
DIGITAL ENGINEERING SUMMIT

16-17 June 2025

Rome Marriott Park Hotel, Italy



EMULATE3D

by ROCKWELL AUTOMATION



Creating the Future of

INDUSTRIAL OPERATIONS

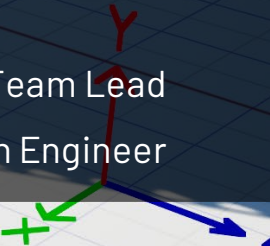


expanding **human possibility**®

Catalog Updates for 2025

Roger Kassouf, Emulate3D Applications Team Lead

Andre Yost, Emulate3D Simulation Engineer



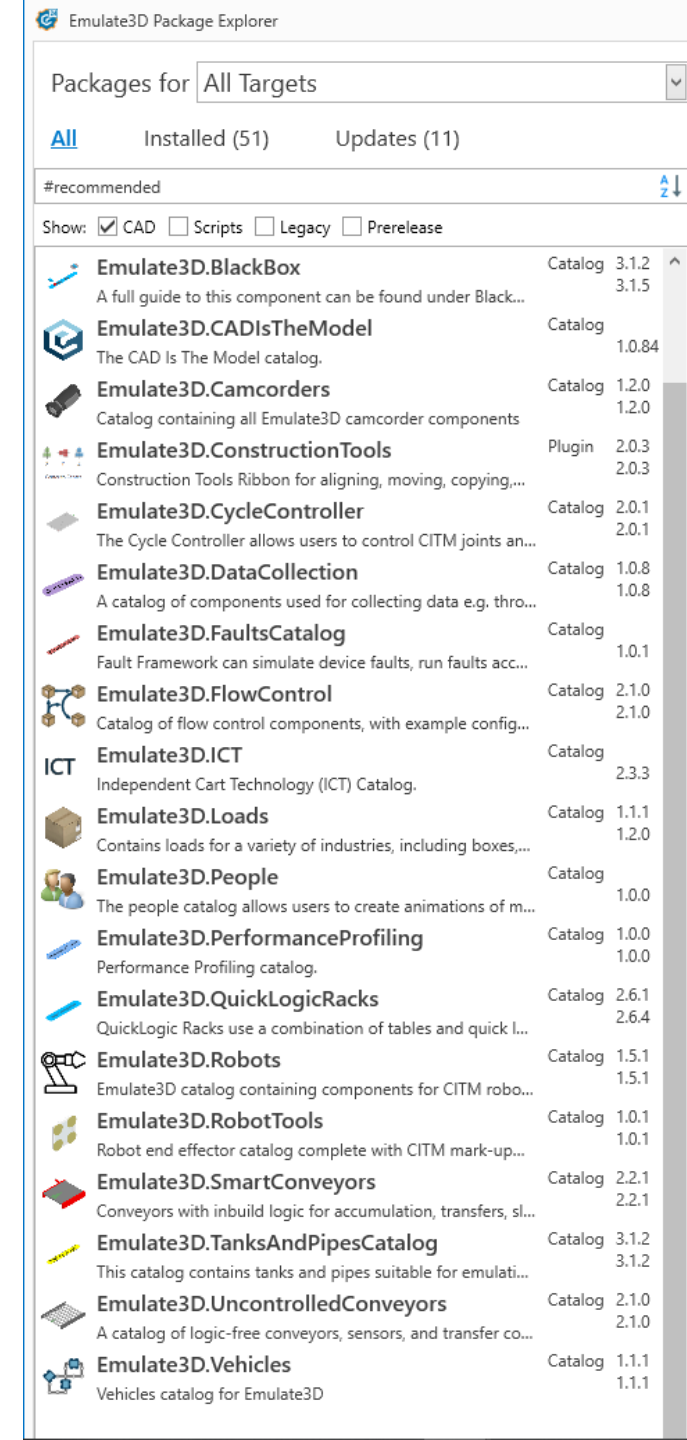
| What have we been doing with catalogs?

Last few releases has seen an overhaul of the fundamental frameworks – “Replacing QuickStart”

Generic frameworks with high customizability:

- Smart Conveyors
- Robot Framework
- Flow Control Framework
- AMR Framework
- Data Collection Framework
- Fault Framework
- Motor Controller and Encoders
- Black Boxes etc.

These are ready to be build upon for specific equipment and industry implementations





AMR Catalog Updates

New fleet of generic bots.

- Conveyor and Lift are integral parts for all E3D AMRs.
- Built in framework level transfer logic

Support for AMRs occupying more than one tile at a time.
Claim tiles based on the Front and Rear vehicle offsets.

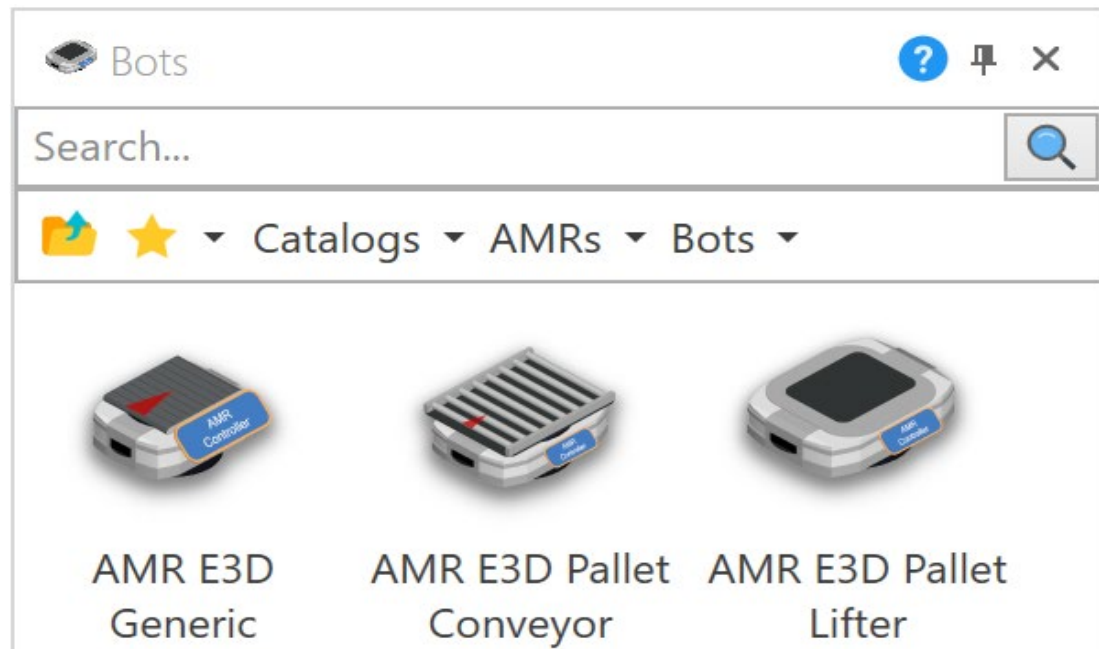
Support for driving AMRs in reverse.

New properties for control over AMR charging.

New AMR events for greater user customizability

Improvements to path finding algorithm performance.

Improved experimentation and data collection.





AMR E3D
Generic



AMR E3D Pallet
Conveyor



AMR E3D Pallet
Lifter



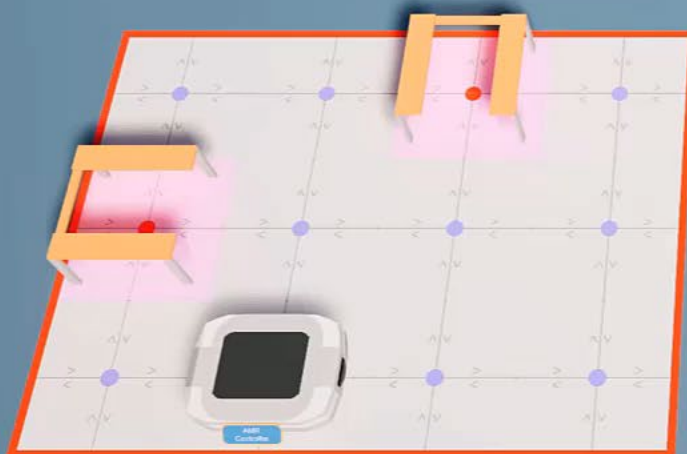
AMR E3D Pallet Conveyor

Load Types: Pallets



AMR E3D Pallet Lifter

Load Types: Pallets, Pallet Stands



AMR E3D Pallet Lifter

Load Types: Pallets, Pallet Stands



AMR E3D Generic

Load Types: Boxes, Totes, Pods



| AMR Catalog Roadmap

AMR Catalog current and future developments

- **Latest Release** – ACRs
(Autonomous Case-
Handling Robots)
- **In Development** – Cube
Storage Systems
(AutoStore)
- **Future** – OTTO for both
Simulation and
Emulation





AMR Catalog Updates – ACR Systems

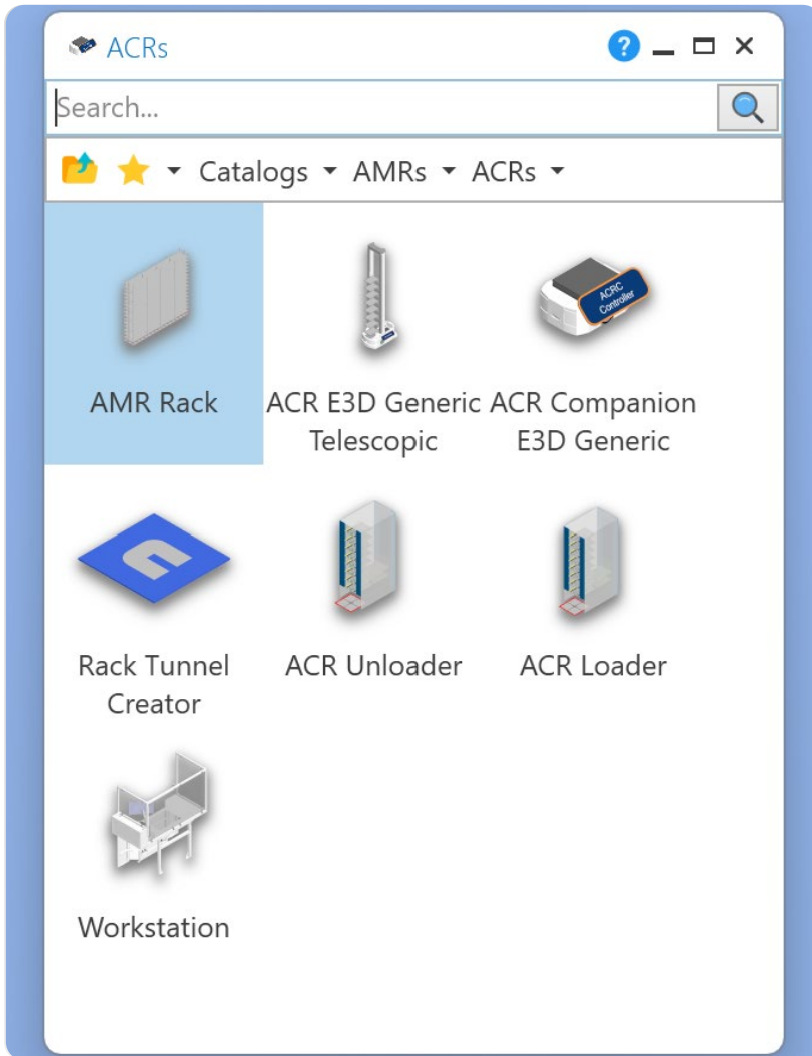
Mixed racks with totes and pallets e.g. HaiRobotics Type 2 System



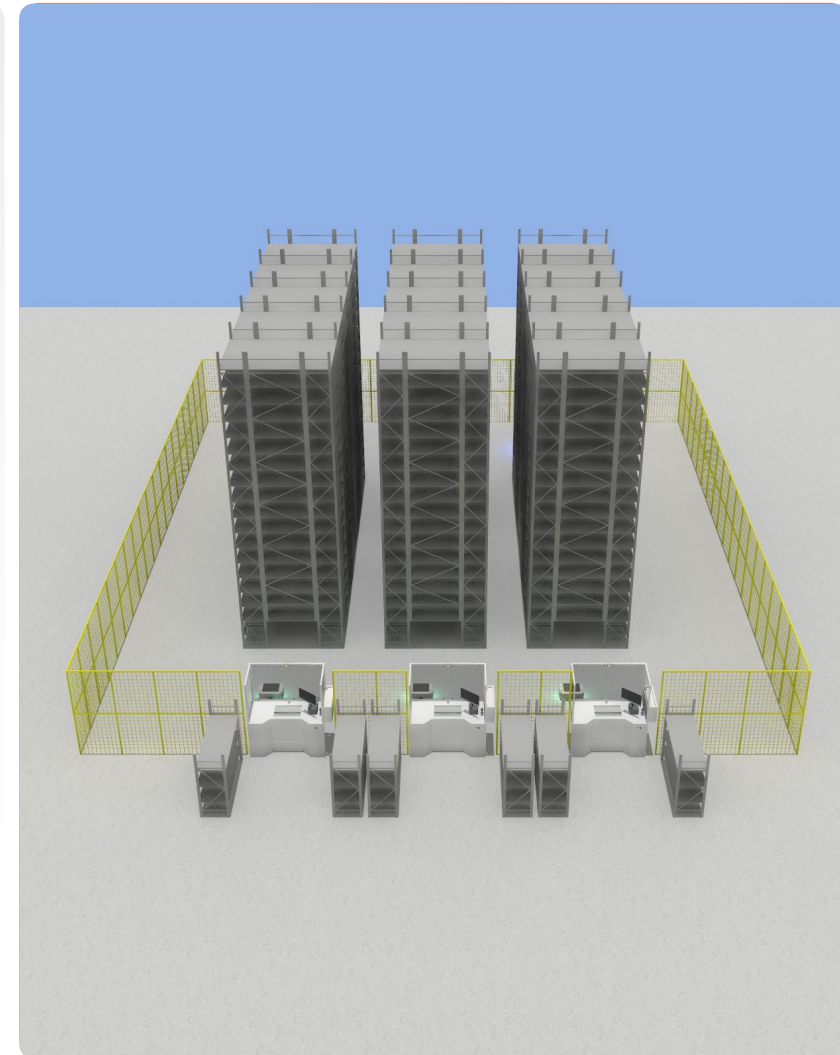


AMR Catalog Updates – ACR Framework

New Autonomous Case-Handling Robot (ACR) components.



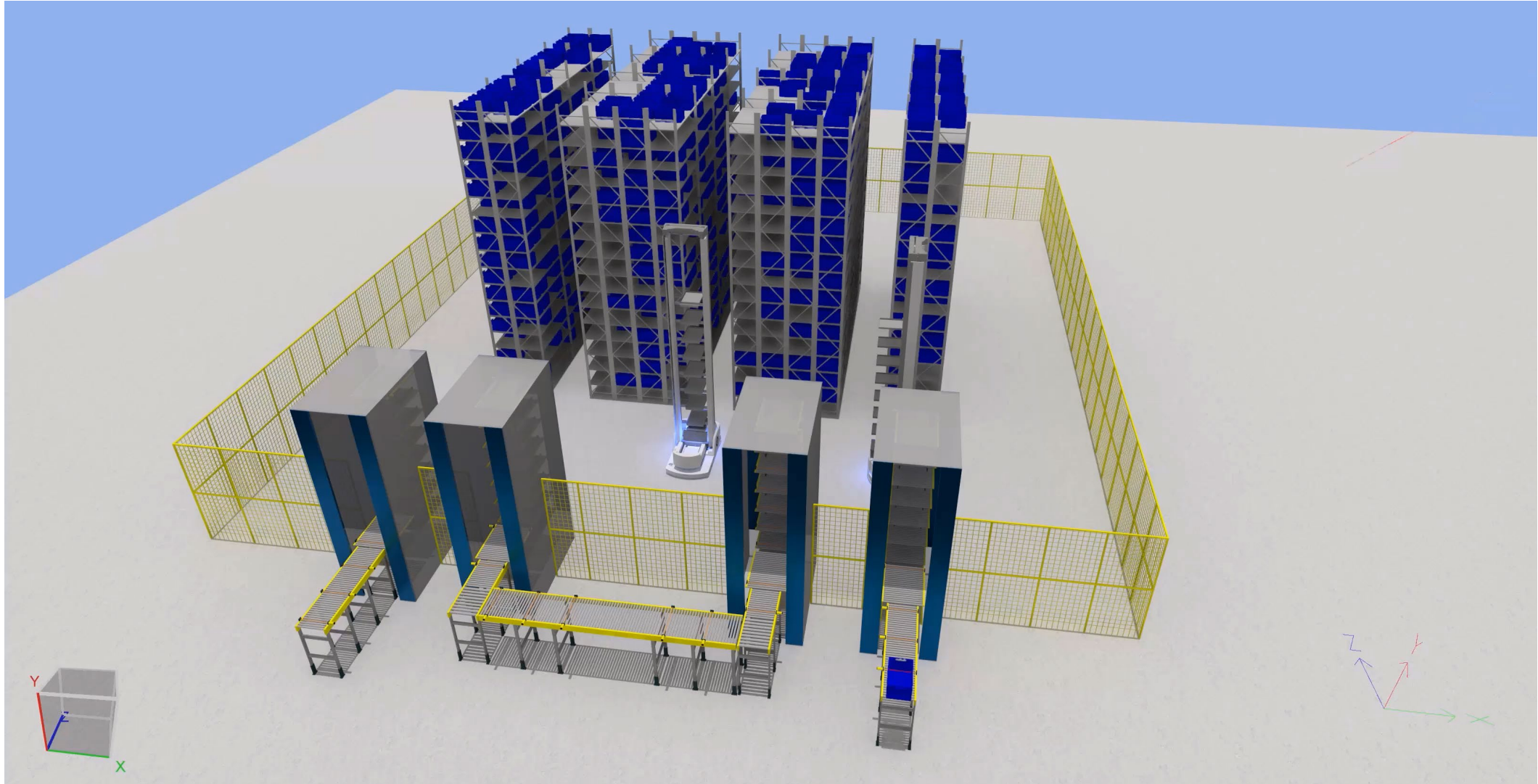
- Parametric AMR Rack designed specifically for the AMR Framework. Snaps to AMR Tile grid.
- ACR Telescopic – the tall one.
- ACR Companion – the small one.
- Custom ACR Controller. Advanced path planning & internal logic for transfers.
- Rack Tunnel Creator & ACR Ports.

