powerPLM (powerFLC)

coolOrange s.r.l

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POWERPLM (POWERFLC)

CHAPTER

ONE

INSTALLATION

1.1 Requirements

Operating System: 64-bit only

- Microsoft Windows 10
- Microsoft Windows 11

Windows PowerShell: PowerShell 5.1 or higher

1.1.1 powerFLC Processor

As powerFLC Processor contains a Vault Client Extension the Vault system requirements defined by Autodesk leads.

Autodesk Vault Client: 2026 / 2025 / 2024 / 2023

- Vault Professional

coolOrange powerJobs Processor

- Needed in order to use the powerJobs Processor workflow *Transfer Item BOMs* or to use custom workflows using the Vault JobProcessor.

1.2 Setups

The powerPLM (powerFLC) setups are delivered as executables and accept the standard windows installer arguments documented here.
To accept the products EULA when starting the setup in silent mode pass the **ACCEPT_EULA=1** argument.
Two different setups are provided:

- **powerFLC Client**: Installs only the PowerShell *commandlets*.
- **powerFLC Processor**: Installs the PowerShell *commandlets*, *Workflows* and *Configuration Manager*.

1.3 Install Locations

powerPLM (powerFLC) is installed in the following locations on your system:

- The Vault client extensions are placed in *C:\ProgramData\Autodesk\[Vault Version]\Extensions\powerFLC Processor*
- All PowerShell libraries are placed in *C:\Program Files\coolOrange\Modules\powerFLC*

Following shortcuts are added to the start menu:

- **powerFLC Console** - Opens the PowerShell Console and loads the powerFLC module
- **powerFLC Logs** - Opens the log file location
- **powerFLC Information** - Opens the About dialog with product related information
- **coolOrange License Manager** - Opens the License Manager dialog for activating coolOrange products

1.4 Windows permissions

To activate the product via the License Manager dialog, the current Windows user needs the following rights, which are automatically installed for *"Everyone"*:

Path	Required Rights
C:\ProgramData\coolOrange\	**Read**, **Write** data

1.5 Updates

To install a newer version of powerPLM (powerFLC) just execute the setup file of the new version. This will automatically update the files in the existing installation.

1.6 Uninstall

In case you want to remove powerPLM (powerFLC) from your computer you can:

- Execute the setup file again. This will give you the option to repair or remove powerPLM (powerFLC). Click on "Remove" to uninstall the program.
- Go to "Control Panel - Programs and Features", find "coolOrange powerFLC" and run "Uninstall".

CHAPTER

TWO

ACTIVATION AND TRIAL LIMITATIONS

2.1 Trial limitations

There is no difference in functionality between the trial version and the fully licensed product.
After the installation the product is available as a trial version for **30 days**.

2.2 Activation

There are two types of license available for powerPLM (powerFLC):

- **powerFLC Client** licences must be activated on workstations.
  This licence type only allows the use of *commandlets* within Vault Client customisations.
- **powerFLC Processor** licenses are for the use on Job Processor environments.
  They enable an unrestricted use of *commandlets*, e.g. also in *Workflows* jobs

The licence must be activated on every computer where one of the corresponding *setups* has been installed.

Follow these simple steps to activate powerPLM (powerFLC) on completely **new computers**, together with all other products included in your subscription:

- How to activate coolOrange products

After successful activation, all these products can be used on the computer until your licences expire.

Note: If an Internet connection is available, no further activation steps are necessary from now on:
neither after the annual licence renewal nor after unlocking additional products in your subscription.

As your subscription allows it, you can also activate additional Vault workstations - or other Job Processors - with your customer key.

2.2.1 Other methods of activation using a serial number

The classic way to activate powerPLM (powerFLC) is by using a serial number.

Use this activation method, for example, if there is no internet connection or if you want to activate an older powerPLM version (v22 - v24).
Further details can be found in the second section on activations via serial numbers "For products with version 20.x - 24.x".

To register the serial number for this product, the powerFLC specific License Information dialog is required:

Open it via the Start Menu and navigate to "*All Apps → coolOrange → License Manager*" and search for "*powerPLM*". Then click on the "*Trial*" link (or on the already displayed serial number).

Alternatively, you can start it via the command line:

```
"C:\Program Files\coolOrange\Modules\powerFLC\License.exe" --Serialnumber="XXXXX-XXXXX-
↪XXXXX-XXXXX" --StandAlone
```

Depending on whether you have an internet connection or not, you can register a signed licence file or the serial number:

- Register the **serial number** of powerPLM (powerFLC) if an internet connection is available.
- For an **offline activation** you need a signed license file.
  You can download it from another device using this link: Offline Activation of powerFLC. Again you need the serial number of powerPLM (powerFLC), as well as the *Machine Code* which is displayed in the License Information dialog.

> **Note:** Please note that after the annual licence renewal this offline activation must be updated on every computer. Further information can be found here.

2.3 Are you having problems with the Activation?

To check on a workstation or on the Job Processor whether the products of your subscription are activated, you can open the Licence Manager via the Start Menu by navigating to "*All Apps → coolOrange → License Manager*".
For further information about the powerPLM (powerFLC) license, open the License Information dialog to see the remaining days until the licence expires.

On worstations, the Vault user will see additional notifications about the coolOrange subscription that needs to be renewed, in the last 30 days before this licence expires.

License expired

If the powerPLM (powerFLC) licence expires, *commandlets* will throw a *LicenseException* when trying to connect to Fusion 360 Manage.

A Windows notification about the expired licence is displayed on workstations.

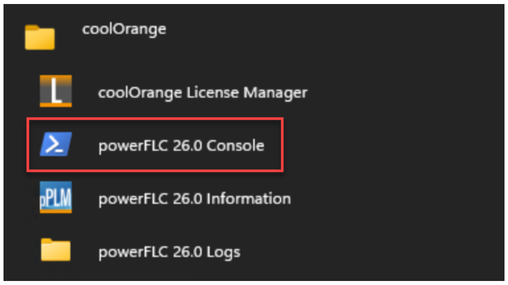
On the Job Processor, *workflow jobs* can no longer be executed by powerJobs Processor.
The jobs fail and the result displayed in the Job Queue contains an error message referring to the expired licence.

CHAPTER

THREE

GETTING STARTED

3.1 Using the Cmdlets



3.1.1 Start the PowerShell environment

To get started, simply open any Windows PowerShell IDE. The `powerFLC` module now provides cmdlets that allow you to interact with Fusion 360 Manage.
The module is generally imported automatically when you run one of its cmdlets.

Alternatively, you can open the *powerFLC Console* shortcut in the start menu, which executes `Import-Module powerFLC` for you.

3.1.2 Connect with Fusion 360 Manage

Before you are able to work with the Fusion 360 Manage tenant in your PowerShell environment you have to make sure that the *tenant is configured* correctly!

Next retrieve the Client ID and Secret (see Step 3: Note Down Your Client ID and Secret) of your registered *powerPLM* app from the Forge portal.

Find your tenants name by copying the first part of the URL from your browser, after you sign in to your Fusion 360 Manage Site.
For `https://previewcoolorange.autodeskplm360.net/plm/mainDashboard` the tenant name would be `previewcoolorange`.

Now you can authenticate using *Connect-FLC* and all the previously retrieved information.

```
$connected = Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_client_secret' -UserId 'your_email@example.com'
```

3.1.3 Get multiple items from Fusion 360 Manage

After successfully connecting to the Fusion 360 Manage tenant you can start using the cmdlets to interact with FLC items and workspaces.
To retrieve a collection of specific items from a Fusion 360 Manage workspace you can use the *Get-FLCItems* cmdlet.

Note: *Get-FLCItems* has the optional parameter **-Filter** that allows you to specify a string in the same format as Fusion 360 Manage searches to filter the result.

Get all items from the **workspace** `Products` that are in the **workflow state** `Concept` and have a **field** named `Number` with the exact value `900-00010`:

```
$items = Get-FLCItems -Workspace 'Products' -Filter 'workflowState=Concept AND ITEM_DETAILS:NUMBER="900-00010"'
```

3.1.4 Update a Field of an Item

One of the previously retrieved Fusion 360 Manage Items can now be picked and updated using the *update-flcitem* cmdlet.
By navigating to the Workspace Manager in Fusion 360 Manage we can find a Item Details Form that provides us a list of possible **Item Details Fields** that can be edited.

In following example we edit the value of a simple Text Field with the name *'Description'* by just extending the value with a suffix.

```
$itemToUpdate = $items[0]

$itemToUpdate| Update-FLCItem -Properties @{'Description'= "$($itemToUpdate.Description) - Edited"}
```

After executing the Cmdlet, it will return an Item with the updated *'Description'* Field.

3.2 Using Workflows

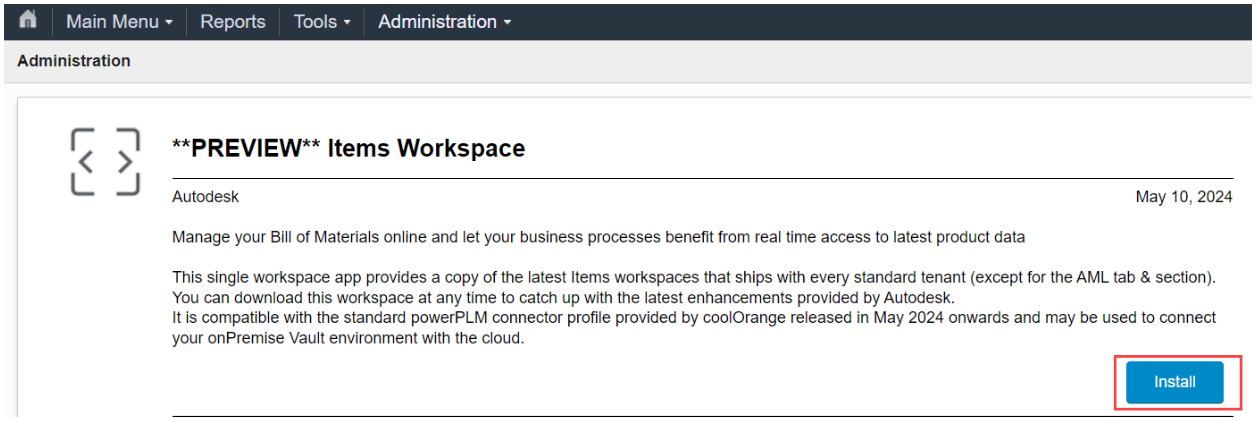
3.2.1 Transferring the BOM of a Vault Item to Fusion 360 Manage

With powerPLM (powerFLC) you can automate different scenarios when working within Vault Client and exchanging data with Fusion 360 Manage, for instance transferring the metadata of a Vault Item and its Bill Of Material information to Fusion 360 Manage.
This is very simple because powerPLM (powerFLC) offers the *Transfer Item BOMs* workflow example. So all you have to do is:

3.2.2 Guarantee existence of prerequisite workspace *Items*

Autodesk's default workspace *"Items"* is already configured to align with the *Transfer Item BOMs* workflow. This workspace is available in all current Fusion Manage tenants.

If you don't find this workspace in your tenant, simply install it throught *"Administration -> Template Library"*:



PREVIEW Items Workspace

Autodesk

May 10, 2024

Manage your Bill of Materials online and let your business processes benefit from real time access to latest product data

This single workspace app provides a copy of the latest Items workspaces that ships with every standard tenant (except for the AML tab & section).
You can download this workspace at any time to catch up with the latest enhancements provided by Autodesk.
It is compatible with the standard powerPLM connector profile provided by coolOrange released in May 2024 onwards and may be used to connect your onPremise Vault environment with the cloud.

In this case, you also need to manually perform the following configuration steps:

1. In the *Security tab: Assign the "Items [R/W]" role to your user's group*.
   This makes the new "Items" workspace visible in your menu.
2. In the *Workspace Manager tab: Add the "Items" workspace as a new "Managed Items Tab" relationship to the "Change Orders" workspace*
   (required for the *Change Management* workflow)
3. Usually there is already a "Product Development" category in Fusion Manage menus.
   The new "Items" workspace can then be found under *"Product Development_1"*. Optionally, you can move it via *Administration -> System Settings -> Main Menu Designer*.

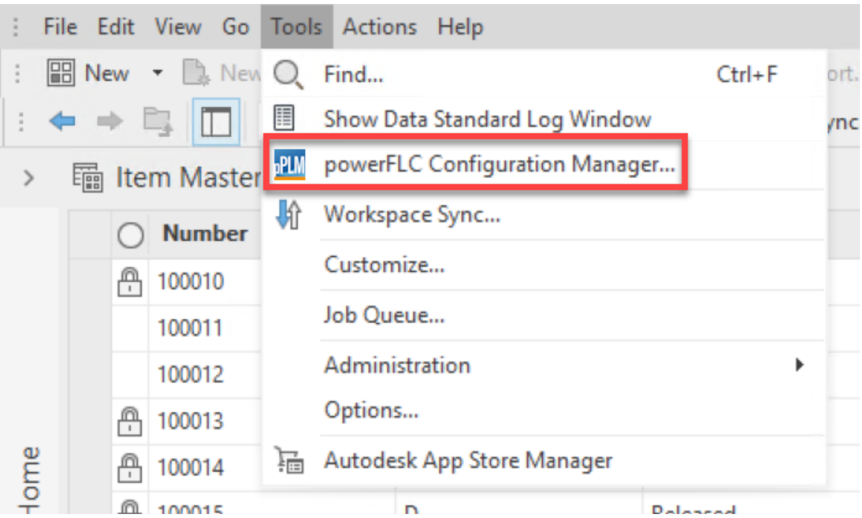
3.2.3 Connect Vault with Fusion 360 Manage

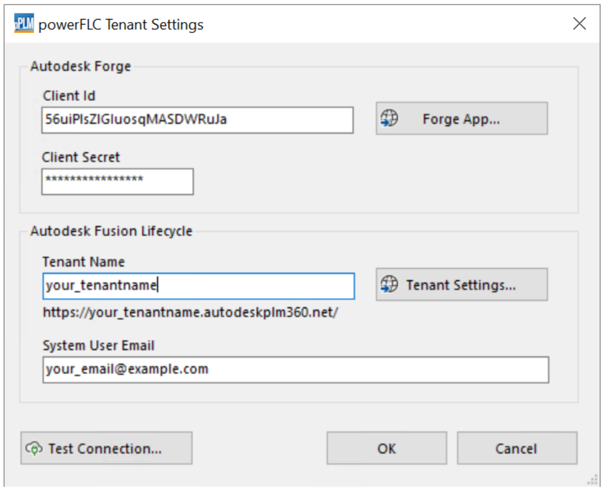
Please ensure that your *tenant is properly configured* to allow connections from the Vault Client and your Job Processor.

Then open the Vault Client and *enter the required Fusion 360 Manage Credentials* for authentication.

Note: The system user configured here is not used for the item transfer on the Job Processor.
Instead, Items and BOMs are created or updated in Fusion Manage under the name of the user who released the Item in Vault and queued the workflow job.

Therefore, an *email address must be configured* for all **Vault users that corresponds to accounts in your Fusion Manage** tenant.
Assign the user accounts to the **Engineering** group!




powerFLC Tenant Settings

Autodesk Forge

Client Id: 56uiPlsZIGluosqMASDWRuJa

Client Secret: ****************

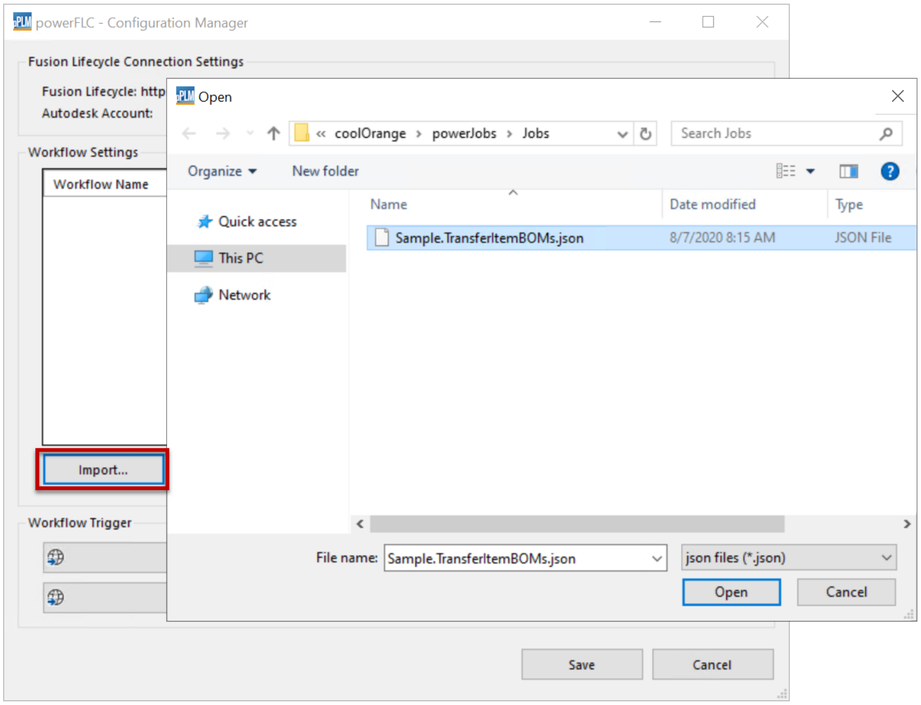
Autodesk Fusion Lifecycle

Tenant Name: your_tenantname

https://your_tenantname.autodeskplm360.net/

System User Email: your_email@example.com

Import the configuration using following file: *%ProgramData%\coolOrange\powerJobs\Jobs\Sample.TransferItemBOMs.json*. If required adapt the *workflow settings* or create the properties in Vault and/or FLC that are missing.
Finally press *Save*.



powerFLC - Configuration Manager

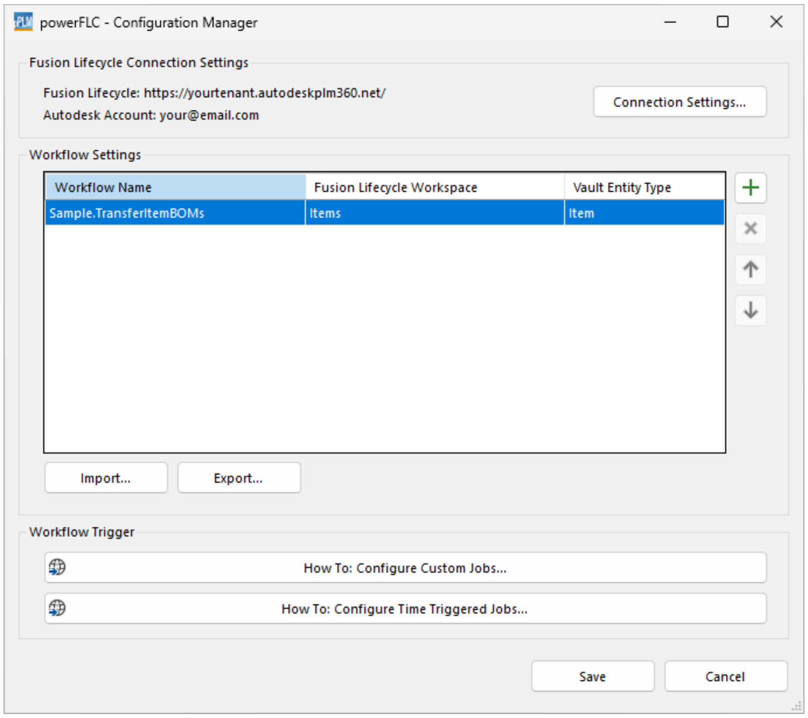
Open

« coolOrange › powerJobs › Jobs

Name	Date modified	Type
Sample.TransferItemBOMs.json	8/7/2020 8:15 AM	JSON File

File name: Sample.TransferItemBOMs.json

json files (*.json)



powerFLC - Configuration Manager

Fusion Lifecycle Connection Settings

Fusion Lifecycle: https://yourtenant.autodeskplm360.net/

Autodesk Account: your@email.com

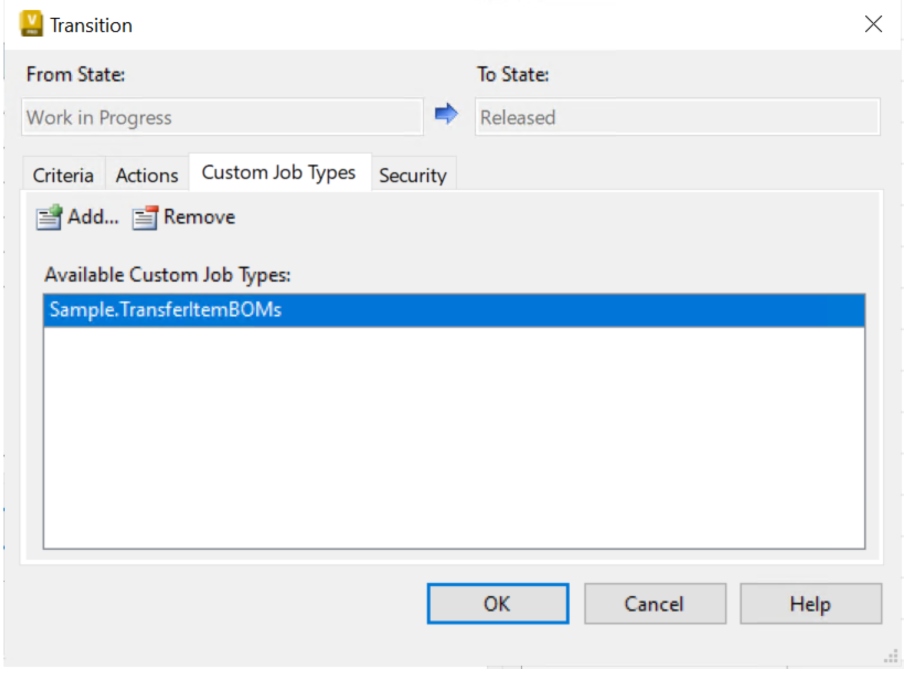
Workflow Settings

Workflow Name	Fusion Lifecycle Workspace	Vault Entity Type
Sample.TransferItemBOMs	Items	Item

Connection Settings...
Import...
Export...
Workflow Trigger
How To: Configure Custom Jobs...
How To: Configure Time Triggered Jobs...
Save
Cancel

3.2.4 Trigger Job for Workflow

Configure a Vault lifecycle state transition for items to trigger the Job Type: **Sample.TransferItemBOMs** on a lifecycle change.
Afterwards select an Item in Vault and change its lifecycle state to the respective state.

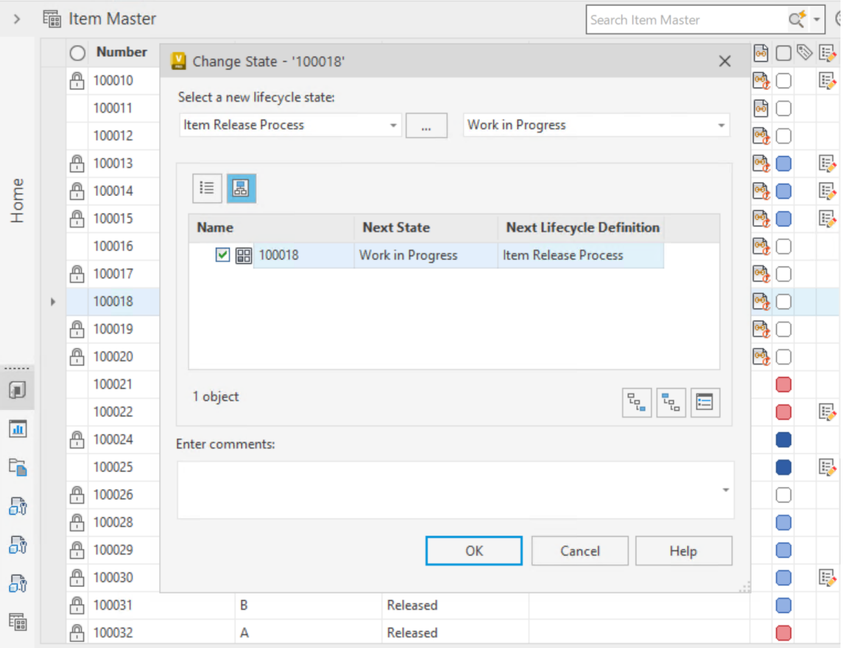

Transition

From State: Work in Progress

To State: Released

Available Custom Job Types:

- Sample.TransferItemBOMs


Change State - '100018'

Select a new lifecycle state: Item Release Process ... Work in Progress

Name	Next State	Next Lifecycle Definition
☑ 100018	Work in Progress	Item Release Process

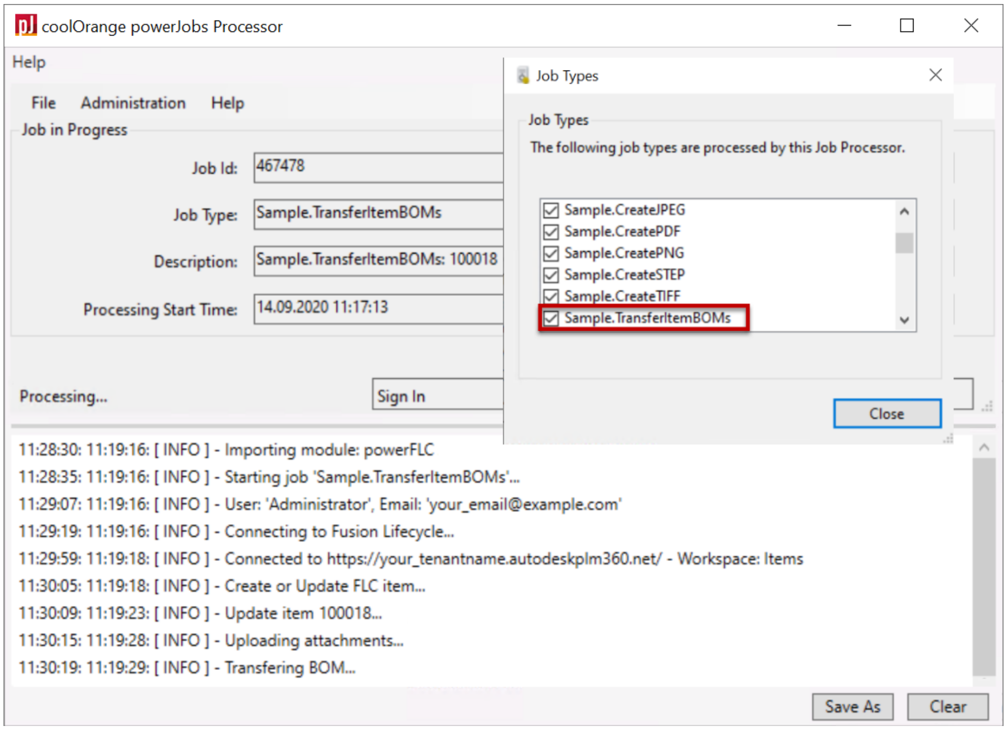
1 object

Enter comments:

Number		
100010		
100011		
100012		
100013		
100014		
100015		
100016		
100017		
100018		
100019		
100020		
100021		
100022		
100024		
100025		
100026		
100028		
100029		
100030		
100031	B	Released
100032	A	Released

3.2.5 Job Processor

In order to execute the job you have to start the Job Processor.
We recommend using the **powerJobs Processor** which can be started using the shortcut on the Desktop or in the StartMenu.



