

DIGITAL ENGINEERING SUMMIT

16-17 June 2025

Rome Marriott Park Hotel, Italy



Creating the Future of
INDUSTRIAL OPERATIONS

Version Control ?

New
Open
Save
Save As

Version Control

Catalogs

Import

Export

Print

Options...

Licenses

About Emulate3D



UGM Example



AMRs



Autonox Catalog

No saved changes since last commit.



Commit history:



Message

Hello User Group Meeting!

Author Date ID

ASYost 6/12/2025 d74bdeaf



Autonox Catalog (21_050625)



CADIsTheModel



CaseErector



CycleController



DynamicPathFollowerJoint

expanding **human possibility**®

Commit message:

Hello User Group Meeting!

Native GIT Integration and Testing

Changes in this commit:

- Model демодик
- 摩擦系数
- notes/note01.rtf
- 所有者

Andrew Deeble, Emulate3D Product Manager

Andre Yost, Emulate3D Simulation Engineer



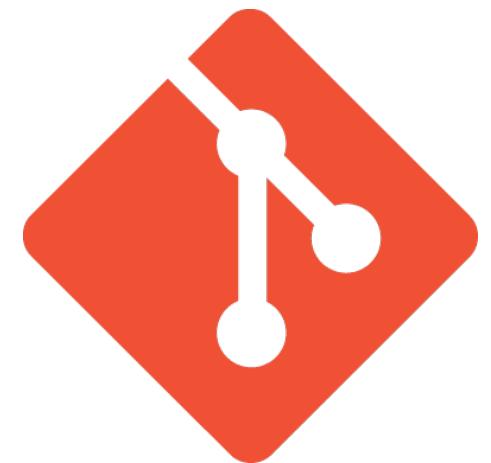
| What is Git?

Git is a free and open-source distributed version control system that tracks versions of files.

Git records changes to a files over time so that you can recall specific versions later.

Git is often used for collaborative development, and tracks **who** made **what** changes **when**.

It is the most popular distributed version control system, with nearly 95% of developers reporting it as their primary version control system.



Why Native Version Control within Emulate3D

There are 101 reasons why to do version control... here are three

Backup your work

Previous approach is
Options -> Autosave.

Now, create checkpoints for
each stable change.

Jump back to these
checkpoints if something
didn't work.

Create an audit trail

Previous approach uses
demo3dx / catalog3dx format.

Now, this will be standard and
accessible for all.

Full log of who did what and
why, complete with more
readable file diffs.

Collaborate on projects

Previous approach uses
package feeds and
versioning.

Now, develop in your chosen
repo then deploy as package.

Use branching and merging
tools to simultaneously work
on catalogs and scripts.

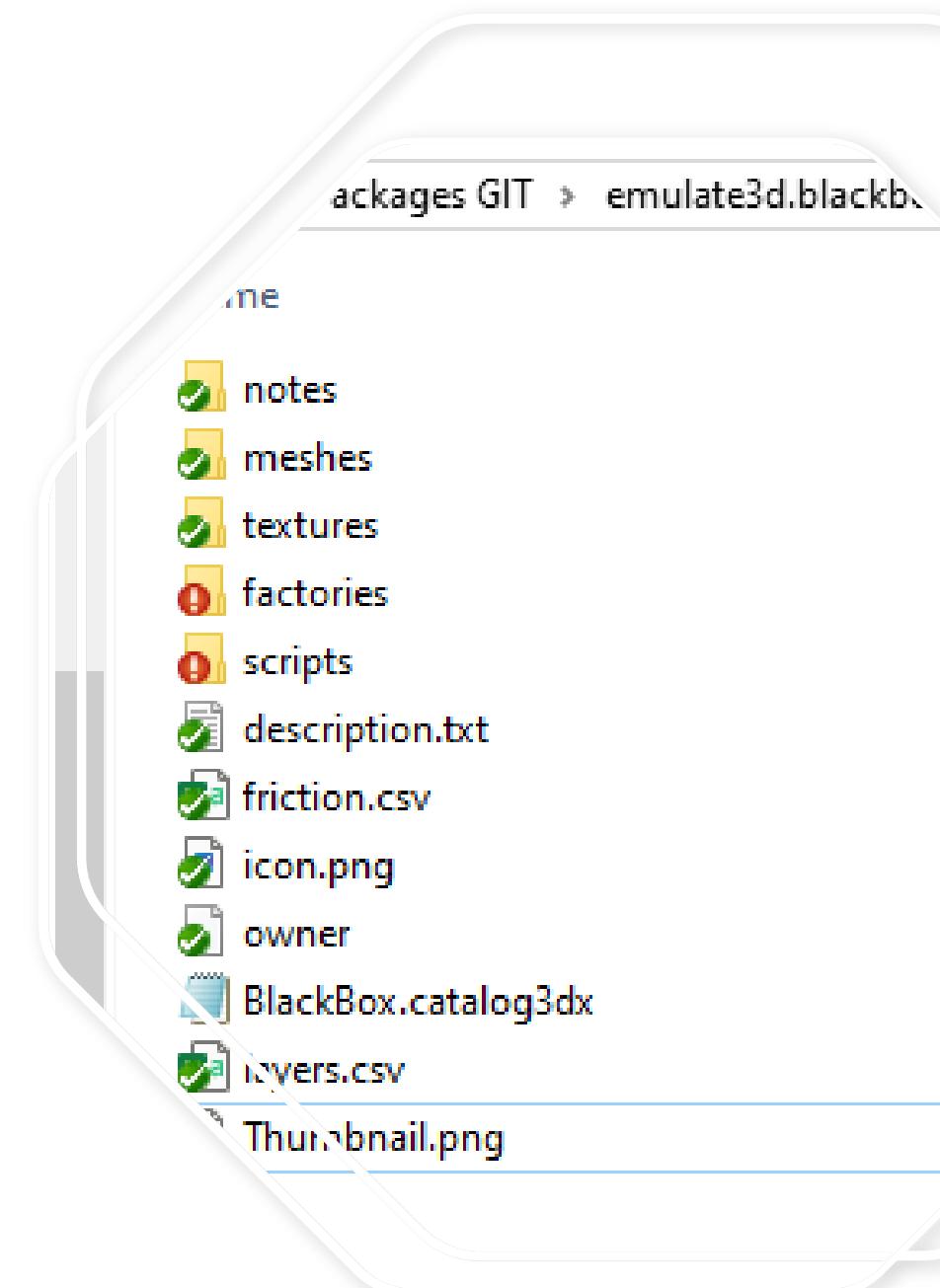
What have we done?