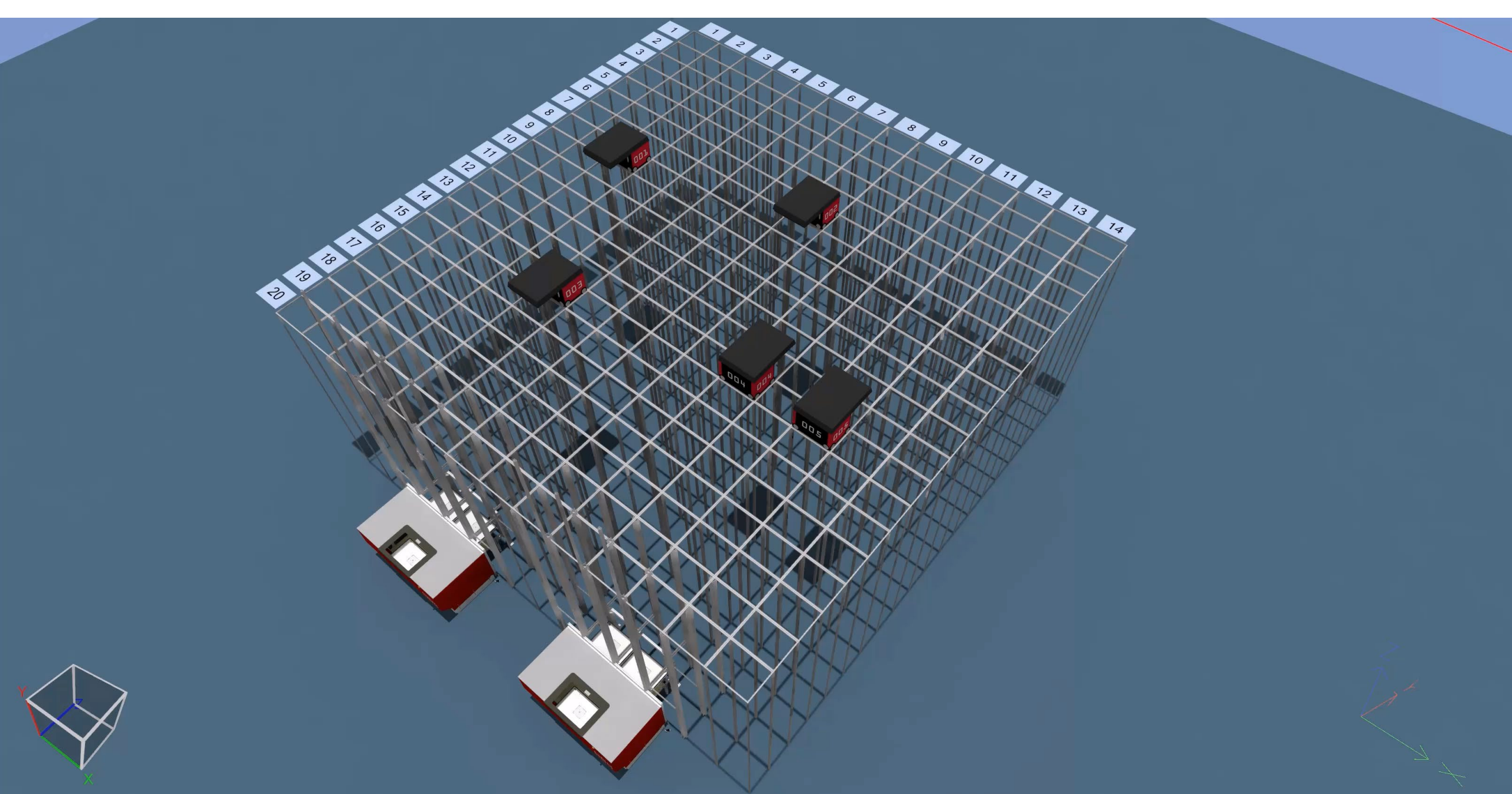




| AMR Catalog Updates – ACR Ports

Components for loading and unloading totes e.g. HaiPorts

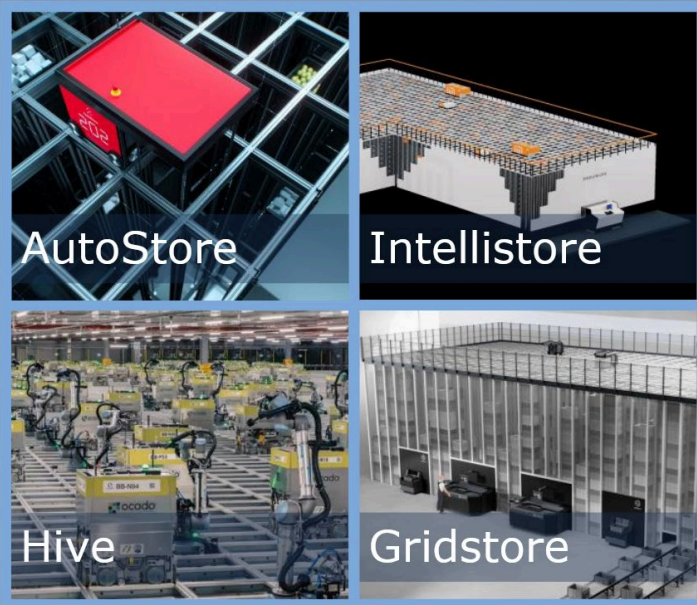




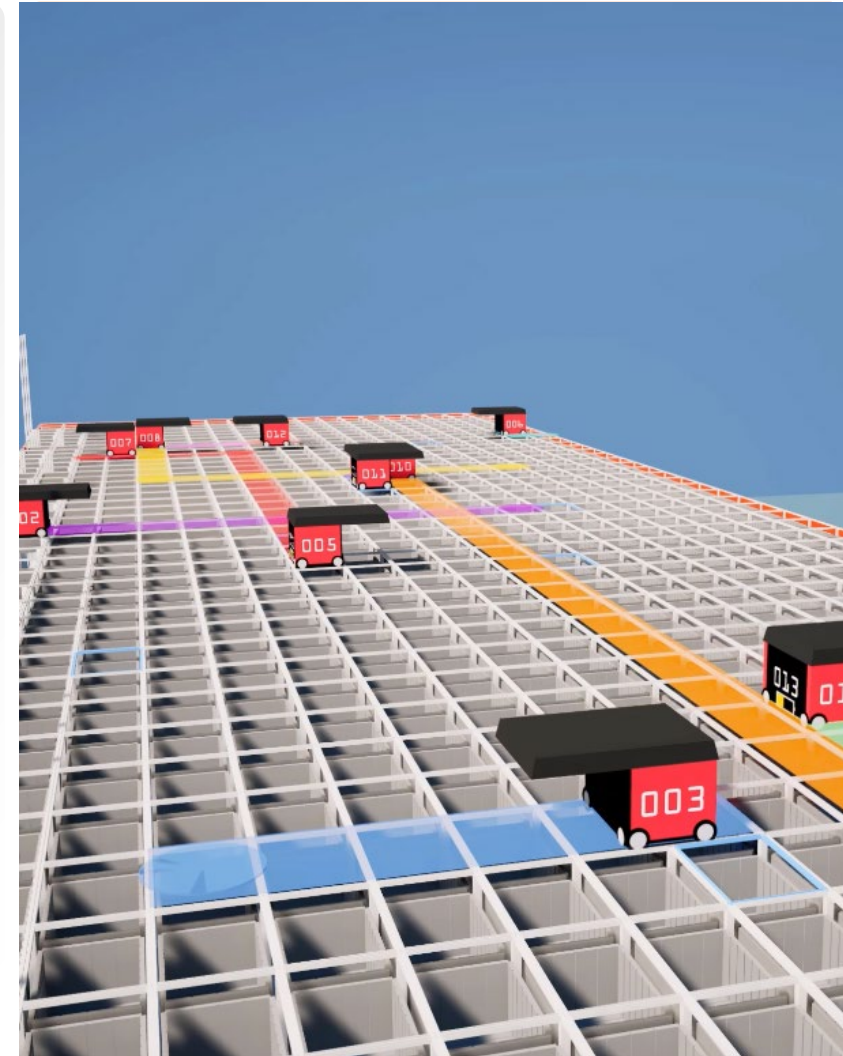


What's Planned – Cube Storage Framework

Initial support for AutoStore and eventually other systems



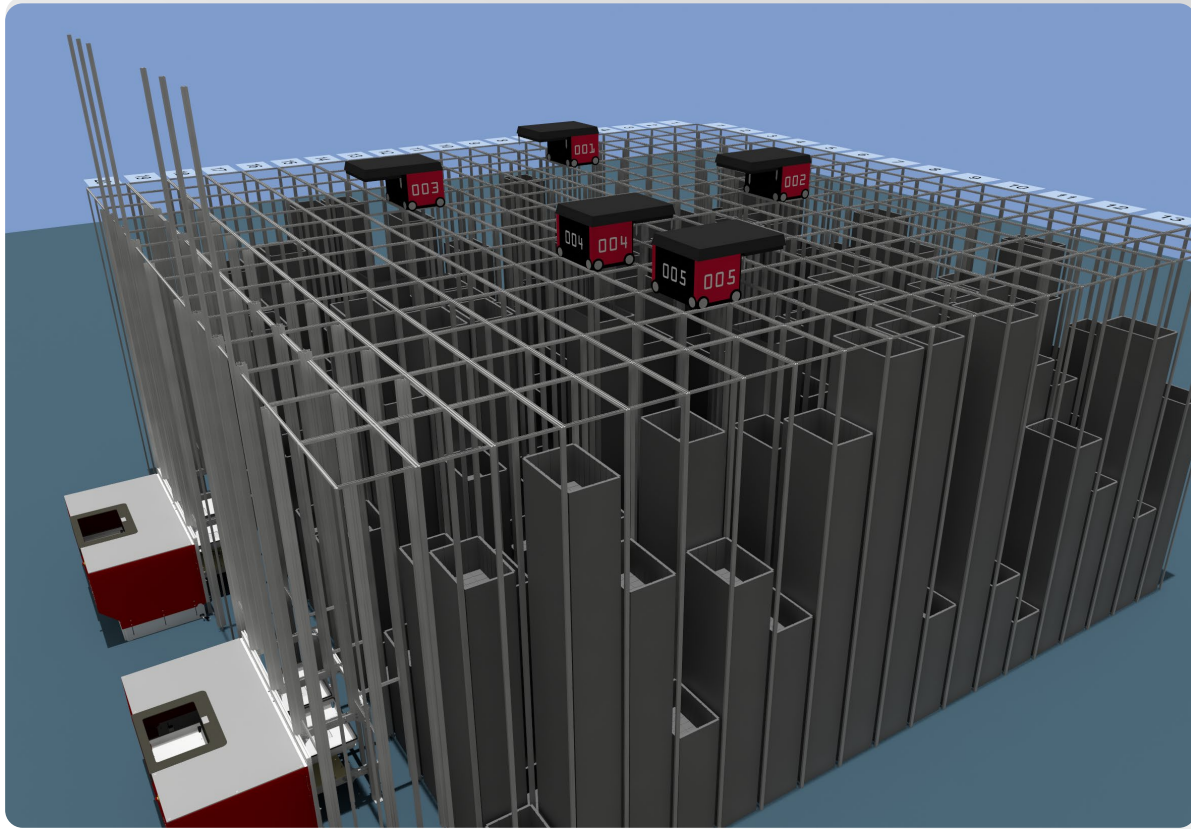
- A set of components for simulating and emulating cube storage systems e.g. AutoStore.
- Support for 2x1 sized bots e.g. AutoStore R5. Support for other Nx1 size bots in the future.
- Each parametric tile/cell responsible for managing its own tote stack.
- Support for SDG and DDG systems.
- Automatic creation of digging and filling subtasks when picking and stowing from cells.
- Composite job widget for tote preparation that moves target tote to the top of the stack.
- Default Simulation logic customizable via scripting.
- Modelled grippers for picking and stowing.



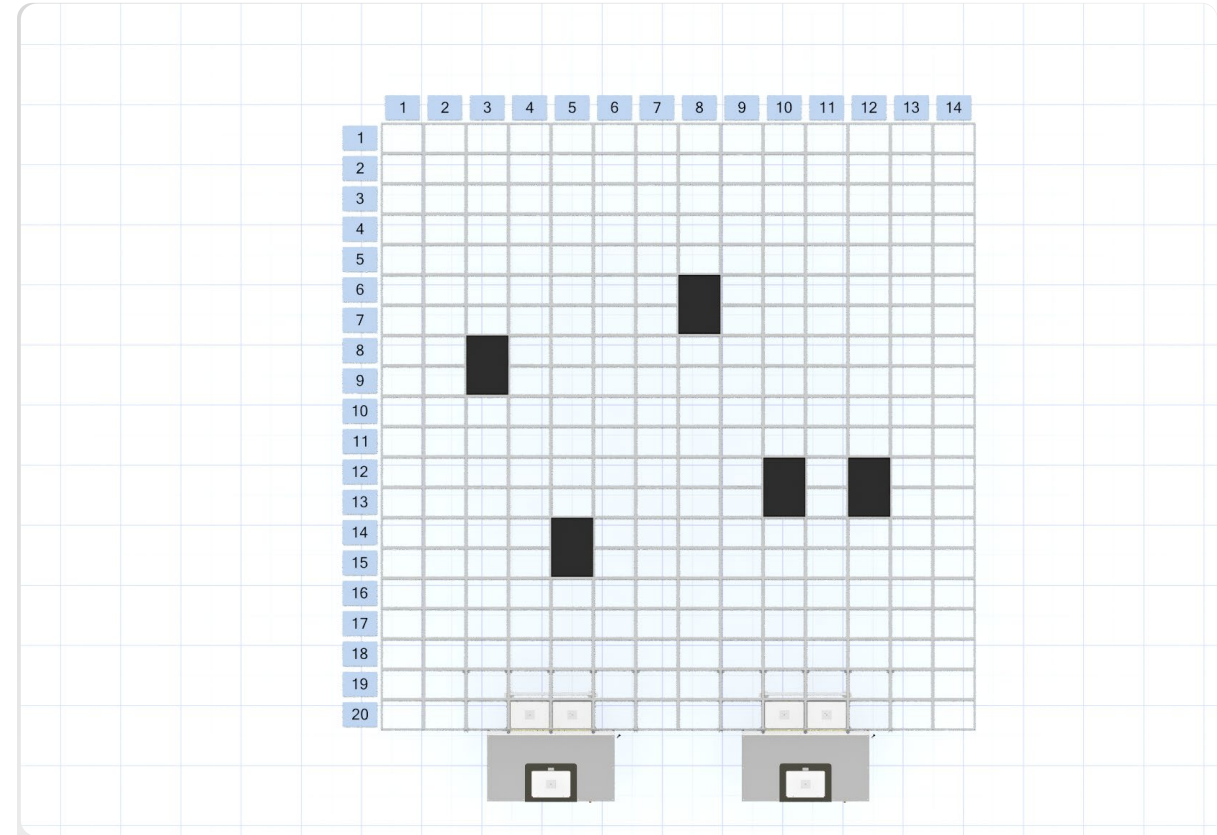


What's Planned – Cube Storage Framework

Cube Storage Grid Architecture



Customizable tile cell stacks with batch property management via Grid Manager



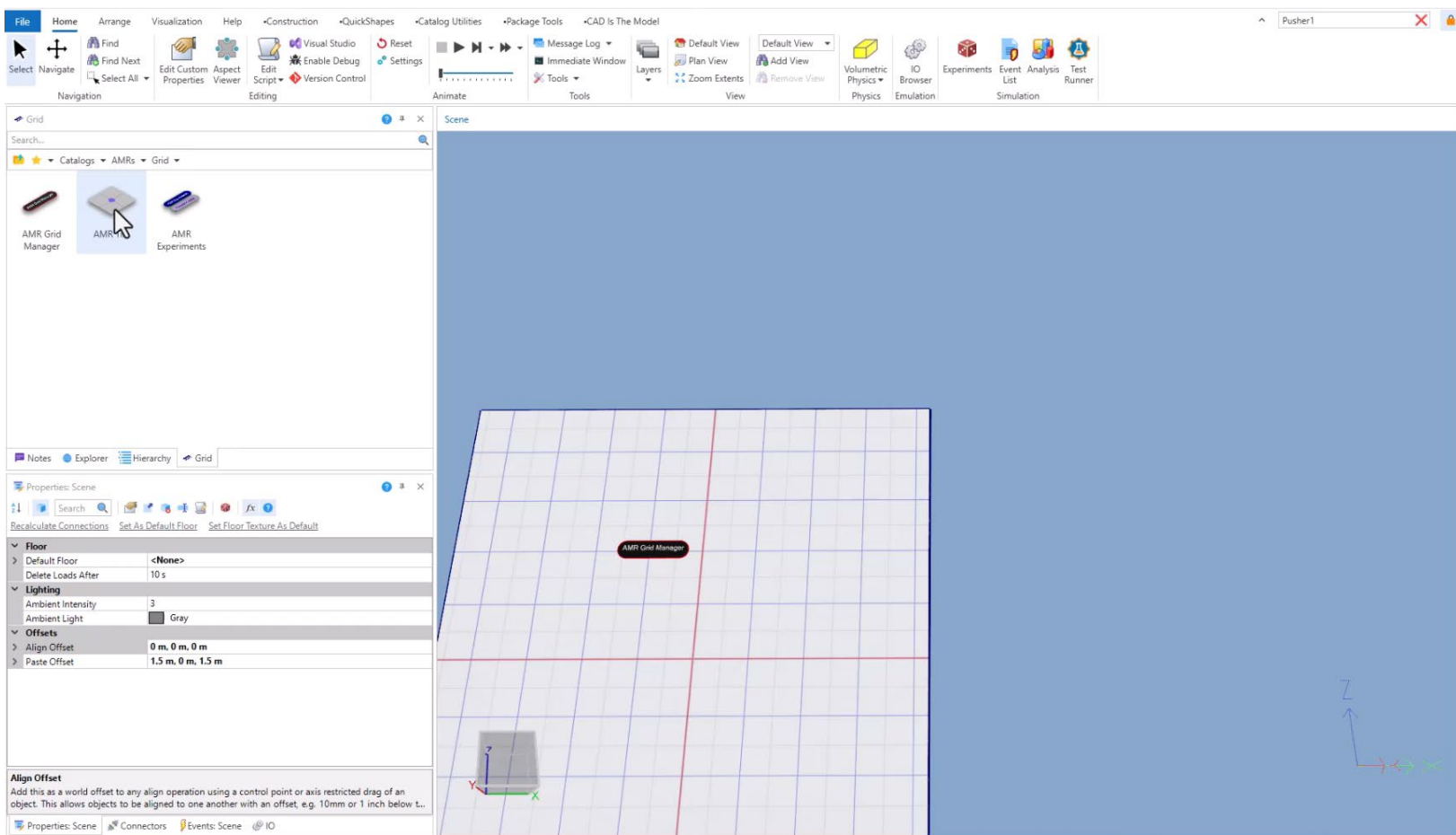
Quickly establish XY Grid by declaring root tile position.



