

# Introduction to Visual Components

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Session 1/6 Notes

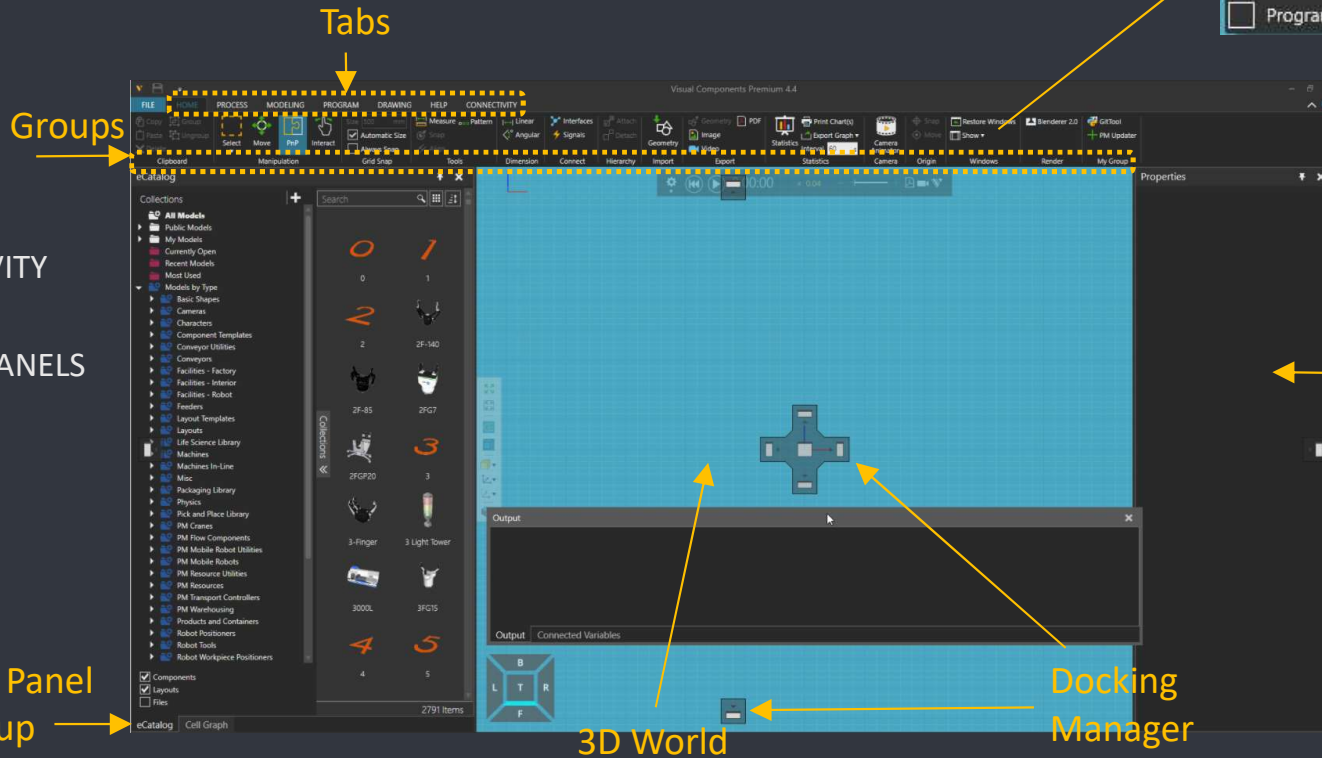
Optimai 02-03-2022



4.4

# UI OVERALL

- 1) VERSIONS
- 2) FILE
- 3) HOME
- 4) PROCESS
- 5) MODELING Groups
- 6) PROGRAM
- 7) DRAWING
- 8) CONNECTIVITY
- 9) HELP
- 10) DOCKING PANELS



Docked Panel Group

3D World

Docking Manager Handles

# VERSIONS

|  | ESSENTIALS | PROFESSIONAL | PREMIUM |
|--|------------|--------------|---------|
| LAYOUT CONFIGURATION                         | ■          | ■            | ■       |
| PROCESS MODELING                             | ■          | ■            | ■       |
| E-CATALOG                                    | ■          | ■            | ■       |
| CAD COMPATIBILITY                            | ■          | ■            | ■       |
| PROJECT READY DELIVERABLES                   | ■          | ■            | ■       |
| SIMPLE ROBOTICS                              | ■          | ■            | ■       |
| POINT CLOUD SUPPORT                          | ■          | ■            | ■       |
| 2D DRAWINGS                                  | ■          | ■            | ■       |
| PLC CONNECTIVITY                             | ■          | ■            | ■       |
| STATISTICS AND REPORTING                     | ■          | ■            | ■       |
| VC EXPERIENCE                                | ■          | ■            | ■       |
| COMPONENT MODELING                           |            | ■            | ■       |
| GEOMETRY SIMPLIFICATION                      |            | ■            | ■       |
| WIZARDS                                      |            | ■            | ■       |
| BASIC CAD                                    |            | ■            | ■       |
| GEOMETRICAL CAD DATA FOR ROBOT PATHS         |            |              | ■       |
| ROBOT PATH STATEMENT AND CURVE TEACHING TOOL |            |              | ■       |
| PAINT PROCESS VISUALIZATION                  |            |              | ■       |
| ROBOT CONNECTIVITY FOR FANUC, UR AND STÄUBLI |            |              | ■       |
| SIEMENS S7 PLC CONNECTIVITY                  |            |              | ■       |
| WINMOD AND SIMIT CONNECTIVITY                |            |              | ■       |
| ANIMATION STREAMING AND INTERACTIVE VR       |            |              | ■       |

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 VISUAL  
COMPONENTS

UI overall

# FILE



Clear All

Info

Open

Save

Save As

Print

Options

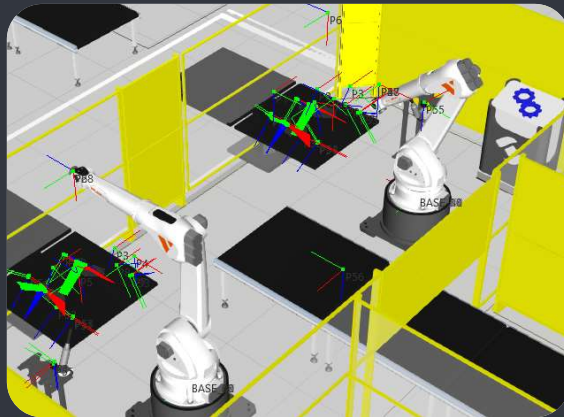
Exit

- Clear All, Open, Save
- Info of the current layout
- Print 3D View or 2D Drawing
- Options
  - Language
  - Theme
  - Background coloring
  - Floor
  - World Origin

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# FILE

- Set the floor color
- Display World origin frame
- Robot frame visibility
  - show all motion points in the layout simultaneously or only selected robot's points



## Options

General

Display

Add On

### Floor display options

- Background color
- Floor visibility
- Grid visibility
- Floor color
- Floor reflection
- Major grid line color
- Minor grid line color
- Auto Resize Floor
- Floor Size X:  Y:
- Grid Size X:  Y:
- World origin frame
- Frame label size
- Robot frame visibility

### Dimensions and Annotations

Display accuracy

### Decimal precision setting

Decimal accuracy

Show trailing zero

- 1) VERSIONS
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# HOME

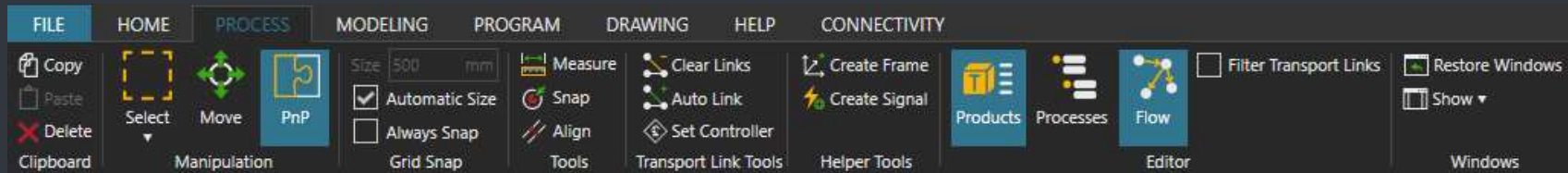


- Layout editing
- Component libraries - eCat
- Component interconnections (interfaces and signals)
- Statistics
- Exports: videos, animations, pdf, statistics etc.

