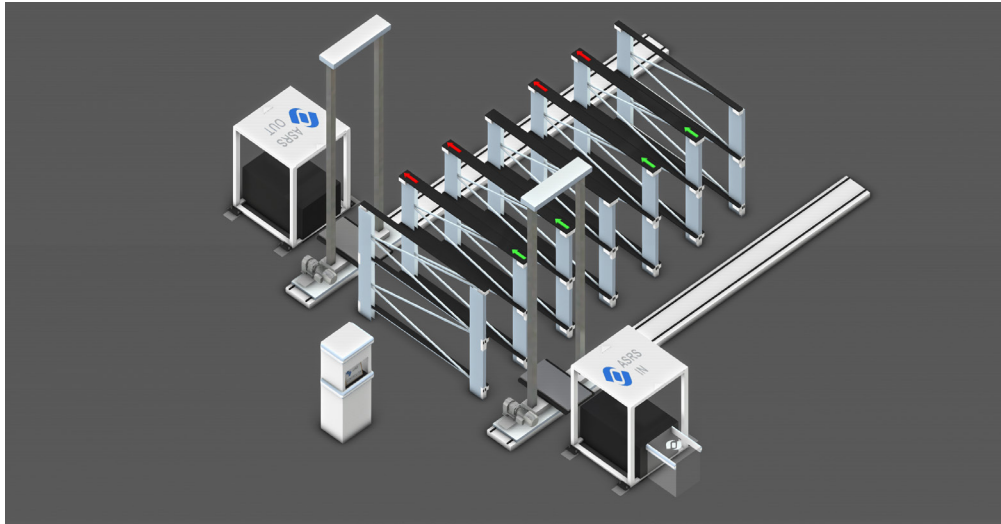


Automate Storage and Retrieval Systems

Visual Components 4.0 | Version: August 17, 2017



The Automated Storage and Retrieval System (ASRS) library allows you to simulate warehouse operations that receive, store and ship products.

This guide shows you how to build a layout that can simulate basic ASRS tasks, for example storage and retrieval of items.

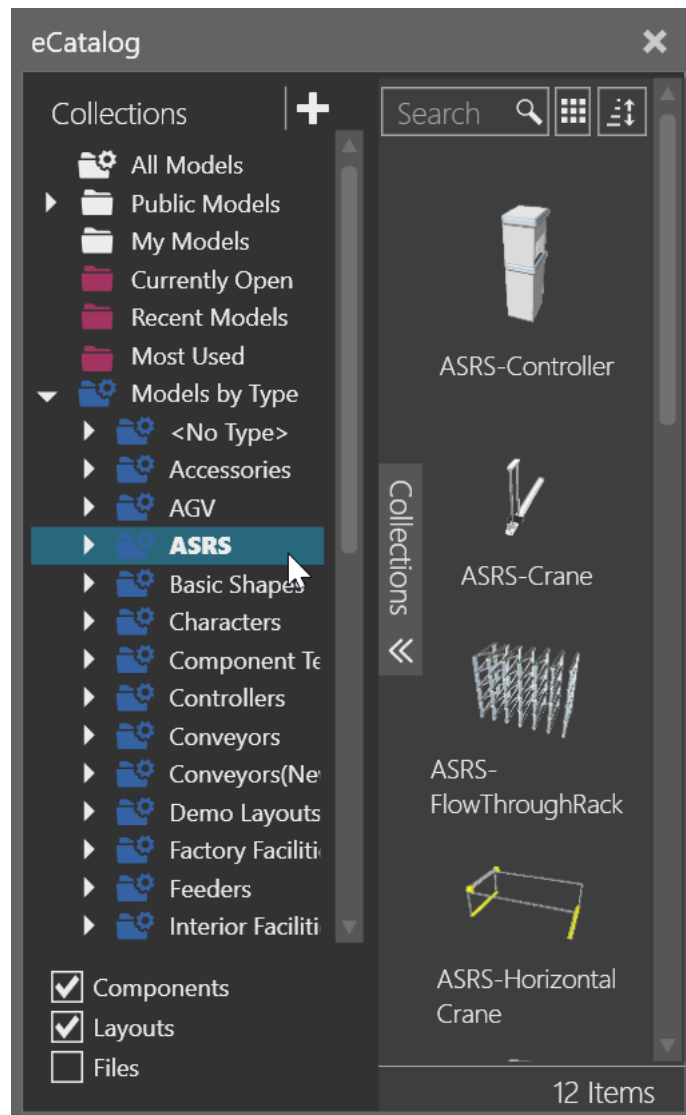
Support
support@visualcomponents.com

Forum
forum.visualcomponents.com

Find Components

Components in the ASRS library are available in the Visual Components Web eCatalog.