Job in Progress

Job Id: 467478

Job Type: Sample.TransferItemBOMs

Description: Sample.TransferItemBOMs: 100018

Processing Start Time: 14.09.2020 11:17:13

Processing...

Job Types

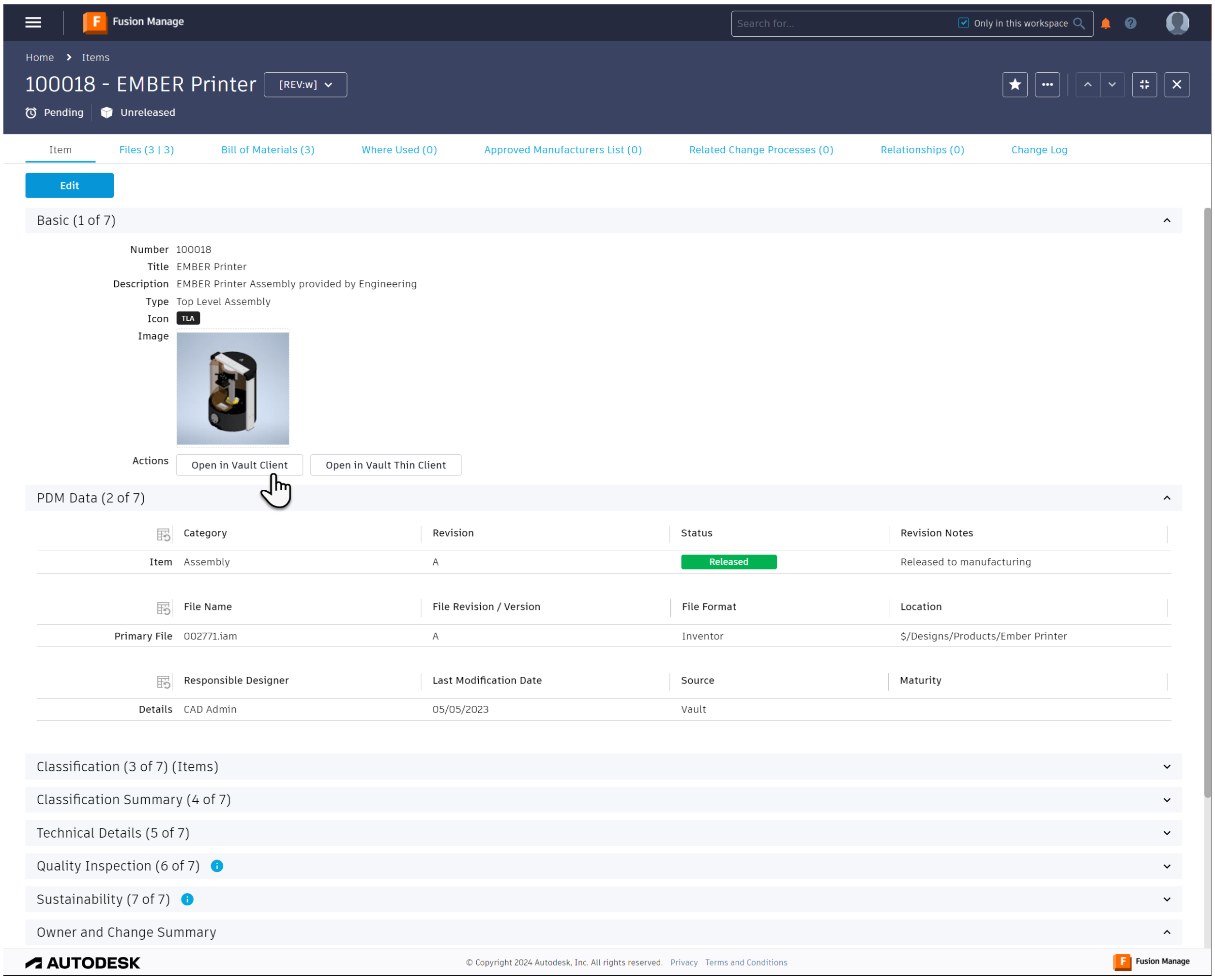
The following job types are processed by this Job Processor.

☑ Sample.CreateJPEG
☑ Sample.CreatePDF
☑ Sample.CreatePNG
☑ Sample.CreateSTEP
☑ Sample.CreateTIFF
☑ Sample.TransferItemBOMs

```
11:28:30: 11:19:16: [ INFO ] - Importing module: powerFLC
11:28:35: 11:19:16: [ INFO ] - Starting job 'Sample.TransferItemBOMs'...
11:29:07: 11:19:16: [ INFO ] - User: 'Administrator', Email: 'your_email@example.com'
11:29:19: 11:19:16: [ INFO ] - Connecting to Fusion Lifecycle...
11:29:59: 11:19:18: [ INFO ] - Connected to https://your_tenantname.autodeskplm360.net/ - Workspace: Items
11:30:05: 11:19:18: [ INFO ] - Create or Update FLC item...
11:30:09: 11:19:23: [ INFO ] - Update item 100018...
11:30:15: 11:19:28: [ INFO ] - Uploading attachments...
11:30:19: 11:19:29: [ INFO ] - Transfering BOM...
```

3.2.6 Result

After the Job Processor has finished processing the Job, the item and its *mapped Vault Properties*, *Attachments* and *Bill of Materials* should habe been successfully transferred to your “Items” workspace in Fusion Manage:



100018 - EMBER Printer

Basic (1 of 7)

Number 100018
Title EMBER Printer
Description EMBER Printer Assembly provided by Engineering
Type Top Level Assembly
Icon TLA
Image
Actions Open in Vault Client | Open in Vault Thin Client

PDM Data (2 of 7)

	Category	Revision	Status	Revision Notes
Item	Assembly	A	Released	Released to manufacturing

	File Name	File Revision / Version	File Format	Location
Primary File	002771.iam	A	Inventor	$/Designs/Products/Ember Printer

	Responsible Designer	Last Modification Date	Source	Maturity
Details	CAD Admin	05/05/2023	Vault	

Classification (3 of 7) (Items)

Classification Summary (4 of 7)

Technical Details (5 of 7)

Quality Inspection (6 of 7)

Sustainability (7 of 7)

Owner and Change Summary

Note: To make the **Vault Thick** and **Thin Client buttons** work, you have to customize the calculated *"Actions"* field in Fusion Manage under **Administration -> WorkspaceManager -> Items -> Item Details Tab**.
Replace the text `your-server-name` in the *"Computed Field Formula"* with the correct **name of your ADMS host**.

If you are new to powerPLM (powerFLC), topics in this section will help you quickly start getting the best of the product:

- *Using the Cmdlets*
- *Using Workflows*

Before you are able to use your Fusion 360 Manage tenant you have to make sure that the tenant is configured as described below.

3.3 Configuration in Fusion 360 Manage

3.3.1 Whitelisting the Forge App

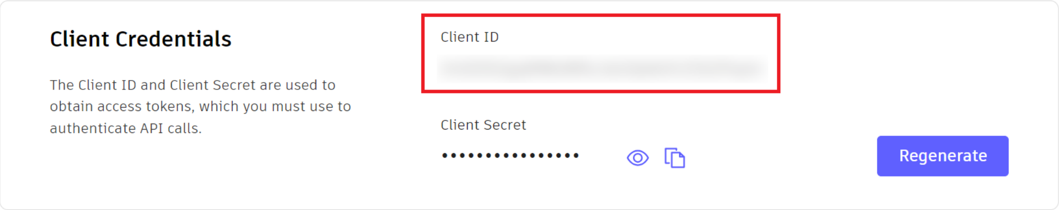
Fusion 360 Manage has to be configured to allow communication with your Forge App.

Create an App

If you don't already have a Forge App, please create an App for *powerPLM* in your Forge portal.

In order to allow connecting powerPLM (powerFLC) via your registered apps credentials, Fusion 360 Manage needs to know and allow them.
This can be done with following steps:

1. Open the My Apps section of your Forge app and copy the *Client ID* of your app



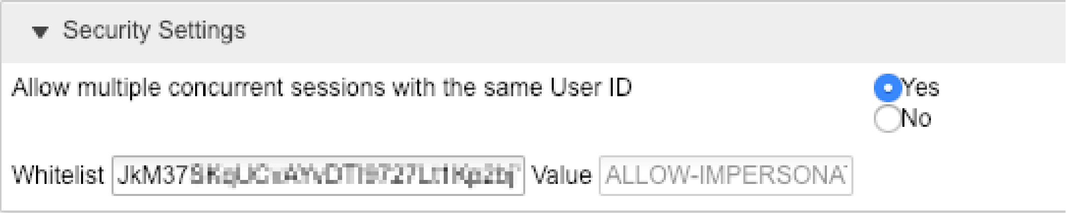
Client Credentials

The Client ID and Client Secret are used to obtain access tokens, which you must use to authenticate API calls.

Client ID [redacted]

Client Secret ••••••••••••••••

2. Go to your Fusion Manage Site, click the burger menu on the top left -> *Administration* -> System *Configuration*
3. Click on the *General Settings* link
4. In the section *Security Settings*, add the Client ID to the *Whitelist*:



▼ Security Settings

Allow multiple concurrent sessions with the same User ID ● Yes ○ No

Whitelist JkM37[redacted] Value ALLOW-IMPERSONA

5. Change the setting "*Allow multiple concurrent sessions with the same User ID*" to *Yes*.
6. Press *Save*

3.3.2 Security Settings

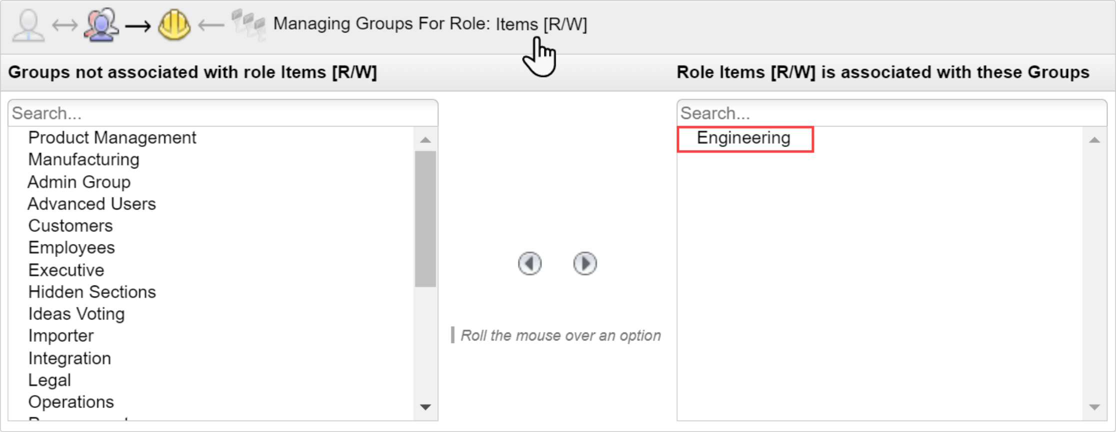
The *user accounts* that perform requests on Fusion Manage must be be active in the system and have the appropriate workspace permissions.

Grant read/write permissions to all *workspaces that are configured* in your workflows, by adding all the necessary users to the relevant groups and roles.

Autodesk recommends assigning the users to the **"Engineering"** group, which already contains the necessary permissions for our sample workflows.
In addition, for the default "Items" workspace, it is currently important to also add them to the **"Employees"** group to grant access to all sections and fields in the Item Details tab (Autodesk plans to simplify this with "Engineering" soon).

For a newly created workspace, such as an installed *Items Workspace template*, you can follow these steps:

1. In your Autodesk Fusion Manage site, click on *Administration → Security*
2. For the respective user, click on the *Groups* link
3. Add the user to the **"Engineering"** group
4. Press *Save*
5. Click on the *Roles* tab
6. Find the appropriate role for your workspace and click on the *Groups* link
   (e.g. *'Items [R/W]'* to allow workflows performing read and write operations in the 'Items' workspace)
7. **Accociate the role with the "Engineering" group**
8. Press *Save*


Managing Groups For Role: Items [R/W]

Groups not associated with role Items [R/W]

Search...

Product Management
Manufacturing
Admin Group
Advanced Users
Customers
Employees
Executive
Hidden Sections
Ideas Voting
Importer
Integration
Legal
Operations

Roll the mouse over an option

Role Items [R/W] is associated with these Groups

Search...

Engineering

3.3.3 Attachments

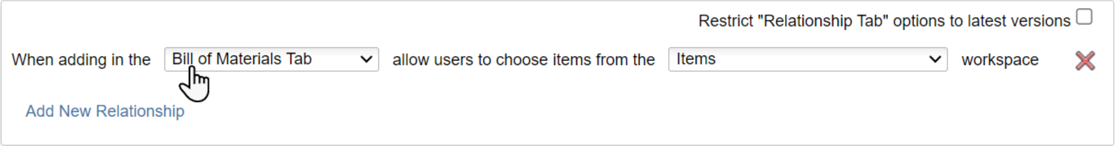
The Fusion Manage workspaces must be configured to allow the user to work with items in the Attachments Tab. To do this, they need the following permissions assigned: **View Attachments**, **Download Attachments** , **Add Attachments** and **Edit Attachments**.

Required for: Add-FLCAttachment, *Save-FLCAttachment* and *Get-FLCItemAssociations* when using -*Attachments* parameter

3.3.4 Bill of Materials

Relationships to workspaces which contain the according BOM line items must be configured for the Bill of Materials Tab:

1. In your Autodesk Fusion Manage site, click on *Administration → Workspace Manager*
2. For the affected workspace, click on *Workspace Relationships*
3. Make sure that one or multiple **relationships exist for the "Bill of Materials Tab"**
4. Press *Save*


Restrict "Relationship Tab" options to latest versions □

When adding in the Bill of Materials Tab allow users to choose items from the Items workspace ✕

Add New Relationship

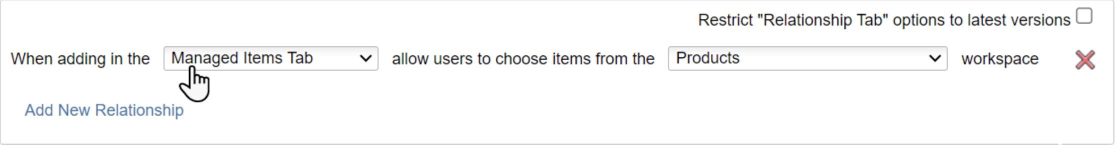
5. Additionally the user must have the following permissions in the workspace: **View BOM**, **Add to BOM**, **Edit BOM** and **Delete from BOM**

Required for: *Transfer Item BOMs* workflow and all *BOM cmdlets*

3.3.5 Linked Items / Affected Items

The workspaces must be configured to allow relationships to the Affected Items Tab (in non-revisioning workspaces the tab serves as *Linked Items* tab):

1. In your Autodesk Fusion Manage site, click on *Administration* → *Workspace Manager*
2. For the affected workspace, click on *Workspace Relationships*
3. Make sure that one or multiple **relationships exist for the "Managed Items Tab"**
4. Press *Save*



Restrict "Relationship Tab" options to latest versions ☐

When adding in the Managed Items Tab allow users to choose items from the Products workspace ✗

5. Additionally the user must have the permission to **View Managed Items** in the according workspace

Required for: *Change-Management* workflow, *Get-FLCItemAssociations* and the *Update-FLCItem* *-AffectedItems* parameter

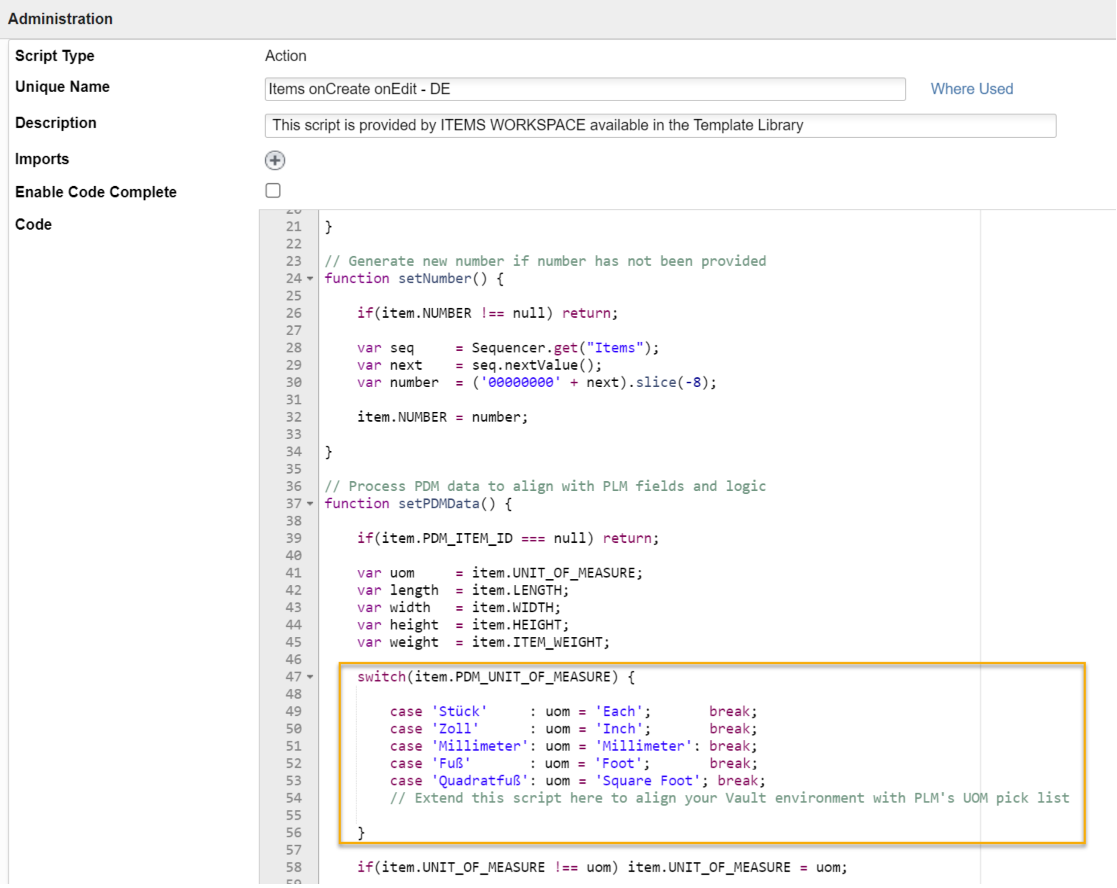
3.3.6 Workspace Behaviors

When integrating Vault with Fusion Manage, it is important to consider that scripts configured in Fusion Manage also execute when items are automatically created or updated by your Vault integration!

For the *Transfer Item BOMs* workflow, this script execution is even necessary to ensure all Vault data beeing processed correctly.
Units, dimension fields, and weights, for example, are calculated from the corresponding *"PDM_"* fields, which are mapped directly to Vault properties.

You can check which scripts are enabled - or temporarily disable them in case of problems - by performing the following steps for all *workspaces that are configured* in your workflows:

1. In your Autodesk Fusion Manage site, click on *Administration* → *Workspace Manager*
2. For all the configured workspaces, click on *Behaviors*
3. Verify the settings "**Script to run at item creation**" and "**Script to run when item details are modified**".
   (e.g. for Autodesk's default *Items* workspace the action *'Items onCreate onEdit'* is required)
4. Navigate to *Administration* -> System *Configuration*
5. Click on the *Scripting* link
6. Find the configured script and click on the *Edit* icon to **check and adjust its logic**.
   (e.g. in the following *'Items onCreate onEdit'* script, all your Vault Units must be specified so that a *Unit of Measure* is displayed in the Item Details tab)



Administration

Script Type	Action
Unique Name	Items onCreate onEdit - DE
Description	This script is provided by ITEMS WORKSPACE available in the Template Library
Imports	⊕
Enable Code Complete	□

Code

```
}

// Generate new number if number has not been provided
function setNumber() {

    if(item.NUMBER !== null) return;

    var seq     = Sequencer.get("Items");
    var next    = seq.nextValue();
    var number  = ('00000000' + next).slice(-8);

    item.NUMBER = number;

}

// Process PDM data to align with PLM fields and logic
function setPDMData() {

    if(item.PDM_ITEM_ID === null) return;

    var uom     = item.UNIT_OF_MEASURE;
    var length  = item.LENGTH;
    var width   = item.WIDTH;
    var height  = item.HEIGHT;
    var weight  = item.ITEM_WEIGHT;

    switch(item.PDM_UNIT_OF_MEASURE) {

        case 'Stück'     : uom = 'Each';       break;
        case 'Zoll'      : uom = 'Inch';       break;
        case 'Millimeter': uom = 'Millimeter': break;
        case 'Fuß'       : uom = 'Foot';       break;
        case 'Quadratfuß': uom = 'Square Foot'; break;
        // Extend this script here to align your Vault environment with PLM's UOM pick list

    }

    if(item.UNIT_OF_MEASURE !== uom) item.UNIT_OF_MEASURE = uom;
```

CHAPTER

FOUR

CONFIGURATION MANAGER

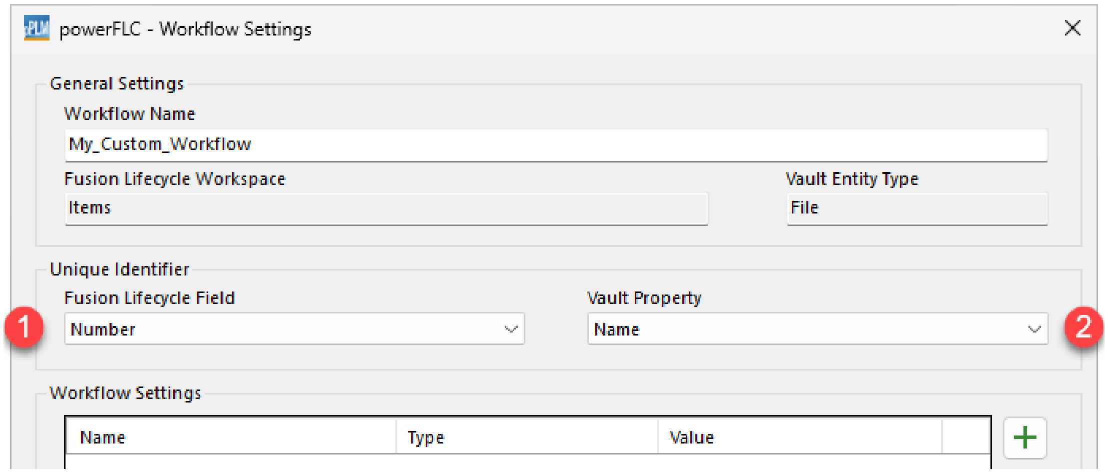
4.1 Workflow Settings

The Workflow Settings dialog allows to create, modify and remove workflow settings and mappings.

After confirming the **Workflow name**, **Fusion Lifecycle Workspace** and **Vault Entity Type** in the *New Workflow* dialog, this dialog will open.
The dialog can be started even by **double-clicking** a workflow entry in the *Configuration-Manager* dialog.

