VISUAL COMPONENTS

Introduction to Layout Configuration

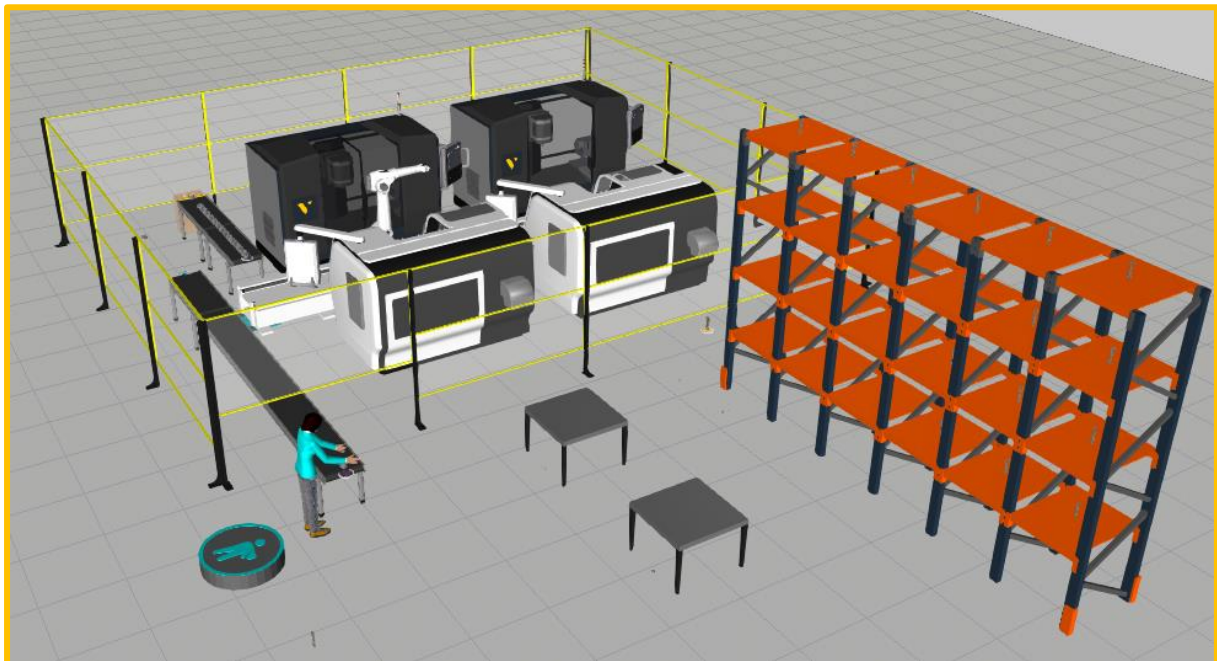Visual Components Product Family 4.3

OVERVIEW

In this tutorial, you will learn about the Visual Components user interface, features, and basic tasks. The primary outcome is to allow users to quickly develop key skills and competencies for using the program.

You'll create a layout as shown below that simulates a machine tending process and an assembly process involving a human.

Furthermore, you can access the Visual Components Academy to learn more about specific features and purposes that fit their simulation needs.

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1. GETTING STARTED

Once Visual Components is installed, open the application.

1.1 HELP DOCUMENT

To learn more about the Visual Components user interface select the **Help** tab, where links to Help and Reference Documents, Online Support Material, and Social Media can be found. Pressing F1 opens the application's Help Document as well.
The Search tool finds tutorials and discussions on the Visual Components academy and Forum sites.
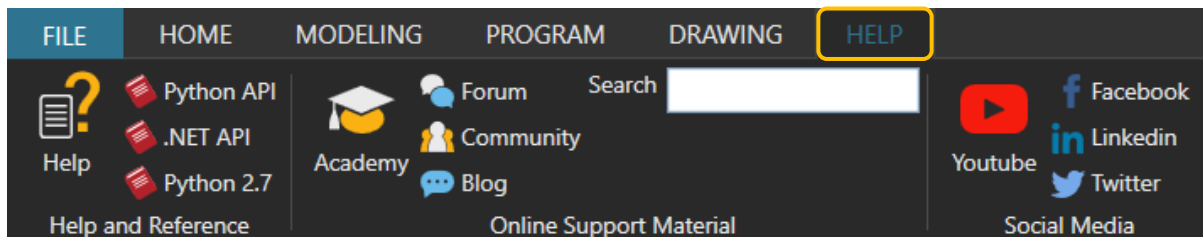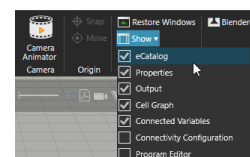

1.2 CREATE A BASIC LAYOUT

In this section, you will learn to create a basic layout. Some of the contents will be explained in more details later on.

By default, the **eCatalog** panel is visible in the **Home** context on the left-hand side. There is an **Item Display** area on the lower-left corner of the panel, which filters objects that are shown in the **eCatalog**.
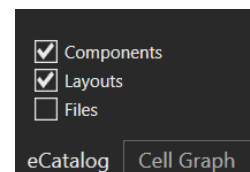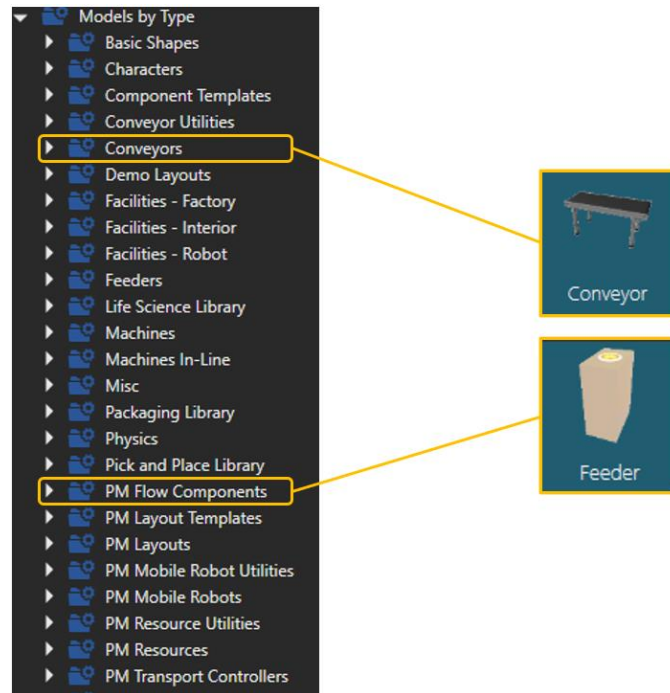

If the **eCatalog** or one of the other panels is not visible, it is possible to enable them through the **Windows** context.

1. Make sure you are in the **Home** context. In eCatalog panel, open up the smart collection **Models by Type.** Then select **PM Flow Components** by Visual Components.

2. Drag and drop the **Feeder** into the 3D world. (You can also double-click the items. When double-clicking a component, it is connected automatically to the selected component in the 3D view, if possible. Otherwise, the component appears in the world origin.)

3. Select the **Conveyors** by Visual Components.

4. Drag and drop the **Conveyor** into the 3D world.

5. Use the **PnP** tool to move the component on the floor level. Move the conveyor closer to the feeder until a green line appears showing that a connection is possible. The line also shows the distance and direction, where the connections happen. Move it even closer, until the conveyor snaps to the predefined position. Release the mouse button and note that the yellow arrow changes to a green arrow, which indicates that the connection is active.

Support
support@visualcomponents.com
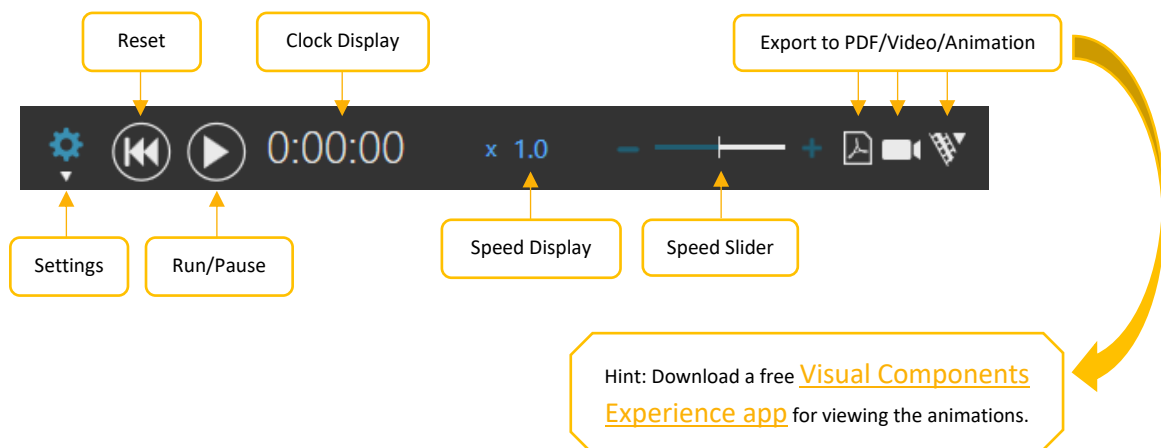
Community
community.visualcomponents.net
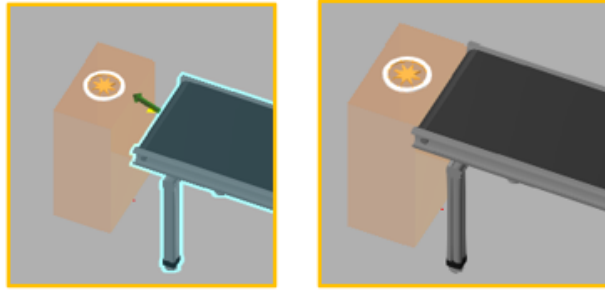
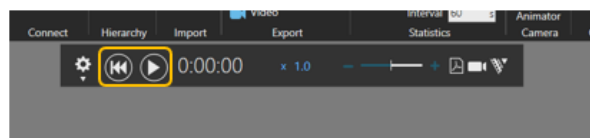**Note:** The components shown in the 3D world are listed in the **Cell Graph** panel.
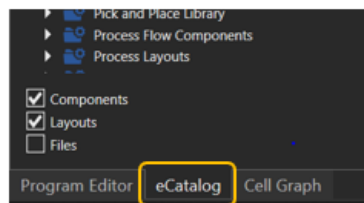
1.3 RUNNING A SIMULATION

The layout can be tested by running the simulation using the controls in the top center of the application.

