DIGITAL ENGINEERING SUMMIT

16-17 June 2025

Rome Marriott Park Hotel, Italy

EMULATE3D

by ROCKWELL AUTOMATION

ROK LIVE EMEA

Creating the Future of INDUSTRIAL OPERATIONS

Rockwell Automation

expanding **human possibility**©

Catalog Updates for 2025

Roger Kassouf, Emulate3D Applications Team Lead

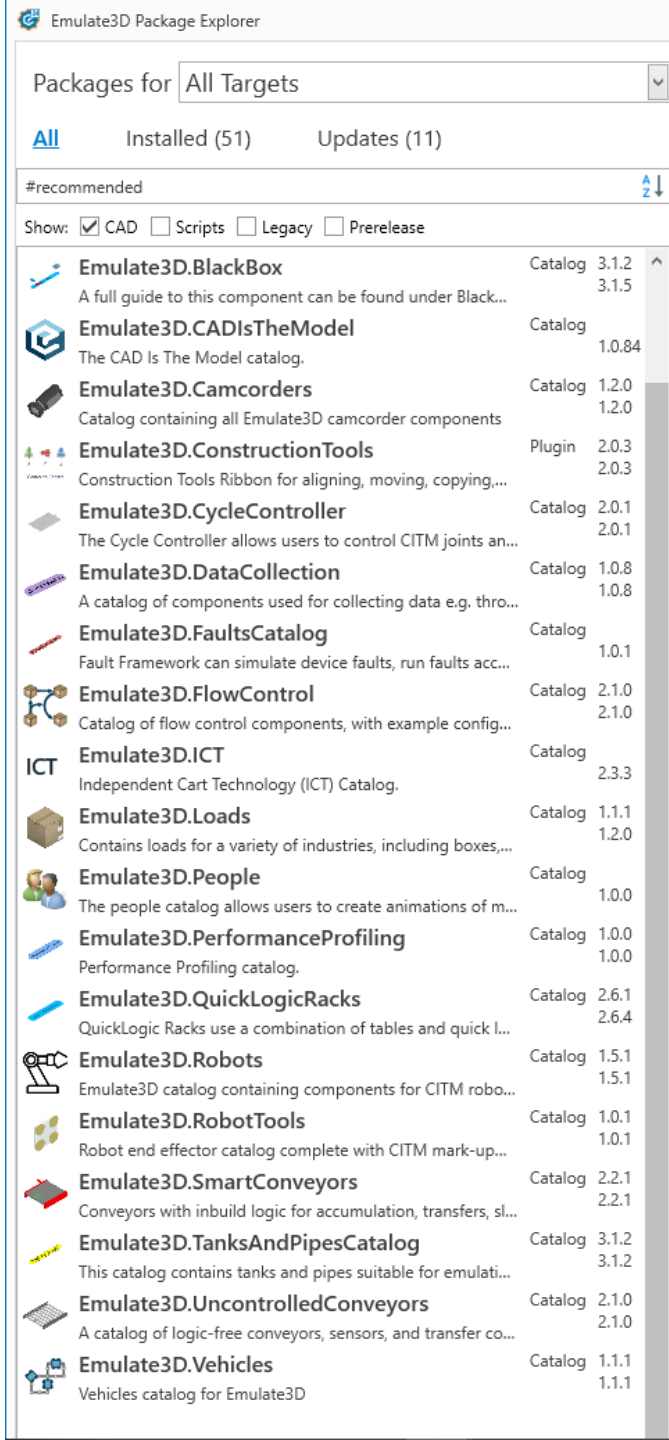
Andre Yost, Emulate3D Simulation Engineer

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.

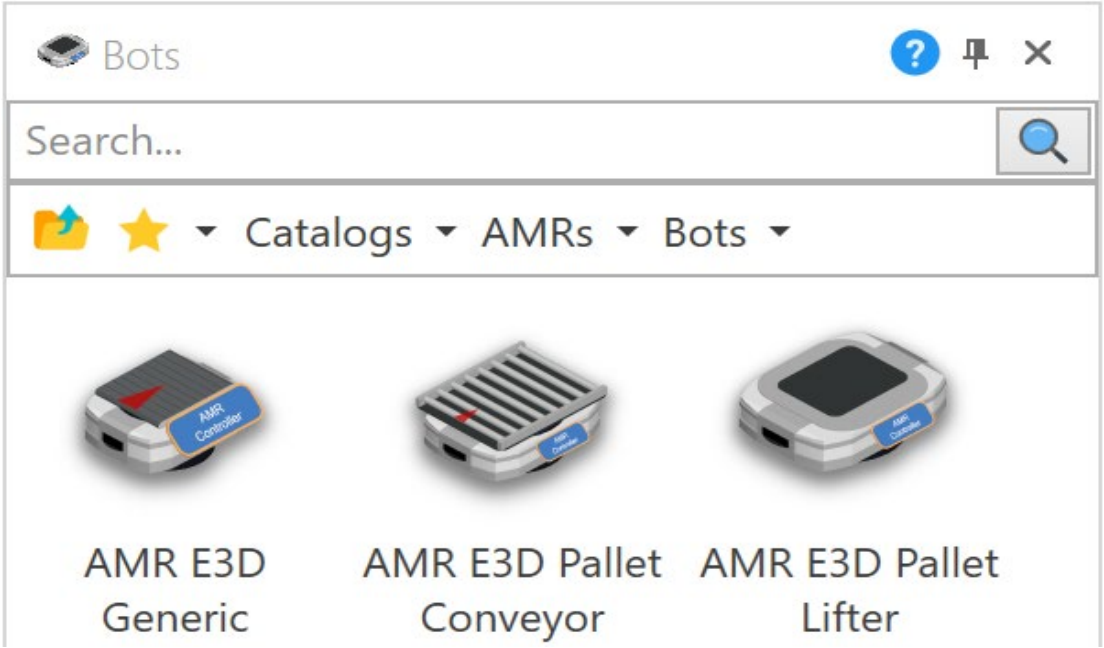
Support for driving AMRs in reverse.

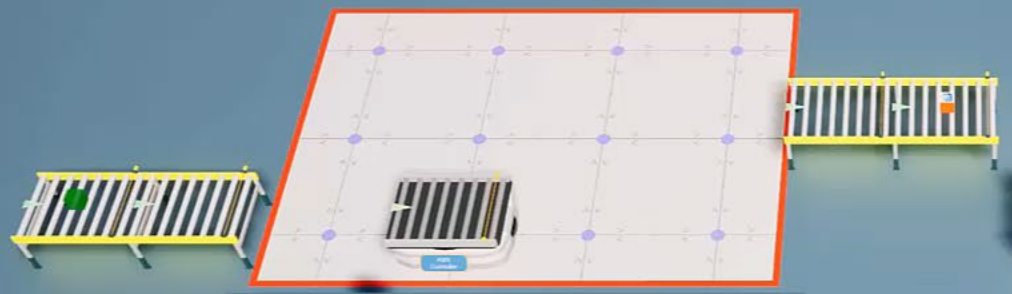
New properties for control over AMR charging.

New AMR events for greater user customizability

Improvements to path finding algorithm performance.

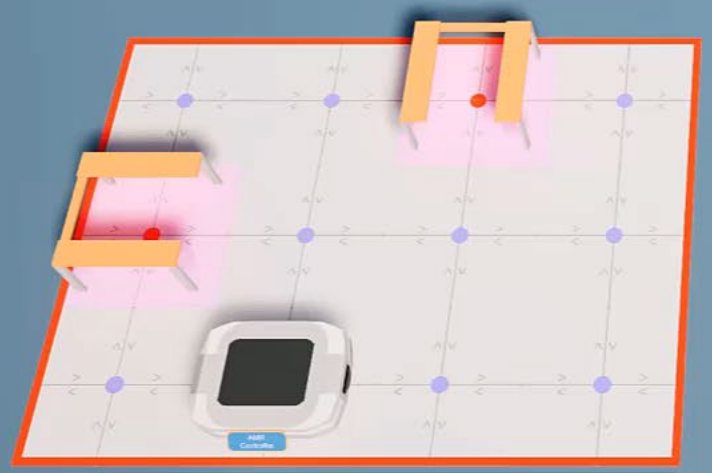
Improved experimentation and data collection.





AMR E3D 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

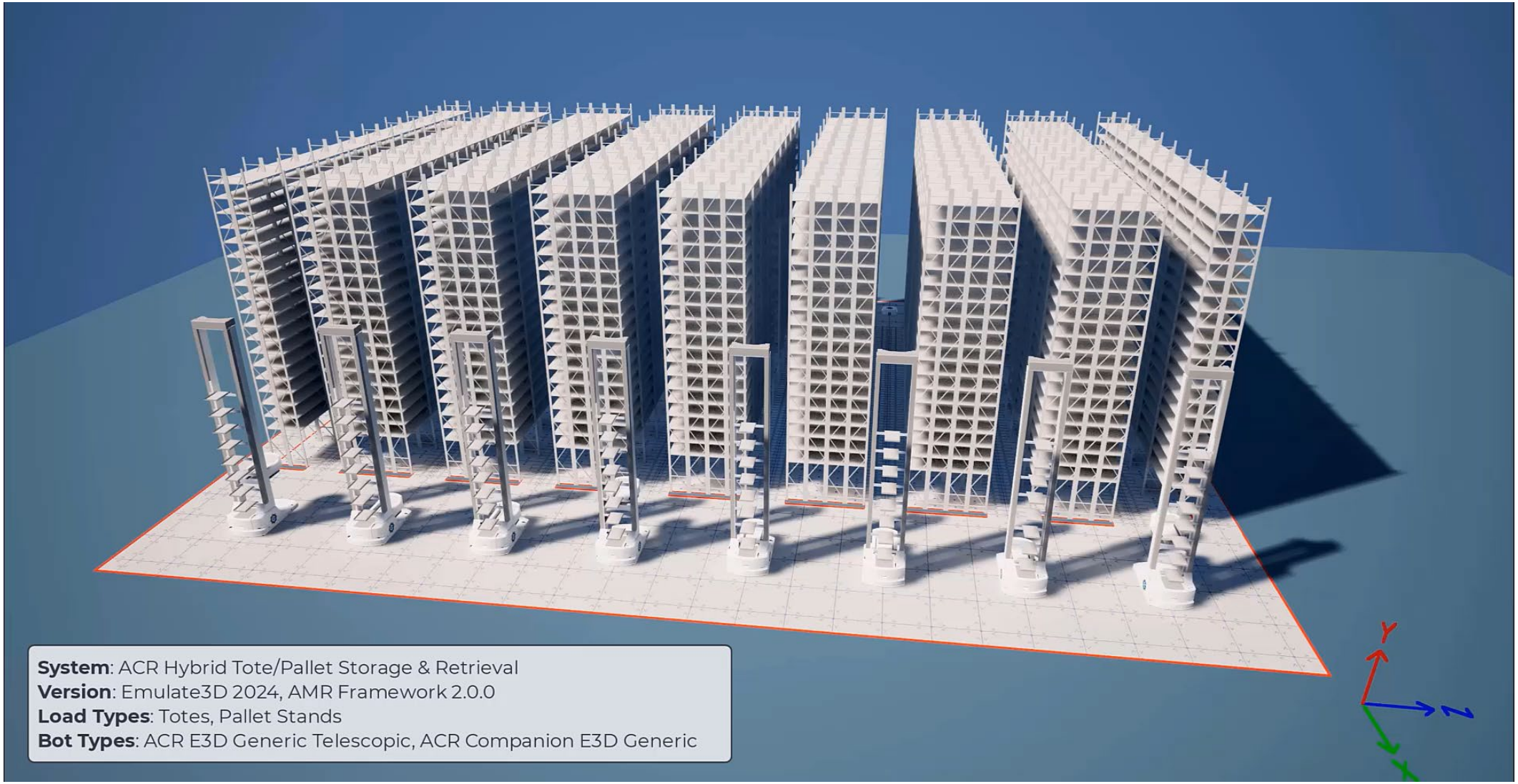
AMR Catalog Roadmap

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

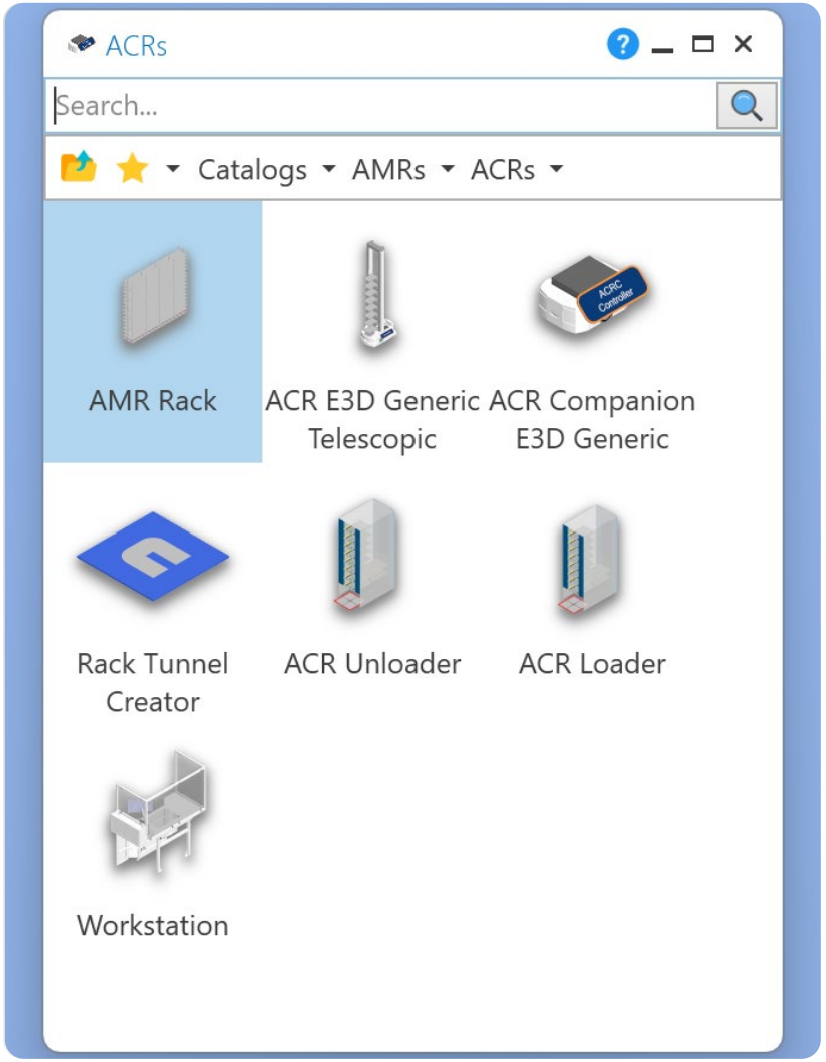
AMR Catalog Updates – ACR Systems

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

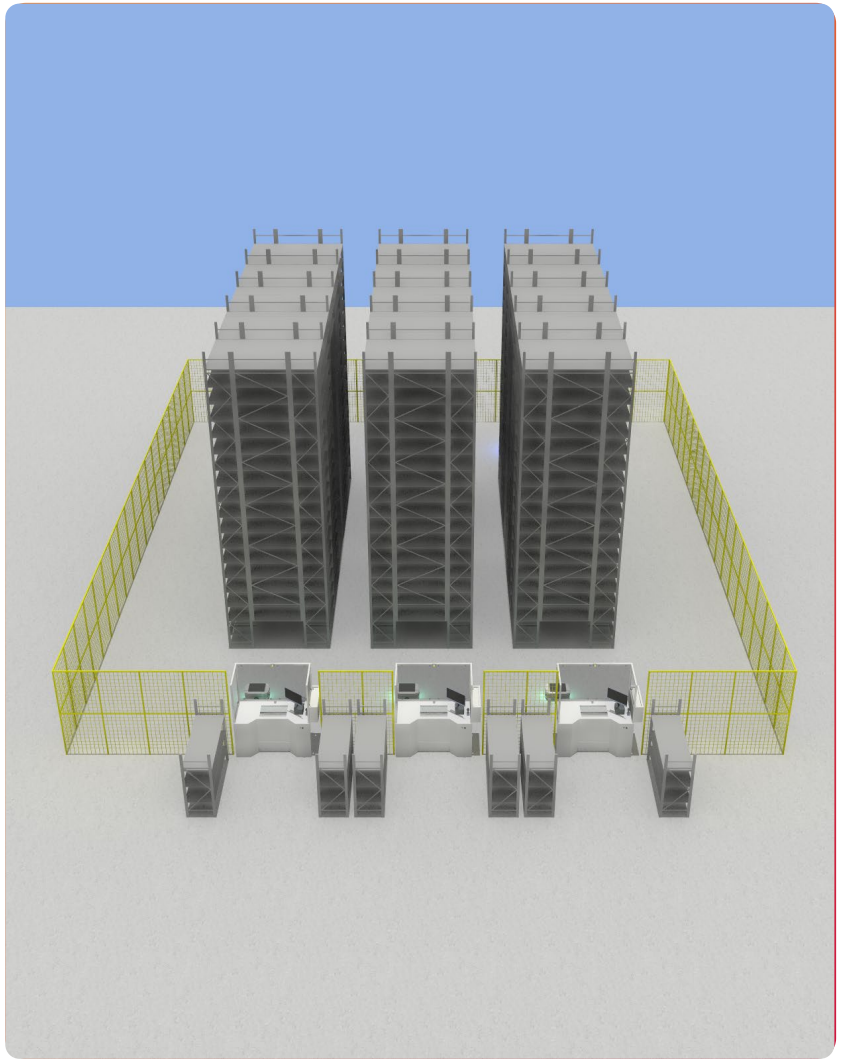


AMR Catalog Updates – ACR Framework

New Autonomous Case-Handling Robot (ACR) components.

