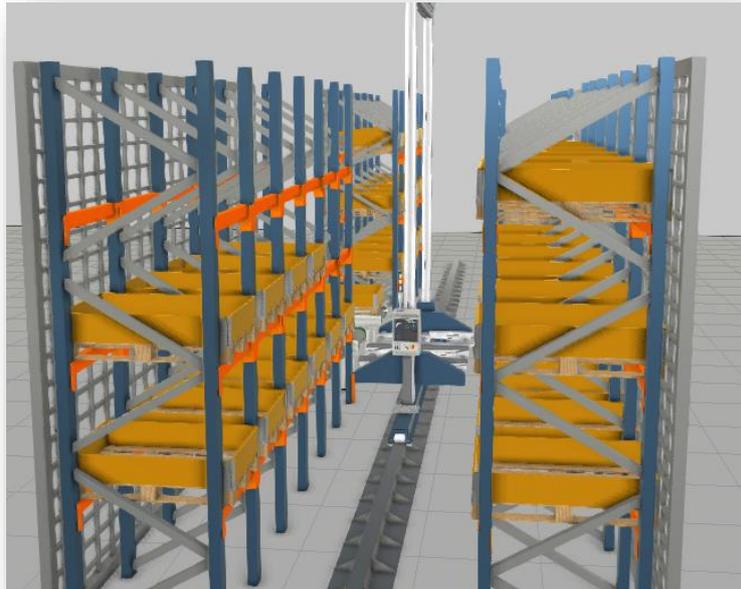


Process Modeling ASRS Manual

Visual Components Essentials 4.2 | Version: November 16, 2020



This manual introduces Process Modelling Stacker Crane Resources, a Crane Transport Controller, and a Warehouse Shelf used in Automatic Storage and Retrieval Systems (ASRS). This manual requires basic knowledge of Process Modelling with Visual Component.

This manual contains:

- Features overview
- Property descriptions

Support

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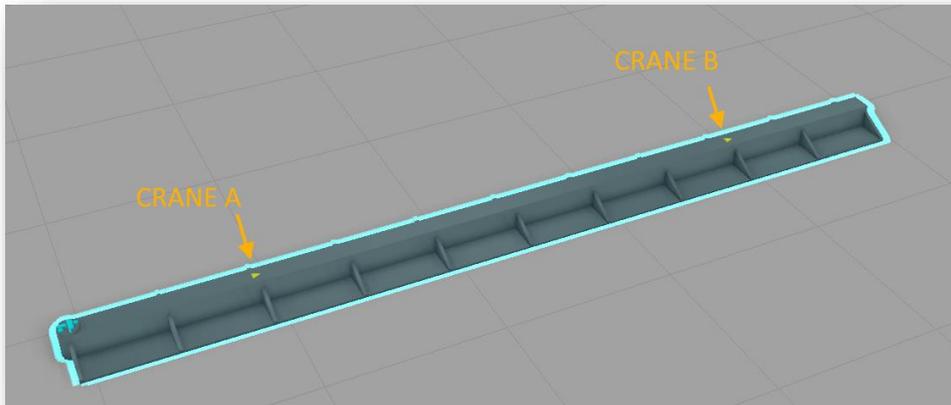
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Crane Transport Controller

The Crane transport controller is required to control the cranes and serve as the track/runway for the cranes. It can control up to two cranes simultaneously. The cranes are connected to the controller with the PnP tool. The cranes are referred to as the crane A or crane B determined by the interface to which the crane is connected to.



Once a crane is connected, the interface is moved to match the crane's dimensions, preventing it from exceeding the track. The dimensions of the crane are taken from its bounding box.

