Joint Effort: Vault and Fusion Lifecycle as the new dream couple

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Technical Evangelist | coolOrange
About the speaker

Christian Gessner

Christian Gessner is a co-founder and Technical Evangelist at coolOrange. In this role, he helps customers and resellers to use the right technology and tools to successfully design, implement and customize Autodesk data management solutions.

He has over 15 years of experience in software development with a focus on Autodesk data management products and Microsoft development technologies.

Prior to coolOrange, Christian was member of the data management software engineering team at Autodesk.

www.coolOrange.com
Agenda

• Introduction
• Out-of-the-box capabilities of powerFLC
• Architecture and the different components used by powerFLC
• Custom workflows to transfer data between Vault and Fusion Lifecycle
• Real-world use cases and benefits for customers
• Additional resources
Vault + Fusion Lifecycle

**Engineering**
- Copy design
- Version control
- Release history
- Engineering Documentation
- Engineering BOM Management
- Engineering Change Management
- Non-Eng Document Management
- In CAD support
- Multi-CAD support

**Process**
- NPI
- Tasks & actions
- Quality, Warranty
- Engineering requests
- Supplier Feedback
- Specifications
- Requirements
- Enterprise BOM

**Items**
- BOM
  - Change
  - Tasks

**Documents**

**Process**

**Engineering**

**Vault + Fusion Lifecycle**

**Engineering**

**Process**

**Vault + Fusion Lifecycle**
History of powerFLC

2014
Idea was born
coolOrange plays with the idea to connect Vault and PLM360 based on PowerShell cmdlets

2018
Prototype
In collaboration with Autodesk, coolOrange investigates in the topic again and starts developing a Vault-to-Fusion Lifecycle Connector

2019
Release of vaultFLC
coolOrange releases vaultFLC, a configurable connector with predefined workflows

2020
Release of powerFLC
coolOrange releases powerFLC, a configurable and customizable connector with unlimited workflows
vaultFLC vs. powerFLC

**vaultFLC**

- Hardcoded workflows
  - BOM workflow only supports Inventor files
- Configurable but **not** customizable
- Four built-in workflows
  - File centric BOM publishing
  - Change Order synchronization (file based)
  - Folder synchronization (NPI)
  - File (drawing) publishing
- Limited to built-in workflows
- Standalone Product

**powerFLC**

- Script-based workflows
  - Any objects in Vault supported
- Configurable and customizable
- One built-in workflow
  - Item centric BOM publishing
- **Extendable with any workflow**
  - Folder synchronization (NPI)
  - File centric BOM publishing
  - File (drawing) publishing
  - Change Order synchronization (ECO based)
  - Many others...
- Bundled with powerJobs Processor
  - powerJobs Processor license included
powerFLC
out-of-the-box capabilities
powerFLC – what’s in the box?

**powerFLC Processor**
- A full powerJobs Processor (with all jobs and possibilities)
- Cmdlets (/ˈkɒməldəts/) for reading, searching, creating, updating and uploading FLC items, attachments and BOMs
- Based on Autodesk Forge and the FLC V3 API
- Configuration Manager to change workflow behaviors and define property/field mappings
- Vault Item and BOM publishing workflow (created in collaboration with Autodesk)

Additional Workflow templates / samples available
Items and BOM workflow – Key Features

• **Vault Item centric**
  - Vault Item BOM is derived from CAD Data (Inventor, ACADM, ACADE, SWx) or built based on manually created items
  - Triggered on Vault item release (or any other lifecycle state transition)

• **Publish Vault Item metadata to FLC**
  - Item metadata
  - Primary linked file metadata
  - Vault thin- and thick client links

• **Publish engineering BOMs to FLC**
  - Merged BOM rows (Inventor “Part Number Row Merge Settings”)
  - Rows manually added in Fusion Lifecycle
  - Raw materials
  - Virtual Components
  - Cutting list (Part List Details)

• **Upload Vault Item attachments and associated files attachments**
• **Fusion Lifecycle App (workspace) available**
Items and BOM workflow – Process

