECAD-specific workflows.

8. With the ECAD work complete, you can now add **Comments** to the **Create Component** task and then click **Complete** to release the new part for use.

The ECAD Engineer receives a message in their **Inbox** that the request is complete and that the part is now available for use.

Submit the new design for review and release

As the ECAD Engineer, you have requested and received your new components. Once they are added to your assembly, you can send the design for review and release.

Procedure

1. From the BOM assembly for your design that contains the newly created components, select the top element in the structure.

2. Click **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel is displayed.

3. For the **Template**, select **Machine Builder ECAD Design Release Process** from the list.

4. Click **Submit**.

   The design is submitted to the workflow and the tasks related to the review and release of the design are generated and sent to the ECAD Manager.

Release the ECAD design

As the ECAD Manager, you receive the workflow tasks to review the ECAD design and approve its release.

Procedure

1. Click **Inbox** and then open the **perform-signoffs** workflow task.

2. Do any of the following as necessary:

   - To review the design, select it from the **TARGETS** section and open it.
   - Add any necessary information as **Comments**.
   - If the design needs no corrections, click **Approve** to approve the design for release.
   - If the design needs corrections, click **Reject** to reject the design and send it back to the ECAD Engineer for additional work.

7. Program monitoring

Program monitoring overview

As the project manager, you monitor the program and update the program and event information as necessary throughout the life of the machinery project. This typically involves **managing resource assignments for events**, **updating the event details**, **modifying the program properties**, and **monitoring the status of the program, projects, subprojects, and events**.

Program, project, subproject, and event states

As work on the program and its events occurs, the state of the objects is updated for tracking purposes. Programs, projects, subprojects, and events all use the same default values for tracking their state. These values are:

- **Not Started**. The program, project, subproject, or event has been created, but no work has started on it yet and it is not in progress.
- **In Progress**. The program, project, subproject, or event is in progress and is actively being worked on by the team.
- **Complete**. The program, project, subproject, or event is complete and is no longer being worked on, but it has yet to be released to the customer.
- **Closed**. All work on the program, project, subproject, or event is complete, and the overall project is released to the customer.

Modify the program properties

As work proceeds on a program, the project manager often manually updates the program properties to reflect the current program state.

Procedure

1. Search for the desired program using the search box or click the **Programs by State** tile on your dashboard.
2. Open the desired program.
3. Select the program, project, subproject, or subproject you want to edit.
4. From the primary toolbar, click **Edit** > **Summary**.
5. Edit the properties as needed.

6. From the primary toolbar, click **Edit** > **Save Edits**.

Edit the event information

As work proceeds on an event, the project manager may have to update the event properties to reflect the current event state.

Procedure

1. Open the program that contains the event that needs editing and then select the event.
2. From the primary toolbar, click **Edit** > **Summary**.
3. Edit the event properties as needed.
4. From the primary toolbar, click **Edit** > **Save Edits**.

Manage resource assignments

As the project manager, you can manage resources for an event's deliverables and impacts from the program. This allows you to assign these objects to a resource who can then proceed to work on the program object.

Procedure

1. Search for the desired program using the search box or click the **Programs by State** tile on your dashboard.
2. Open the desired program.
3. Select an event within the program and then click **Open**.

   The event opens in a full screen view of the **Overview** tab.
4. Select the appropriate tab that contains the object you want to manage.

   The **Overview** tab contains the event deliverables. The **Impacts** tab contains the risks, issues, and opportunities objects.
5. If you are assigning a resource to a deliverable, do the following:

   a. Select the deliverable from the **DELIVERABLES** section of the **Overview** tab.

   b. In the upper right corner of the table, click **Resource Assignment**. The **Assign Resource** panel opens.

c. Select the user from the list and then click **Assign** to assign them as a resource for the deliverable.

> Tip:
>
> If you have a large number of users, you can filter the list by **Group**, **Role**, and **Project**. If you know the exact user or resource pool you are looking for, you can type the name in the **Filter** box.

If you are assigning a resource to an impact, such as a risk, issue, or opportunity, do the following:

a. Click the **Impacts** tab.

b. Select the object from the **RISKS**, **ISSUES**, or **OPPORTUNITIES** section that needs a resource and then open it.

c. From the primary toolbar, click **Manage** > **Assign Resource**. The **Assign Resource** panel opens.

d. Select the user from the list and then click **Assign** to assign them as a resource for the risk, issue, or opportunity.

> Note:
>
> If you have a large number of users, you can filter the list by **Group**, **Role**, and **Project**. If you know the exact user or resource pool you are looking for, you can type the name into the **Filter** box.