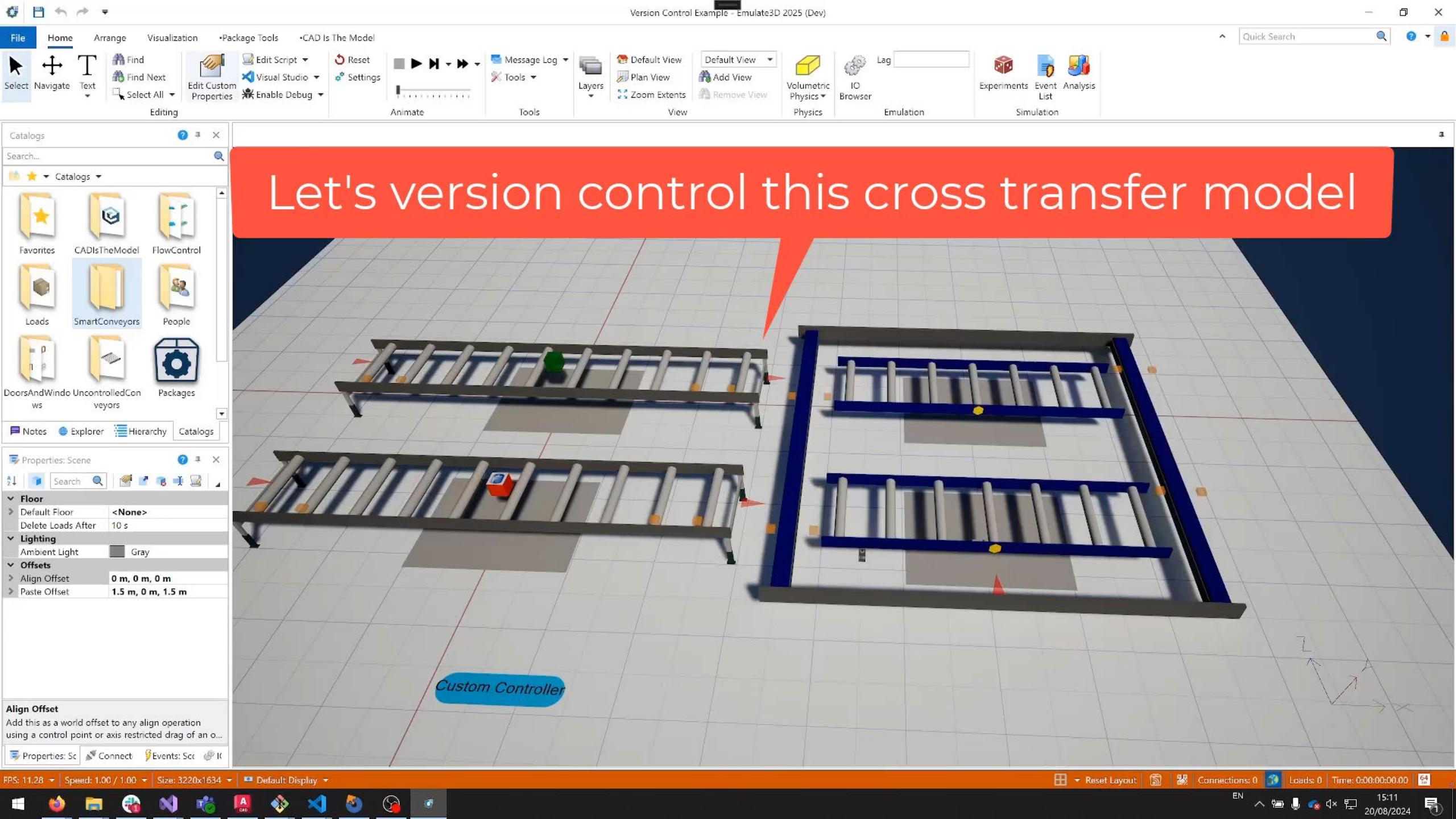
Improved the demo3dx and catalog3dx formats.

Added tools to create a local repo and commit a model or catalog in a single click.

User interface to commit changes from File menu.

User interface to view commit history, undo local changes, load a previous commit, switch branch, and revert to a previous commit.





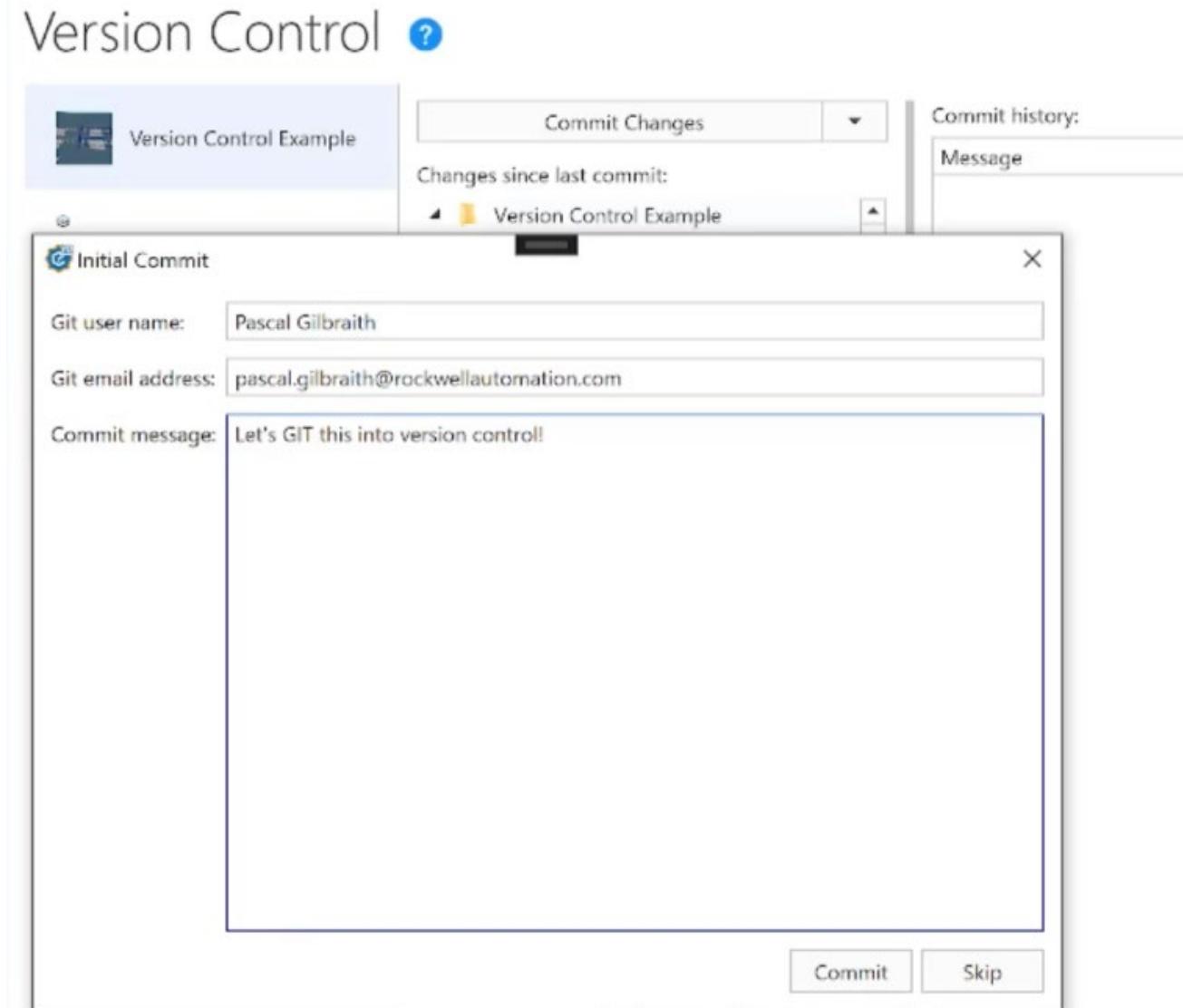
Bringing a Model into Version Control

Simplifying repository creation

With *one click*, Emulate3D will...

- Create a local repository
- Convert and save your model in demo3dx, or catalog in catalog3dx format, which are version control friendly
- Commit to the local repository
- Use the users GIT credentials defined in the options menu

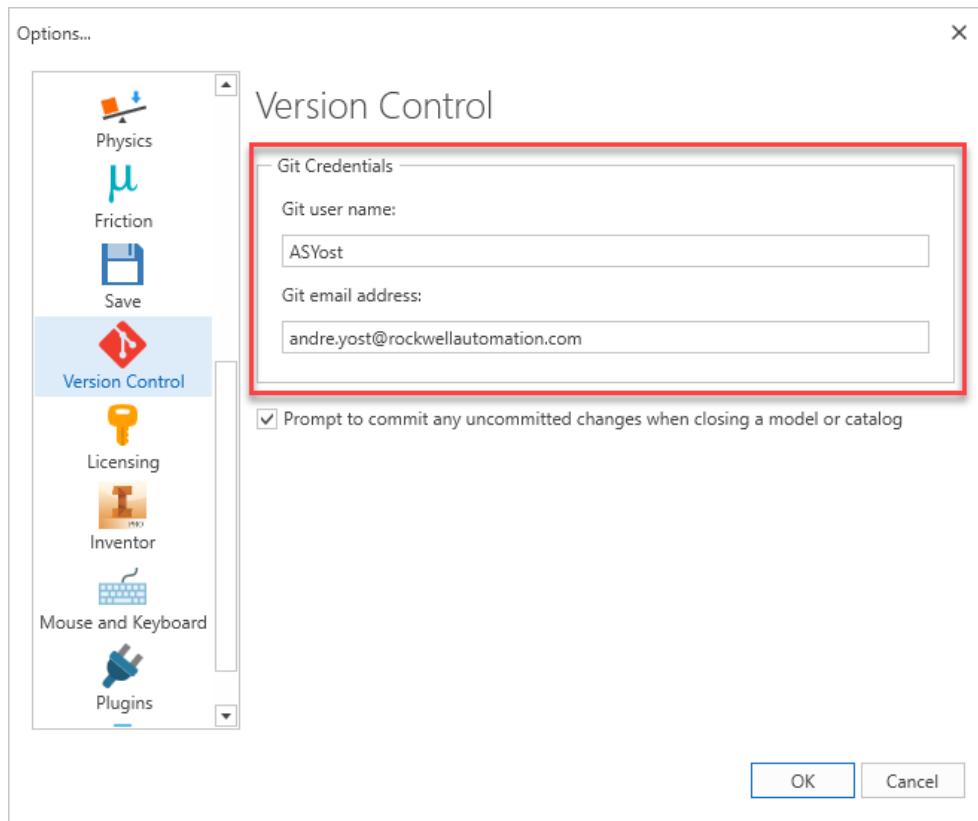
...making version control accessible to all!



