IM319555 Living the Lifestyle You Want

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Learning Objectives

- Learn how to configure lifecycle definitions
- Learn how to apply state changes and manage revisions
- Learn how to generate PDFs
- Learn how to apply security settings and downstream usage

Utilizing Vault Lifecycles

To move past the basics of Vault software into the area of drawing revisions, approvals, security, and advanced property management, you need to deal with lifecycles. In this class, we'll look at Vault lifecycles. We'll configure lifecycles and discuss how they're used in the revision process and how they set the rules for state changes. As a cherry on top, we'll dive into setting up Vault to generate PDFs at various steps along the process.

Mike Thomas

I have been using AutoCAD since r13, cut my solid modeling teeth on Mechanical Desktop, and have been using Inventor since before it was known as Inventor. Data Management has always been a big part of my professional life, for the most part with Autodesk Vault.

Vault and Its Lifecycles

Our drawings (and models) are the language of engineering and manufacturing. It is how we communicate with others from concept-to-design-to-manufacture/construction. How we manage this language is as important as the document itself.

It is important to maintain a history of a document (including drawings) to track what has changed, when it changed, and hopefully why it changed. This history aids in making better decisions, provides crucial customer information, and provides the means to go back to a previous version of the document.

A ***Version*** is an iteration of a document, something that is different from the previous copy. **Versions** maintain the previous design in case you need to restore back to a previous copy. All editions of Vault maintain versions of the files checked into Vault.

A **Revision** is a milestone, the act of making a change and completing the work required for change.

Webster's dictionary describes a revision as "*the act of revising, which is to make a new, amended, improved, or up-to-date version*." The versions are the steps to get to the revision, the revision is released and can be made up of multiple versions.

Autodesk Vault Basic provides **Version control**, but not tools to manage and track change. **Vault Workgroup** and **Vault Professional** move from a simple data management tool that tracks versions to a system managing the change of your files - from creation to retirement.

- **Vault (Basic)** = Version Management "Organize, manage, and track data creation, simulation, and documentation"
- **Vault Workgroup** = Vault + Project lifecycle tools to manage change on files; workflows, lifecycles, and other revision management tools
- **Vault Professional** = Vault Workgroup + Items and tools for managing change (Change Orders)

What are Lifecycles?

From Vault's help… "*A lifecycle definition is an engine that can be configured to automatically assign security, behaviors, and properties to Vault objects based on where the object is in the life of the design process*."

The lifecycle engine is available for files, items, custom objects, and folders.

The basic **Lifecyle** process:

- Assign the **Category**
- Change the **State**
- **Revise** the File
- Change the **State**
- Rinse, Wash, and Repeat

Categories

Categories provide a grouping method for a set of files, folders, custom objects, or items. Categories assign user-defined properties, the lifecycle definitions, and the wanted revision schemes.

Within Vault, you adjust the **Category** *manually* or establish *rules* to assign the category *automatically*.

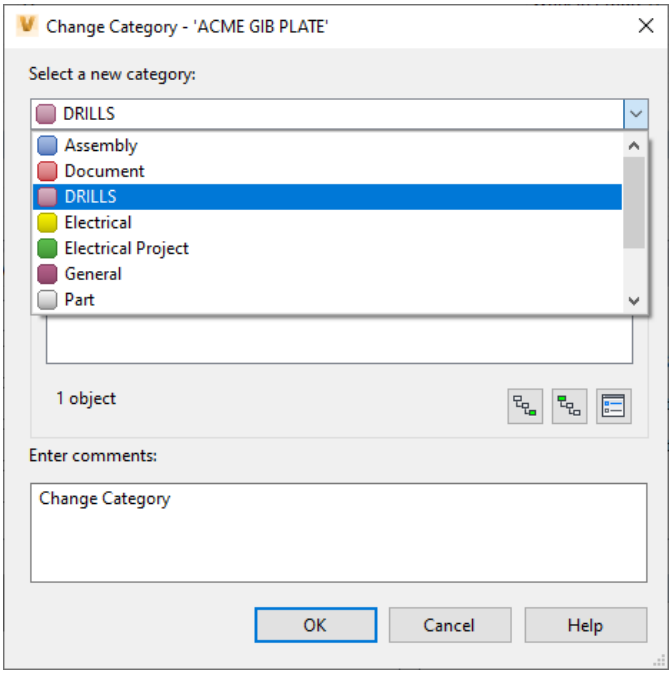


Figure 1: Adjust the Category

To change the **Category** manually, select the object(s) and pick the **Change Category button**.

The subsequent dialog allows for the selection of the category.

The comment auto-populates with the configured default but adjusted when needed.

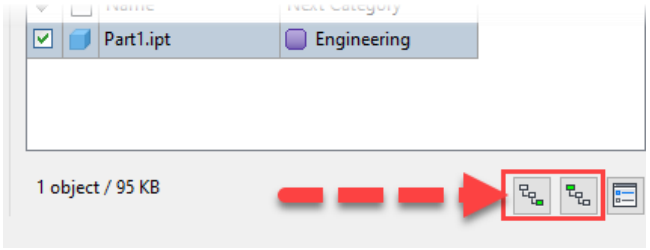


Figure 2: Dependents and Parents

When changing categories on files and items use the options to apply the change to the dependents (children) and/or parents as well.

With folders you can optionally apply the change to the folder's dependents (aka objects in the folder).

Rules are appropriate for frequently categorized components. For example, automatically assigning a Purchased Part category to parts generated by Inventor's Content Center. **Rules** apply during check-in. So, if established, Vault assigns the category based on the rule during check-in.

States

By themselves the states are simply labels, representing the various stages that you want your object to transition through. However, the **State** identifies the object's status within the lifecycle. For example, *Work in Progress* (WIP) or *Released*.

To change the state of an object, select **Change State**.

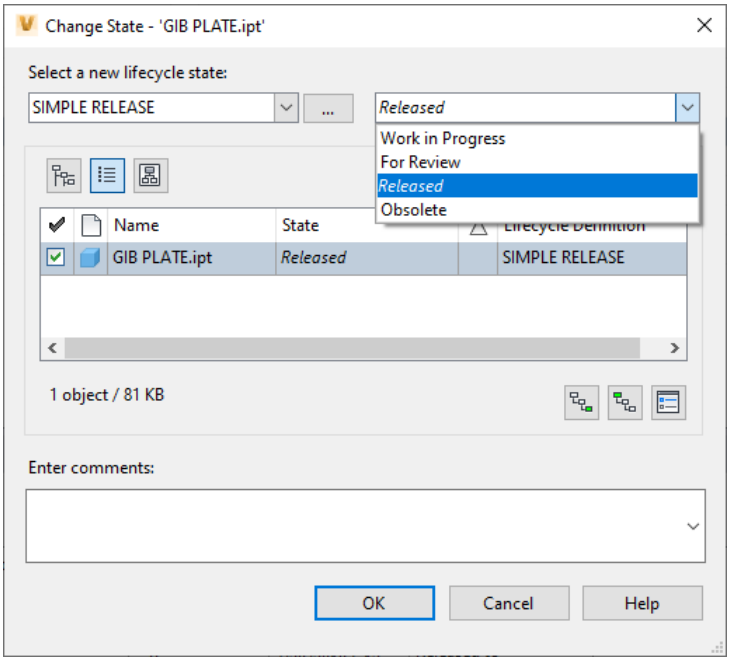


Figure 3: Change State

In the **Change State dialog**:

- adjust the assigned *Lifecycle definition* (if required)
- choose the **State**

As with changing the category use the options to include the dependents and/or parents of the select object(s).

The relationship grid displays the selected data and currently assigned state. Adjust each object individually or use the drop-down to set the state to a group of selected files. Uncheck objects you do not want to adjust.