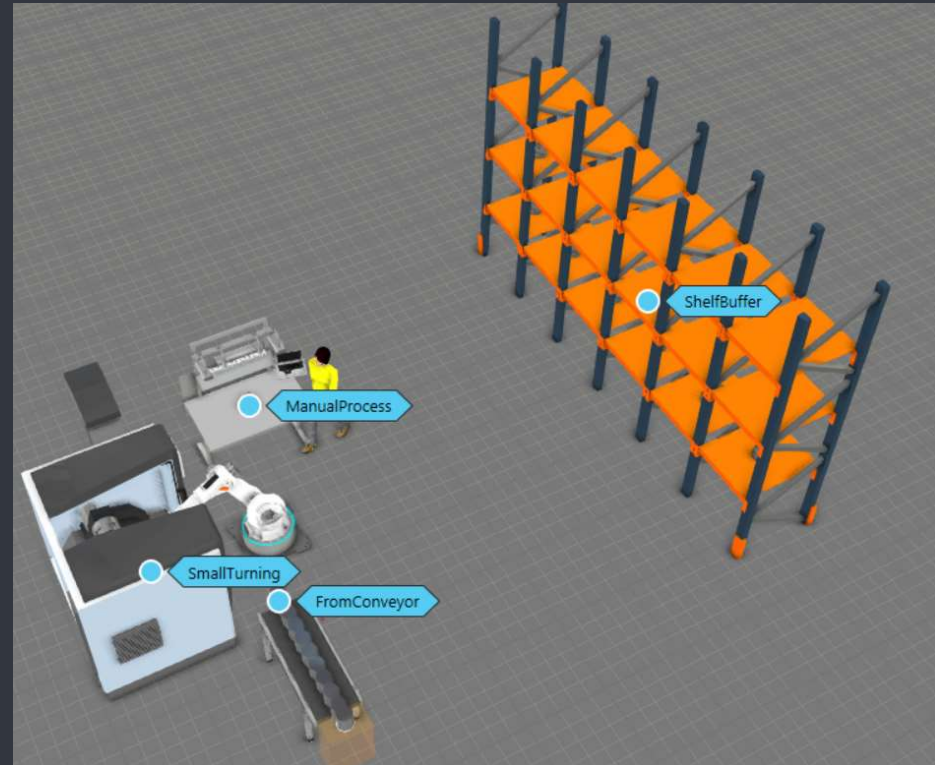
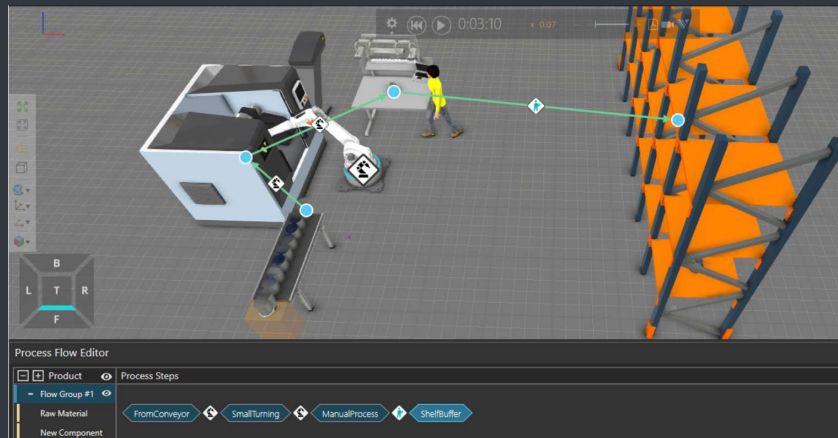
*A layout is always open in the 3D world*

- 1) VERSIONS
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# PROCESS



- Defining products for processes
- Creating processes
- Grouping processes in flow groups
- Have multiple flow groups
- Map the processes to form flows

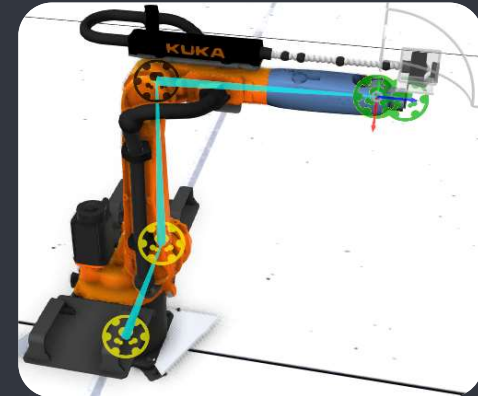


- 1) VERSIONS
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# MODELING

HOME PROCESS **MODELING** PROGRAM DRAWING HELP CONNECTIVITY

- Component modeling
  - Ability to **save as a separate file** for reusing in another layout and **adding to a catalog**
- Creating and/or editing component
  - **Features** (i.e. geometries)
  - **Properties**
  - **Behaviors** (i.e. logic, functionality, interfaces, statistics etc.)
  - **Materials**



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# PROGRAM

HOME

PROCESS

MODELING

PROGRAM

DRAWING

HELP

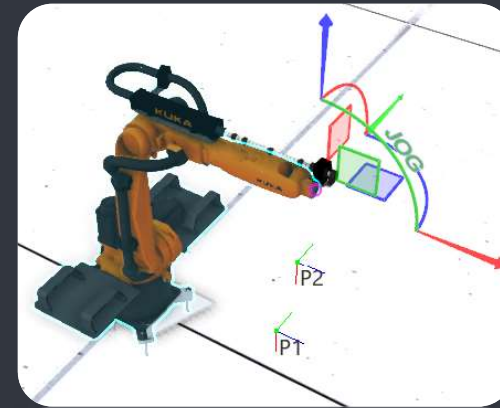
CONNECTIVITY

## ■ Robot programming

- Jogging (Teaching)
- Tool and base configurations
- Main and sub sequences/routines

## ■ Feasibility tools

- Reachability
- Collision detection
- Singularities



PREMIUM

+ Path Statement  
+ Paint Add-On



- 1) VERSIONS
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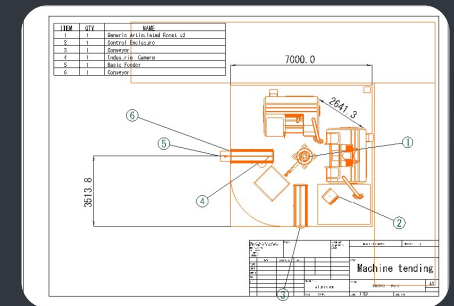
VISUAL  
COMPONENTS

UI overall

# DRAWING

HOME PROCESS MODELING PROGRAM **DRAWING** HELP CONNECTIVITY

- Creating **technical drawings** of the layout (3D World)
- Orthographic/perspective projections, dimensioning
- Exporting
- Sheet templates and Bill of Material



*Drawing is saved along with the layout*

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# CONNECTIVITY

HOME

PROCESS

MODELING

PROGRAM

DRAWING

HELP

CONNECTIVITY

- Mapping and synchronization of simulation variables/signals **with external controllers and data sources** e.g.
  - PLC via OPC UA
  - Beckhoff ADS
- Used with
  - Virtual Commissioning
  - Co-simulation
  - Remote Visualization

**Hint:** Activate the tab from Options / Add On

PREMIUM

- + Universal Robots RTDE
- + Stäubli CS8 Add-On
- + Fanuc Robot Connectivity
- + Siemens S7 – PLC
- + WinMOD and SIMIT