Tips & Tricks

Unearth the obscure! Improve your AMR workflow!

- Engage forum
- AMR Grid Manager custom functions!



A ROCKWELL AUTOMATION COMMUNITY

8. RE: Case of AMR 3 LIKE

Posted Mar 31, 2025 05:39:00 AM | [view attached \(2\)](#) No replies, thread closed.

[@ Andrew Wu](#)

Hi Suryan,

Charging when Idle can be easily implemented for this model by checking at the end of each drop-off whether the AMR has a job or not. The trick is to do this check in a new thread after waiting a short amount of time, to allow pending jobs to be assigned (if they exist).

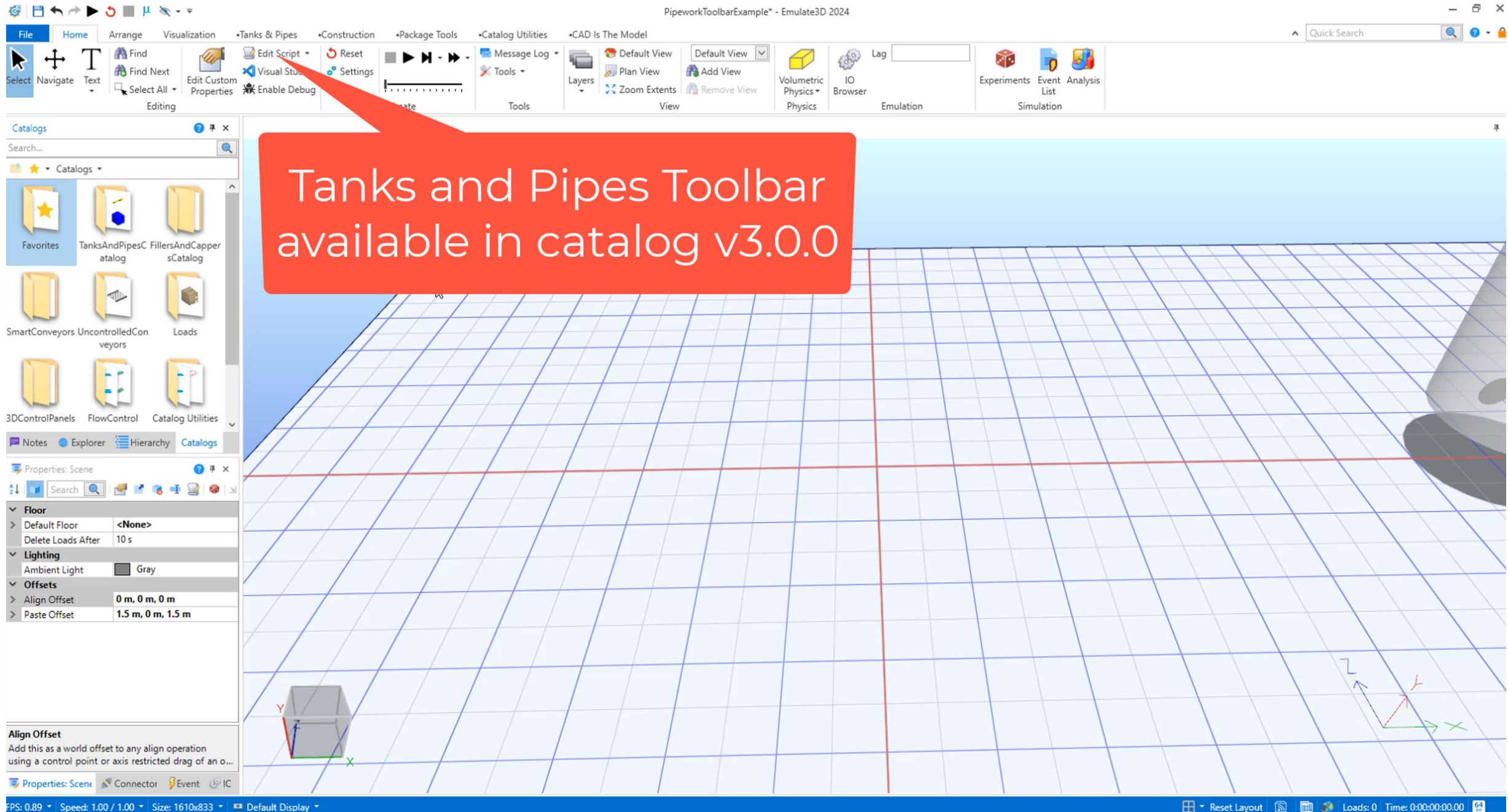
You can compare the above model logic to the previous logic. The difference is in the AMRArrived procedure on the Outfeed tiles. I also corrected a mistake I made in the previous model: The AMRDeparted procedures on the Charge tiles should include an if 'IsStartingTile' check. Otherwise, the logic will run each time an AMR passes the tile, which is not what we want.

You can find the updated model file attached below.

Additional notes:

- As for why your print statement wasn't working, this is because the AMRStatus is set slightly before the HasJob property, meaning when AMRStatus is updated, the status may be Idle but HasJob = true until the event code exits.
- Regarding the use of a job schedule table, if a model is event driven and sequential like this one, there is usually no need to write job data to a table first before creating them. The job schedule table concept is more useful when dealing with complex models where jobs need to be executed at a specific time in the future.

Tanks and Pipes V3 - Automatic Pipe Routing



Tanks and Pipes V3

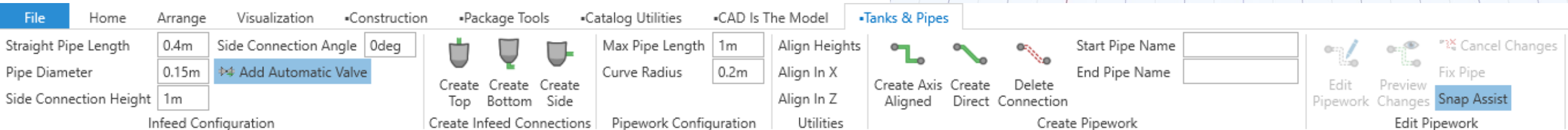
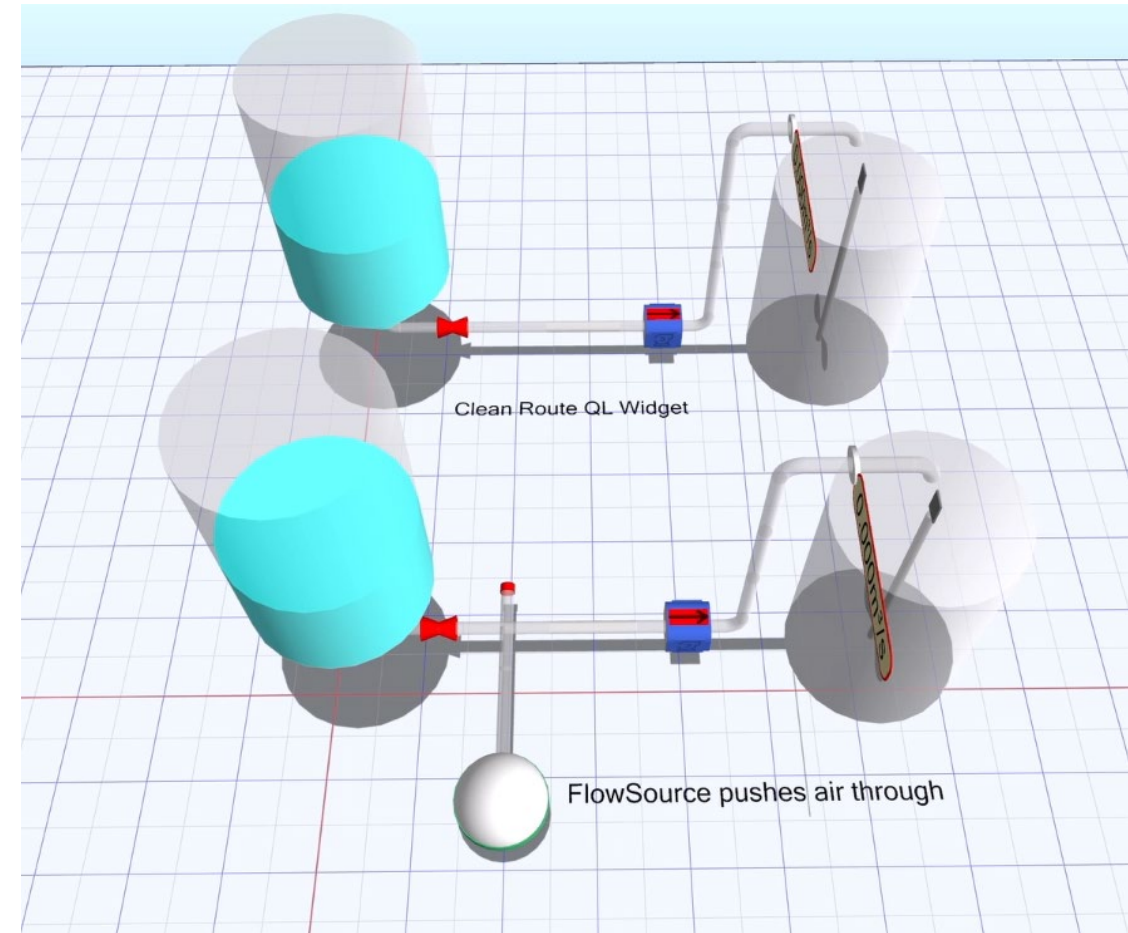
New toolbar for automatic creation and editing of pipework, tank infeeds, and outfeeds.

New tools to model cleaning of pipes, via air or through a mechanical pig.

Improved draining and siphoning logic.

Many new tools and utilities, including:

- Optional sensor and pump noise.
- Easy signal scaling (i.e. reading to 4-20 ma)
- Discontinuous pipe segments
- Creation of scenarios through multiple tables





Singulation Conveyors

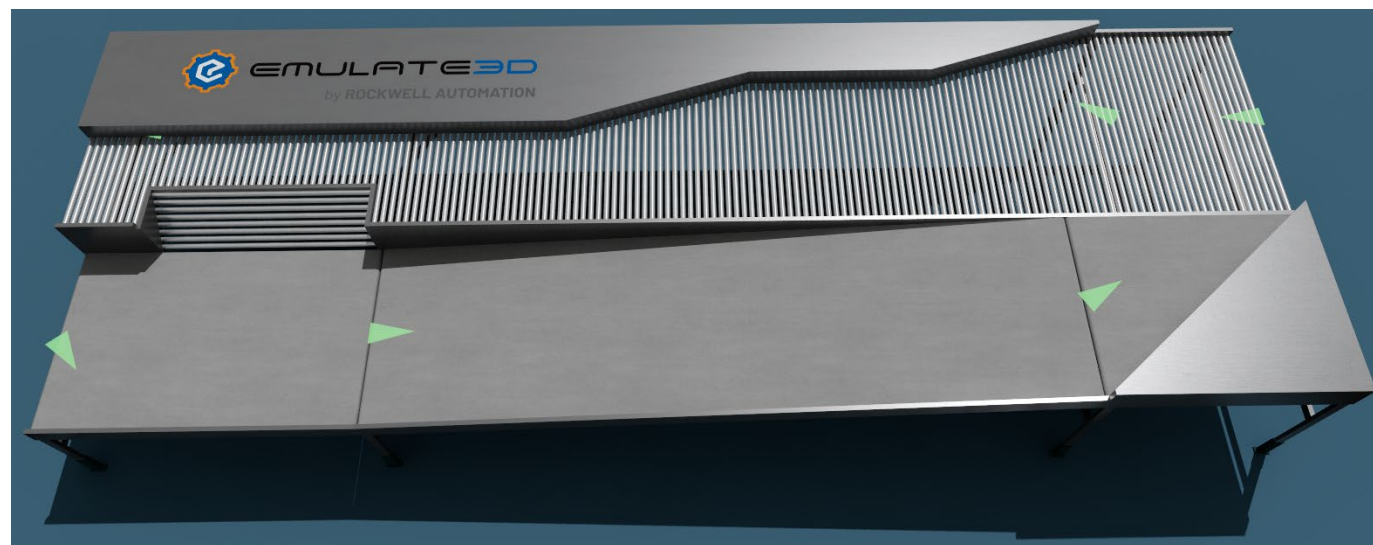
Easy to configure parametric component

200+ scripted unit tests using Test Runner

- Verify & learn custom property behavior
- The script comments & organization of test cases are great references when making your own tests!

Optionally snap output loads for perfect right/left-alignment

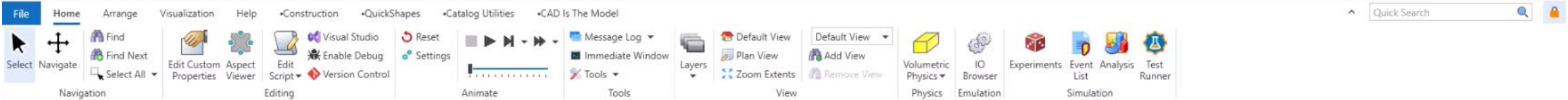
Requires volumetric physics



Emulate3D TestRunner

New Project

<



SingulationConveyors

Search...

SingulationConveyors

Parcel Singulator Right Aligned

Parcel Singulator Left Aligned

Not Explo Hieran SingulationConv

Properties: Scene

Floor

Default Floor	<None>
Delete Loads After	10 s

Lighting

Ambient Intensity	3
Ambient Light	Gray

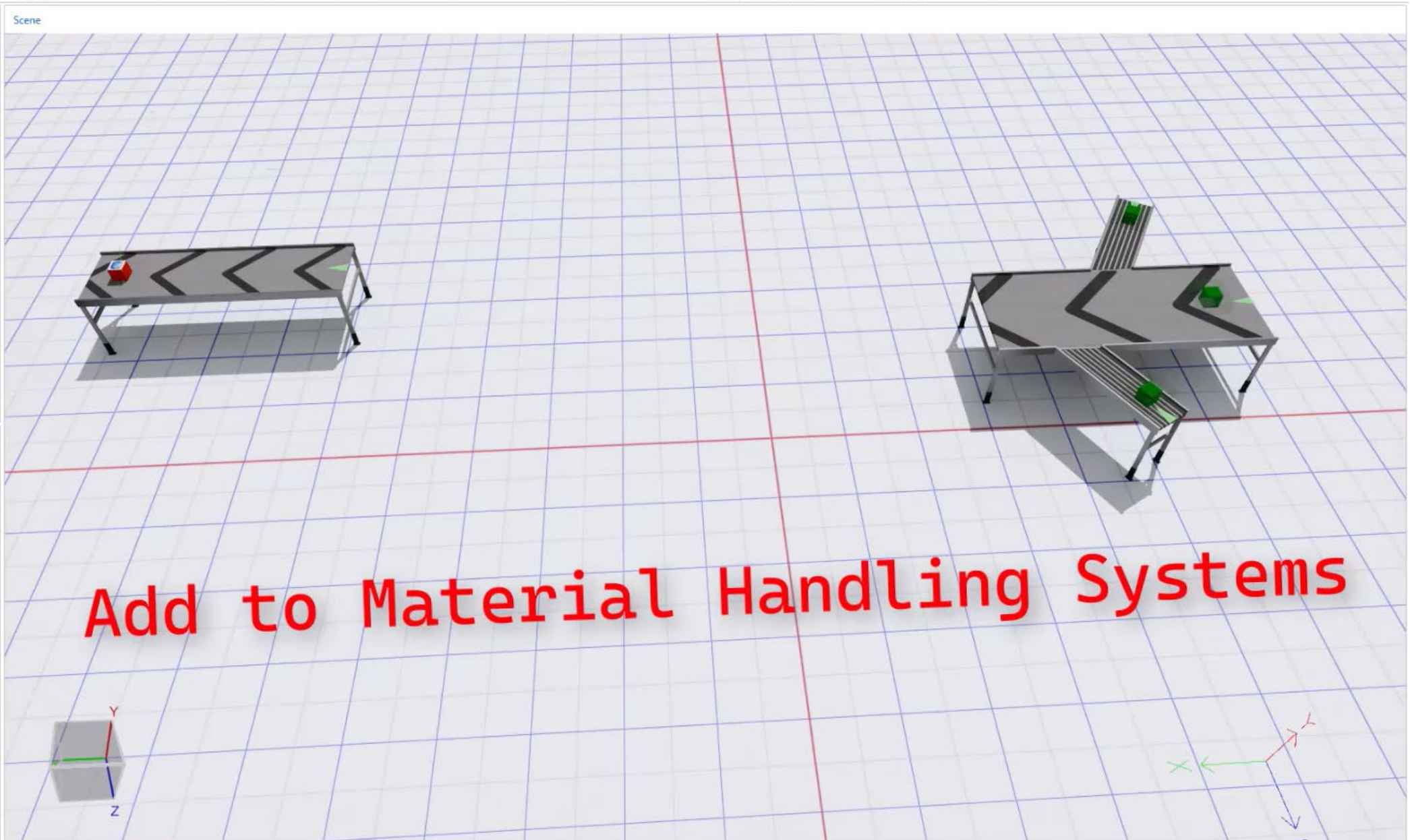
Offsets

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

Align Offset

Add this as a world offset to any align operation using a control point or axis restricted drag of an o...