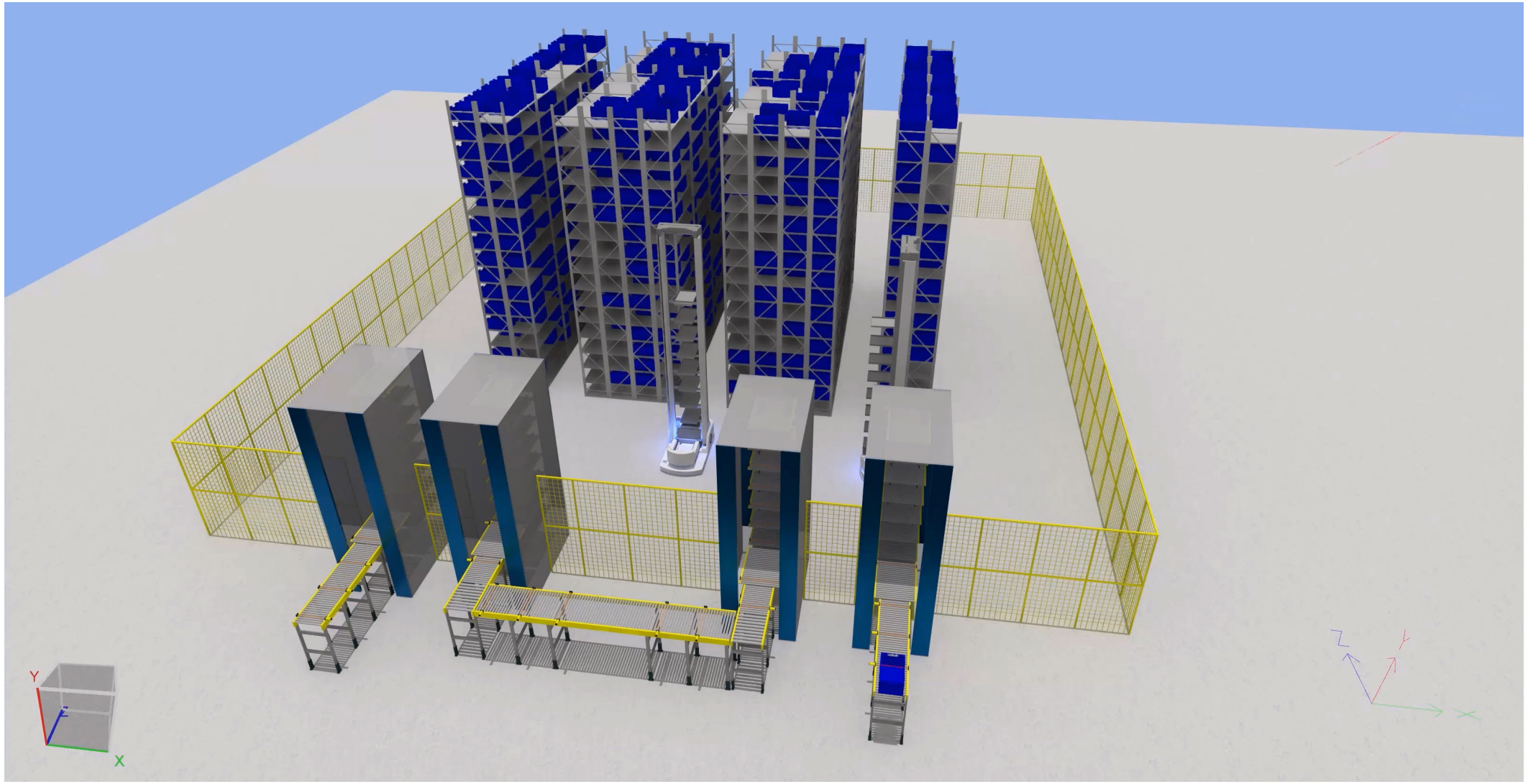


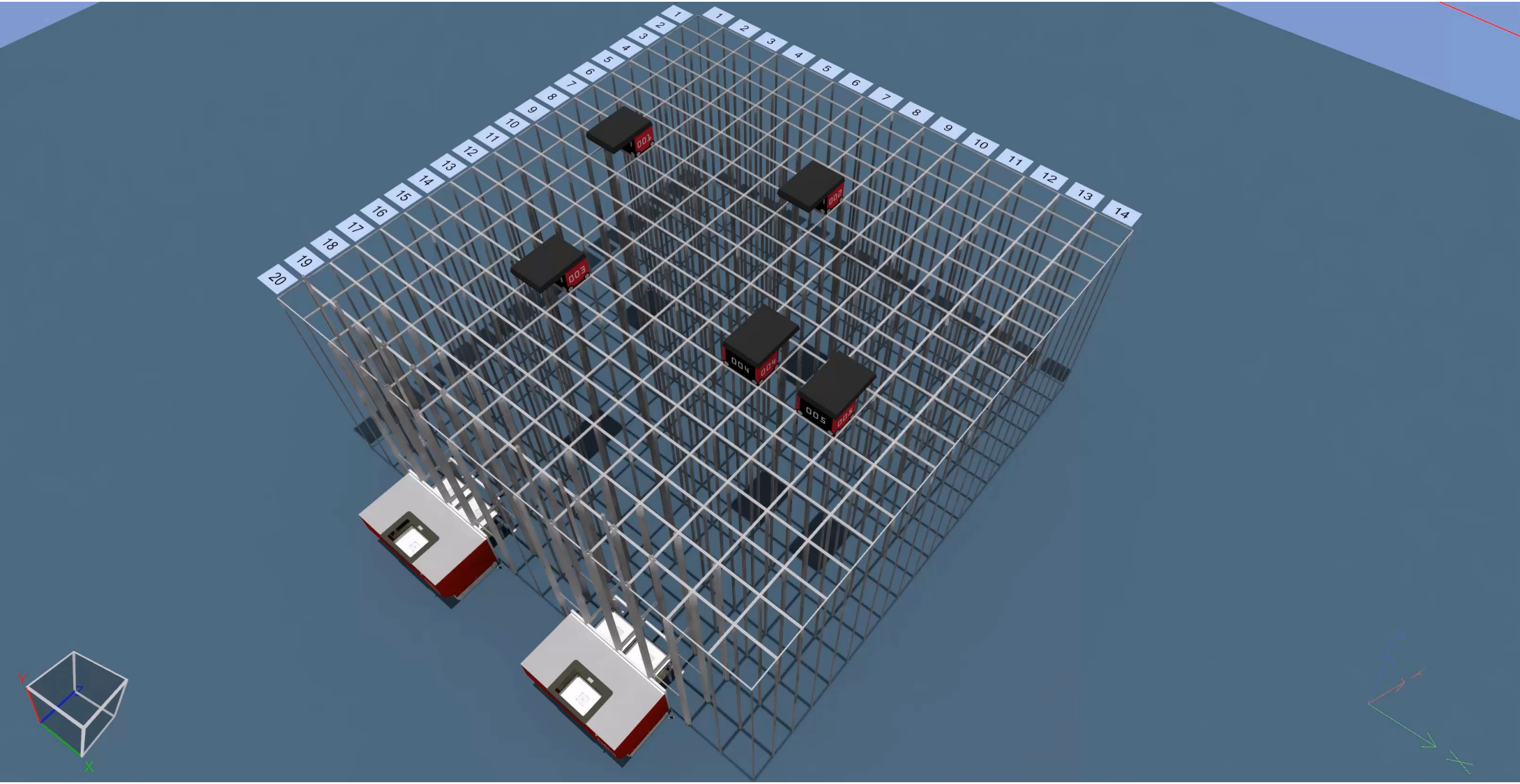
- Parametric AMR Rack designed specifically for the AMR Framework. Snaps to AMR Tile grid.
- ACR Telescopic – the tall one.
- ACR Companion – the small one.
- Custom ACR Controller. Advanced path planning & internal logic for transfers.
- Rack Tunnel Creator & ACR Ports.



AMR Catalog Updates – ACR Ports

Components for loading and unloading totes e.g. HaiPorts

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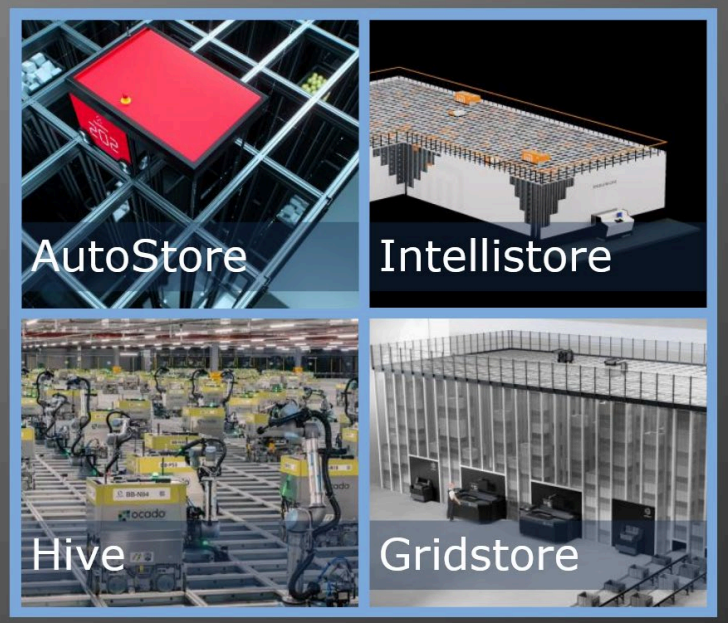
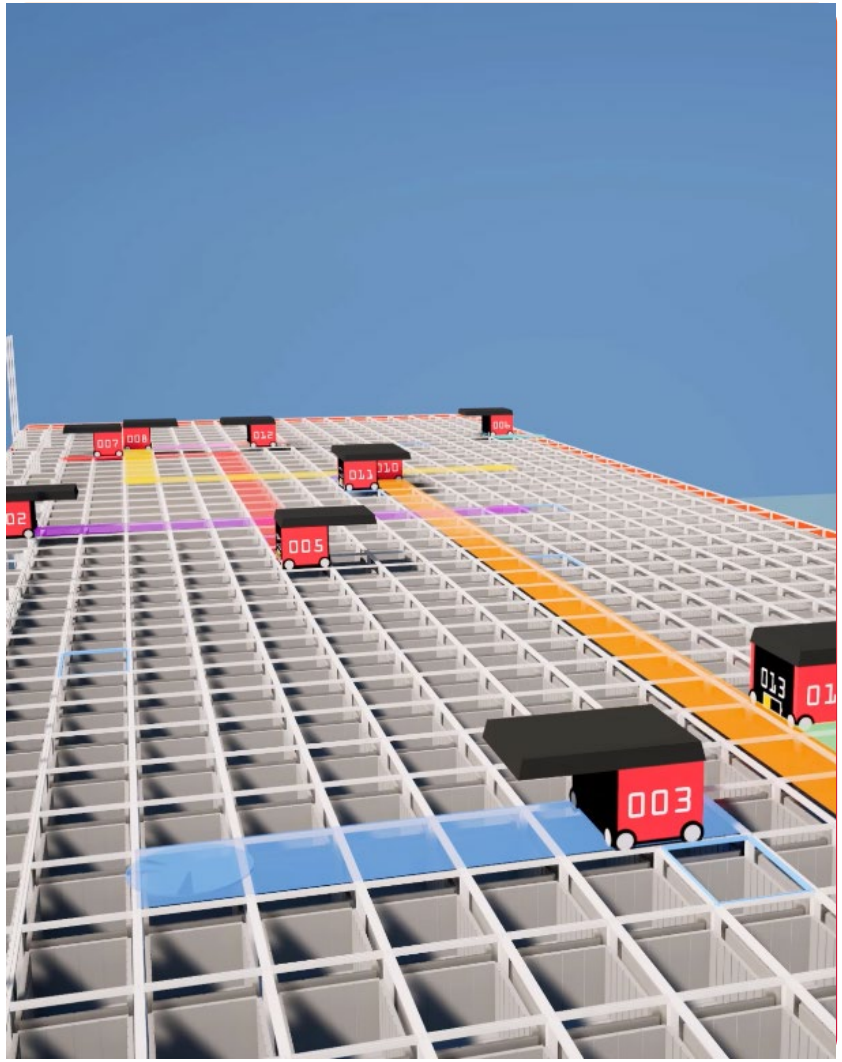
What's Planned – Cube Storage Framework

Initial support for AutoStore and eventually other systems

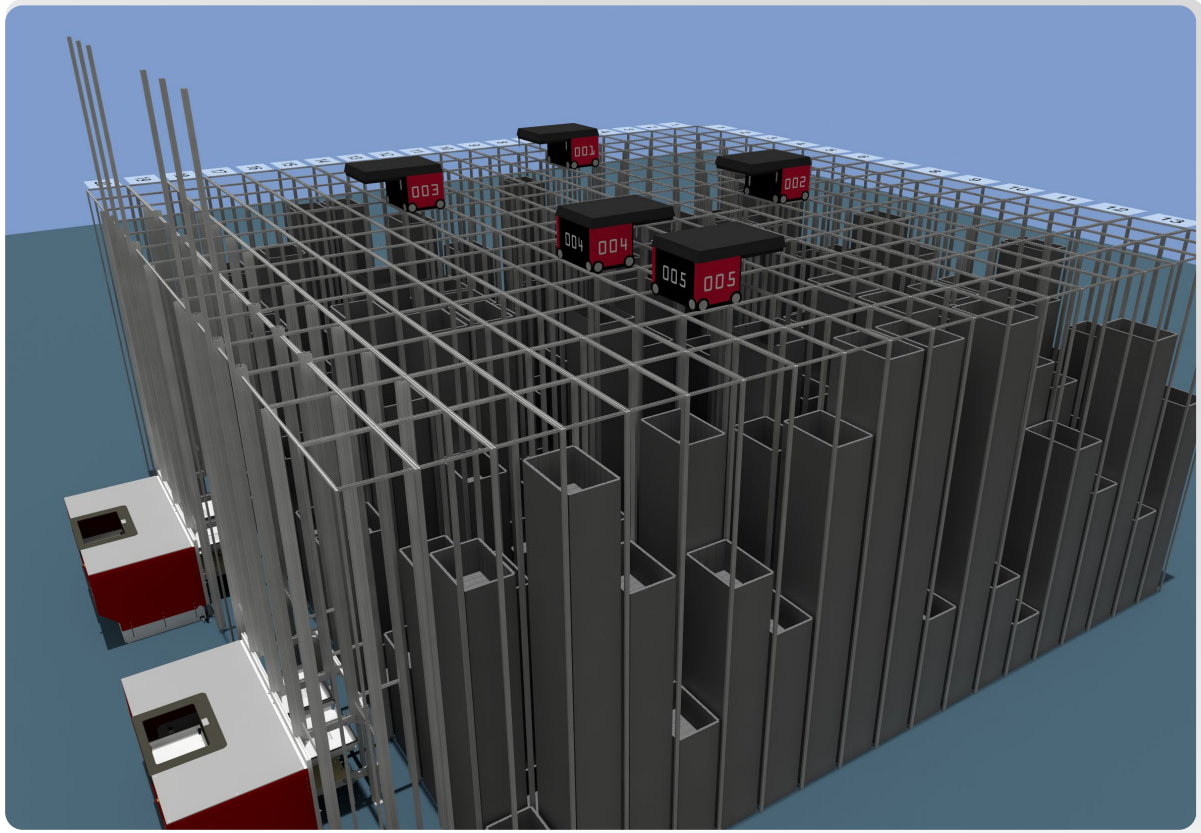


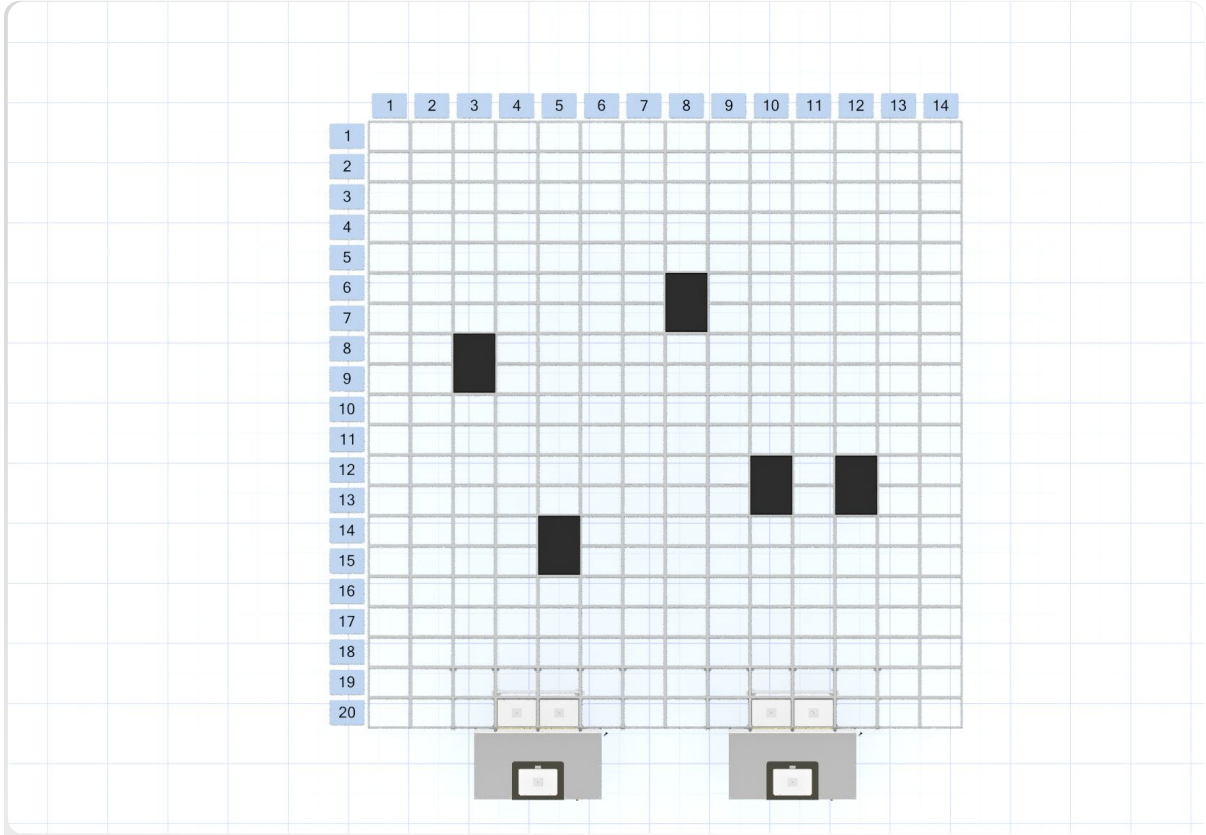
- A set of components for simulating and emulating cube storage systems e.g. AutoStore.
- Support for 2x1 sized bots e.g. AutoStore R5. Support for other Nx1 size bots in the future.
- Each parametric tile/cell responsible for managing its own tote stack.
- Support for SDG and DDG systems.
- Automatic 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