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VISUAL  
COMPONENTS

UI overall

# HELP

*Get used to find support right from the beginning*

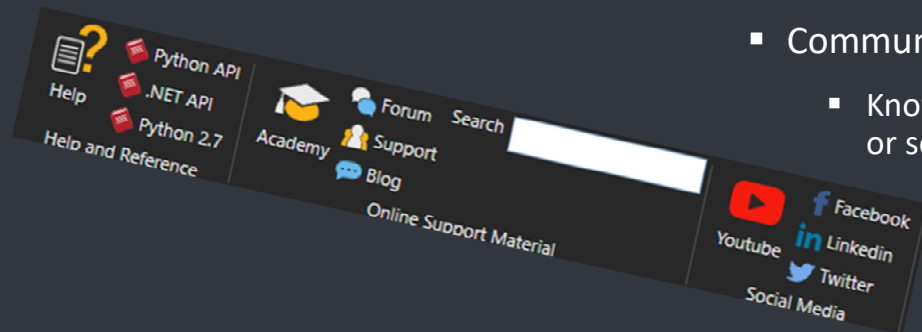
HOME PROCESS MODELING PROGRAM DRAWING **HELP** CONNECTIVITY

## Offline

- Help File (F1)
- Separate API References

## Online

- Search
- Academy <https://academy.visualcomponents.com/>
- Forum <http://forum.visualcomponents.com>
- News, blogs, articles <http://www.visualcomponents.com/insights/>
- Community → Support <https://support.visualcomponents.com>
  - Knowledgebase, File a new **support ticket** and follow old ones or send mail directly to [support@visualcomponents.com](mailto:support@visualcomponents.com)



- 1) VERSIONS
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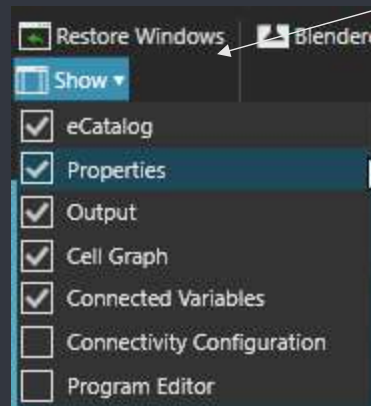
UI overall

# DOCKING PANELS / WINDOWS



- Show / Hide
- Dock / Undock
- Pin / Unpin
- Restore Windows

Whoops!  
..where did it go?



**Hint:** Panels can be made context (tab) independent from Options. Has performance impact!

### Application Context Layout

- Enable Independence
- Enable Global Restore

- 1) VERSIONS
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UI overall

# INTRODUCTION - HOME

- 1) QUICK ACCESS TOOLBAR
- 2) NAVIGATION
- 3) THE E-CAT
- 4) OPEN A LAYOUT (3D World Toolbar)
- 5) CELL GRAPH
- 6) SIMULATION CONTROLS
  - i. OVERALL
  - ii. SIMULATION MODE
  - iii. SIMULATION LEVEL
- 7) VISUALIZATION
- 8) VIEW EDITOR

Visualization  
(3D World Toolbar)

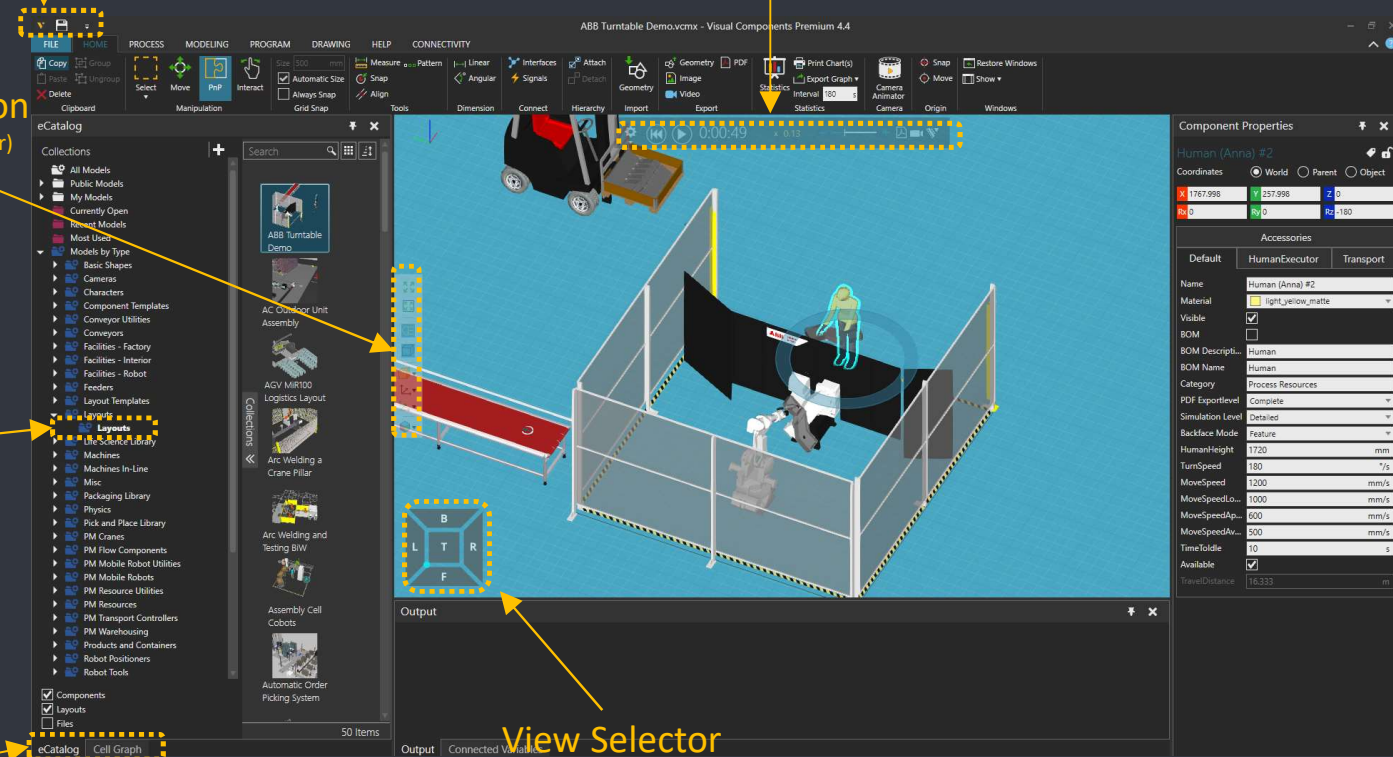
Layouts

eCatalog &  
Cell Graph

QAT

Simulation Controls

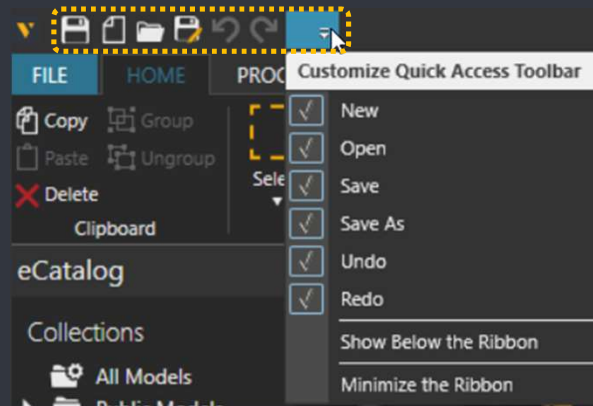
View Selector




# QUICK ACCESS TOOLBAR

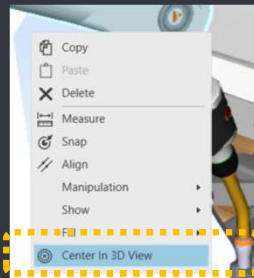
By pressing  sign the user can:

- Customize Quick Access Toolbar (QAT)
- Minimize the Ribbon tab
- Set QAT either above or below the toolbar