The number-of and roll-of the states is based on the **Lifecycle's Transition Rules** and assigned to the object via the category. The Vault administrator configures the state change to perform various actions. For example, you might also notice the revision value bump with the state change.

Roll back lifecycle changes to a previous state using **Roll Back Lifecycle State Change.**

Roll Back Lifecycle State Change

Use **Roll Back Lifecycle State Change** to return the object to a previous lifecycle state.

By rolling back the state change it returns the file to the version associated with the previous state. It returns the object to the security, lifecycle definition, and revision associated with the rolled-back state. Vault deletes the current version with the rollback.

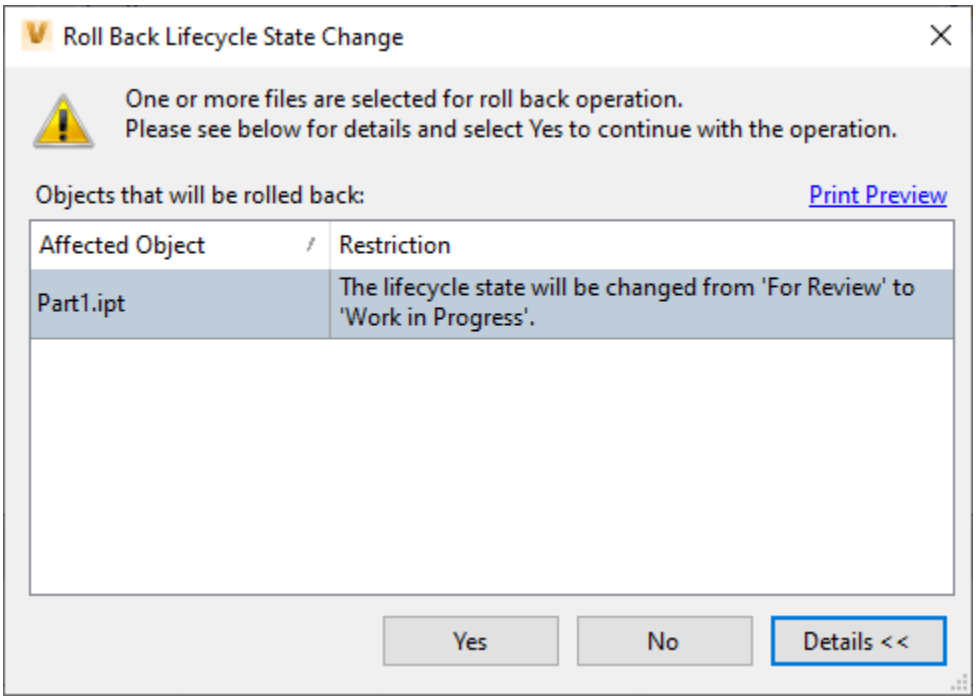


Figure 4: Roll Back Lifecycle State Change

To rollback a file's lifecycle state:

- you must be a Document Manager Level 2 (or Administrator)
- the file is checked-in
- no parent versions consume the current file's version
- the previous state has not been deleted

It is possible to limit state changes to Change Orders, meaning that it may only be possible to rollback the file's state change from within a change order.

Revising

Revising is the act of making a change. We document this change by adjusting the revision of the document. A revision is a permanent version and will not be purged from the vault.

The ability to adjust the revision of the file will depend on the permissions assigned to your Vault User Account, the category the files belongs to, and the current state of the file.

With Vault, manually set the revision level, or let the lifecycle engine automatically bump it for you.

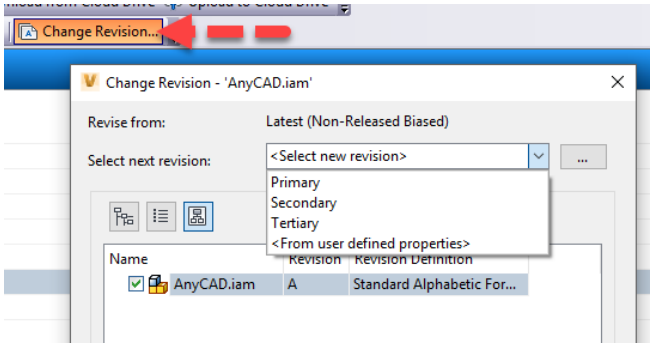


Figure 5: Bump the Revision

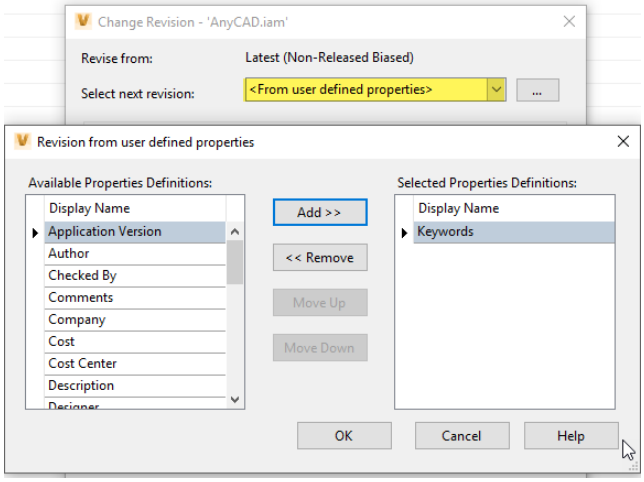
Use the **Change Revision** feature to *bump* the revision to the next available value in the current revision scheme.

Within the dialog, select the revision level you want to bump to (i.e. are you going from 1 to 2 or 1 to 1.1) and Vault automatically goes to the next available value.

You can also adjust the revision for multiple files in one step by selecting them in the grid view and selecting **Change Revision**. This will *bump* each file's revision to the its next available value, NOT set them all the files to the same revision.

As Vault maintains file relationships of the files checked into Vault you can adjust the revision level on a file and all of it dependents or parents. Use the buttons at the *bottom right-corner* to **Include Parents**, **Include Children**, and other optional files like *attachments*.

Alternatively, to a bump, use a **property** of the selected file to populate the revision value. Utilizing the property is especially useful when migrating data into Vault. If a document property contains its revision, then use it to set the initial Vault revision value.



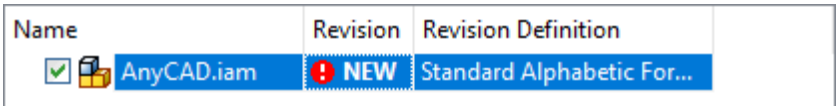
FROM USER DEFINED PROPERTIES

The property will work if the current value fits within the Scheme Definition.

For example, you could not use the description (a multi-character string) if the current scheme is alphabetical (A, B, C).

To adjust the revision manually, click in the Revision field and type the desired value. The value entered must *fit* within the scheme definition. For example, you could not enter "*hello*" if the revision scheme is A, B, C or 1, 2, 3.

Vault displays a **red exclamation mark** if the current entered value does not fit within the revision format, meaning you must change it.