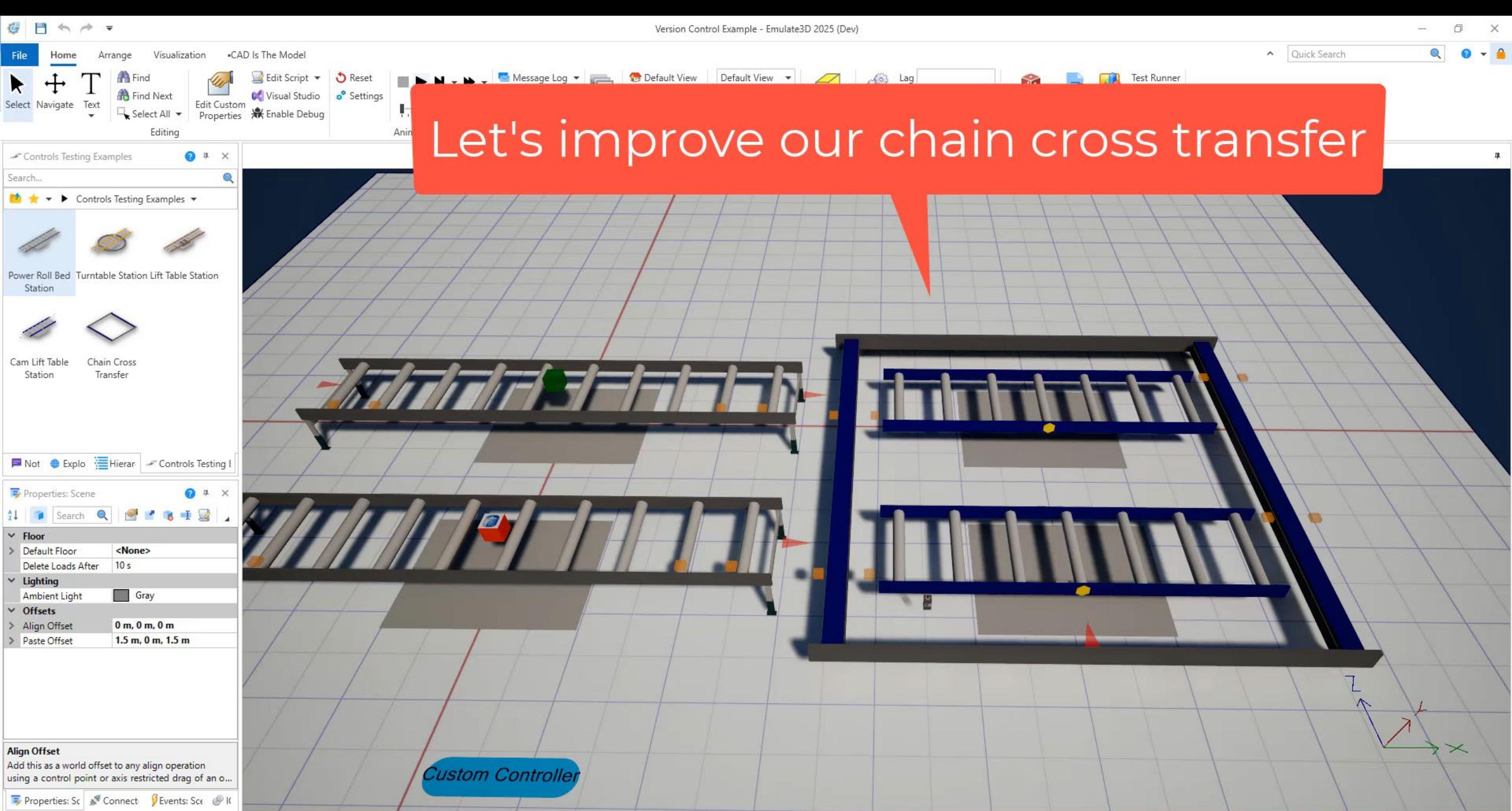


Tips - Git credentials & VCSs

- Save your git credentials in your model
- Your local repo can be pushed to your preferred git provider, such as GitHub or GitLab



Subgroups and projects	Shared projects	Inactive
<input type="button" value="⟳"/> <input type="text" value="Search (3 character minimum)"/>		
> ⚙ C Camcorders 🔒		
> ⚙ C Controls Testing 🔒		
> ⚙ E Emulate3D.Building 🔒		
> ⚙ F Factory Test 🔒		
> ⚙ M ModelToModelExperiment 🔒		
> ⚙ O Other Catalogs 🔒		
> ⚙ R Robot Emulation Plugins 🔒		
> ⚙ R Robot Framework 🔒		
> ⚙ S Small Components 🔒		
> ⚙ V Vehicle Framework 🔒		
⌚ E Emulate3D.3DControlPanels 🔒		
⌚ E Emulate3D.Actuators 🔒		
⌚ E Emulate3D.AllenBradleyVelocityDrives 🔒		
⌚ E Emulate3D.BlackBox 🔒		
⌚ E Emulate3D.ChainGenerator 🔒		





Making a Commit – what just happened?

GIT terminology can be daunting for the unfamiliar!

We created a **repository** – this is a directory that stores the project. It also contains files (.git/) which tracks changes made to files, building a history over time.

Using **demo3dx files** – an unzipped model file. We save out scripts, meshes, locations and properties of visuals as separate files, and as human readable.

We made a **commit** – this is a snapshot or milestone in the repository.

And viewed **commit history** – a log of all the commits. **Who** changed **what** and **when**.

GIT was designed for code, which makes it great for managing scripts.....

Version Control Example - Emulate3D 2025 (Dev)

File Home Arrange Visualization Package Tools CAD Is The Model

Select Navigate Text Find Find Next Select All Edit Custom Properties Edit Script Reset Visual Studio Settings

Layers Message Log Default View Default View Tools Plan View Add View Zoom Extents Remove View