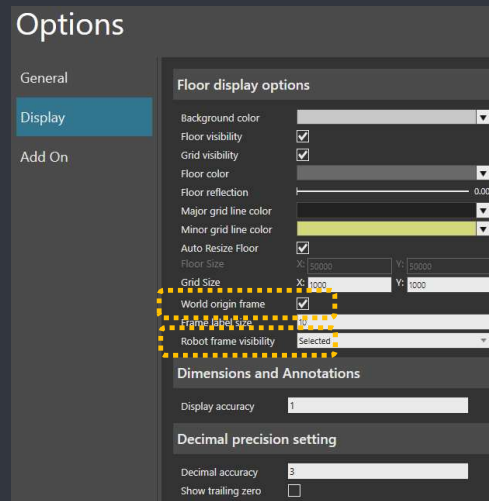


- 1) Quick Access Toolbar
  - 2) Navigation
  - 3) The eCat
  - 4) Open a Layout
  - 5) Cell Graph
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    - i. Overall
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-  VISUAL  
COMPONENTS

# NAVIGATION



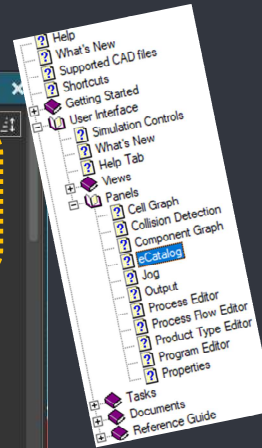
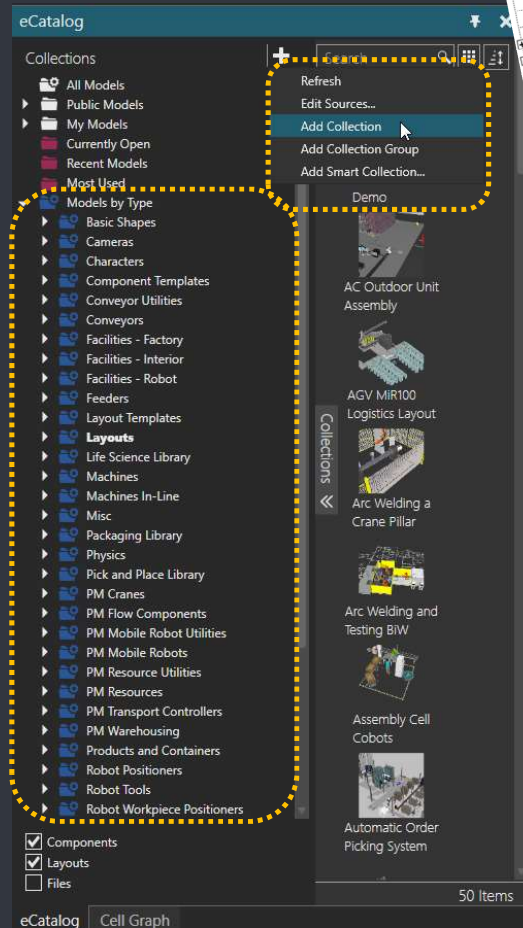
- a. **Rotation** RMB (Right mouse button) + drag mouse
- b. **Pan** LMB + RMB + drag mouse
- c. **Zoom** Scroll wheel Up/Down  
Or  
Shift + RMB + drag mouse up/down
- d. **Set Center** Ctrl + RMB on geometry  
  
Or  
MB on geometry Center in 3D View



- 1) Quick Access Toolbar
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# THE ECATALOG PANEL

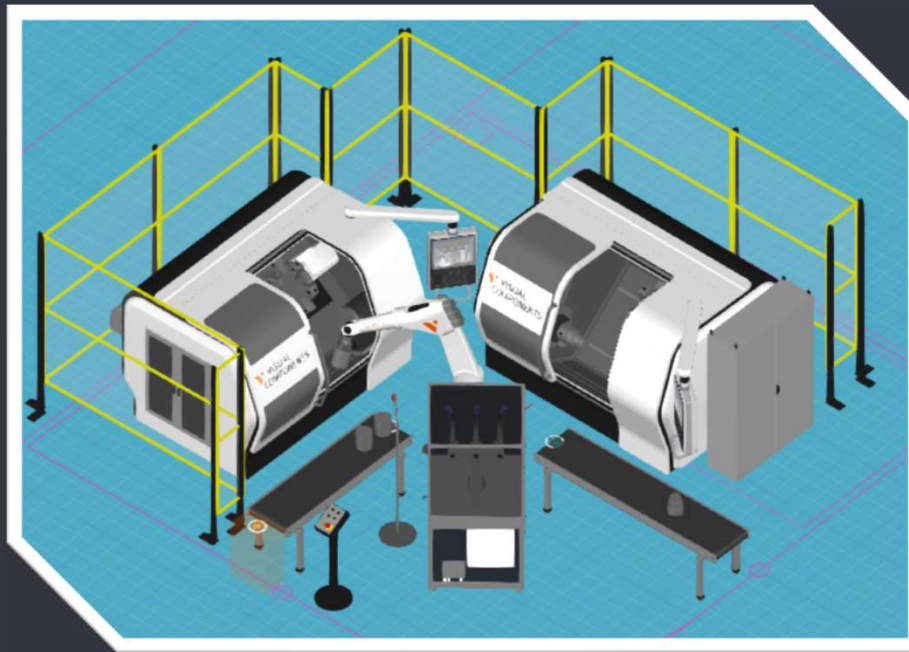


Hint: Check the Help (F1)

- 1) Quick Access Toolbar
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- VISUAL COMPONENTS**

# OPEN A LAYOUT

Models By Type → Layouts → Machine Tending

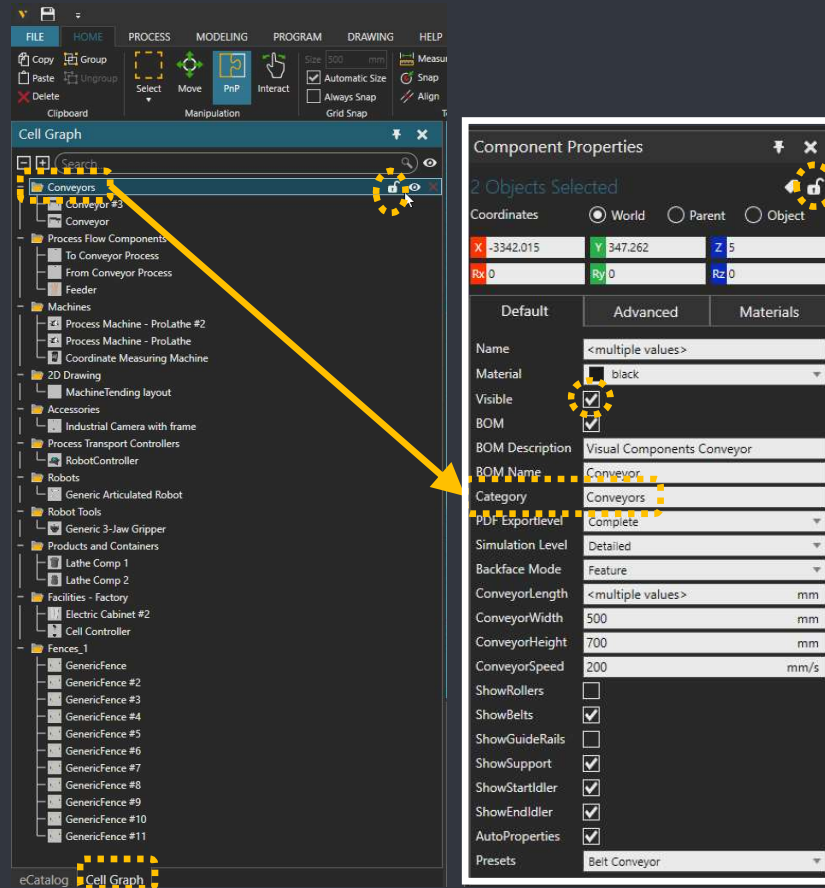


Let's open a layout and  
practice some tools with it!