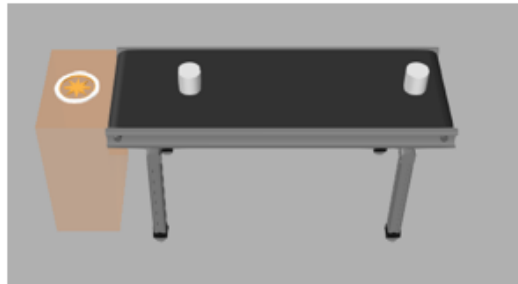Hint: Download a free Visual Components Experience app for viewing the animations.

1.   Run the simulation.
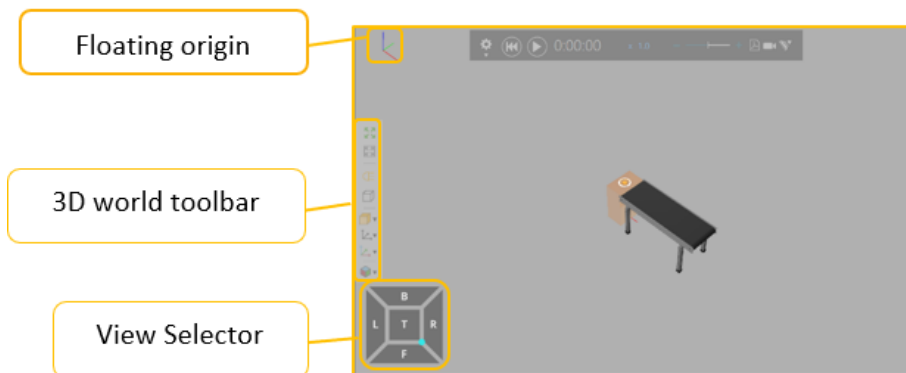
Don't forget to reset the simulation by clicking the reset button next to the play button!

2.   Check the final result:

3.   View:

The **floating origin** in the top left corner of the 3D world indicates the XYZ orientation of the current view. Red, Green and Blue (RGB) vector lines represent X-, Y- and Z-axes, respectively.

The origin of the 3D world is indicated by a **static origin** positioned on the XY plane. The static origin is not shown by default, but it can be enabled in the settings:

**FILE > Options > Display > World Origin Frame**

1.4 NAVIGATING THE 3D WORLD

Select **Standard views** using the **View Selector** in the lower-left corner. The top view can be rotated by 90 degrees by clicking multiple times. The bottom view can be accessed by double-clicking the "T".

The **3D world toolbar** on the left of the viewport allows you to affect the visuals of the viewport. Use the first group to fill the view to all the components   or the selected component.

To interact with the 3D world's camera to change the view of the 3D world, use the mouse to activate **Orbit** (Right Mouse Button click, later RMB), **Pan** (RMB + Left Mouse Button, later LMB), **Zoom** (Scroll+wheel Up/Down or Shift + RMB + drag mouse up/down) and **Set Center** (Ctrl + RMB on geometry or MB on geometry Center in 3D View) options with the mouse.
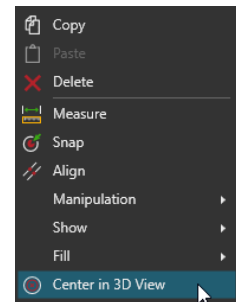
Press **F11** to toggle full-screen mode on and off.

To change the default settings of the floor and the grid select **FILE > Options > Display**. From the display menu it is possible, for example, to disable the floor and grid visibility, show or hide the world origin frame, among other settings.

1.5 LAYOUTS

A layout is a file that contains information related to changes made in the 3D world. This includes, but is not limited to, components that have been added to the 3D world and their parameter values, for example, an object's location. A layout is always displayed in the 3D world.

To save a layout click the **File** tab, and then on the Navigation pane, click **Save As**. Then select **Browse** to define the location and the name for the output file. The default location is *"…\Documents\Visual*

Components\4.3\My Models" folder for saving both, components, and layouts. All files under that folder and its subfolders appear on the **My Models** collection in the **eCatalog**.

Let's now save the layout that we created before as "**Example Layout**" to My Models.

Select My Models in the Collections pane. The Item Display area is updated to show the layout created in the previous section.

It is possible to clear a layout by pressing CTRL+N or through the toolbar by selecting **File > Clear All.**
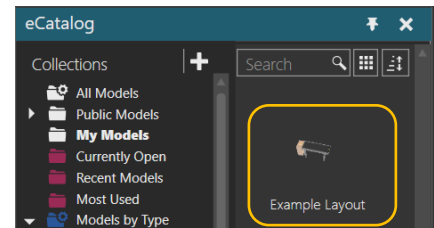
2. BASIC TASKS

Now you know how to set up a layout in the 3D world by adding, moving, and connecting components. Now a less basic layout will be created to learn new techniques and review those contents. The final result is a layout that demonstrates a robot doing machine tending and a human doing an assembly process. Conveyors will be used to transfer parts between stations.

2.1 DELETE AND CLONE COMPONENTS

Components can be copied and pasted in the 3D world using the Copy/Paste commands in the **Clipboard** group of the Ribbon tab, or in the **Context menu** (RMB click on top of viewport). The keyboard shortcuts **CTRL + C** and **CTRL + V** can also be used.

Selecting a component (LMB) in viewport opens the **QuickMenu** with clone and delete icons. **Cloning** the selected component does all the three actions at once; it copies, pastes, and connects the new component to the original one.
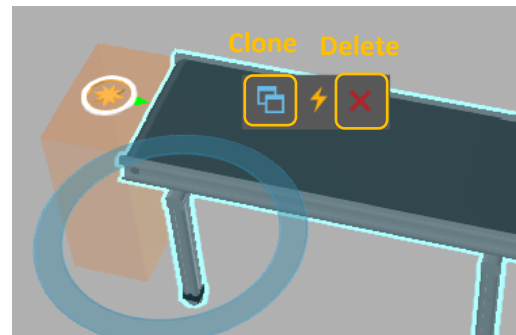
Let's continue the previous exercise with some new tasks!

1. Clone the Conveyor using the Clone tool from the Quick menu.
2. Hold down the CTRL key and select the two conveyors.
3. Copy and paste the selected components using one of the methods taught (e.g. Ctrl + C, Ctrl + V). There are now two conveyor lines in the 3D world and notice how the pasted components did not have to be reconnected.

Note: If you have problems finding a component from the eCat, use the Search tool located on the top of the eCat item display.
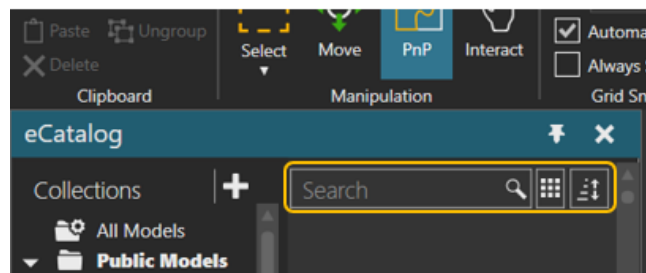
2.2 CREATE COMPONENTS

The **Feeder** can create any component in the 3D world if it is attached to it.
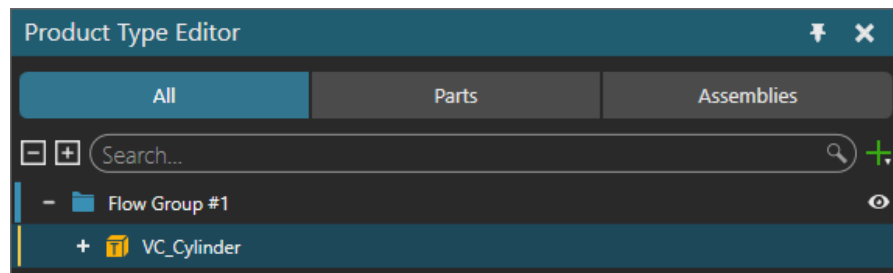
1. Expand the Models by Type collection and select type **Products and Containers**.
2. Drag and drop the **Piston Head** and place it somewhere on the 3D world.
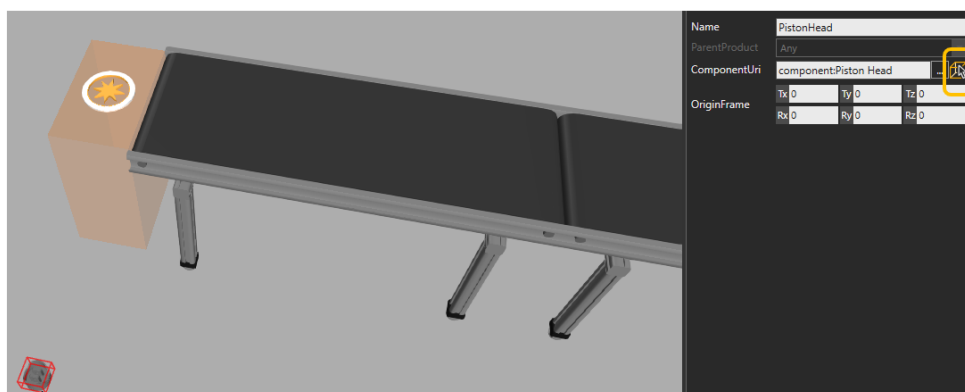3. Go to the **Process** tab and click on **Products**.
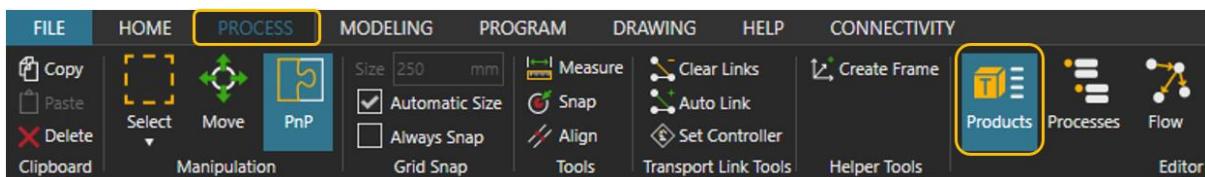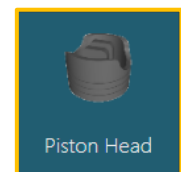
4.   Select VC_Cylinder in the **Product Type Editor** and on the **Properties** tab change the name to PistonHead.

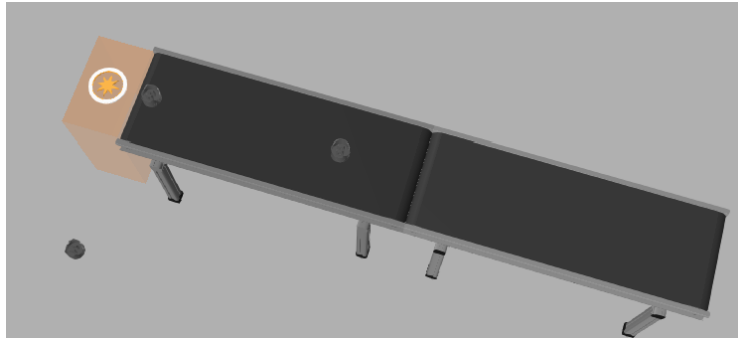5.   Click on the yellow cube on the right and select the Piston Head component.