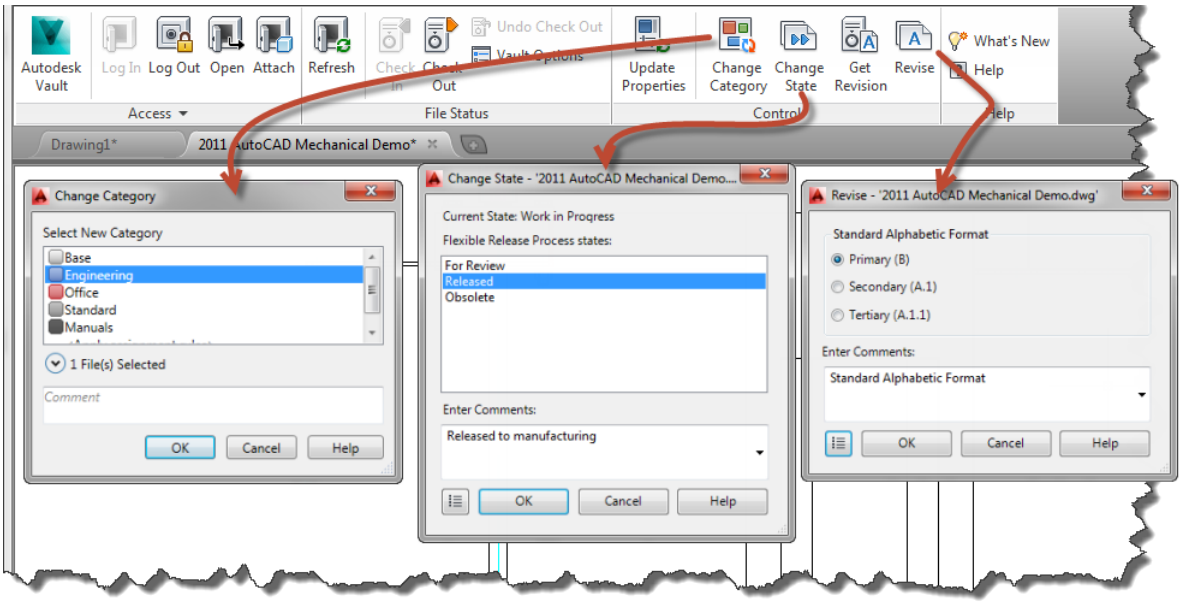


The option of setting the revision is useful with the historical revisions of files occurring before added into Vault. If you add a drawing to Vault that is currently at Rev 14, you do not need to (or want to) bump the revision 14 times. Just revise the file and set the revision to 14.

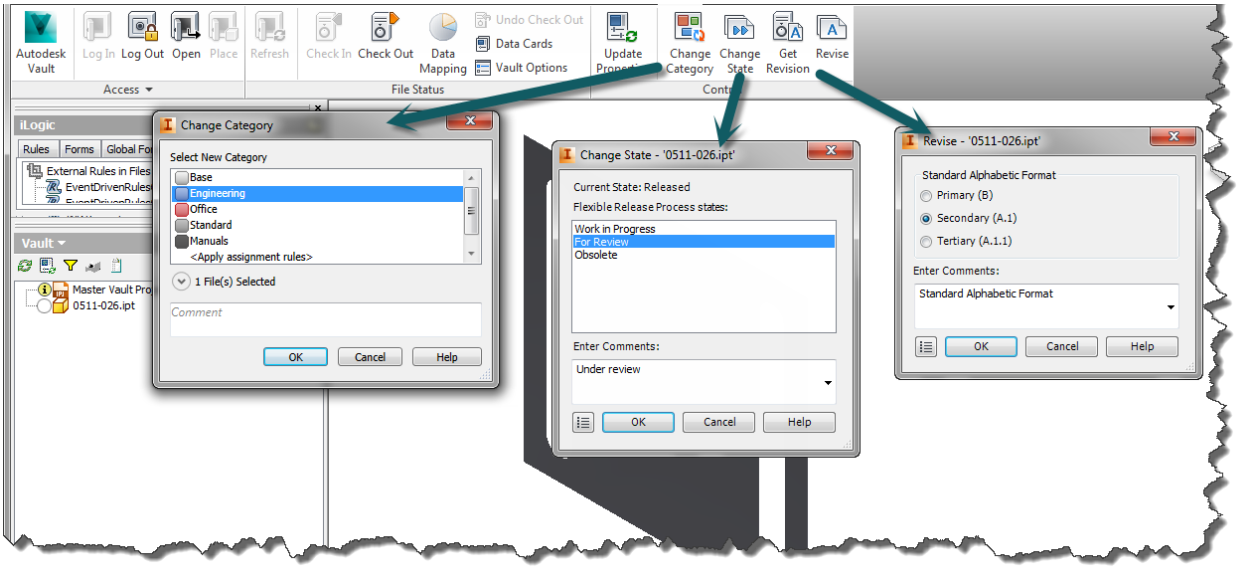
Once a Revision level is achieved there is no going backwards. If I take a file and manually adjust from 1 to 11 I will NOT be able to assign revision levels 2 thru 10 to it.

In-CAD Lifecycles

When using the Vault CAD add-in, you can perform lifecycle changes directly within the CAD application. This includes changing **Categories**, changing **States**, and **Revising.** This is available within Inventor, Revit, and AutoCAD (and all its flavours).



AUTOCAD - VAULT LIFECYCLE FEATURES



INVENTOR – VAULT LIFECYCLE FEATURES

Item Lifecycles

Like how a recipe or business card represents information and provides a method for organization and quickly locating, **items** represent things within our business. Items represent the components that the company manage, assemble, sell, and manufacture.

The **item master** is a master list of everything within the engineering system. Vault assigns a unique number (an identifier) to each **item** and uses it to locate, edit, updated, and track the changes to the item. **Items** can represent a variety of things including parts and assemblies, instructional guides, consumable goods (fluids, lubricants, etc.), and any related Bill of Material items.

Items behave like files. Use revisions to track the history of changes applied to an item. After creating the item, use the item lifecycles to manage the revisions.

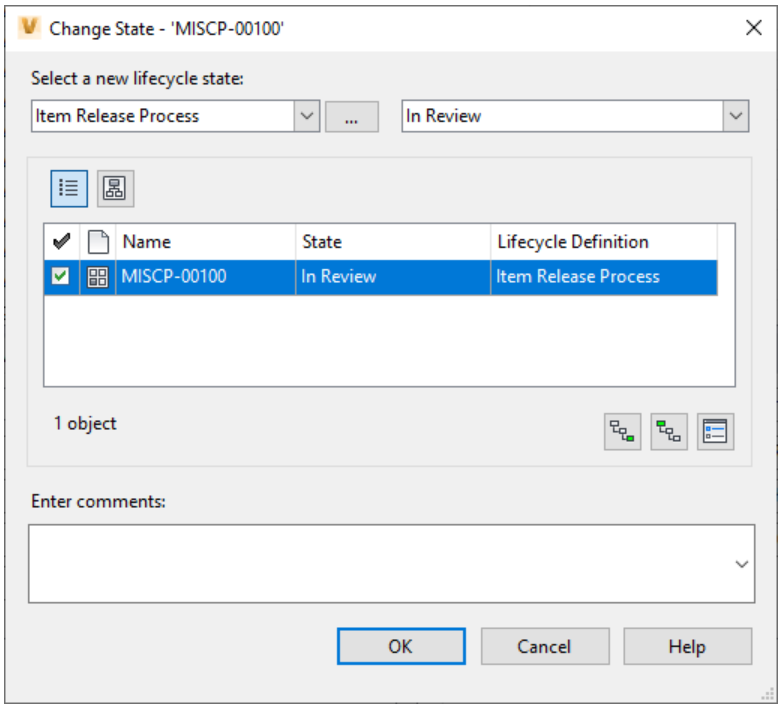


Figure 6: Change State (Item)

Items can be used to manage the lifecycle of the associated files. For example, using the item's revision to populate the file's revision or putting an item into the released state locks the associated files preventing changes.

Projects

Vault Projects are folders you manage with lifecycles. With projects you organize the related data and manage it from one location.

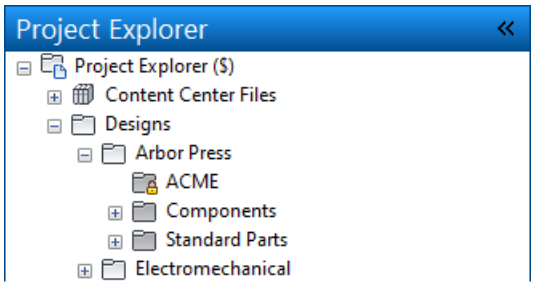


Figure 7: Projects

Convert the folder to a project by assigning a category.