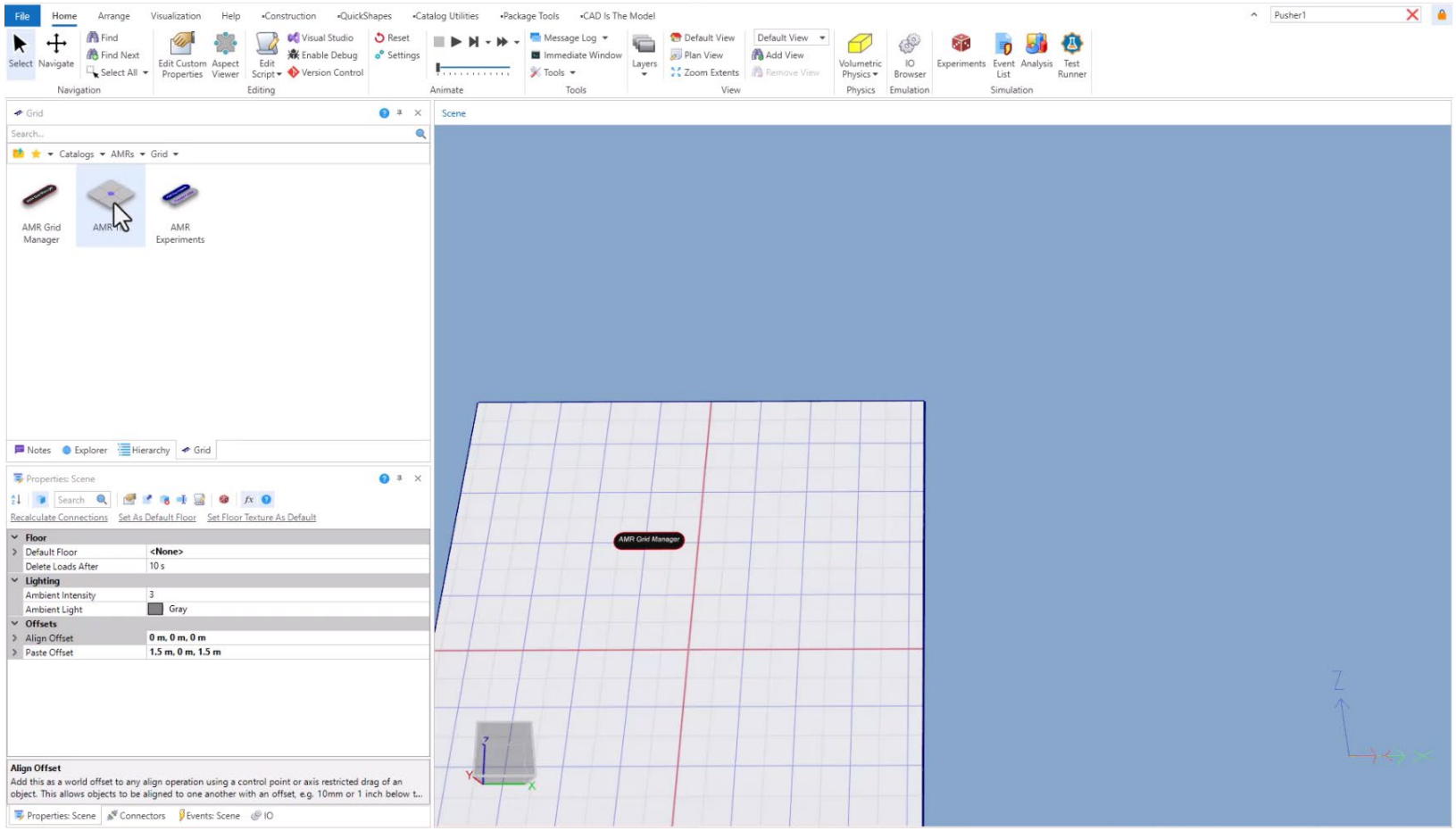
Quickly establish XY Grid by declaring root tile position.

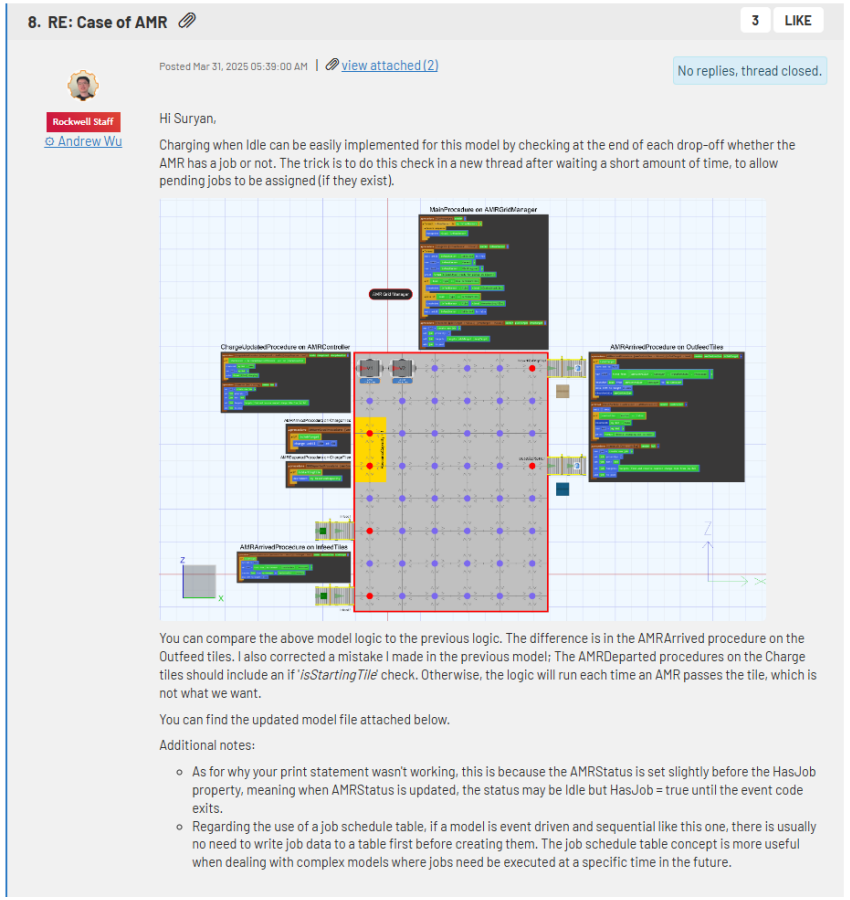
| Tips & Tricks

Unearth the obscure! Improve your AMR workflow!

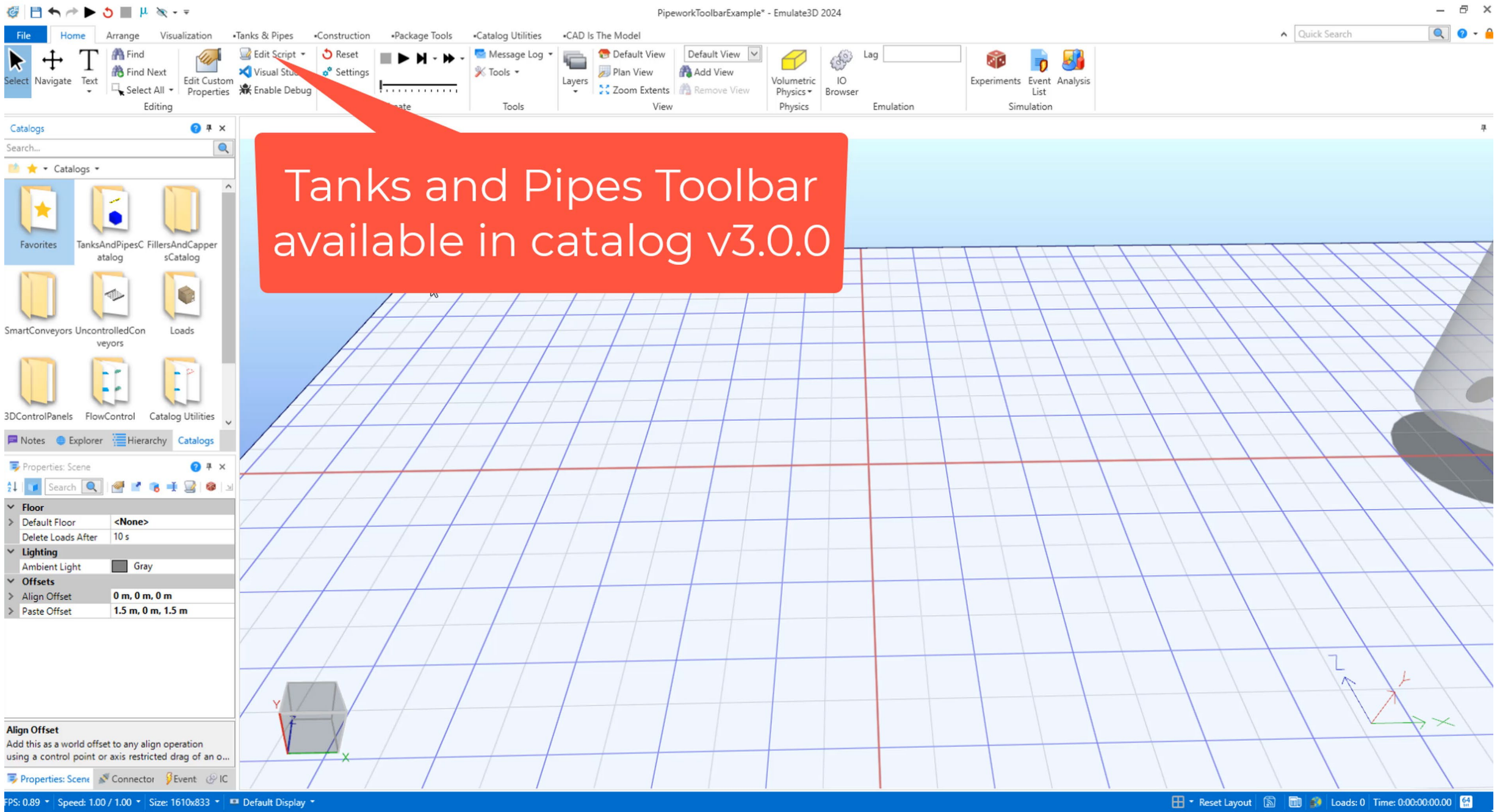
engage
A ROCKWELL AUTOMATION COMMUNITY

- Engage forum
- AMR Grid Manager custom functions!





Tanks and Pipes V3 - Automatic Pipe Routing



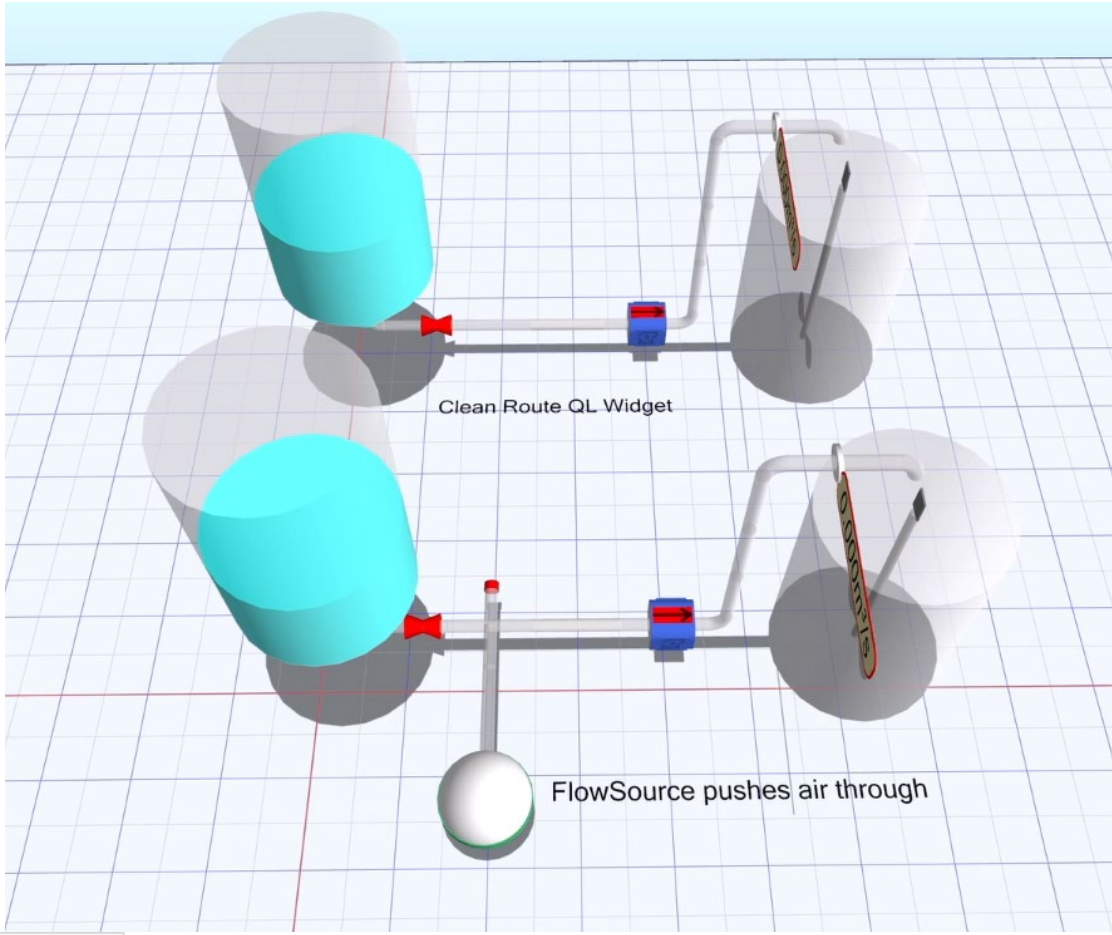
Tanks and Pipes V3

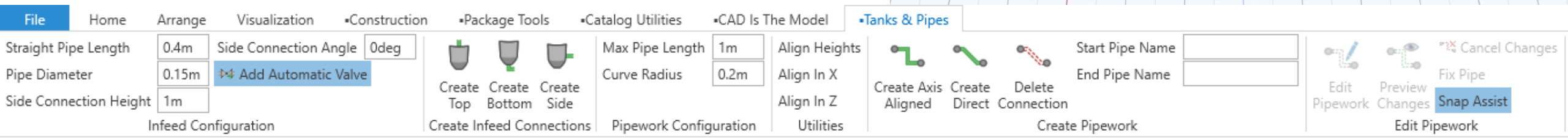
New toolbar for automatic creation and editing of pipework, tank infeeds, and outfeeds.