Properties: Sc Connect Events: Sci K





Baggage Handling Updates

Constant improvements to existing catalogs, available on Package Manager

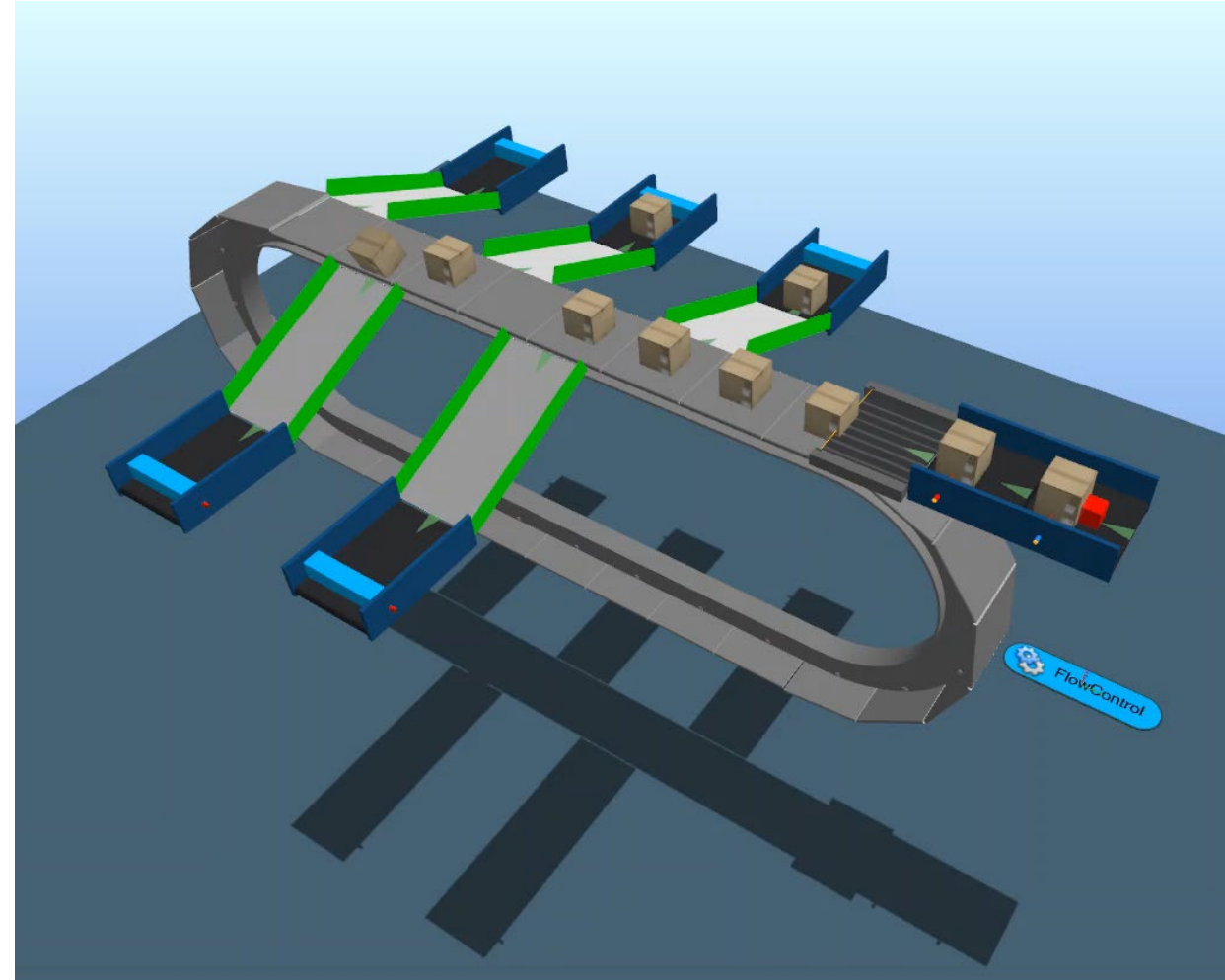
Single Plough Diverter – HaltLoadPosition property to set point of accumulation

Vertical Cross Belt Sorter

StrictMerging for Managed Merge Controller

InhibitTimeoutDelay for Tilt Tray outfeeds

Property to disable tilt trays during a simulation to mimic reduced capacity





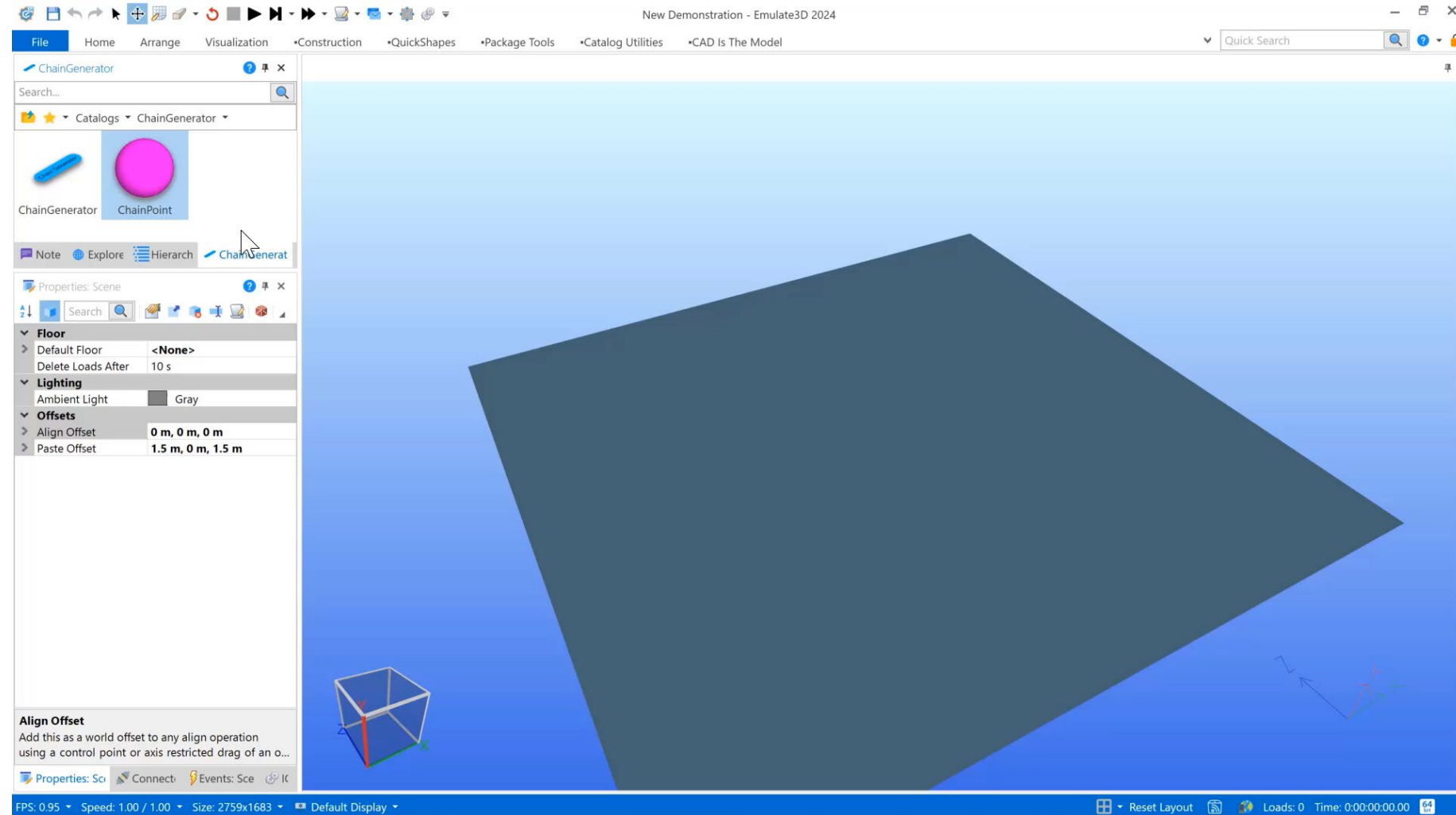
Chain Generator

Create and configure dynamic jointed chains

Create new hoses
or chains from links
of dynamic joints

Quickly generate
new chains or
configure existing

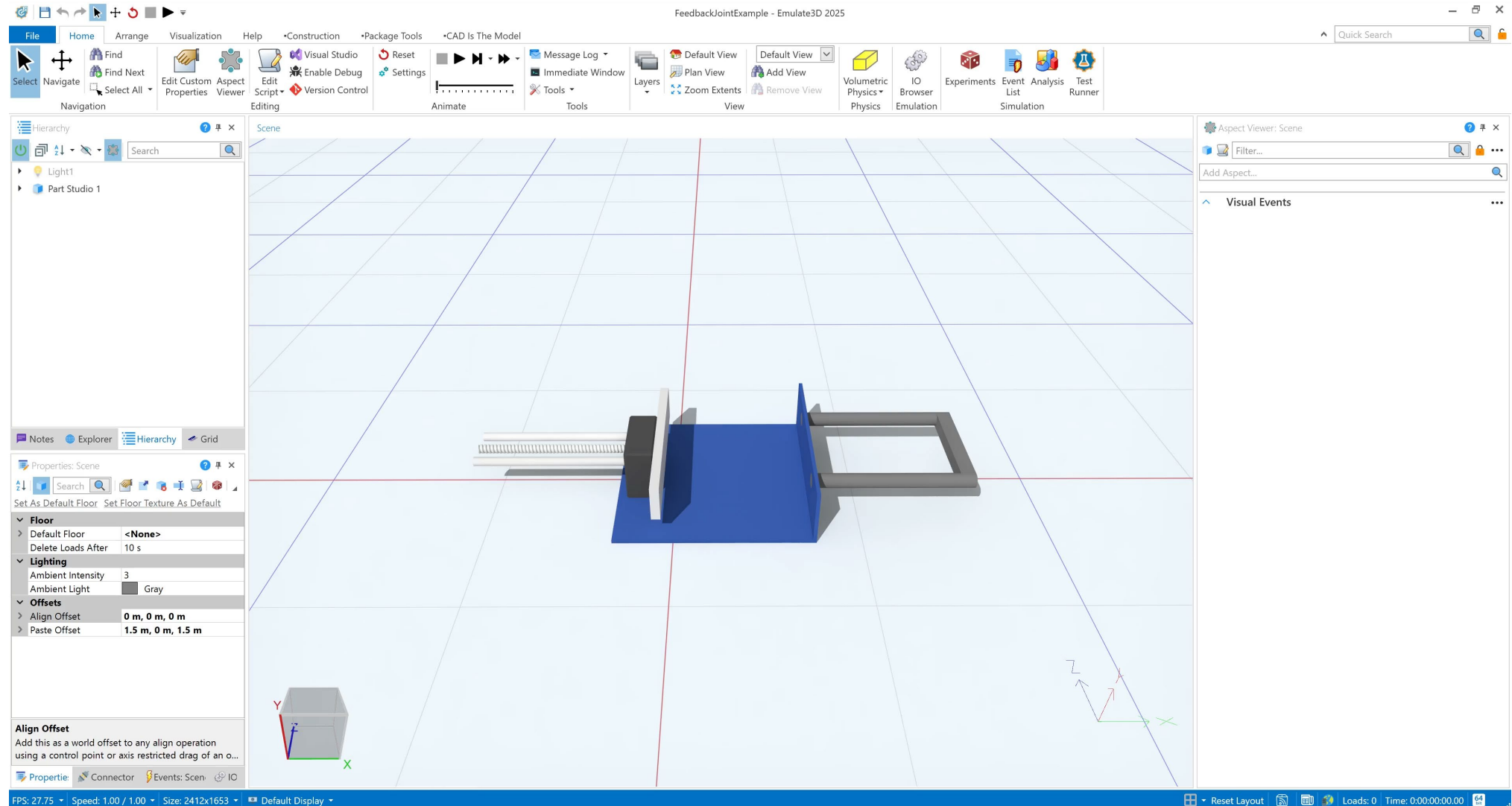
Requires AGX
Physics Engine





Dynamic Feedback Motors

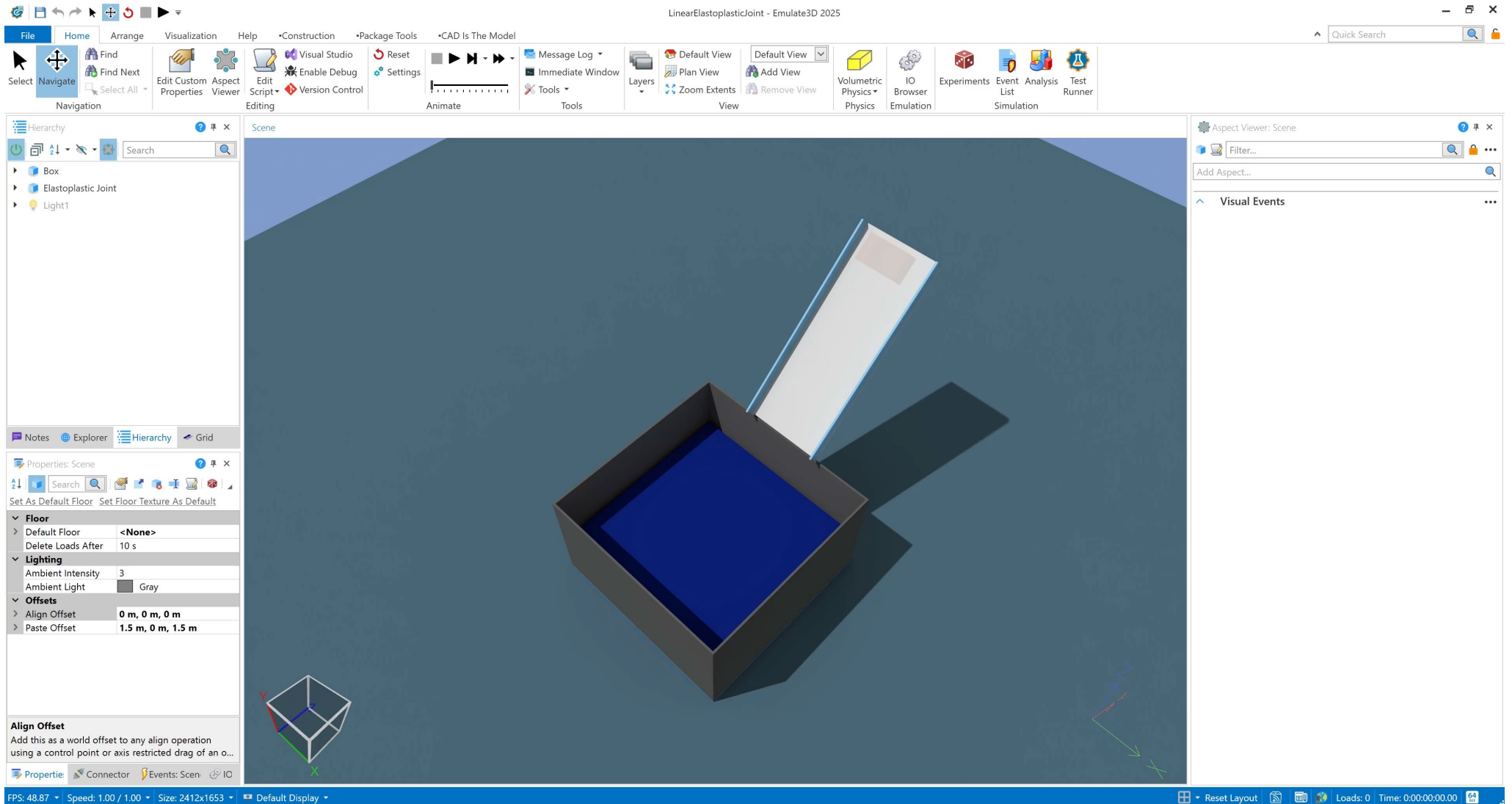
Position control for dynamic joints!