- 1) Quick Access Toolbar
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- VISUAL COMPONENTS**

# CELL GRAPH 1/2

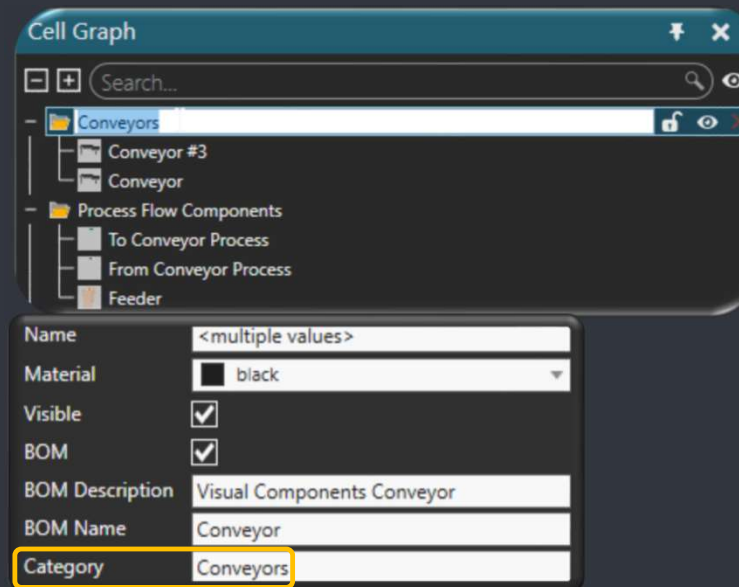
- Select all components under one group by selecting the group
- Multi selection with Ctrl-button
  - Add to selection
  - Remove from selection
- Select a group of component with Shift-button
  - Components in between will be selected
- **Lock** (group or single component)
- **Hide/Show** (group or single component)
  - Use the Visible Property to Hide/Show all selected



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- VISUAL COMPONENTS**

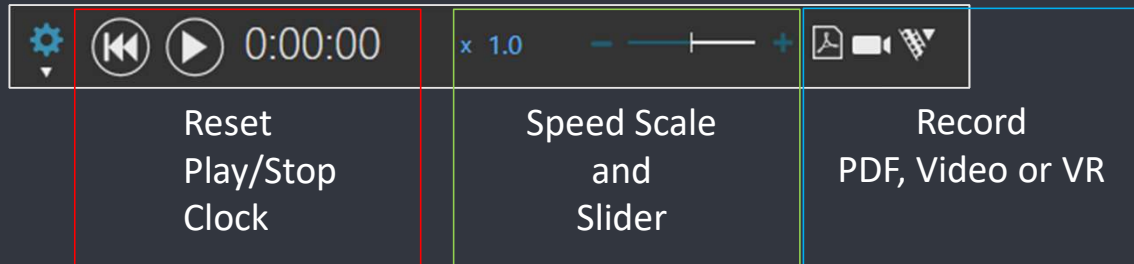
# CELL GRAPH 2/2

- Rename component(s)
- Rename **Category**
  - Applies to all components in that Category



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# SIMULATION CONTROLS

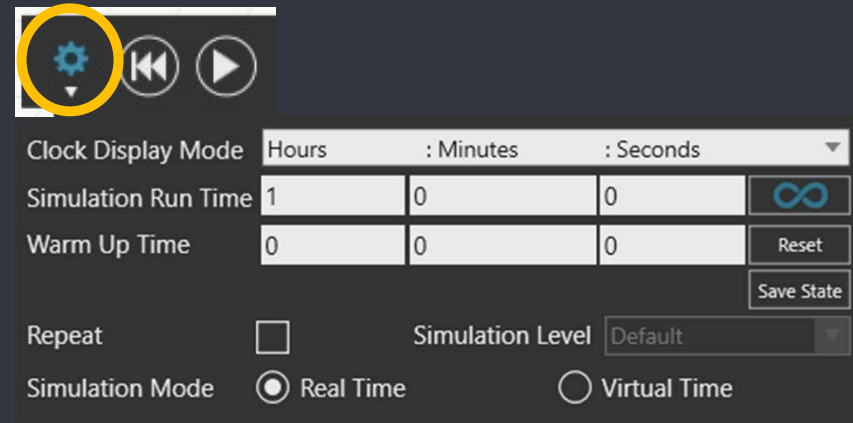


## Tips:

- Double-click the Speed slider thumb to reset scale to 1.0
- Record controls also displayed in Ribbon
- Each record control displays a task pane/action panel of additional options

# SIMULATION CONTROLS

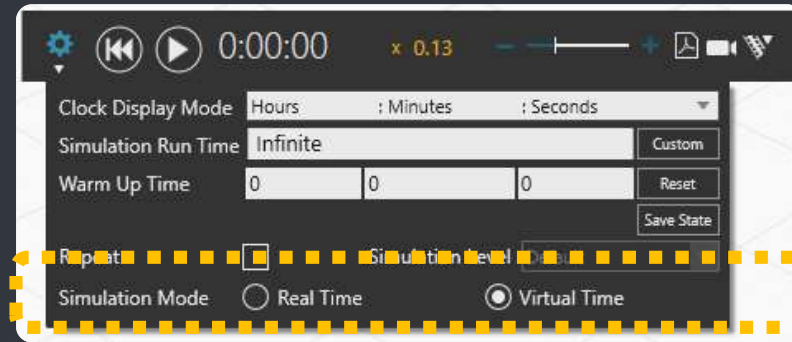
- Simulation Run Time
  - Set to custom to stop the simulation at a given time
- Warm Up Time
  - Use to run the simulation to a given time as fast as possible (run without rendering)
  - Use *Reset* to zero
- Repeat
  - Start automatically from beginning when running to the end
- Save State
  - Save orientation (joint values) of all components in the layout
  - Used as the initial state



**Note:** *Save State* is also called always when hitting Play

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# SIMULATION CONTROLS



## Real Time

- The speed of simulation is scaled to operate in real time, for example one second in simulation is one second in real time.
- Use a scale factor to speed up or slow down the simulation, thereby allowing you to sync simulation with real world device.

## Virtual Time

- The speed of simulation is dependent on computer speed, thereby allowing simulation to run as fast as possible.
- Use a step size to define a virtual frame rate for rendering the 3D world. For example, a step size of 0.13 would render a frame every 0.13 seconds of simulation runtime.

# SIMULATION CONTROLS

## ■ Default

- Accuracy is defined by component setting (property)

## ■ Detailed

- Simulates component movements as accurate as possible, thereby simulating full range of motion for component

## ■ Balanced

- Simulates component movements in a way that is balanced with performance of simulation, thereby component may move from point to point without simulating unnecessary joint motions

## ■ Fast

- Simulates component movements as quickly as possible, thereby component may snap to joint configuration or jump from point to point

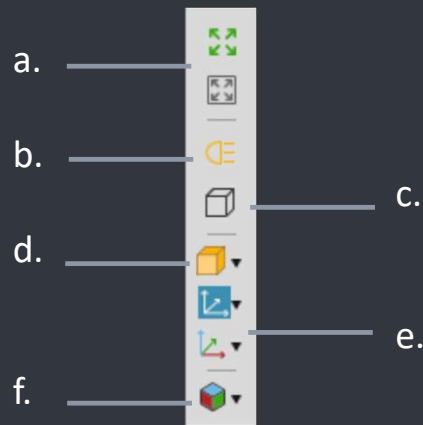
**Note:** Simulation level control is disabled if no component in the layout has implemented the feature

VERRIDES COMPONENT SETTING

- 1) Quick Access Toolbar
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- ▼ VISUAL COMPONENTS



# VISUALIZATION



- a. Fill View
- b. Headlight
- c. Camera Projection
- d. Rendering
- e. Frame Visibility
- f. View Editor

## View Selector

- Easy access for default views
- Selectable faces, lines and corners
- **Double click** on top => bottom
- **Single click** on top => rotates 90°