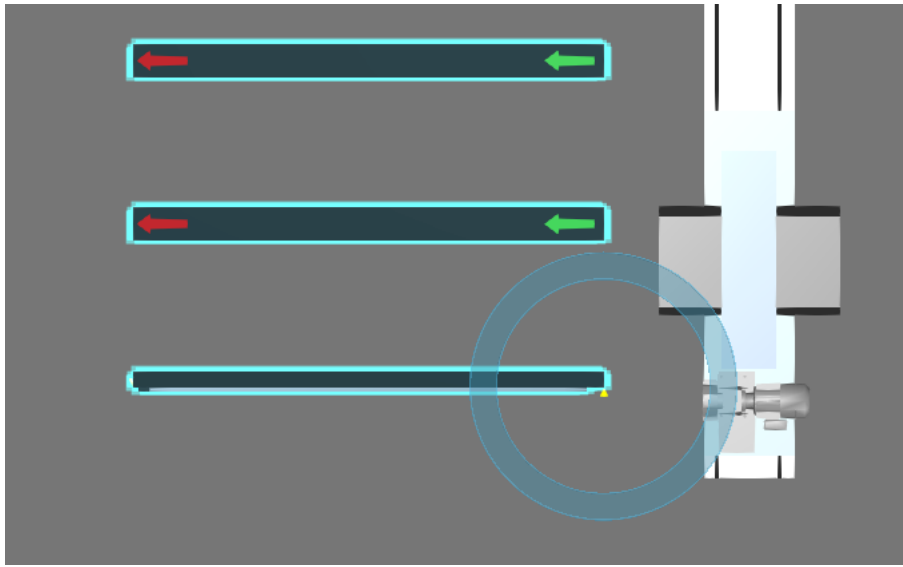
- In the eCatalog panel, Collections view, expand **Models by Type**, and then click **ASRS**.



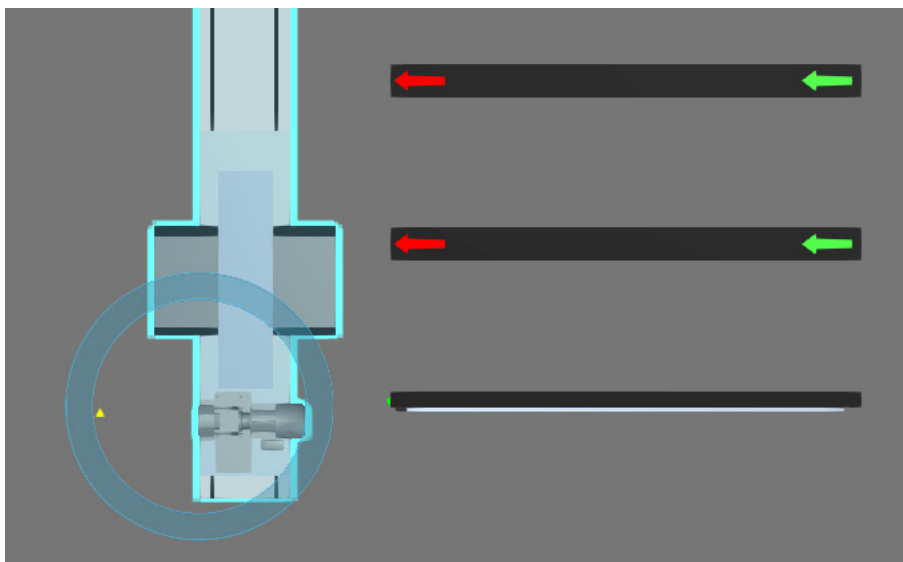
Connect Cranes and Rack

A **crane** is used for loading and unloading items in storage. A **rack** is used for storing items. Flow Through Racks require two cranes, one for loading and another for unloading products.

1. Add an **ASRS Crane** to the 3D world origin.
2. Add an **ASRS Flow Through Rack** and then connect its loading side (green arrows) to the **A side** of the crane.