Elastoplastic Joints

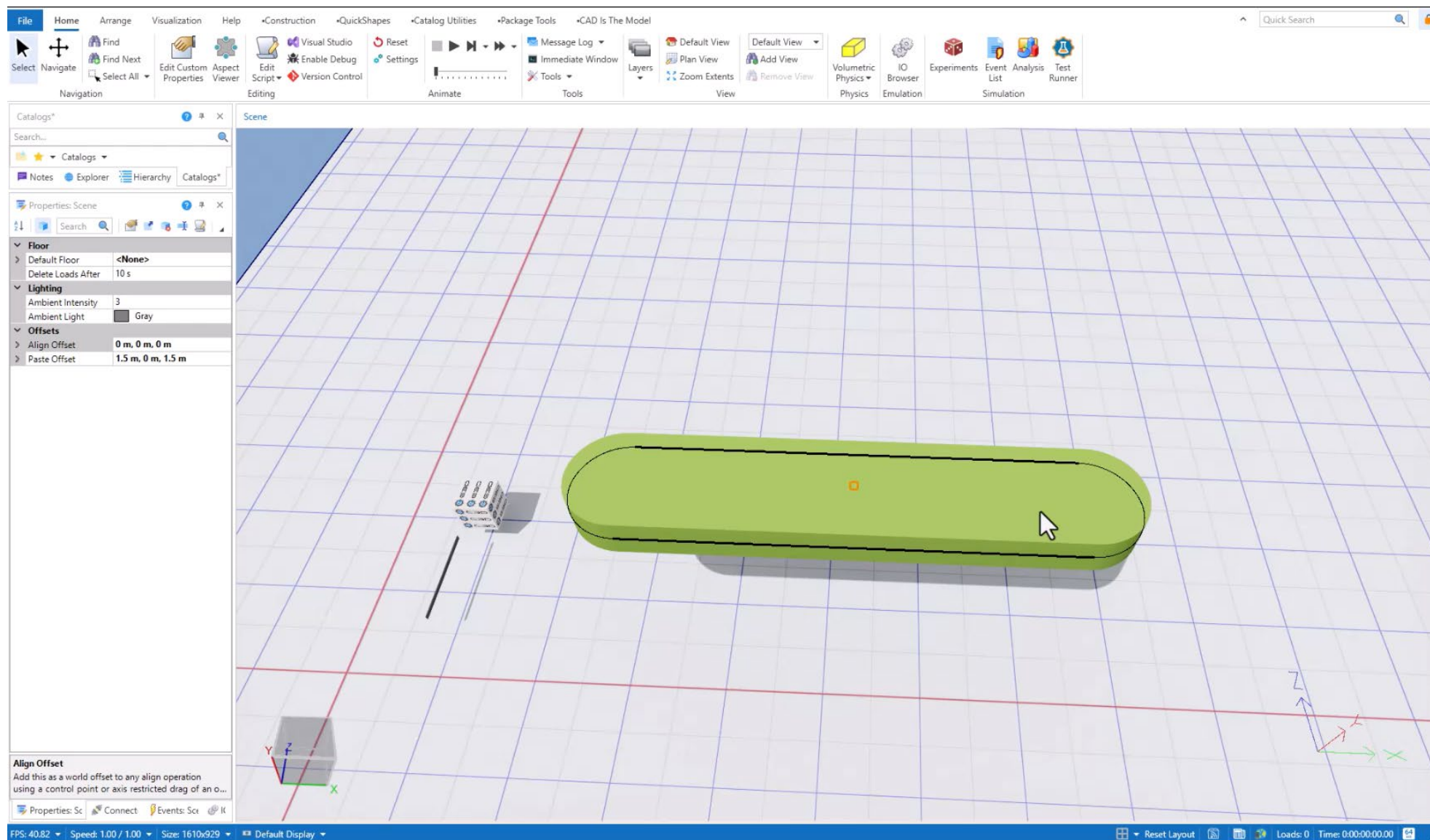
Easily model springs, and use the deformation angle to model folding





What's Planned – Path Joint Tools

Streamlined workflows to make smooth paths, and to set up many path follower joints



Robot Updates

New robots, marked up and ready to use

Universal Robots – UR

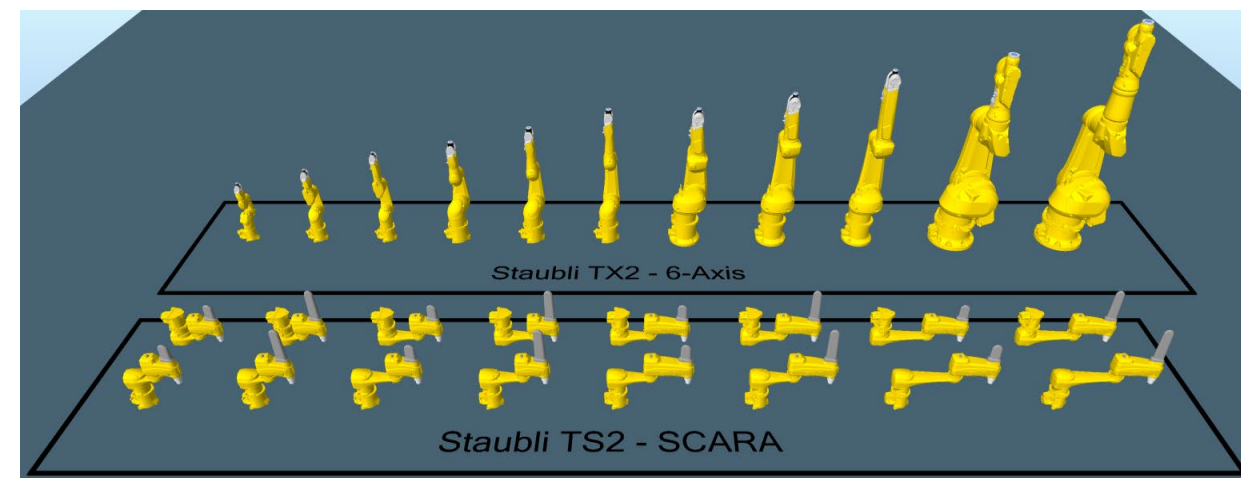
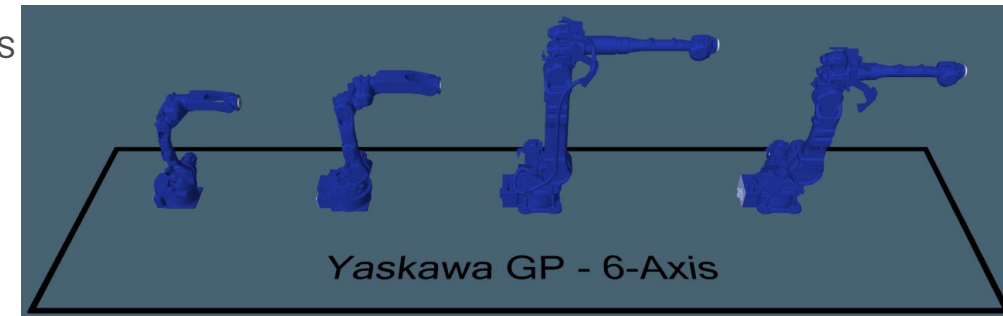
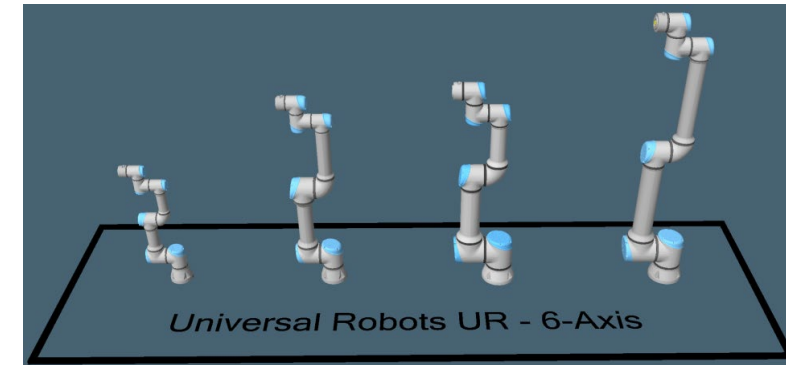
Yaskawa Robots – GP

Staubli Robots – TS2 & TX2

What's Planned – Autonox

100's of updated Robots

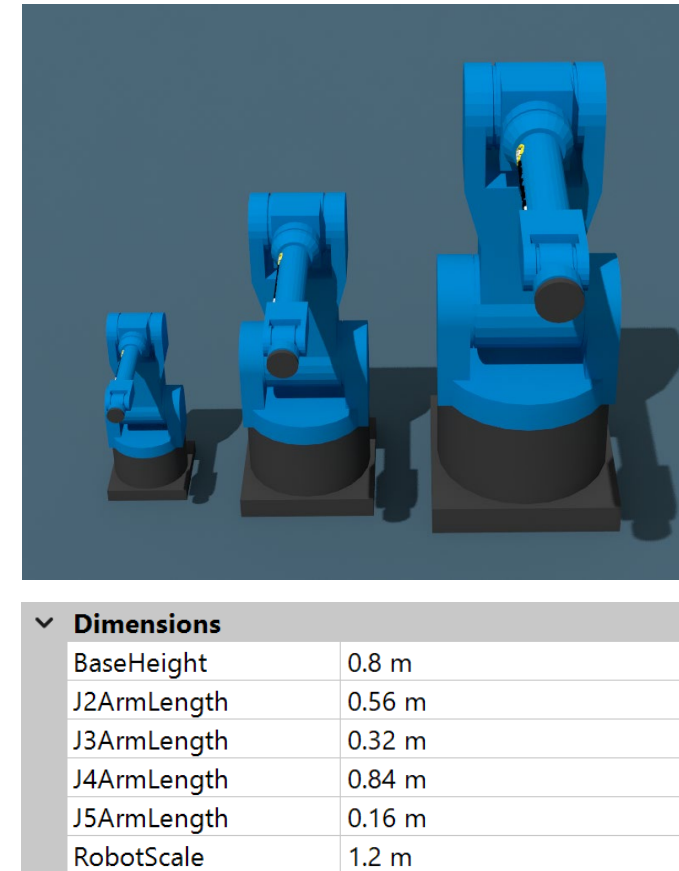
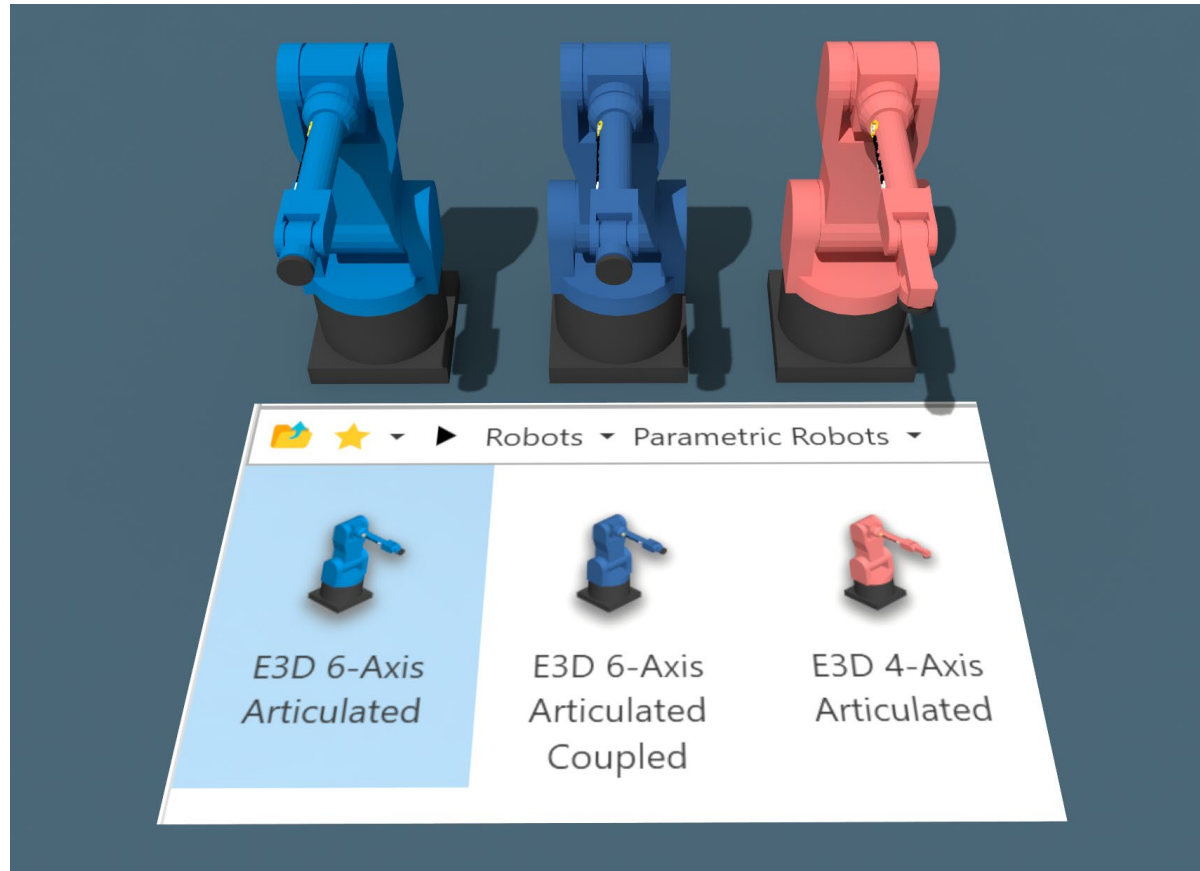
- Fixed various issues
- Standardized Visual & Joint Names
- Standardized Tool Plate Connectors
- Documentation & Tags added for Package Manager searching





Parametric CITM Robots

New in the Robots Catalog



- New Parametric Articulated CITM Robots available in Robots Catalog 1.7.0 and above. Easy configuration of overall scale and/or individual arm lengths.

Wiring Diagram V3

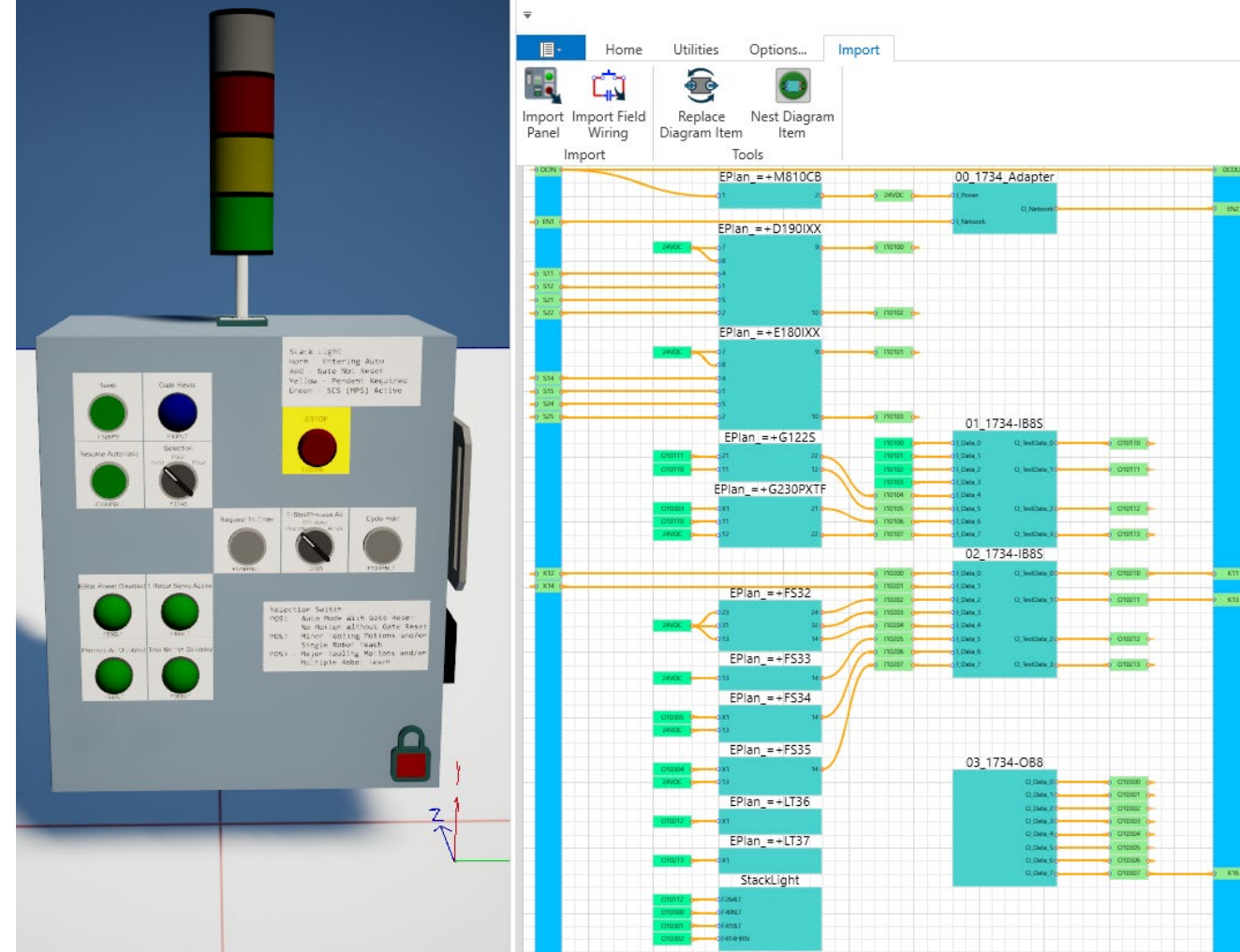
Significant improvements to performance and usability.

- Faster GUI refreshing (~10x)
- Removed GUI impact on comms
- Faster signal propagation (~100x)
- Buttons to create/delete internal wiring custom properties

Multiple simultaneous wiring views

Detailed API for custom workflows

EPLAN Import of WD and Panels
(Importer available in v3, exporter available from EPLAN team as public preview)



Mihai 4:18 PM

the beta wiring diagram is AMAZING!



Deebs 4:23 PM



Can I put that in the UGM presentation?



Mihai 4:31 PM

I'm doing VC no hiccups, no signal inconsistencies, navigate the wiring at will with all updates enabled,

i love it

you should really brag about it at the UGM with confidence



What is Device Emulation?

There are two parts to Device Emulation:

1. **Device Network Emulation** emulates the low level **CIP Class 1 communication** with the PLC. This layer of emulation is only enough to establish data communication with the PLC, exchanging uninterpreted data.
2. **Module Emulation** emulates the logic inside the device/module. This might include any CIP Class 3 Objects that the module supports, and any Smart logic that it offers.



Why Device Emulation within Emulate3D?

No PLC Code Changes

Don't need to Inhibit Allen-Bradley Modules

Communicate via CIP Class 1 with supported devices using Device Network Emulation layer

Enables automated testing of your controls code and CI/CD workflows

Write to Safety IO

E3D creates the CIP Class 1 connection on the specified IP

The PLC thinks it's talking with the real hardware module, and Status bits are satisfied

IO can be freely exchanged (Logix Firmware 35+)

Comprehensive Testing

Module configuration errors can be discovered & resolved

With Module Emulators, internal logic is emulated with highly accurate behavior

Fault testing can be performed virtually

What Module Emulators are available?

AB Digital I/O Modules

AB Velocity Drives
(standard)

Armor PowerFlex
(future)

Create your own!
APIs and Tutorials for
Device Network
Emulation.