Projects have properties, meaning a terrific location for project data.

Projects are like files except you cannot set the revision. After applying the desired category, adjust the state of that folder. The state change configuration may force you to perform the state change on the files contained within the folder as well.

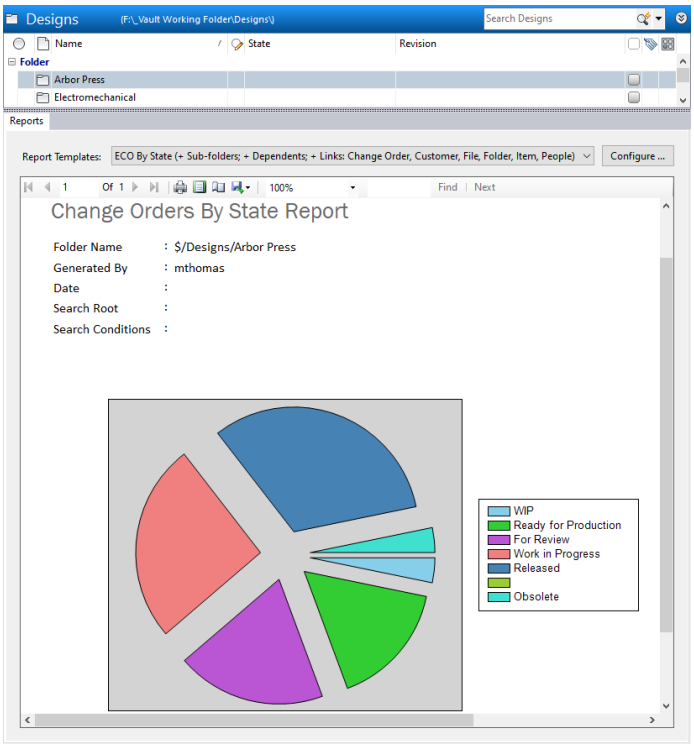


Figure 8: Project Reports

Run **reports** on the project to gain insight including information on the files, items, sub-projects, and other objects contained within the project.

Access reports from the **Preview tab** of the project.

Links

A key component of projects are **Links**. The object resides anywhere within the vault but referenced within the folder.

A link is a *direct representation* of the object, meaning commands apply to the target object, even though contained in a different location. What can you do with a **link**? *Get, Check-in/out, Change State, Change Category,* and *Revise.*

Links represent files, folders, items, and change orders. Use linked folders to establish sub-projects.

	**Custom Objects** are like folders in that they can contain links to other objects.

Changes to the target automatically apply to the link as well. For example, renaming a file renames the link as well.

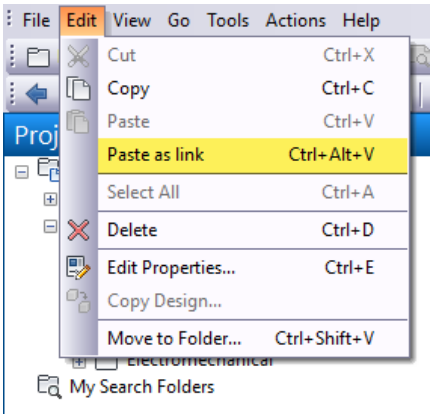
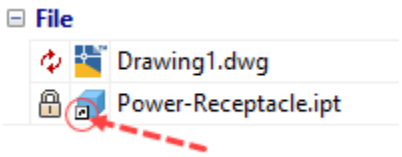


Figure 9: Paste as Link

To create a link, select the object and from the **Edit menu** select **Copy**. Navigate to the destination project and select **Paste as link** (Edit menu).

The link icon is the same as the target object except for a small arrow overlay.

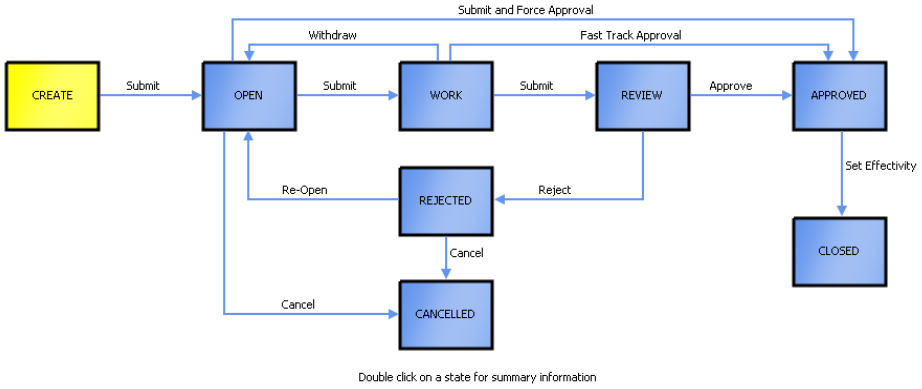


	Deleting a link only removes the link, NOT the associated object.

Change Orders

When a design requires a change or modification you want to put controls in place to help manage the change. A record of the changes provides a history *trail* of what changed, why it changed and when the change occurred.

Vault Professional provides **Change Orders** to capture the changes and manage the change as the modifications are completed, reviewed, and released to be manufactured. The change order is the historical *paper trail* of the why, how, when, who, and what of the design modifications



CHANGE ORDER WORKFLOW

Change Orders are not available to everyone. You need to have at least basic level privileges to files or items to create or participate in change orders. Participants can create a change order, and anyone assigned can review a change order.

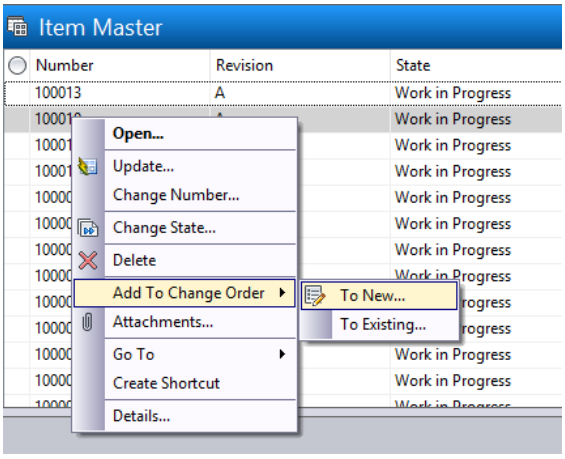
In addition, only *Administrators* or *Change Order Editors* can affect change orders:

- **Change Order Editor (Level 1)** – create, edit, participate, and read change orders
- **Change Order Editor (Level 2)** – Level 1 + add/remove from an approved ECO

Creating New Change Orders (Quick Procedure)

1. Locate the item or file requiring the change
2. Create the Change Order (right-click add)
3. Describe the change required
4. Markup the drawing (as required)
5. Assign the Routing
6. Submit it

Creating the Change Order



CREATING A NEW CHANGE ORDER

The first step is to create the change order is to locate the objects requiring the change, *right-click*, and select **Change Order > New**.

Alternatively, from the **Change Order List view** select **New**.