Run the simulation and check that the feeder is creating PistonHeads.

2.3 PROCESS MODELING

Process modeling allows you to quickly build and simulate machine tending applications using different resources and machines. This feature streamlines the layout planning.

Next, let's create a machine tending cell. Let's start by getting the components we need from the eCatalog.
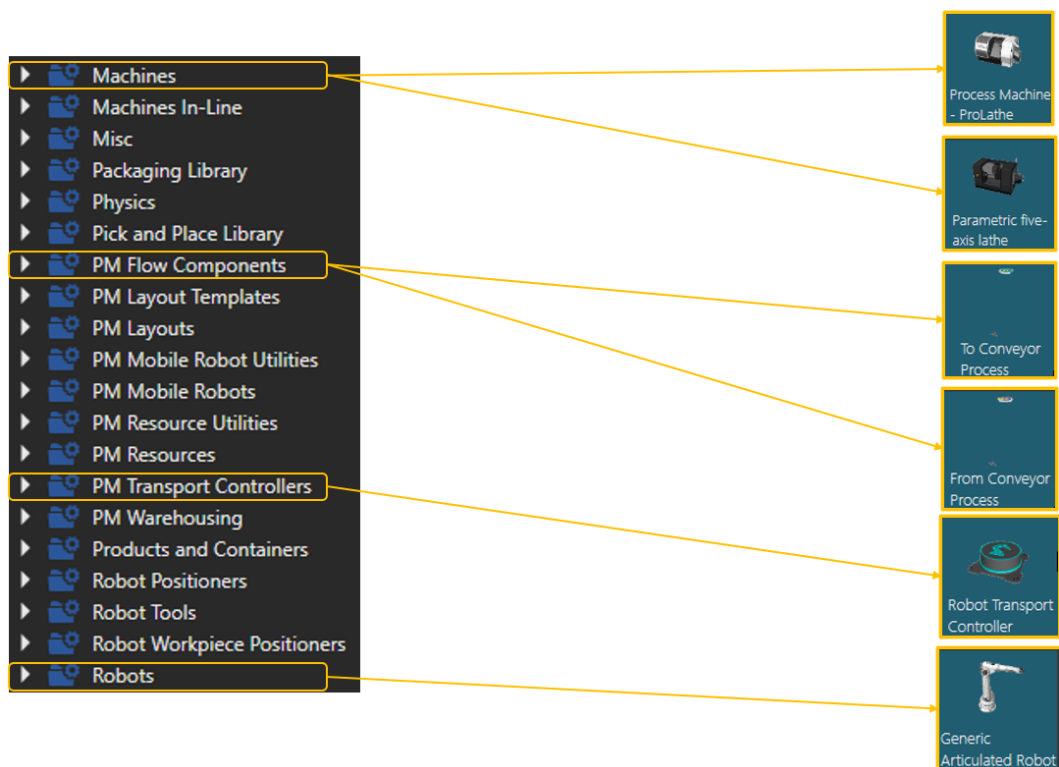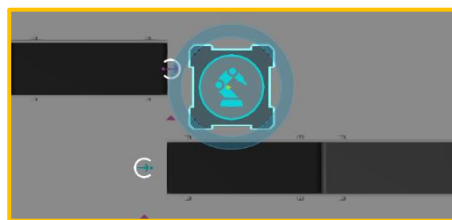
1. Expand the Models by Type collection and select type **PM Flow Components**.
2. Drag and drop the **From Conveyor Process** into the 3D world and connect it to the end of the right conveyor. In this case, the **From Conveyor Process** acts as an input or location for picking up products.
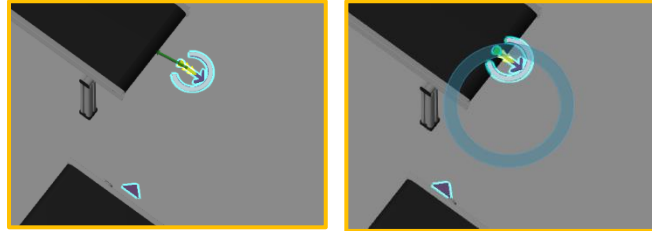
3. Drag and drop the **To Conveyor Process** into the 3D world. In this case, the **To Conveyor Process** acts as an output or location for placing products.
4. Connect the **To Conveyor Process** to the beginning of the right conveyor.
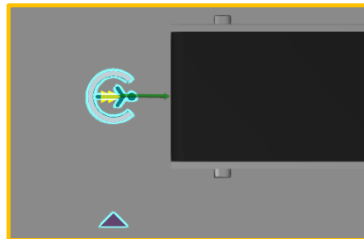
5. From the collection **PM Transport Controller** drag and drop the **Robot Transport Controller** into the 3D world, place it close to the **From Conveyor Process**. A **Robot Transport Controller** manages a robot that is used as a resource for picking and placing components in a machine tending process.


6. Expand the **Models by Type** collection and select type **Robot positioners** from Visual Components.
7. Drag and drop the **Robot Floor Track** and snap it to the **Robot Transport Controller**.

8.   Select both **Robot Floor Track** and **Robot Transport Controller** and turn them 90 degrees as shown in the image below.
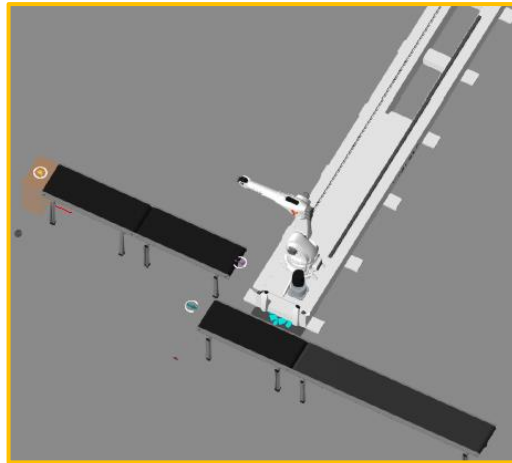
Note: Rotation can be done through the Component Properties panel, using the blue circle from the PnP selection or with the Move tool. The Component Properties panel is compatible with the other options. Here some examples:
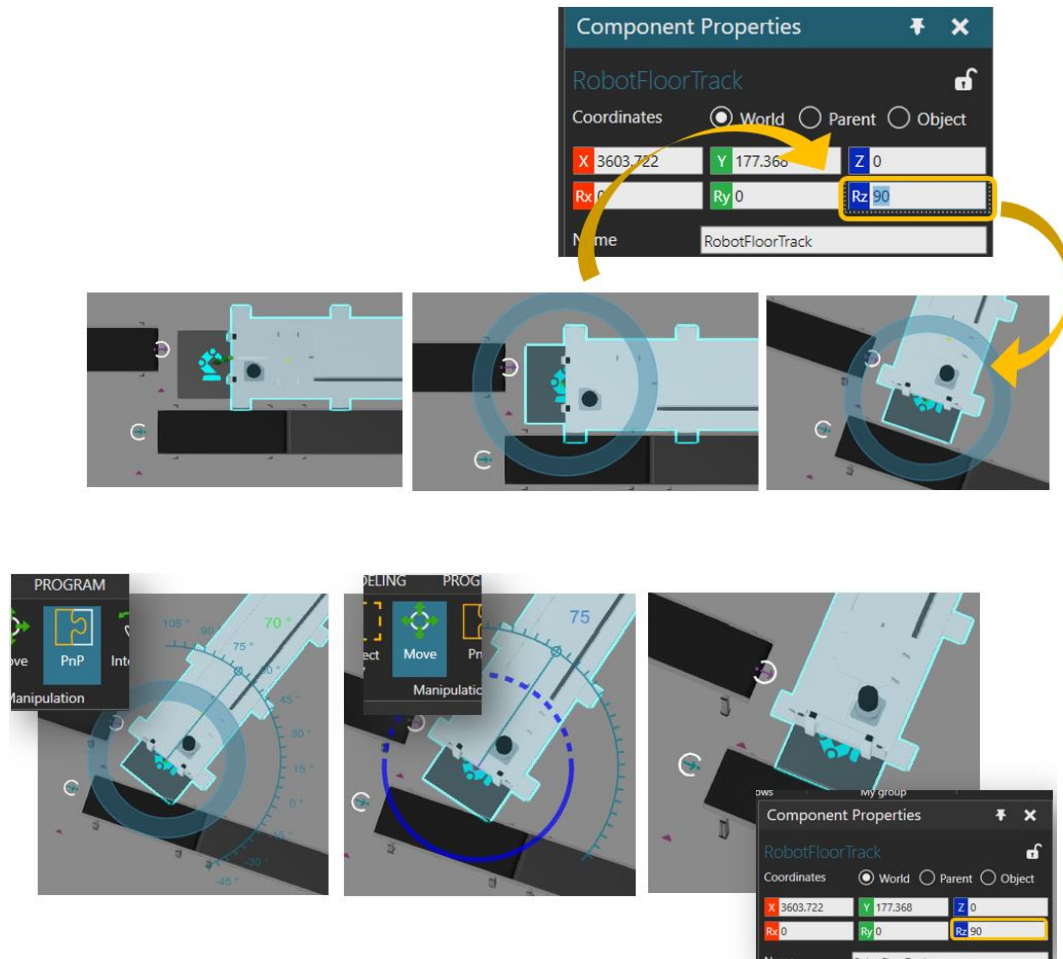

9.   Select **Robots** from Visual Components on the eCat and Drag and Drop the **Generic Articulated Robot**.
10. Snap it to the Robot Floor Track.