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

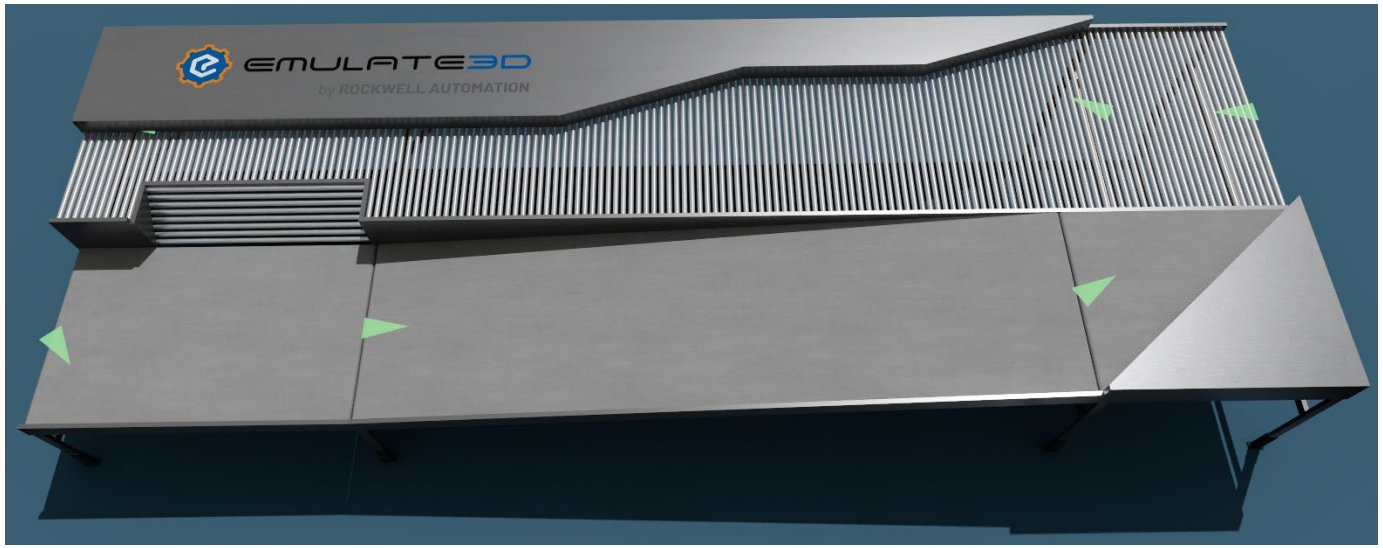
Easy to configure parametric component

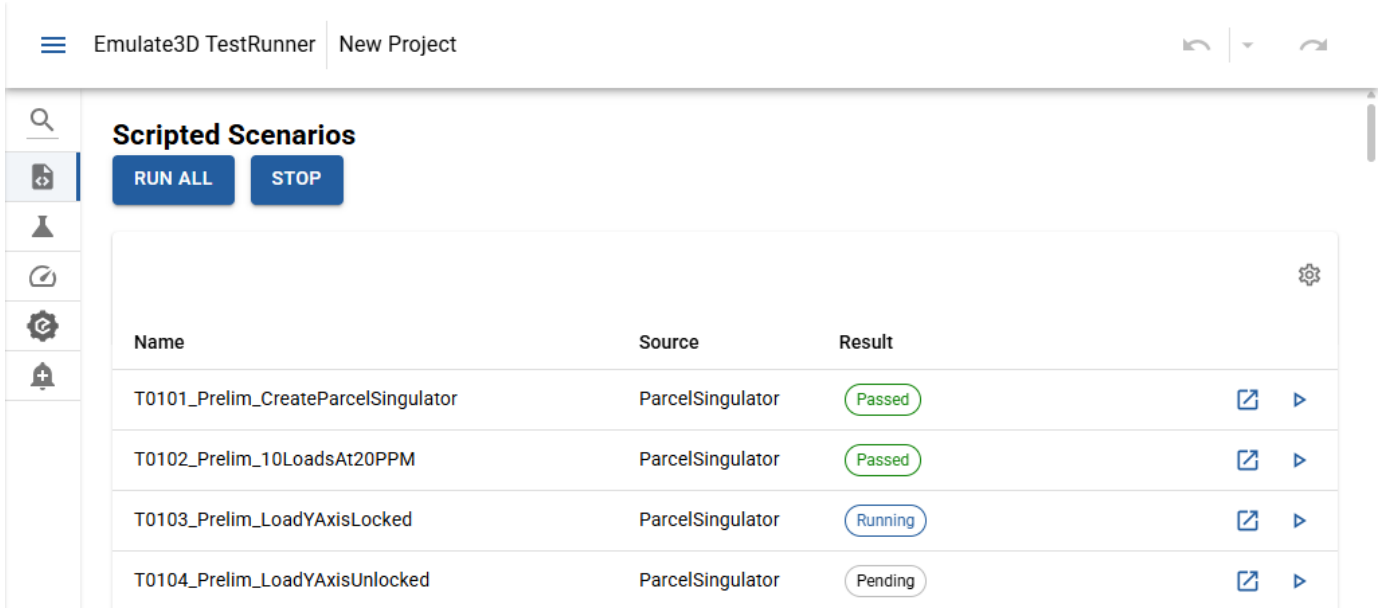
200+ scripted unit tests using Test Runner

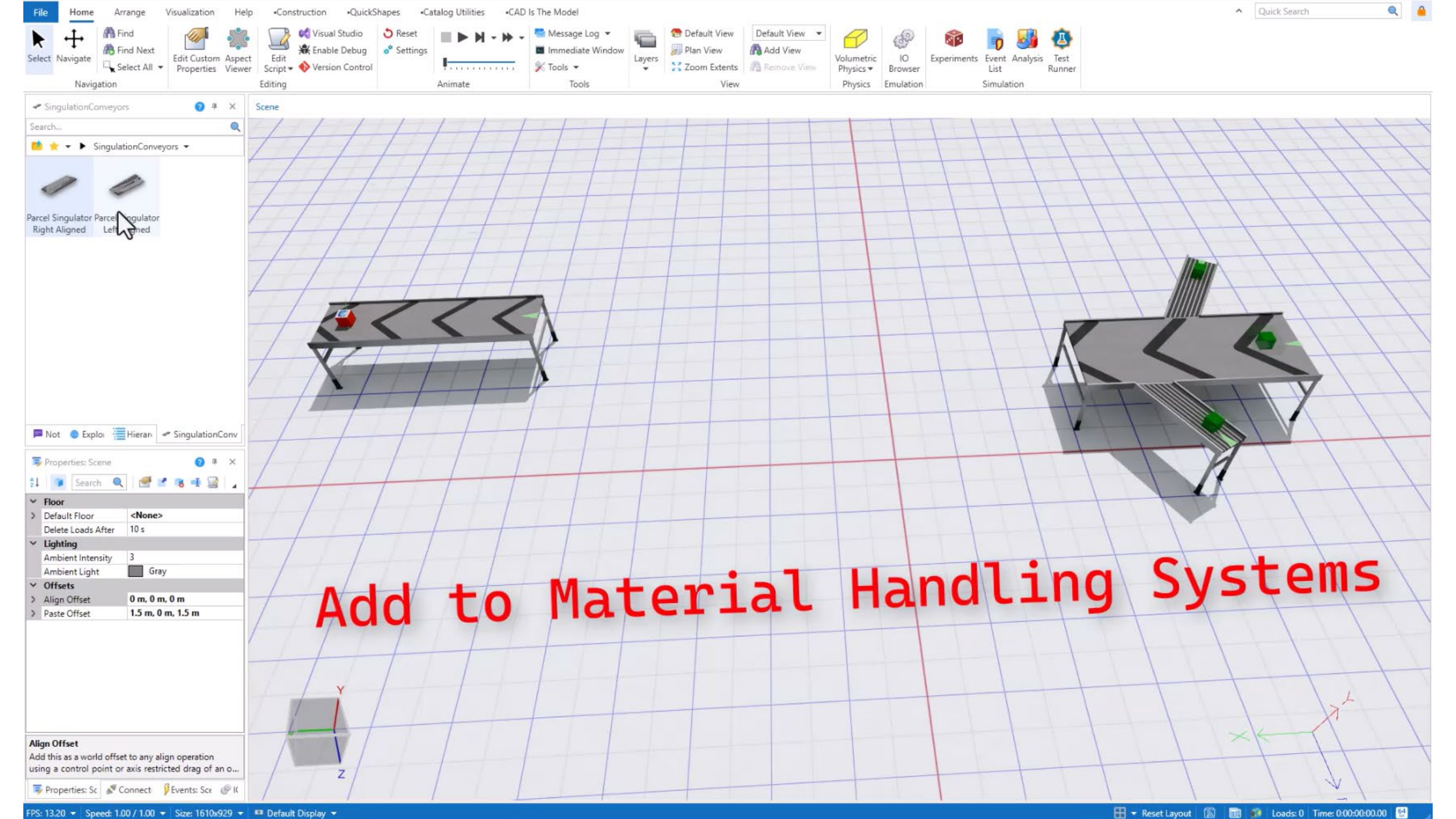
- Verify & learn custom property behavior
- The script comments & organization of test cases are great references when making your own tests!

Optionally snap output loads for perfect right/left-alignment

Requires volumetric physics



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Visualization
Help
•Construction
•QuickShapes
•Catalog Utilities
•CAD Is The Model
Quick Search
Select
Navigate
Find
Find Next
Select All
Navigation
Edit Custom Properties
Aspect Viewer
Edit Script
Visual Studio
Enable Debug
Version Control
Reset
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Animate
Message Log
Immediate Window
Tools
Layers
Default View
Plan View
Zoom Extents
Add View
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Volumetric Physics
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Emulation
Experiments
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Connect
Events: Sce
Scene
Add to Material Handling Systems
Y
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FPS: 13.20
Speed: 1.00 / 1.00
Size: 1610x929
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Reset Layout
Loads: 0
Time: 0:00:00:00.00

Baggage Handling Updates

Constant improvements to existing catalogs, available on Package Manager

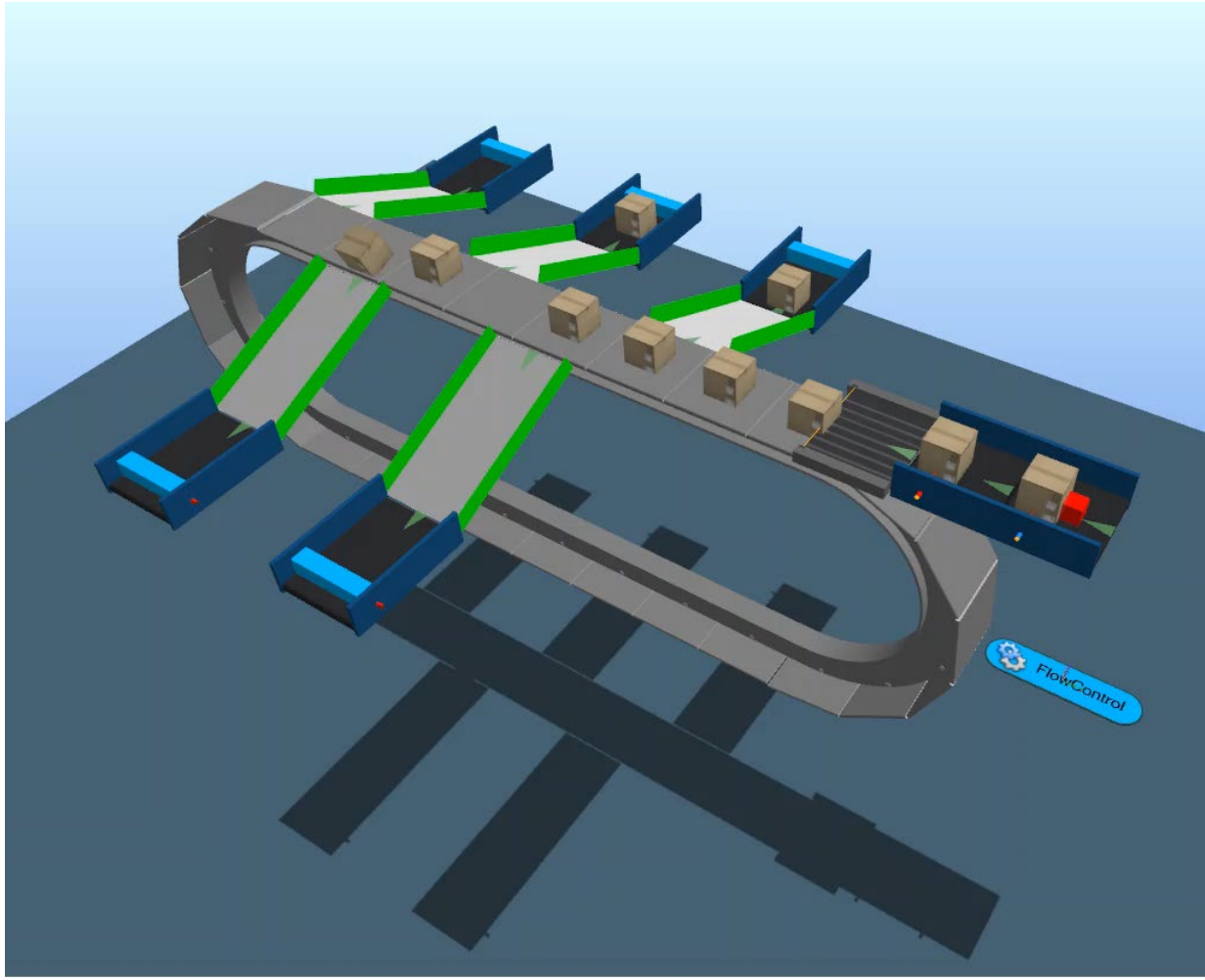
Single Plough Diverter – HaltLoadPosition property to set point of accumulation

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



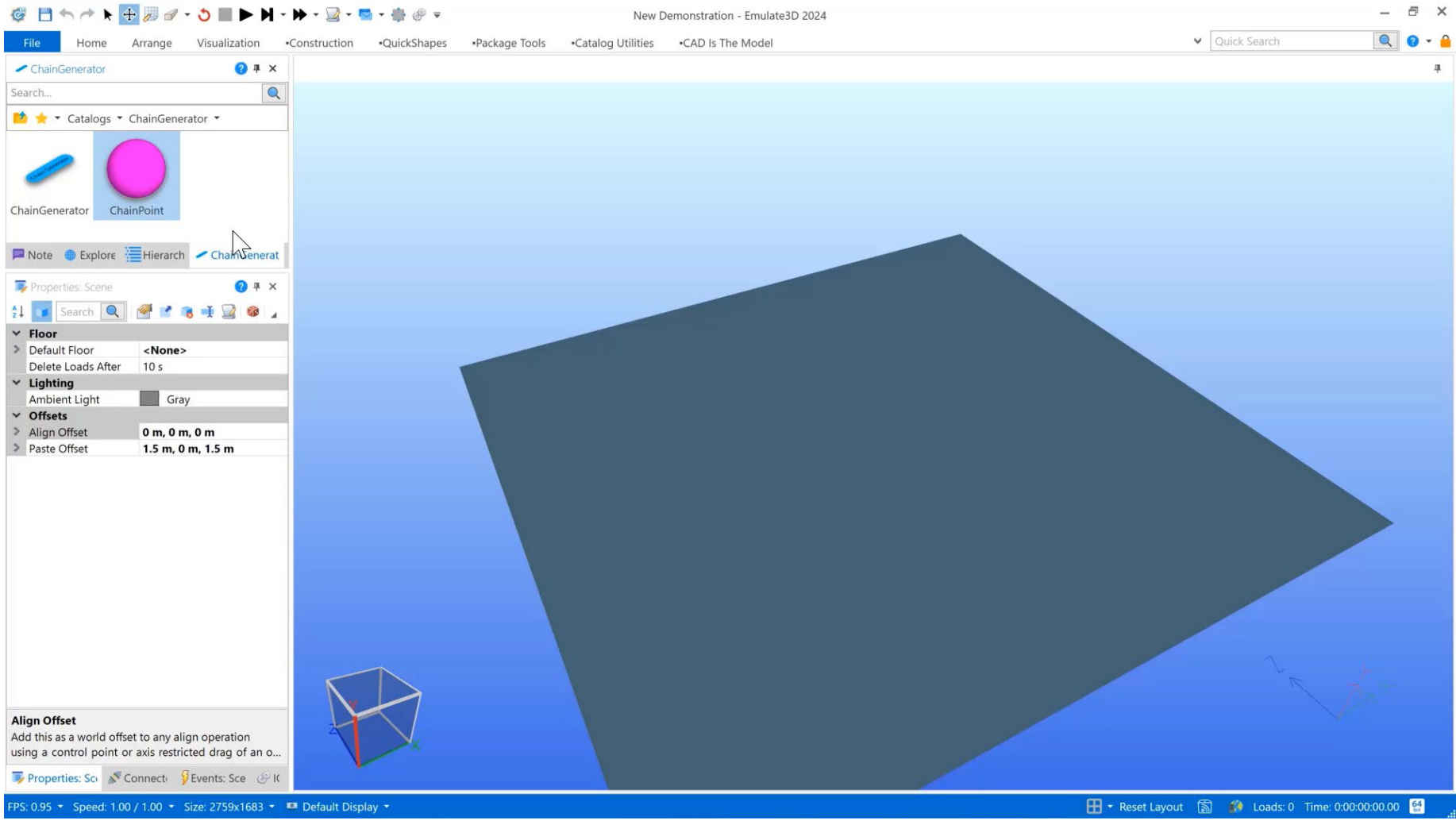
Chain Generator

Create and configure dynamic jointed chains

Create new hoses or chains from links of dynamic joints

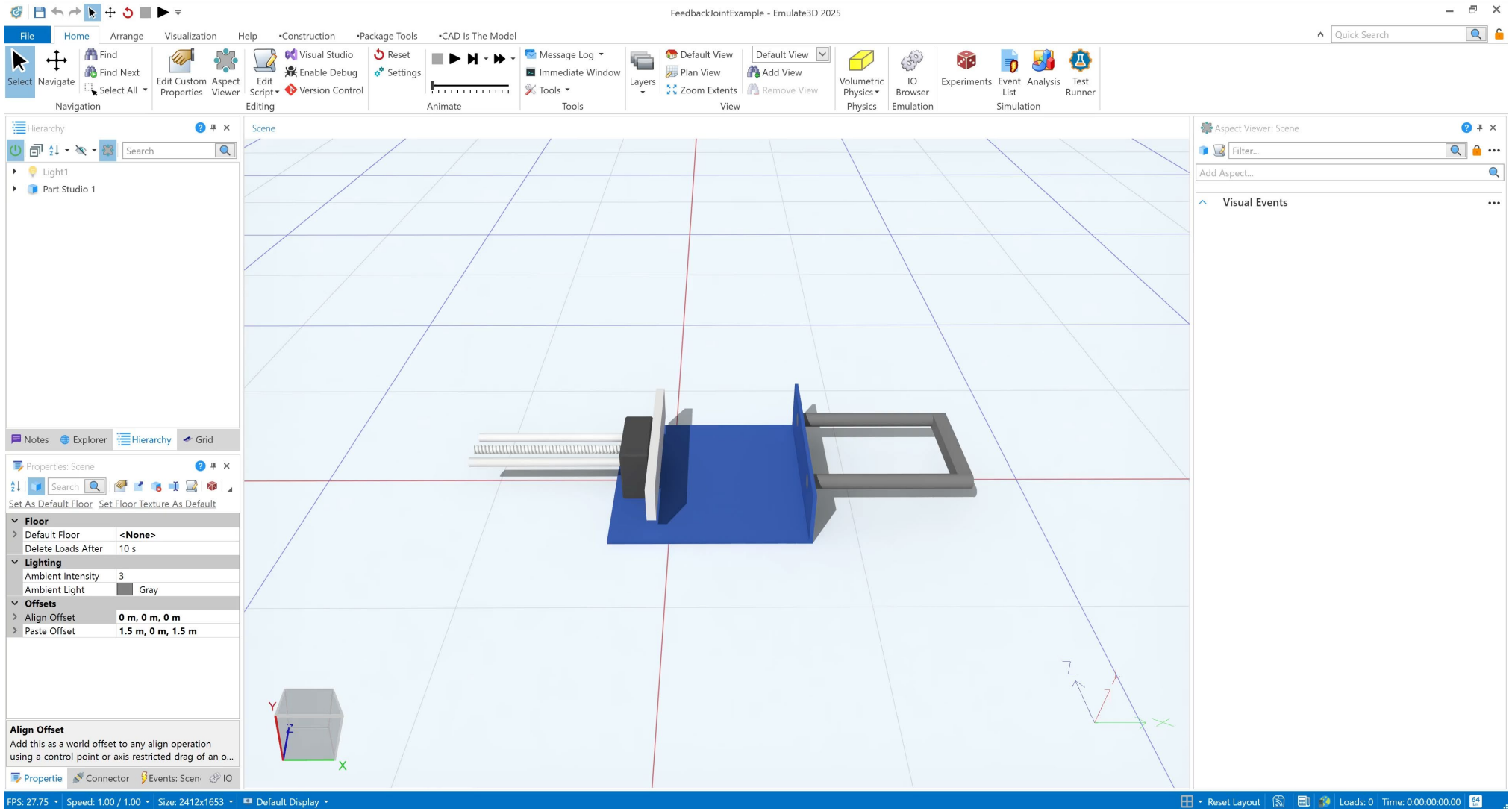
Quickly generate new chains or configure existing