1732ES ArmorBlock Guard I/O Ethernet/IP Safety Modules

IB16, IB12X0BV2, IB12X0B4, IB8X0BV4, IB8X0B8

1734 Point I/O Digital Modules

IB8S, OB8S, 8CFG, IA2, IB2, IM2, IV2, IA4, IB4, IM4, IV4, IB8, IV8, OA2, OB2, OW2, OX2, OB2E, OB2EP, OV2E, OA4, OB4, OW4, OB4E, OV4E, OB8, OB8E, OV8E

1756 Control Logix EtherNet/IP Digital I/O Modules

IA16I, IB16I, IA16, IB16, IC16, IH16I, IM16I, IN16, IV16, IG16, IB16D, IA32, IB32, IV32, OA8, OB8, ON8, OC8, OH8I, OX8I, OB8I, OB8EI, OA16I, OB16I, OW16I, OG16, OA16, OB16E, OV16E, OB32

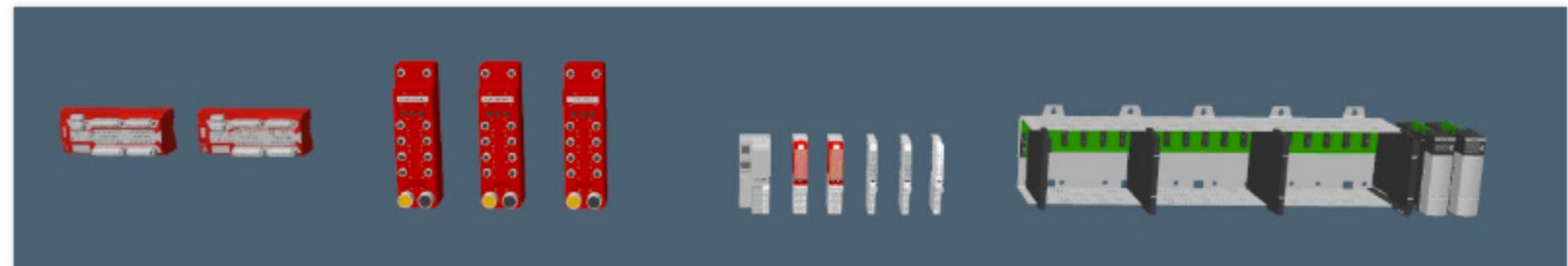
1791ES CompactBlock Guard I/O Ethernet/IP Safety Modules

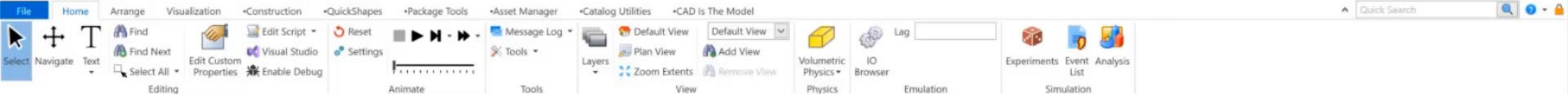
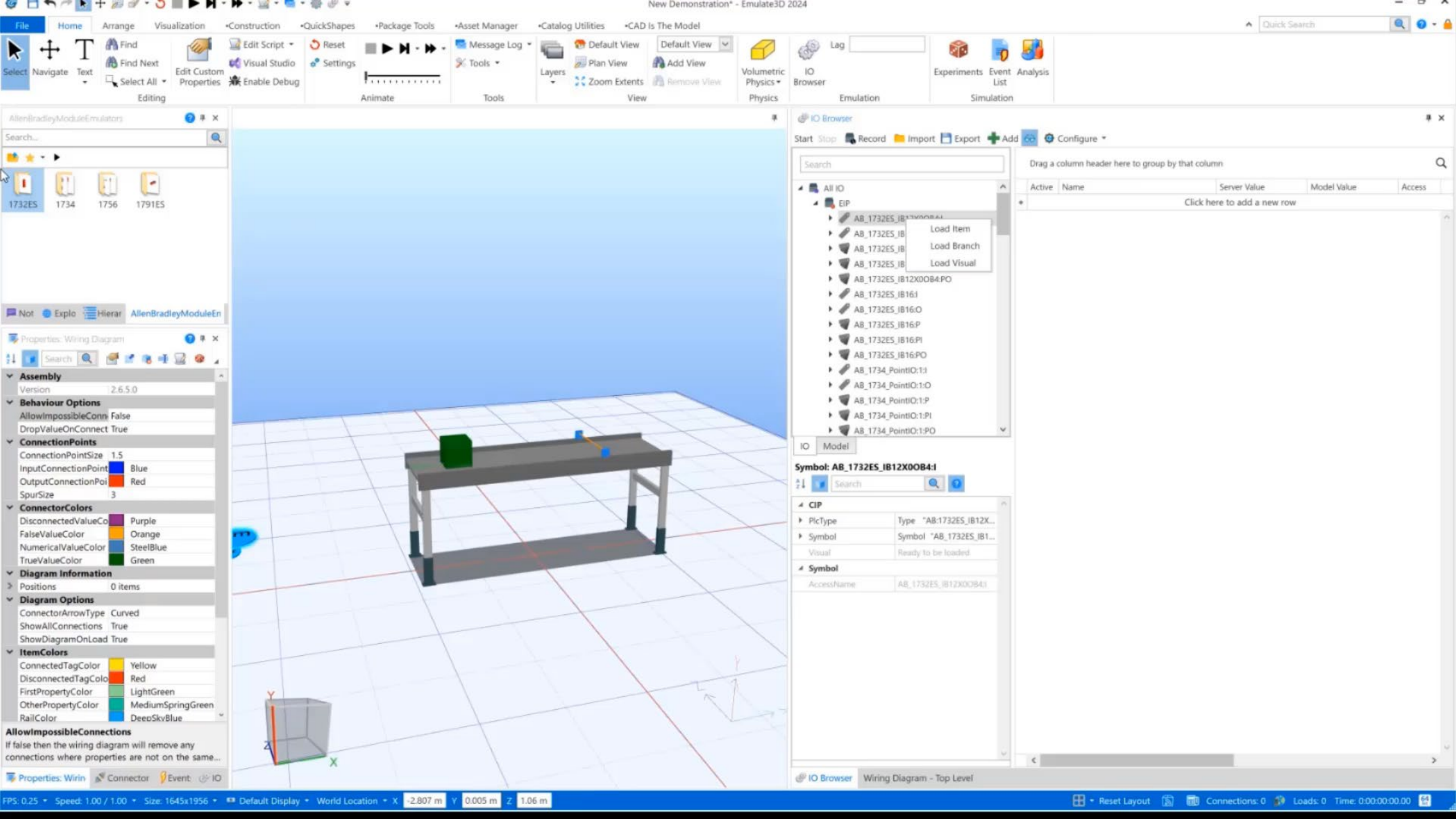
IB16, IB8X0B4

Velocity Drives

ArmorStart 284E, PowerFlex 525, PowerFlex 753, PowerFlex 755, and PowerFlex 755T

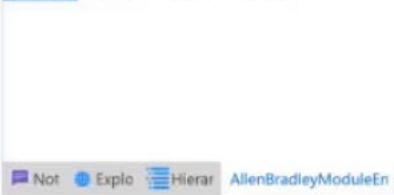
See [Allen-Bradley Velocity Drives Catalog](#) for more details.





AllenBradleyModuleEmulators

Search...



Properties: Wiring Diagram

Assembly

Version: 2.6.5.0

Behaviour Options

AllowImpossibleConn: False

DropValueOnConnect: True

Connection Points

ConnectionPointSize: 1.5

InputConnectionPoint: Blue

OutputConnectionPoint: Red

SpurSize: 3

Connector Colors

DisconnectedValueColor: Purple

FalseValueColor: Orange

NumericalValueColor: SteelBlue

TrueValueColor: Green

Diagram Information

Positions: 0 items

Diagram Options

ConnectorArrowType: Curved

ShowAllConnections: True

ShowDiagramOnLoad: True

Item Colors

ConnectedTagColor: Yellow

DisconnectedTagColor: Red

FirstPropertyColor: LightGreen

OtherPropertyColor: MediumSpringGreen

RailColor: DeepSkyBlue

AllowImpossibleConnections

If false then the wiring diagram will remove any connections where properties are not on the same...

Properties: Wiring Diagram

Connector

Event

IO

IO Browser

Wiring Diagram - Top Level

Reset Layout

Connections: 0

Loads: 0

Time: 0:00:00.00.00

FPS: 0.25

Speed: 1.00 / 1.00

Size: 164x1956

Default Display

World Location

X: -2.807 m

Y: 0.005 m

Z: 1.06 m

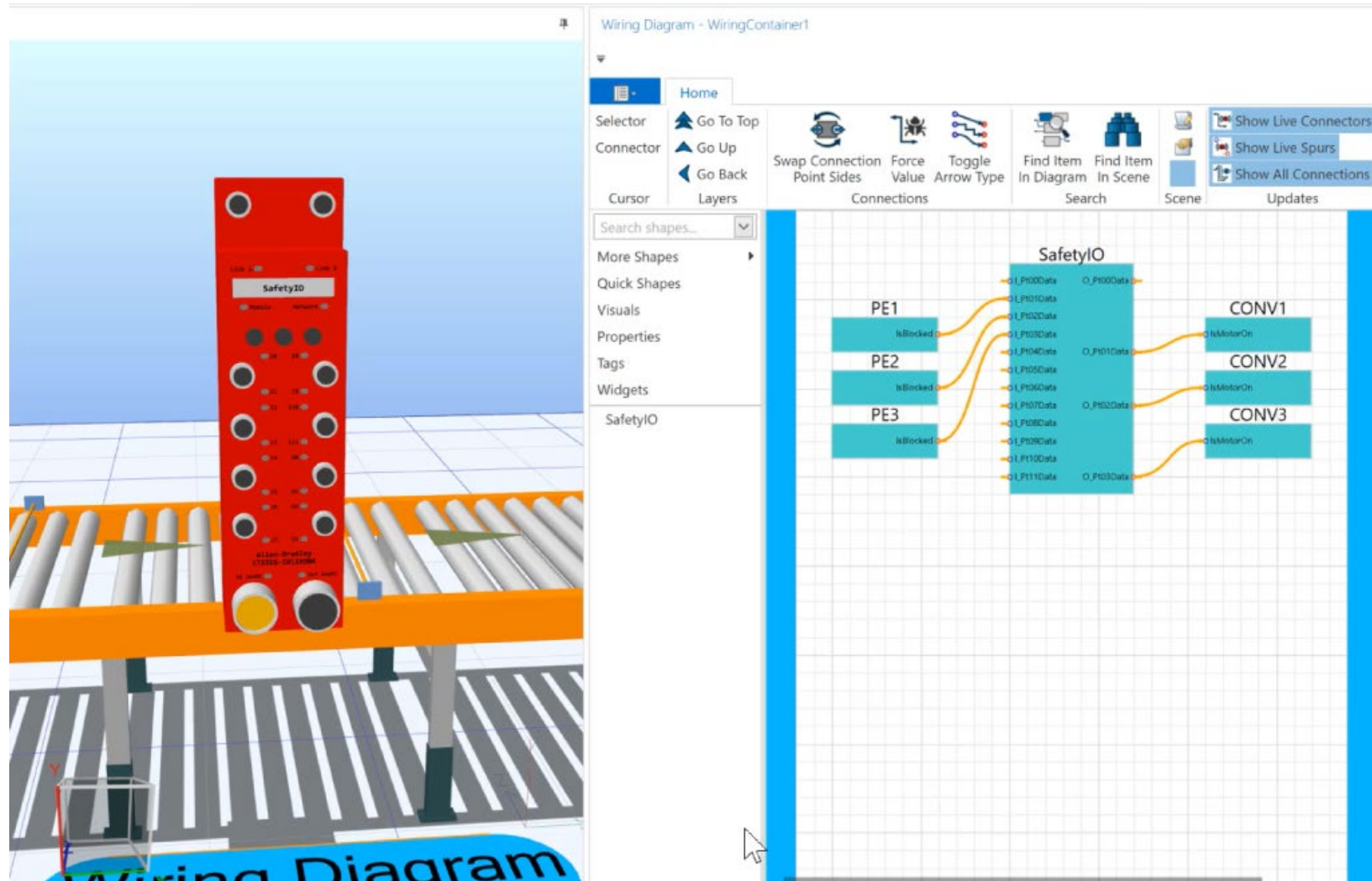
Allen-Bradley Module Emulators Catalog

Add the catalog item into the model to automatically generate the module emulation logic

Highly parametric with many configurations modelled

Single binding in IO browser

Easily bind inputs and outputs to E3D properties via IO Browser, Wiring Diagram or scripting



Allen-Bradley Velocity Drives Catalog (in-progress improvements)

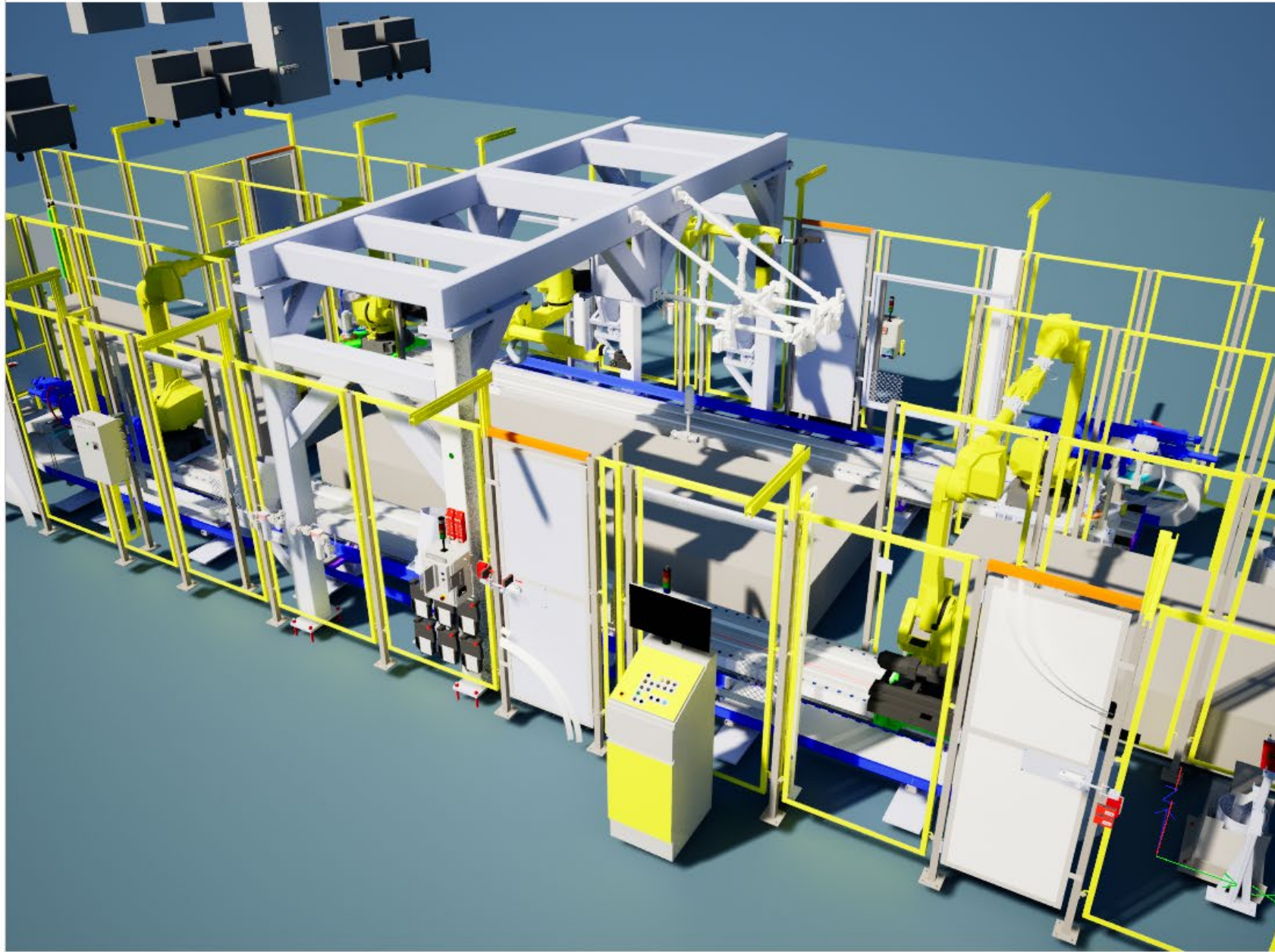
IO Browser bindings automatically generated

The screenshot displays the Allen-Bradley Velocity Drives Catalog software interface, which is used for configuring and monitoring industrial drives. The interface is divided into several main sections:

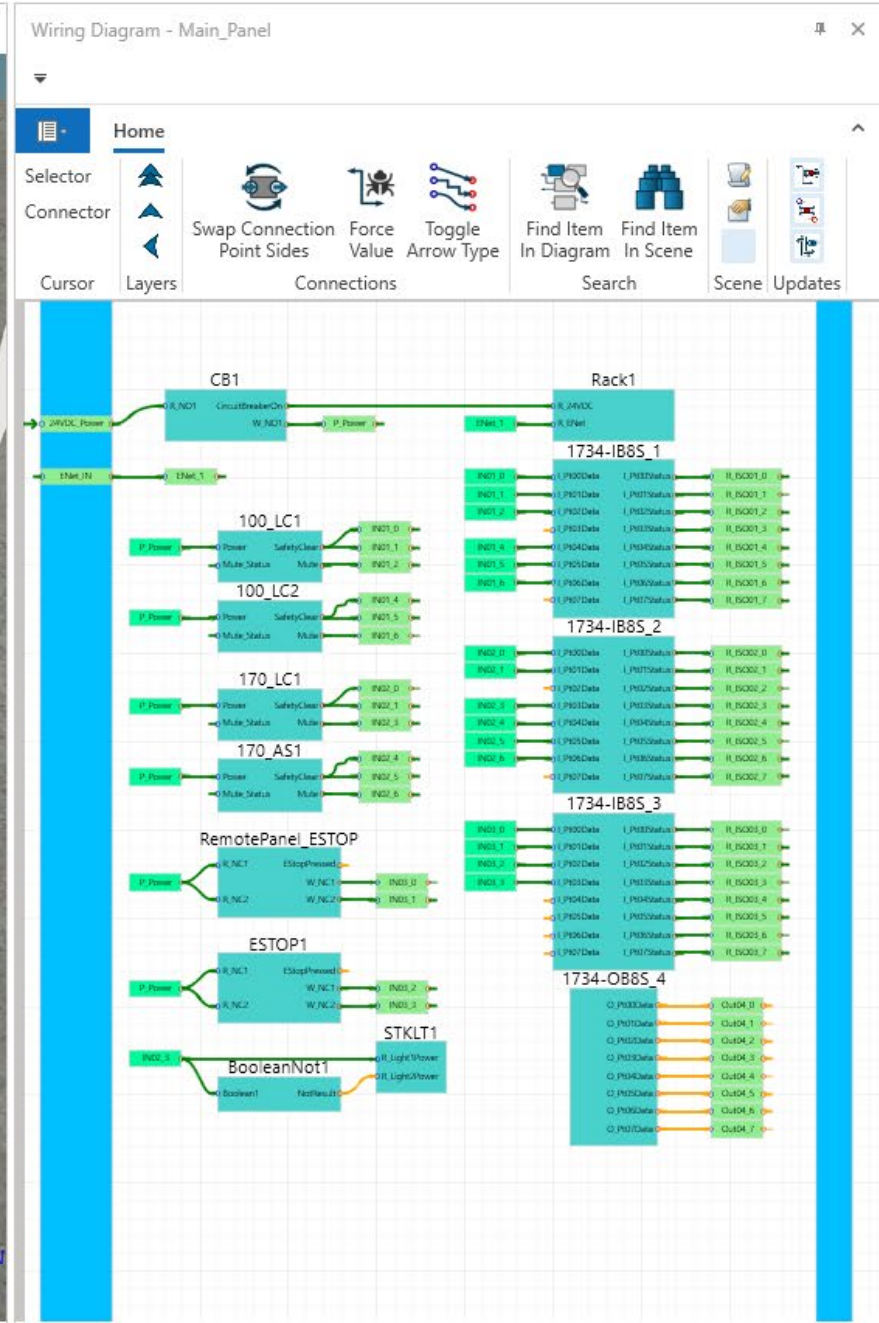
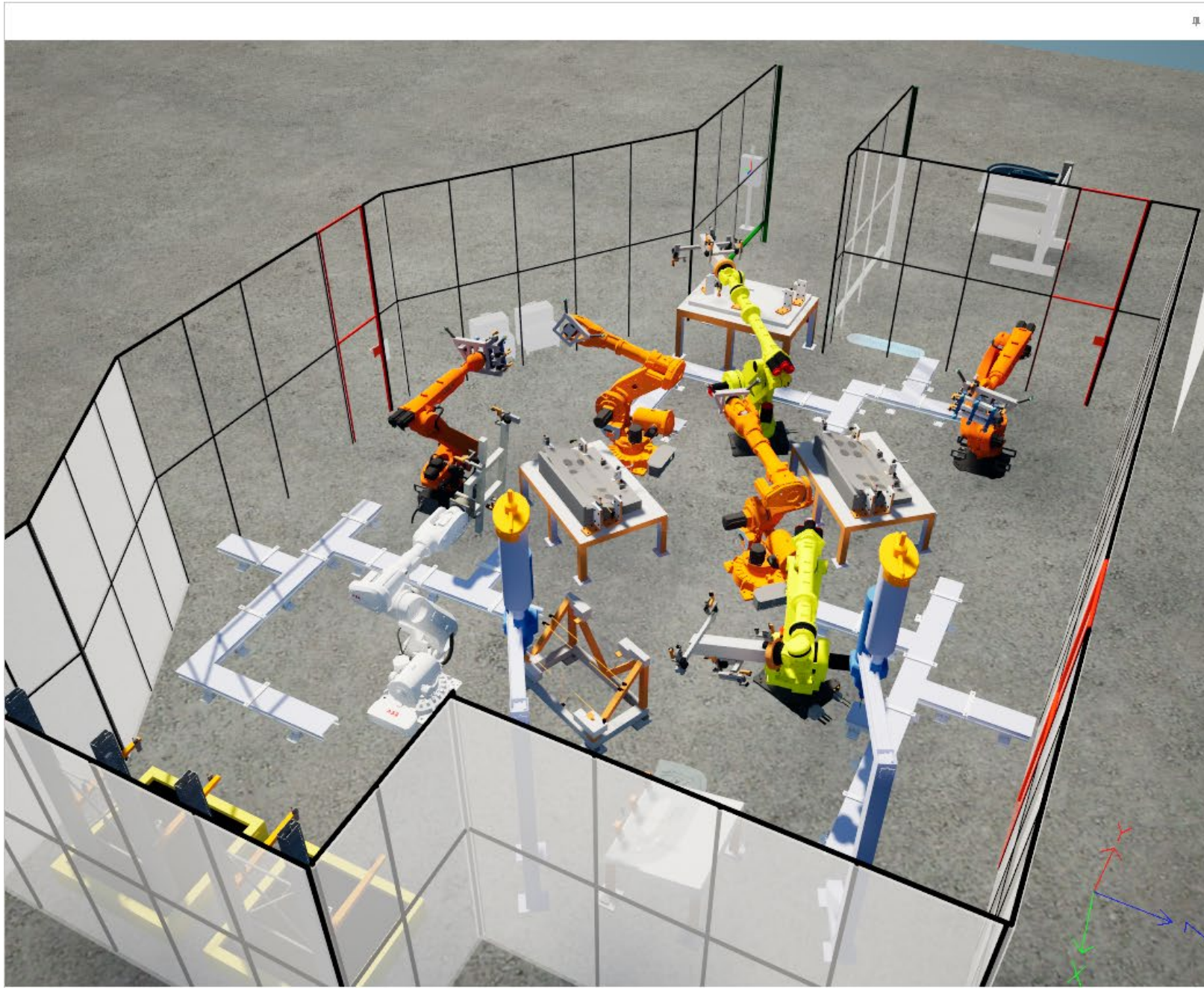
- Controller Organizer:** Located on the left, it shows a hierarchical tree of components. The selected component is "1756-EN2TR_1756-EN2TR", which is a module within a "1756-EN2TR_1756-EN2TR" backplane. The "Module Defined Tags" section below it lists tags for "PF525_1:I" and "PF525_1:O".
- Controller Tags:** The central pane shows a list of tags for the selected component. The "Name" column lists various tags, and the "Value" column shows their current values. The tags are organized into groups: "PF525_1:I", "PF525_1:O", "PF525_1:O.LogicCommand", "PF525_1:O.Stop", "PF525_1:O.Start", "PF525_1:O.Jog", "PF525_1:O.ClearFaults", "PF525_1:O.Forward", "PF525_1:O.Reverse", "PF525_1:O.ForceKeypadCtrl", "PF525_1:O.MOPIncrement", "PF525_1:O.AccelRate1", "PF525_1:O.AccelRate2", "PF525_1:O.DecelRate1", "PF525_1:O.DecelRate2", "PF525_1:O.FreqSel01", "PF525_1:O.FreqSel02", "PF525_1:O.FreqSel03", "PF525_1:O.MOPDecrement", "PF525_1:O.FreqCommand", "PF525_1:O.AccelTime1", "PF525_1:O.DecelTime1", "PF525_2:I", "PF525_2:O", "PF755_PTP1:I", "PF755_PTP2:I", "PF755_PTP2:O", "PF755_Velocity1:I", "PF755_Velocity1:O", "PF755_Velocity2:I", and "PF755_Velocity2:O".
- IO Browser:** Located on the right, it shows a table of IO points. The table has columns for "Active", "Name", "Server Value", "Access", "Visual", "Property", "Expression", and "Protocol". The "All IO" section is currently selected, and the "Advanced" checkbox is checked.
- 3D Model:** The bottom right pane shows a 3D model of a conveyor system. The model includes a conveyor belt, a motor, and a yellow cube. The "Scene" view is active, and the "Aspect Viewer" is visible on the right.
- Message Log:** The bottom left pane shows a log of messages. The "Model" column lists the components, and the "Message" column shows the messages.

The status bar at the bottom indicates the software is running on "FactoryTalk Linx" and shows various system metrics, including "FPS: 25.03", "Speed: 1.00 / 1.00", "Size: 2024x1040", and "Default Display".

We're using this ourselves...



We're using this ourselves...



We're using this ourselves, today...

The screenshot displays the Siemens NX software interface, which is used for 3D CAD modeling and simulation. The top menu bar includes File, Home, Arrange, Visualization, Construction, Package Tools, Asset Manager, and CAD Is The Model. The ribbon contains various toolsets: Select, Navigate, Text, Find, Find Next, Select All, Edit Custom Properties, Edit Script, Visual Studio, Enable Debug, Animate, Tools, View, HMI, Add View, Remove View, Layers, Default View, Plan View, Zoom Extents, Volumetric Physics, IO Browser, Lag, Experiments, Event List, Analysis, Simulation, and Simulation.

The main workspace is divided into two panels. The left panel shows a 3D simulation of a robotic assembly line. It features a central conveyor belt with a white car body being assembled. Yellow robotic arms are positioned on both sides of the conveyor, performing tasks. The right panel shows a 2D schematic diagram of the same assembly line. It includes a central conveyor belt with a white car body, yellow robotic arms, and various control elements like buttons and indicators. The schematic is divided into sections for different parts of the line, such as 'Gate 2 MPS', 'RC 1', 'R1', 'R5', 'RC 5', 'R3', 'RC 3', 'RC 2', 'R2', 'R6', 'RC 6', 'R4', and 'RC 4'. It also includes a 'No Carrier Present' indicator and a 'SCC' (Safety Control Circuit) indicator.

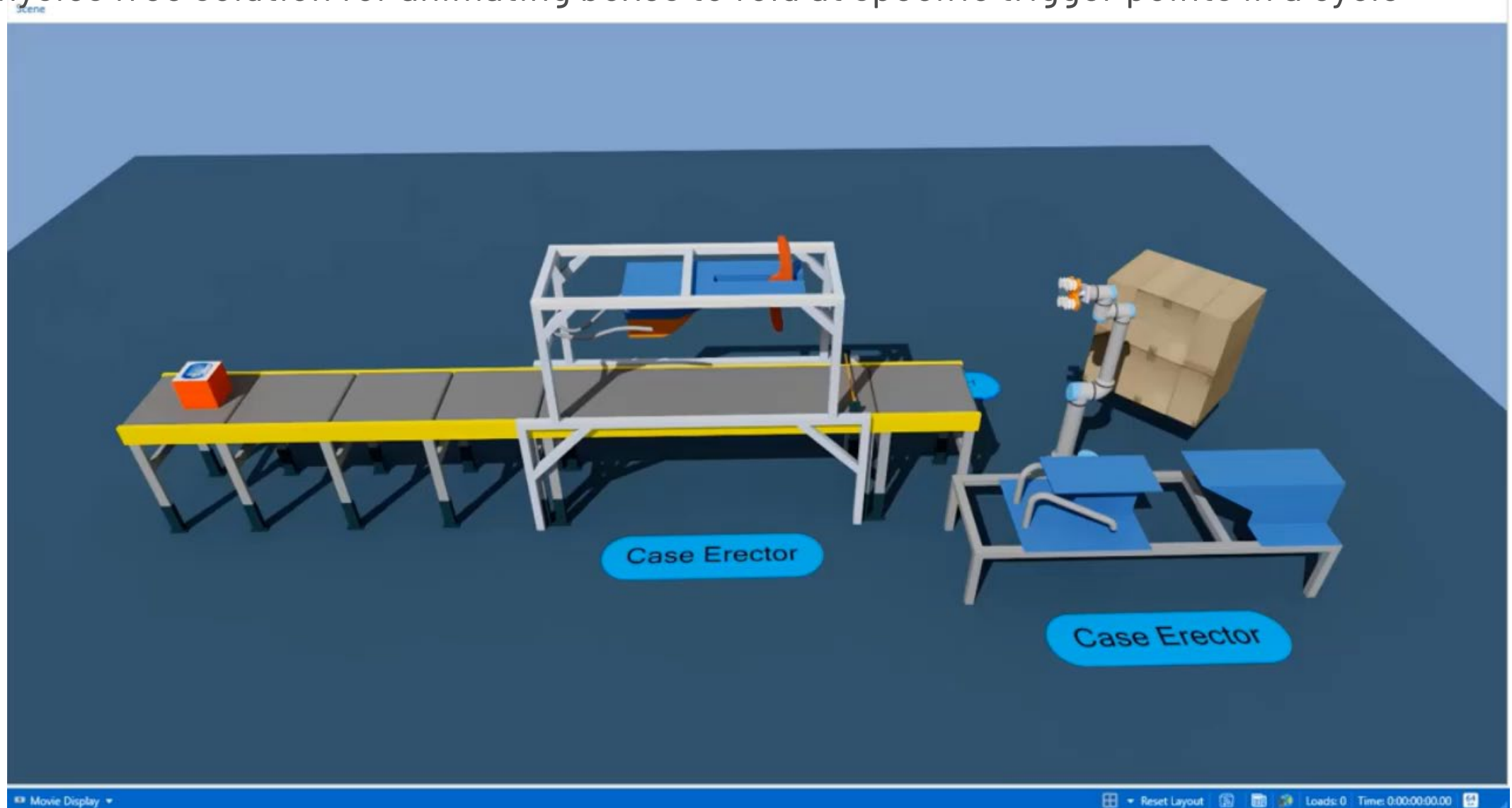
The bottom left panel shows the 'Properties: C1YB_body' window. It includes a search bar, a list of properties (General, Position, Name), and a 'Name' field with the value 'C1YB_body'. The 'Position' field shows 'World Location' as '3192.5049 mm, 775.6001 m'. The bottom right panel shows the 'Properties: C1YE' window, which includes a search bar, a list of properties (General, Position, Name), and a 'Name' field with the value 'C1YE'.

The status bar at the bottom of the interface displays the following information: FPS: 6.78, Speed: 1.00 / 1.00, Size: 801x398, High Performance, Reset Layout, Connections: 61, Loads: 1, Time: 0:02:58:17.24.



| And There's More! Case Erector

Physics free solution for animating boxes to fold at specific trigger points in a cycle

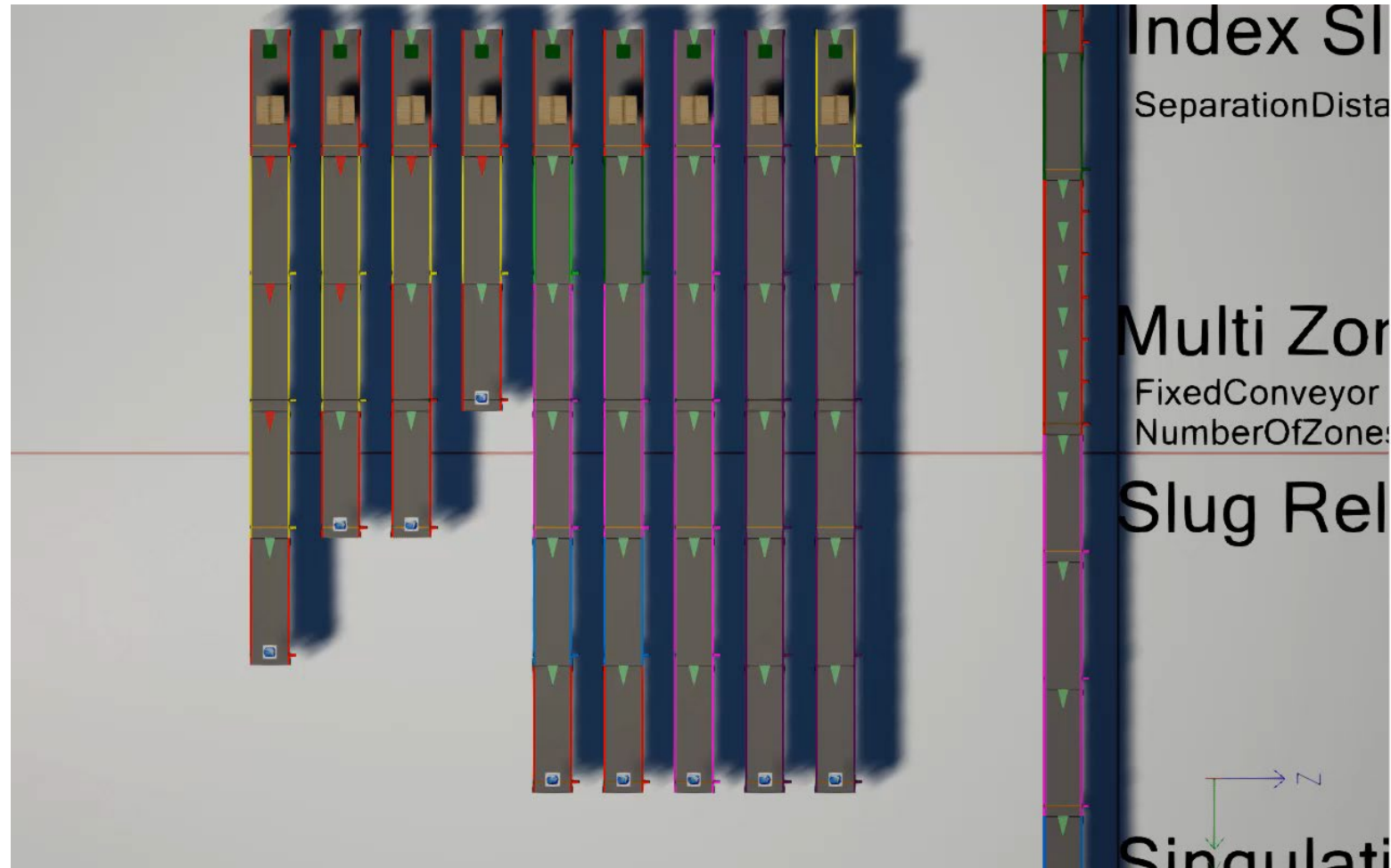




Smart Conveyors V2.2

Reconfigured based upon customer feedback for improved usability.