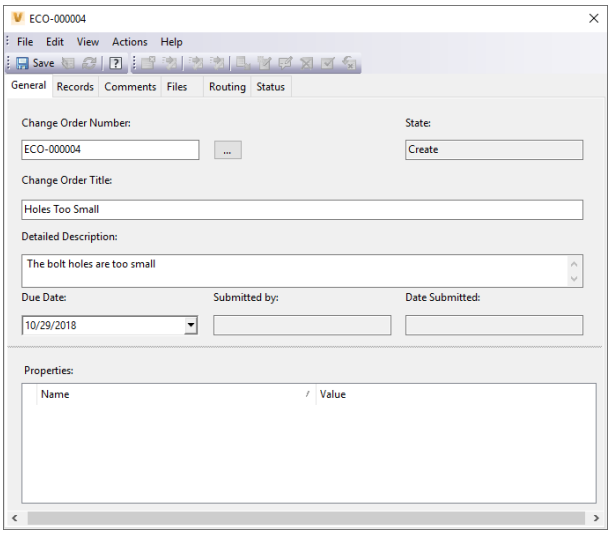
This puts the change order into the **Create stage**

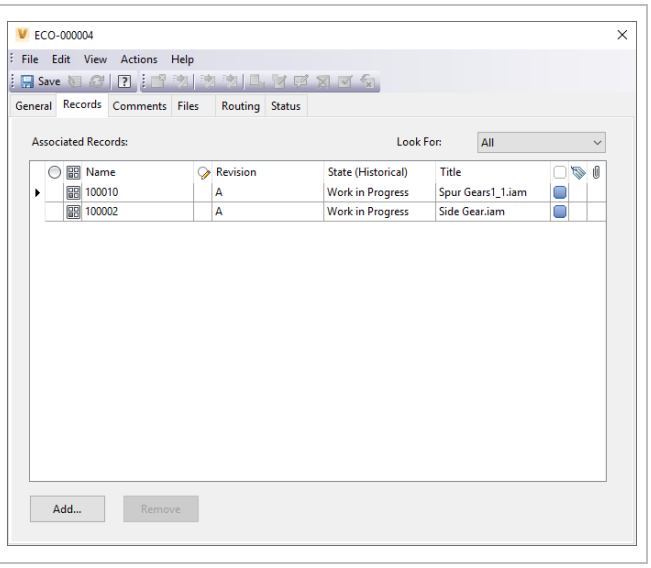
With the new **Change Order**, enter information about the required change. On the **General tab** enter the change order title and summary (description) as well as the expected due. The **Change Order Number** auto-populates based on the applied numbering scheme.

As a best practice, it is useful to add all files affected by a design change. For example, changing a part can impact the parent assembly.

Files and items can only be associated with one active change order at a time

The **Records tab** lists the objects (and related items) added for changes. Include additional items using the **Add button**. This can include other assemblies, components, or really any document requiring changes.





Adding Comments and Markups

Use the **Comments tab** to add comments (text) and attachments (i.e. markups, photos) and reply to these comments. You must be a routing participant to add (or reply) comments.

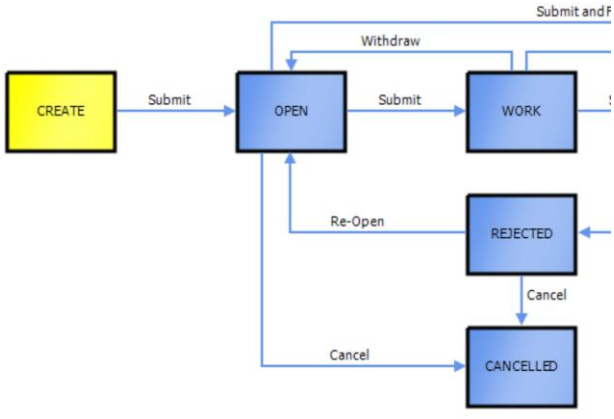
Change Administrators can add comments during any state except Create. **Any role** can add comments during the Work state. **Reviewers** add comments once it moves into the Review state.

Vault (automatically) creates DWF visualization files of CAD files (during check-in). Use these to markup and add comments to the change order. Any routing participant can add a markup when adding a comment.

Change Order (Initial) Review

Initially the Change Order sits in the **Create** stage and then submitted to **Open**. During **Create** no work on the items occur as this stage is intended for the collection of information and for documenting what is to change and why it is to change. When complete, *submit* the Change Order, moving it into **Open**.

Before you create a change order: Make sure that a routing exists. The routing should contain everyone that needs to review, be responsible for, and approve the change order.



INITIAL STATE OF A CHANGE ORDER

Vault assigns the **Change Requestor** role to the user creating the Change Order. This participant automatically becomes a **Reviewer** when submitting the Change Order.

During the **Open** stage, **Change Administrators** review the details, determining what actions occur next. If requiring changes, assign users and their roles from the **Routing tab.**

Use the **Records tab** to add additional files or items for change.

Change Administrators are the only ones able to adjust routings and assigned roles. They additionally can adjust properties and add/remove files/items to the change order.

To make changes submit the Change Order to **Work**. To perform no changes, but keep the Change Order as a record, submit it to **Cancelled**. A third option**, Fast Track Approval**, approves the Change Order and automatically approves and closes it.

Completing the Required Changes (aka doing the work)

Once the change order enters the **Work stage** the **Responsible Engineer** can start making the required changes and modifications. With the work complete, the **Responsible Engineer** submits it for review.

The **Change Order Administrator** can make the item editable in all states except Canceled and Closed. The **Responsible Engineer** can make an item editable in the Work State, changing the lifecycle state.

Summary of the "Work" steps:

1. Add related files (the files requiring changes)
2. Change the lifecycle state of the files/items to Work In Progress
3. Adjust item revision levels as necessary
4. Check-out the files and make the changes
5. Check-in the files
6. Update the items within the change order
7. Change the lifecycle state of any WIP items to "In Review'
8. Submit the change order for review

Once updating the items and you are satisfied with the changes you can change the lifecycle of the items to In Review. Submit the change order to move to the next stage (Review)

Reviewing and Approving

In the **Review stage**, **Reviewers** can view the change order, make markups, and add comments. In the **Review stage, Approvers** either *Reject* or *Approve* the changes.

- **Rejecting** the changes moves the change order back to a **Rejected state** where further decision can be made.
- **Approving** the changes moves the change order into the Approved state where the change order will await the setting of effectivity.

The change order must be in the Approved state before it can be closed.

Notification Users receive notification when the change order is closed. This is useful for participants who need to move changes downstream.

Lifecycle Administration

Categories

Categories provide a method of grouping items based on a common label. This label provides a method of identifying, tracking, and organizing the items. By assigning a **Category** you are also assigning a set of predefined behaviors and rules that the item must follow.

Regardless the object type, create and edit Categories via the Behaviours tab of the Vault Settings dialog.

Vault always assigns a category, even if just the default one. Set the default using the option in the Configure Categories dialog.

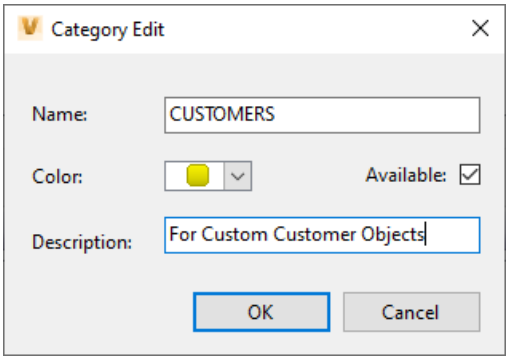


Figure 10: Create a Category

When creating a new category, you set the name, color, and description of the category.

Once created, edit the **Category Behavior** to assign *Properties, Lifecycles,* and depending on the object type the *Revision Schemes* as well.

When files are checked into the vault, only the properties that are set enabled are automatically extracted and indexed. **Properties** however do not need to be enabled for all categories. Use the **Properties** section to assign user-properties for indexing specifically for the category.