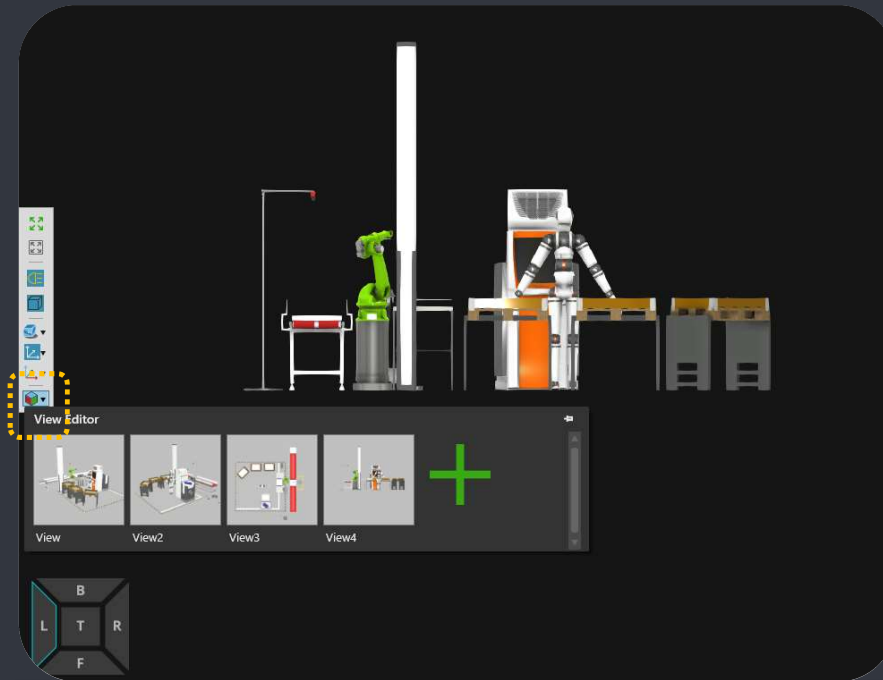


**Hint:** Hit **F11** to enter full screen mode

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- ▼ VISUAL COMPONENTS

# VIEW EDITOR

- Editor for **custom views**
  - Add
  - Select
  - Update
  - Rename
  - Delete

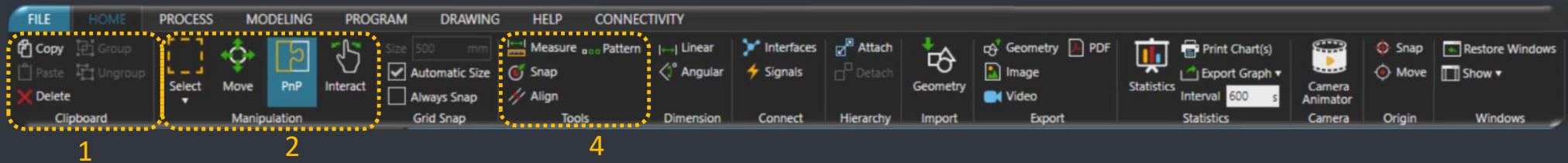
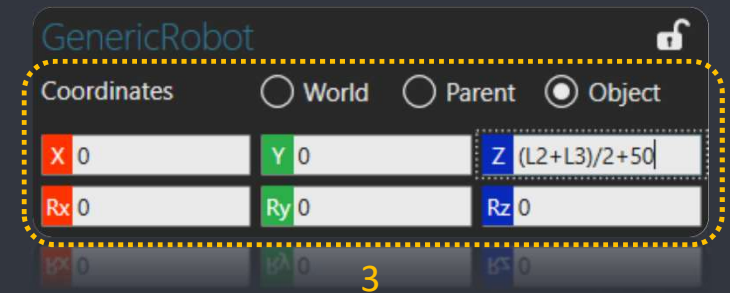


**Tip:** Comes handy with the **Camera Animator**

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- VISUAL COMPONENTS**

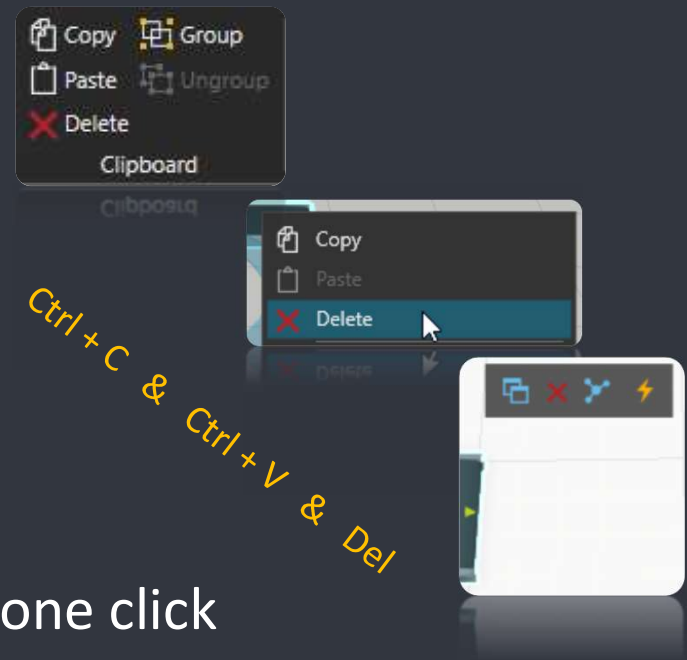
# HOME TAB TOOLS

- 1) CLIPBOARD
- 2) MANIPULATION
  - i. SELECTION
  - ii. MOVE TOOL
  - iii. PnP TOOL
  - iv. INTERACT TOOL
- 3) COORDINATE SYSTEMS
- 4) TOOLS



# CLIPBOARD

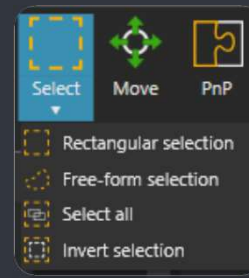
- Clipboard – Ribbon Tab Group
- Context menu – RMB
- Quickmenu – LMB
  - **Clone** copies, pastes and connects at one click



- 1) **Clipboard**
- 2) Manipulation
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) Coordinate Systems
- 4) Tools

# SELECTION

- Selecting a single component with **single LMB click** works with ALL tools
- Select components in
  - Rectangular Area
  - Free-form Area
- Multi-selection with Ctrl-button
  - Add to selection
  - Remove from selection
- Select All (not hidden)
- Invert selection (not hidden)

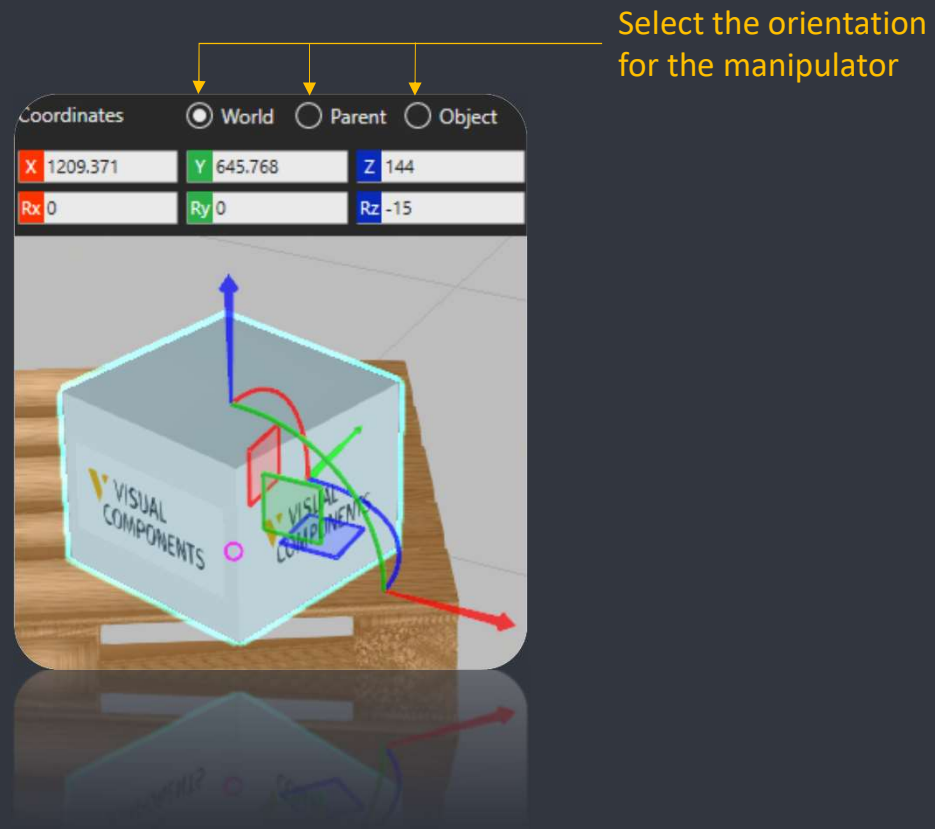


**Hint:** Hold down **Ctrl** to enter rectangular selection

- 1) Clipboard
- 2) **Manipulation**
  - i. Selection
  - ii. Move Tool
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  - iv. Interact Tool
- 3) Coordinate Systems
- 4) Tools