3. Add another **ASRS Crane** and then connect its **B side** to the unloading side (red arrows) of the rack.

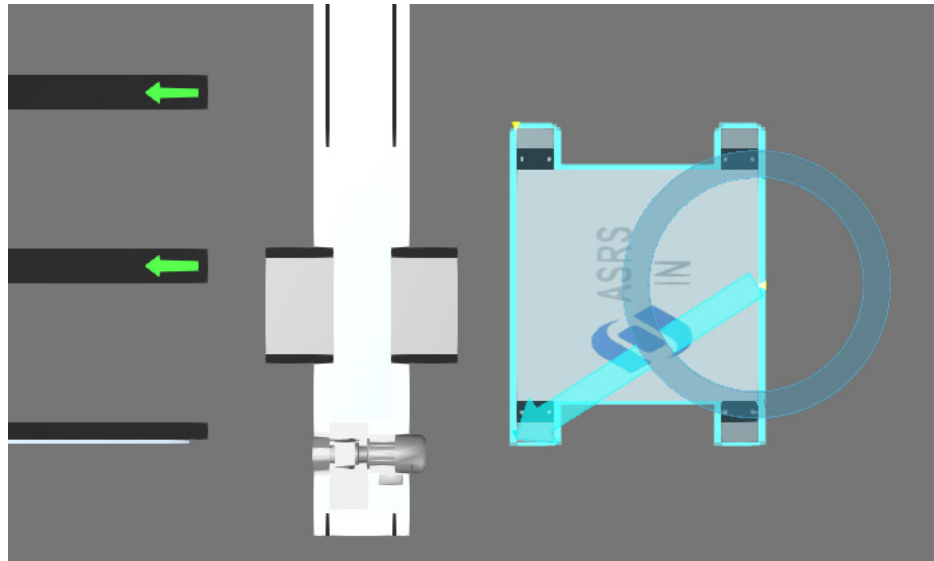


Connect Infeeder and Outfeeder

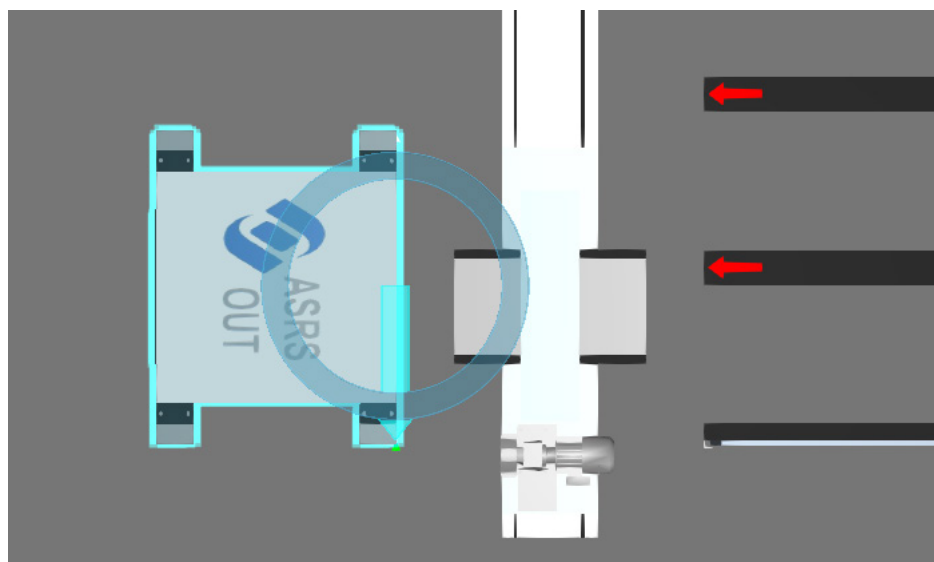
An **infeeder** is a receiving station that generates requests for storing components. For example, an infeeder can receive components and then request for them to be put in storage.

An **outfeeder** is a shipping station that generates requests for pulling components. For example, an outfeeder can receive components from storage.

1. Add an **ASRS Infeeder** and then in the Component Properties panel, select the **GrowLeft** check box, and then connect the Infeeder to the **B side** of the first crane.



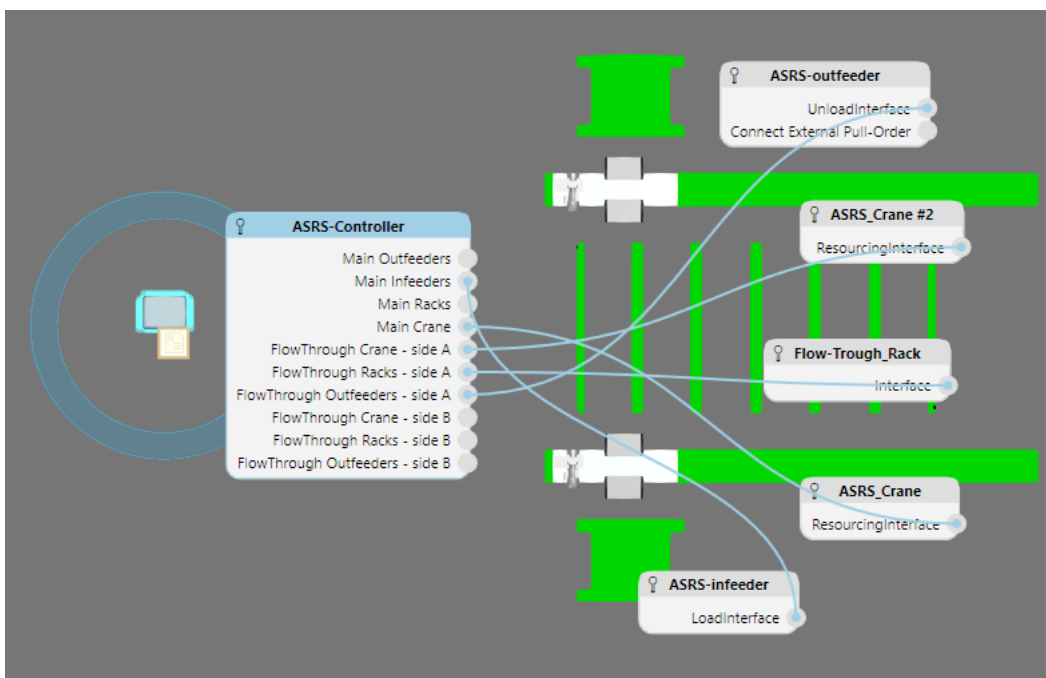
2. Add an **ASRS Outfeeder** and then connect it to the **A side** of the second crane.



Connect Controller

A **controller** allows you to configure and manage a storage and retrieval system via remote connections.

1. Add an **ASRS Controller** to the 3D world.
2. On the Home tab, in the Show group, select the **Interfaces** check box to display an editor for wiring connections to the controller.
3. Do all of the following:
 - Wire the **Main Crane** interface to the first crane.
 - Wire the **Main Infeeders** interface to the infeeder.
 - Wire the **FlowThrough Crane - side A** interface to the second crane.
 - Wire the **FlowThrough Racks - side A** interface to the rack.
 - Wire the **FlowThrough Outfeeders - side A** interface to the outfeeder.