Check in Inventor Assembly with Drawing
Assign / Update Item
Attach additional file to Item
Check in update from Inventor and set file state to “Released”
Create DWF & PDF
Assign / Update Item
Change Item Status that invokes the integration
powerFLC creates / updates Vault Items, maps defined properties & uploads files

- **IDW P0001**
  - Released
  - Parent Drawing Relationship

- **IAM P0001**
  - Released

- **IPT P0002**
  - Released

- **IPT P0003**
  - Released

- **Item P0001**
  - Released

- **Item P0002**
  - Released

- **Item P0003**
  - Released

- **Vault Item P0001**
  - Unreleased

- **Vault Item P0002**
  - Unreleased

- **Vault Item P0003**
  - Unreleased

- **Title**
- **Revision**
- **Filename**
- **Item Status**
- **Item Category**

- **Title**
- **Vault Revision**
- **Filename**
- **Vault Status**
- **Vault Category**
powerFLC
architecture & components
powerFLC – Workflow Architecture

**Administrator**
- Vault Server
  - Vault Options
  - Vault Job Queue
  - Vault Data
- Time Trigger
- State Change
- Periodically

**Vault User**
- Vault Options
- Vault Job Queue
- Vault Data

**Vault Job Processor**
- PowerFLC
- Authentication

**Firewall**
- FUSION LIFECYCLE
- FORGE

- Vault Server
  - Credentials
  - Settings, Mappings
  - State Change
  - Periodically

- Vault Job Queue
  - Vault Data

- PowerFLC
  - Authentication

- On-Prem
- Cloud
powerFLC – Configuration Manager

- Graphical UI in Vault (Tools Menu)
- Tenant Configuration (Forge 3-legged Auth)
- Workflow Settings
  - Various settings for each workflow
- Field Mappings
  - Multiple mappings supported
  - Fusion Lifecycle field to Vault property mapping
  - Fusion Lifecycle field to Function mapping
- Import / Export workflow settings/mappings (JSON)
- Same UI for all workflows
- Configuration stored in Vault Options
- Configuration used by workflows (scripts)
powerFLC – Cmdlets
Cmdlet = Building Block
powerFLC + powerJobs Cmdlets

- Cmdlets hide the complexity of APIs
- Cmdlets are API version independent
  - Eliminates migration efforts
- 3rd party Cmdlets available
  - File operations
  - SQL connections
  - and many more...
- No advanced programming skills needed
  - PowerShell syntax is well documented
  - Administrators are used to PowerShell
  - Thousands of books, courses and examples available
- APIs can be accessed directly if needed

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<td>Update-FLCItem</td>
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<td>Show-Inspector</td>
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<td>Update-VaultItem</td>
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powerJobs Processor

- **Vault Job Processor Extension**
- **Enables Job Processor to execute scripts**
- **Customizable scripts for**
  - Automated Publishing
  - Automated Printing and Plotting
  - Email notifications
  - Files upload to Network drives, SharePoint, OneDrive...
- **PowerShell Commands to**
  - Create neutral formats (e.g. PDF, DXF, STEP, STL...)
  - Communicate with Vault
  - Communicate with Inventor
  - Communicate with AutoCAD / DWGTrueView
- **“Time Triggered Jobs” functionality**
  - Submits Jobs in a configurable interval

- **powerJobs Processor License included in powerFLC**
Vault Job Trigger

• **Vault’s built-in “Custom Job Types” functionality**
  - Triggers jobs on entity lifecycle state change

• **coolOrange powerJobs Processor “Time Triggered Jobs” functionality**
  - Triggers jobs in configurable intervals

• **coolOrange powerEvents**
  - Triggers jobs on any Vault actions
    - Check-in, Check-out, Change State, Delete...
    - Customizable (Scripting)
    - Not included in powerFLC – can be purchased separately
Vault UI Extension

- Navigate to Fusion Lifecycle item
- Manually trigger jobs
- Check if Item exists in Fusion Lifecycle

Sample Vault UI Extension available:
- [https://github.com/coolOrangeLabs/powerflc-explorer-extension](https://github.com/coolOrangeLabs/powerflc-explorer-extension)
- Sample code written in C#
- Installer available