# MOVE TOOL 1/3

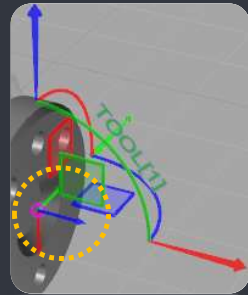
- The manipulator (**big arrows/planes**) is used to translate and rotate the selected object
- Origin of the manipulator is always in the **object's origin**
- The object can be translated/rotated along the coordinate system that is currently selected for the manipulator
  - World, Parent or Object coordinate system



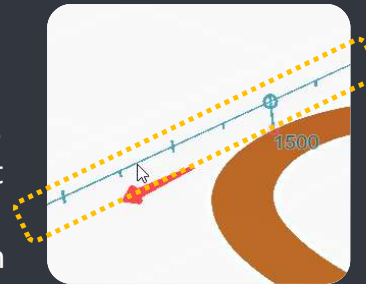
- 1) Clipboard
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  - i. Selection
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# MOVE TOOL 2/3

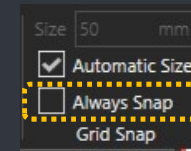
- **Snap to any geometry** by dragging the torus/origin of the manipulator
- **Snap to scale** marks by placing cursor over the scale



**Hint:** small arrows (if shown) present the object's own coordinate system

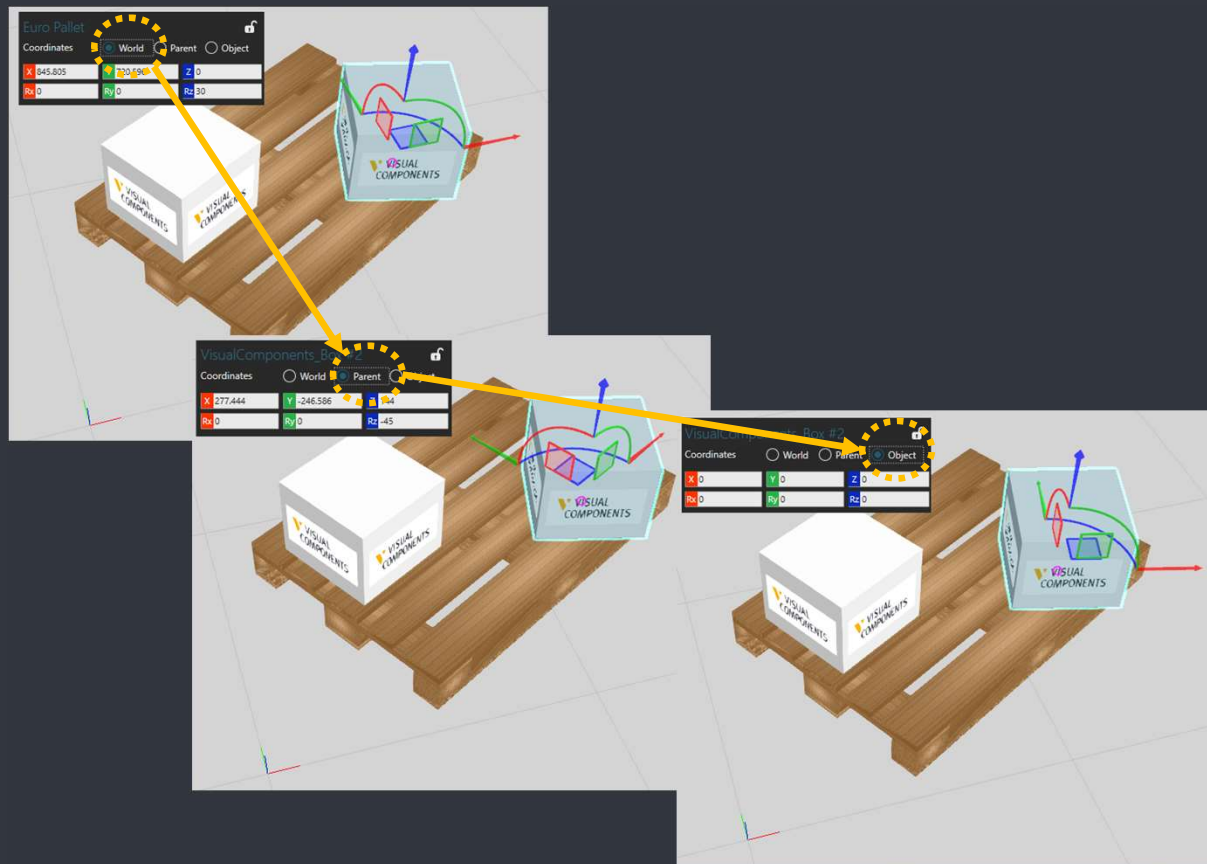


**Hint:** Snap to scale-marks by placing cursor over the scale or activate the "Always Snap".



- 1) Clipboard
- 2) **Manipulation**
  - i. Selection
  - ii. **Move Tool**
  - iii. PnP Tool
  - iv. Interact Tool
- 3) Coordinate Systems
- 4) Tools

# MOVE TOOL 3/3



Question: What happens when rotating around Z?

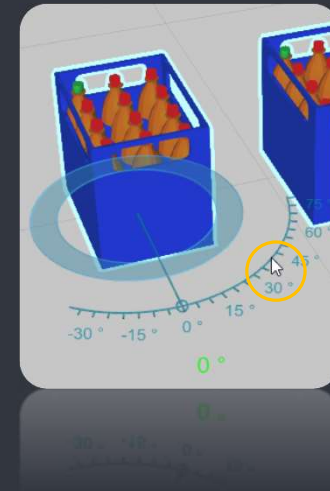
- 1) Clipboard
- 2) Manipulation
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) Coordinate Systems
- 4) Tools



# PNP TOOL: MOVING

- Coordinates selection has the same functionality as with the Move tool
- Translate by dragging
  - in **perspective** projection
    - moves component(s) always on XY-plane (floor)
  - in **orthographic** projection
    - moves component(s) parallel to the camera lens
- Rotate by dragging on the "donut"
  - Snap to scale marks by placing the cursor over the scale

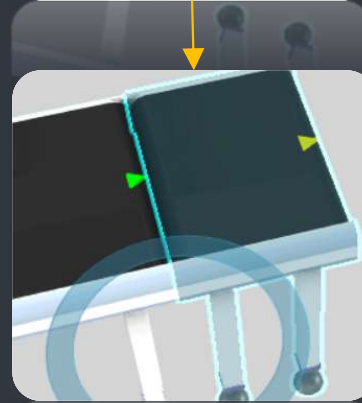
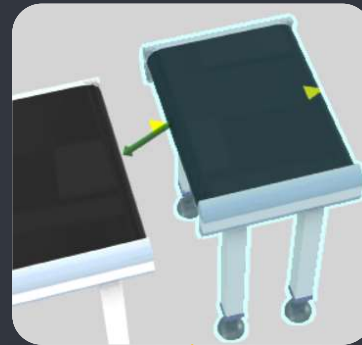
**Hint:** Snap to scale marks by placing the cursor over the scale



- 1) Clipboard
- 2) **Manipulation**
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) Coordinate Systems
- 4) Tools