4.1.1 Unique Identifier

For the Fusion 360 Manage *Workspace* and the *Vault Entity* the unique field must be chosen, that is used to identify the Fusion 360 Manage Item with the according Vault Entity and vice versa.



powerFLC - Workflow Settings

General Settings

Workflow Name: My_Custom_Workflow

Fusion Lifecycle Workspace: Items

Vault Entity Type: File

Unique Identifier

Fusion Lifecycle Field: Number

Vault Property: Name

Workflow Settings

Name	Type	Value

1. Fusion Lifecycle Fileld

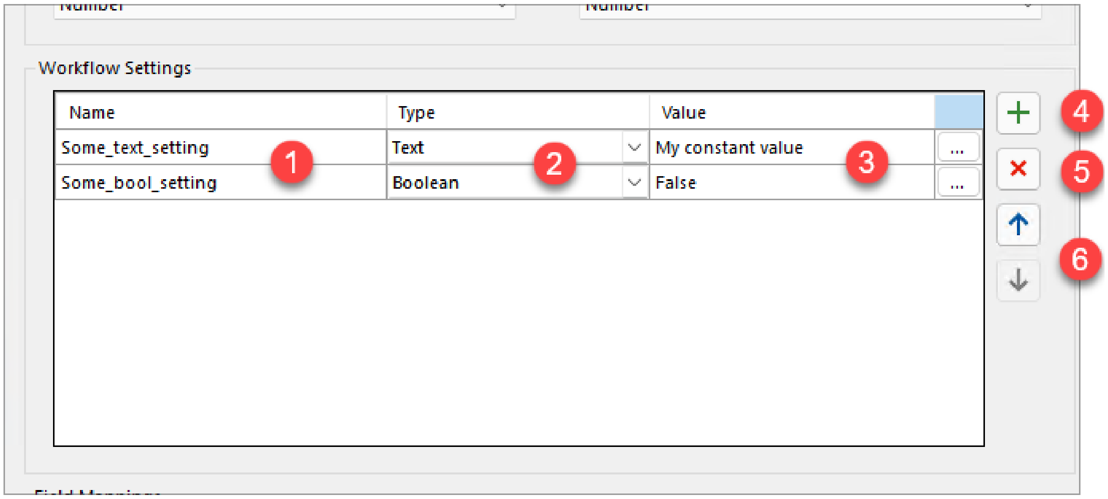
The field name which is the unique identifier for the *Item* in the selected Fusion 360 Manage Workspace.

2. Vault Property

The field name which is the unique identifier for the selected *Entity Type* in Vault.

4.1.2 Workflow Setting(s)

The *Workflow Settings* section allows to create, modify and remove settings. These settings are retrieved in the workflow (e.g. the powerJobs Job) and can have constant or dynamic values.



Workflow Settings

Name	Type	Value
Some_text_setting	Text	My constant value
Some_bool_setting	Boolean	False

1. Name

Name of the setting. Used to get the value in the workflow by using the *$workflow* variable.
For instance `$workflow.Some_text_setting`.

2. Type

Possible Datatypes of the settings are:

Text	
Boolean	
Number	
Date	
FLC Item Details Field	
FLC BOM Field	
FLC Grid Field	
FLC State	The Fusion Lifecycle workflow states can be configred in: *Administration->Workspace Manager->[Workspace]->Workflow Editor*.
FLC States	List of multiple workflow states. Similar to *FLC State* type.
Vault Category	The name of a Vault Category that is available for the selected *Vault Entity Type* can be chosen.
Vault Lifecycle Definition	
Vault Lifecycle State	
Vault Lifecycle States	
Vault Property	The name of a Vault Property that is available for the selected *Vault Entity Type* can be chosen.
Vault Folder	In the Vault folder browser a target Folder must be chosen and its Vault Path will be configured.
Local Folder	

3. Value

A constant value for the field or an expression that is evaluated when the workflow is executed. Clicking on the … button opens a dialog to set the value.

4. New Workflow Setting

The + button adds a new setting to the table.

5. Remove Workflow Setting

The × button removes the currently selected setting from the table.

6. Move Workflow Setting

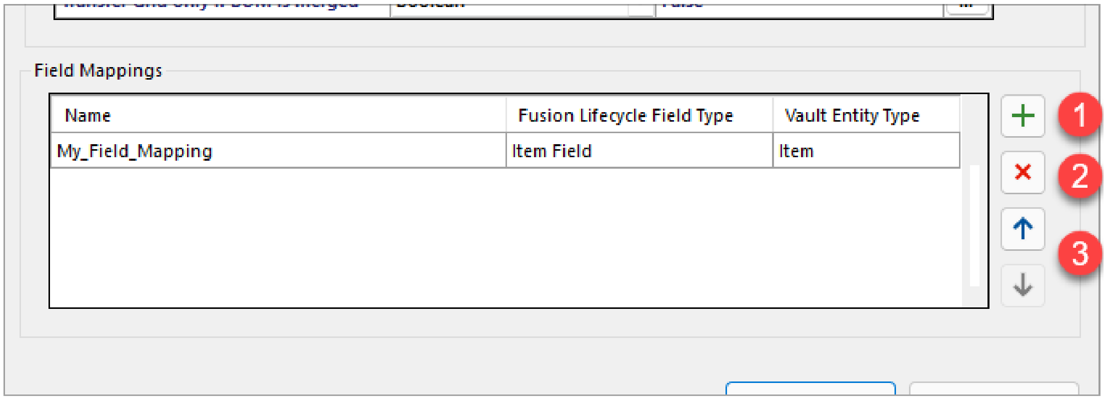
The ↑ and ↓ buttons move the selected row in the table up or down.

Write protected settings

Settings on imported workflows can be write protected and are displayed in a blue bold font.
The name and type of those settings **can not be changed**.

4.1.3 Field Mappings

The Field mappings section allows to crate, modify and delete field mapping groups.



Field Mappings

Name	Fusion Lifecycle Field Type	Vault Entity Type
My_Field_Mapping	Item Field	Item

Field mapping groups can be edited by **double-clicking** the entry which will open the *Field Mappings* dialog.

1. New Field Mapping group

The + button opens the *dialog to create a new field mapping group*.

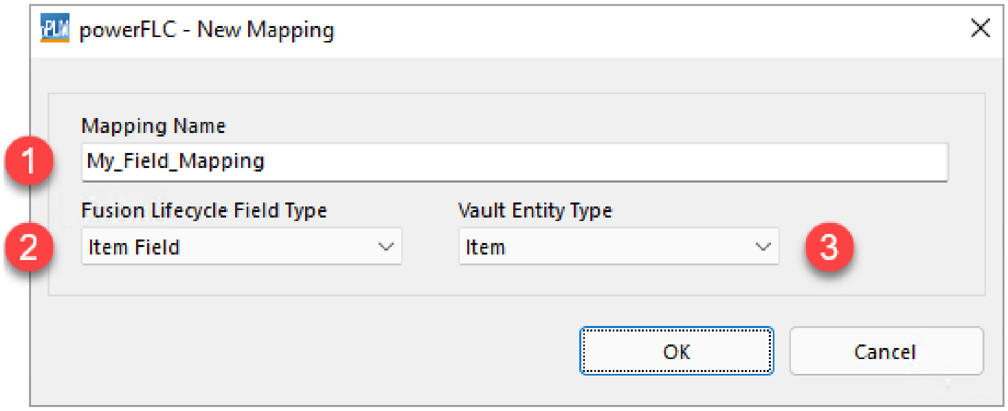
2. Remove Field Mapping group

The × button removes the currently selected field mapping group from the table.

3. Move Field Mapping group

The ↑ and ↓ buttons move the selected row in the table up or down.

4.1.4 Create new Field Mapping



powerFLC - New Mapping

Mapping Name: My_Field_Mapping

Fusion Lifecycle Field Type: Item Field

Vault Entity Type: Item

1. Mapping Name

Name of the mapping group, must be unique in the workflow.

2. Fusion Lifecycle Field Type

Possible values are:

- Item Field
- BOM Field
- Grid Field

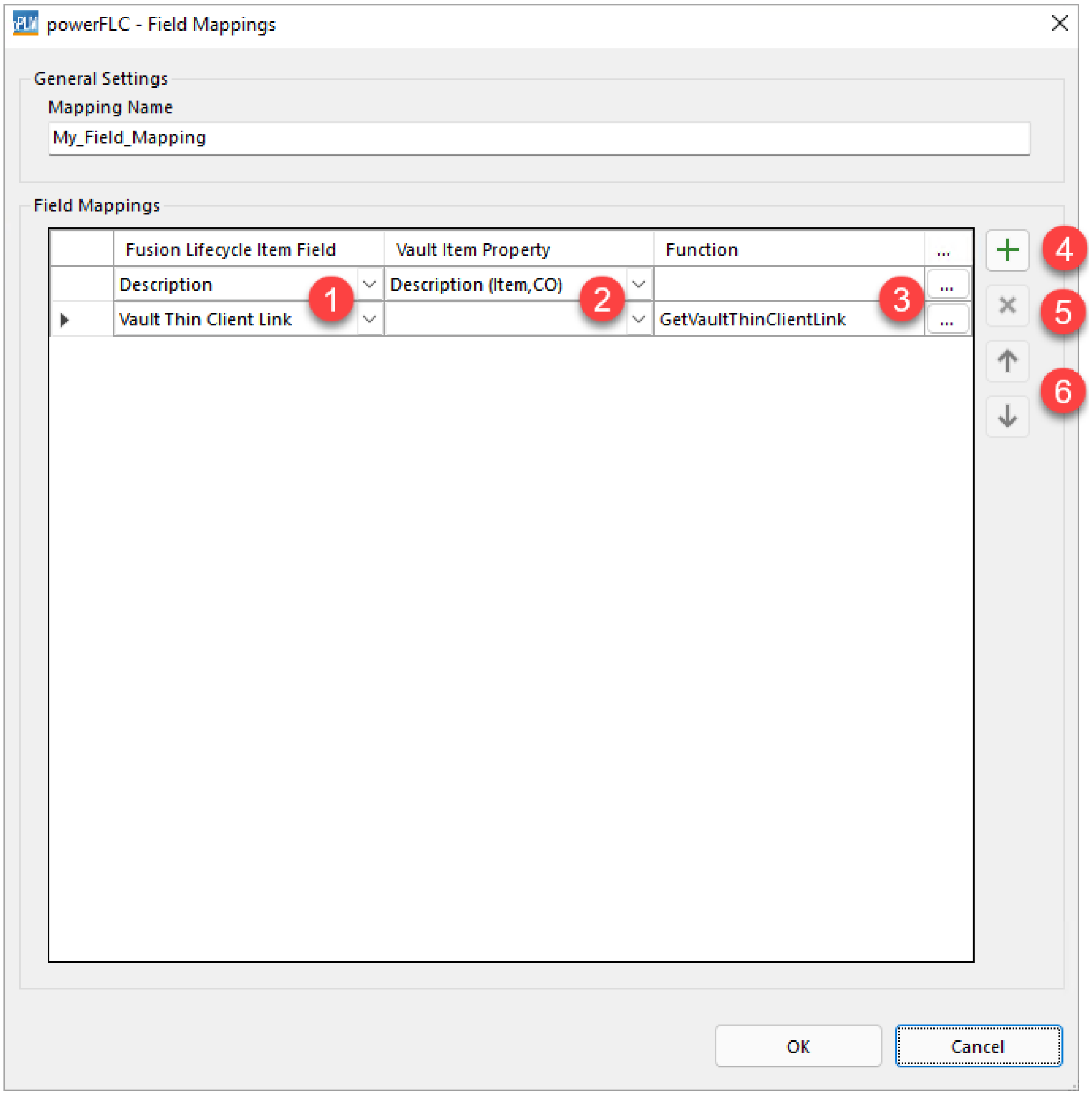
3. Vault Entity Type

Possible values are:

- Change Order
- Custom Object
- File
- Folder
- Item
- Bill of Materials

4.1.5 Field Mappings Dialog

Field Mappings are used to map Vault properties or functions to Fusion Lifecycle fields.
The properties from the *Vault Property* column will be copied to the field configured in the *Fusion Lifecycle Field* column, when a *Fusion 360 Manage* representation of the according Vault Entity is created in Fusion Lifecycle.



powerFLC - Field Mappings

General Settings

Mapping Name

My_Field_Mapping

Field Mappings

Fusion Lifecycle Item Field	Vault Item Property	Function	...
Description	Description (Item,CO)		...
Vault Thin Client Link		GetVaultThinClientLink	...

As many mappings as needed can be configured.

Mandatory Fusion Lifecycle fields

Mandatory fields in Fusion 360 Manage Lifecycle must be mapped with the appropriate Vault property, otherwise the according *Workflow Job* will fail.

1. Mapping target

A Fusion Lifecycle field of the selected field type e.g. Item field

2. Mapping Source: Vault Property

Vault property of the selected entity type e.g. Item property.

3. Mapping source: Function

In some situations Item fields cannot be mapped directly to Vault properties, because the required information is not available as entity-property at all. In such cases a PowerShell *Function* can be can be selected by clicking the … button.
Available functions are: `GetVaultName`, `GetVaultServer`, `GetVaultPersistentId`, `GetVaultThickClientLink`,`GetVaultThinClientLink`, `GetItemPositionNumber`.
Additional functions can be added to the file: *“%ProgramData%\coolOrange\powerJobs\Modules\coolOrange.powerFLC.Workflows.Ma*

Performance

Please note that every configured *Function* gets executed for each individual Vault entity.
Therefore, many Vault API- or Fusion 360 Manage requests within these PowerShell functions can have a major impact on the execution time of the workflow job!

4. New Field Mapping

The + button adds a new Field Mapping to the table.

5. Remove Field Mapping

The × button removes the currently selected Field Mapping from the table.

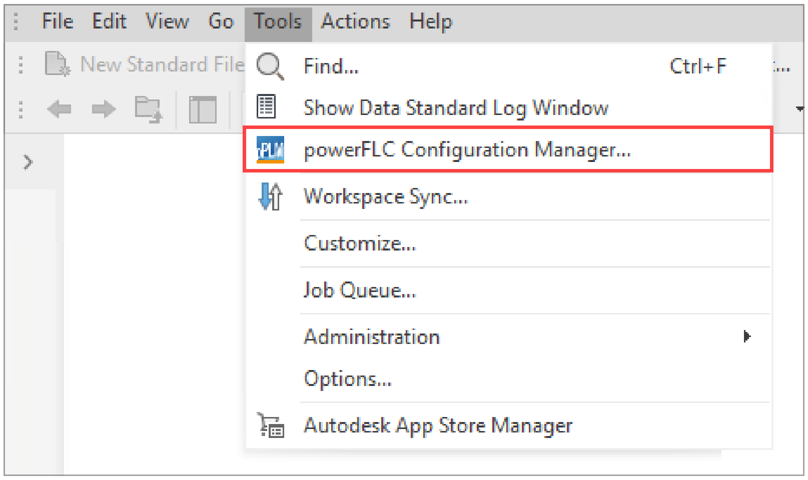
6. Move Field Mapping

The ↑ and ↓ buttons move the selected row in the table up or down.

The Configuration Manager dialog allows Vault Administrators to configure, import, export and create workflows.

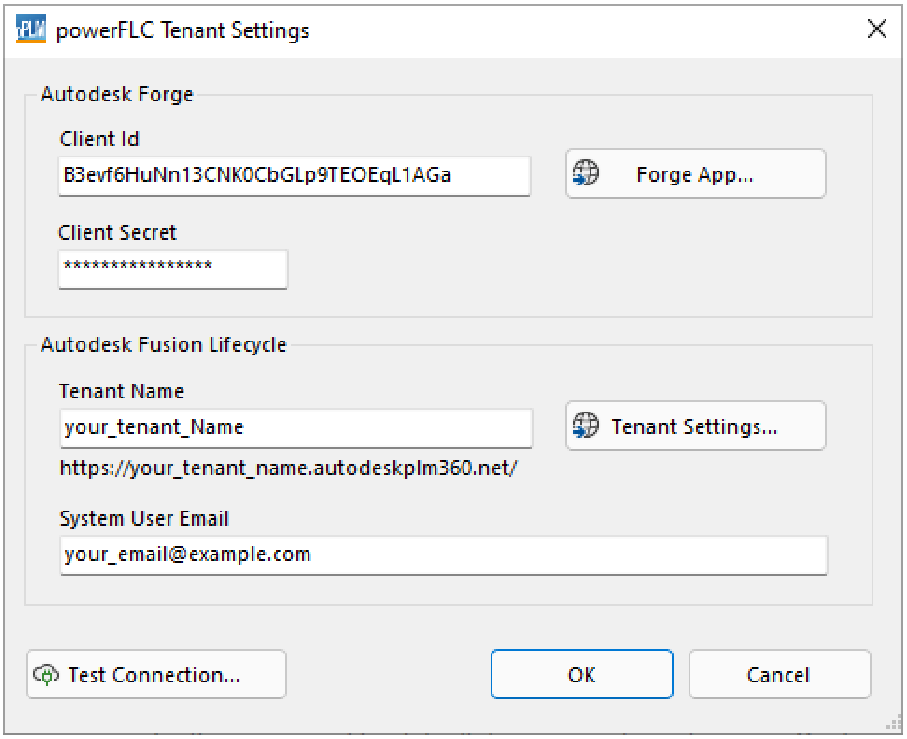
4.2 Starting the dialog

The configuration manager can be accessed in the Vault Client in the *Tools* menu by clicking on the *powerFLC Configuration Manager…* entry.


File Edit View Go Tools Actions Help
New Standard File
Find... Ctrl+F
Show Data Standard Log Window
powerFLC Configuration Manager...
Workspace Sync...
Customize...
Job Queue...
Administration
Options...
Autodesk App Store Manager

4.3 Tenant Settings

When the configuration manager dialog is opened for the first time a dialog to configure the connection to the Fusion 360 Manage tenant automatically opens.


powerFLC Tenant Settings

Autodesk Forge

Client Id: B3evf6HuNn13CNK0CbGLp9TEOEqL1AGa

Client Secret: ****************

Autodesk Fusion Lifecycle

Tenant Name: your_tenant_Name

https://your_tenant_name.autodeskplm360.net/

System User Email: your_email@example.com

Following information are *required*:

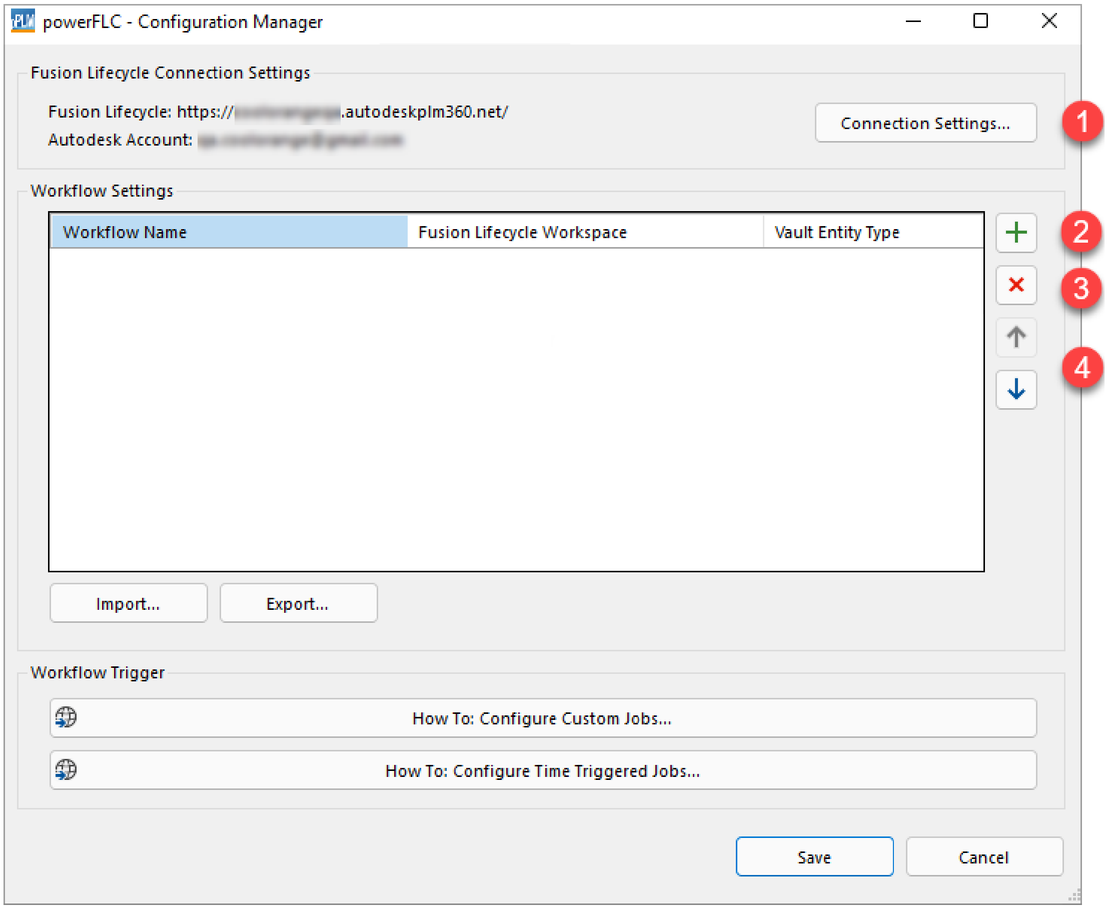
- **Client Id** and **Client Secret**:
  The credentials of the registered *Forge app* required for the two-legged authentication on the Forge Platform. Retrieve the Client ID and Secret (see Step 3: Note Down Your Client ID and Secret) for your *powerPLM* app from the Forge portal.
  The credentials must be *whitelisted* in your Fusion 360 Manage Tenant.
- **Tenant Name**:

The name of the *Fusion Lifecycle tenant*, which is usually the first part of the URL to your Fusion 360 Manage Site: `https://[Tenant Name].autodeskplm360.net/plm/mainDashboard`.

- **System User Email**:
  The e-mail address of a particular *user* who will perform all the succeeding requests to Fusion 360 Manage.

4.4 Manage Workflows

The dialog allows to access and change the Fusion 360 Manage tenant and to create, edit, remove and reorder workflows.


powerFLC - Configuration Manager
Fusion Lifecycle Connection Settings
Connection Settings...
1
Workflow Settings
Workflow Name
Fusion Lifecycle Workspace
Vault Entity Type
2
3
4
Import...
Export...
Workflow Trigger
How To: Configure Custom Jobs...
How To: Configure Time Triggered Jobs...
Save
Cancel

Fusion Lifecycle: https://[redacted].autodeskplm360.net/
Autodesk Account: [redacted]

Workflows can be **edited** by **double-clicking** the workflow entry which will open the *Workflow-Settings* dialog.

4.4.1 1. Connection Settings

The **Connection Settings…** button starts the *Tenant Settings* dialog.

4.4.2 2. New Workflow

The + button opens the *dialog to create a new workflow*.

4.4.3 3. Remove Workflow

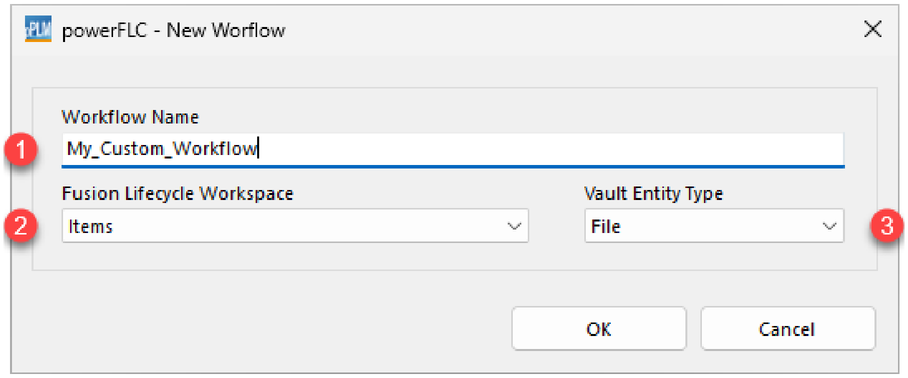
The × button removes the currently selected workflow.

4.4.4 4. Move Workflow

The ↑ and ↓ buttons move the selected Workflow up or down in the list.

4.5 Create a new Workflow

To create a new workflow the following details are required:



powerFLC - New Worflow

Workflow Name: My_Custom_Workflow

Fusion Lifecycle Workspace: Items

Vault Entity Type: File

4.5.1 1. Workflow name

Name of the workflow, the workflow **must have the same name as the associated job**.

4.5.2 2. Fusion Lifecycle Workspace

The Fusion Lifecycle Workspace that is used in the workflow.