Alternative
- Vault Data Standard
## powerFLC – Components Overview

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<th>Vault UI</th>
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<td>Cmdlets to interact with Vault</td>
<td>Hosts powerJobs</td>
<td>Sample Extension</td>
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<tr>
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<td>or</td>
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<tr>
<td></td>
<td>Cmdlets to interact with Fusion Lifecycle</td>
<td>Time Triggered Jobs</td>
<td>Custom Job Types</td>
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<td>Vault Data Standard</td>
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<tr>
<td>Workflow (Job) Scripts</td>
<td>Job Scripts</td>
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<td>Installed on the Job Processor machine</td>
<td>Installed on the Job Processor machine</td>
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<td>Installed on all client machines</td>
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</tbody>
</table>
powerFLC
create custom workflows
Import existing workflows

- **Job script**
  - Download files
  - `C:\ProgramData\coolOrange\powerJobs\Jobs`
  - `C:\ProgramData\coolOrange\powerJobs\Modules`
- **Import**
- **Restart powerJobs Processor**
  - Automatically registers the new job
- **Job Trigger**
  - Job Type == Name of the PS1 file without file extension
  - Time based (triggers continuously) or
  - Vault’s Custom Job Types (triggers on state change)
Create new workflows

- **Job script**
  - Create new PS1 (PowerShell script) file
  - C:\ProgramData\coolOrange\powerJobs\Jobs

- **Restart powerJobs Processor**
  - Automatically registers the new job

- **Job Trigger**
  - Job Type == Name of the PS1 file without file extension
  - Time based (triggers continuously) or
  - Vault’s Custom Job Types (triggers on state change)

- **Configuration Manager optional**
Import-Module powerFLC
Import-Module powerJobs

Write-Host "Starting job 'Publish Word file to FLC' for file '($file._Name)' ...

if ($file._Extension -ne "docx" -or $file._CategoryName -ne "Office") {
    Write-Host "Files with extension "($file._Extension) are not supported"
    return
}

$connected = Connect-FLC -Tenant $tenant.Name -ClientId $tenant.ClientId -ClientSecret $tenant.ClientSecret -UserId $tenant.SystemUserEmail
if (-not $connected) {
    throw "Connection to Fusion Lifecycle failed!"
}

$workspace = $flcConnection.Workspaces.Find("Documents")

$flcItem = (Get-FLCItems -Workspace $workspace.Name -Filter ('ITEM_DETAILS:DOC_NUMBER="{0}"' -f $file._Name))[0]
if (-not $flcItem) {
    Write-Host "Adding document..."
    $flcItem = Add-FLCItem -Workspace $workspace.Name -Properties @{
        "Doc Number" = $file._Name
        "Title" = $file._Title
        "Image" = $file._Thumbnail.Image
    }
} else {
    Write-Host "Updating document..."
    $flcItem = Update-FLCItem -Workspace $workspace.Name -ItemId $flcItem.Id -Properties @{
        "Title" = $file._Title
        "Image" = $file._Thumbnail.Image
    }
}

Write-Host "Uploading file..."
$downloadedFiles = Save-VaultFile -File $file._FullPath -DownloadDirectory "C:\TEMP"
Add-FLCAAttachment -Workspace $workspace.Name -ItemId $flcItem.Id -Path $downloadedFiles[0].LocalPath

Write-Host "Finished job 'Publish Word file to FLC'"
powerFLC
real world use cases
Use Case:
Engineering Data Transfer

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<th>Challenge</th>
<th>Solution</th>
<th>Benefits</th>
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<tr>
<td>Manually create and update Items in Fusion Lifecycle to have engineering data available in Fusion Lifecycle</td>
<td>Automatically create / update Items in Fusion Lifecycle based on Vault data</td>
<td>Departments other than engineering can access up-to-date Engineering data</td>
</tr>
<tr>
<td>Manually create and update Engineering BOMs in Fusion Lifecycle</td>
<td>Automatically create / update Engineering BOMs in Fusion Lifecycle</td>
<td>Viewable files and documentation available to all stakeholders</td>
</tr>
<tr>
<td>Manually download viewable files and drawings from Vault and upload them to FLC</td>
<td>Automatically upload viewable files and drawings from Vault to Fusion Lifecycle</td>
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</tbody>
</table>
Use Case: Change Management