6. When you are finished managing the object, click **Previous Location** to return to the event properties or program.

> Tip:
>
> To remove a user as a resource, follow the same steps as above but click **Remove User** to remove the assigned user from the selected object.

8. Machine design

Machine design overview

To design the machine based on the requirements, the engineering team designs the mechanical components and assembly for the new machine. The design of these components is done in NX with Active Workspace integration.

When working on designing the components, it is assumed that:

- There are existing machine designs that can be used.
- There are existing machinery part libraries that are available for reuse.
- The initial bill of materials (BOM) for the new machine design is generated from the platform BOM.

Example

In this example, a machinery company starts a new project for a SMIC 6-axis milling machine design. As an engineer in the mechanical engineering team, you begin designing the mechanical assembly for the machine order. You review the existing 5-axis milling machine design and determine that you can reuse this design and modify it to add a new 6th-axis movement to the design.

After validating the initial design concept, you begin to design the new component by searching for or reusing existing parts from the library or creating new CAD designs in NX for the parts.

NX and Active Workspace integration

For the machine design process, the engineer works in NX and uses the Active Workspace integration to view requirements and perform other actions. For the PLM for Machine Builders solution, the engineer does the following in NX:

- Accesses Active Workspace through the client integration.
- Searches for the existing parts and uses NX integration to open the parts.
- Creates new CAD designs.
- Creates drawings for machine parts.

For more information the integration between Active Workspace and NX, you can view the *Teamcenter Integration for NX* documentation on Support Center.

9. Document and drawing management

Document and drawing management overview

As an engineer, you generate and manage documents and drawings for a product design. These items are used as part of the process to approve the design content by sending it for review. The documents and drawings can also be used as part of a change if the design must be adjusted before release. Once sent to review and approved, the drawing is released.

Review and release drawings

Once you have completed a drawing, you can submit it to a workflow for approval and release.

Procedure

1. Select the machine design that contains the drawing dataset that is ready for approval and release.
2. Click **Manage** > **Submit to Workflow.**

   The **Submit to Workflow** panel opens.
3. Select the **Machine Builder Drawing Release Process** from the **Template** dropdown list.
4. Click **Submit**.

   The drawing is sent to the workflow and the necessary tasks are generated, including the select signoff team task, which is sent to your **Inbox**.
5. Open the select-signoff-team task and add the required reviewers.
6. Click **Complete** to send the signoff task to the reviewers.

   Once the assigned reviewers approve the drawing, it is released.

10. Change Management

Change management overview

PLM for Machine Builders uses Active Workspace Change Management to manage changes required for parts, documents, and drawings. Because the solution is designed for the machinery industry, the *simple change* functionality of Active Workspace is used for all changes in PLM for Machine Builders.

What is a simple change?

Simple change is a simplified version of the process for creating and performing change revisions. It is designed for situations that do not require the detailed features of a change notice or detailed workflows and is therefore incorporated in the PLM for Machine Builders solution.

> Example:
>
> *Simple change* is intended for minor changes where a single person or small team is responsible.
>
> An engineer is tasked with a minor change to a part. Instead of managing the change using a standard, elaborate change notice, the team uses *simple change* to streamline the process.

A simple change contains **Overview** and **Workflow** tabs.

- **Overview**. This tab displays all the information for the simple change, including the workflow it is assigned to, the tasks involved, the impacted items, details of the change, the change summary, and the change participants. The state of the change (**Elaborating**, **Contributing**, **Approving**, or **Released)** is also displayed.

- **Workflow**. This tab displays detailed information on the workflow process, including the current and completed tasks. A graphical representation of the workflow that shows the upcoming tasks is also displayed.

Simple change states

A change has two key states that capture where in the change process it is and what decisions have been made about the change.

- Its status or *Closure* (for example, Open or Canceled).