Requires AGX Physics Engine



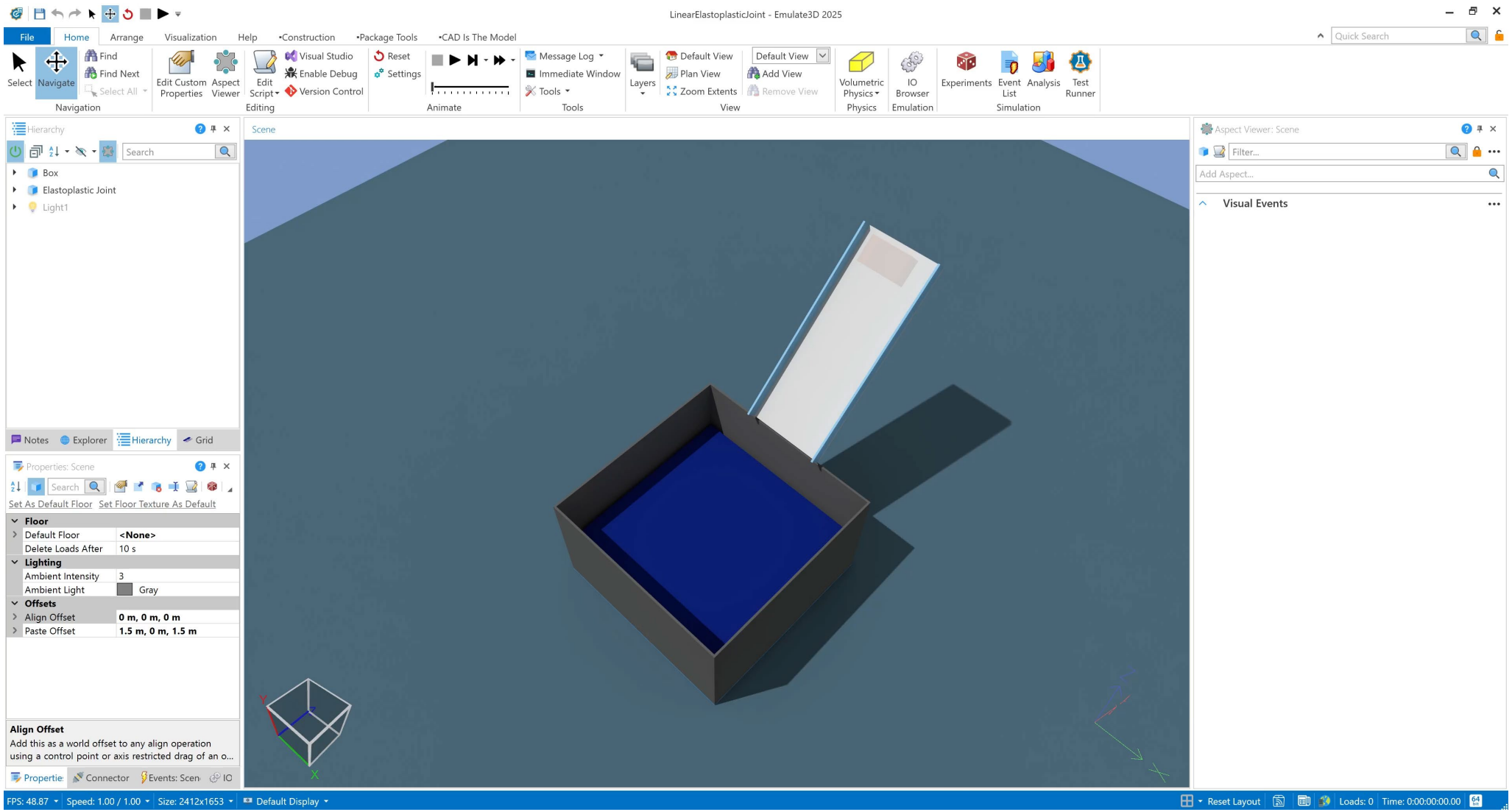
Dynamic Feedback Motors

Position control for dynamic joints!