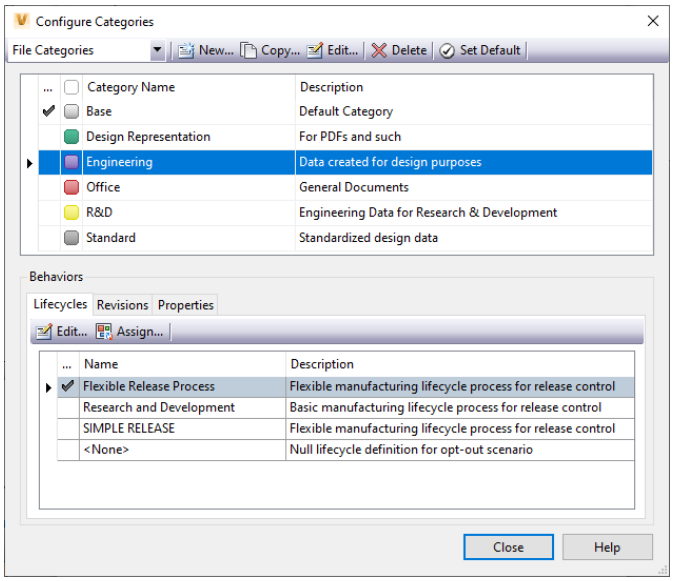


Figure 11: Configure Categories Dialog

The **Lifecycle** definition determines how the object will go from creation to released. Vault allows for assigning of multiple lifecycles to a category, with one being the default.

The assigned **Revision Schemes** define the revision value applied to the object and the sequence of subsequent values. Revisions are only available for files and items.

Assignment Rules

Assignment Rules define conditions where objects are (automatically) assigned to categories based on the object's properties. For files, the assignment occurs during check-in. For items, it occurs when assigning a file to a new item.

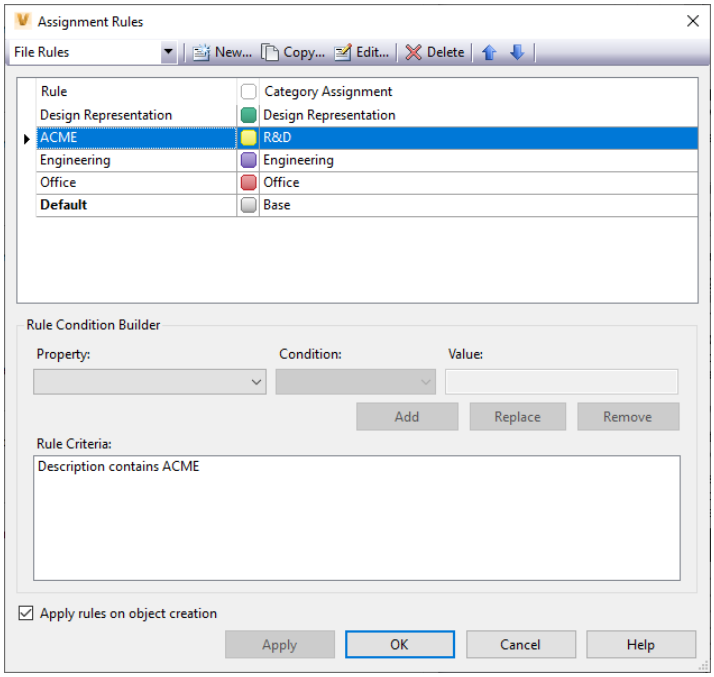


Figure 12: Assignment Rules

Using the **Assignment Rules** dialog:

- select the object type
- select **New** to define the new rule and specify the desired name
- set the **Category Assignment**, this being the category the rule will automatically assign to the object
- use the **Conditions** to define the rule criteria

The **Property** is the value to check with the **Condition** determining how it is checked. The available conditions are based on the type of property.

Revision Schemes

Vault **Revision Schemes** define the revision value applied to the object and the sequence of subsequent values. You specify the format of the primary, secondary, and tertiary revisions.

The scheme forces the users into predefined values, so they can not stray away from the standard. For example, the *Standard Numeric Format* (one of the ones that is out-of-the-box) starts at 1 and increments by 1, not skipping any numbers.

The "out-of-the-box" Revision Schemes

- **Standard Alphabetic (A, B, B.1, B.1.1 to ZZ)**
- **Default Alphabetic (same as standard but starts at rev "-")**
- **Standard Numeric (1, 2, 2.1, 2.1.1 to 99)**
- **Default Numeric (same as standard but starts at rev "-"))**
- **Default ASME Y14.35M (-, A, B, A.1, A.1.1 | no I, O, Q, S, X, Y)[1]**

To define or modify a **Revision Scheme**, within the Vault Settings dialog (Tools > Administration > Vault Options) navigate to the Behaviors tab and select **Revisions**.

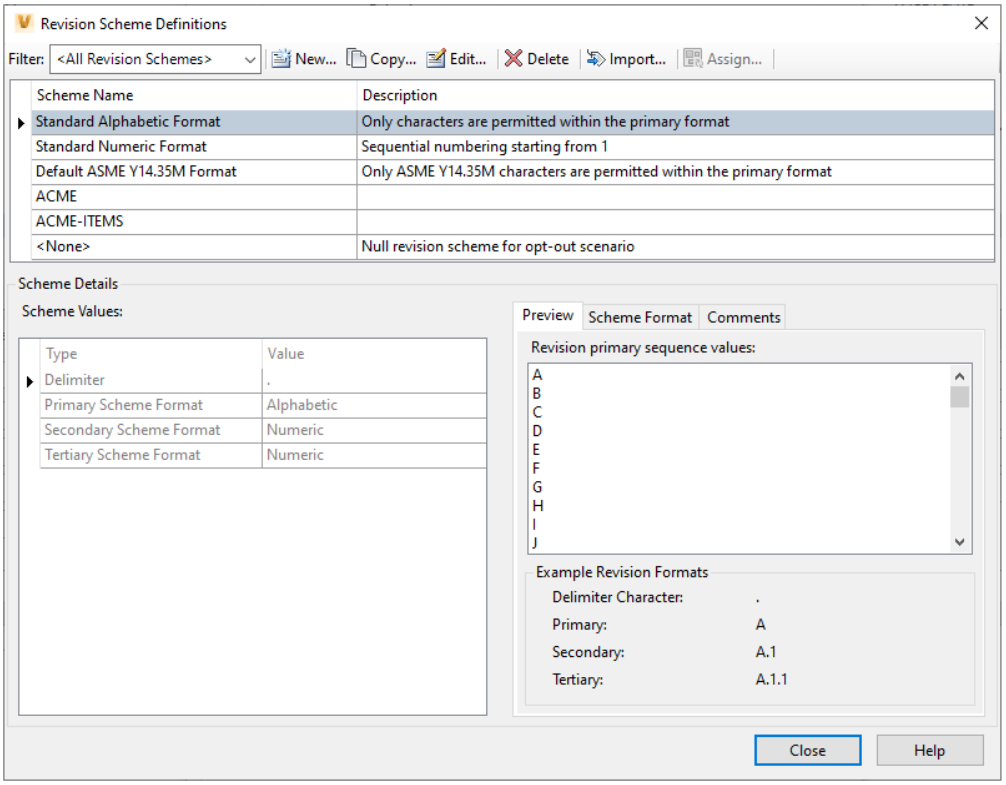


Figure 13: Revision Scheme Definition

[1] The American Society of Mechanical Engineering (ASME) standard that defines the practices for revising drawings and associated documentation, includes the methods of identification and revision documentation.