Properties

TrackLength, RailWidth, and RailHeight: The dimensions of the track

SafetyClearance: Determines the minimum separation between the cranes if more than one is connected to the same track

CheckLimits: Pause the simulation and display output message if a crane runs out of the track (exceeds the track length)

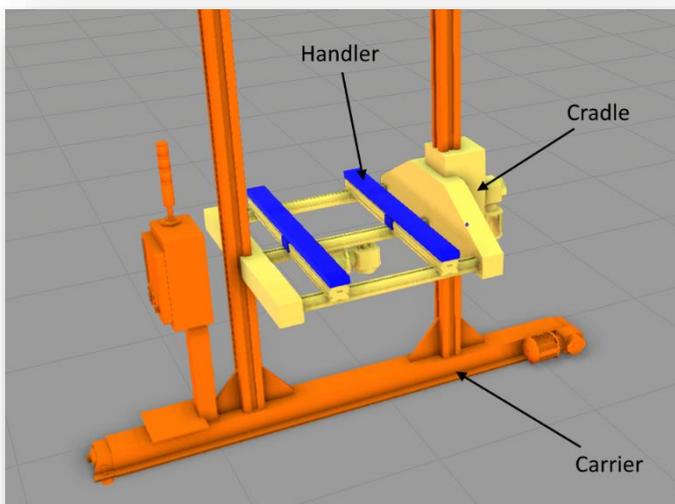
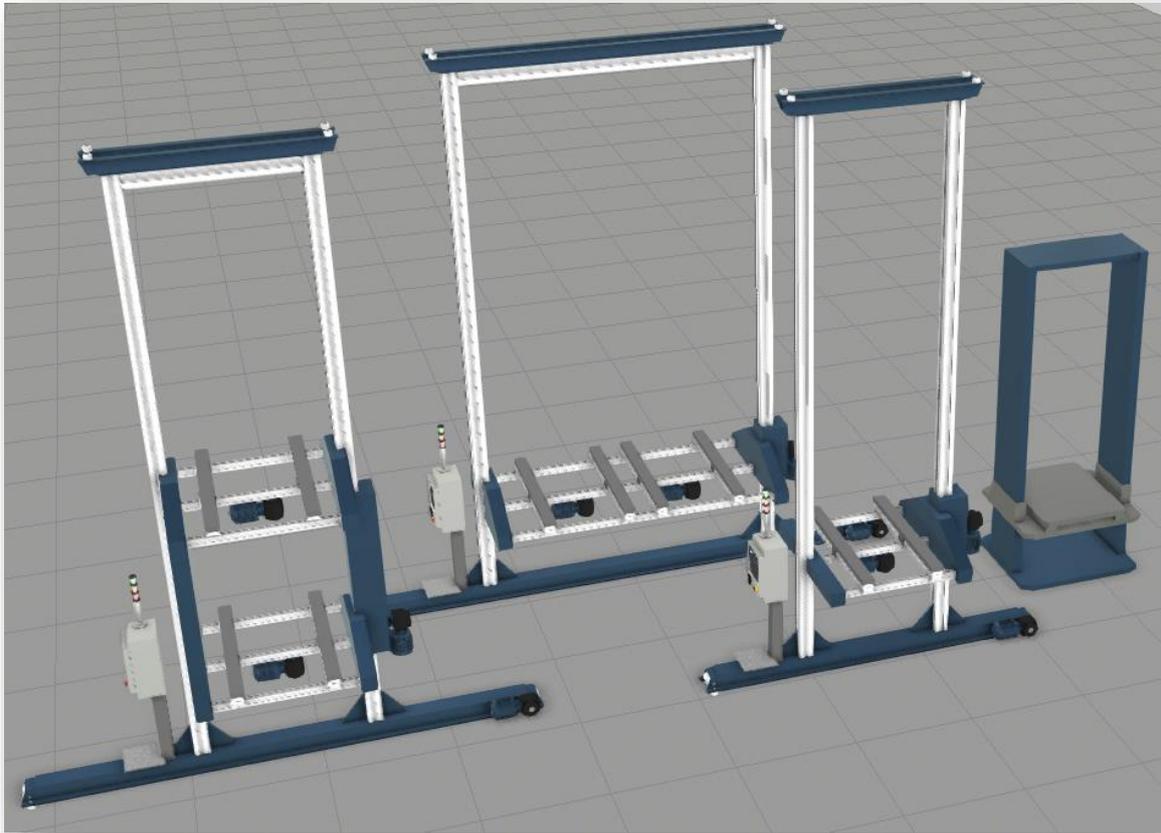
ShowTopRail and TopRailHeight: Enable to display the top rail at the given height

Auto Configure Links: If more than one crane is connected to the track, the auto-configure will associate each link with Crane A or B using the nearest crane to the link's source and destination nodes.