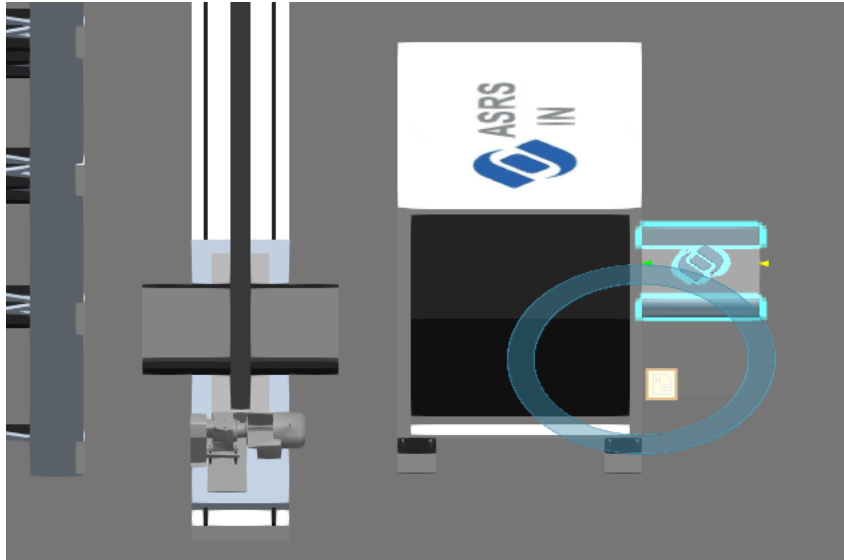
The controller is now configured to handle products coming from its main infeeder using its main crane. For example, the infeeder will receive a product, send a request to the controller to store the product, and then the controller will instruct the crane to pick the product and place it in storage. The rack is connected to side A of the main crane, so the rack, outfeeder and other crane are used for flowing products from side A of the main crane.

4. On the Home tab, in the Show group, clear the **Interfaces** check box to hide the remote connection editor.

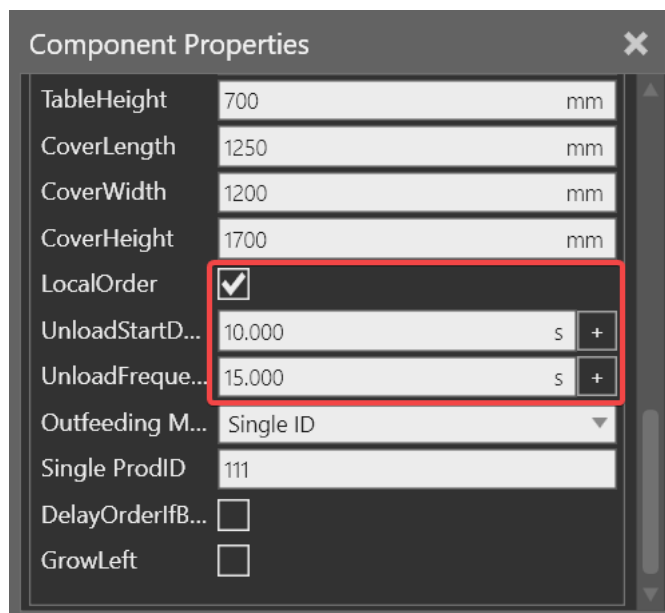
Define Local Order

A **local order** allows you to pull products from storage using an outfeeder.

1. In the eCatalog panel, Collections view, under Models by Type, click **Feeders** and then add and connect an **Advanced Feeder** to the Infeeder in the 3D world.



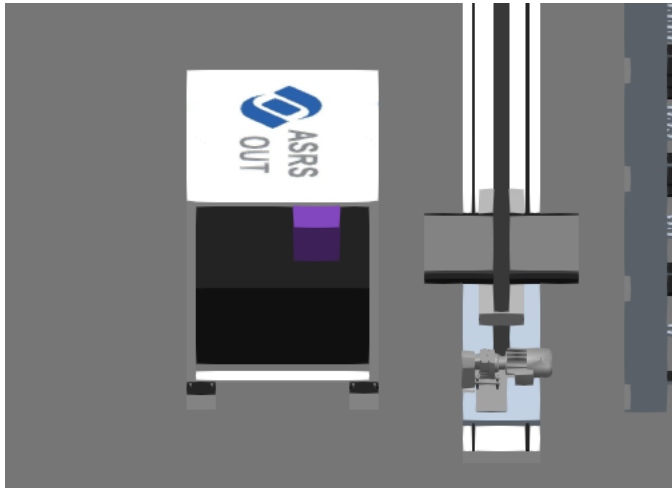
2. In the 3D world, select the **Outfeeder**.
3. In the Component Properties panel, select the **LocalOrder** property to display properties for defining the order, and then do all of the following:
 - Set UnloadStartDelay to **10**. This means the Outfeeder will not start creating orders until after 10 seconds has elapsed in the simulation.
 - Set UnloadFrequency to **15**. This affects how often the Outfeeder creates orders.