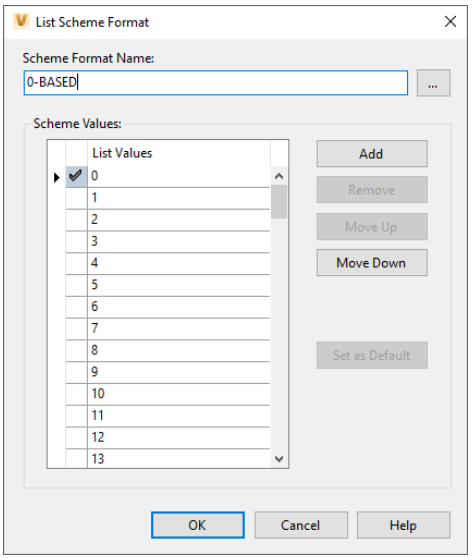
Select **New**…

- Name the new scheme and enter a description
- Select the Categories in which you want the new scheme to be available
- Assign the three (3) Scheme Formats (Primary, Secondary, and Tertiary) and the Delimiter
- If desired Scheme Format is not available, create a new Scheme Format

The **Scheme Definition** is simply the list of values available to the Revision. In most cases it is easier to copy an existing scheme and tweak it, otherwise when starting from scratch you'll be defining each and every value in the scheme.

When defining a new scheme, either copy an existing scheme or start from scratch

Once a scheme is used it CANNOT be modified. Make sure it is what you want before you start using it.



SCHEME FORMAT

Example:

Say your company starts at rev 0 as the initial release to manufacturing, but the Vault out-of-the-box numeric options start at – or 1.

Start by copying the Default Numeric, naming it 0-BASED. It is identical, but starts at 0 instead of 1

Further, you can mix schemes in the Revision Scheme Definition, for example, using "*Alphabetic*" for Primary, "*Numeric*" for Secondary, and "*0-BASED*" for Tertiary.

States

Lifecycle States identify the status of your file within the Lifecycle Definition. By themselves, the states are simply labelling that represent various statuses that you want your files to transition thru your lifecycle path. You need at least two but can have many more.

Vault Settings > Behaviors > Lifecycles. Select **New** to define a new lifecycle definition or **Edit** to modify an existing definition. Set the **Definition Name** and **Description**. Use the **Category List** to select the categories in which you want the lifecycle definition assigned.

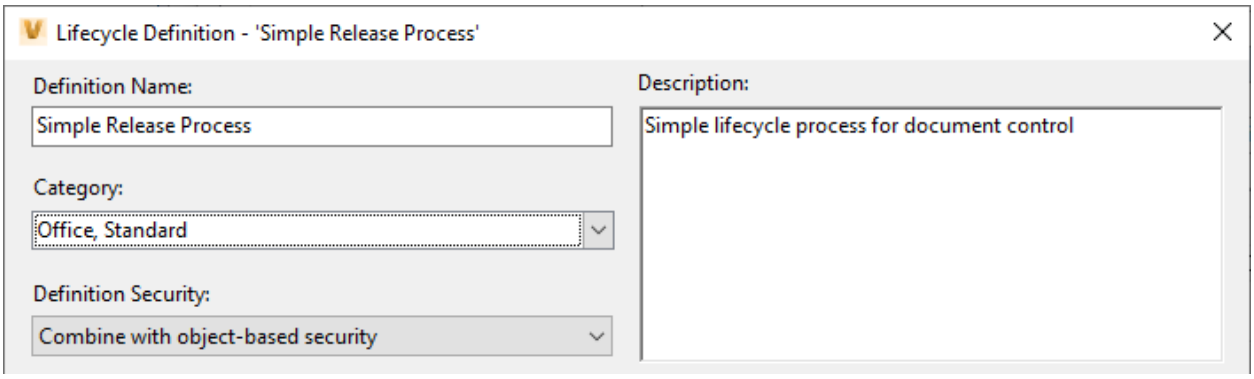


Figure 14: Lifecycle Definition

Vault uses a dual-gate security model with two types of security: **Object-based** and **State-based**. With **Object-based**, the security derives from the object settings. Whereas with **State-based** assigns permissions based on the state of the object. With **Object-based**, the security derives from the object settings.

With the Lifecycle definition you select the desired **Security Definition**. State-based security is either combined with object-based security or overrides object-based security. Use **Combine with object-based security** to merge any state-based security with object-based security on the selected object type. Use **Override object-based security** to have the state-based security override the object-based security.

Click the green plus sign to add a new **Lifecycle State**. Use the up and down arrows to reorder existing states.

With the **Lifecycle State** selected, you use the **General tab** to specify the name and description. Use the **Comments tab** to set the default comment that appears on the file when it transitions into the state.

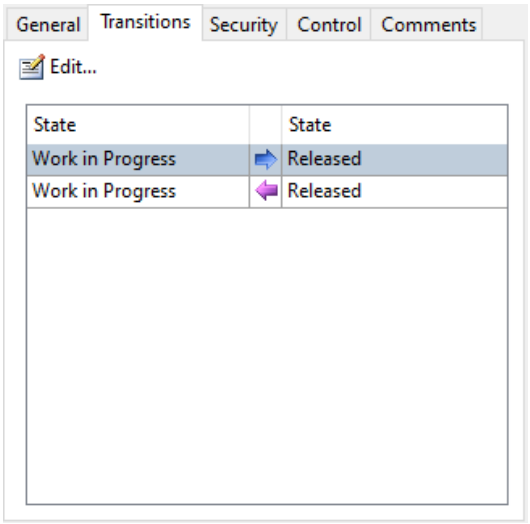


Figure 15: Lifecycle State Transitions

A **Transition** occurs when an object moves from one lifecycle state to the next.

The **Transition** of a state determines the **Property** requirements, the **Actions** that happen during the state change, and the **Security**, as in who can make the specific state change.

Vault adds the requisite transitions automatically.

Select **Edit** to adjust the selected transition:

- **Criteria** specifies property conditions that must be met for a state transition to occur
- Configure the **Actions** you want to occur during the state transition
- **Security** specifies who can make the transition state change. If you leave this as the default no restrictions exist and anyone with lifecycle state changing ability can make the transition