LinkDefaults::GraspTime, ReleaseTime, PostPickWaitTime: Default values to use in the transport links. Value can be overridden in link properties. For a detailed description, refer to the section "Transport Link Properties."

Stacker cranes

There are several types of stacker cranes available in the eCatalog/Process Resources. The Single Pallet Stacker Crane can handle only one product at a time. The other two, the Dual and Double Deck cranes, can handle two products simultaneously.



The crane links are as follows:

Carrier (X-axis)

Cradle (Z-axis)

Handler (Y-axis)

Properties

Default -tab properties define the geometry of the crane

Autohoming::Delay: Defines the time after the crane has been without tasks when it moves to a home position defined by the following properties. Use zero to disable auto homing.

Autohoming::CarrierPosition: Carrier (X) home position

Autohoming::CradlePosition: Cradle (Y) home position

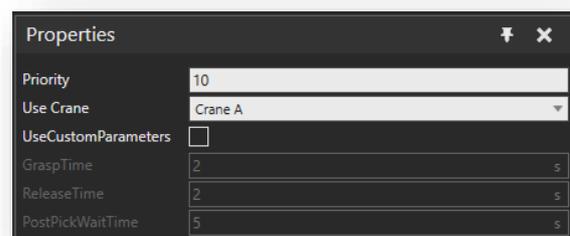
Autohoming::Read Current Joint Values: Read the current position and set the above properties.

Speeds -tab properties set the kinematic parameters for each joint. The deceleration will be equivalent to the acceleration.

Transport Link properties

Priority: Sets the priority for the link against all available/active transportation tasks. The lower the number, the higher the priority

Use Crane: Define a specific crane for transportation or allow the controller to choose the crane (Any). The controller will select the nearest available by default.

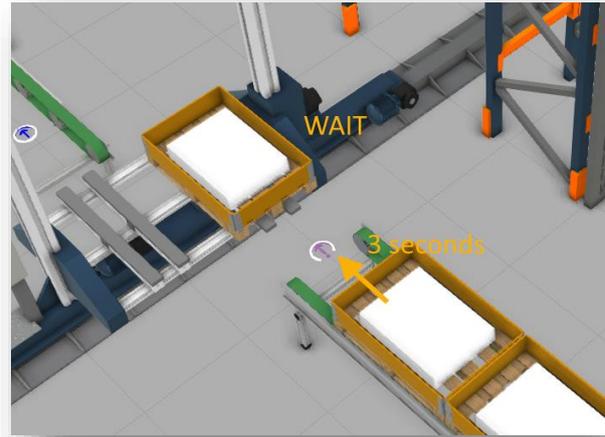


UseCustomParameters: Enable to override default values (defined in controller properties)

GraspTime: A time that is taken to load the crane. Excluding handler extend and retract times.

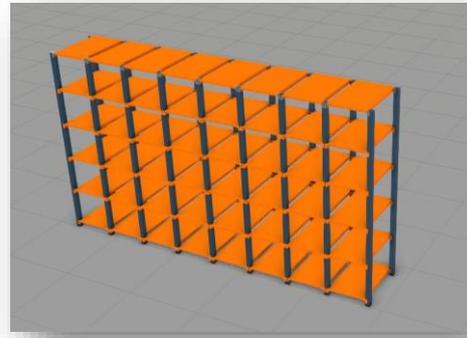
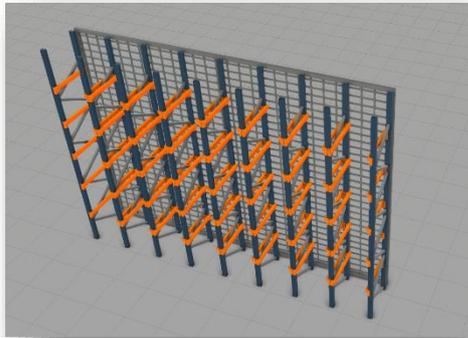
ReleaseTime: A time that is taken to unload the crane. Excluding handler extend and retract times.

PostPickWaitTime: A wait time after picking a product before proceeding to the next task. Wait time is not applied if the crane has no capacity for additional products or another task is available. Use this to wait for additional products to enter a process (via a conveyor, for example) for picking before delivering.