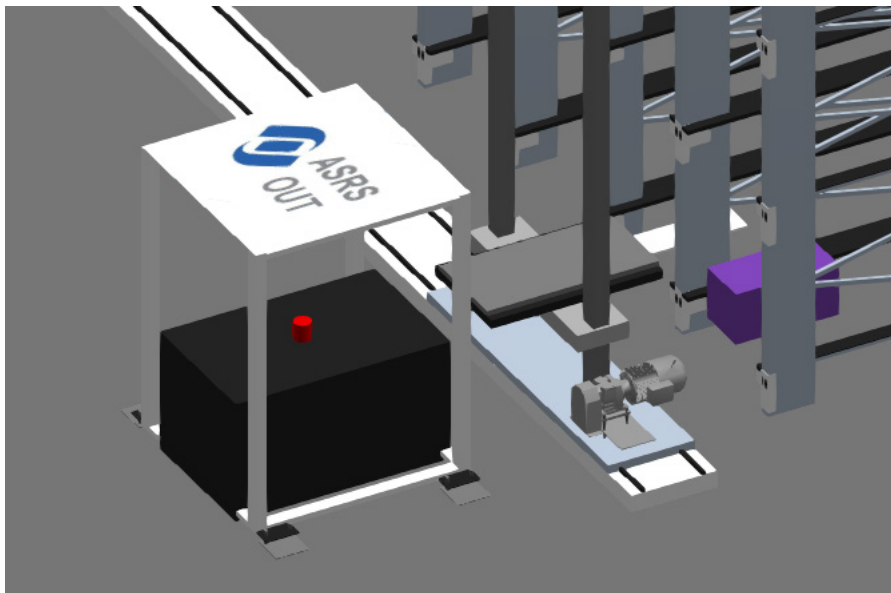
Test Product ID Filtering

By default, an infeeder will write the ProdID property of a received product to 111 and an outfeeder with a local order will request products with a ProdID of 111.

1. Run the simulation, verify all types of products are being retrieved from storage, and then reset the simulation.



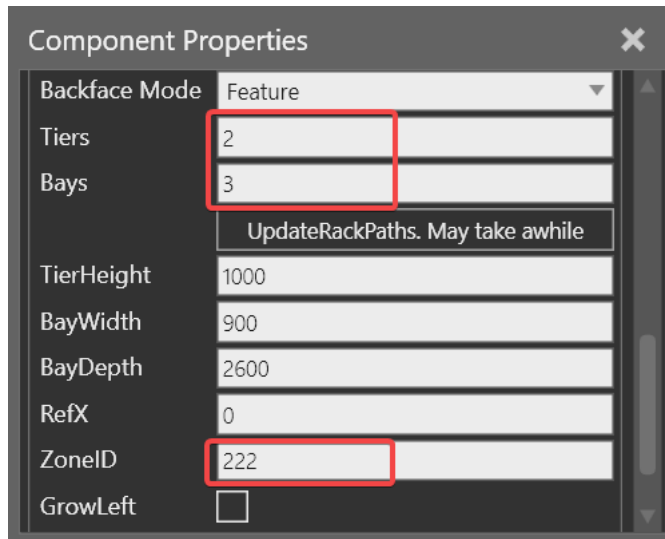
2. In the 3D world, select the **Infeeder**, and then in the Component Properties panel, clear the **WriteProdID** check box.
3. Run the simulation, verify only one type of product is retrieved from storage, and then reset the simulation.



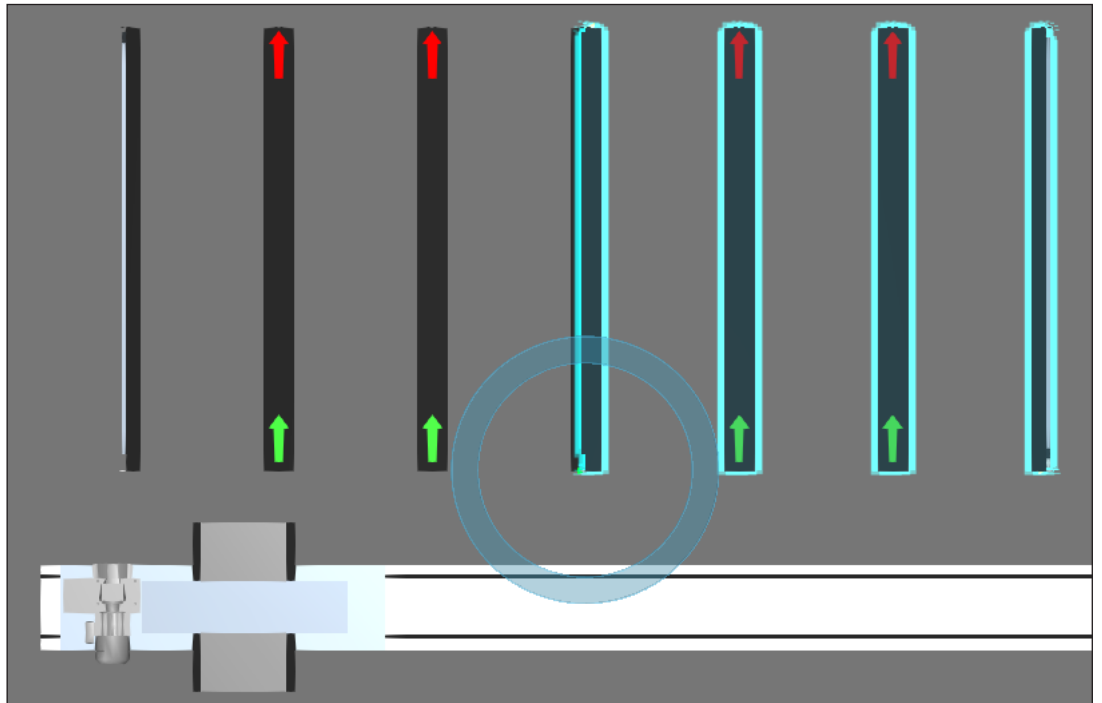
Designate Storage Areas

Products can be filtered and placed in different storage containers by connecting multiple racks with zone ids and enabling the **UseRacksAsZones** property of a controller.