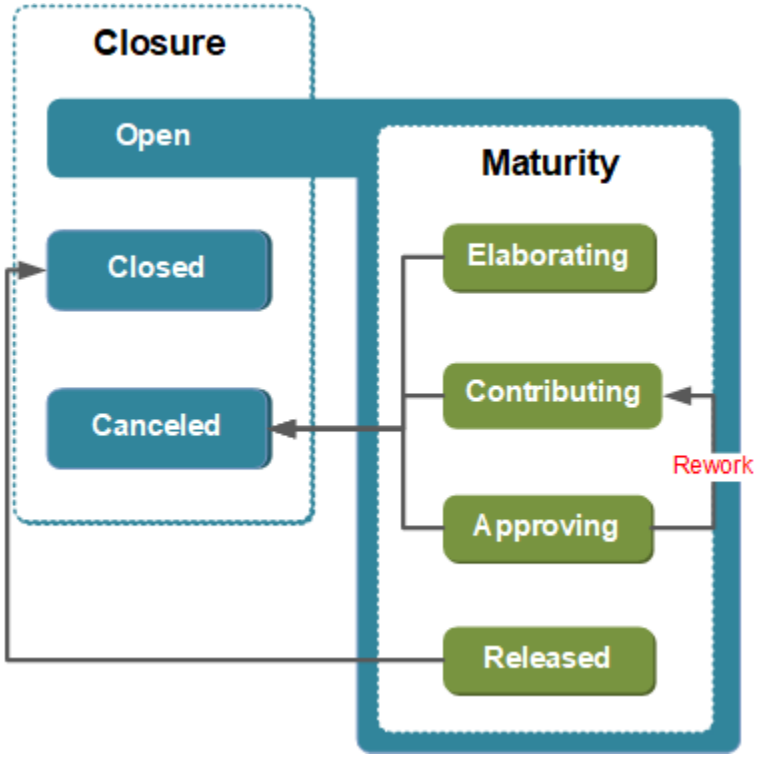
- The degree of completion of the overall change process, that is, its *Maturity*.

The change states interconnect with each other and are dependent on the other change states. For example, *Maturity* is a substate of the *Closure* state. The states of a change are set during the workflow process.

Tip:

You can view the states of a change in the **Overview** tab.

The following graphic illustrates the *simple change* states.



Create a simple change

You can create a simple change when you need to submit a change to a machine object, document, or drawing. Once the change is created, it is automatically submitted to the default *simple change* workflow.

Procedure

1. Select an object and click **New** > **Create Change**. Select **Simple Change** from the list.

2. Complete the required fields and click **Create and Submit**.

   The change is created and automatically submitted to the *simple change* workflow.

3. (Optional) Set a *simple change* as an active change context. Select **Active Change** from the global navigation and select the *simple change* from the list.

> Note:
>
> Set the *simple change* as an Active Change to ensure that all revisions and changes are captured as *solutions* in the **Change Summary**. For more information, refer to Set a change notice or a Simple Change as an Active Change.

Assign, replace, or remove simple change participants

Once you have created your simple change, you can assign the change participants. Once assigned, the participants receive a change task in their **Inbox**.

Procedure

1. From the **Overview** tab of the *simple change*, navigate to the **PARTICIPANTS** section.
2. Select the participant type. You can choose from the following:
   - **Requestor**
   - **Contributor**
   - **Approver**
3. Once the participant type is selected, you can choose from the following actions:
   - **Add**. Opens the **Add** panel so you can add other users as participants.
   - **Remove**. Removes the selected user from the change participants.
   - **Replace**. Opens the **Replace** panel so you can choose a user to replace the selected participant.

All users listed as a participants receive a workflow task in their **Inbox** to complete. Once all the tasks are completed and the change approved, it is released and the impacted items are revised.

11. Review and release the machine

Releasing the machine overview

As the team works on the new machine, program deliverables, such as the machine specifications, machine parts, BOM assemblies, and CAD drawings go through various revisions and changes. Once the work on these items is complete, they are ready to be reviewed and released. The PLM for Machine Builders solution contains workflow templates for these various program deliverables related to the new machine order.

> Note:
>
> You can change the provided workflow templates to meet the needs of your organization.

The workflow templates are preconfigured with common release processes for the deliverable types listed. The following list details the workflow templates included with PLM for Machine Builders.

- **Machine Builder Part/Design Release Process:** This workflow template is used to release machine objects.
- **Machine Builder Drawing Release Process:** This workflow template is used to release a machine object that contains a CAD drawing.
- **Machine Builder IA Release Process:** This workflow template is used to release an installation assembly.
- **Machine Builder Release Process:** This workflow template is used to release module or machine revisions. When used on a module, it is released without review. When used on a machine, reviews are required for the release process.
- **Machine Builder Requirement Specification Release Process:** This workflow template is used to release a requirement specification document, such as machine specifications or customer requirements.

In most cases, the workflow templates contain the following tasks that must be completed by the assigned users to release the deliverable object:

- **Review tasks:** There are two review tasks for the included workflow templates. These tasks are to select a signoff team by assigning the reviewers responsible for the review. These reviewers then perform the task of reviewing the attached target objects to determine if they are approved for release.
- **Rework:** If one of the reviewers determines that the target object is not ready for release and rejects the review task, the object is sent back to the user who initiated the workflow so that the comments from the review can be addressed.

About Sessions in PLM for Machine Builders

Sessions allow you to work with a correct product definition that is relevant to your machinery project. You can apply filters to the product structure or configure it as necessary when cloning the machine. Once the machine is configured to your specifications, you can save the filtering and configuration criteria as a session to help you to easily locate the bill of materials (BOM) for the machine that you are currently working with.