**Challenge**

- Manually create ECO in Vault to track design tasks and changes
- Manually add find related Items in Vault and add them as records to the ECOs
- Manually update CO/CR in Fusion Lifecycle when an ECO is closed in Vault

**Solution**

- Automatically transfer FLC CO/CR as an ECO to Vault
- Automatically assign Records to the Vault ECO based on Affected Items in FLC
- Automatically update CO/CR in Fusion Lifecycle when an ECO is closed in Vault

**Benefits**

Vault ECO functionality is seamlessly integrated into the Fusion Lifecycle Change Process and ECO are available in Vault once they are ready for engineering
Use Case:
New Product Development / Introduction

Challenge
- Manually setup a project in Vault to kick-off the engineering
- Manually check-in technical specs and requirements to Vault to be available for engineers

Solution
- Automatically create Projects and Project Structure in Vault based on Fusion Lifecycle projects
- Automatically transfer Project content from FLC to Vault

Benefits
- Projects and project related templates and files are automatically available in Vault when the engineering work starts
Workflow Examples

**Design Review Process**
- Release Process
- Transfer files or items to Fusion Lifecycle to be reviewed and approved by non-Vault users.
- Once approved in Fusion Lifecycle, the Vault entity automatically transitions to a new state.

**Supplier Collaboration**
- Transfer multiple Vault files as ZIP package to a Fusion Lifecycle workspace to share engineering data with suppliers.

**Revision Management**
- Transfer documentation files of released file revisions from Vault to Fusion Lifecycle to be able to manufacture spare parts from historical revisions.

**Task Synchronization**
- Transfer Fusion Lifecycle Tasks to Vault (as Custom Objects) and automatically link the Tasks to engineers in Vault to automatically distribute work instructions and related information.
powerFLC
additional resources
Documentation and Support

- powerFLC Documentation
- powerJobs Processor Documentation
- powerFLC Solution Portal
  https://support.coolorange.com/support/solutions/22000107360
- powerJobs Processor Solution Portal
  https://support.coolorange.com/support/solutions/22000097987
- coolOrange Helpdesk
  https://support.coolorange.com/support/home
- Feature Request Forum
  https://support.coolorange.com/support/discussions/forums/22000188644
GitHub Repository

Presentation
Handout
Detailed Technical Information
Installation Guide
Sample Scripts

https://github.com/christiangessner/AU2020_MFG463684

MFG463684: Joint Effort: Vault and Fusion Lifecycle as the new dream couple

KEY LEARNING

- Discover the out-of-the-box capabilities of powerFLC
- Understand the architecture and the different components of powerFLC
- Learn how to create custom workflows to transfer data between Vault and FLC
- Discover a variety of real-world use cases and the benefits for customers

DESCRIPTION

When used together, Vault Professional software and Fusion Lifecycle software provide a combined solution that is the best of all worlds for product data management (PDM) and product lifecycle management (PLM). While Vault runs on-prem to keep your CAD data safe behind your firewall, Fusion Lifecycle is cloud-based for flexibility and ease of deployment. With powerFLC (Vault to Fusion Lifecycle connector) coolOrange offers an easy to use and flexible tool to combine Fusion Lifecycle and Vault processes. Previous versions of powerFLC were shipped with predefined workflows and with the latest version of powerFLC it is even possible to create custom workflows to synchronize any data between Vault and Fusion Lifecycle. This class demonstrates the advantages of using both products together and shows some of the endless possibilities of this integration.
Conclusion

powerFLC is the coolest way to connect Vault and Fusion Lifecycle

READY TO USE
SUPER FAST IMPLEMENTATION
SIMPLE CONFIGURATION
HIGHLY CUSTOMIZABLE
LOW MAINTENANCE