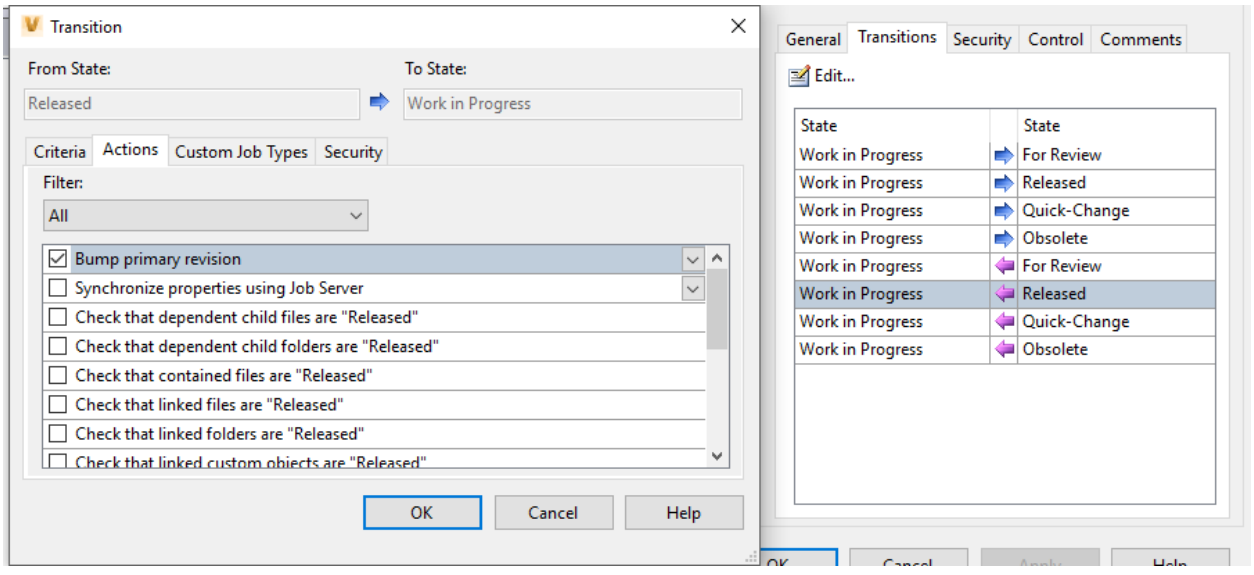


Figure 16: Transition Dialog

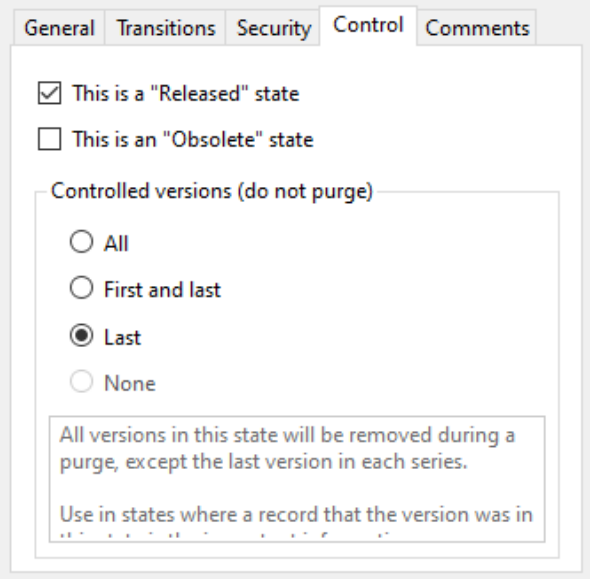


Figure 17: State Control

The **Control** of a state determines if it is a "Released" or "Obsolete" state, meaning you mention the version retention of the files in this state.

- **All** = Vault removes no versions created in the state during a purge
- **First and Last** = all versions created while in the state, except the first and last, are purged
- **Last** = only the last version created while in the state is maintained during a purge
- **None** = no versions are retained during a purge

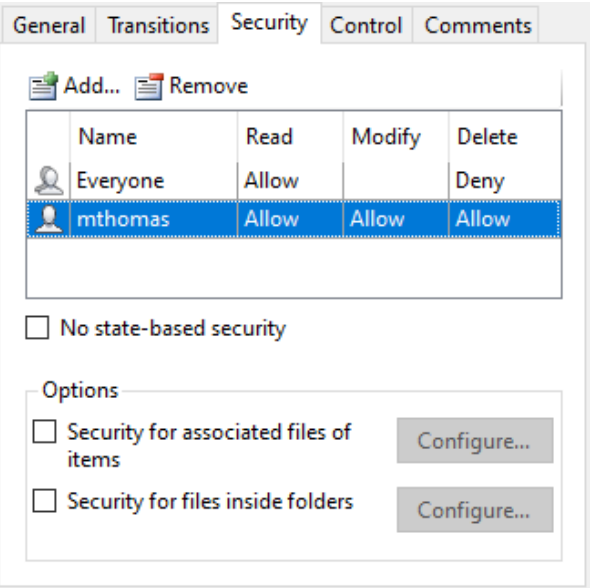


Figure 18: State Security

Use the **Security** to manage who can read, modify, or delete an object assigned to the state.

Enable **No state-based security** to allow the object-type permissions to manage the access.

Security for associated files of items

Security for files inside folders

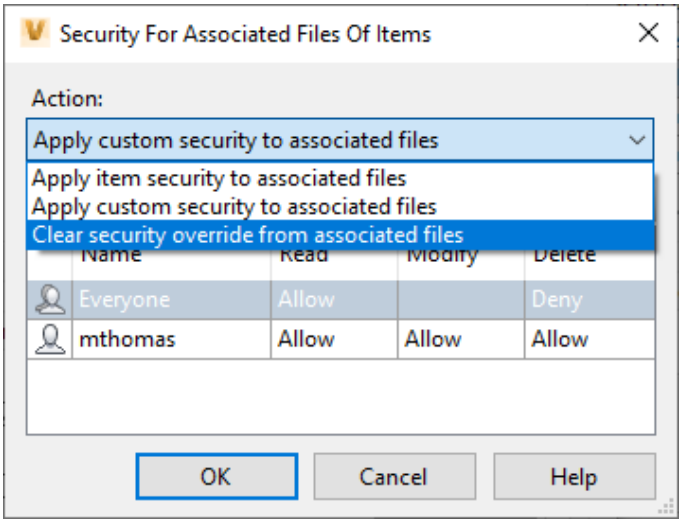


Figure 19: Security for Associated Files of Items

Options exist for managing the security of the files associated with an item. By default, no security is enabled on associated files.

The options include applying the item's security, setting custom security, or clearing the file's security override.

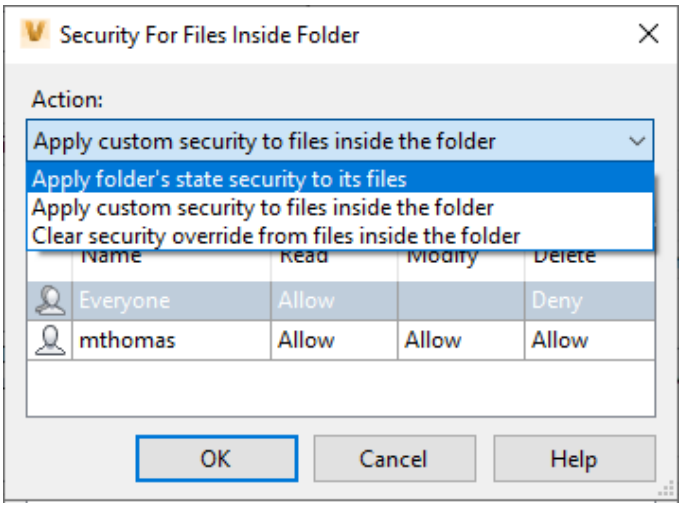


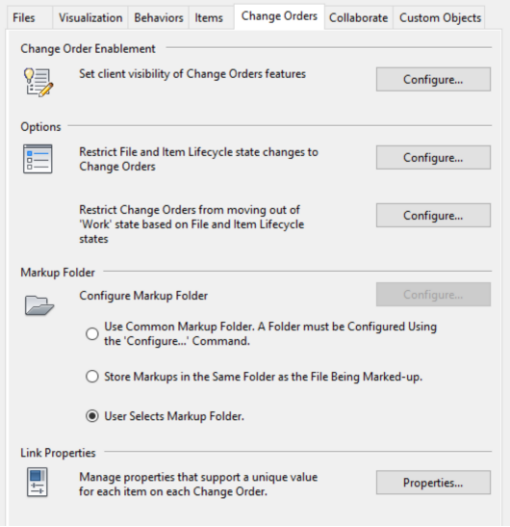
Figure 20: Security for Files Inside Folder

Use the options to manage the security of files within a folder.

The options include propagating the folder state security to its files, applying customized security to the files, or clearing security the files overrides.

Change Order Administration

The **Change Orders** tab contains options for controlling change order behavior, configuring the markup folder, and managing change order link properties.



CHANGE ORDER ADMINISTRATION

Change Order Enablement – if you are not going to use Change Orders, might as well make it invisible

Restrict File and Item Lifecycle state changes to Change Orders – No Lifecycle changes unless its in a Change Order

Restrict Change Orders from moving out of Work state based on File and Item Lifecycle states – no objects in WIP when transitioning out of the "Work" state

Markup Folder – configure how and where Vault stores DWF markups created on a Change Order

Link Properties – link user-defined properties to change orders

In addition to the Change Orders tab, define numbering schemes (Behaviors tab) to auto-label the change orders.