When a session is created, the revision rule, date, variant rules, and other properties of the existing BOM components are saved. This creates a snapshot of the current BOM configuration.

Create a session

You can create a session to save the modified bill of materials (BOM) for a cloned machine when it is ready for the release process.

Procedure

1. Open the structure for the machine BOM that is ready to be released.
2. From the primary toolbar, click **New** > **Create Session**.

   The **Create Session** panel opens.
3. Enter a name and description for the session.
4. (Optional) To specify the level of access to the BOM for other users, do the following:

   - Select the **Allow others to view** check box to grant *read* access to other users. Clear the check box to deny read access.
   - Select the **Allow others to edit** check box to grant *write* access to other users. Clear the check box to deny write access.

     > Note:
     >
     > The **Allow others to edit** check box is displayed only when the **Allow others to view** check box is selected.
5. To create the session, click **Create**.

Once created, the session can then be **added to the machine.**

Add a session to the machine

With the session for the machine BOM created, you can add it to the machine.

Procedure

1. With the new session open, from the primary toolbar, click **Add to Machine**.

   The **Add to Machine** panel opens.

2. From the list of machines, select the machine that you want to add to the session.

3. Click **Add**.

   The session is added to the machine. You can view the session from the **Saved Sessions** tab of the machine and open it to view the saved machine structure.

Review and release a machine object

Once the session is created and added to the machine, you can submit individual objects for review and release.

Procedure

1. Open the machine and navigate to the **Saved Sessions** tab to view the session for the machine.

2. Expand the structure to select the design revision you want to submit to the workflow.

3. From the primary toolbar, click **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel opens.

4. From the **Template** list, select **Machine Builder Part/Design Release Process**.

5. Expand the **ASSIGNMENTS** section.

6. Select the user you want to assign to review the machine object.

7. Click **Submit**.

   The machine object is submitted to the workflow, and the workflow tasks are created and sent to the appropriate user's **Inbox**.

8. From your **Inbox**, open the task to select the signoff team.

9. Add the appropriate reviewers to the task and then click **Complete**.

Once all the reviewers complete their tasks, the part or design is released.

Review and release an installation assembly

Once the session created and added to the machine, you can submit the installation assembly for review and release.

Procedure

1. Open the machine and navigate to the **Saved Sessions** tab to view the session for the machine.
2. Expand the structure to select the installation assembly you want to submit to the workflow.
3. From the primary toolbar, click **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel opens.
4. From the **Template** list, select **Machine Builder IA Release Process**.
5. Expand the **ASSIGNMENTS** section.
6. Select the user you want to assign as a reviewer for the installation assembly.
7. Click **Submit**.

   The installation assembly is submitted to the workflow, and the workflow tasks are created and sent to the appropriate user's **Inbox**.
8. From your **Inbox**, open the task to select the signoff team.
9. Add the appropriate reviewers to the task and then click **Complete**.

Once all the reviewers complete their tasks, the installation assembly is released.

Review and release a machine module

With the session created and added to the machine, you can submit machine modules for review and release.

Procedure

1. Open the machine and navigate to the **Saved Sessions** tab to view the session for the machine.

2. Expand the structure to select the module revision you want to submit to the workflow.

3. From the primary toolbar, click **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel opens.

4. From the **Template** list, select **Machine Builder Release Process**.

5. Expand the **ASSIGNMENTS** section.

6. Select the user you want to assign to review the machine module.

7. Click **Submit**.

   The module is submitted to the workflow, and the workflow tasks are created and sent to the appropriate user's **Inbox**.

8. From your **Inbox**, open the task to select the signoff team.

9. Add the appropriate reviewers to the task and then click **Complete**.

Once all the reviewers complete their tasks, the module is released.

Release the machine

As the project manager, you release the machine to manufacturing once all the parts, designs, installation assemblies, and modules have been reviewed and approved for release. The following instructions assume that you are using the provided program template for your machine order.

Procedure

1. From the milling machine program, select the **Review and Release Order** event and open it.

2. Select the deliverable instance for the machine and open it.

3. Click the **Saved Sessions** tab to view the session for the machine.

4. Review the structure and verify that everything is correct and that all the necessary machine components are approved and released.

5. Navigate to the **Overview** tab for the machine revision.

6. From the primary toolbar, click **Manage** > **Submit to Workflow**.

   The **Submit to Workflow** panel opens.

7. From the **Template** list, select **Machine Builder Release Process**.

8. Click **Submit**.

The machine is released, and the **Release Status** changes to **Design Released**. When you view the saved session for the machine, the session is also released, and the machine builder clone revision rule is applied to the entire machine structure.