11. Select **Machines** in the eCat, drag and drop two **Parametric five-axis lathe** and two **Process Machine-ProLathe** from **Visual Component**, and place them as it is shown on the image below. Notice that the doors have to be located facing the robot.
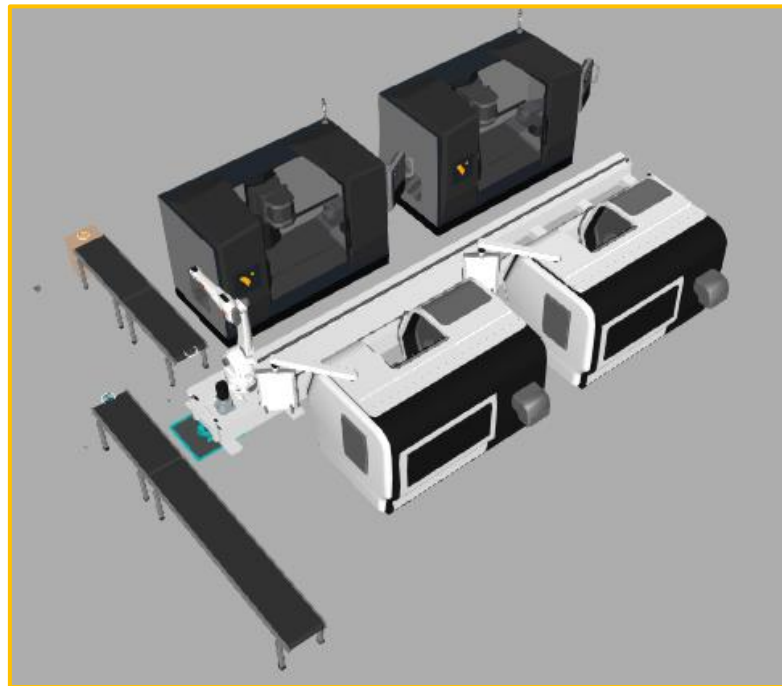
Note: It is possible to remove or change the position of the chip removal for the Parametric five-axis lathe from the Properties panel.
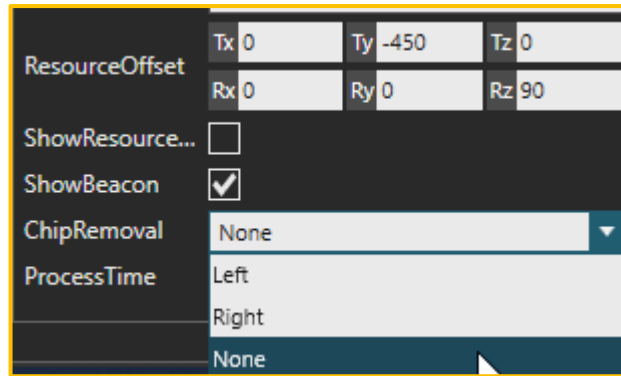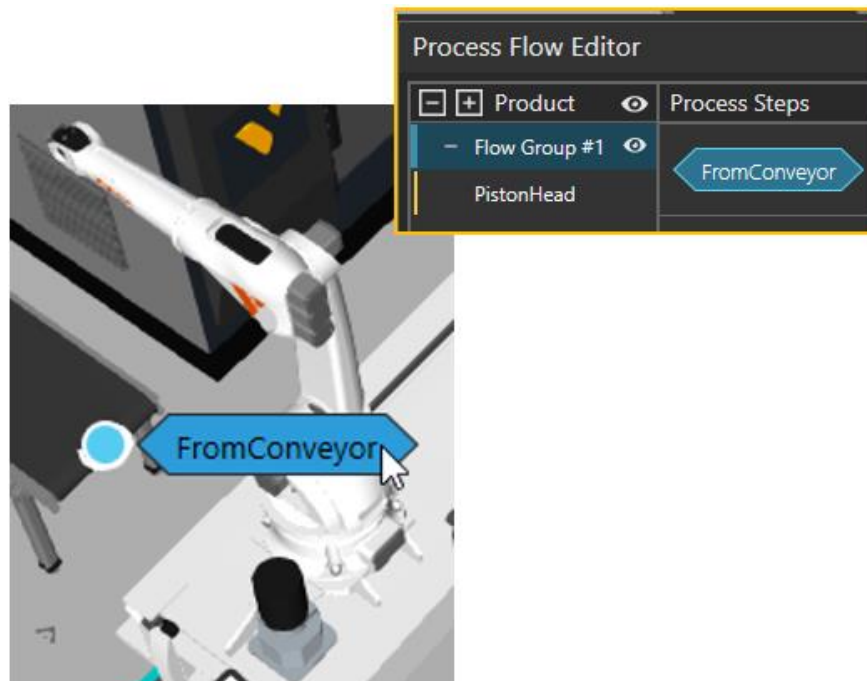
1. Go to the **Process** tab and click on **Flow.**

    Now we are going to create the flow for the components.

2. Select the **FromConveyor** component and click on the label so the flow would get actualized.
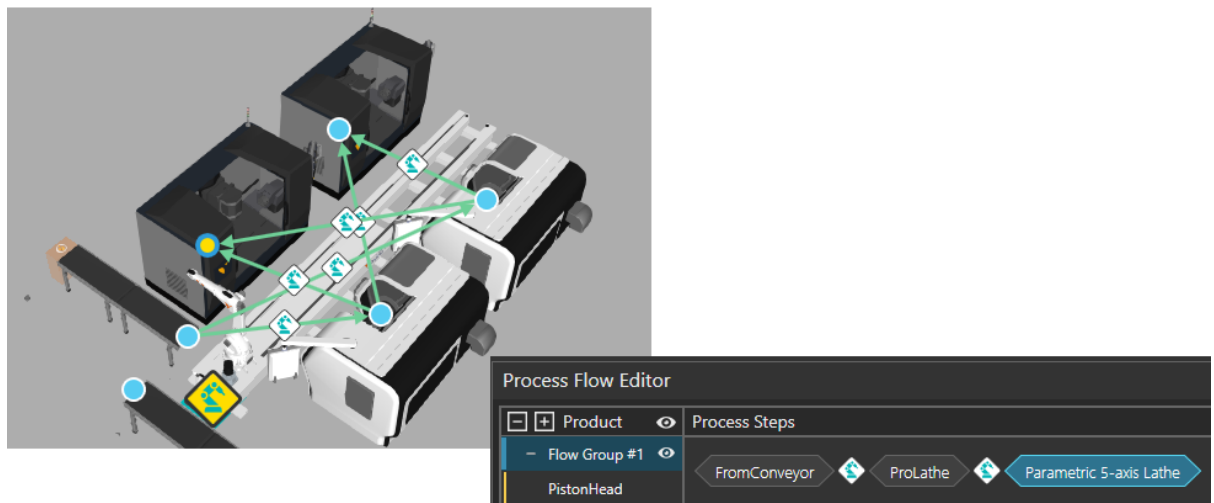

3. Select the **Robot Controller** and click on the **ProLathe** label, automatically, the flow from both machines would be created.
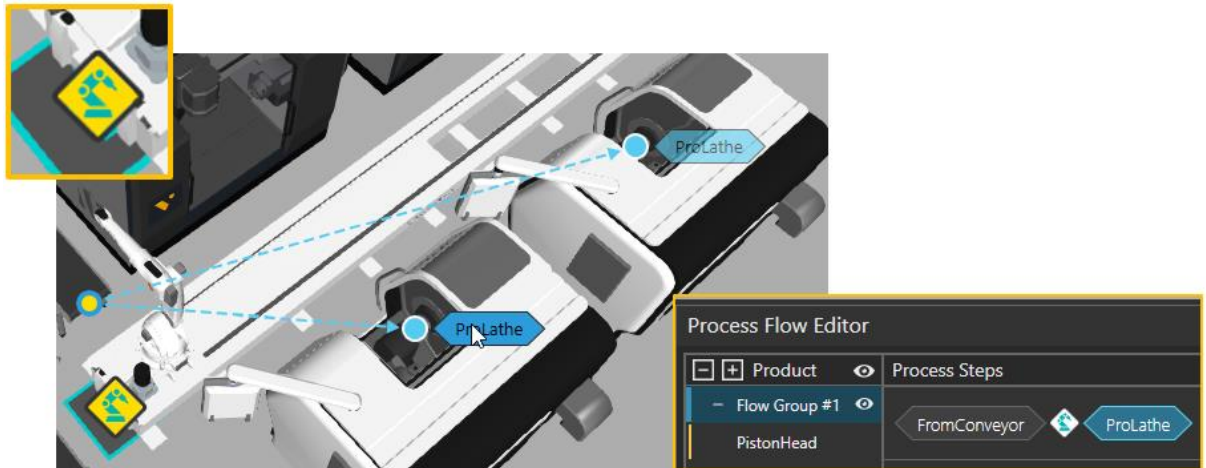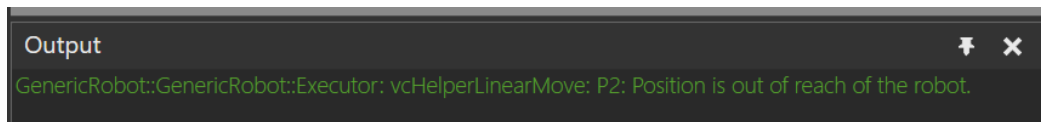
4. With the **Robot Controller**, selected click on the **Parametric 5-axis Lathe** machine label and again the flow would get actualized.


5. Click on the **ToConveyor** label to complete the flow.

Process Flow Editor

Product	Process Steps
Flow Group #1	FromConveyor → ProLathe → Parametric 5-axis Lathe → ToConveyor
PistonHead	
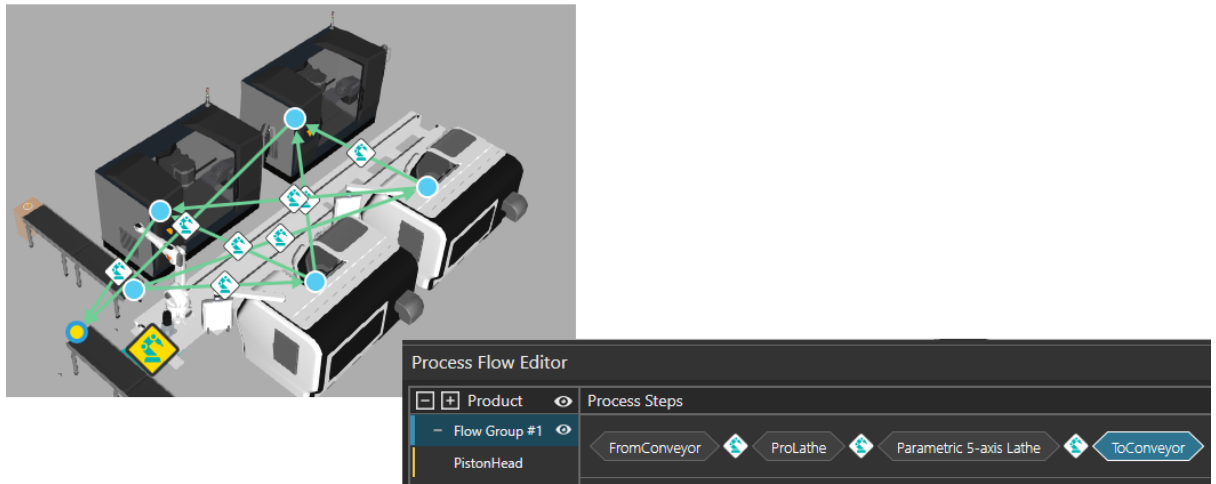
1. Run the simulation!