4.5.3 3. Vault Entity Type

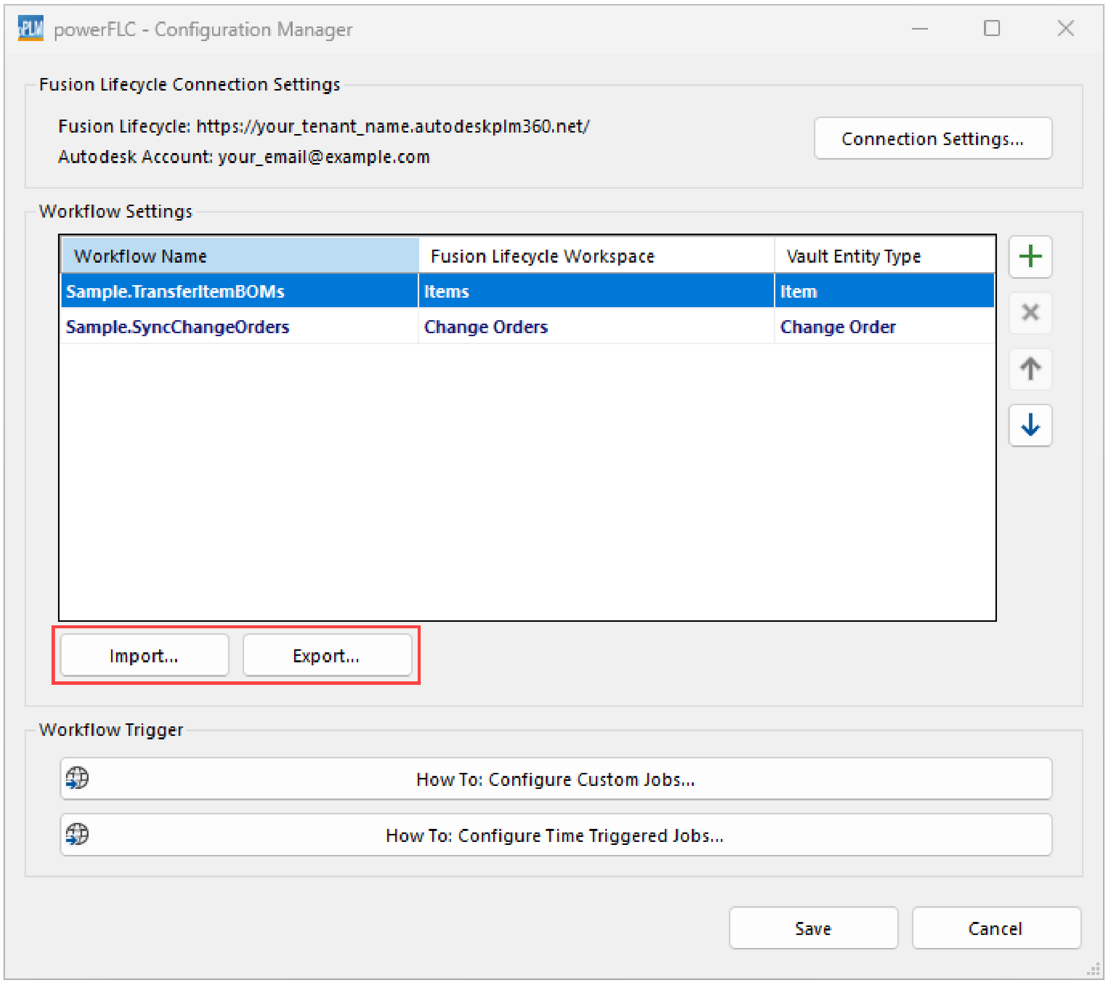
The Vault entity type used in the workflow, must be one of the following:

- Change Order
- Custom Object
- File
- Folder
- Item

After confirming, the *Workflow-Settings* dialog will be displayed.

4.6 Import / Export workflows

The configurations for the workflows and tenants can be imported and exported using the respective buttons.
powerPLM (powerFLC) is delivered with two *sample workflows*, which are designed to cover common user scenarios and to be easily extendable.
They also serve as a base to create custom workflows.


powerFLC - Configuration Manager
Fusion Lifecycle Connection Settings
Connection Settings...
Workflow Settings
Import...
Export...
Workflow Trigger
How To: Configure Custom Jobs...
How To: Configure Time Triggered Jobs...
Save
Cancel

Fusion Lifecycle: https://your_tenant_name.autodeskplm360.net/
Autodesk Account: your_email@example.com

Workflow Name	Fusion Lifecycle Workspace	Vault Entity Type
Sample.TransferItemBOMs	Items	Item
Sample.SyncChangeOrders	Change Orders	Change Order

- The **Import…** button opens a file chooser dialog where you can select a previously exported workflow to import.

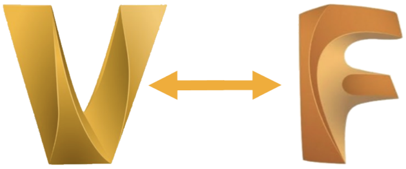
- The **Export…** button opens a dialog to export the currently selected workflow.

CHAPTER

FIVE

WORKFLOWS

5.1 Change Management



This sample *Workflow* is meant to display how to outsource a Change Order from Fusion 360 Manage to Vault.
It is designed to cover common user scenarios and to be easily extendable, because its workflow job is based on PowerShell and makes use of Cmdlets from *powerFLC* and powerVault.
The workflow therefore serves also as a base to create custom workflows.

Note: The workflow synchronizes Change Order items from *Fusion 360 Manage* → *Vault* once they reach a configured *Workflow State*.
It creates new representations for them in Vault and handles the assignment of properties, affected items and attachments.
When such Vault Change Orders are closed, the workflow additionally updates the according Change Order item in Fusion 360 Manage and synchronizes its affected items from *Vault* → *Fusion 360 Manage*.

Requirements

The default configuration expects a Fusion 360 Manage workspace named **"Change Orders"** of type *Revisioning workspace*.
This workspace must be *configured properly* in order to allow reading and writing affected items in the *Linked Items Tab*.

The *Transfer Item BOMs* workflow ensures that Vault and Fusion 360 Manage are in a *synchronized state before* any operations are performed from this workflow.

In addition, the default configuration is designed to be used with the Autodesk example PDMC Vault.

5.1.1 Sample.SyncChangeOrders

This powerJobs Processor Job performs the synchronization of Change Orders in the following directions:

The synchronization from **Fusion 360 Manage** → **Vault** gets triggered automatically on a regular basis of 10 minutes.
The according *Workflow Trigger* must be configured with the name of the Vault which should be synchronized.
Afterwards the job retrieves all the Change Order items from Fusion 360 Manage which are located in a specific state and creates or updates the according Vault Change Orders.
From the second run onwards, only newly created or modified Change Order items are retrieved from Fusion 360 Manage.
They are created with the initial state "*Create*" using the default routing which is configured in Vault.

The synchronization from **Vault** → **Fusion 360 Manage** gets performed when Vault Change Orders are closed.
The according *Workflow Trigger* must be configured for automatically queueing the job after changing the state of Vault Change Orders.
The job updates the according Change Order item in Fusion 360 Manage, whereby the item records of the Vault Change Order will be assigned as new affected items.
Removed item records will not be deleted from the affected items list.
Afterwards a *Workflow Action* is performed, which indicates that the engineering changes are completed.
Depending on the configuration in Fusion 360 Manage, this action transitions the item to a succeeding Workflow State.
The transition can be defined in the Configuration Manager.

The job connects and performs the actions to Fusion 360 Manage as the user entered in the *Tenant Settings* of the Configuration Manager.

Attachments:
The attachments of the Change Order item in Fusion 360 Manage are downloaded into a temporary directory, by default under `C:\Temp\`.
These documents are then uploaded to Vault and attached to the according Vault Change Order. Depending on whether they already exists in the Vault or not, the upload can behave in various ways.
The target directory in Vault can be customized in the *Workflow Settings* of the Configuration Manager.

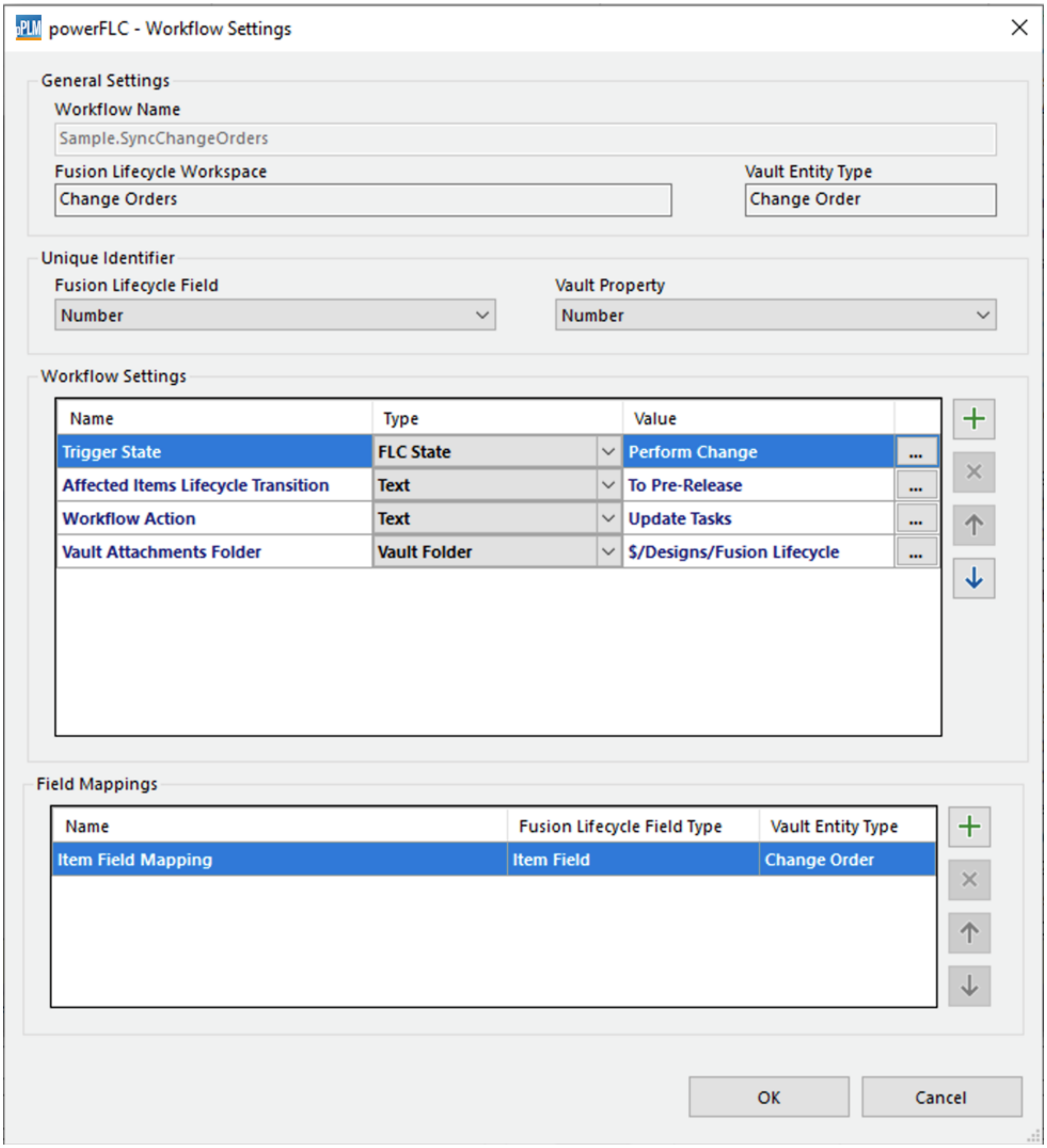
Affected Items:
The job retrieves the affected items of the Change Order item in Fusion 360 Manage (even known as *"Managed Items"*, *"Workflow Items"* or *"Associated Change Orders"*) and tries to re-create these links on the Vault Change Order.
This is only possible if the associated items exist in Vault.
However, this should be the case when the **Transfer Item BOMs** workflow was executed before.
When the according Vault Items cannot be found during the creation of the Vault Change Order, a comment describing this problem gets added.

Fields/Properties:
The job handles the synchronization of properties from Fusion 360 Manage to Vault by applying a *Item Field Mapping defined* in the Configuration Manager.

5.1.2 Configuration

The Workflow State which triggers the job, the Vault folder path for attachments, the property mappings and many other things can be customized using the powerFLC Configuration Manager.

A default configuration file with this settings gets delivered and should be *imported* from the location *%ProgramData%\coolOrange\powerJobs\Jobs\Sample.SyncChangeOrders.json*.
After the import, the predefined values of the imported configuration can be adjusted by accessing the Workflow Settings dialog in the Configuration Manager.



powerFLC - Workflow Settings

General Settings

Workflow Name: Sample.SyncChangeOrders

Fusion Lifecycle Workspace: Change Orders

Vault Entity Type: Change Order

Unique Identifier

Fusion Lifecycle Field: Number

Vault Property: Number

Workflow Settings

Name	Type	Value
Trigger State	FLC State	Perform Change
Affected Items Lifecycle Transition	Text	To Pre-Release
Workflow Action	Text	Update Tasks
Vault Attachments Folder	Vault Folder	$/Designs/Fusion Lifecycle

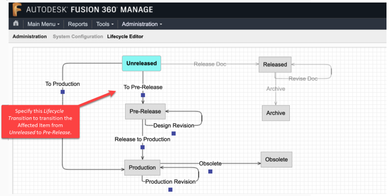
Field Mappings

Name	Fusion Lifecycle Field Type	Vault Entity Type
Item Field Mapping	Item Field	Change Order

A general description on how to configure the sections of the dialog is described *here*.

Note: The *Unique Identifier Vault Property* setting should not be changed, since the `Number` property uniquely identifies Vault Change Orders.

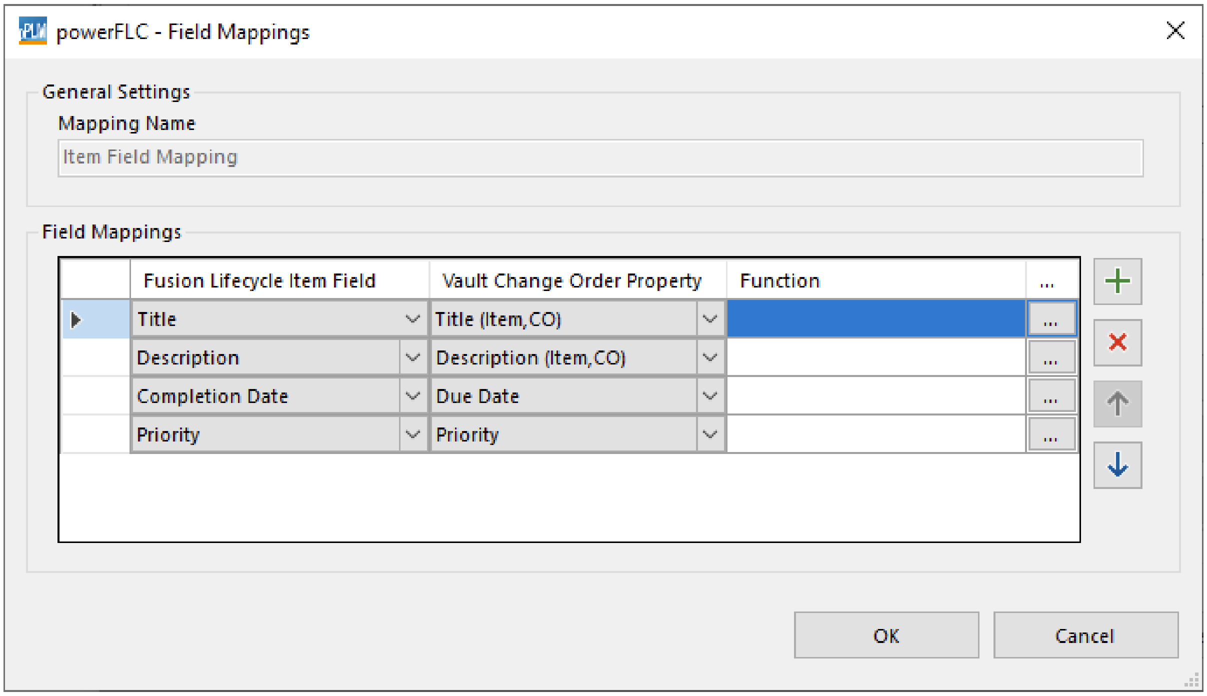
The workflow makes use of the following *Workflow Settings*:

Name	Default	Value Description
Trigger State	Perform Change	All the Change Order items in Fusion 360 Manage with this workflow state are synchronized to Vault.
Affected Items Lifecycle Transition	To Pre-Release	Specify a valid initial lifecycle transition which gets assigned to newly added affected items, when item records of a Vault Change Order are synchronized to Fusion 360  Specify this *Lifecycle Transition* to transition the Affected Item from *Unreleased* to *Pre-Release*. AUTODESK FUSION 360 MANAGE Main Menu Reports Tools Administration Administration System Configuration Lifecycle Editor Unreleased Release Doc Released Revise Doc Archive To Production To Pre-Release Pre-Release Archive Design Revision Release to Production Obsolete Production Obsolete Production Revision Manage.
Workflow Action	Update Tasks	The Workflow Action that gets performed on synchronized Change Order items in Fusion 360 Manage.

Warning:

- Possible restrictions can occur when the user does not have the required Workflow permissions, when Workflow preconditions or validation controls

The workflow can be customized additionally in the *Item Field Mapping* section.
It contains mappings for defining which Vault Change Order properties should be filled with the values displayed in the Item Details Tab of the according Change Order item in Fusion 360 Manage.



powerFLC - Field Mappings

General Settings

Mapping Name: Item Field Mapping

Field Mappings

Fusion Lifecycle Item Field	Vault Change Order Property	Function
Title	Title (Item,CO)	
Description	Description (Item,CO)	
Completion Date	Due Date	
Priority	Priority	

The *Vault Change Order Property* set is limited to User-Defined Properties, except for the System Properties `Title (Item,CO)`, `Description (Item,CO)` and `Due Date`.

Warning:

- *Properties* of type 'Image' are ignored
- Specified *Functions* are ignored
- The HTML formatting of the Fusion 360 Manage `Description` field will be removed since it is not supported by Vault.

5.1.3 Triggering the workflow

Both synchronization directions of the workflow require their own trigger:

Fusion 360 Manage → Vault: Regular time triggered jobs

In order to enable the workflow for being triggered on a regular time interval, the name of the Vault which should be synchronized must be configured.
To do so open the file *C:\ProgramData\coolOrange\powerJobs\Jobs\Sample.SyncChangeOrders.settings* and uncomment the attribute `Vault`.
Its value must specify the Vault name which will contain the Change Orders after the synchronization.

```
{
"Trigger":
        {
        "TimeBased":    "0 0/10 * 1/1 * ? *",
```

(continues on next page)

(continued from previous page)

```
        "Vault":          "{Your Vault database name}",
        "Priority":       101,
        "Description":    "Queries Fusion 360 Manage for new/updated Change Orders"
        }
}
```

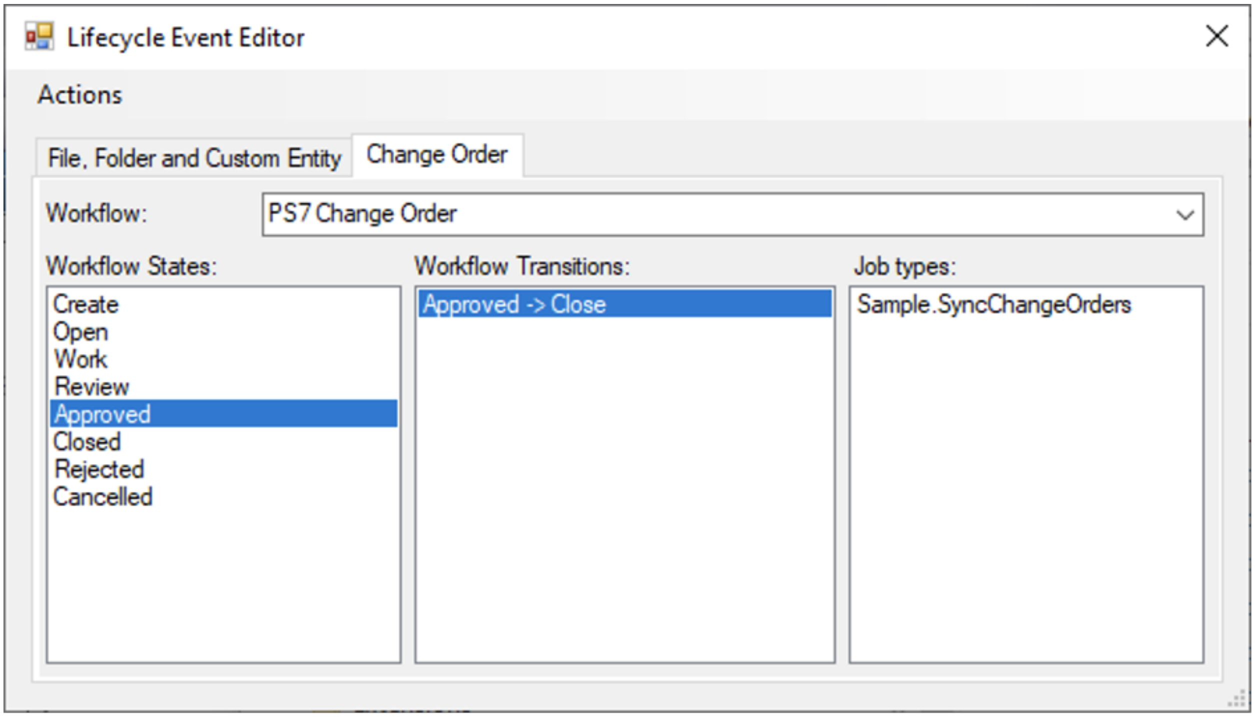
Additionally it is possible to adapt when and in which intervals the workflow should be executed. By default the `TimeBased` setting specifies that a *"Sample.SyncChangeOrders"* job should be queued every 10 minutes.
Moreover, it is possible to change the jobs priority and its description. Read more here.

Notes:

- Make sure the `Priority` is set to a value greater than 100. This ensures, that the *Transfer Item BOMs* workflow is executed prior this workflow.
- Run the *powerJobs.exe* which automatically triggers the workflow job on a regular basis

Vault → **Fusion 360 Manage**: Trigger on status changes in Vault

The job *"Sample.SyncChangeOrders"* should be configured to be queued automatically after Vault Change Orders reach the desired *'Close'* state.
This can be done by using the Lifecycle Event Editor. Read more here.


Lifecycle Event Editor

Actions

File, Folder and Custom Entity | Change Order

Workflow: PS7 Change Order

Workflow States:
Create
Open
Work
Review
Approved
Closed
Rejected
Cancelled

Workflow Transitions:
Approved -> Close

Job types:
Sample.SyncChangeOrders

Notes:

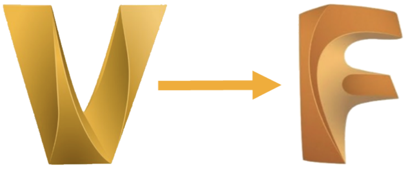
- When the status of the Vault ChangeOrder gets changed to *'Close'*, then the states of its ItemRecords are changed to *'Released'*. Therefore the *Transfer Item BOMs* workflow gets automatically triggered for them.
These *'Sample.TransferItemBOMs'* jobs have the same priority as the *'Sample.SyncChangeOrders'* jobs but they are executed prior this workflow, so that newly created Vault Items can be created in Fusion 360 Manage.

Alternatively the job can even be queued within your own client customization using powerEvents and the Add-VaultJob cmdlet, by passing the following ChangeOrder parameters:

```
$changeOrder = Get-VaultChangeOrder -Number 'ECO-00008'
$job = Add-VaultJob -Name "Sample.SyncChangeOrders" -Parameters @{"ChangeOrderId"=
↪$changeOrder.Id} -Description "Synchronize Change Order: $($changeOrder._Number)"
```

The Vault Event UpdateChangeOrderState_Post provides information to act on the closure of Vault Change Orders.

5.2 Transfer Item BOMs

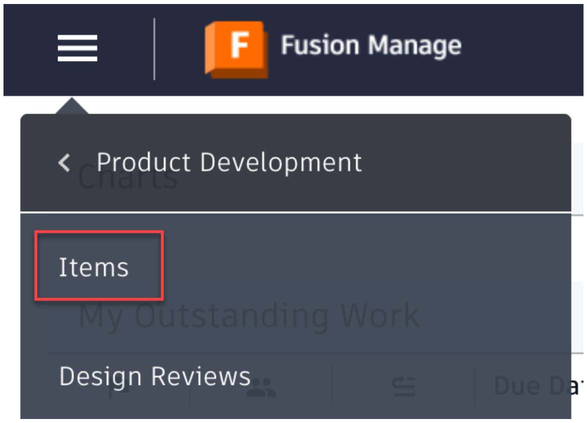


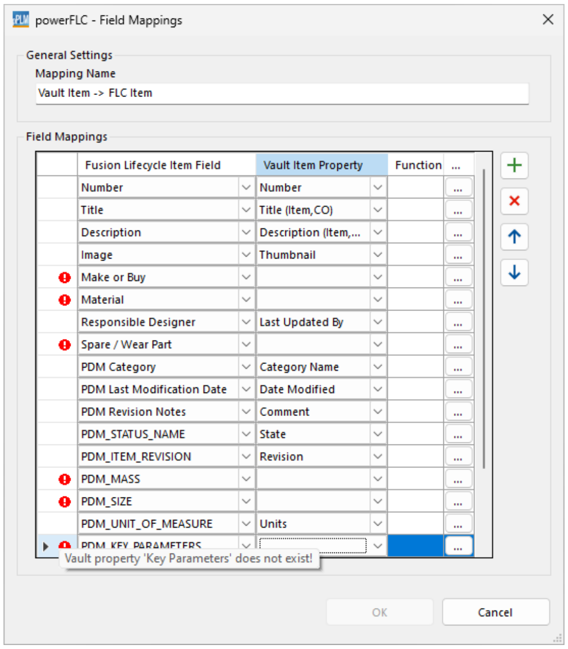
This sample *Workflow* is meant to display how Vault Item metadata, attached Vault files as well as Bill Of Material information can be transferred to Fusion 360 Manage.
It covers the most common user scenarios and is easy to configure but also serves as a base to create custom workflows.

Note: It pushes Vault items, their BOMs and attachments from Vault to Fusion 360 Manage.

Requirements

The job and its configuration are designed for use with a **pre-configured Vault** and the Fusion 360 Manage **workspace named "Items"**.





powerFLC - Field Mappings

General Settings

Mapping Name: Vault Item -> FLC Item

Field Mappings

	Fusion Lifecycle Item Field	Vault Item Property	Function	...
	Number	Number		...
	Title	Title (Item,CO)		...
	Description	Description (Item,...		...
	Image	Thumbnail		...
!	Make or Buy			...
!	Material			...
	Responsible Designer	Last Updated By		...
!	Spare / Wear Part			...
	PDM Category	Category Name		...
	PDM Last Modification Date	Date Modified		...
	PDM Revision Notes	Comment		...
	PDM_STATUS_NAME	State		...
	PDM_ITEM_REVISION	Revision		...
!	PDM_MASS			...
!	PDM_SIZE			...
	PDM_UNIT_OF_MEASURE	Units		...
!	PDM_KEY_PARAMETERS			...