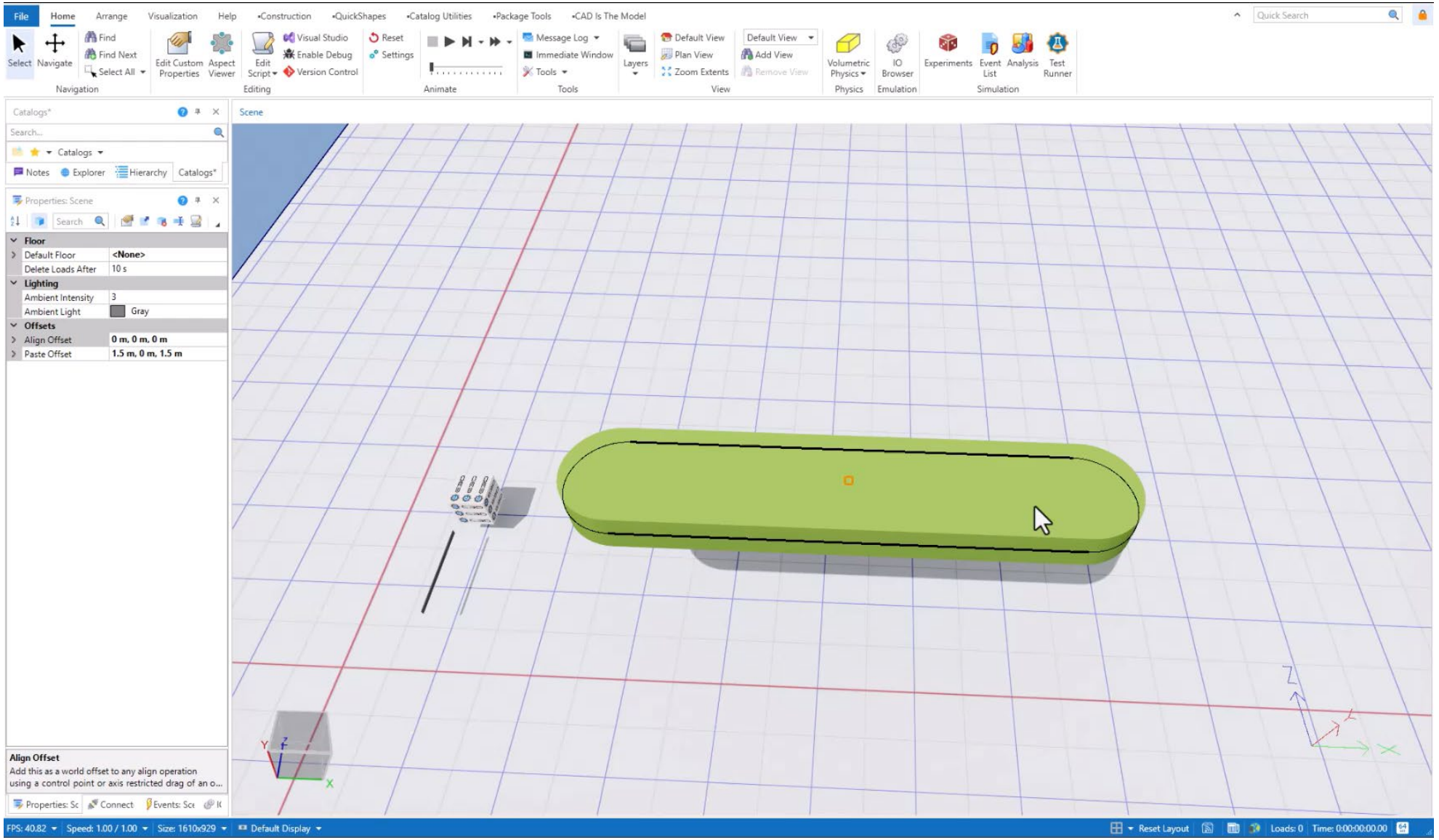
Elastoplastic Joints

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

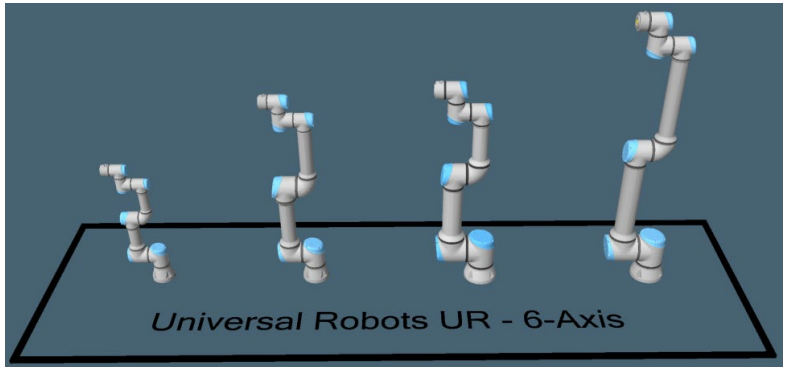
Yaskawa Robots – GP

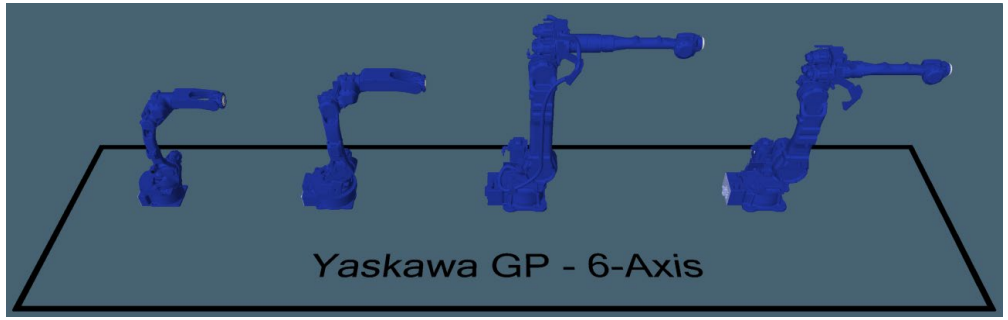
Staubli Robots – TS2 & TX2

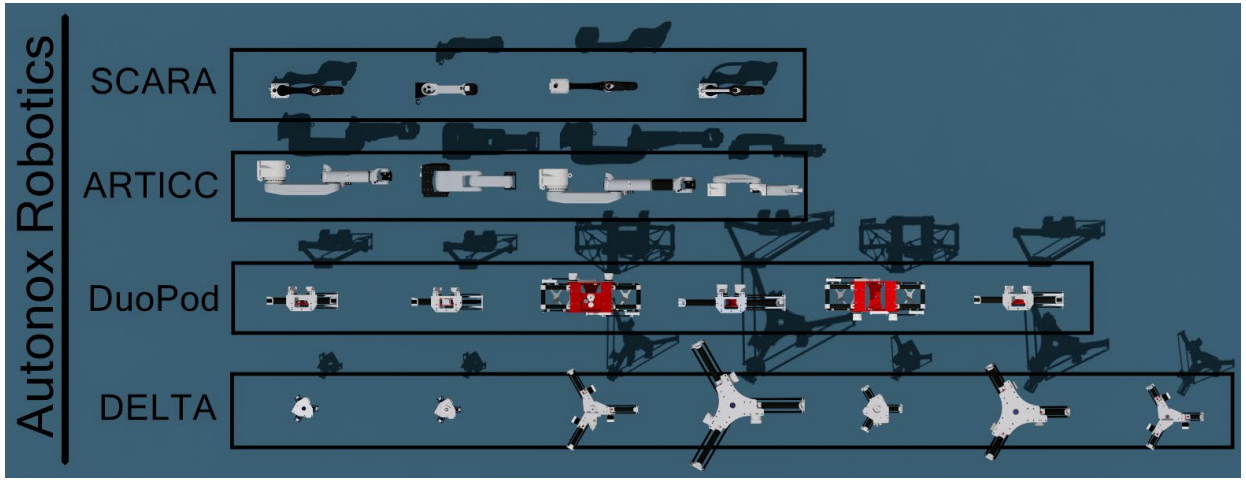
What's Planned – Autonox

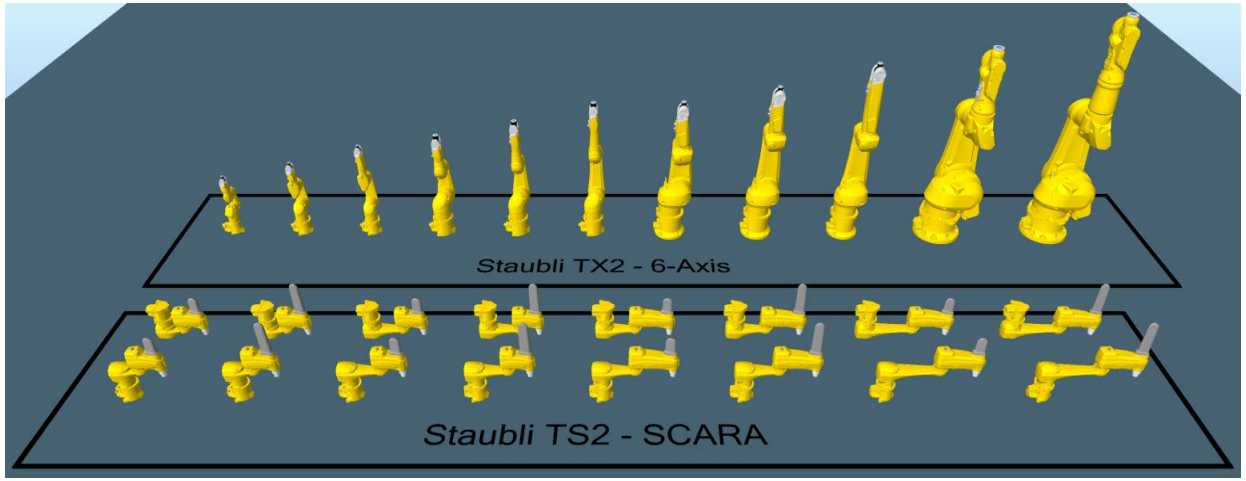
100's of updated Robots

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



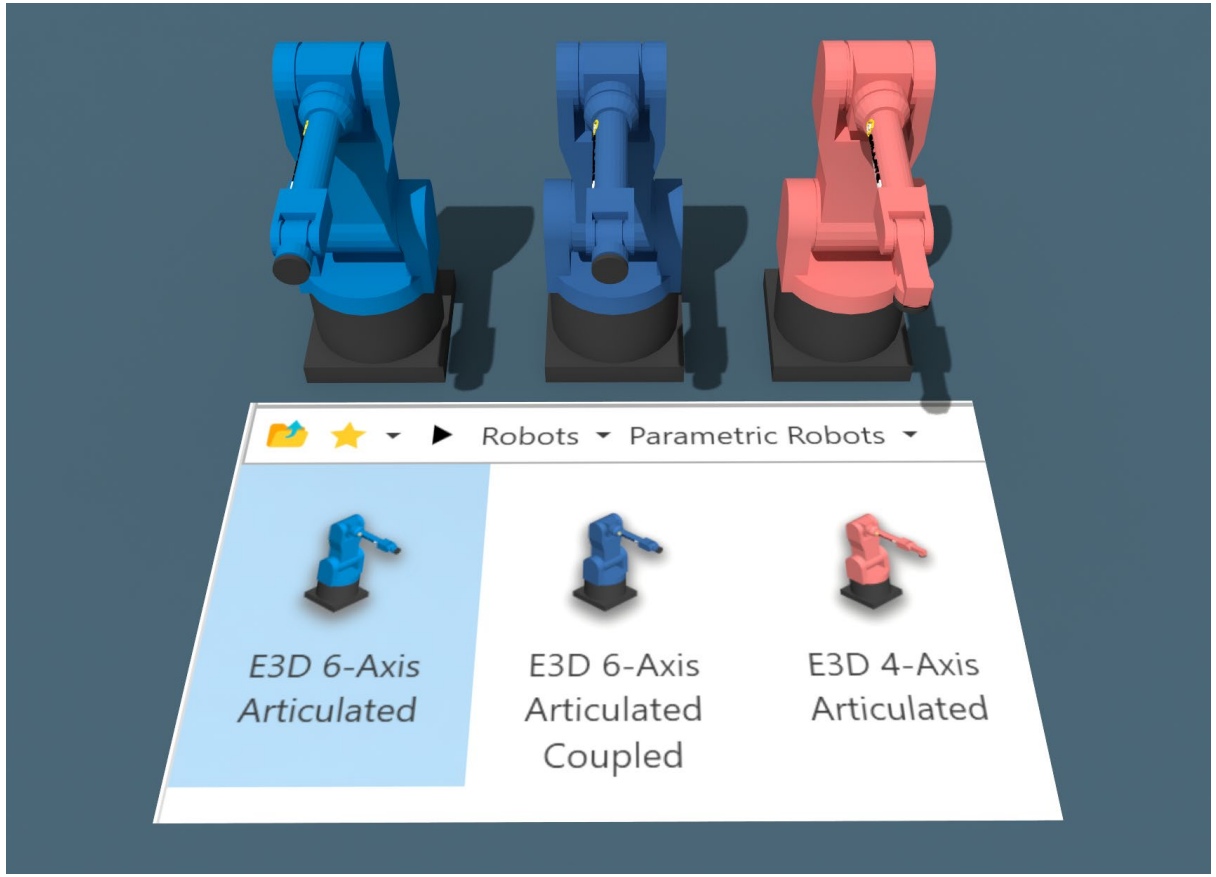


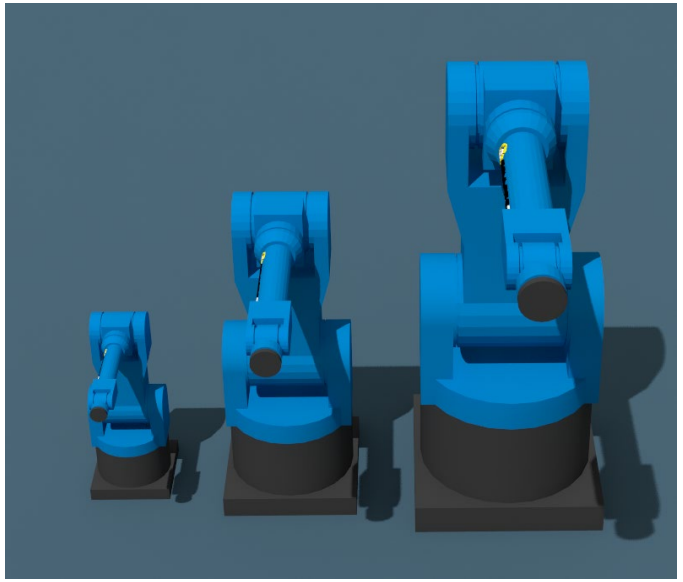




Parametric CITM Robots

New in the Robots Catalog





Dimensions	
BaseHeight	0.8 m
J2ArmLength	0.56 m
J3ArmLength	0.32 m
J4ArmLength	0.84 m
J5ArmLength	0.16 m
RobotScale	1.2 m

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

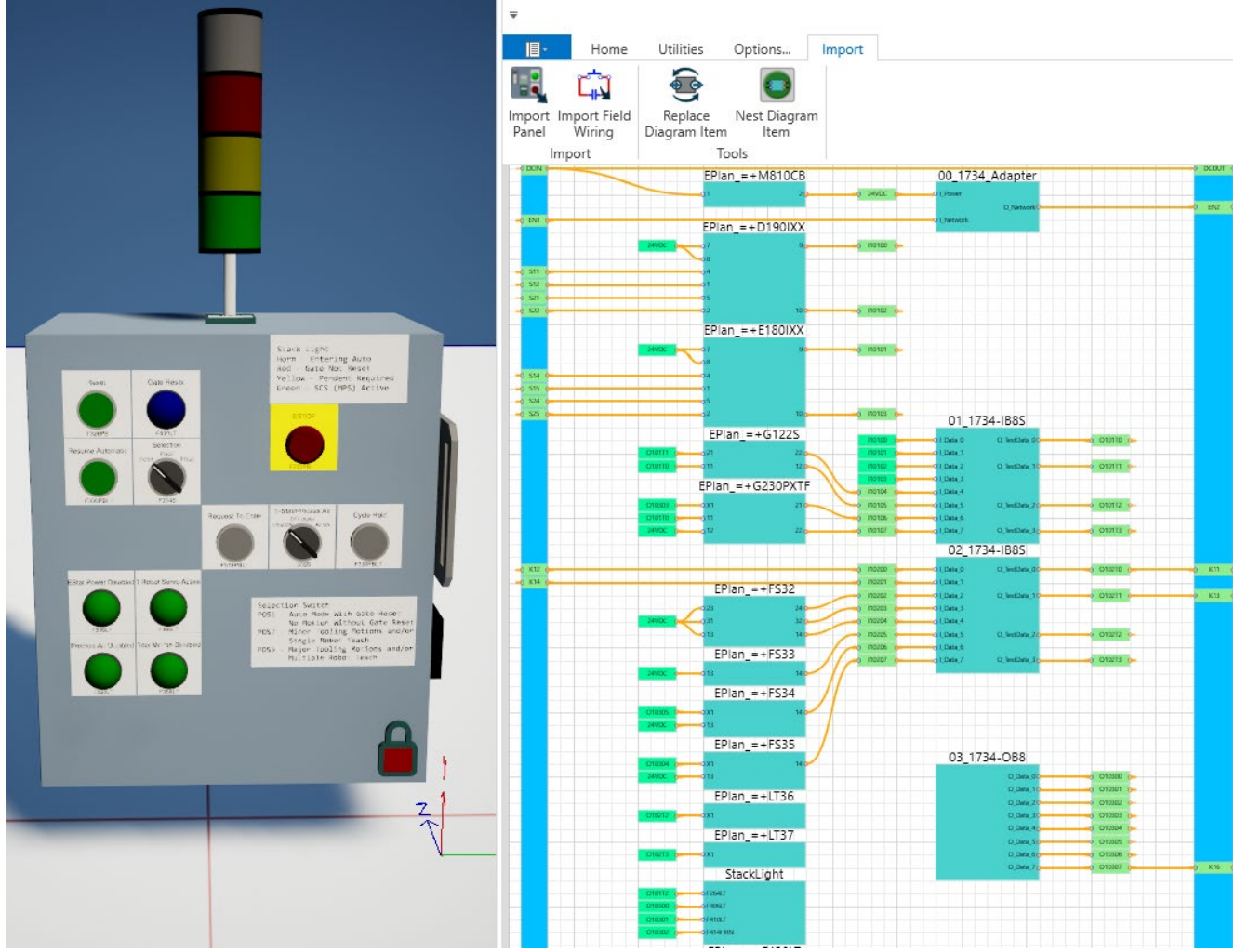
Wiring Diagram V3

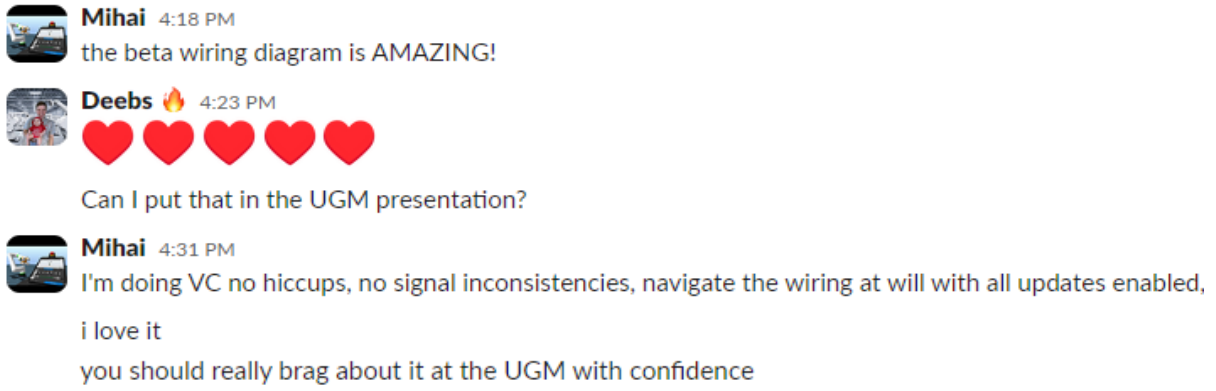
Significant improvements to performance and usability.
- Faster GUI refreshing (~10x)
- Removed GUI impact on comms
- Faster signal propagation (~100x)
- Buttons to create/ delete internal wiring custom properties

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)





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 IO 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, IB12XOBV2, IB12XOB4, IB8XOBV4, IB8XOB8

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

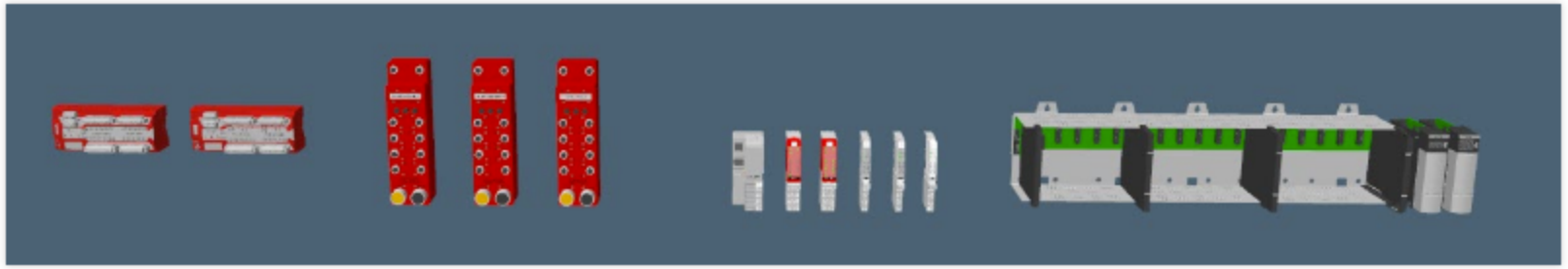
1791ES CompactBlock Guard I/O Ethernet/IP Safety Modules

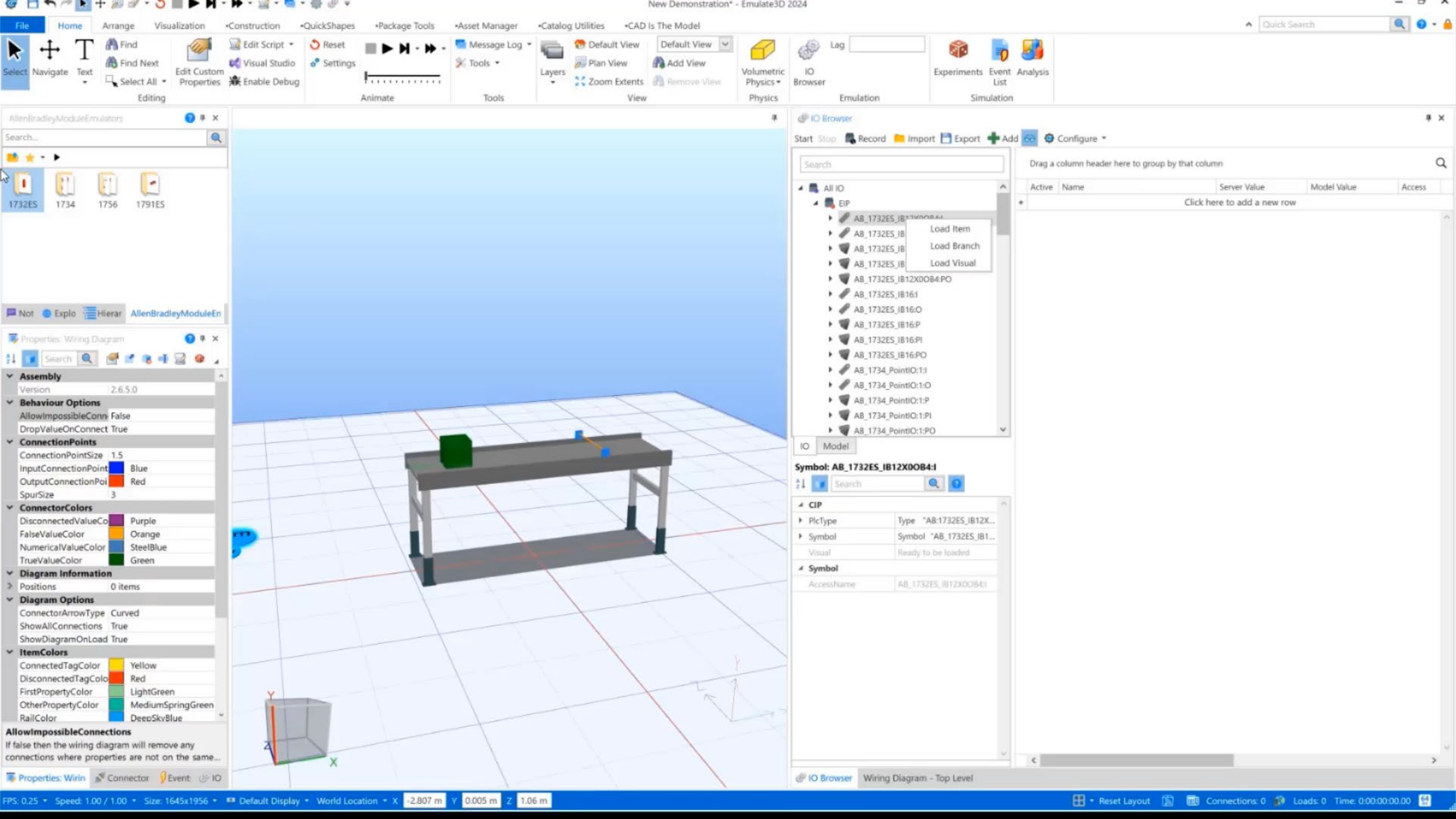
IB16, IB8XOB4

Velocity Drives

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

See Allen-Bradley Velocity Drives Catalog for more details.




New Demonstration* - Emulate3D 2024
File
Home
Arrange
Visualization
Construction
QuickShapes
Package Tools
Asset Manager
Catalog Utilities
CAD Is The Model
Quick Search
Select
Navigate
Text
Find
Find Next
Select All
Editing
Edit Custom Properties
Edit Script
Visual Studio
Enable Debug
Reset
Settings
Animate
Message Log
Tools
Layers
Default View
Plan View
Zoom Extents
Add View
Remove View
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Volumetric Physics
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1732ES
1734
1756
1791ES
Properties: Wiring Diagram
Assembly
Version 2.6.5.0
Behaviour Options
AllowImpossibleConn False
DropValueOnConnect True
ConnectionPoints
ConnectionPointSize 1.5
InputConnectionPoint Blue
OutputConnectionPoi Red
SpurSize 3
ConnectorColors
DisconnectedValueCo Purple
FalseValueColor Orange
NumericalValueColor SteelBlue
TrueValueColor Green
Diagram Information
Positions 0 items
Diagram Options
ConnectorArrowType Curved
ShowAllConnections True
ShowDiagramOnLoad True
ItemColors
ConnectedTagColor Yellow
DisconnectedTagColo 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...
IO Browser
Start
Stop
Record
Import
Export
Add
Configure
Search
All IO
EIP
AB_1732ES_IB12X0OB4:PO
AB_1732ES_IB16:I
AB_1732ES_IB16:O
AB_1732ES_IB16:P
AB_1732ES_IB16:PI
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AB_1734_PointIO:1:I
AB_1734_PointIO:1:O
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Symbol
Visual
Ready to be loaded
Symbol
AccessName
Drag a column header here to group by that column
Active
Name
Server Value
Model Value
Access
Click here to add a new row
Properties: Wirin
Connector
Event
IO
IO Browser
Wiring Diagram - Top Level
FPS: 0.25
Speed: 1.00 / 1.00
Size: 1645x1956
Default Display
World Location
X -2.807 m
Y 0.005 m
Z 1.06 m
Reset Layout
Connections: 0
Loads: 0
Time: 0:00:00:00.00