   → Do you get this message below in your output panel? Let's fix it!

Output

GenericRobot::GenericRobot::Executor: vcHelperLinearMove: P2: Position is out of reach of the robot.

2. If you got this message, your robot is too far from the machines and you should drag them closer to it. One way to ensure that the robot can reach a point is using the **Envelope** tool. Select the Generic Robot and in the Component Properties panel, WorkSpace tab, click on **Envelope**, a grey globe appears covering the zones that the robot can reach. Use the Interact tool from the manipulation tab to move the robot along the floor track for checking that is also reaching the machines. Disable the envelope after this step.
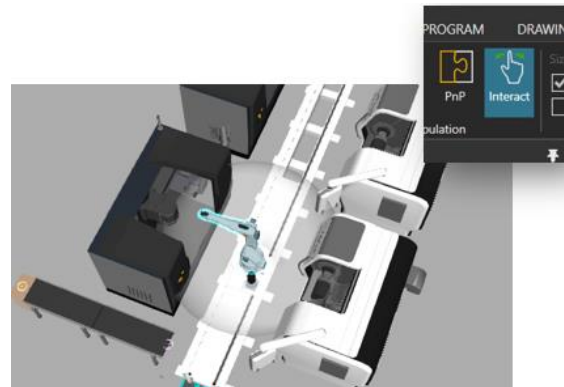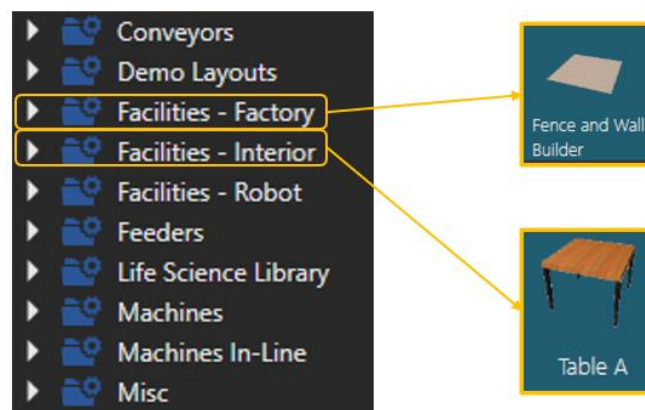
Note: Don't forget to reset the simulation to return the components to the initial position.

2.4 INTERIOR FACILITIES

Visual Components eCat provides Interior Facilities and Factory Facilities libraries. These components are static components used for enriching the simulation environment with tables, fences, walls, and such.
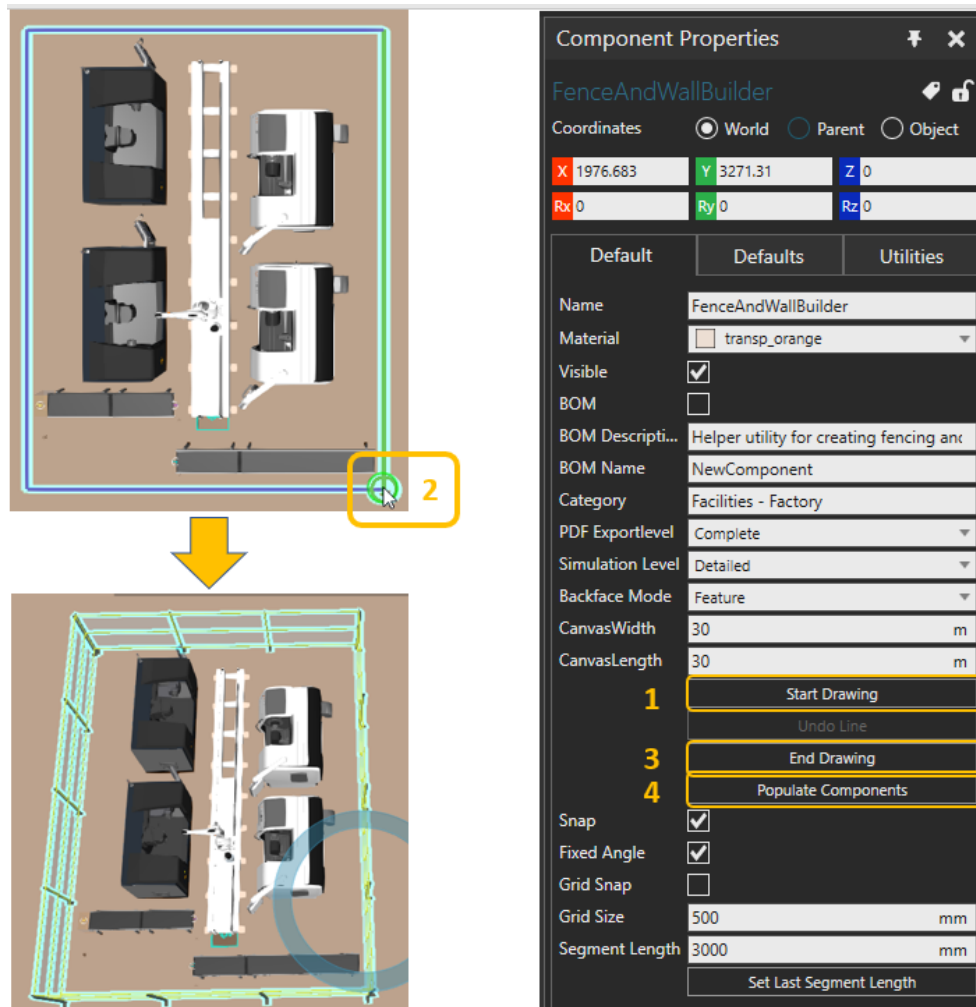
Let's use some of those components!

1.   Expand the **Models by Type** collection and select type **Facilities-Factory**.

2.   Drag and drop the **FenceAndWallBuilder** into the 3D world.

3.   Click on **Start Drawing** and make a closed contour for the fences. During the drawing, if you want to undo a line, you can press **Undo Line**. Once the drawing is finished, press **End Drawing** and then press **Populate Components** to generate the fences. The image below explains the process.

Note: Once the fences are generated, you can delete the **FenceAndWallBuilder** component from the 3D world first by selecting it using LMB and then **Delete** (This does not delete the fences):
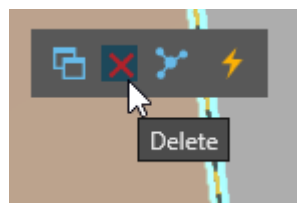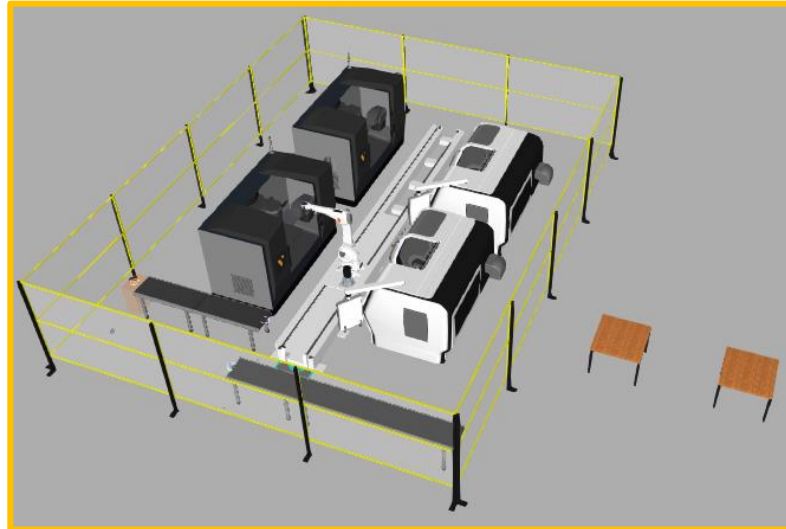
Now let's add the facilities needed for the next part:

4. Expand the Models by Type collection and select type **Facilities-Interior**.
5. Drag and drop **Table A** into the 3D world and place it roughly as shown in the image below.
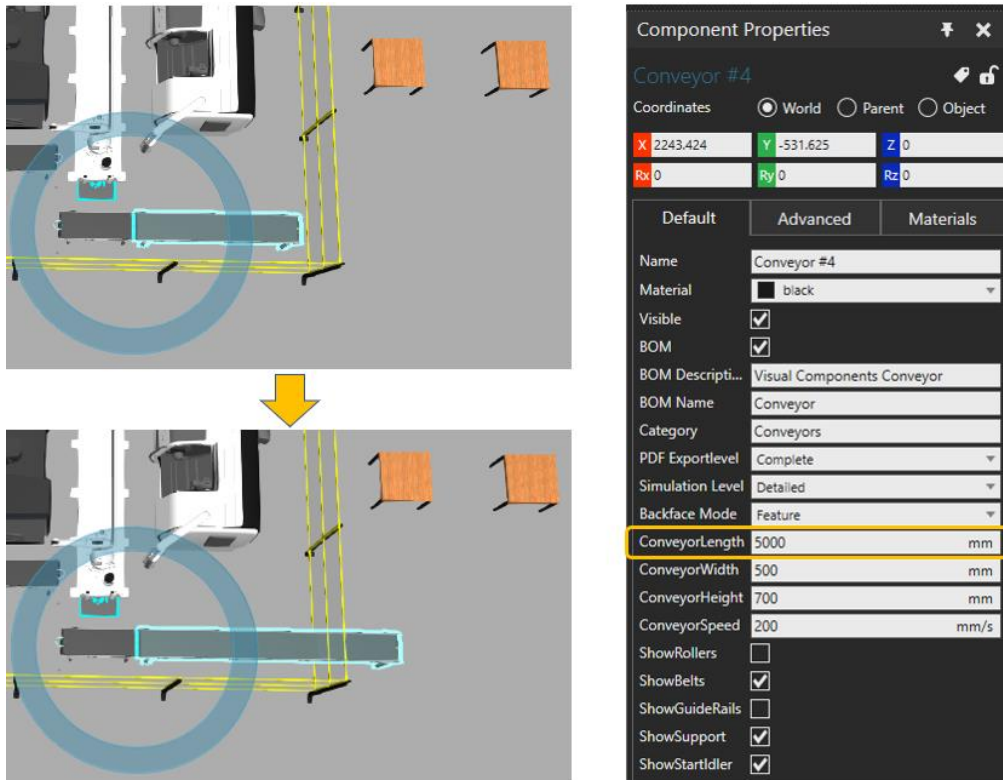

2.5 MODIFY PROPERTIES

A component's property can be edited in the Component Properties tab. The design of a component determines what parameters are available and the functionality of certain parameters.
Now let's do some changes!