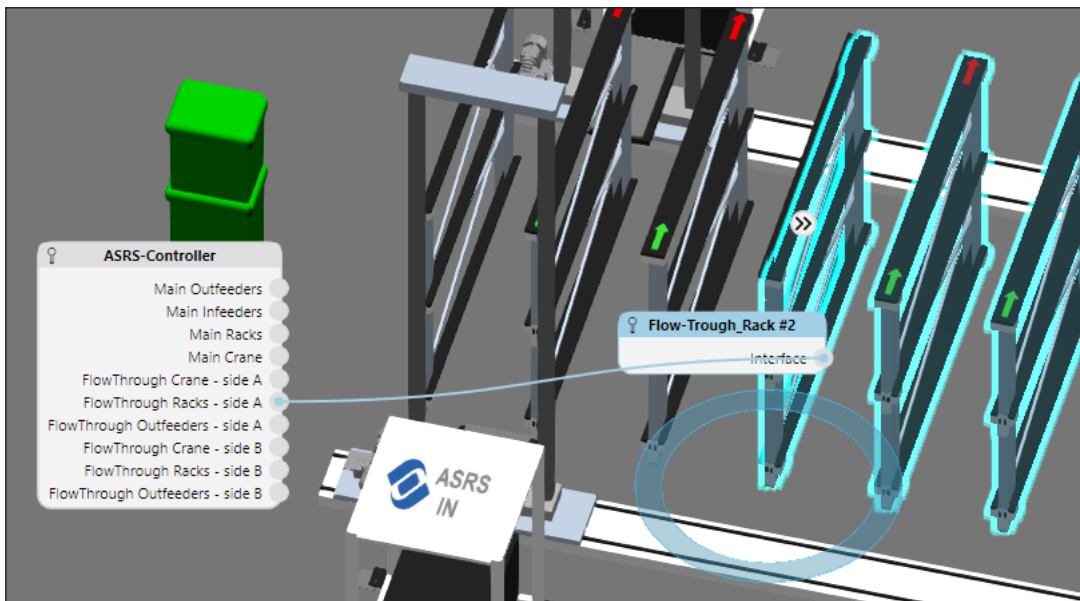
1. In the 3D world, select the **Rack**.
2. In the Component Properties panel, set Tiers to **2** and Bays to **3** and ZoneID to **222**.



3. Copy and paste the rack, and then connect the copy to the original rack.

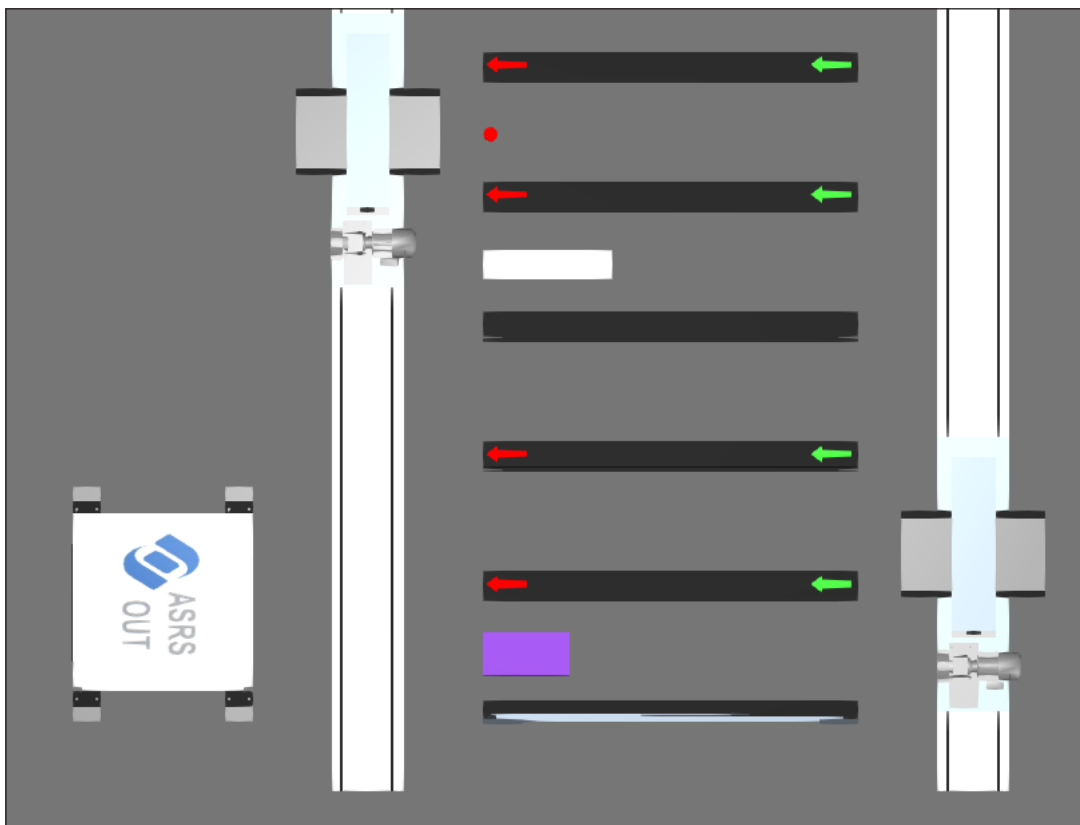


4. Set the ZoneID of the copied rack to **111,333** so it can receive two types of products.
5. Remotely connect the copied rack to the **FlowThrough Racks - side A** interface of the controller, which supports multiple connections.