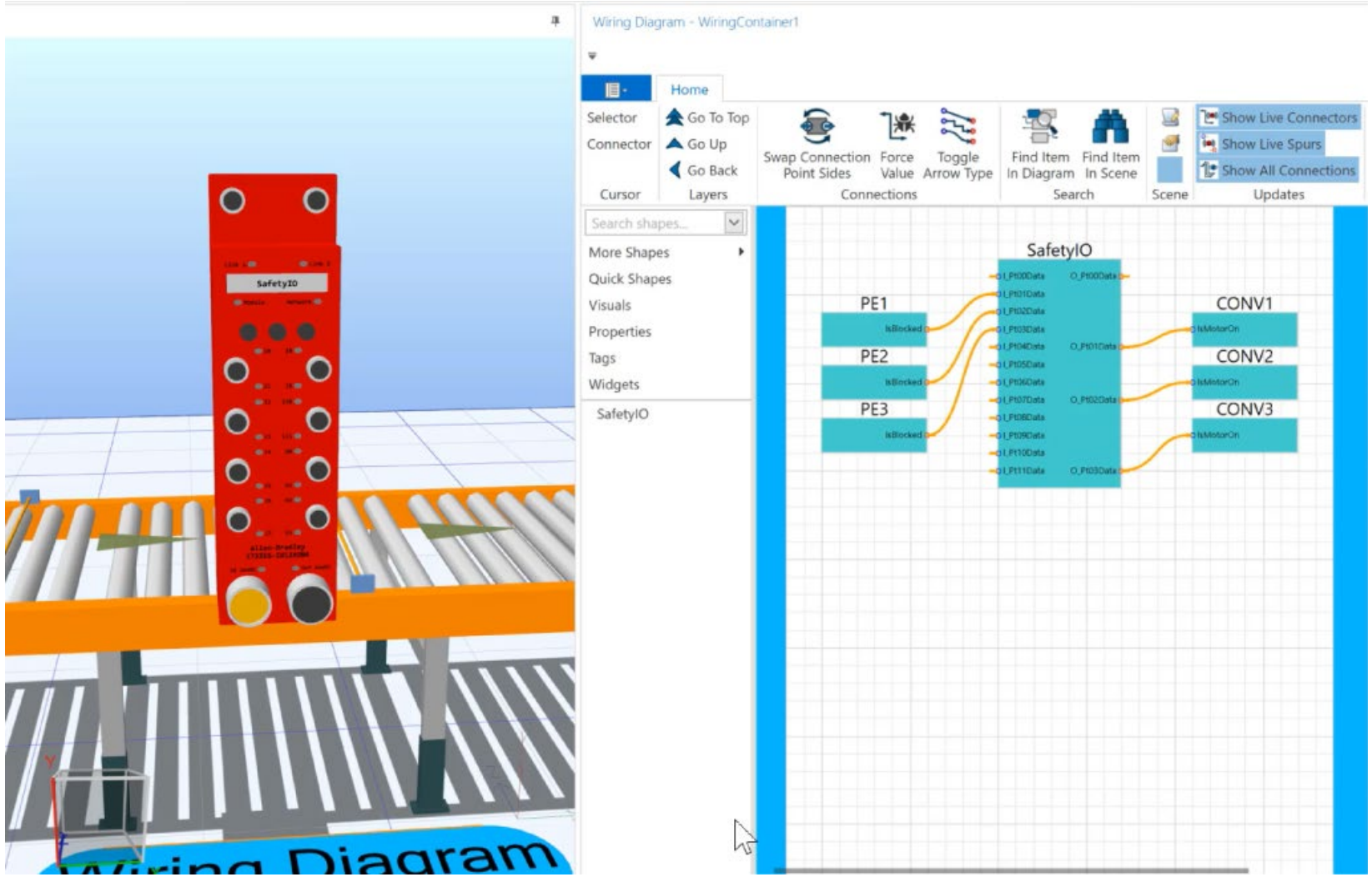
Allen-Bradley Module Emulators Catalog

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

Highly parametric with many configurations modelled

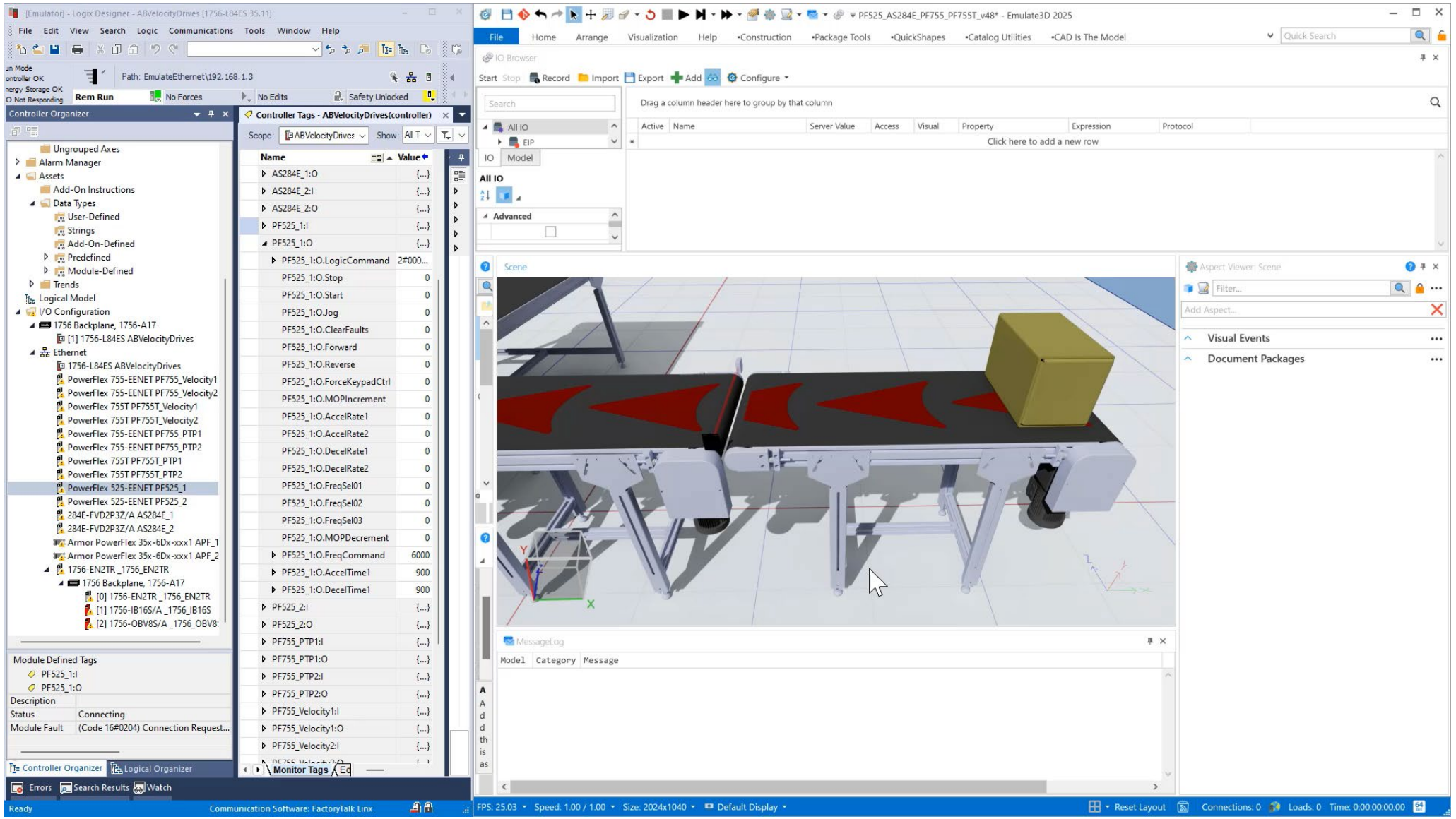
Single binding in IO browser

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

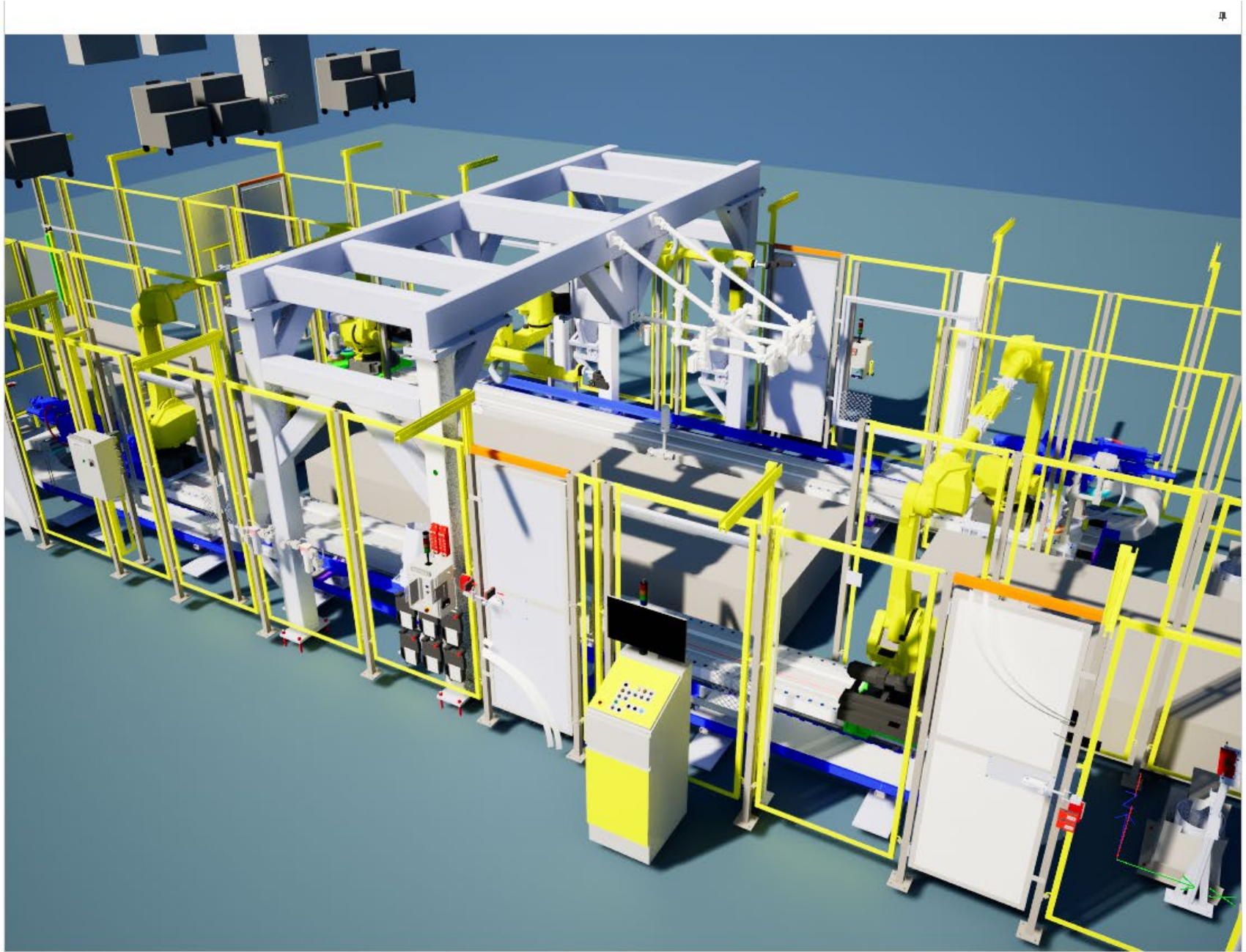


Allen-Bradley Velocity Drives Catalog (in-progress improvements)

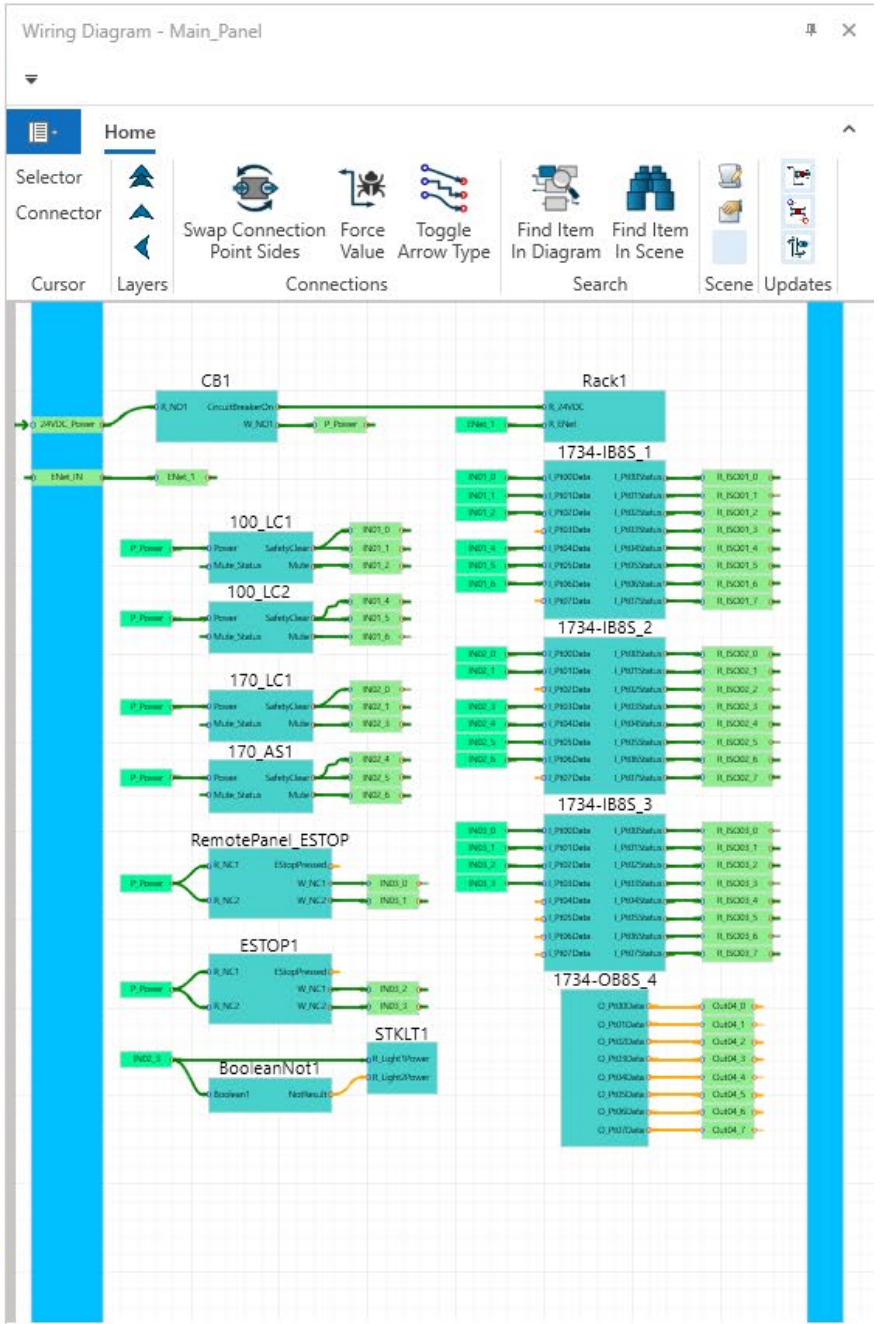
IO Browser bindings automatically generated



We’re using this ourselves...



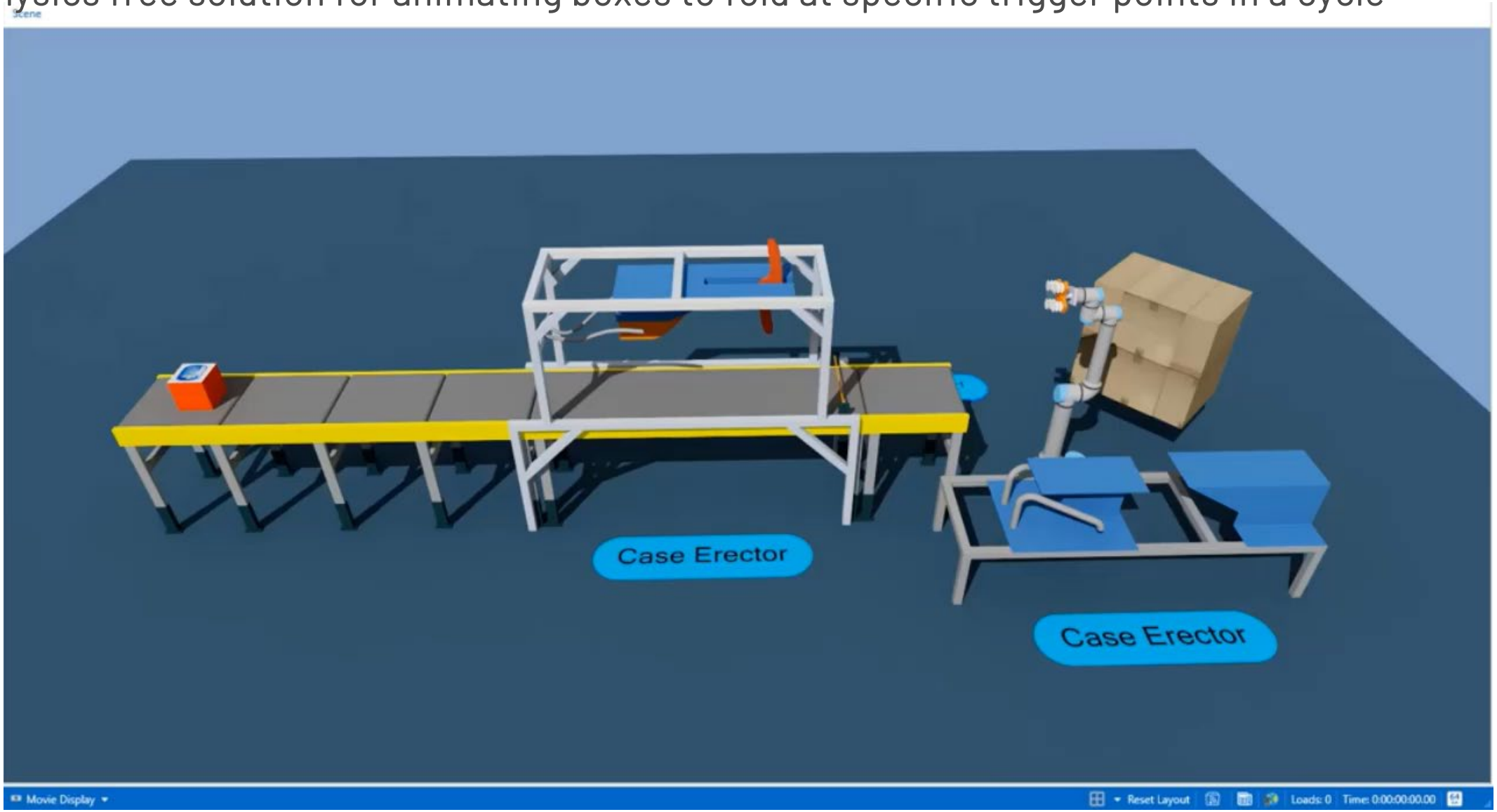
We’re using this ourselves...