Volumetric Physics Lag IO Browser

Experiments Event Analysis List Emulation Simulation

Catalogs

Search... Catalogs

Favorites CADIsTheModel FlowControl

Loads SmartConveyors People

DoorsAndWindo UncontrolledCon ws UncontrolledCon veys Packages

Notes Explorer Hierarchy Catalogs

Properties: Scene

Search Align Offset

Floor Default Floor <None> Delete Loads After 10 s

Lighting Ambient Light Gray

Offsets Align Offset 0 m, 0 m, 0 m Paste Offset 1.5 m, 0 m, 1.5 m

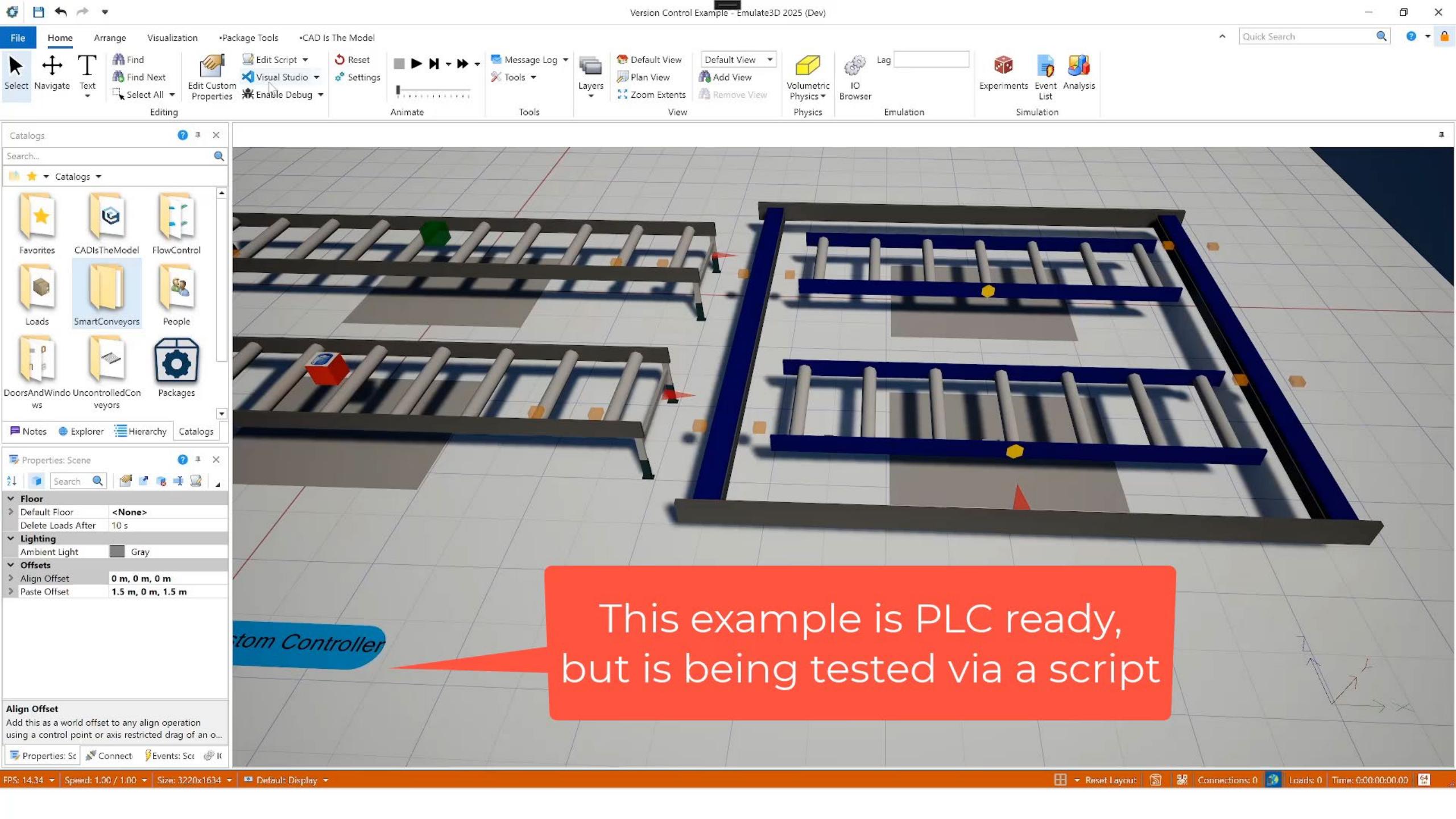
Align Offset

Custom Controller

This example is PLC ready, but is being tested via a script

FPS: 14.34 Speed: 1.00 / 1.00 Size: 3220x1634 Default Display

Reset Layout Connections: 0 Loads: 0 Time: 0:00:00:00:00



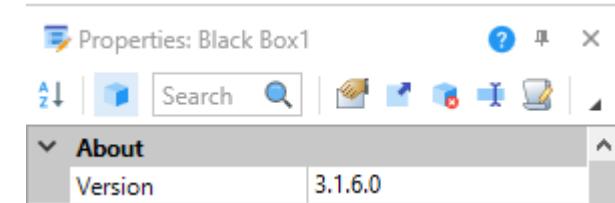
Tip - Define an assembly version to your scripts & display using a custom property.

- Models are automatically updated with higher versioned scripts in catalogs.

Additional tip - If multiple components in the catalog have the same assembly version, they will all have the same version numbers.

```
[assembly: AssemblyVersion("3.1.6.0")]

[Auto]
1 reference
public class BlackBox : NativeObject {
    0 references
    public BlackBox(Visual sender) : base(sender) {
        sender.AddSimpleProperty("Version",
            Assembly.GetExecutingAssembly().GetName().Version.ToString(),
            "Current script version");
    }
}
```



What's Planned - Define Assets within Emulate3D, with version numbers.

- Pushed or pulled Asset updates from catalogs and package manager.
- Change an Asset's template to update every instance in the model.
- Or override the template's properties to tweak a single Asset instance,

Version Control

New

Open

Save

Save As

Catalogs

Version Control

Import

Export

Print

Options...

About Emulate3D



Version Control Example

Current branch:

main

Commit Changes

No saved changes since last commit.



CADIsTheModel



DoorsAndWindows



FlowControl



Loads



People



SmartConveyors



UncontrolledConveyors

Commit history:

Message

Increased delay before lift table lowers, to drive load against the pin stop

Add a pin stop to the transfer

Let's GIT this into version control!

Author	Date	ID
Pascal Gilbraith	20/08/2024	d6d0006c
Pascal Gilbraith	20/08/2024	39cb01aa
Pascal Gilbraith	20/08/2024	2efb9463

Commit message:

Add a pin stop to the transfer

Changes in this commit:

	Analysis.xlsx
	Thumbnail.png
	Version Control Example.demo3dx

Switching, Reverting, Branching, Merging...?

GIT terminology can be daunting for the unfamiliar!

We **switched** to a previous commit, like loading a past checkpoint for our model

We returned to the **main branch**, which is the latest update. This is what our colleagues would see when they load the model.

We **reverted** changes to roll back a bad commit for everyone

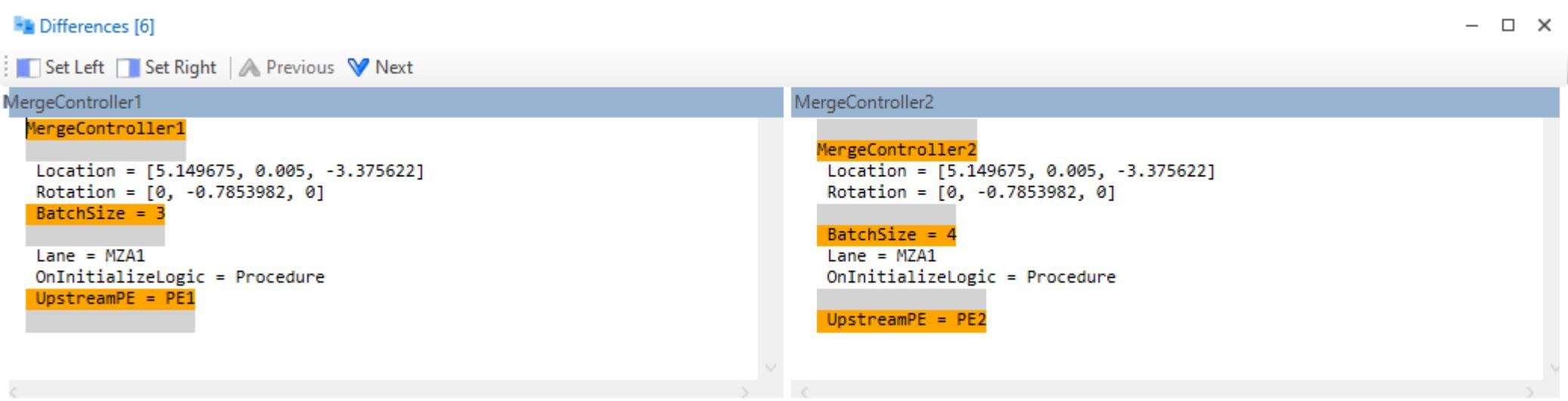
We could work on our own **branch**, make local commits, and then **merge** changes into the main branch when we're done.

What's Planned – Divide the model into sections using Assets, and work on each area without risk of conflicts. Run the whole model together, or as multi-model sections.