1. Select the last conveyor in the line and change its length so that it reaches through the fence.

2.   Select the panel that the Conveyor crosses and change its StandHeight to 1000.
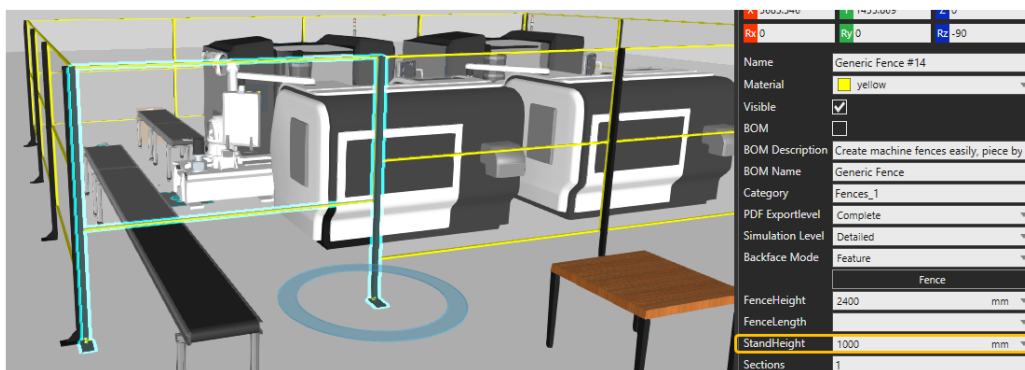
Maybe wooden tables are not the best option for an industrial environment. Let's change the material.

3.   Select both tables and on the Component properties panel set the Material property to *Metal*.
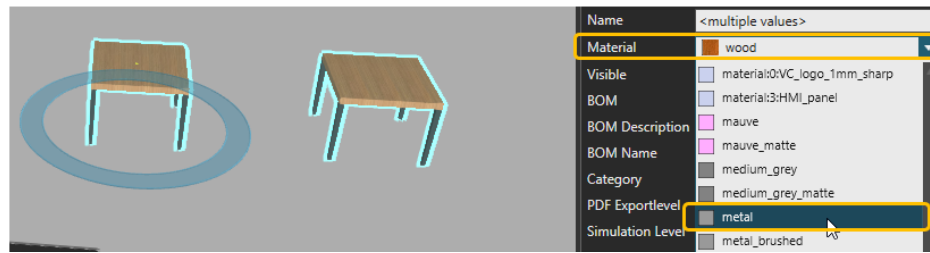
4. Let's change the height of the tables to 700
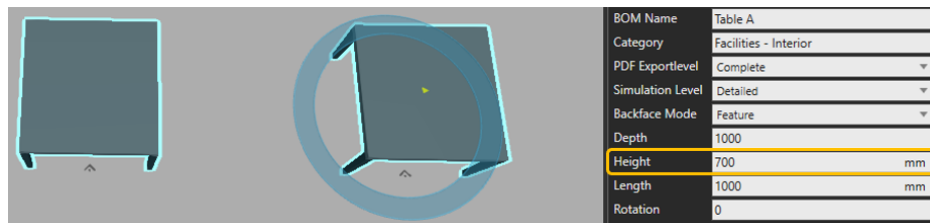
2.6 CREATE STATEMENTS

A **Process Modeling** statement is used for creating and executing specific tasks.

Now we'll create a manual assembly cell using the Process Modelling components. Let's get the components from the eCatalog.

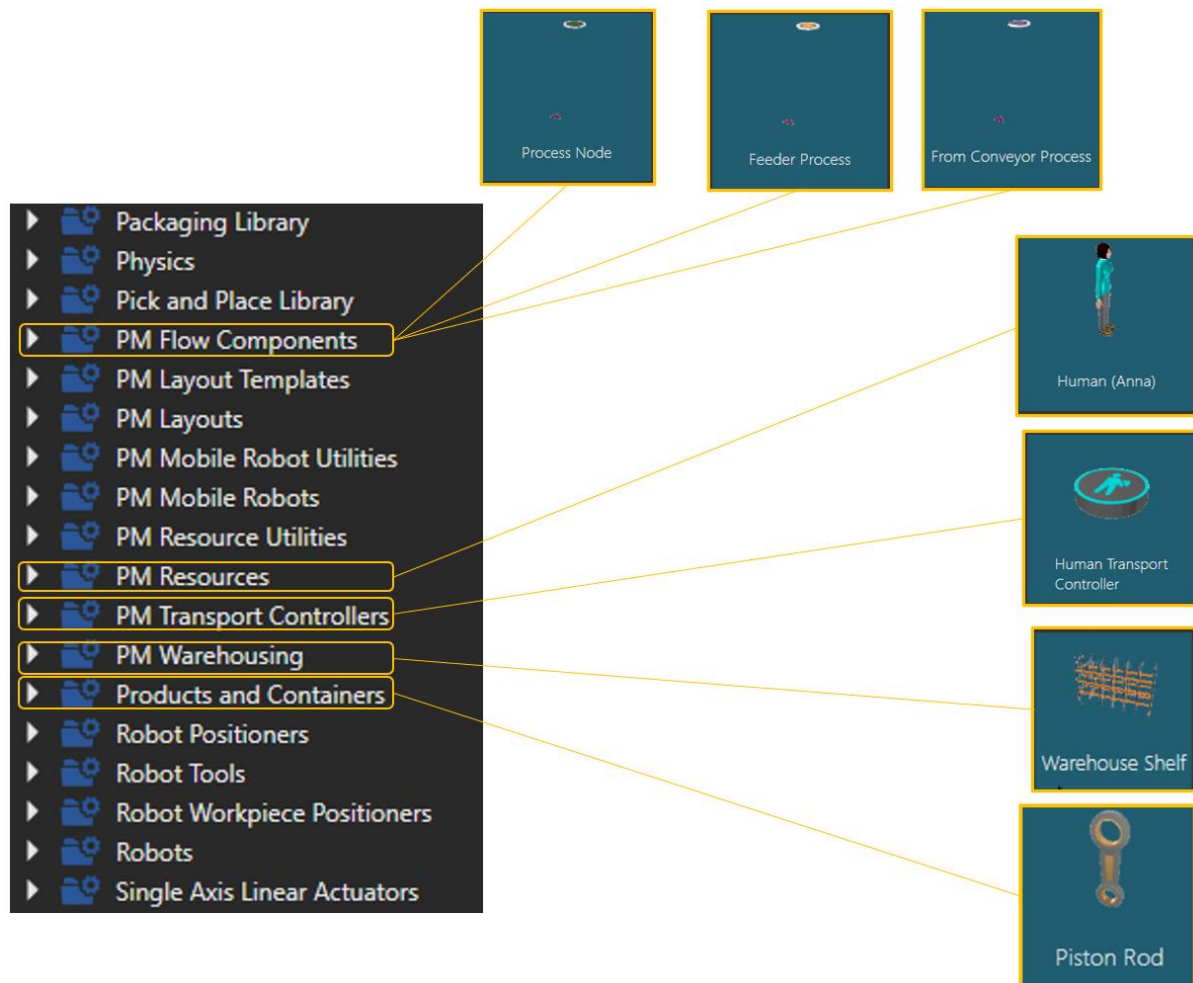1. Expand the Models by Type collection and select type **PM Transport Controller.**
2. Drag and drop the **Human Transport Controller** into the 3D world. The location of the controller in the scene is irrelevant.
3. Expand the **Models by Type** collection and select type **PM Resources**.
4. Drag and drop the **Human** into the 3D world.
5. Expand the **Models by Type** collection and select type **Products and Containers.**
6. Drag and drop the **Piston Rod** into the 3D world.
7. Expand the **Models by Type** collection and select type **PM Warehousing.**
8. Drag and drop the **Warehouse Shelf** into the 3D world.
   Note: You can show the Shelf and the TopShelf of the **Warehouse Shelf** from the Options in the Component Properties panel:
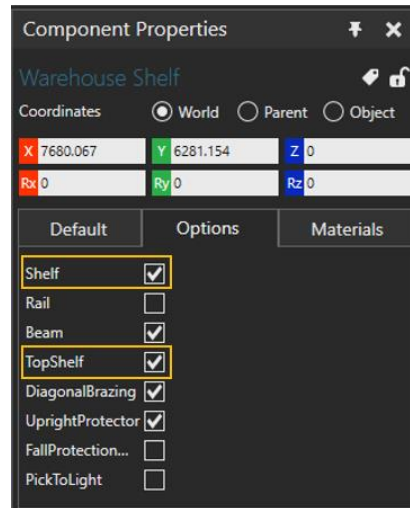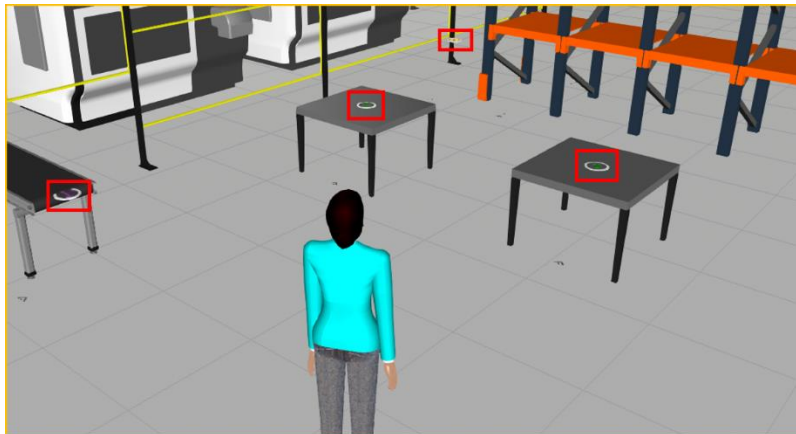
Notice that these components don't have to be located in a specific position or connected to another component. The **Piston Rod** is a template for the objects that will be created later.

9.   Open the **PM Flow Components** file.
10.   Drag and drop a **From Conveyor Component** a **Feeder Process** and two **Process Nodes.**

As you can see from the picture, the **Feeder Process** is in a random place close to the **Shelf Buffer,** the **Process Nodes** are located on top of the tables and the **From Conveyor Process** is located at the end of the Conveyor.

Now, let's connect the interfaces! Components in the 3D world can be remotely connected.

1.   Go to the Home tab, select the **Human Transport Controller,** and click on Interfaces from the Connect Tab. This displays an action pane along with connection editors in the 3D world for wiring connections.