We’re using this ourselves, today…

And There's More! Case Erector

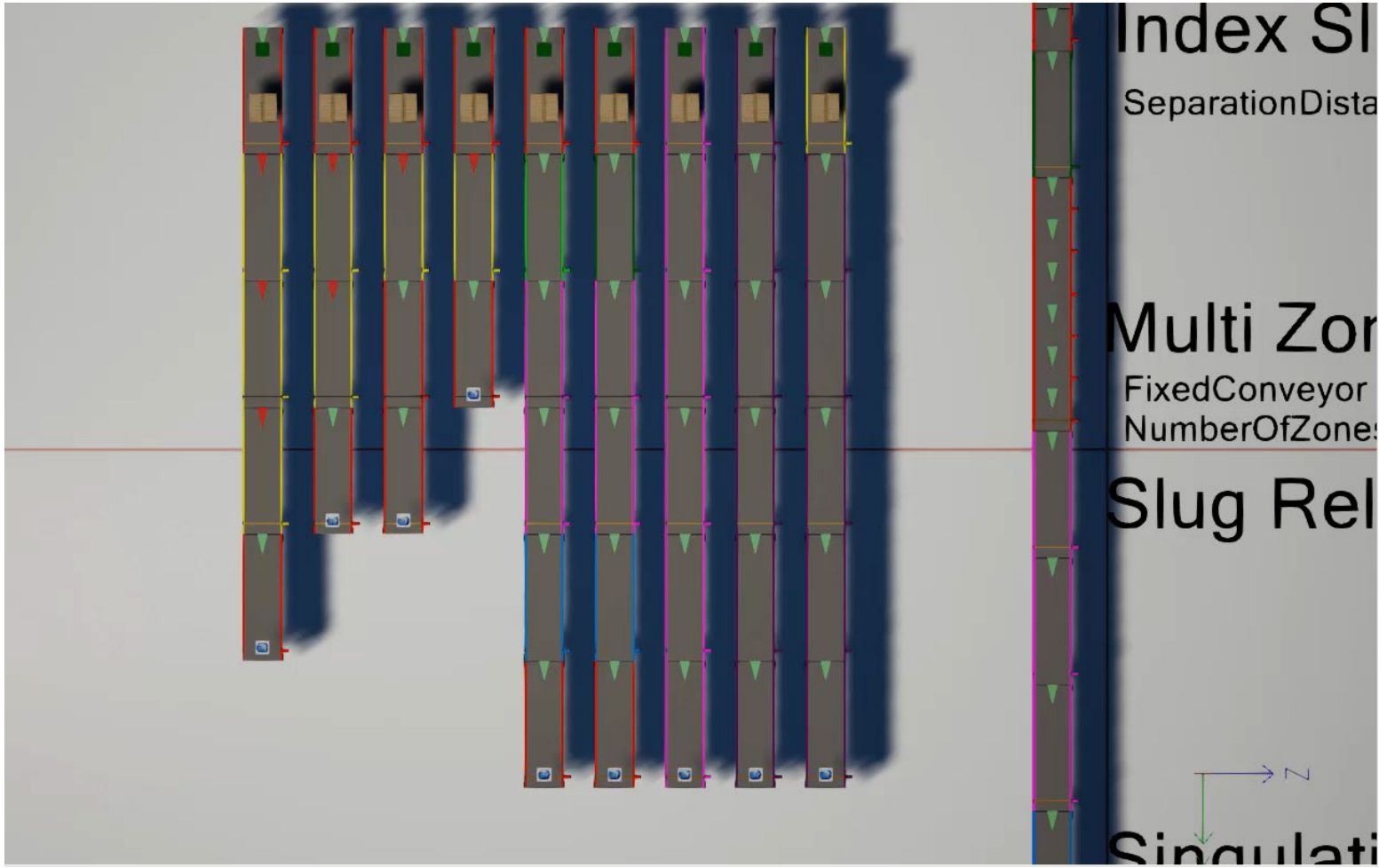
Physics free solution for animating boxes to fold at specific trigger points in a cycle



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

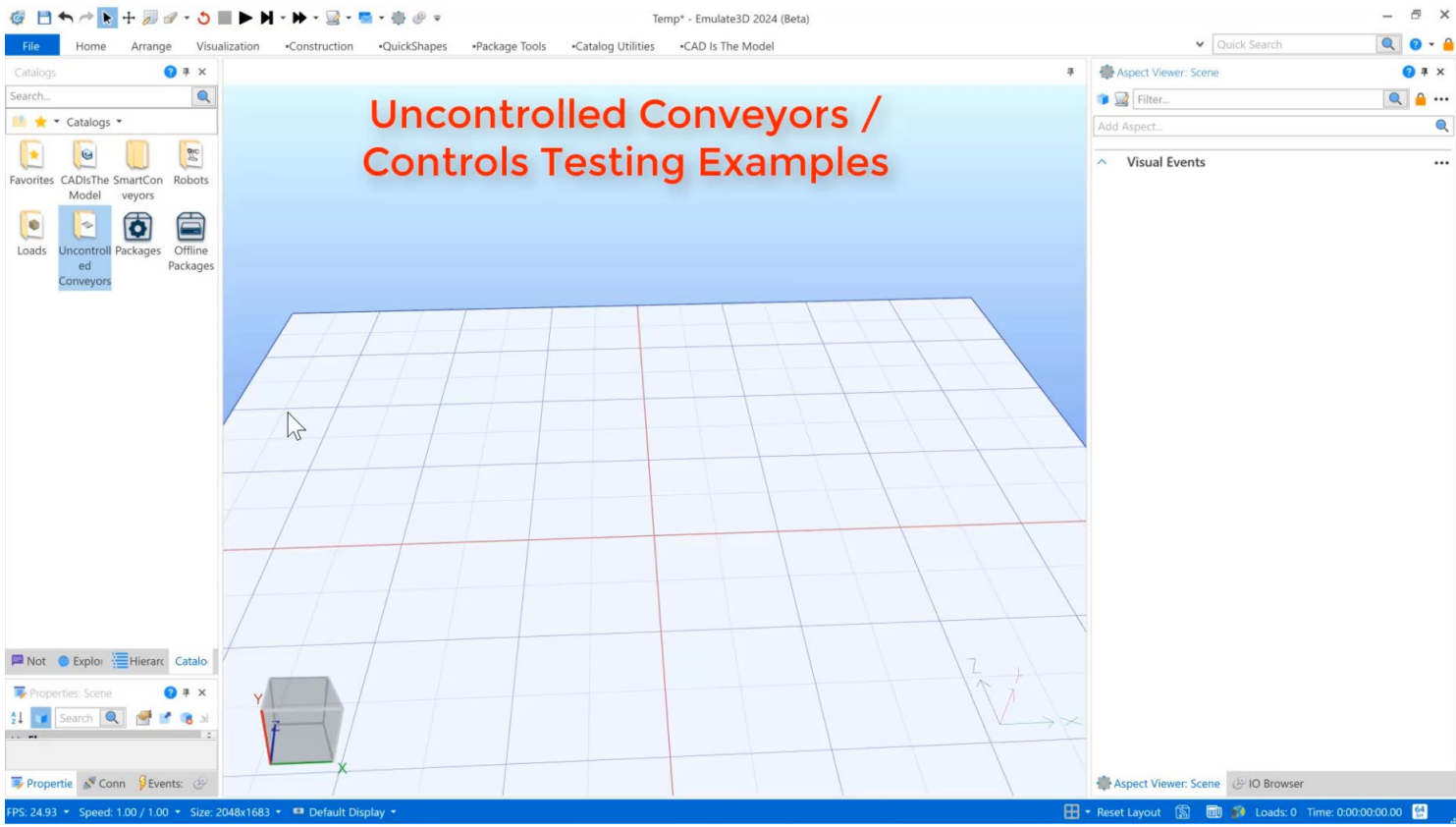
Add joints, motors, and drives, directly to parametric conveyors.

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



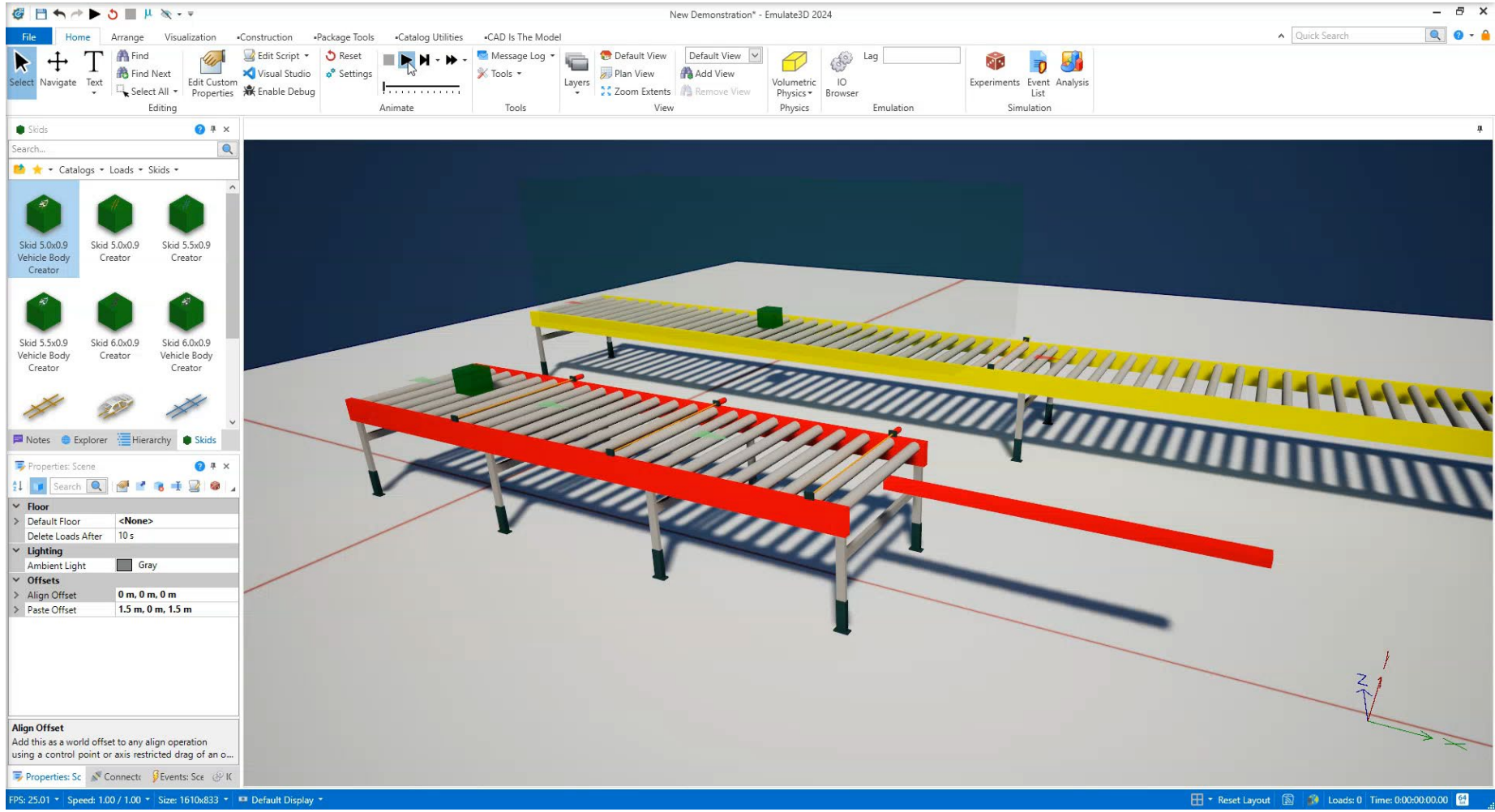
New Loads

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

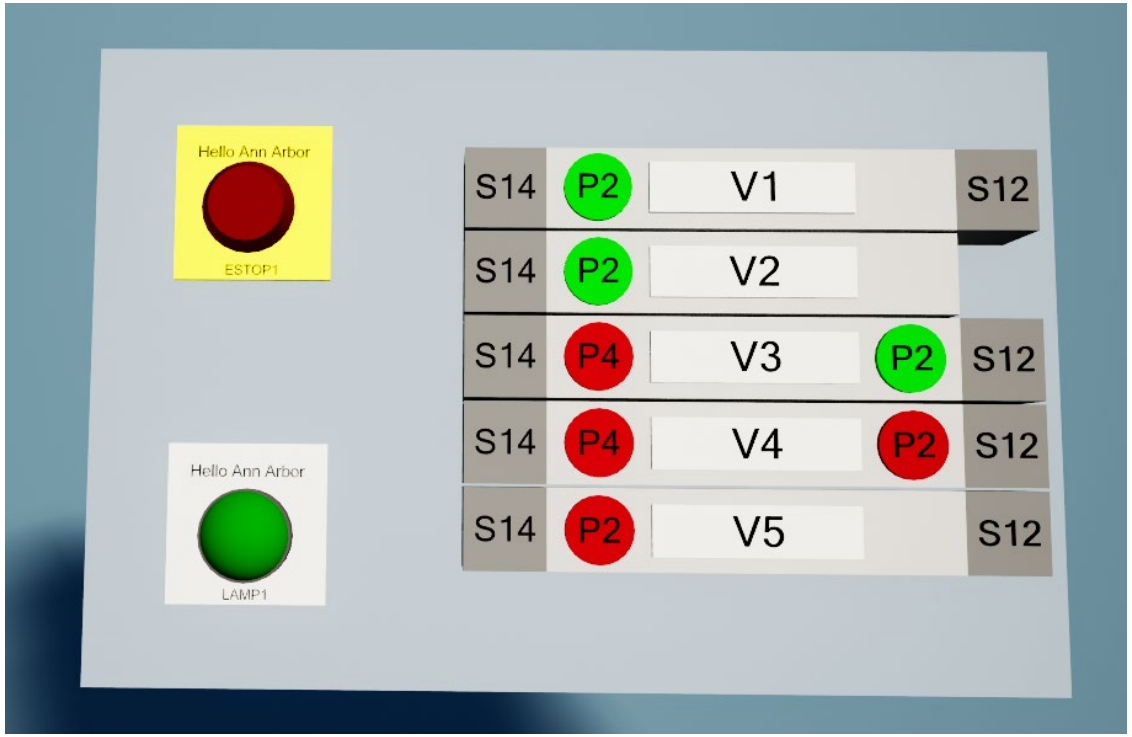
Added ConnectOnModelStart custom property

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

Constant improvements to existing catalogs, available on Package Manager

Palletizer

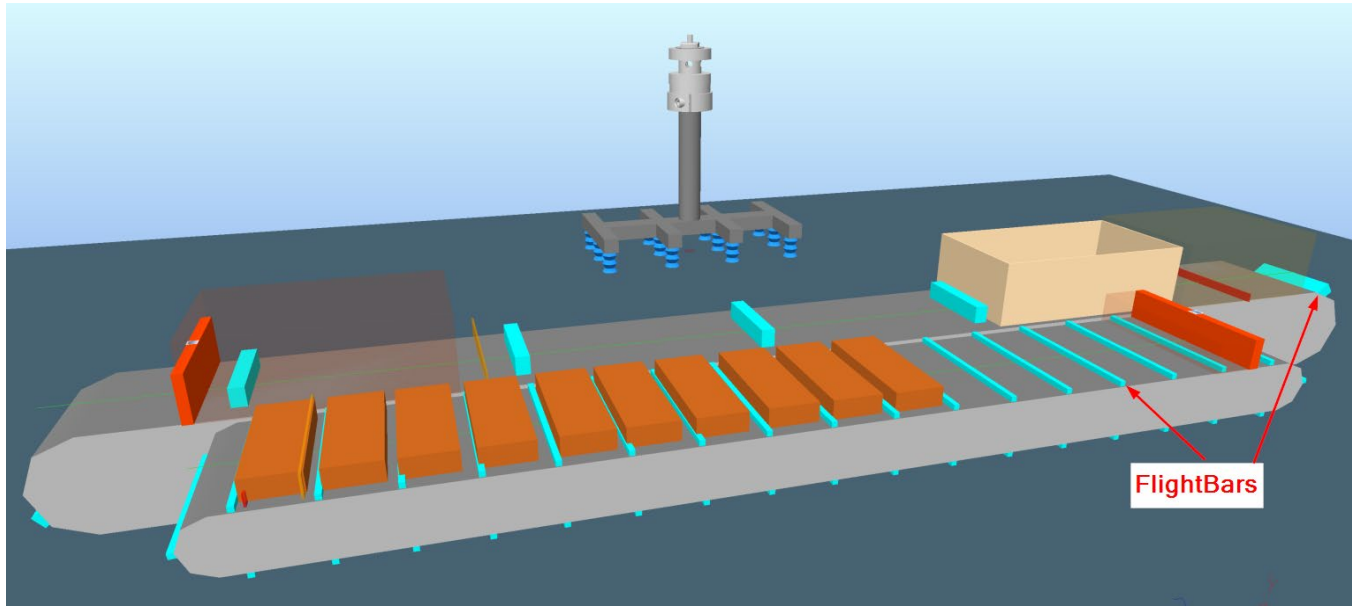
Improved partial Palletization support

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?