TIP! When wiring a connection, you can select the rack to only display its connections.

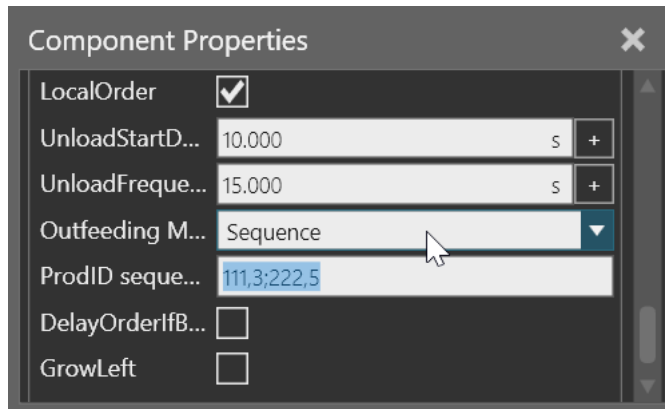
6. Run the simulation, verify products are filtered and stored in different racks, and then reset the simulation.



Define Order Sequence

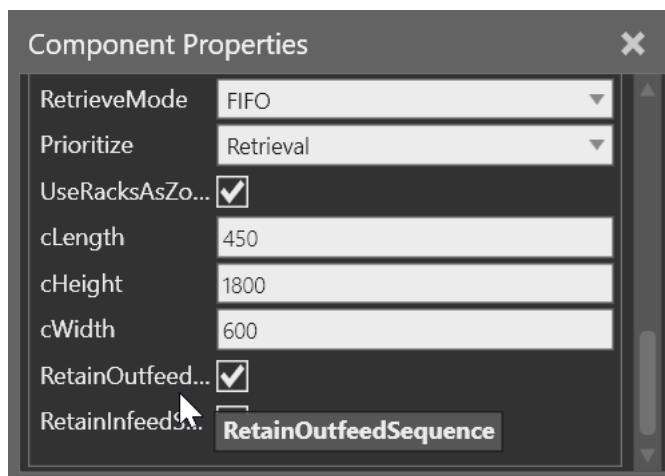
An outfeeder has different modes for pulling products. One mode allows products to be requested in sequential order.

1. In the 3D world, select the **Outfeeder**.
2. In the Component Properties panel, set Outfeeding Mode to **Sequence**.



The ProdID sequence property allows you to define the pull sequence. The format for a request is **<product id>,<amount>** with a semicolon separating each request.

3. Run the simulation, verify the sequence for pulling products is loosely followed because the requested products might not be readily available, and then reset the simulation.
4. In the 3D world, select the **Controller**.
5. In the Component Properties panel, select the **RetainOutfeedSequence** check box to strictly enforce the sequence in the connected outfeeder.

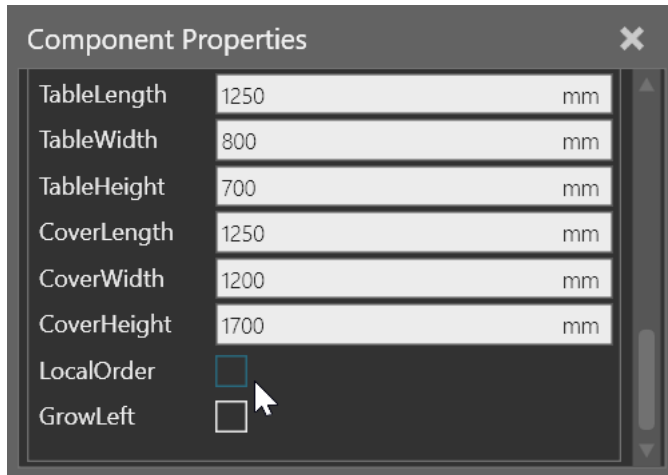


6. Run the simulation, verify the sequence for pulling products is strictly followed, and then reset the simulation.

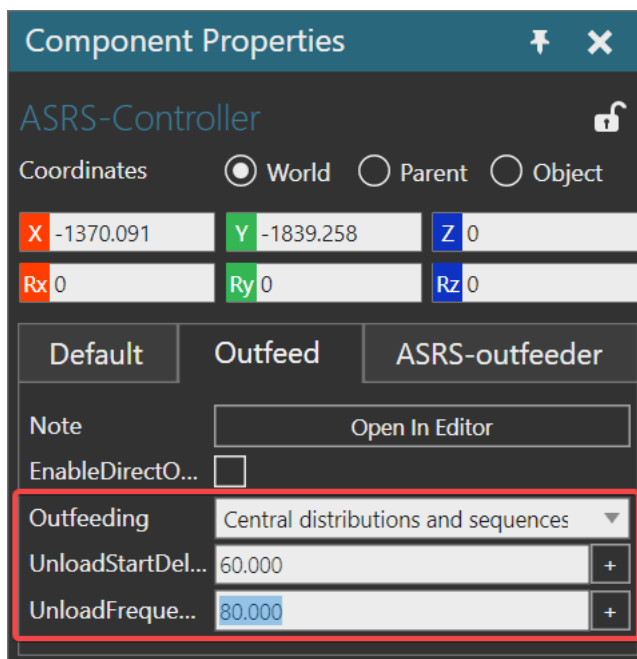
Define Order Distribution

A controller can manage and execute orders using an outfeed mode of **Central distributions and sequences**. Instead of using sequences, a distribution allows you to define the percentage of products needed in an order.