- Dieback conveyor, with multi zone
- Transfer state conveyor, with improved interface with non-TSE
- Index slug creation, user defined gap
- Pressure slug creation, with timeout
- Pressure accumulation
- Singulation release, user defined gap
- Slug release, user defined delays
- Transfer state lifts
- Merges, roller diverts, chain transfers, lift tables, pallet stackers, and many more





Controls Testing Conveyor Examples

Use joints, motors, drives, and sensors to quickly build emulation ready conveyors

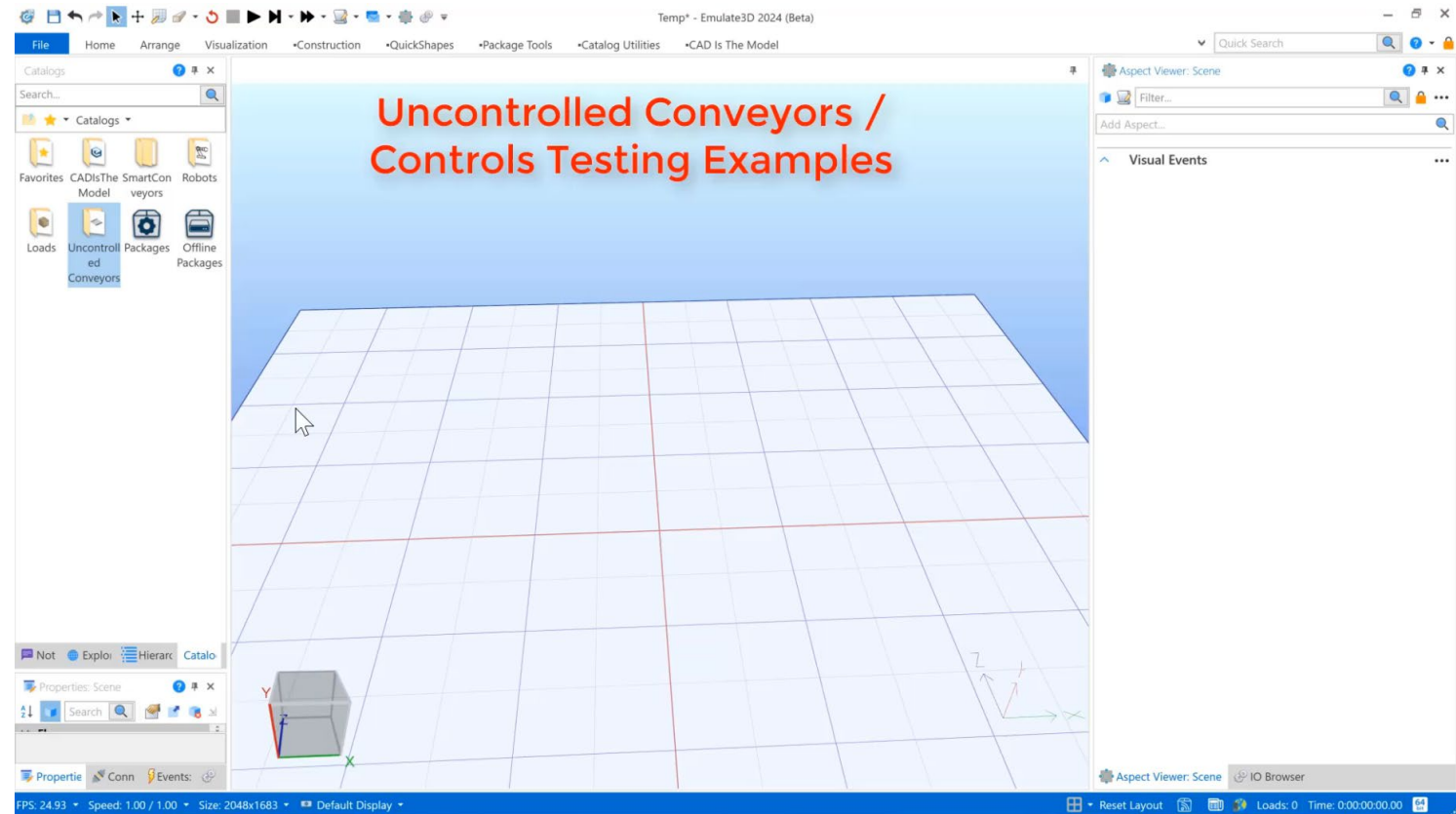
Add joints, motors, and drives, directly to parametric conveyors.

Use generic motor controllers, or realistic emulated drives.

Create more complex assemblies by adding joints, stops, and sensors.

Examples in Uncontrolled Conveyors, including ready to go Wiring setup.

Tutorials for Allen-Bradley and Siemens





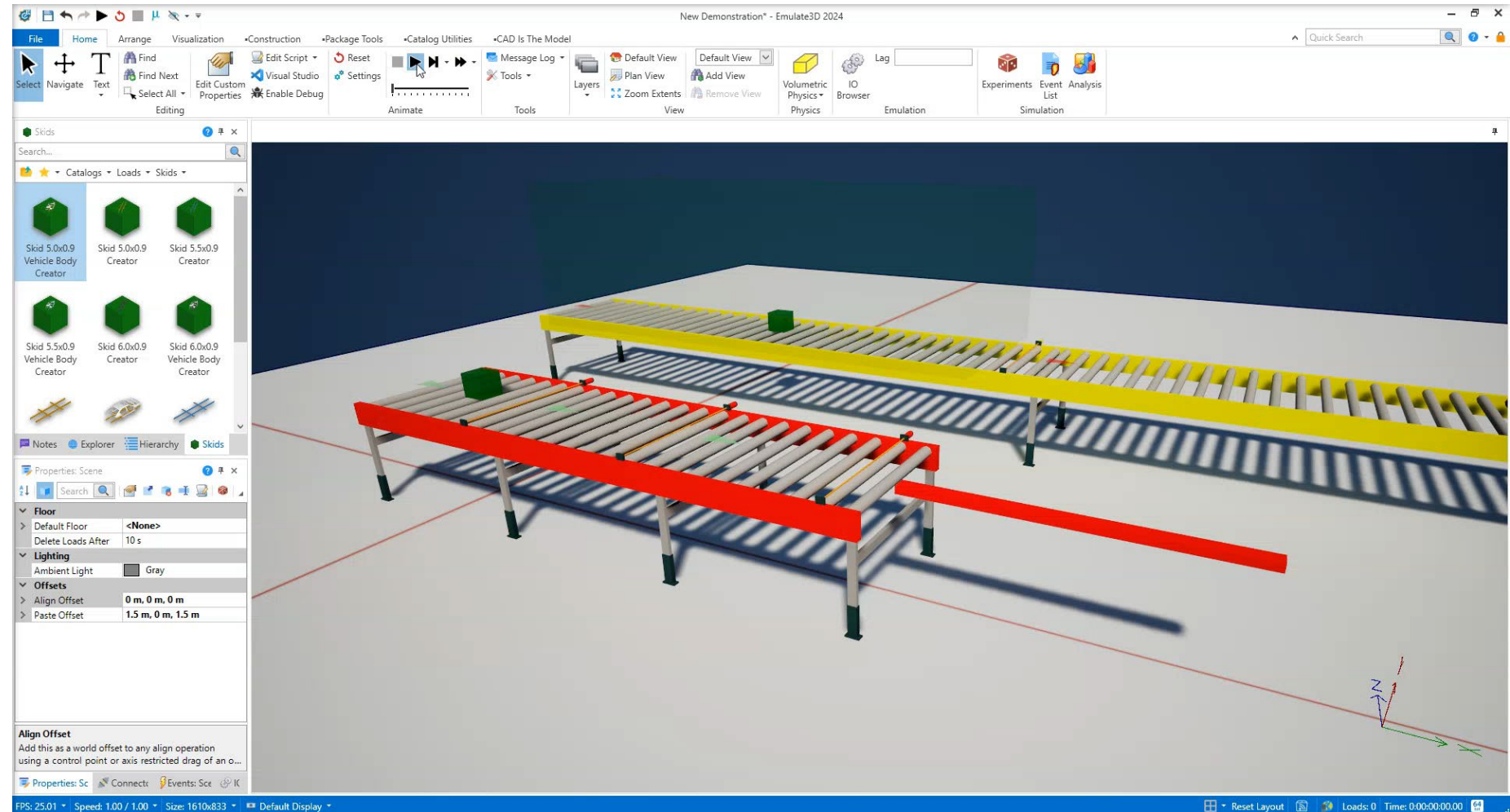
New Loads

Growing the new Loads catalog with more example product

New Unreal
Textures

Physics Pallets
Built from shape
primitives.
Performant physics
collisions for
controls testing.

Automotive Skids
and Car Bodies.





3D Control Panels Catalog

Snap together a control panel using highly customizable components.

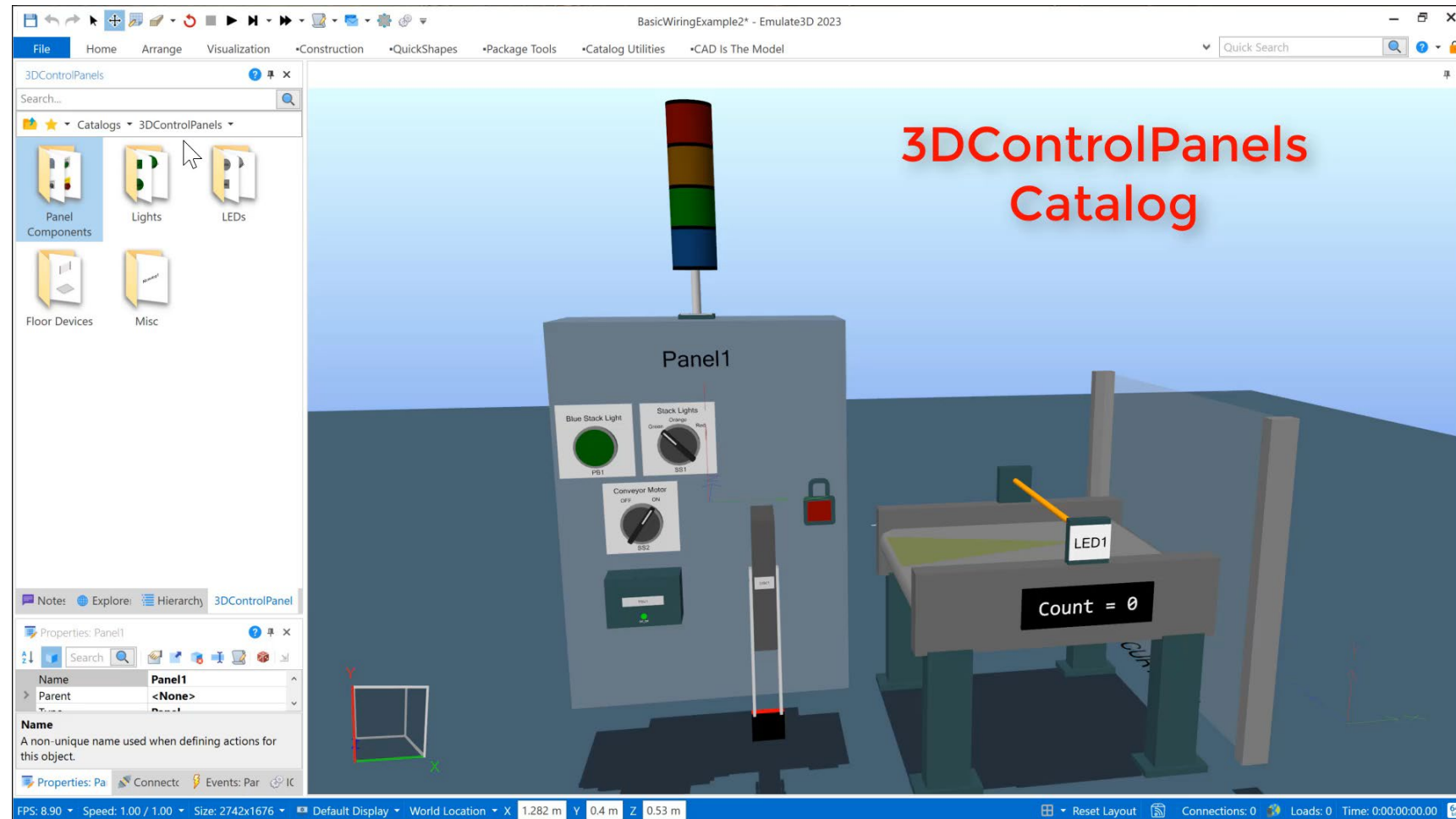
Parametric buttons, switches, lamps, stack lights, contactors, and more.

Configurable snapping including for valves and other devices, front, back, & inside.

New components including Panel Board, LEDs & Relays

New properties including self lighting and click to force

Optional integration with the Wiring Diagram





Catalog Minor Updates

Constant improvements to existing catalogs, available on Package Manager

Allen-Bradley Velocity Drives

Added Accel & Decel Datalinks to PowerFlex 525, 755, and 755T Drives

Emulation State

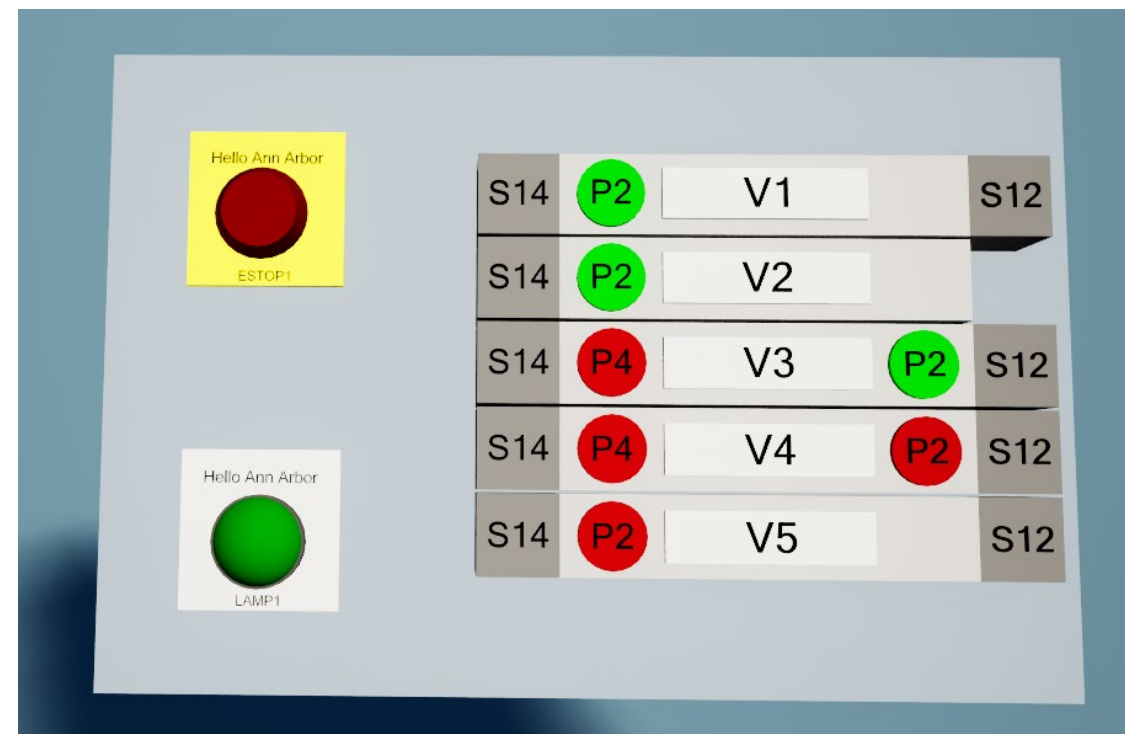
Added ConnectOnModelStart custom property

Latency Tester

Faster testing, by measuring round trip time for each change to the ToPLC property

Actuators

Solenoid Valve connectors snap to 3D Control Panels visuals (Panel & Panel Board)





Catalog Minor Updates

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Palletizer

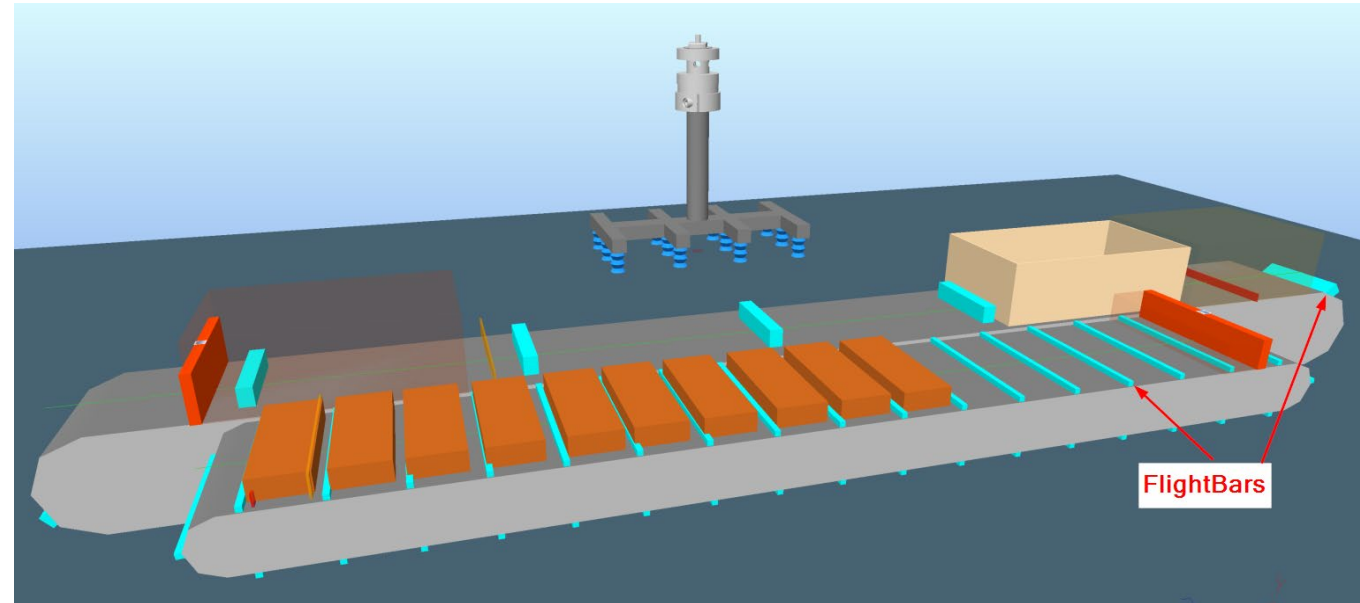
Improved partial Palletization support

Vision Camera

Added QL widgets to get encoder aspect values

FlightBar

Added NextFlightBarOffset property to easily add multiple flights onto a conveyor





Thank you!

Questions? Requests? Inquiries?