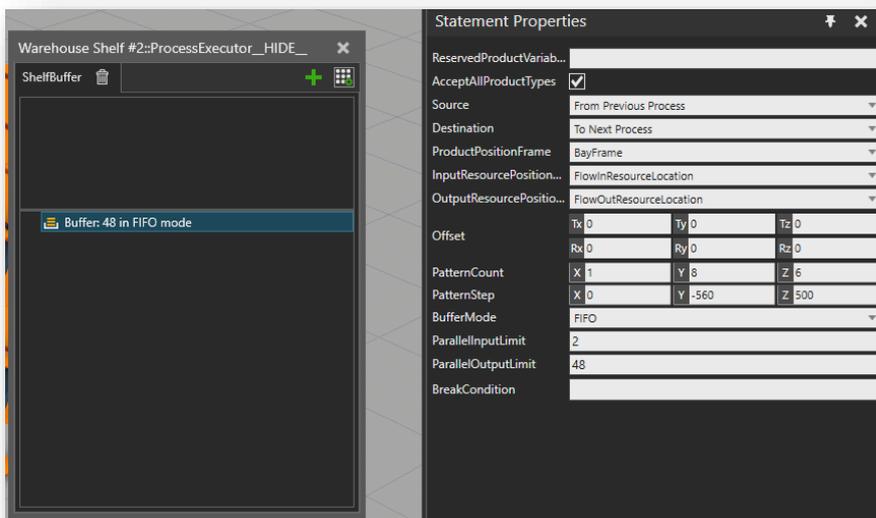


Warehouse Shelf

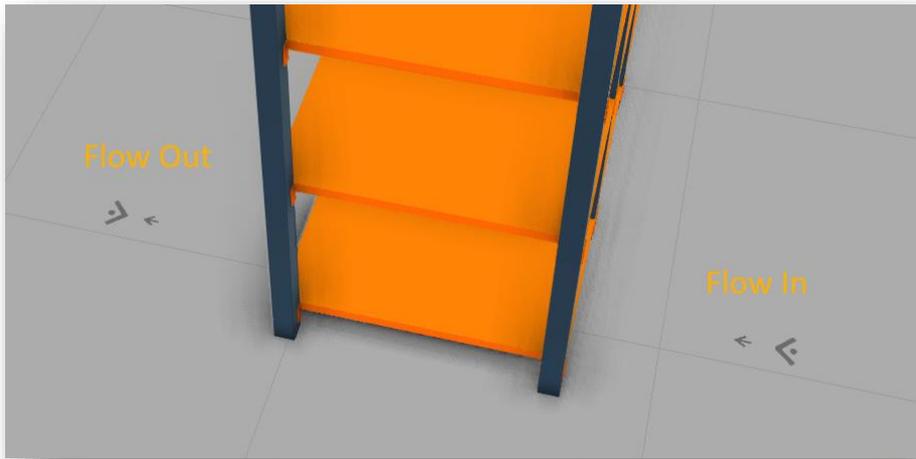
The warehouse comes with multiple different presets, the *Pallet Rack*, *Crane Rack*, *Light Pallet Rack*, *Manual Picking Shelf*, and *Pick To Light*, that can be used to quickly set up the appearance and the dimensions.



The shelf is a process with a Buffer statement, and the statement properties are set automatically based on the shelf setup. The setup is the number of *Bays* (columns), *Tiers* (rows), *FloorClearance*, *Horizontal* and *VerticalFillOrder*, and *ProductOrientation*.



Some statement properties need to be visited to change the e.g. the following properties: accepted product types or groups, change *BufferMode* (FIFO/LIFO), and *ParallelInput* and *OutputLimit*. The *ParallelInputLimit* should be set to a value that is the total capacity of the available resources or less. That way, if more than one shelf is used, the shelves will be filled roughly at the same rate. *ParallelOutputLimit* is set automatically to match the number of slots but can be manually changed after the shelf has been set up.



It is possible to load and unload the shelf from the opposite sides. If resources such as humans are used, they will go to the *FlowIn* or *FlowOutResourceLocation*. The cranes or robot arms will not use the location. A small arrow indicates the flow in or the flow out location. The location will be automatically transformed to match the product location on the floor level, and the offset from the shelf will be maintained. Both locations can be modified with the corresponding properties on the shelf.