Vault property 'Key Parameters' does not exist!

In current Fusion 360 Manage tenants, the "Items" workspace is available by default.

If the workspace is missing on your tenant, add it via *Administration → Template Library* by installing the "Items Workspace" template.
Then follow the configuration steps described *here*.

In both cases, remember to adjust your ADMS hostname for the *Vault Thick and Thin Client* buttons to function property.
Also adapt the *'Items onCreate onEdit' script* to your Vault so that units, dimension fields, and weights are transferred for all items.

Note: Prior to 2024, Autodesk delivered customer tenants with a "*Vault Items and BOMs*" workspace or a workspace named "*Items and BOMs*". Find compatible configurations and appropriate jobs on coolOrangeLabs.

In the default configuration, several Vault Item Properties are expected, which may need to be created in Vault first! These are not included in standard Vaults, but you can use the Autodesk sample PDMC Vault to guarantee the expected settings.

5.2.1 Sample.TransferItemBOMs

This powerJobs Processor Job performs all the succeeding Fusion 360 Manage requests by retrieving the e-mail address of the particular user that added the Job to the Queue.
Therefore, follow the configuration steps described *here*.

On the condition that the according *Workflow Trigger* is configured, the job can easily be triggered from within the Vault Client by changing the lifecycle state of an item to *'Released'*.
The job fails when the *'Sample.TransferItemBOMs'* workflow or the Fusion 360 Manage Workspace is not configured properly, when the Job Processor can't connect to the Fusion 360 Manage tenant or when invalid positions are detected in the Vault Item BOM. See error handling.
The job creates Fusion Lifecylce Items for the $item where the Job is triggered on, and for all the Vault Items that are contained in its *Bill of Material*.
All the configured *Item Details* will become filled with the mapped Vault data. If the corresponding Items already exist in Fusion 360 Manage, they will be updated with these configured values, but only if their description has changed since the last transfer.

When an item is transferred to Fusion 360 Manage that represents a *virtual component* which is used by an assembly, then the thumbnail shows the thumbnail of the assembly.
The fields of the section *Primary File* in Fusion 360 Manage are empty, as there is no file equivalent existing for the Virtual Component.

Once a Vault Item is transferred to Fusion 360 Manage this relationship is stored in Vault Entity Attributes. They are not visible within Vault Explorer but can be retrieved e.g. in customizations by using the Vault APIs:

```
$vault.PropertyService.GetEntityAttributes($item.MasterId, 'FLC.ITEM') | Where-Object {$_.Attr -eq 'Urn' } | Select-Object -First 1 -ExpandProperty Val
#Returns "urn:adsk.plm:tenant.workspace.item:previewcoolorange.136.10610"
```

Attachments:
By default the attachments of the following *Vault Item associations* are configured to be downloaded into a temporary directory (by default `C:\Temp\`), then uploaded and linked in the Attachments Tab of the Fusion 360 Manage Item:

- Vault Item attachments
- Composition association attachments (attachments of the primary associated file)
- Design Document association attachments (attachments of the tertiary associated files)
- Design Document DWGs (tertiary associated DWG files)

Already *existing attachments* in Fusion 360 Manage will *not be deleted* when the item is updated, although the attachment was removed from the item in Vault or the configuration settings have been changed.

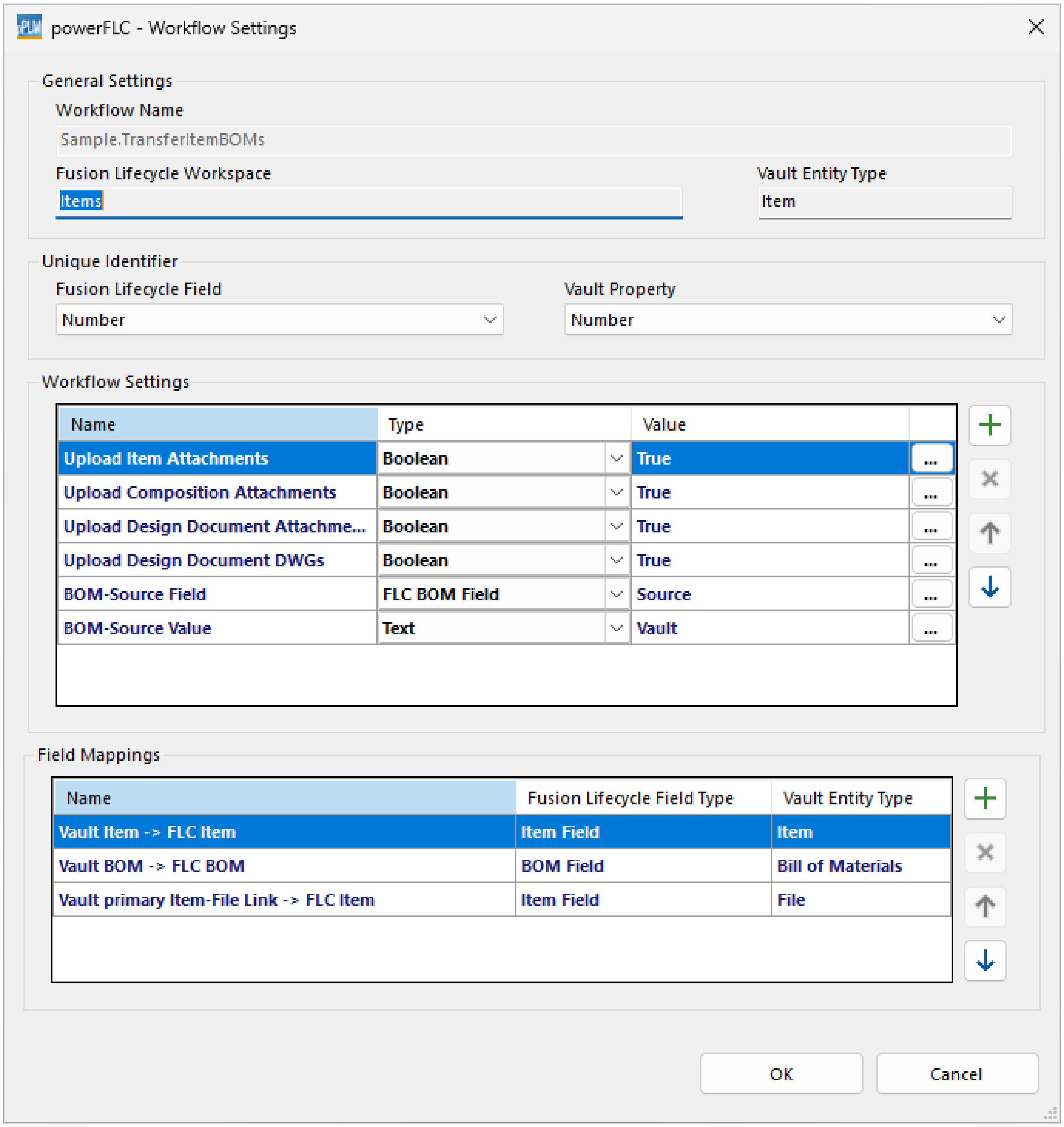
Bill of Materials:
For each Get-VaultItemBOM component, a corresonding item will be created in Fusion Manage and linked in the Bill of Materials tab of the header Item.
The BOM line items and their BOM information will be updated if they already exist in the Fusion Manage BOM. Only line items that have been added manually to the Fusion Manage BOM remain untouched (determined using the `Source` field).
When a BOM is created/updated by this job, following information is populated in Fusion Manage:

- BOM item structure from Vault
- Position (#)
- Quantity
- Mapped properties which are configured in the field mapping group *Vault BOM → FLC BOM*

The `Bom_PositionNumber` property of the ItemBomRow in Vault is copied to the BOM field *Position Number*, and the `Bom_InstCount` is copied to the BOM *Quantity* field (both are not configurable!).
Vault ItemBomRows with identical `Bom_Number` properties are not unique and are getting merged within Fusion. The *Quantity* is determined from the sum of the Vault Instant Count values if the item occurs more than once. The *Qty Pos* is summed up from the Vault Quantity. Merged text fields with different values are set to "*Varies*". Numerical fields with different values are set to "-1".

5.2.2 Configuration

The job is delivered with a default configuration file that has to be *imported* from the location *%ProgramData%\coolOrange\powerJobs\Jobs\Sample.TransferItemBOMs.json*.
Once imported, the default configuration can be adjusted in the *Workflow-Settings* dialog.



powerFLC - Workflow Settings

General Settings

Workflow Name: Sample.TransferItemBOMs

Fusion Lifecycle Workspace: Items

Vault Entity Type: Item

Unique Identifier

Fusion Lifecycle Field: Number

Vault Property: Number

Workflow Settings

Name	Type	Value	
Upload Item Attachments	Boolean	True	...
Upload Composition Attachments	Boolean	True	...
Upload Design Document Attachme...	Boolean	True	...
Upload Design Document DWGs	Boolean	True	...
BOM-Source Field	FLC BOM Field	Source	...
BOM-Source Value	Text	Vault	...

Field Mappings

Name	Fusion Lifecycle Field Type	Vault Entity Type
Vault Item -> FLC Item	Item Field	Item
Vault BOM -> FLC BOM	BOM Field	Bill of Materials
Vault primary Item-File Link -> FLC Item	Item Field	File

This workflow synchronizes Vault BOMs for the **Vault Entity Type** *Item* to the default **Fusion Manage workspace** *Items*.
In Fusion Manage this workspace is already *configured properly* and allows users to choose items from this workspace from within the *Bill of Materials Tab*.

However, you can also configure a different workspace and adapt the workflow to your Vault configuration. To do this, either remove the unneeded mappings or create the missing properties in Vault and/or Fusion Manage.

Item Details

The fields in the Item Details Tab get filled with the values of the mapped Vault properties, or the results of the mapped *Functions*.
These mappings are transferred for all the Items which are created, and for those which already exist in Fusion 360 Mangage and will be updated.

Most of the mappings are configured in a *field mapping group* named *Vault Item → FLC Item*.
It contains the mappings between the properties of the Vault Item and the fields of the Item in Fusion 360 Manage:
e.g. the *Fusion Lifecycle Item Field* `Number` gets filled with the value of the *Vault Property* `Number`, `Title` with `Title (Item,CO)`, `Description` with `Description (Item,CO)` and `Image` with `Thumbnail`.

Additional mappings can be found in the field mapping group *Vault primary Item-File Link → FLC Item*.
It contains the Vault File properties which should be transferred from the primary subcomponent of the Vault Item to the fields of the Item in Fusion 360 Manage:
e.g. the *Fusion Lifecycle Item Field* `Primary File Name` gets filled with with the `Name` of the primary file that is linked to the Vault Item, `PDM Location` with the `Folder Path` and `Primary File Revision / Version` with its `Revision`.

Attachments

In order to configure what types of Vault Item associations will uploaded and attached to the Fusion 360 Manage Item the following *Workflow Settings* can be adjusted:

Type	Name	Description
Boolear	Upload Item Attachments	Whether item attachments should be transferred to Fusion 360 Manage
Boolear	Upload Composition Attachments	Whether attachments of the primary attached file should be transferred to Fusion 360 Manage
Boolear	Upload Design Document Attachments	Whether attachments of the design document file should be transferred to Fusion 360 Manage
Boolear	Upload Design Document DWGs	Whether design document native DWG files should be transferred to Fusion 360 Manage

Bill of Materials

The according behavior of how the Vault Item BOM gets transferred to Fusion 360 Manage can be adjusted with the following *Workflow Settings*:

Type	Name	Description
FLC BOM Field	BOM-Source Field	A BOM field in Fusion 360 Manage used to identify that the particular BOM row as been transferred by the workflow
Text	BOM-Source Value	The value that identifies that the particular BOM row has been transferred by the workflow

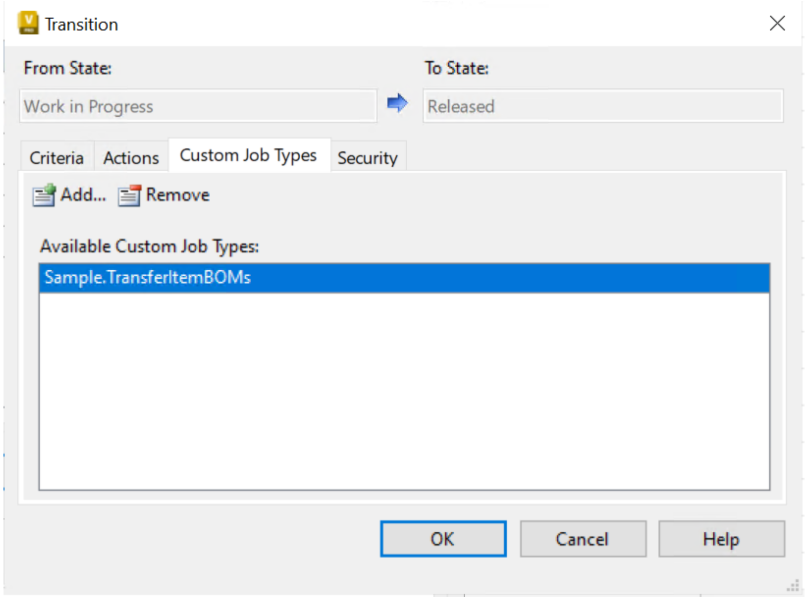
The mappings from Vault Bill of Materials properties to Fusion 360 Manage BOM fields can be configured in the *field mapping group* named *Vault BOM → FLC BOM*,
e.g. the *Fusion Lifecycle BOM Field* `Row Order` with the *Vault Property* `Bom_RowOrder` and `Qty Pos` with `Bom_Quantity`.

The following fields are set by the job and **do not** need to be mapped:

Fusion 360 Manage	Vault
Position	BOM row Position Number
Quantity	BOM row Quantity
Source	"Vault" (depending on the *BOM-Source Value* setting)

5.2.3 Triggering the workflow

In order to execute the workflow job on Vault Item lifecycle changes to a *'Released'* state, each single Vault lifecycle state transition must be extended to trigger a job of the type *"Sample.TransferItemBOMs"*:



Transition

From State: Work in Progress

To State: Released

Available Custom Job Types: Sample.TransferItemBOMs

Afterwards when changing the state for a specific Vault item, this will automatically queue the "Transfer Item BOMs" workflow job. Read more here.

Note: When the Lifecycle state gets changed to "*Released*" for the Vault Item and its dependent child Items, then the "*Sample.TransferItemBOMs*" job is automatically triggered for all of them.

Alternatively the job can be queued within your own client customization using powerEvents and the Add-VaultJob cmdlet, by passing the following Item parameters:

```
$item = Get-VaultItem -Number 100018
$job = Add-VaultJob -Name "Sample.TransferItemBOMs" -Parameters @{"EntityId"=$item.Id;"EntityClassId"="Item"} -Description "Transfer Item BOMs for: $($item._Number)"
```

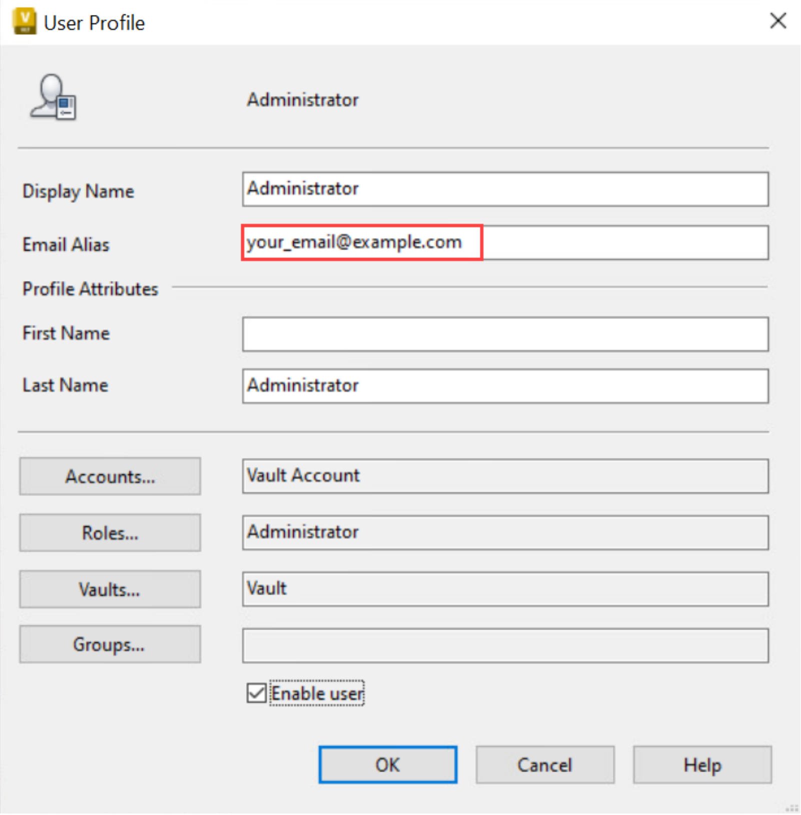
Also the *Priority* of the created Job can be configured this way. Jobs with higher priority will be executed first. The lower the number the higher the priority.

Workflows consist of two components: the Workflow Configuration within the *Configuration Manager* and the according powerJobs Processor job.

5.3 Configuration

Before setting up the Configuration Manager, the proper configuration of the *Fusion 360 Manage Tenant* is required. Afterwards the *Tenant Settings* can be configured in the Vault Client to allow powerPLM (powerFLC) Workflows to establish a connection to Fusion 360 Manage.

In order to give workflows the possibility to perform their actions with the correct Fusion 360 Manage user, the e-mail address of the Vault user that submitted the according job must be configured in the Vault User profile:



User Profile

Administrator

Display Name	Administrator
Email Alias	your_email@example.com

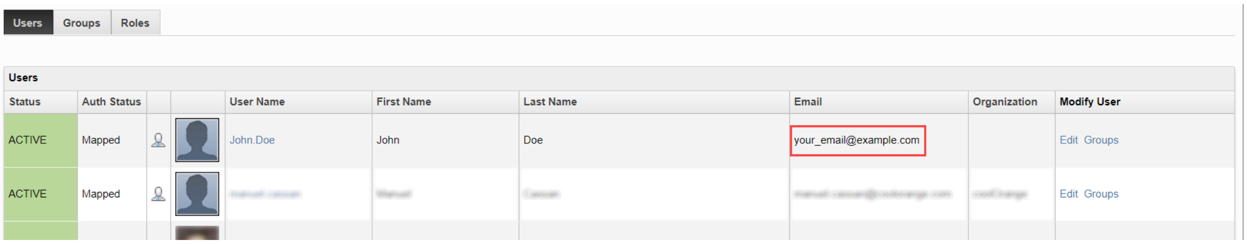
Profile Attributes

First Name	
Last Name	Administrator

Accounts...	Vault Account
Roles...	Administrator
Vaults...	Vault
Groups...	

☑ Enable user

This same email address must be present for the Fusion 360 Manage User:



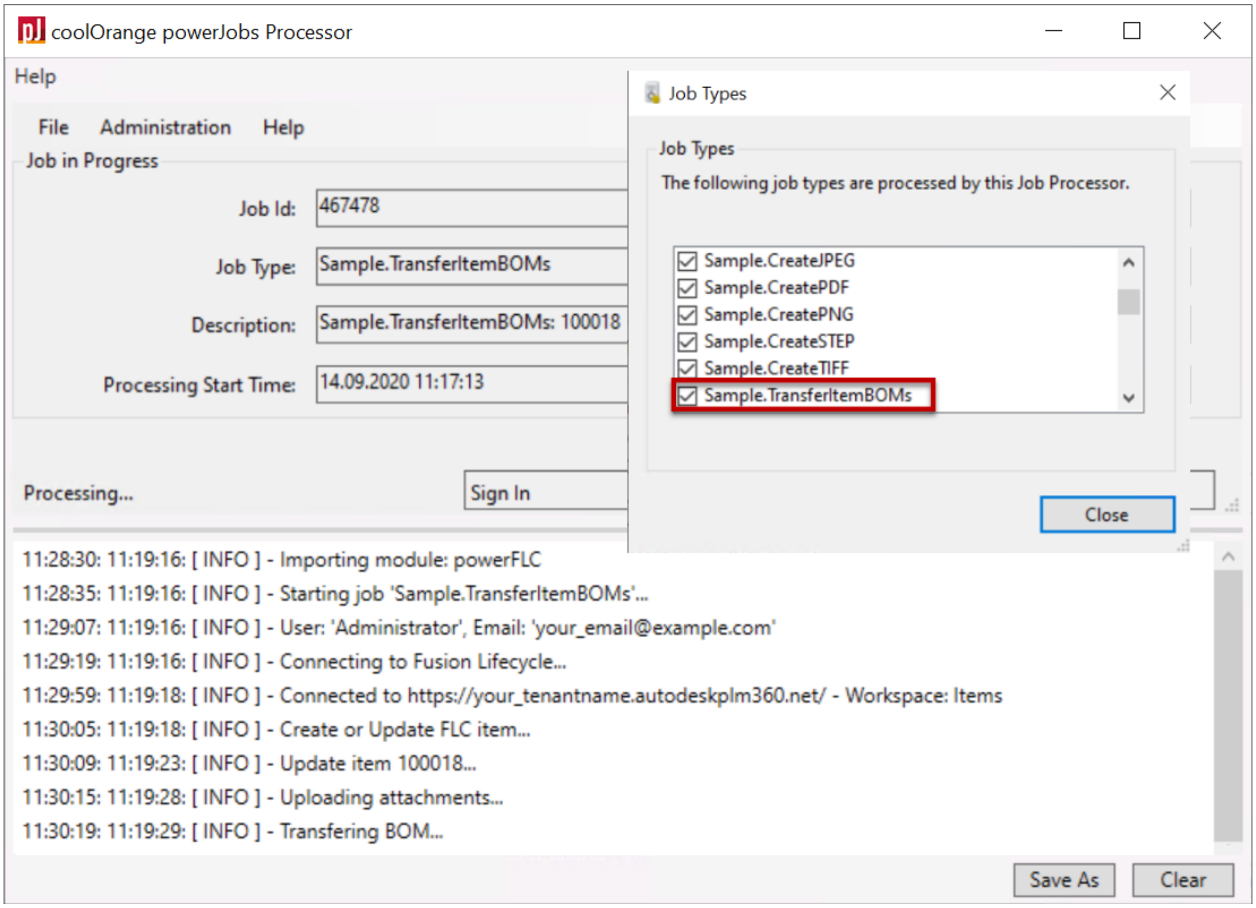
Users

Status	Auth Status			User Name	First Name	Last Name	Email	Organization	Modify User
ACTIVE	Mapped			John.Doe	John	Doe	your_email@example.com		Edit Groups
ACTIVE	Mapped			[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	Edit Groups

5.4 Jobs

powerPLM (powerFLC) is delivered with two sample workflow jobs *Transfer Item BOMs* and *Change Management*. Their purpose is help people getting started with creating their own workflows based on powerJobs Processor.
The samples cover the most common scenarios for exchanging data between Vault and Fusion 360 Manage and is highly *customizable*.
We recommend to copy the sample workflow script and create your own Custom Workflow job, when additional customizations are preferred.

Make sure to start the powerJobs.exe at least once to make sure the workflow job types are synchronized and can be processed by powerJobs Processor.



Job in Progress

Job Id: 467478

Job Type: Sample.TransferItemBOMs

Description: Sample.TransferItemBOMs: 100018

Processing Start Time: 14.09.2020 11:17:13

Processing...

Job Types

The following job types are processed by this Job Processor.

- ☑ Sample.CreateJPEG
- ☑ Sample.CreatePDF
- ☑ Sample.CreatePNG
- ☑ Sample.CreateSTEP
- ☑ Sample.CreateTIFF
- ☑ Sample.TransferItemBOMs

```
11:28:30: 11:19:16: [ INFO ] - Importing module: powerFLC
11:28:35: 11:19:16: [ INFO ] - Starting job 'Sample.TransferItemBOMs'...
11:29:07: 11:19:16: [ INFO ] - User: 'Administrator', Email: 'your_email@example.com'
11:29:19: 11:19:16: [ INFO ] - Connecting to Fusion Lifecycle...
11:29:59: 11:19:18: [ INFO ] - Connected to https://your_tenantname.autodeskplm360.net/ - Workspace: Items
11:30:05: 11:19:18: [ INFO ] - Create or Update FLC item...
11:30:09: 11:19:23: [ INFO ] - Update item 100018...
11:30:15: 11:19:28: [ INFO ] - Uploading attachments...
11:30:19: 11:19:29: [ INFO ] - Transfering BOM...
```

5.4.1 Modules

Following PowerShell script modules are delivered with powerPLM (powerFLC) and installed in the powerJobs Processor module directory:

- The **coolOrange.powerFLC.Workflows.MappingFunctions.psm1** module contains the functions that are used in the *Field Mappings* dialog.
- **coolOrange.powerFLC.Workflows.Common.psm1** contains functions for simplifying workflow jobs and the variable `$workflow`, which supplies the configuration
- The module **coolOrange.powerFLC.Workflows.Extensions.psm1** provides the function `Update-FLCGrid` to populate the Grid tab in Fusion Manage

- **coolOrange.powerFLC.Workflows.Async.psm1**

5.5 Workflow trigger

In order to execute a Workflow Job after Vault **lifecycle changes**, the Vault lifecycle state transition must be extended with the Job Type matching the **"Workflow Name"**.
See the delivered samples *Sample.TransferItemBOMs* and *Sample.SyncChangeOrders* are enqueued after changing the state of Vault entities.