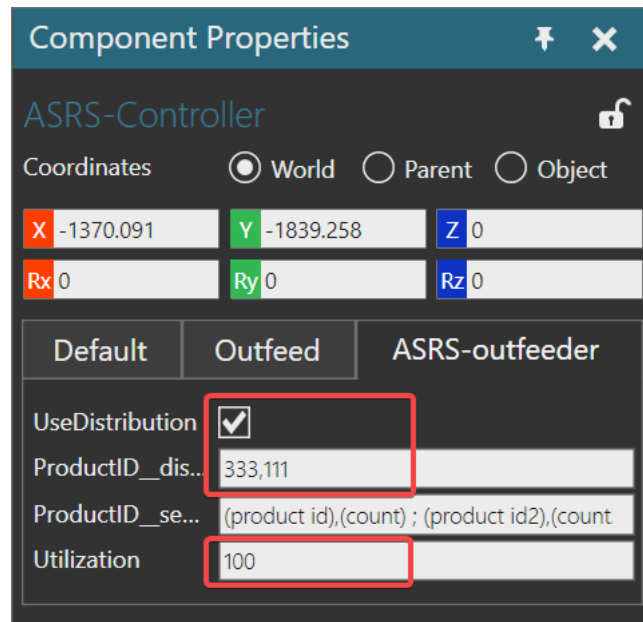
1. Select the **Outfeeder**, and then disable its **LocalOrder** property.



2. Select the **Controller**, and then in the Component Properties panel, click the **Outfeed** tab.
3. Now, set Outfeeding to **Central distributions and sequences** to display properties for when to start orders and how often they are created during a simulation, and then set UnloadStartDelay to **60** and UnloadFrequency to **80**.



4. In the Component Properties panel, click the **ASRS - outfeeder** tab, and then do all of the following:
 - Set ProductID_distribution to **333,100**.
 - Select the **UseDistribution** check box.
 - Set Utilization to **100**.

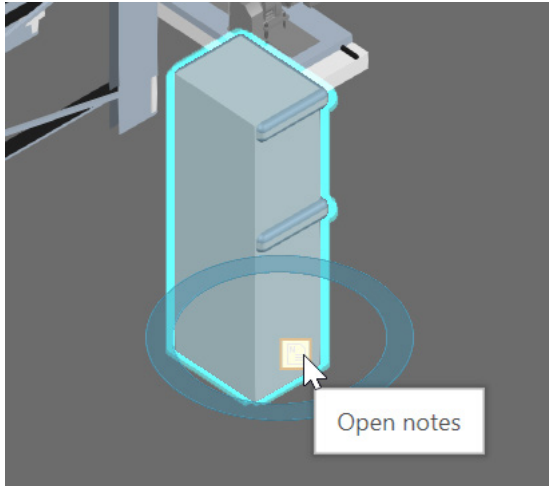


5. Run the simulation, verify only one type of product is pulled from storage, and then reset the simulation.

Define Order Book

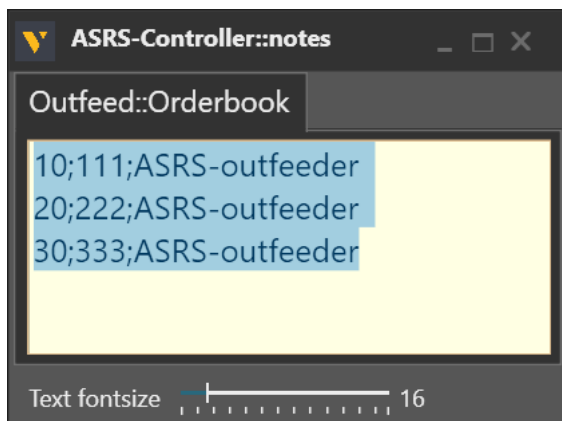
An order can come from a CSV file or a Note behavior in a component.

1. In the 3D world, click the **Note** of the selected controller to open its notes.



2. In the Notes editor, modify the **Orderbook** note to have the following content:

```
10;111;ASRS-outfeeder  
20;222;ASRS-outfeeder  
30;333;ASRS-outfeeder
```



The format is **<time>;<product id>;<outfeeder name>** with each line its own order.

3. In the Component Properties panel, click the **Outfeed** tab, and then set Outfeeding to **Orderbook**.
4. Run the simulation, verify products are pulled according to the Orderbook of the controller, and then reset the simulation.

NOTE! The RetainOutfeedSequence property is still enabled in the controller, which is why the sequence in the Orderbook note is strictly followed during a simulation.