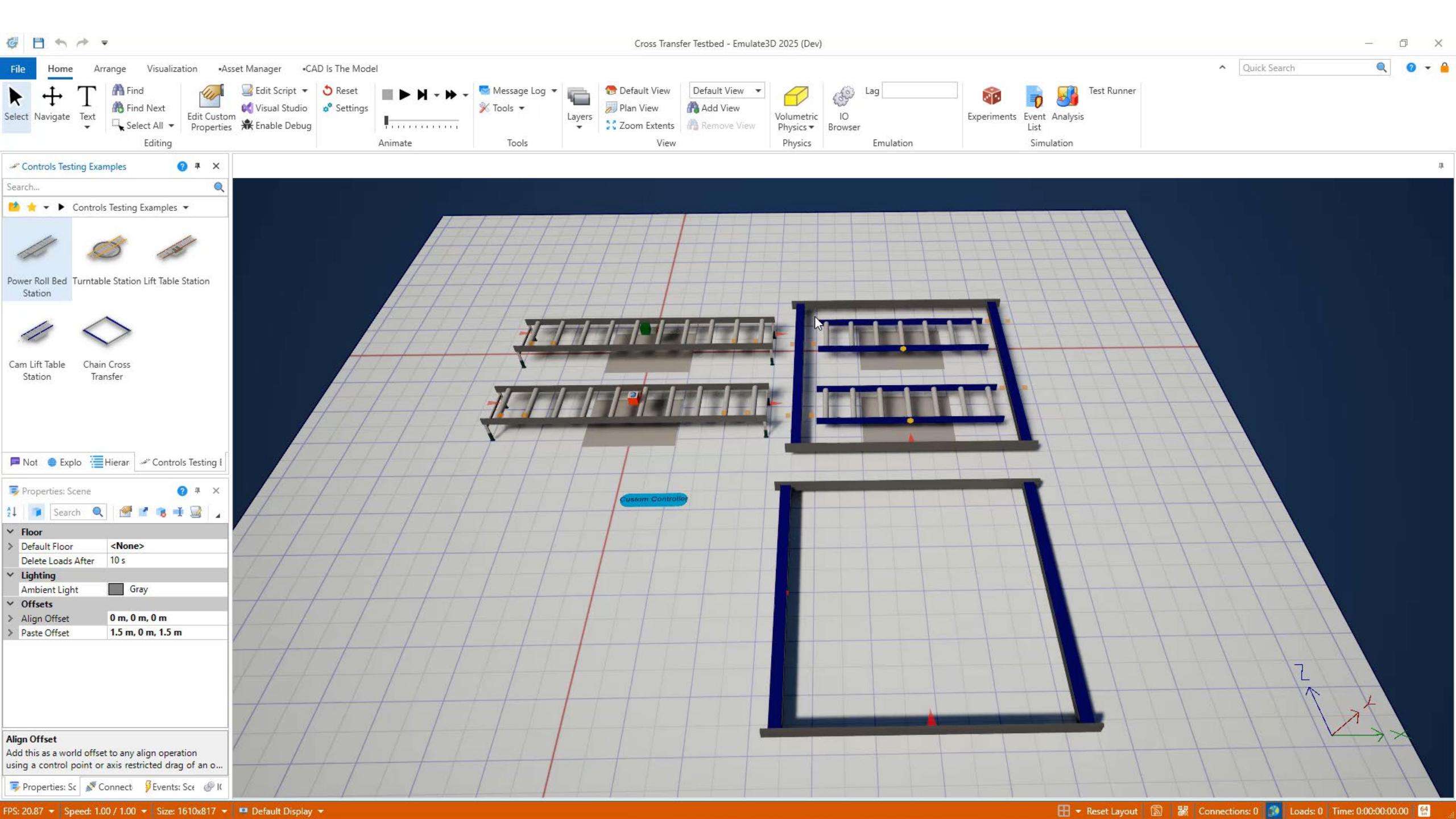
Tips and Future - Comparing Commits

Tip - The differences window can be used to select two objects and compare them



What's Planned - Improved comparison tools

Assets are given individual demo3dx subfiles, making it clearer to see changes
Visual comparison tools to highlight which visuals and properties have changed.
Overlay two different versions of a model or asset!

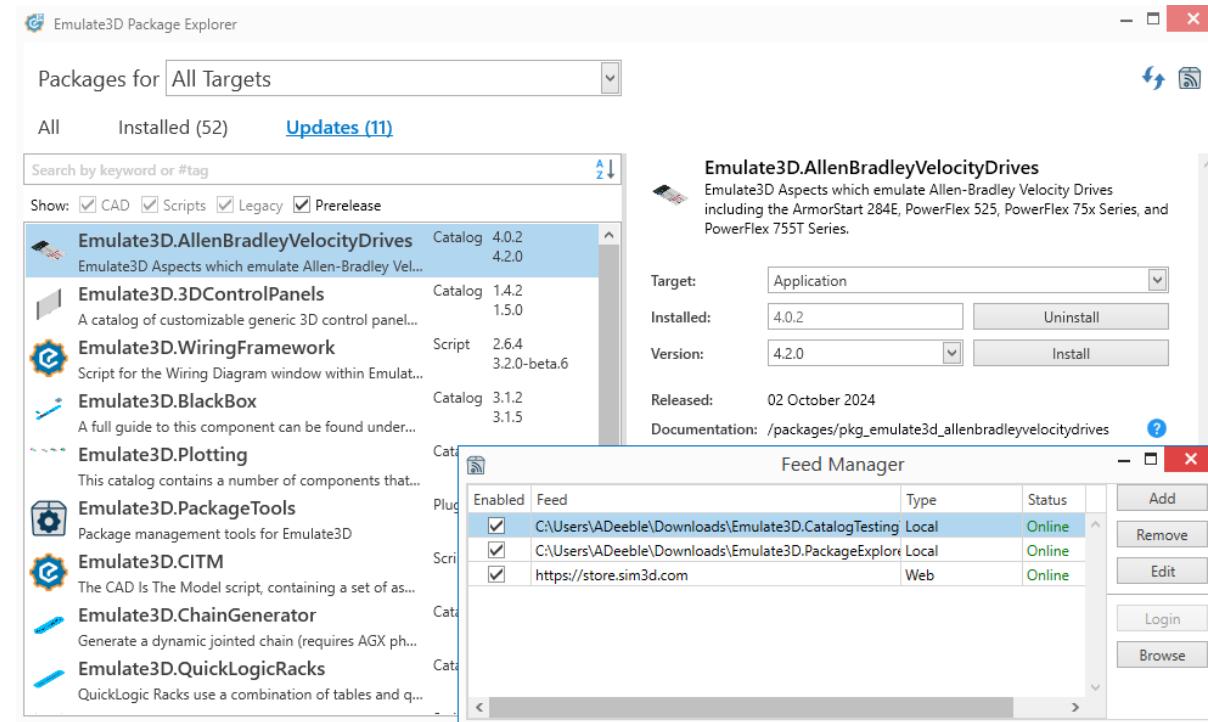




Developing Catalogs with Emulate3D 2025

- Use GIT version control to make commits to your catalogs and scripts
- Optionally push to a shared repository for collaborative development
- Use Test Runner and NUnit to run automated tests
- Deploy tested catalogs to a custom package feed, with dependencies and documentation.
- Colleagues are notified of a package update!