Alternatives for queueing jobs automatically are client-side PowerShell customizations using the `Add-VaultJob` cmdlet, or settings to submit jobs regularly at specific Intervals.

CHAPTER SIX

CODE REFERENCE

The Code Reference section describes:

6.1 Cmdlets

6.1.1 Add-FLCAttachment

Adds an Attachment to an existing Item in Fusion 360 Manage.

Syntax

```
Add-FLCAttachment -Workspace <String> -ItemId <Long> -Path <FileInfo> [[-Title] <String>
↪] [[-Description] <String>] [<CommonParameters>]
<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    -Path
        Required                true

    -Title
        Required                false

    -Description
        Required                false

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Directly passing an *Item* object:

```
Add-FLCAttachment -InputObject <PSObject> -Path <FileInfo> [[-Title] <String>] [[-
↪Description] <String>] [<CommonParameters>]
```

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```
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    -Path
        Required                true

    -Title
        Required                false

    -Description
        Required                false

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Type	Name	Description
String	Workspace	The name of the workspace that contains the Item
Long	ItemId	The ID of the Item for which the attachment should be added
Item	InputObject	The Fusion 360 Manage Item for which the attachment should be added.
FileInfo	Path	The Path to the file which should be uploaded and attached to the item.
String	Title	The title to use for the attachment. If no title is provided, the filename without extension will be used.
String	Description	A description for the uploaded attachment

Return type

Attachment ← on success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The cmdlet supports passing all versions of an item.
This means that for a *revision-controlled* workspace, an attachment can be added not only to *working versions* but also to the *latest versions* of an item.

The **-Path** arguments accepts all file types to be uploaded as attachment although only specific file types can be viewed with the Viewer in Fusion 360 Manage.
A list of the file types that can be viewed in Fusion 360 Manage can be found here.

When an attachment with the same *Title* already exists on the item *a new version* of the attachment is added.
Optionally with the **-Title** argument you can upload the same attachment using a different title.

Examples

To use the examples below a Fusion 360 Manage demo Tenant is required:

Add an Attachment to an Item

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$attachment = Add-FLCAttachment -Workspace 'Products' -ItemId 8684 -Path 'C:\Temp\
↪Injection Molding Machine.dwf'
```

Add an Attachment using a specific title

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$item = (Get-FLCItems -Workspace 'Documents' -Filter '"Final Assembly Installation"')[0]

$item | Add-FLCAttachment -Title 'Instructions' -Path '.\Documents\C300NO678S.pdf' -
↪Description 'Documentation for Installation'

<#
Id          : 470
ItemId      : 8644
Workspace   : Documents
Title       : Instructions
FileName    : C300NO678S.pdf
Folder      :
Description : Documentation for Installation
Size        : 225659
Version     : 1
#>
```

Error handling, analyze why adding attachment failed using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$attachment = Add-FLCAttachment -Workspace 'Suppliers' -ItemId 5839 -Path 'C:\Temp\
↪Picture.png'

if(-not $attachment){
   $Error[0].Exception #Returns "FORBIDDEN: User ****: access ADD_ATTACHMENTS denied..."
}
```

6.1.2 Add-FLCItem

Creates a new Item in the specified workspace in Fusion 360 Manage.

Syntax

```
Add-FLCItem -Workspace <String> [[-Properties] <Hashtable>] [<CommonParameters>]
```

Parameters

Type	Name	Description	Optional
String	Workspac	The name of the workspace where the item should be added to	no
Hashtabl	Properties	The properties for the item being created, which will be set for the according fields in Fusion 360 Manage	yes

Return type

Item ← on success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The *-Properties* arguments allows passing the name and value for all the fields which should be set when creating the Item.
For those fields which are not present in the Hashtable the value is set to a *default value* configured in Fusion 360 Manage.

Only fields which where assigned either to a *Section* or to a *Matrix* in the Item Details Form in Fusion 360 Manage can be passed.
Addionally they must have one of the following Field types:

- Integer
- Float
- Money
- Date
- Single Line Text
- Paragraph
- Paragraph w/o Line Breaks
- Check Box
- Image
- Email
- BOM UOM Pick List
- Defined Pick List - Single Selection

- Defined Pick List - Multiple Selection

Maximum number of characters

When the passed value for a Field exceeds the in Fusion 360 Manage configured *maximum length*, the value gets *trimmed* to its maximum length.

Examples

To use the examples below a Fusion 360 Manage demo Tenant is required:

Create a new Item

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

Add-FLCItem -Workspace 'Training'

<#
Id                       : 9009
Workspace                : Training
RootId                   : 9009
Number                   : TRN000003
Document Number          :
Trainee Name             :
Job Title                :
Primary Trainer          :
Training Start           :
Training End             :
Qualification Completed :
Comments                 :
```

Create an Item with properties

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$item = Add-FLCItem -Workspace 'Items' -Properties @{
    'Title' = 'powerPLM is fun!'              #Field Type: Single Line Text
    'PDM Last Modification Date' = (Get-Date) #Field Type: Date
    'Estimated Cost'  = 9000.5                #Field Type: Money
    #'My custom checkbox' = $true            #Field Type: Check Box
}
```

Create an Item with Pick List fields

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$item = Add-FLCItem -Workspace 'Audits' -Properties @{
    "Unit of Measure" = "Cubic Centimeter"                  #Field Type: BOM UOM Pick␣
↪List
    "SPC Score" = "3 - Advanced"                            #Field Type: Defined Pick␣
```

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```
↪List - Single Selection
    "Audit Team" = @("Thomsen, Dane", "Bernat, Lauran")     #Field Type: Defined Pick␣
↪List - Multiple Selection
}
```

Create an Item with Paragraph and Image fields

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$imageBytes = Get-Content -Path 'thumbnail.jpeg' -Encoding Byte -Raw

$item = Add-FLCItem -Workspace 'FMEA Analysis' -Properties @{
    "Type of FMEA required" = "System FMEA"                #Field Type: Defined Pick List␣
↪- Single Selection
    "Request Date" = (Get-Date)                            #Field Type: Date
    "Request Notes" = "<p><b>Renewe next time!<b></p>"     #Field Type: Paragraph
    "Process or Product Image" = $imageBytes               #Field Type: Image
}
```

Error handling, analyze why Item could not be created using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$item = Add-FLCItem -Workspace 'Not existing Workspace'

if(-not $item){
   $Error[0].Exception #Returns "No Workspace found with the given name: Not existing␣
↪Workspace"
}
```

6.1.3 Connect-FLC

Authenticates and prepares a connection for communicating to the specified Fusion 360 Manage tenant.

Syntax

Providing connection details directly:

```
Connect-FLC -Tenant <String> -ClientId <String> -ClientSecret <String> -UserId <String> [
↪<CommonParameters>]
<#
PARAMETER
    -Tenant
        Required                true

    -ClientId
        Required                true

    -ClientSecret
        Required                true
```

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```
    -UserId
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Configuration from Vault:

```
Connect-FLC [-UseSystemUserEmail] [<CommonParameters>]
<#
PARAMETER
    -UseSystemUserEmail
        Required                false

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Parameters

Type	Name	Description
String	Tenant	The name of the Fusion 360 Manage tenant, which is usually the first part of the URL to your Fusion 360 Manage Site: `https://<Tenant>.autodeskplm360.net/plm/mainDashboard`
String	ClientId	The Client ID of the registered Forge app is your app's username required for the two-legged authentication on the Forge Platform
String	ClientSecret	The Client Secret is your app's password and can be found next to the Client ID in the My Apps section
String	UserId	The e-mail address of a particular user who will perform all the succeeding requests to Fusion 360 Manage
SwitchParameter	UseSystemUserEmail	Whether to use the configured system user's email or the current users's email as UserId

Return type

Bool:
$true ← on success.
$false ← on failure with an additional property 'Error' containing the Exception/ErrorMessage.

Remarks

Authentication to the Fusion 360 Manage Tenant is achieved through the 2-legged OAuth flow provided by the Forge Platform. The cmdlets use a token that is retrieved using the provided **-ClientId** and **-ClientSecret** of the registered Forge app.
Retrieve the Client ID and Secret (see Step 3: Note Down Your Client ID and Secret) of the registered *powerPLM* app from the Forge portal and make sure the Client ID is *whitelisted* in the *Fusion 360 Manage Configuration*.
Because the 2-legged OAuth flow won't have any information tied to a particular user, FusionLifecycle needs to know via **-UserId** the *e-mail address* of a *valid user* in the system via the **-UserId** parameter.

When the Cmdlet could successfully establish a connection to Fusion 360 Manage, the PowerShell variable *$flcConnection* is created and lets you communicate to your tenant directly through the Fusion 360 Manage APIs.

The cmdlet can be invoked **without arguments** in applications that are already connected to Vault (for example within the Vault Explorer or the Job Processor), so that the globally configured *Tenant Settings* from the Configuration Manager dialog are used.
In Job Processor environments the email address of the Vault user who queued the the currently processed job is automatically used for the login.
For other Vault applications the email address of the logged-in Vault user is used as the *UserId* instead.

If the **-UseSystemUserEmail** switch was passed the *system User Email address* will be used as the *UserId*.

If the application already has a Fusion 360 Manage connection for the passed tenant settings, the Cmdlet does not create a new connection but reuses the existing connection to create the *$flcConnection* variable in the PowerShell session.

Examples

Connect to a Fusion 360 Manage tenant using Two-legged authentication

```
Connect-FLC -Tenant 'previewcoolorange' -ClientId 'nkerZQhAFEgt9f23Jk8aQ6B2NeRaLSjU' -
↪ClientSecret 'w68qUITbY8RTjGCh' -UserId 'info@coolorange.com'
```

Connect to Fusion 360 Manage using a powerVault connection and the Tenant Setting stored in Vault

```
Open-VaultConnection -User 'coolOrange' # Vault user 'coolorange' has email address
↪'info@coolorange.com' assigned

Connect-FLC

$flcConnection.UserId # Returns 'info@coolorange.com'
```

Error handling, analyze why the connection could not be established

```
$result = Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -
↪ClientSecret 'your_client_secret' -UserId 'your_email@example.com'

if(-not $result) {
   $result.Error #Returns "Authentication to Forge failed!"
}
```

6.1.4 Get-FLCBOM

Retrieves the BOM of an FLC Item.

Syntax

```
Get-FLCBOM -Workspace <String> -ItemId <Long> [<CommonParameters>]
<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Directly passing an *Item* object:

```
Get-FLCBOM -InputObject <PSObject> [<CommonParameters>]
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Parameters

Type	Name	Description
String	Workspace	The name of the workspace that contains the header Item
Long	ItemId	The ID of the BOM header Item
Item	InputObject	The Fusion 360 Manage header Item.

Return type

BomRow[] ← on success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The Cmdlet returns a *single-level* list of all the direct BOM line items for the passed Fusion 360 Manage header Item.

The passed **-Workspace** has to be *configured properly* and must allow viewing the according BOM information in the Bill of Materials Tab.

Each linked *item is located only once* in the BOM and the returned line items can be located in *different Workspaces*. For linked items from *revision-controlled* workspaces the cmdlet returns the **exact** versions.

Examples

To use the examples below a Fusion 360 Manage PLM demo Tenant is required:

Display the direct BOM line items for an Item in Fusion 360 Manage

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$bomRows = Get-FLCBOM -Workspace 'Items' -ItemId 8070

#Print BOM data similar to the 'Basic' view in the Fusion Manage BOM tab
$bomRows | sort-object {$_.Bom_PositionNumber} | Format-Table Bom_PositionNumber,Number,
↪Title,Bom_Quantity,'Bom_Qty Pos',Bom_Source

<#
Bom_PositionNumber Number    Title                                                   Bom_
↪Quantity Bom_Source
------------------ --------- ------------------------------------------------------- ----
↪-------- ----------
1                  368-00002 custom rubber hand grip surround for MK1 steering wheel    ␣
↪     1.0      Vault
2                  368-00003 Grip back                                                  ␣
↪     1.0      Vault
3                  600-00001 Standard single push control button                        ␣
↪     4.0
4                  402-00001 Block                                                      ␣
↪     1.0      Vault
5                  699-00002 Gear Shift Paddle Assembly                                 ␣
↪     2.0
6                  402-00007 M-ST-1020                                                  ␣
↪     1.0      Vault
7                  368-00006 Control Unit Housing Cover                                 ␣
↪     1.0      Vault
8                  402-00008 Steering Wheel Central Control Housing Back Plate          ␣
↪     1.0      Vault
9                  368-00007 Central steering column branding cover                     ␣
↪     1.0
10                 085-00003 Push Button                                                ␣
↪     1.0      Vault
11                 085-00004 Push Button                                                ␣
↪     2.0      Vault
12                 368-00008 Main housing unit for the MK 1 Mono steering wheel         ␣
↪     1.0      Vault
13                 368-00009 Steering Wheel Gasket                                      ␣
```

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```
↪     1.0      Vault
14                085-00005 Push Button                                                      ␣
↪     1.0      Vault
15                085-00006 Push Button                                                      ␣
↪     2.0      Vault
16                180-00002 Control Unit PCB Housing                                         ␣
↪     1.0      Vault
17                699-00003 Mono MK1 Steering Wheel Locking Ring Assembly                    ␣
↪     1.0      Vault
18                690-00002 ZS06 PCB Final                                                   ␣
↪     2.0      Vault
#>
```

Error handling, analyze why retrieving BOM line Items failed using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$item = (Get-FLCItems -Workspace 'Customers' -Filter '"Autodesk Novi"')[0]

$bomRows = $item | Get-FLCBOM

if(-not $bomRows){
   $Error[0].Exception #Returns "FORBIDDEN: User ****: access VIEW_BOMS denied..."
}
```

6.1.5 Get-FLCItemAssociations

Returns a collection of attachments or affected items which are associated to the given Fusion 360 Manage Item.

Syntax

```
Get-FLCItemAssociations -Workspace <string> -ItemId <long> -AffectedItems [
↪<CommonParameters>]
<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    -AffectedItems
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

```
Get-FLCItemAssociations -Workspace <string> -ItemId <long> -Attachments [
↪<CommonParameters>]
```

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```
<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    -Attachments
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Directly passing an *Item* object:

```
Get-FLCItemAssociations -InputObject <PSObject> -AffectedItems [<CommonParameters>]
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    -AffectedItems
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

```
Get-FLCItemAssociations -InputObject <PSObject> -Attachments [<CommonParameters>]
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    -Attachments
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Parameters

Type	Name	Description
String	Workspace	The name of the workspace that contains the item whose associated Items are retrieved
Long	ItemId	The ID of the item whose associated Items are retrieved
Item	InputObject	The Fusion 360 Manage Item whose associated Items are retrieved.
SwitchParameter	AffectedItems	Retrieves associated Affected Items (can be Linked Items and/or Managed Items).
SwitchParameter	Attachments	Retrieves associated Attachments.

Return type

LinkedItem[] / *Attachment[]* ← On success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The SwitchParameters *AffectedItems* and *Attachments* cannot be combined.

AffectedItems

The passed **-Workspace** has to be *configured properly* and must allow viewing the according Affected Items in the Linked Items Tab.
This tab is often known as Managed Items- or Affected Items Tab (or even *"Workflow Items"*, *"Associated Change Orders"*, . . .) within *revisioning* workspaces.

For such *revisioning* Items the cmdlet returns the **exact** revisions of all the Affected Items from the associated *revision-controlled* workspaces.

The resulting Items can be located in different Workspaces.

Attachments

The passed **-Workspace** has to be *configured properly* and must allow viewing the according Attachments in the Attachments Tab.

The Cmdlet returns a list of all the *direct Attachments* for the passed Fusion 360 Manage Item.

Examples

To use the examples below a Fusion 360 Manage PLM demo Tenant is required:

Display all the Affected Items for a revisioning Item in Fusion 360 Manage

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$item = (Get-FLCItems -Workspace 'Change Orders' -Filter 'ITEM_DETAILS:NUMBER="CO000012"
↪')[0]
$affectedItems = $item | Get-FLCItemAssociations -AffectedItems

#Print details which are displayed in the 'Affected Items' tab in Fusion Manage
$global:index=0
$affectedItems | Format-Table -Property @{name="index";expression={$global:index;
↪$global:index++}},Number,LinkedItem_LifecycleTransition,LinkedItem_EffectivityDate,
↪LinkedItem_FromRevision,LinkedItem_ToRevision,LinkedItem_Disposition

<#
index Number    LinkedItem_LifecycleTransition LinkedItem_EffectivityDate  LinkedItem_
↪FromRevision  LinkedItem_ToRevision  LinkedItem_Disposition
----- --------- ------------------------------ --------------------------- --------------
↪---------- ---------------------- -----------------------
1     001-00001 Bypass Design and Release      18.02.2016 00:00:00                       ␣
↪            A                      Rework
1     001-00001 Bypass Design and Release      18.02.2016 00:00:00                       ␣
↪            A                      Scrap
2     035-00001 Bypass Design and Release      18.02.2016 00:00:00                       ␣
↪            A
...
45    035-00002 Design Revision                06.11.2021 00:00:00        2              ␣
↪            3                      Use Until Depleted
#>
```

Display all the Attachments for an Item in Fusion 360 Manage

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$attachments = Get-FLCItemAssociations -Workspace 'Change Request' -ItemId 7584 -
↪Attachments

#Print details which are displayed in the 'Attachments' tab in Fusion 360 Manage
$attachments | Format-Table -Property 'FileName',Title,Version,@{name="Type";expression={
↪"$([System.IO.Path]::GetExtension($_.'File Name').TrimStart('.').ToUpper()) Image"}},@
↪{name="Size";expression={"$([Math]::Round($_.Size/1KB,1)) KB"}},Description

<#
FileName                    Title                   Version Type   Size      Description
--------------------------- ----------------------- ------- ------ --------- -----------
GT220 Change Proposal.png   GT220 Change Proposal         1  Image 1313.4 KB Screenshot
p681 Heatsink Cap Issue.jpg p681 Heatsink Cap Issue       1  Image 146.5 KB
#>
```

Error handling, analyze why retrieving Linked Items or Attachments failed using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$linkedItems = Get-FLCItemAssociations -Workspace 'Suppliers' -ItemId 6394 -AffectedItems

if(-not $linkedItems){
   $Error[0].Exception #Returns "FORBIDDEN: User ****: access VIEW_WORKFLOW_ITEMS denied.
↪.."
}
```

6.1.6 Get-FLCItems

Retrieves items from an FLC workspace.

Syntax

```
Get-FLCItems -Workspace <String> [[-Filter] <String>] [<CommonParameters>]
```

Parameters

Type	Name	Description	Optional
String	Workspace	The name of the workspace where the items should be retrieved from	no
String	Filter	Search string in the form of a Fusion 360 Manage search query	yes

Return type

Item[] ← On success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The **-Filter** argument accepts the same search query as Fusion 360 Manage and can be used to include only specific items in the result.
The search queries support General item properties, Workspace specific properties and Advanced searches with logical operators.
Cross-workspace searches are not supported by the cmdlet.

For *revision-controlled* Workspaces the cmdlet returns *working versions* for all the Fusion 360 Manage items, unless no other information was requested in the *-Filter* argument.
This means that instead of filtering items by their `isWorkingVersion` property, it is also possible to retrieve their *latest versions* via `isLatestVersion=true` (for some items the *latest version* can be the same as the *working version*).
Specific item versions can be retrieved using the filter property `itemId=...` instead.

> **Warning:** Inaccurate results can be caused by the Fusion 360 Manage search index being out of date.
> This can be resolved by starting a Re-Index for the workspace in the workspace settings.

Examples

To use the examples below a Fusion 360 Manage PLM demo Tenant is required:

Get all items in a workspace

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

Get-FLCItems -Workspace 'Change Orders'
<#
Id                          : 7296
Workspace                   : Change Orders
RootId                      : 7296
WorkflowState               : Implementation
Number                      : CO000004
Title                       : Modify Heatsink Cover
Priority                    : HIGH
Change Reason Code          : Quality Issue
Description of Change       : <i>Reduce size</i> of the heatsink cover to resolve <b>
↪capacitor interference issue</b>.
Stage 1 Predefined Approvers : {Black Amanda, Miller Boris}
...

Id                          : 7384
Workspace                   : Change Orders
...
#>
```

Save field of type Image to file

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$items = Get-FLCItems -Workspace 'FMEA Analysis' -Filter 'ITEM_DETAILS:NUMBER=FMEA000001'

$imageBytes = $items[0].'Process or Product Image'
Set-Content -Path 'image.png' -Value $imageBytes -Encoding Byte
```

Filter items by workflow state and a workspace specific field

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$items = Get-FLCItems -Workspace 'Products' -Filter 'workflowState="Requirements␣
↪Definition" AND ITEM_DETAILS:DESCRIPTION="AUTOMOTIVE Infotainment"'
$items[0].Number #returns 900-00006
```

Get working- and latest version of item

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$items = Get-FLCItems -Workspace 'Items' -Filter 'ITEM_DETAILS:NUMBER="035-0055-000" AND␣
```

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```
↪(isWorkingVersion=true OR isLatestVersion=true)'
$items | Format-List Id, RootId, Number

<#
Id     : 6803
RootId : 6803
Number : 035-0055-000

Id     : 7187
RootId : 6803
Number : 035-0055-000
#>
```

6.1.7 Save-FLCAttachment

Downloads the specified attachment from Fusion 360 Manage to a local directory.

Syntax

```
Save-FLCAttachment -Workspace <String> -ItemId <long> -AttachmentId <Long> -DownloadPath
↪<String> [<CommonParameters>]
<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    -AttachmentId
        Required                true

    -DownloadPath
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Directly passing an *Attachment* object:

```
Save-FLCAttachment -InputObject <PSObject> -DownloadPath <String> [<CommonParameters>]
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    -DownloadPath
        Required                true
```

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```
    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Parameters

Type	Name	Description
String	Workspace	The name of the workspace that contains the item with the specified attachment.
Long	ItemId	The ID of the item to which the specified attachment belongs.
Long	AttachmentId	The ID of the attachment that will be downloaded.
Item	InputObject	The Fusion 360 Manage Item whose associated Items are retrieved.
DirectoryInfo	DownloadPath	The Path to a local directory where the attachment should be downloaded. If the destination directory does not exist, it will be created.

Return type

FileInfo ← On success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The Cmdlet downloads the specified *direct Attachment* and returns its download location.

The passed **-Workspace** has to be *configured properly* and must allow viewing/downloading the according Attachments in the Attachments Tab.

Attachments that have the *same file name* will be downloaded with a *suffix*, for example "*SampleFile (1).png*" .

For attachments that have multiple versions, the *latest version* is downloaded.

Examples

To use the examples below a Fusion 360 Manage PLM demo Tenant is required:

Download a specific attachment of an Item in Fusion 360 Manage

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$item = (Get-FLCItems -Workspace 'Change Orders' -Filter 'ITEM_DETAILS:NUMBER="CO000016"
↪')[0]
$attachments = $item | Get-FLCItemAssociations -Attachments

$attachments | Where-Object {$_.Title -eq "GT220 Change Proposal"} | Save-FLCAttachment -
↪DownloadPath 'C:\Temp\MyPictures'
<#
```

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```
Mode                LastWriteTime         Length Name
----                -------------         ------ ----
-a----       02.07.2021     13:09        1344916 GT220 Change Proposal.png
#>
```

Download the related attachments of a header item that has BOM line items with attachments in its BOM in Fusion 360 Manage

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$bomRows = Get-FLCBOM -Workspace 'Items' -ItemId 7516
foreach($bomRow in $bomRows) {
   $relatedAttachments = $bomRow | Get-FLCItemAssociations -Attachments
   $relatedAttachments | Save-FLCAttachment -DownloadPath 'C:\Temp\Attachments'
}
```

Error handling, analyze why the attachment could not be downloaded to the specified directory, by using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$downloadedAttachment = Save-FLCAttachment -Workspace 'Tasks' -ItemId 7624 -AttachmentId␣
↪266 -DownloadPath '\\192.0.0.1\Some currently not available directory\'

if(-not $downloadedAttachment ){
   $Error[0].Exception #Returns "The network path was not found."
}
```

6.1.8 Update-FLCBOM

Manipulates the BOM of an existing Item in Fusion 360 Manage.

Syntax

```
Update-FLCBOM -Workspace <String> -ItemId <Long> -Rows <Object[]> [<CommonParameters>]
<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    -Rows
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Directly passing an *Item* object:

```
Update-FLCBOM -InputObject <PSObject> -Rows <Object[]> [<CommonParameters>]
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    -Rows
        Required                true

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Parameters

Type	Name	Description
String	Workspace	The name of the workspace that contains the header Item
Long	ItemId	The ID of the BOM header Item
Item	InputObject	The Fusion 360 Manage header Item.
(Hashtable/PsObject)[]	Rows	Overrides all BOM line items with the passed BOM line items information

Return type

BomRow[] ← on success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The Cmdlet can be used to add *existing Items* to a BOM, edit BOM line items and delete Items from a specific BOM in Fusion 360 Manage.

The passed **-Workspace** has to be *configured properly* and must allow linking the passed items.

In order to override the current BOM line items the **-Rows** argument allows passing BOM information for Items from *different Workspaces* that should be *added* or *edited* on the according header Item.
All the BOM items that are not present in the array will be *deleted* from the BOM (not from the Workspace).