2.   Connect the **Human Transport Controller** with the **Human.**

When the is an available connection the component would show in yellow, when the connection is done, the component would show in green.
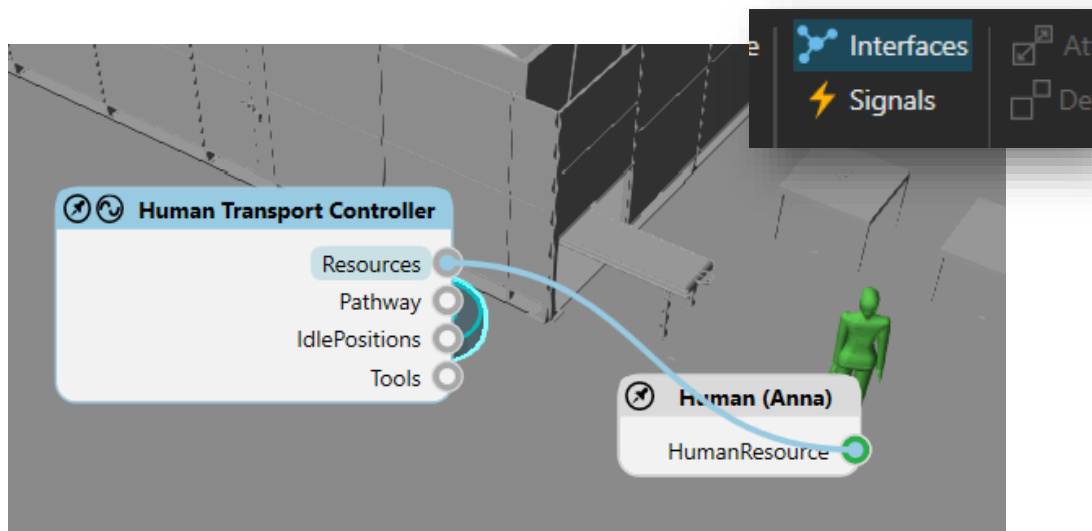
Now let's change some settings before creating the flow:

1.   Go to the Process tab click on **Products -> Flow group #2 -> VC_Can**, now change the name from VC_Can to PistonRod, and select it following the steps from before.

2.   Click on Processes select FromConveyor and change the name to ToAssembly.

3.   Select the Process Nodes and change the names from Process #1 to Assembly and FinalAssembly.
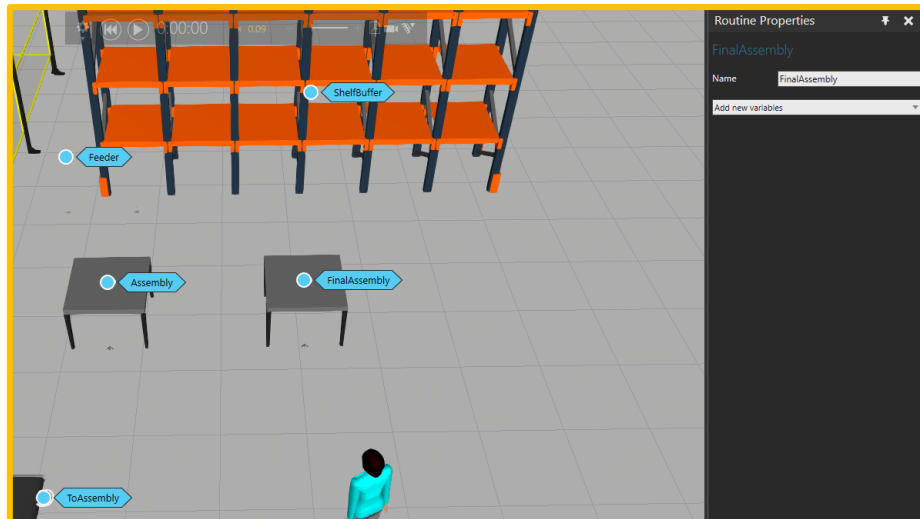
Now let's create the flow.

The human is supposed to pick the part from the conveyor, place it in the **Process Node**, assemble it with the piece from the buffer and place it to the other Process Node.

1.   Click on **Flow** and select Flow Group #1 in the **Process Flow Editor**, connect ToConveyor to ToAssembly.

If you forget to click on the label, you can select the next process from the flow panel.
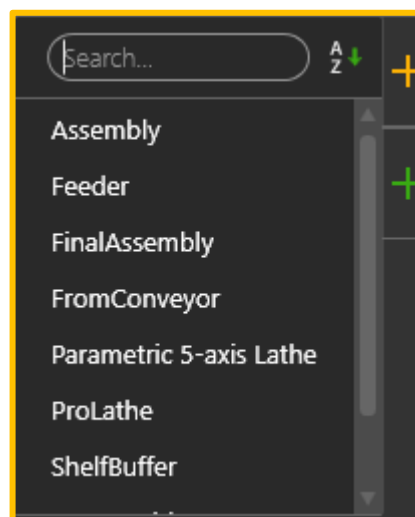
2.   Select the **Human Transport Controller** and connect ToAssembly to Assembly.

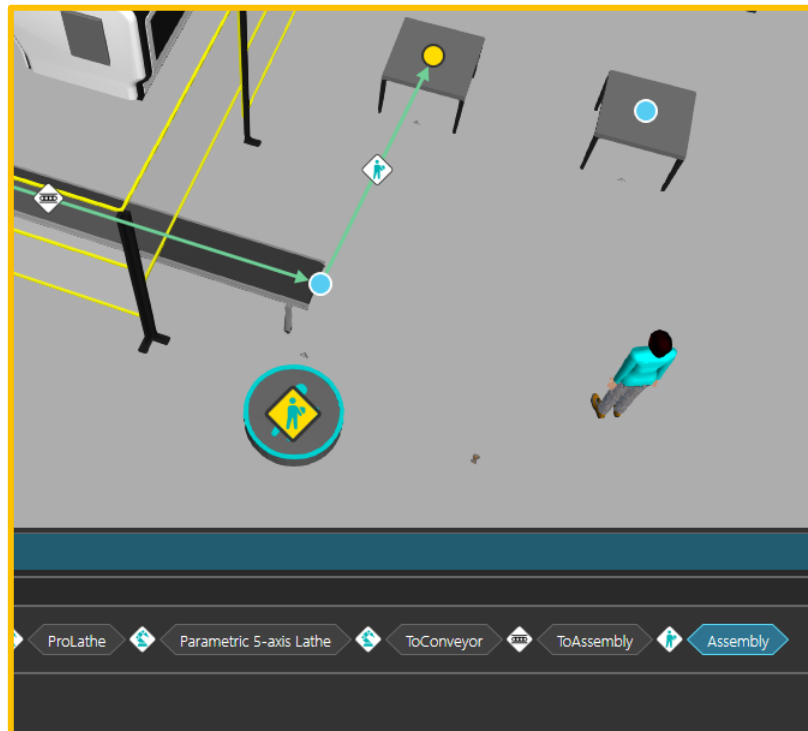3.   Select Flow Group #2 in the **Process Flow** Editor and connect the Feeder to the ShelfBuffer. Select the **Human Transport Controller** and Connect the Buffer to Assembly and then to Final Assembly.
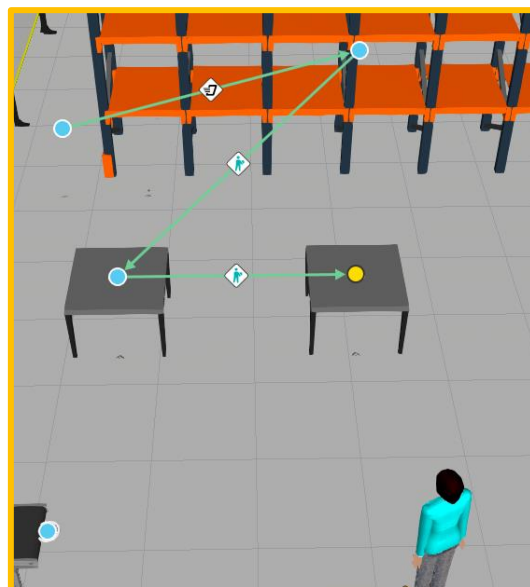
This should be the final flow result:
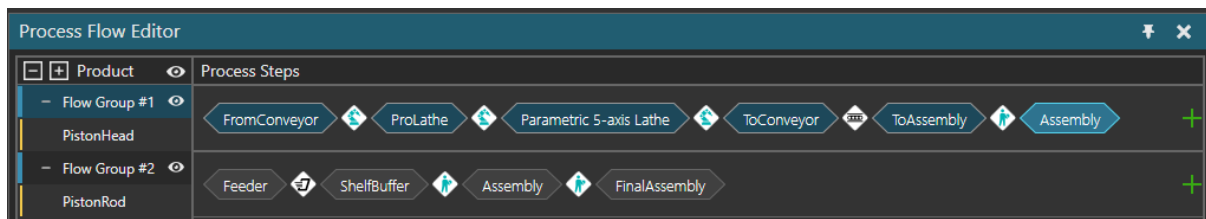
Now let's modify the statements from Assembly and FinalAssembly.
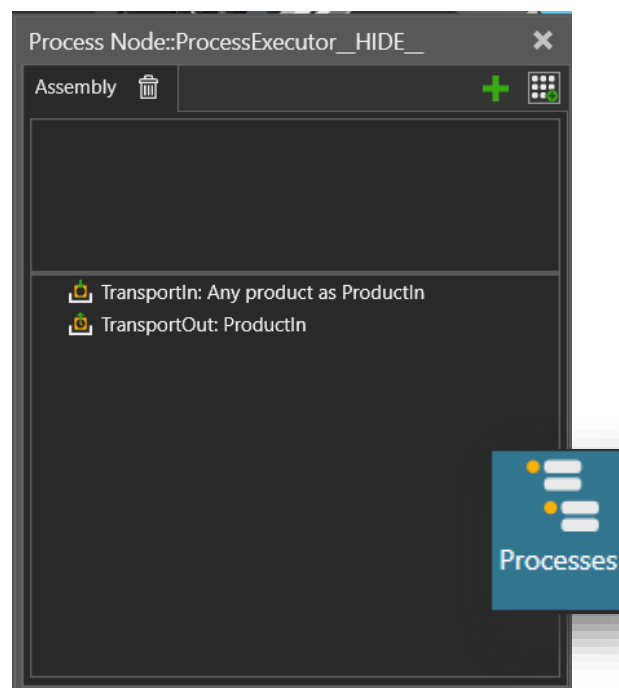
4.   Select **Processes** from the **Editor** tab and click on Assembly.