What's Planned - Catalog Development Tools





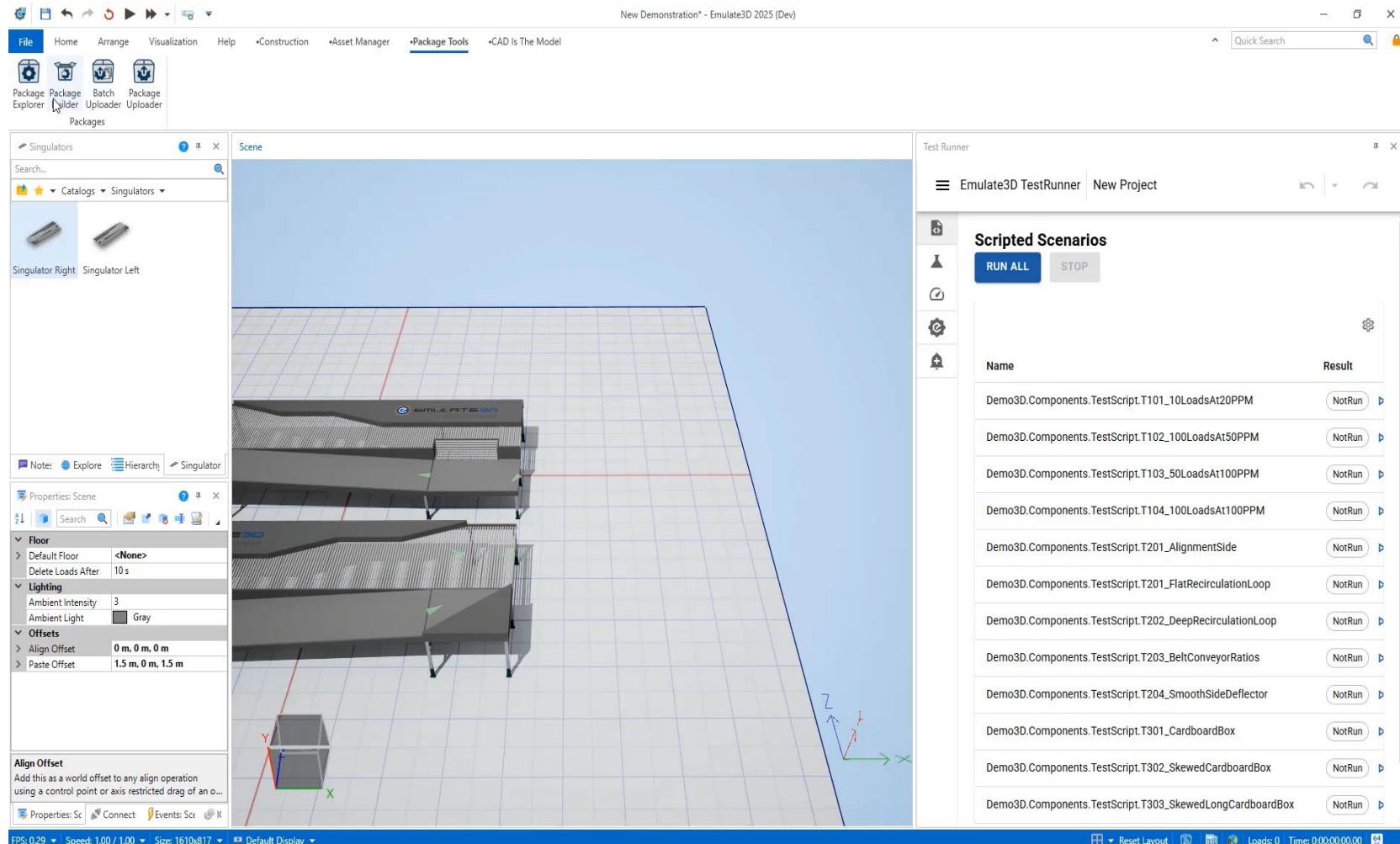
Tips - Custom Package Feeds

Create a custom package feed,
which can even be a local folder.

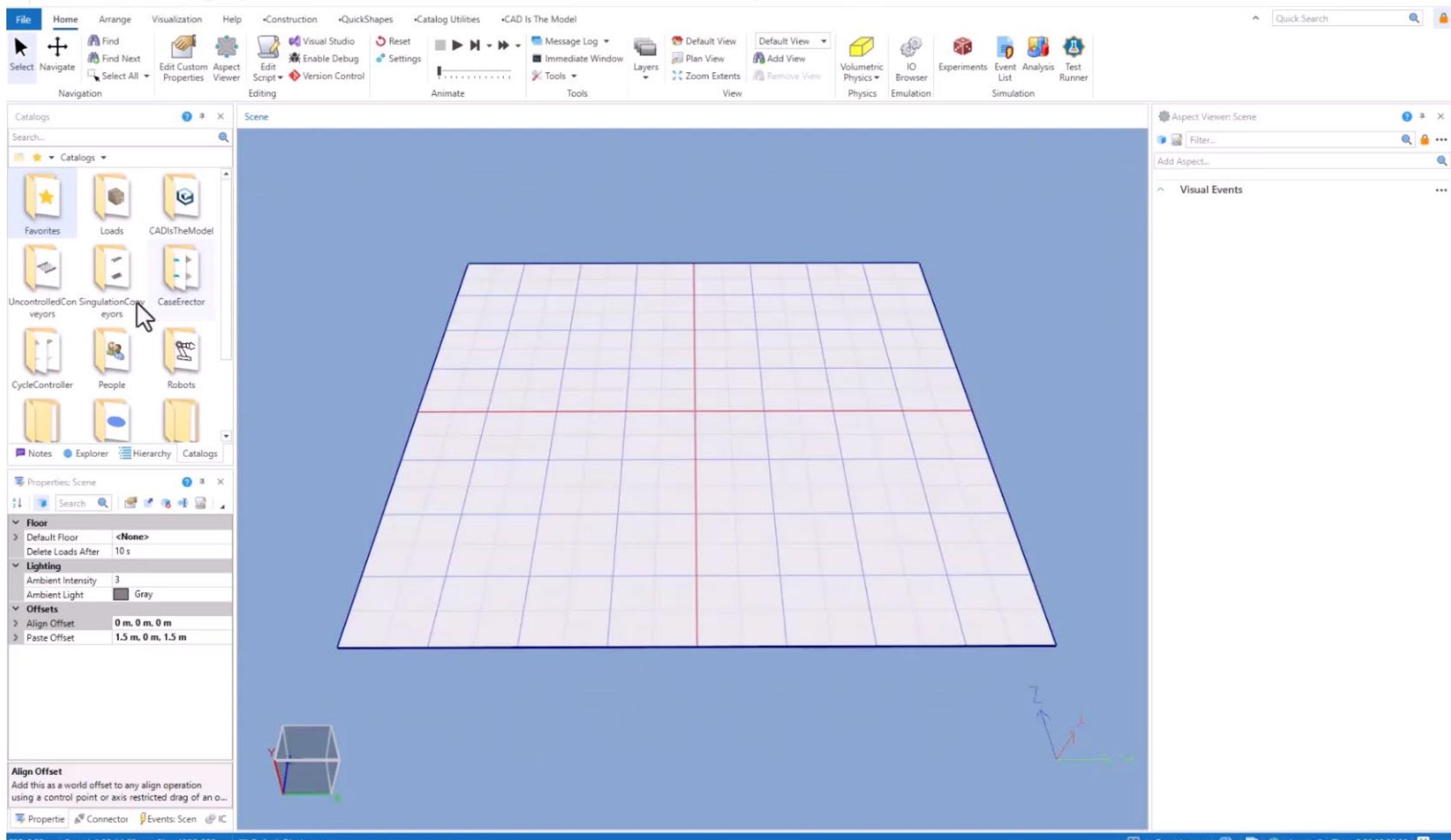
Publish catalogs and updates.
Think of these versions as
"landmark" commits!

Swap back to previous versions,
automatically update models.