The *required information* for linking Fusion 360 Manage Items can be passed using the `Workspace` and `Id` properties. For BOM line items from *revision-controlled* workspaces, always the *latest versions* of the passed items are linked, even if *work versions* of the respective items are passed.

The argument allows passing the name and value for all the Standard BOM Fields and Custom BOM fields using the *'Bom_'* prefix (e.g `Bom_Quantity`) regardless of the used display names in the different BOM Views.
Only *BOM Fields* that are assigned to a *View* in the Bill of Materials Tab can be specified.
For those BOM fields which are not present in the Hashtable or PsObject, a configured default value is used when a new line item is added. For example auto-numbering is used when no `Bom_PositionNumber` field is supplied
When editing existing BOM line items, the value in Fusion 360 Manage is kept untouched.
Additional information about the limitations and requirements of the possible *BOM Field Types* can be found *here*.

Not editable Fields

Fields that are *not editable* in the Bill of Materials Tab (e.g. computed Roll Up Fields) can not be updated using this cmdlet.

Examples

To use the examples below a Fusion 360 Manage PLM demo Tenant is required:

Update a BOM and its fields for an Item in Fusion 360 Manage

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$bomRows = Update-FLCBOM -Workspace 'Products' -ItemId 7557 -Rows @(
   @{
      'Bom_PositionNumber'=1            #Field Type: Integer
      'Workspace' = 'Products'
      'Id'=7549
      'Bom_Quantity'= 6.96              #Field Type: Float
   },
   @{
      'Workspace' = 'Items'
      'Id' = 8065
      'Bom_CustomCheckbox' = $false     #Field Type: Check Box
   }
)
```

Override only specific line items in a BOM

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'
$item = (Get-FLCItems -Workspace 'Items' -Filter '"699-00007 - BAC Mono mk1 custom␣
↪steering wheel"')[0]

# all the filtered out items will be removed
$existingBomRows = ($item | Get-FLCBOM) | Where-Object { $_.Title -ne 'Push Button' }
$existingBomRows[0].Bom_Quantity = 2.0
$newBomRows = (Get-FLCItems -Workspace 'Items' -Filter '"Push Button"') | Select-Object -
↪Property Workspace, Id, @{Name = 'Bom_Quantity'; Expression = {1.0}}

$bomRows = $item | Update-FLCBOM -Rows ($existingBomRows + $newBomRows)
```

Create a BOM and its associated Items in Fusion 360 Manage from the Structured BOM of a Vault File

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$file = Get-VaultFile -Properties @{Name = 'Pad Lock.iam'}
$fileBom = Get-VaultFileBOM -File $file._FullPath

$flcBomRows = @()
```

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```
foreach($fileBomRow in $fileBom) {
   $flcBomRowItem = Add-FLCItem -Workspace 'Items' -Properties @{
        'Title' = $fileBomRow._PartNumber
        'PDM_UNIT_OF_MEASURE' = 'Each'
   }
   $flcBomRows += @{
       'Id' = $flcBomRowItem.Id
       'Workspace' = $flcBomRowItem.Workspace
       'Bom_PositionNumber' = $fileBomRow.Bom_PositionNumber
       'Bom_Quantity' = $fileBomRow.Bom_Quantity
   }
}

$flcItem =  Add-FLCItem -Workspace 'Items' -Properties @{'Title' = $file._PartNumber}
$flcBomRows = $flcItem | Update-FLCBOM -Rows $flcBomRows
```

Error handling, analyze why adding Items to a BOM failed using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$childItems = Get-FLCItems -Workspace 'Items' -Filter 'ITEM_DETAILS:TITLE="Gear Shift␣
↪Paddle"'

$bomRows = Update-FLCBOM -Workspace 'Items' -ItemId 8071 -Rows $childItems

if(-not $bomRows){
   $Error[0].Exception # Returns "error.bom.cyclical: Saving these changes produces a␣
↪cyclical BOM, this is not permitted"
}
```

Error handling, analyze why several bomRows could not be updated using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$bomRows = Update-FLCBOM -Workspace 'Items' -ItemId 6862 -Rows @(
   @{
       'Workspace' = 'Items'
       'Id'=8213
       'Bom_PositionNumber'= "Invalid_Pos"    #Invalid position number
   },
   @{
       'Workspace' = 'Items'
       'Id' = 0                              #Invalid item Id
   }
)

if(-not $bomRows){
   $Error[0].Exception                   # Returns System.AggregateException: "One or␣
↪more errors occurred."
   $Error[0].Exception.InnerExceptions   # Returns: "Input string was not in a correct␣
```

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```
↪format."
                                         #          "No Item found with the given id: 0."
}
```

6.1.9 Update-FLCItem

Updates properties and affected items and performs workflow actions on an existing Item in Fusion 360 Manage.

Syntax

```
Update-FLCItem -Workspace <String> -ItemId <Long> [-Properties <Hashtable>] [-
↪WorkflowAction <String> [-Comment <String>]] [-AffectedItems <Object[]>] [
↪<CommonParameters>]

<#
PARAMETER
    -Workspace
        Required                true

    -ItemId
        Required                true

    -Properties
        Required                false

    -WorkflowAction
        Required                false

    -Comment
        Required                false

    -AffectedItems
        Required                false

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Directly passing an *Item* object:

```
Update-FLCItem -InputObject <PSObject> [-Properties <Hashtable>] [-WorkflowAction
↪<String> [-Comment <String>]] [-AffectedItems <Object[]>] [<CommonParameters>]
<#
PARAMETER
    -InputObject
        Required                true
        Accepts pipeline input: true

    -Properties
        Required                false
```

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```
    -WorkflowAction
        Required                false

    -Comment
        Required                false

    -AffectedItems
        Required                false

    <CommonParameters>
        This cmdlet supports the common parameters: ErrorAction, ErrorVariable
#>
```

Parameters

Type	Name	Description
String	Workspace	The name of the workspace that contains the item
Long	ItemId	The ID of the item to update
Item	InputObject	The Fusion 360 Manage item that should be updated.
Hashtable	Properties	The according fields in Fusion 360 Manage which should be updated
(Hashtable/PsObject)[]	AffectedItems	The items which should be linked to the according item.
String	WorkflowAction	The name of the Workflow Action which should be performed on the item
String	Comment	A comment associated with the performed Workflow Action

Return type

Item ← on success.
empty ← on failure. Exception/ErrorMessage can be accessed using $Error.

Remarks

The cmdlet supports passing all versions of an item.
This means that for a *revision-controlled* workspace, not only *working versions* but also the *latest versions* of an item can be updated.

Properties

To update the properties of a Fusion 360 Manage item, the *-Properties* parameter allows passing a set of key-value pairs for the *fields* which should be updated.
The name (key) of the properties is the same as displayed in the user interface of Fusion 360 Manage.
Fields that are **not** declared in the hashtable, will **not** be updated in Fusion 360 Manage. In other words, only the passed fields will be changed.

Limitations and requirements

Additional information about the limitations and requirements of the possible fields can be found *here*.

Affected Items

The Cmdlet can be used to *update the links* of an item to other existing items in Fusion 360 Manage.
The passed -*Workspace* has to be *configured properly* and must allow reading/writing the according affected items in the Linked Items Tab.
This tab is often known as Managed Items- or Affected Items Tab (or even *"Workflow Items"*, *"Associated Change Orders"*, . . .) within *revisioning* workspaces.

The *required properties* for linking items can be passed using the `Workspace` and `Id` information.

Additionally, it is possible to set or update custom *Linked Item Properties*. Specify the according fields and values as key-value pairs in the object passed to the -*AffectedItems* parameter (same as for the -*Properties* parameter).

Moreover, items from revision-controlled workspaces can have the optional property `@{'LinkedItem_EffectivityDate'=...}` assigned. The effectivity date is set to '*On Release*' when the property is not specified.

By default newly created items in these workspaces have the lifecycle state Unreleased.
Lifecycle transitions which are starting from such a state can be specified by using the `@{'LinkedItem_LifecycleTransition'= ... }` property. When the property is not specified, no lifecycle transition will be assigned to the affected item.

Assign initial lifecycle transitions

When linking items from Revision Controlled Workspaces it is recommended to assign valid **lifecycle transitions** to all the newly added affected item links.
In certain cases *Workflow Actions* can not be performed on items when they contain affected items without lifecycle transitions specified (for instance when moving the item to a locked workflow state).

Workflow Action

Workflow actions can only be performed on items in a Workspace with Workflow.

When performing workflow actions on a Fusion 360 Manage item, various requirements must be taken into consideration in order to prevent failures when executing the Cmdlet. Possible restrictions can occur for example when the user does not have the required *Workflow permissions*, when *Workflow preconditions* or *validation controls* are not met, when attempting to change to an *invalid or impossible state*, if the item is in a *locked state* or if a *Comment* is required by a workflow action.

The -Comment parameter is only available in combination with the -WorkflowAction parameter.

Update properties by passing the item as pipeline input

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$items = Get-FLCItems -Workspace 'Tasks' -Filter 'ITEM_DETAILS:TASK_ID=TK000059'

$items[0] | Update-FLCItem -Properties @{ "Notes" = "All certification documents are up␣
↪to date"; "Reviewers Assigned" = @("Berry, Jan") }
```

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```
<#
Id                 : 7615
Workspace          : Tasks
RootId             : 7615
WorkflowState      : Open
LifecycleState     : Production
Number             : TK000059
Type               : SIM CFD
Description        : Attach results summary of thermal CFD studies.
Phase Needed By    : Development
Owner              :
Completed By       :
Reviewers Assigned : {Berry, Jan}
Reviewed By        :
Notes              : All certification documents are up to date
Image              : {255, 216, 255, 224...}
Related Product    :
Orig Start Date    : 13.12.2014 00:00:00
Orig End Date      : 25.12.2014 00:00:00
Orig Duration      : 12
#>
```

Update item fields of various types

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$imageBytes = Get-Content -Path 'thumbnail.png' -Encoding Byte -Raw

$item = Update-FLCItem -Workspace 'Items' -ItemId 6796 -Properties @{
   'Title' = 'required'                                    #Field Type: Single Line Text
   'Description' = '<p><b>Updated paragraph!</b></p>'      #Field Type: Paragraph
   'Type' = $null                                          #Field Type: Radio Button
   'Unit of Measure' = 'Cubic Centimeter'                  #Field Type: BOM UOM Pick List
   'Estimated Cost'  = 9000.5                              #Field Type: Money
   'Country' = 'United States'                             #Field Type: Defined Pick␣
↪List - Single Selection
   'PDM Last Modification Date' = (Get-Date)               #Field Type: Date
   'Image' = $imageBytes                                   #Field Type: Image
   #'My custom checkbox' = $true                          #Field Type: Check Box
}
```

Add Affected Items to an existing item

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$affectedItemsToAdd = @()

# Add item from a Revision Controlled Workspace
$affectedItemToAdd = (Get-FLCItems -Workspace 'Items' -Filter 'itemId=2886')[0]
$affectedItemToAdd | Add-Member -Name 'LinkedItem_LifecycleTransition' -Value 'Initial␣
```

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```
↪Design Revision' -Type NoteProperty
$affectedItemToAdd | Add-Member -Name 'LinkedItem_EffectivityDate' -Value (Get-Date ...)␣
↪-Type NoteProperty
$affectedItemsToAdd += $affectedItemToAdd

# Add item from a Non-Revision Controlled Workspace (no lifecycle transition and␣
↪effectivity date can/must be specified)
$affectedItemsToAdd += @{
   'Id' = 123
   'Workspace' = 'Products'
   'LinkedItem_CustomField' = 'My custom field'
}

$item = Update-FLCItem -Workspace 'Change Orders' -ItemId 6796 -AffectedItems
↪$affectedItemsToAdd
```

Update the workflow state of an item

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$item = (Get-FLCItems -Workspace 'Change Orders' -Filter 'itemDescriptor="CO000158"')[0]
if($item.WorkflowState -eq 'Pushing to ERP') {
   $item = Update-FLCItem -InputObject $item -WorkflowAction 'Complete' -Comment 'State␣
↪updated by powerFLC'
}
```

Error handling, analyze why updating Item Properties failed using $Error

```
Connect-FLC -Tenant 'your_tenant_name' -ClientId 'your_client_id' -ClientSecret 'your_
↪client_secret' -UserId 'your_email@example.com'

$item = Update-FLCItem -Workspace 'Approval Lists' -ItemId 7679 -Properties @{
   "Applicable To" = ''
}

if(-not $item){
   $Error[0].Exception #Returns "error.selectanoption: You must select an option for␣
↪Applicable To"
}
```

Requirements

In order to use the Cmdlets with your Fusion 360 Manage tenant you have to make sure that the *tenant is configured* correctly.

The cmdlets try to perform *as less requests as possible* to Fusion 360 Manage in order to ensure high performance.

Tenant configuration data

This means that configuration settings such as *Workspaces*, *Fields*, *Defined Picklist* values and *BOM UOM Picklist* values will be retrieved *only when required* from the connected Fusion 360 Manage tenant.

After retrieving these settings once, *no further request are required* as the results are cached by the product.

6.1.10 Connection

Cmdlets related to Fusion 360 Manage connection.

Name	Description
Connect-FLC	Connects to a Fusion 360 Manage tenant.

6.1.11 Items

Cmdlets for retrieving, adding and updating Fusion 360 Manage Item(s).

Name	Description
Get-FLCItem	Retrieves items from an Fusion 360 Manage workspace.
Add-FLCItem	Adds a new Item to a workspace in Fusion 360 Manage.
Update-FLCItem	Updates properties and affected items and performs workflow actions on an existing Item in Fusion 360 Manage.
Get-FLCItemAssociations	Retrieves Linked Items (or Managed Items) or Attachments for an Item in Fusion 360 Manage.

6.1.12 Attachments

Cmdlets related to Fusion 360 Manage Item Attachment(s).

Name	Description
Add-FLCAttachment	Adds an attachment to an existing Item in Fusion 360 Manage.
Save-FLCAttachment	Downloads the specified attachment from Fusion 360 Manage to a local path.

6.1.13 BOMs

Cmdlets for retrieving and manipulating Fusion 360 Manage Item Bom(s).

Name	Description
Get-FLCBOM	Retrieves the BOM of an FLC Item.
Update-FLCBOM	Manipulates the BOM of an existing Item in Fusion 360 Manage.

6.2 Objects

6.2.1 Attachment

The Attachment object is of type *PsObject* and represents an Attachment of a specific Item in Fusion 360 Manage.

Syntax

```
$attachment.Title
```

Following properties are available :

Type	Name	Description
long	Id	The ID of the attachment.
long	ItemId	The ID of the Item that the file is attached to in Fusion 360 Manage.
string	Workspace	The name of the workspace containing the attachment.
string	Title	The title of the attachment.
string	FileName	The file name of the attachment.
string	Folder	The folder name of the attachment.
string	Description	The description of the attachment.
long	Size	The file size of the attachment (in bytes).
long	Version	The current version of the attachment.

Example

```
Id          : 266
ItemId      : 7624
Workspace   : Tasks
Title       : Moldflow_p680_Enclosure
FileName    : Moldflow_p680_Enclosure.pdf
Folder      :
Description :
Size        : 585272
Version     : 1
```

6.2.2 BomRow

The BomRow object is of type *PsObject* and represents an individual line item in a BOM of a specific Fusion 360 Manage Item.

The $bomRow object is dynamically created depending on the defined Custom BOM fields which are assigned to a *View* in the Bill of Materials Tab and additionally provides all the members from the corresponding *Item*.

The *BOM specific properties* have the same name as the BOM Fields in Fusion 360 Manage starting with the *'Bom_'* prefix (regardless of the used display names in the different BOM Views).
Properties that include whitespaces can be accessed by enclosing them in single quotes.

Syntax

```
$bomRow.Bom_PositionNumber
```

The following Standard BOM fields are always available in addition to the *Item* members:

Type	Name	Description
Integer/long	Bom_PositionNumber	The line number of the item in the BOM
Decimal	Bom_Quantity	The quantity of the item in the BOM
String	Bom_UnitAbbreviation	The Unit Abbreviation value of the BOM line item (e.g. EA, kg, mm,. . .).

The *Unit of Measure* property on the according *Item* returns the full Unit name instead.”

Remarks

Similar as for *Item Fields*, the Custom BOM field properties are converted to a corresponding PowerShell data type based on the configured Field types in Fusion 360 Manage.

Examples

Example of a single line item in BOM of Item *‘699-00001 - p681 GeForce GT210’*:

```
Id                            : 7516
Workspace                     : Items
RootId                        : 7516
Bom_PositionNumber            : 2
Bom_Quantity                  : 1.0
Bom_Ref Des                   :
Bom_Source                    : Vault
Bom_Row Order                 : 2
Bom_Qty Pos                   : 1
Bom_Lead Time Min             :
Bom_Lead Time Max             :
Bom_Total Cost Min            :
Bom_Total Cost Min            :
Bom_Total Cost                : 3.227
Bom_Lead Time                 :
Bom_Est. Total Cost           :
Bom_Total Weight              :
Bom_Maximum Recycling Per... :
Bom_Minimum Recycling Per... :
Bom_Total Plastic Waste       : 0.0
Bom_Total Potential Carb ... : 0
Bom_Total Carbon Emissions    : 0.0
Number                        : 680-00001
Title                         : GeForce GT210
Type                          : Mechanical
LifecycleState                : Production
Unit of Measure               : Each
```

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```
...
PDM_UNIT_OF_MEASURE          : Box
PDM Category                 : Part
PDM Location                 : $/Designs/680
Responsible Designer         : Administrator
PDM Last Modification Date   : 06.04.2023 00:00:00
PDM Maturity                 :
PDM_STATUS_NAME              : Released
PDM_ITEM_REVISION            : B
PDM_ITEM_VERSION             :
PDM_MASS                     :
PDM_SIZE                     :
PDM_KEY_PARAMETERS           :
PDM_ITEM_ID                  : 1679012
PDM_MASTER_ID                : 2101102
PDM_OBJECT_ID                : 680-00001
PDM_PROJECT_ID               :
PDM_VAULT_NAME               : Vault
Source PDM                   : Vault
Top Level Class              : Items
Class Path                   : Items
Class Name                   : Items
```

6.2.3 FLCConnection

The FlcConnection object is of type *FusionLifecycleProxy.FusionLifecycle.IFusionLifecycleConnection* and provides the required information for directly accessing the Fusion 360 Manage APIs.

The $flcConnection is available after beeing *connected* to the Fusion 360 Manage tenant.

Syntax

```
$flcConnection.Url
```

Following properties are available :

Type	Name	Description	Access type
string	Tenant	The name of the connected Fusion 360 Manage tenant	read-only
System.Uri	Url	The base URL for sending requests to the Fusion 360 Manage API Endpoints, in the format `https://<Tenant>.autodeskplm360.net/`.	read-only
string	UserId	The e-mail address of a particular user who is performing the requests to Fusion 360 Manage.	read-only
string	AuthenticationToken	The access token that was returned after a successful Forge authentication, in the format `Bearer <Token>`. Automatically returns a refreshed token when the previous token expired.	read-only
IWorks	Workspace	A collection of workspaces accessible on the current tenant.	read-only

Example

```
Tenant                   : previewcoolorange
Url                      : https://previewcoolorange.autodeskplm360.net/
UserId                   : info@coolorange.com
AuthenticationToken      : Bearer eyJhbGciOiJIUzI1NiIsImtpZCI6Imp3dF9zeW1tZXRyaWNfa2V5In0.
↪eyJjbGllbnRfaWQiOiJua2VyWlFoQUZFZ3Q5ZjIzSms4YVE2QjJOZVJhTFNqVSIsImV4cCI6MTU3NDI2OTc2MSwic2NvcGUiOlsid
↪xe2-CYW3HFmO1x0figGuFVKFeS9_URlQsLjhGXyrK8g
Workspaces               : {Products, Tasks, Items, Documents...}
```

6.2.4 Item

The Item object is of type *PsObject* and represents an Item of a specific workspace in Fusion 360 Manage.

The $item object is dynamically created depending on the defined *Fields* which are assigned to a *Section* or *Matrix* in the Item Details Tab.
Each field is attached to the PsObject as NoteProperty member with the same name and value as defined in the Fusion 360 Manage workspace.
Properties containing white spaces can be accessed by enclosing them in single quotes.

Syntax

```
$item.Id
```

The following properties provide information about the item itself:

Type	Name	Description
long	Id	A unique identifier for the item in Fusion 360 Manage.
long	RootId	A unique identifier for the root item of the current item version in Fusion 360 Manage.
string	Workspace	The name of the workspace containing the item.
string	WorkflowState	The name of the workflow state the item is currently in. Only available in Workspaces with Workflows.
string	LifecycleState	The name of the lifecycle state the item is currently in.

Remarks

Depending on the configured Field types in Fusion 360 Manage the properties are converted to a corresponding PowerShell data type.

Fusion 360 Manage	PowerShell
Auto Number	String
Integer	Integer
Float	Decimal
Date	DateTime
Single Line Text	String
Paragraph	String
Paragraph w/o Line Breaks	String
Check Box	Boolean
Image	byte[]
BOM UOM Pick List	String
Defined Pick List - Single Selection	String
Defined Pick List - Multiple Selection	String[]
Workspace Pick List - Single Selection	*Item*
Workspace Pick List - Multiple Selection	*Item[]*

Example

```
Id                                    : 7552
Workspace                             : Products
RootId                                : 7552
WorkflowState                         : In Design
LifecycleState                        : Production
Number                                : 900-00004
Description                           : DESKTOP Compute Kepler (GK) Tesla K40 PCIe 12GB␣
↪10.5in Long
Task Template                         : @{Id=7561; Workspace=Project Task Template;␣
↪Number=TT000001;
                                                Name=Consumer High Tech; ... }
Bracket Width                         : Double Slot
Length                                : 10.5
Marketing Name                        :
Memory Size                           : 12GB
PCB Form Factor                       : PCIe
Processor Family                      : Kepler (GK)
Product Class Name                    : DESKTOP_COMPUTE
Project Number                        : K40
Volume                                :
Volume Current                        :
Volume Diff                           :
Volume Comment                        :
ASP                                   :
ASP Current                           :
ASP Diff                              :
ASP Comment                           :
Product Cost                          :
Product Cost Current                  :
Product Cost Diff                     :
Product Cost Comment                  :
Revenue                               :
```

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```
Revenue Current                       :
Revenue Diff                          :
Revenue Comment                       :
Margin                                :
Margin Current                        :
Margin Diff                           :
Margin Comment                        :
Concept Approvers                     :  {Black Amanda, Miller Boris}
Concept Approvers Has                 :
Requirements Definition Approvers     :
Requirements Definition Approvers Has :
Development Approvers                 :
Development Approvers Has             :
Validation Testing Approvers          :
Validation Testing Approvers Has      :
Pilot Run Approvers                   :
Pilot Run Approvers Has               :
Production Approvers                  :
Production Approvers Has              :
Product Families                      : {@{Id=7553; Workspace=Product Description␣
↪Generator; Code=DG000003;
                                                 Class Name=DESKTOP_COMPUTE; ... },
                                                 @{Id=7551; Workspace=Product␣
↪Description Generator; Code=DG000002;
                                                   Class Name=DESKTOP_PRO; ... }}
Industry                              : Consumer High Tech
Classification Values                 : MARKETING_NAME:, MEMORY_SIZE1:12GB, LENGTH:10.5,␣
↪PROJECT_NUMBER:K40,
                                              PCB_FORM_FACTOR:PCIe, PROCESSOR_
↪FAMILY:Kepler (GK),
                                              PRODUCT_CLASS_NAME:DESKTOP_COMPUTE,␣
↪BRACKET_WIDTH1:Double Slot,
```

6.2.5 Linked Item

The Linked Item object is of type *PsObject* and represents the link between two Fusion 360 Manage Items.

The $linkedItem object provides all the members from the linked *Item* and additionally all the details which are specific to this link.
The properties can be retrieved with a *'LinkedItem_'* prefix and the same name as the *Fields* displayed in the Fusion 360 Manage Linked Items Tab, however if they contain whitespaces they must be be accessed by enclosing them in single quotes.

Managed items which are revised/released through this link relationship (even known as *Affected Items*, *Workflow Items* or *Associated Change Orders*) provide additional properties which can be retrieving using this *'LinkedItem_'* prefix.

Syntax

```
$linkedItem.Id
```

For linked items from *revision-controlled* workspaces a set of predefined Fields is always available in addition to the members of the related *Item* revision.
They are only meaningful to Managed Items:

Type	Name	Description
Nullable[DateTime]	LinkedItem_EffectivityDate	A date at which the Managed Item will become or has been effective.
String	LinkedItem_LifecycleTransiti	The current lifecycle phase of the Managed Item.
String	LinkedItem_FromRevision	The initial item revisions name
String	LinkedItem_ToRevision	The resulting item revisions name

Remarks

The property `LinkedItem_EffectivityDate` contains the date in which an item in a revisioning workspace is revised/released. If no specific date is set, the effectivity date is implied by the release date of the change order. In the Fusion 360 Manage UI the value *On Release* is displayed in the text box. Since this is not a valid date format the property is displayed as **empty** by the Cmdlet.

Similar as for *Item Fields* even the values of Custom Linked-Item fields are provided as a corresponding PowerShell data type depending on their configured Field types.

Examples

Example of an Affected Item which gets modified as part of a Change Order:

```
Id                              : 7531
Workspace                       : Items
RootId                          : 7519
LinkedItem_LifecycleTransition  : Production Revision
LinkedItem_EffectivityDate      : 6/7/2021 12:00:00 AM
LinkedItem_FromRevision         : A
LinkedItem_ToRevision           : B
LinkedItem_Comment              : Screw
LinkedItem_Proposed Change      :
LinkedItem_Change performed     :
LinkedItem_Stock Quantity       : 1.2
LinkedItem_Stock Value          :
LinkedItem_Disposition          : Use Until Depleted
LinkedItem_Make or Buy          :
LinkedItem_Pending Supplies     : False
LinkedItem_Pending POs          : False
LinkedItem_Next PO Date         :
LinkedItem_Next PO Quantity     :
LinkedItem_Next PO Action       :
LinkedItem_Last Update by ERP   :
LinkedItem_PO_DATA              :
...
```

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```
Number                          : 367-00001
Title                           : ENCLOSURE Injection Molded PC
Description                     : <p>Consumer High Tech</p>
Prefix                          : 000
Industry                        : Consumer High Tech
```

CHAPTER

SEVEN

LOGGING

powerPLM (powerFLC) uses Apache log4net as core logging library, and additionally PostSharp Diagnostics for extended Debug logging.