5.   Select the **TransportIn** statement and copy these **Statement Properties** to accept the flow from the Piston Head (Flow Group #1):
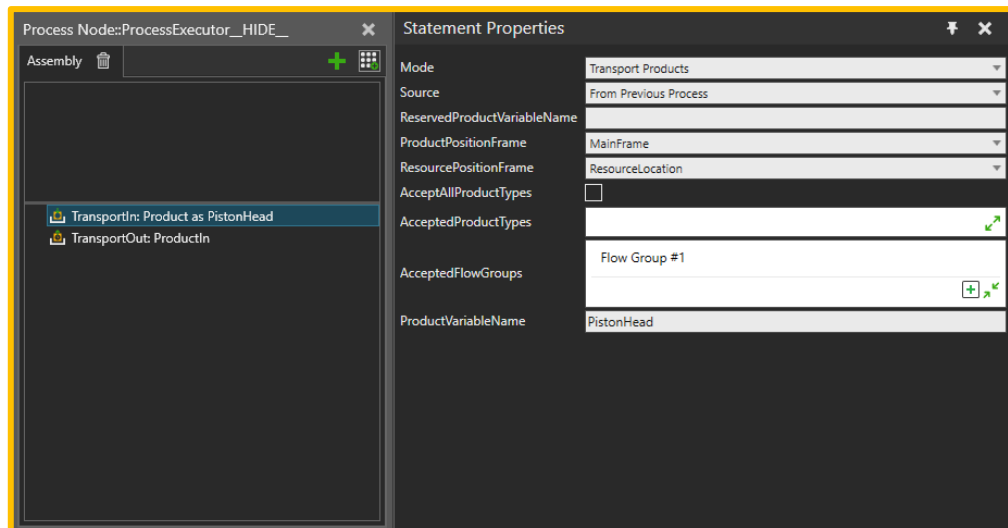
6.   Click on statements and add a **TransportIn** Statement and an **Attach** Statement so that both
      the Piston Head and the Piston Rod will be merged.
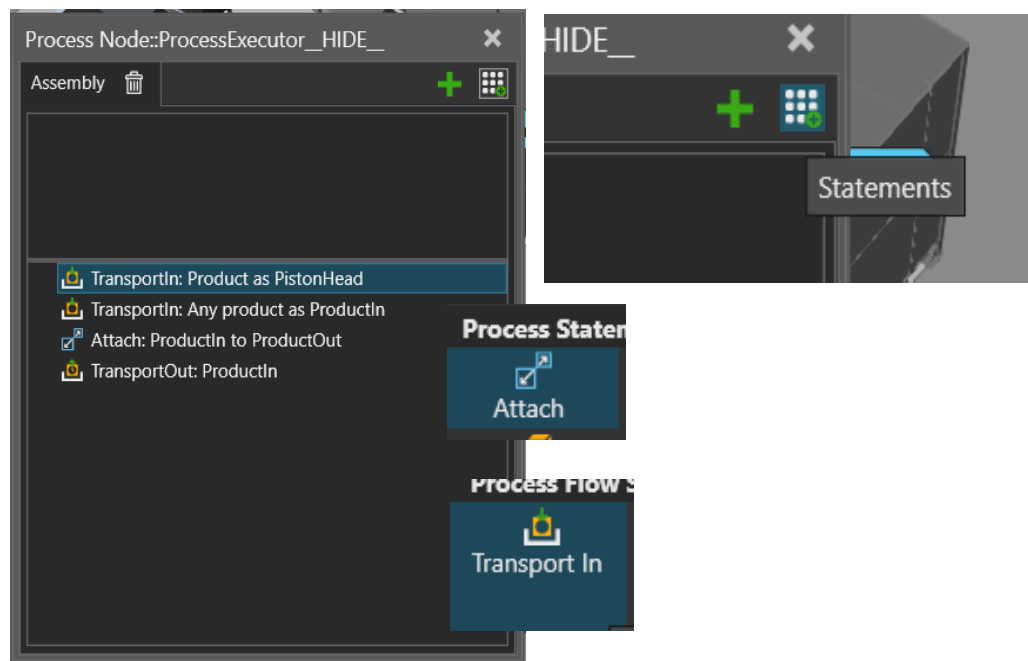
7.   Now let's modify the second **TransportIn** to accept the **PistonRod**.
8.   After that, attach both components and Transport them out to the FinalAseembly.

Process Node::ProcessExecutor__HIDE__   ✕

Assembly 🗑   ➕ ▦

- 🔼 TransportIn: Product as PistonHead
- 🔼 TransportIn: Product as PistonRod
- 🔲 Attach: ProductIn to ProductOut
- 🔼 TransportOut: ProductIn

Statement Properties   📌 ✕

Mode	Transport Products ▾
Source	From Previous Process ▾
ReservedProductVariableName	
ProductPositionFrame	Null ▾
ResourcePositionFrame	Null ▾
AcceptAllProductTypes	☐
AcceptedProductTypes	⤢
AcceptedFlowGroups	Flow Group #2
	➕ ⤡
ProductVariableName	PistonRod

Process Node::ProcessExecutor__HIDE__   ✕

Assembly 🗑   ➕ ▦

- 🔼 TransportIn: Product as PistonHead
- 🔼 TransportIn: Product as PistonRod
- 🔲 Attach: PistonHead to PistonRod
- 🔼 TransportOut: ProductIn

Statement Properties   📌 ✕

Parent	PistonRod
Child	PistonHead

Process Node::ProcessExecutor__HIDE__   ✕

Assembly 🗑   ➕ ▦

- 🔼 TransportIn: Product as PistonHead
- 🔼 TransportIn: Product as PistonRod
- 🔲 Attach: PistonHead to PistonRod
- 🔼 TransportOut: PistonRod

Statement Properties   📌 ✕

ProductVariableName	PistonRod
Mode	Transport Products ▾
Destination	To Next Process ▾
ResourcePositionFrame	ResourceLocation ▾

9. The process is almost finished! Select the FinalAssembly and change the **TransportIn** to accept the new assembly, it is called PistonRod in this case.
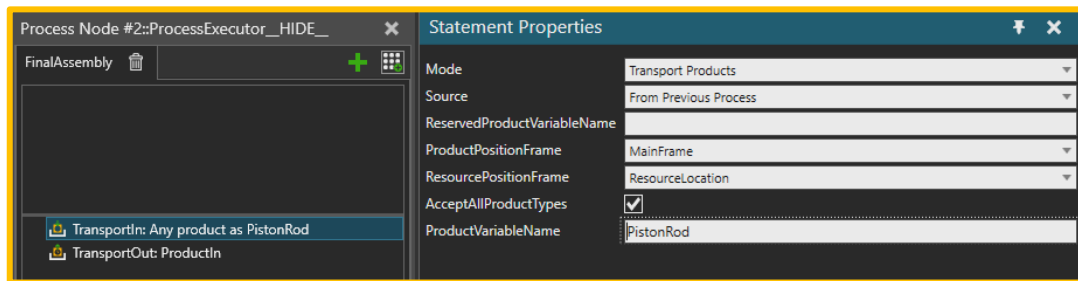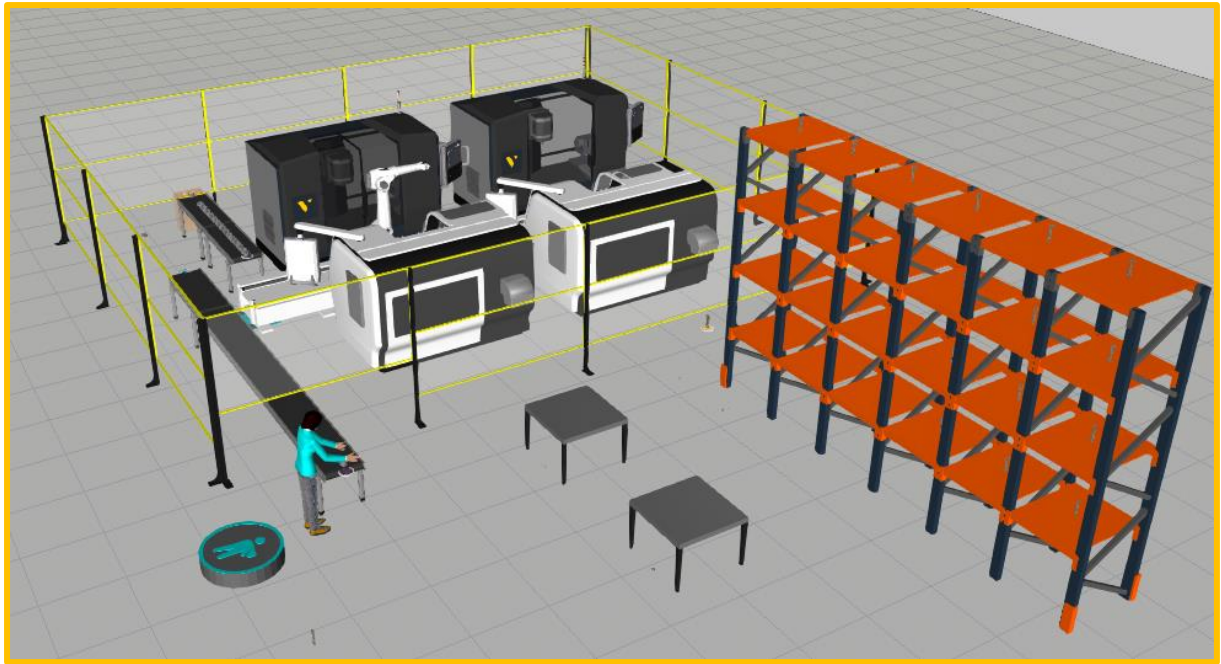

10. Delete the **TransportOut** and add a **Delay** and a **Remove**.
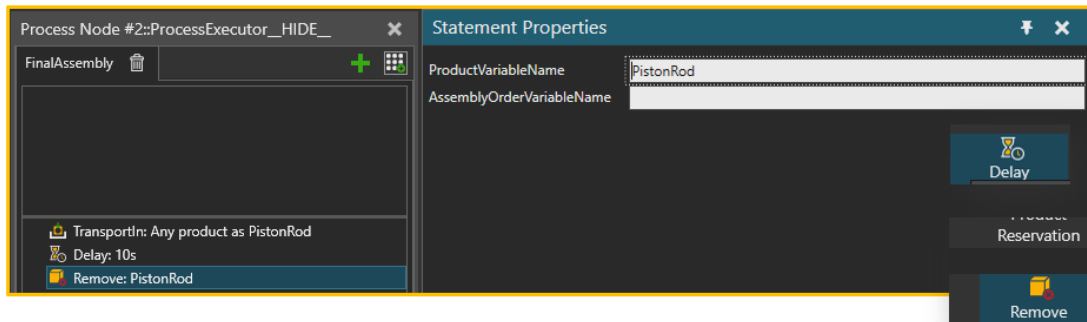
And this is the end! Run the layout and check that everything is working!

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2.7 CONCLUSION

This concludes the tutorial. Please visit Visual Components Academy to access more tutorials, videos, and webinars. Also, don't forget to check our Forum.

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