Share with other E3D Users



Catalog Tests with the Test Runner





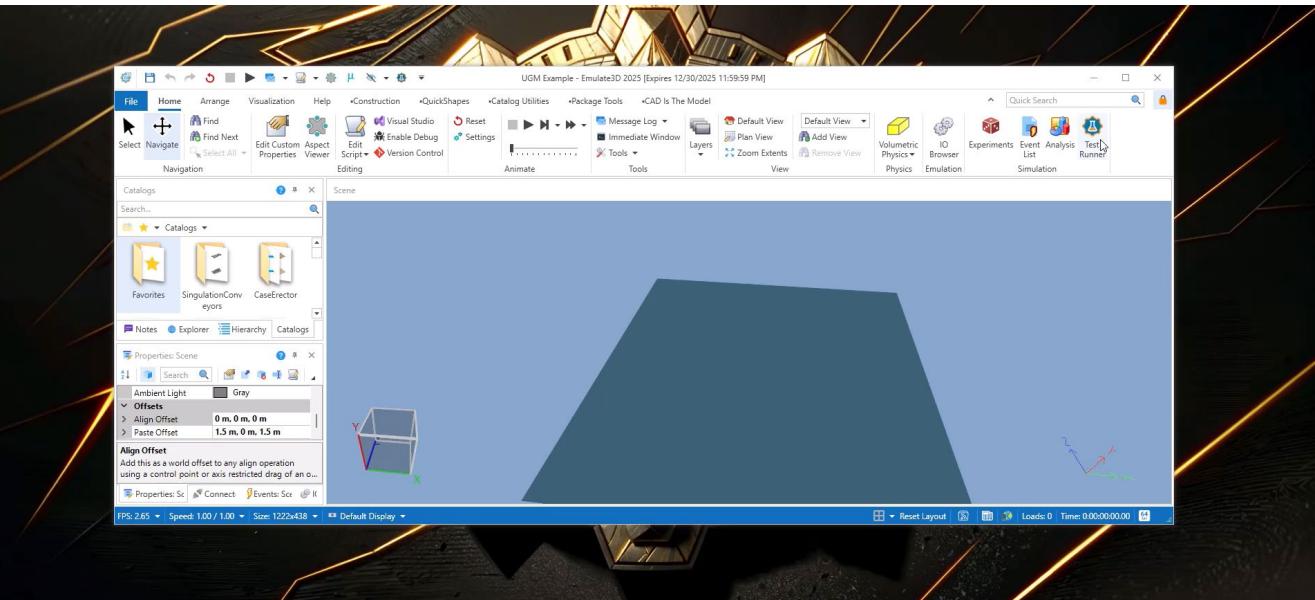
Tips - Catalog Unit Testing

- NUnit attributes: Setup/ Teardown
- Run tests from the command line interface
- Position the Test Runner window anywhere in E3D or externally
- Engage forum

What's Planned - Catalog Best Practice guidelines

```
[OneTimeSetUp]
0 references
public void SetUpParcelSingulatorTesting() {
    FindInstallPackage("Emulate3D", "Loads");
    FindInstallPackage("Emulate3D", "UncontrolledConveyors");
    ModelAction(() => {
        DeleteVisuals();
        App.Invoke(App.Reset);
    });
}

[TearDown]
0 references
public void CleanUpTest() {
    LoadList.Clear();
    ModelAction(() => {
        DeleteVisuals();
        App.Invoke(App.Reset);
    });
}
```



1. Test Runner for Simulation

Posted Apr 04, 2025 03:27:00 AM

Rockwell Staff
Deebs

Test Runner is a fantastic tool that can be applied to simulation to catalog development to virtual commissioning. This final thread will look at using Test Runner to experiment and optimize your system designs. You can learn about the other use cases in other threads!

Test Runner Scenarios are a bit like Sim3D Experiments but supercharged!

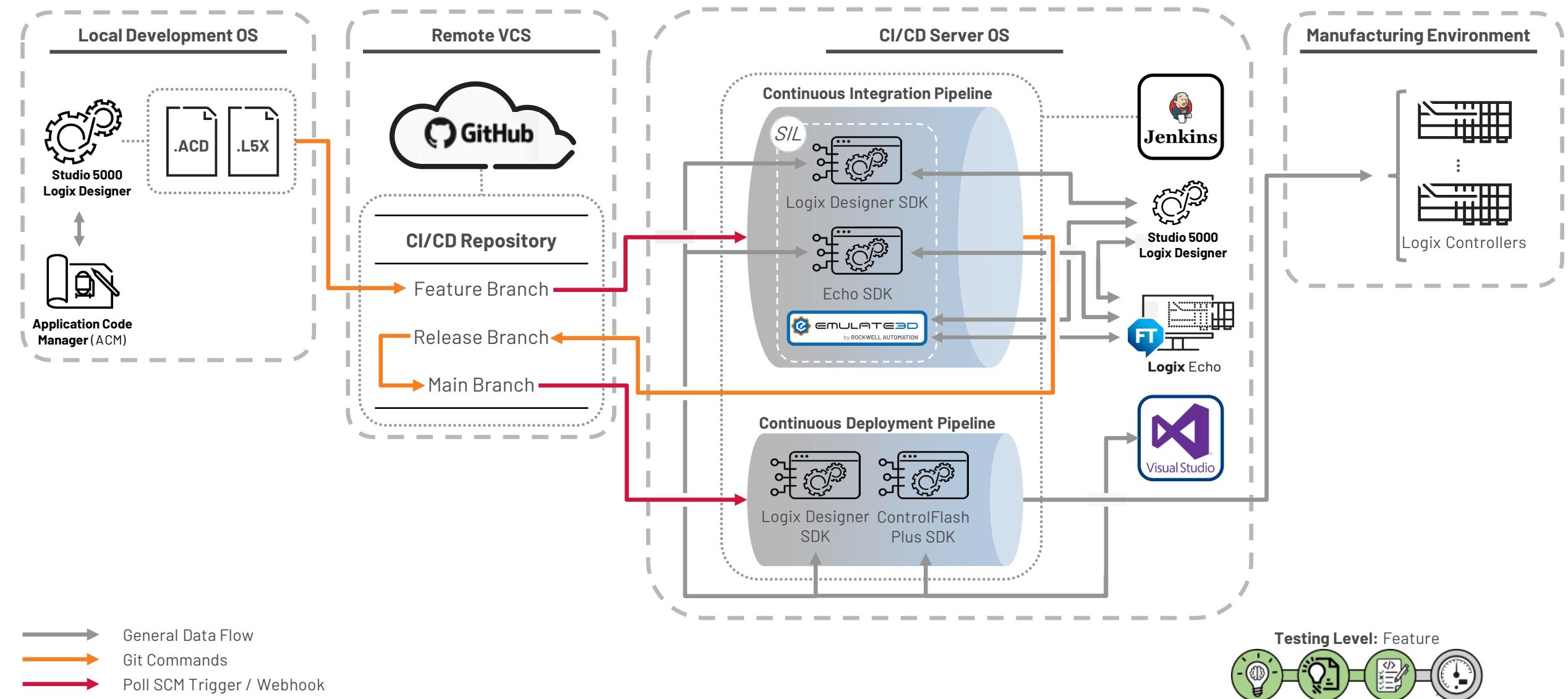
3 LIKE

REPLY

engage
A ROCKWELL AUTOMATION COMMUNITY

CI/CD for Logix Control Systems: Example Data Flow Diagram

CI/CD with Software-in-the-Loop Testing





We're using this ourselves...

Previously used .catalog3dx with GitLab for catalog dev.

Now using the native Emulate3D GIT integration as our catalog dev workflow.

Moved our catalog regression tests from a previous tool to now use Test Runner.

What's Planned –
Improved Package Tools
Catalog Dev Best Practice Documentation

StartingPoint* - Emulate3D 2025 (Dev) [Borrowed Until 12/10/2024 10:14:23]

?

Current branch: main

Commit Changes

Changes since last commit:

- Wiring Catalog
- Wiring Catalog
- factories
- scripts
- Wiring
- Wiring.info
- Thumbnail.png
- Wiring Catalog.catalog3dx

Commit history:

Message	Author	Date	ID
Merge branch 'main' of ragitlabegl4.ra.rockwell.com:swc/emulate3d/catalogs/emulate3d.wiringdiagr...	pwright	27/09/2024	40ab0ee3
Fixing (hopefully) issue where connectors disappear on zooming in, by disallowing negative co-ordinates for i...	pwright	27/09/2024	96af5307
Added a CreateInputProperties button and DeleteProperties button to the Utilities ribbon. Incremented versi...	Mark Emeott	25/09/2024	6c8a80d
Seeing issues where source and/or target visuals are null when creating connectors, just adding a null check i...	pwright	19/09/2024	5fc996e1
Increment AssemblyVersion.	Mark Emeott	18/09/2024	166fddd9
Potential fix for issue of wires disappearing when zooming in.	pwright	18/09/2024	fcf77be3
Fixing crash on using arrow keys on top layer, and refactoring WiringView.DiagramControl_KeyDown while I'...	pwright	17/09/2024	51d9c8a6
Tidying up previous fix for issue where items were lost on script recompilation: moving code for processing n...	pwright	16/09/2024	242f993b
Updates to wiring schematic import, small refactors for clarity (much more work needed)	Andrew Deeble	13/09/2024	ec20c31
Addition to previous fix to support repositioning of rail by arrow keys, ensuring updates are saved	Andrew Deeble	12/09/2024	e35bde8d
Fixed an issue where rail spacing changes were not always saved when closing the diagram	Andrew Deeble	12/09/2024	7d66aa8c
Fixed a minor issue where property items would "jump" up 10 points in Y when you refreshed the wiring view	Andrew Deeble	12/09/2024	5d855edf
Committing for Pete - Fixed an issue where updates to the diagram were lost when recompiling a script or ch...	Andrew Deeble	12/09/2024	49378154
Commit on behalf of Pete - fixed issue where selection net is started when going into a layer and back up for...	Andrew Deeble	12/09/2024	8eb6780c
Added an API method to see if a bindable item is in the diagram. Tidied up some of the xml descriptions, mo...	Andrew Deeble	04/09/2024	7e00cc1a
Made the EPLAN import an opt in feature found only in advanced properties	Andrew Deeble	02/09/2024	43c199b9
Increment version number as we make a beta update	Andrew Deeble	30/08/2024	4ad9c31f
When setting scroll position, if there are no items, create a dummy item just so that the scroll viewer is access...	pwright	29/08/2024	620ab61b
Fixed issues with displaying the instance number above property items, as well as fixing issues with changing properties on rails whilst you have the parent layer open in another window	Andrew Deeble	29/08/2024	bd284035

Merge branch 'main' of ragitlabegl4.ra.rockwell.com:swc/emulate3d/catalogs/emulate3d.wiringdiagr...

Wiring Catalog.catalog3dx

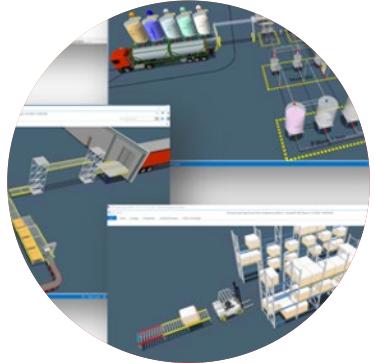
Wiring Catalog/scripts/Wiring/Diagram/WiringRibbonManager.cs

Wiring Catalog/scripts/Wiring/Events/WiringEventManager.cs

Wiring Catalog/scripts/Wiring/WiringView.cs

What's Planned - Emulate3D Assets

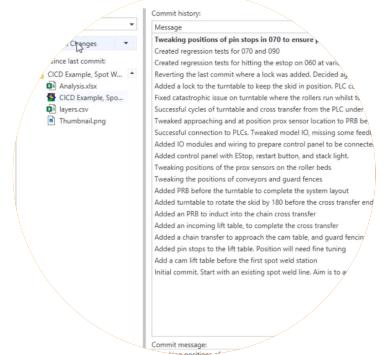
Define subsections within a model, for organization and reuse



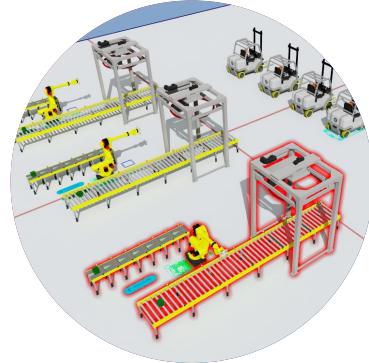
Subdivide models into Assets.

An Asset can be any scale; a line, a cell, a machine, a device.

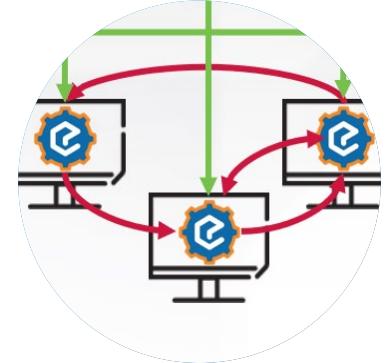
Assets can nest and contain other Assets



Version Control assets with GIT.
Push changes from one asset to all matching assets.
Push/pull updates from catalogs.

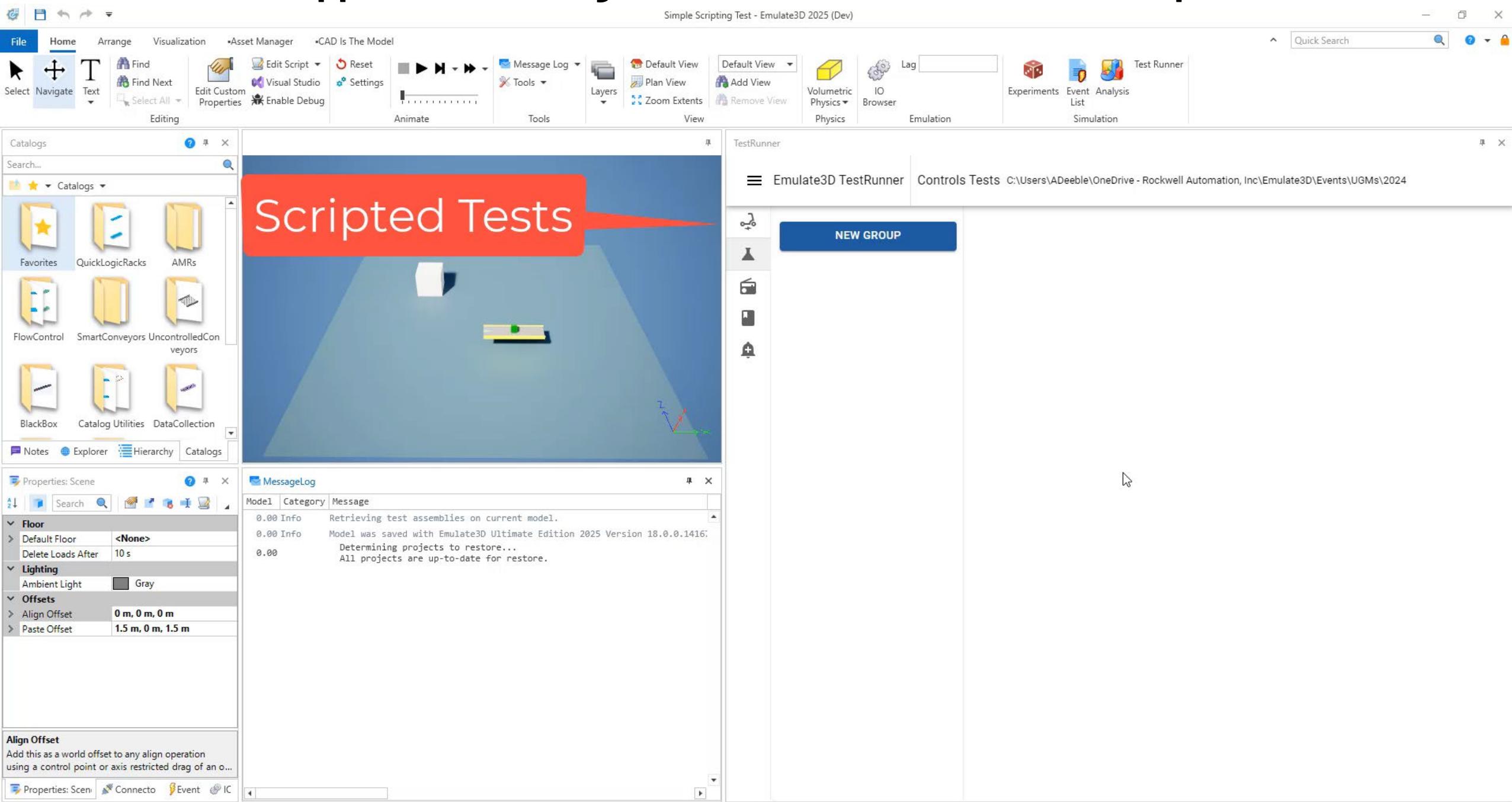


Comparison tools to understand model and asset changes.
Overlay and compare two versions.
Highlight differing properties.



Work on assets individually.
Work on assemblies containing many nested assets.
Use assets as Multi-Model boundaries.

Appendix - Catalog Tests with the Test Runner Example





Thank you!

Questions? Requests? Inquiries?