By default, all the logs are stored in a logfile located in *'C:\Users\{USER}\AppData\Local\coolOrange\powerFLC\Logs\powerFLC.log'* and it contains only Infos, Warnings and Errors.

The log4net settings file is located in *C:\Program Files\coolOrange\Modules\powerFLC\powerFLC.log4net*.
Further information about log4Net Configurations can be found here.

You can change the logging behavior of:

- the *Workflows*
- the *Vault Menu* Addin
- the *PowerShell IDE*

7.1 When to change the logging behavior?

When you have issues or when you want to get a more detailed knowledge about what went wrong, you can increase the Logging Levels.

Note: When changing the loglevel to *DEBUG* PostSharp Diagnostics will be enabled and will log all the function calls into the log files. This could cause performance issues

Additionally you can change the logfile location or integrate the logging mechanism into your administrative environment by using build in EventLogMessages etc.

7.2 Workflows

When you need to get more details of errors that happen for *Sample or Custom Workflows*, this are the right places to increasing the Logging Levels.

Since workflows consists of powerJobs Processor Jobs, they are writing directly to the powerJobs Processor - Trace Window and its LogFile located in *'C:\Users\{USER}\AppData\Local\coolOrange\powerJobs Processor\Logs\powerJobs Processor.log'* by default.
Therefore the powerJobs - JobProcessor Addin sections are the right places where you want to configure the logging behavior for workflow jobs like *Sample.TransferItemBOMs*.

The following sections are used to control the logging behavior for the *Cmdlets*.

```
<logger name="powerFLC.Cmdlets">
        ...
</logger>
<logger name="coolOrange.Powershell">
        ...
</logger>
```

Both of them make use of the following main *LogAppender* by default:

7.2.1 LogFile

The *FileAppender* is the main appender and most loggers us it:

```
<appender name="FileAppender" type="log4net.Appender.RollingFileAppender">
```

If you want to change the Logging Levels for the logfile, please visit in the configuration file in the lines:

```
<root>
        <level value="INFO" />
        <appender-ref ref="FileAppender"/>

</root>
```

In that root element, you can configure the logginglevel for all appenders. You could set the level to "DEBUG", than all the appenders will log in debug.
In the line

```
<param name="File" value="${LOCALAPPDATA}\coolOrange\powerFLC\Logs\powerFLC.log" />
```

you can configure the outputpath and name of the logfile.

7.3 Vault Menu Addin

Following section is used to control the logging behaviour for the *Vault Menu extension*:

```
<logger name="powerFLC.VaultExtension" />
```

Only the *LogFile* appender is used.

7.4 PowerShell IDE

When using the powerFLC cmdlets in PowerShell environments, or when debugging or creating workflows in PowerShell IDEs, all the logs that would be shown in the powerJobs Processor - Trace Window are written into the PowerShell *console window*.

In order to customize the logging level in the console window, visit following appender:

7.5 ColoredConsoleAppender

ColoredConsoleAppenders are working for PowerShell IDE's that support console windows.

```
<appender name="ColoredConsoleAppender" type="log4net.Appender.ManagedColoredConsoleAppender">
```

In the lines

```
<filter type="log4net.Filter.LevelRangeFilter">
        <levelMin value="INFO" />
        <levelMax value="FATAL" />
</filter>
```

you can configure the required Logging Levels. You could set the minimal filter level to "DEBUG", than all the levels between the range Debug and Fatal will be logged.

We are using a ManagedColoredConsoleAppender, therefore you could also change the colors of the messages, depending on their log level:

```
<mapping>
        <level value="DEBUG" />
        <backColor value="White" />
</mapping> <mapping>
        <level value="INFO" />
        <backColor value="Green" />
</mapping> <mapping>
        <level value="WARN" />
        <foreColor value="Black" />
        <backColor value="Yellow" />
</mapping> <mapping>
        <level value="ERROR" />
        <backColor value="Red" />
</mapping> <mapping>
        <level value="FATAL" />
        <backColor value="Red, HighIntensity" />
</mapping> </sxh>
```

Troubleshooting

However the **PowerShell ISE** currently does not support *console logs* at all.

CHAPTER

EIGHT

CHANGE LOGS

8.1 powerPLM (powerFLC) v26

8.1.1 v26.0.2

`10-06-2025`

Fixed

- Issue where importing the *powerFLC* module fails in client customizations for Inventor 2025 and Inventor 2026.

8.1.2 v26.0.1

`09-05-2025`

Features

- Added support for PowerShell 7, enabling cmdlets to seamlessly run in both Windows PowerShell and PowerShell Core

General

- Added support for Vault 2026

8.2 powerPLM (powerFLC) v25

8.2.1 v25.0.9

`14-01-2025`

General

- Shared third-party Libraries (e.g. log4net) are no longer installed into the GAC but are now merged to avoid conflicts with other products and plugins
- Updated Licensing to version: 18.4.7
- Changed color for WARN log messages in Console to make them easier to read

8.2.2 v25.0.3

`24-05-2024`

Features

- Updated Licensing to version: 18.4.1.
  The product can now be easily activated on new environments via a single customer key - together with all other coolOrange products in your subscription.
- The *Transfer Item BOMs* workflow has been updated for Autodesk's official standard "Items" workspace
- For this, the *Configuration Manager* dialog now allows easy mapping of Vault *Id* and *MasterId*, e.g. to enable the new Vault Thin and Thick Client buttons on transferred Fusion Manage "Items"

General

- Added support for Vault 2025
- The Windows Start Menu now contains the coolOrange-wide *Licence Manager* instead of the *powerFLC License Information* shortcut
- Introduced a new product icon that's simpler and easy to recognize within our product portfolio
- The *Sample.TransferItemBOMs.json* file now contains appropriate property and field mappings for the *"Items"* workspace
  (Vault Thin Client links, for example, are now calculated by Fusion Manage to simplify updates after changes to the ADMS name)
- Removed sample code for populating the Part List Details Grid in the *Transfer Item BOMs* job, along with the related settings `'Grid ID Field'`, `'Enable Grid Transfer'` and `'Transfer Grid only if BOM is merged'`.
  Additionally, the setting `'Use RowOrder as BOM Position'` is no longer necessary for the Bill of Materials transfer and has been removed.
  The original sample can be found on coolOrangeLabs.
- Added DEPRECATED support for removed *CleanupWorkingDirectory* function

Fixed

- "Page not found" error page opens after clicking "How To: Configure Custom Jobs…" in the *Configuration Manager* dialog

Breaking Changes

Removed CleanupWorkingDirectory function
The `CleanupWorkingDirectory` function from the provided *coolOrange.powerFLC.Workflows.Common.psm1* module has been removed.
With powerJobs Processor v22.0.19 the working directory is automatically cleaned up after every job execution.
If required, the Clean-Up cmdlet can be used directly in the custom workflow jobs.

8.3 powerPLM (powerFLC) v24

8.3.1 v24.0.4

`13-09-2023`

General

- Adapted to Autodesk Platform Services API changes: Authentication v2 and deprecation of v1

8.3.2 v24.0.3

`12-09-2023`

General

- Changed mapping functions for Vault Thin and Thick client links to use properties provided by powerVault

Breaking Changes

Mapping functions for Vault Thin and Thick client links require a minimum version of powerVault
Requires powerVault version 24.0.5 or higher so that *GetVaultThinClientLink and GetVaultThickClientLink* work properly.

Fixed

- Issue where Thin and Thick client link where not generated correctly when the Vault name contained a whitespace

8.3.3 v24.0.2

`20-07-2023`

General

- Updated Licensing to version: 18.3.1

8.3.4 v24.0.1

`05-05-2023`

General

- Added support for Vault 2024
- Updated Licensing to version: 18.2.29
- End User License Agreement (EULA) has changed

8.4 powerPLM (powerFLC) v23

8.4.1 v23.0.2

`14-07-2022`

Fixed

- Compatibility-Issue with the *Open-VaultConnection* cmdlet of powerJobs Processor v23.0.1.
  The module *coolOrange.powerFLC.Workflows.Common.psm1* caused job executions to fail logging into Vault (*"System.Exception: Failed to login to Vault"*).

8.4.2 v23.0.1

`22-04-2022`

Features

- Added support for Vault 2023

8.5 powerPLM (powerFLC) v22

8.5.1 v22.0.22

`26-01-2022`

Features

- *Get-FLCItems* supports retrieving the *latest versions* of *revision-controlled* Items
- Extended *Item* result with new member `RootId`, which allows to determine the root item for different item versions

General

- *Transfer Item BOMs* and *Update-FLCBOM*: Improved performance by reducing the amount of requests to Fusion 360 Manage, which check if the passed BOM line items already exist in the BOM
- The *Change Management* workflow job correctly searches for Change Order items with the configured *Trigger State* by enclosing the name of the workflow state (which can contain spaces) in double quotes

Fixed

- *Get-FLCItems*: Issue with *revision-controlled* items not beeing returned when using the `itemId` property in the *-Filter* argument to search for non-*working versions*
- The *Change Management* workflow job therefore failed to transfer newly added item records from the Vault Change Order to the Affected Items tab, when new revisions where created for the according Fusion 360 Manage Item
- *Configuration Manager*: Issue were sometimes the dialog did not open after logging into Vault

Breaking Changes

Get-FLCItems -Filter searching terms which include spaces must be enclosed in double quotes
When upgrading from an earlier version of powerPLM (powerFLC), custom workflow jobs which make use of the *Get-FLCItems* cmdlet with *-Filter* expressions that **include spaces, but are not enclosed in double quotes** might not work properly!
So that such searching terms are not considered invalid by the Fusion 360 Manage backend, the words which include the spaces must simply be enclosed in double quotes (see Autodesk help: Exact matching).

Example:

```
Get-FLCItems ... -Filter "owner=`"Doe John`""
```

8.5.2 v22.0.21

16-12-2021

Features

- *Connect-FLC* provides following functionalities:
  - The Cmdlet automatically retrieve the *configured Tenant Setting* when it gets used *without* parameters or with the *-UseSystemUserEmail* parameters and the application is connected to Vault.
  - If an application already has an open connection to Fusion 360 Manage, the cmdlet does not recreate a new connection, and reuses the existing *FLCConnection*.

General

- Improved performance of Cmdlets in job processor environments

Fixed

- *Cmdlets*: Issue that cmdlets stopped working after about 30 minutes because the *access token* expired.

Breaking Changes

Removed $tenant variable in Workflows
The **$tenant** variable which was used in Workflows for connecting to FLC, was removed and can be replaced by making use of the *Connect-FLC* cmdlet:

Previous	Now

`$jobs = $vault.JobService.GetJobsByDate([int]::MaxValue, [DateTime]::MinValue)`
`$vaultUser = $vault.AdminService.GetUserByUserId(($jobs | Where-Object { $_.Id -eq $job.Id }).CreateUserId)`
`Connect-FLC -Tenant $tenant.Name -ClientId $tenant.ClientId -ClientSecret $tenant.ClientSecret -UserId $vaultUser.Email`
	`Connect-FLC`

`Connect-FLC -Tenant $tenant.Name -ClientId $tenant.ClientId -ClientSecret $tenant.ClientSecret -UserId $tenant.SystemUserEmail`	`Connect-FLC -UserSystemUserEmail`

8.5.3 v22.0.17

`02-12-2021`

General

- Two *Setups* are provided to install Cmdlets and Workflow components separately
- *License types* **powerFLC Client** and **powerFLC Processor** have been introduced

> **Warning:** When upgrading from previous versions it is recommended to uninstall the old version and re-installing the latest version

8.5.4 v22.0.16

`28-10-2021`

Features

- *Transfer Item BOMs* workflow job: Added validation for the Fusion 360 Manage properties specified in the *field mapping groups* *Vault BOM → FLC BOM* and *Vault Item → FLC Item*.
  Erroneous entries lead to a failing job and the user is notified in the Vault JobQueue, powerJobs Processor logfile- and Trace Window.

General

- Updated Licensing to version: 18.2.27

Fixed

- Adapted *Transfer Item BOMs* workflow job to function with latest released Fusion 360 Manage tenant.

8.5.5 v22.0.15

`06-09-2021`

Fixed

- *Transfer Item BOMs* workflow job: Issue with validating the existence of all related Fusion 360 Manage items by using separate *Get-FLCItems* calls for each item.

8.5.6 v22.0.14

`02-09-2021`

Features

- The *Transfer Item BOMs* workflow job updates *Item Details* only if the description has changed since the last transfer.
  Additionally they are directly updated even for all the Vault Items contained in the BOM.

General

- **Significant performance improvements for the *Transfer Item BOMs* workflow:**
  - *Get-FLCItems*, *Add-FLCItem*, *Update-FLCItem*, *Get-FLCBOM* and *Update-FLCBOM*: Improved performance for workspaces with Image fields by only downloading their content when the according properties are accessed
  - *Get-FLCBOM*: Improved performance when retrieving large BOMs from Fusion 360 Manage
  - Replaced *Function mappings* for retrieving primary Item-File Links from Vault with new field mapping group *"Vault Primary File properties - FLC Item fields"*
  - *Add-FLCItem*: Improved performance by reducing the amount of requests to Fusion 360 Manage when Item details are not accessed
  - the workflow job validates the existence of all related Fusion 360 Manage Items in a single *Get-FLCItems* call
- *Get-FLCItemAssociations* and *Change Management* workflow: Improved performance for workspaces with Image fields by only downloading their content when the according properties are accessed
- *Update-FLCItem*: Improved performance by reducing the amount of requests to Fusion 360 Manage when Item details are not accessed
- The *Transfer Item BOMs* workflow job is now split into distinct sections, whereby all Fusion 360 Manage Items are processed in the first part of the workflow job, followed by the BOM update
- Cosmetic changes to all scripts:
  - Parameters are now written in PascalCase to be consistent with PowerShell Standard
  - Functions are now called with their named parameters instead of positional once to be consitent with other coolOrange scripts
  - Removed usage of pipes where it hurt the readability of the script
- Updated Licensing to version: 18.2.26

Fixed

- *Connect-FLC* and *Standard Workflows*: performance issues when product is *activated*

Breaking Changes

Configuration of Transfer Item BOMs workflow
When upgrading from an earlier version of powerPLM (powerFLC) the configuration of the *Transfer Item BOMs* workflow must be *imported* again!

In order to keep the modifications which were performed in this workflow configuration, the following modifications have to be performed on the existing *field mapping groups*:

- rename the field mapping group *"Item Field Mapping"* to *"Vault Item → FLC Item"*
- rename the field mapping group *"BOM Field Mapping"* to *"Vault BOM → FLC BOM"*
- rename the field mapping group *"Grid Field Mapping"* to *"Vault BOM → FLC Grid"*
- create a new field mapping group named *"Vault primary Item-File Link → FLC Item"* for *Item-* and *File Fields*. All the mappings from the field mapping group *"Item Field Mapping"*, which contains functions starting with `"GetPrimaryFile"`, have to be added to this field mapping group.
  Instead of the *Functions*, the corresponding settings can simply to be set in the *Vault File Property* column.

Removed GetPrimaryFile* functions
All the custom workflows which contain *field mappings* that are using one of the following *Functions* are affected: `GetPrimaryFileName`, `GetPrimaryFileFolder`, `GetPrimaryFileVersion`, `GetPrimaryFileProvider`, `GetPrimaryFileCategory`, `GetPrimaryFileState`, `GetPrimaryFileRevision`, `GetPrimaryFileProject`.

The module *coolOrange.powerFLC.Workflows.MappingFunctions.psm1* must be temporarily saved apart before upgrading to the latest version of powerPLM (powerFLC).
After the upgrade, the new version of this file can simply be replaced with your previous version, so that the removed functions are available again in the *Configuration Manager* dialog.

8.5.7 v22.0.11

`20-07-2021`

Features

- Added *Change Management* workflow for synchronizing Change Orders from Fusion 360 Manage to Vault and vice versa, based on a customizable powerJobs Processor Job.

8.5.8 v22.0.9

`07-07-2021`

Features

- New Cmdlet: *Get-FLCItemAssociations* provides functionality to
  - retrieve Linked Items (or Managed Items) of a Fusion 360 Manage Item.
  - retrieve Attachments of a Fusion 360 Manage Item.
- New Cmdlet: *Save-FLCAttachment* to download a specified attachment from Fusion 360 Manage.
- Extended *Attachment* result with new members: `Id`, `FileName`, `Folder`, `Description`, `Size` and `Version`.
- *Update-FLCItem*: Extended functionality to link items to an existing item in Fusion 360 Manage by providing a new parameter *-AffectedItems*.

8.5.9 v22.0.3

`01-06-2021`

Features

- *Update-FLCItem*: Provided functionality to perform workflow actions on an item in a workspace by providing new parameters -*WorkflowAction* to execute a workflow action and -*Comment*.

Fixed

- *Cmdlets*: Issue with missing `WorkflowState` member on *Item* and *BomRow* results for *Revisioning Workspaces*.

8.5.10 v22.0.1

`29-04-2021`

Features

- Added support for Vault 2022

General

- Updated Licensing to version: 18.1.24
- End User License Agreement (EULA) has changed

8.6 powerFLC v21

8.6.1 v21.1.6

`02-03-2021`

Fixed

- *Update-FLCItem*: Issue where updating a Fusion Lifecycle Item failed for Workspaces that contain a Field of the following type:
  - *Workspace - Pick List*
  - *Defined - Pick List* of type *Radio Button*, *Show first value as default*, *Retains Last Saved Label* and *With search filter*
- *Update-FLCItem*: Issue where updating a Fusion Lifecycle Item failed for Workspaces that used a *Classification*.
- *Update-FLCItem* and *Add-FLCItem*: Issue where using the cmdlet on a workspace containing a matrix with an empty cell resulted in an error.

8.6.2 v21.1.4

`20-01-2021`

General

- Updated Licensing to version: 18.1.22

8.6.3 v21.1.3

15-12-2020

General

- Updated Licensing to version: 18.1.21
- Copyright notices have changed
- *Get-FLCBom*, *Update-FLCBom* and : Improved performance of operations required for transferring BOMs
- *Item* and *BomRow*: Properties are retrieved on demand when respective property is accessed

8.6.4 v21.1.2

16-09-2020

Features

- Added *Transfer Item BOMs workflow* workflow for transferring Vault Item BOMs to Fusion Lifecycle based on a customizable powerJobs Processor Job
- Replaced Settings Dialog with a *more customizable dialog*
- Workflows need to have the same name as their respective powerJobs Processor job to avoid confusion.

General

- Removed the *Administration Tab* in Vault Explorer that gave administrators the possibility to navigate to the transferred Fusion Lifecycle item and the opportunity for viewing and deleting these stored relationships.

Breaking Changes

Settings not restored
When upgrading from an earlier version of powerFLC the previous configuration for connecting to Fusion Lifecycle is lost and will not be restored!
The required information for connecting to Fusion Lifecycle have to be entered again in the Tenant Settings dialog.

Removed Standard Workflows
The stored configuration and the Job Processor extension for the *Synchronize Projects*, *Synchronize Change Orders*, *Transfer Files* and *Transfer File BOMs* workflows have been removed.
If required, the according workflows and their configurations have to be re-created using the more customizable Configuration Manager dialog by creating custom Workflow Jobs.

8.6.5 v21.0.6

01-07-2020

General

- *Add-FLCItem* and *Update-FLCItem*: Improved performance of item operations that require retrieving *SingleSelection-Defined Pick List*, *MultiSelection-Defined Pick List* or *BOM UOM Pick List* fields

Fixed

- *Cmdlets* and *Standard Workflows*: Issue where setting certain values on fields of type Pick Lists with User Defined values in Fusion Lifecycle did not work.

- *Cmdlets* and *Standard Workflows*: Issue where setting values other than the first 10 displayed in Fusion Lifecycle to a field of type BOM UOM Pick List resulted in an error.
- Issue in *Transfer Files* and *Transfer File BOMs* workflows, where setting a single value to a Fusion Lifecycle field of type Multiple Selection Pick List resulted in an error.

8.6.6 v21.0.4

`16-06-2020`

- *Cmdlets*: Official Release

Fixed

- Compatibility-Issue with other coolOrange products using an older *Logging* version

8.6.7 v21.0.3

`01-05-2020`

General

- Renamed *vaultFLC* to *powerFLC*

Breaking Changes

Renamed Powershell module
Renamed *Powershell Module* *vaultFLC* to *powerFLC*.
All scripts which use `Import-Module vaultFLC` have to be changed to `Import-Module powerFLC`.

License Registration
The License has to be registered again using the same serial number or activation file.

Registry Keys
Changed registry keys from `HKEY_LOCAL_MACHINE\SOFTWARE\coolOrange s.r.l.\vaultFLC` to `HKEY_LOCAL_MACHINE\SOFTWARE\coolOrange s.r.l.\powerFLC`.

8.6.8 v21.0.2

`28-04-2020`

Features

- Added support for Vault 2021

General

- End User License Agreement (EULA) has changed
- Updated Licensing to version: 18.1.17
- Added *vaultFLC Information* shortcut to startmenu
- Removed vaultFLC Help shortcut from startmenu as it can be accessed via vaultFLC Information shortcut
- Removed Splashscreen

8.7 vaultFLC v20

8.7.1 v20.0.9

`13-03-2020`

Features

- New cmdlet: *Get-FLCBom* to get the Fusion Lifecycle item's BOM data
- New cmdlet: *Update-FLCBom* for adding Items to a BOM, editing BOM line items or deleting Items from a BOM in Fusion Lifecycle

Fixed

- *Item-Object*: Issue with several cmdlets (e.g. *Get-FLCItems*) that hang or provide bad performance when retrieving items with Workspace Pick List fields

8.7.2 v20.0.8

`12-02-2020`

Features

- *Cmdlets*: Added support for the Image field type

Fixed

- Issue in *Transfer Files* and *Transfer File BOMs* workflows, when transferring property values of type Image
- *Get-FLCItems*: Issue where the Cmdlet is running into an endless loop when an item contains an image
- *Add-FLCItem* and *Update-FLCItem*: Issue where passing properties for date fields directly from Get-Date resulted in an error

8.7.3 v20.0.7

`30-01-2020`

Features

- New cmdlet: *Update-FLCItem* for updating properties of Items in Fusion Lifecycle
- New cmdlet: *Add-FLCItem* for adding an attachment to an Item in Fusion Lifecycle

General

- For *revision-controlled* Workspaces the *Synchronize Projects* and *Synchronize Change Orders* workflows are now synchronizing the *working versions* of the Fusion Lifecycle Items to Vault instead of the latest versions

Fixed

- Issue in *Transfer Files* and *Transfer File BOMs* workflows, where attachments were not uploaded to Fusion Lifecycle

8.7.4 v20.0.5

`09-01-2020`

Features

- New cmdlet: *Get-FLCItems* to get multiple Items from Fusion Lifecycle

8.7.5 v20.0.4

`12-12-2019`

Features

- New cmdlet: *Add-FLCItem* for creating Items in Fusion Lifecycle

Fixed

- Extended debug logging for *Cmdlets*
- Issues in *Transfer Files* and *Transfer File BOMs* workflows, when transferring property values:
  - values with *special characters*
  - values of type *Date*
  - values of type *Float* with multiple decimal places

8.7.6 v20.0.3

`22-11-2019`

Features

- Added *PowerShell module* (BETA)
- New cmdlet: *Connect-FLC* with according *$flcConnection* object for accessing Fusion Lifecycle APIs

General

- Updated Licensing to version: 18.0.10
- Added *install requirement*: PowerShell 4.0 or higher
- Moved *License.exe* and *logging configuration* to *PowerShell module install location*
- Splashscreen is now displayed when the first vaultFLC job is processed

8.7.7 v20.0.1

`15-10-2019`

- Rebranded: Name, Titles and Icons.

Warning: When upgrading from previous versions uninstall the old version before upgrading

powerPLM (powerFLC) allows the exchange of data between Vault and Fusion 360 Manage as well as PowerShell and Fusion 360 Manage.
This is made possible through Workflows and a set of PowerShell Cmdlets.

CHAPTER NINE

CMDLETS

The powerFLC module provides *commandlets* that allow creating scripts for **automating** the work with Fusion 360 Manage.
These Cmdlets allow to communicate with your Fusion 360 Manage Tenant in an easy to use and customizable way.

CHAPTER

TEN

WORKFLOWS

In order to create a solution for your own **defined scenarios** when working within Vault Client and exchanging data with Fusion 360 Manage, powerPLM (powerFLC) provides an according *Configuration-Manager* dialog to easily configure such a *Workflows*. Pre-installed *powerJobs Processor jobs* act as examples for the most common transfer scenarios from *Vault to Fusion 360 Manage* or vice versa.