# PNP TOOL

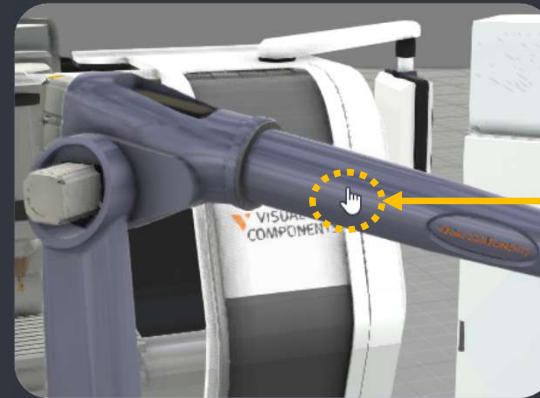
- The PnP command connects **physical** interfaces
- To activate the connection, drag the component closer another component
  - Available connection is indicated by **dark green** arrow
  - Move closer along the arrow until the component snaps
- When a component is selected with the PnP-tool:
  - Available interfaces are shown as **yellow** arrows
  - Connected interfaces are shown as **green** arrows



- 1) Clipboard
- 2) **Manipulation**
  - i. Selection
  - ii. Move Tool
  - iii. **PnP Tool**
  - iv. Interact Tool
- 3) Coordinate Systems
- 4) Tools

# INTERACT TOOL

- Interact with components that have **moving joints** or **functionality** to support interacting e.g.
  - Operate robot joints
  - Adjust Conveyor length
  - Resize Pathways
- Possibility to interact is indicated with a **hand pointer**



**Hint:** Possibility to interact is indicated with a hand pointer

- Operate robot joints
- Adjust Conveyor length
- Resize Pathways

- Clipboard
- 2) Manipulation**
  - Selection
  - Move Tool
  - PnP Tool
  - iv. Interact Tool**
- Coordinate Systems
- Tools

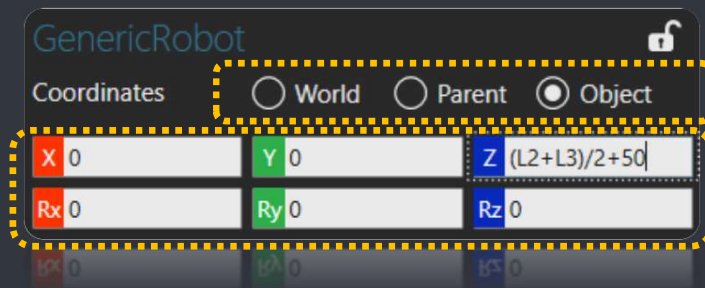
# COORDINATE SYSTEMS 1/2

- **X, Y, Z** → The position
  - Distance in the selected coordinate system
- **Rx, Ry, Rz** → The orientation
  - Angle in degrees in the selected coordinate system
- You can also **use expressions** instead of typing values
  - Eg.  $(L2+L3)/2+50$
  - Used variable name have to belong to the component
- Apply with Enter key

- 1) Clipboard
- 2) Manipulation
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) **Coordinate Systems**
- 4) Tools

## COORDINATE SYSTEMS 2/2

- In *Object* mode: temporary, relative translation
  - fields are always zeroed out when reselecting



**Hint:** Click the axis label to zero out the value

**Hint:** Expressions - Access properties under other than *Default* tab by using colons e.g. `Advanced::TableLength`

- 1) Clipboard
- 2) Manipulation
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) **Coordinate Systems**
- 4) Tools

# COORDINATE SYSTEMS

## ■ World

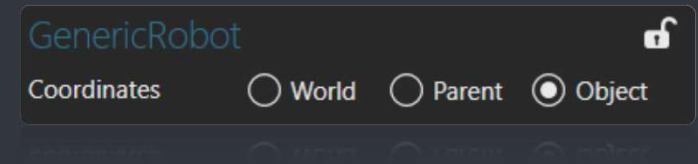
- Global coordinate system with a fixed origin

## ■ Parent

- References the object coordinate system of selected component's parent
- (If a component is NOT attached to a node in another component, the parent of a selected component is the 3D world)

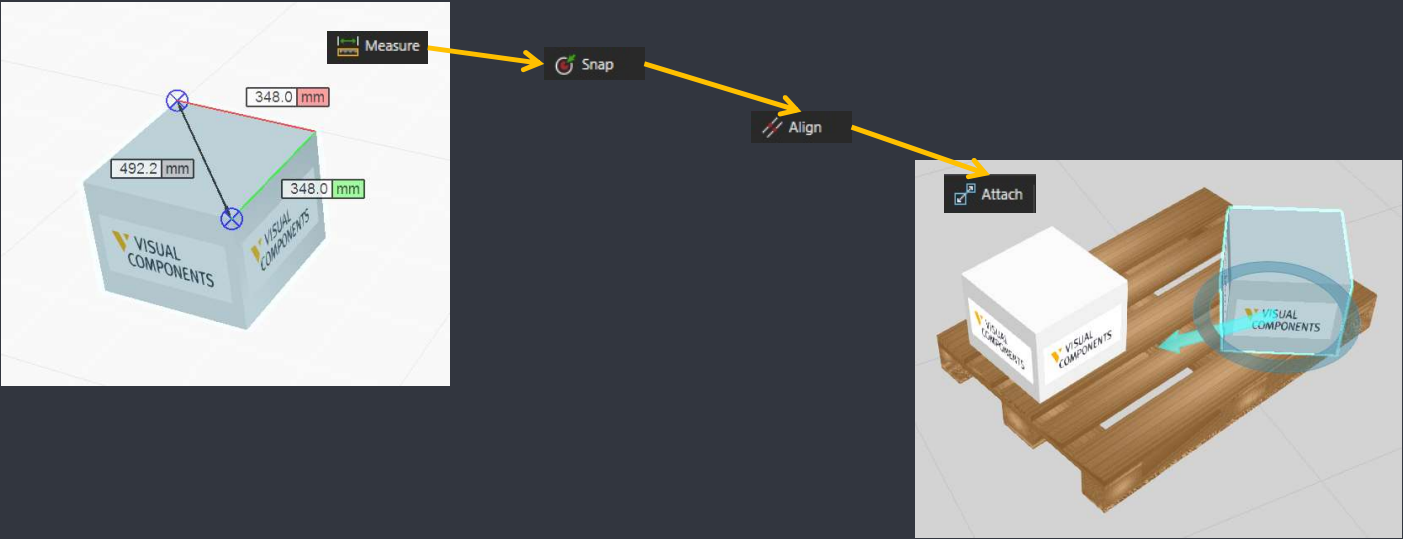
## ■ Object

- References selected component's coordinate system. That is, the location of a component is relative to its own origin.



- 1) Clipboard
- 2) Manipulation
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) **Coordinate Systems**
- 4) Tools

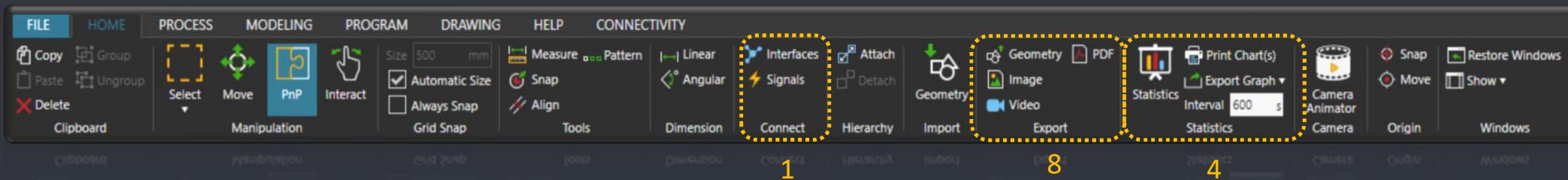
# TOOLS



- 1) Clipboard
- 2) Manipulation
  - i. Selection
  - ii. Move Tool
  - iii. PnP Tool
  - iv. Interact Tool
- 3) Coordinate Systems
- 4) **Tools**

# LAYOUT BASICS

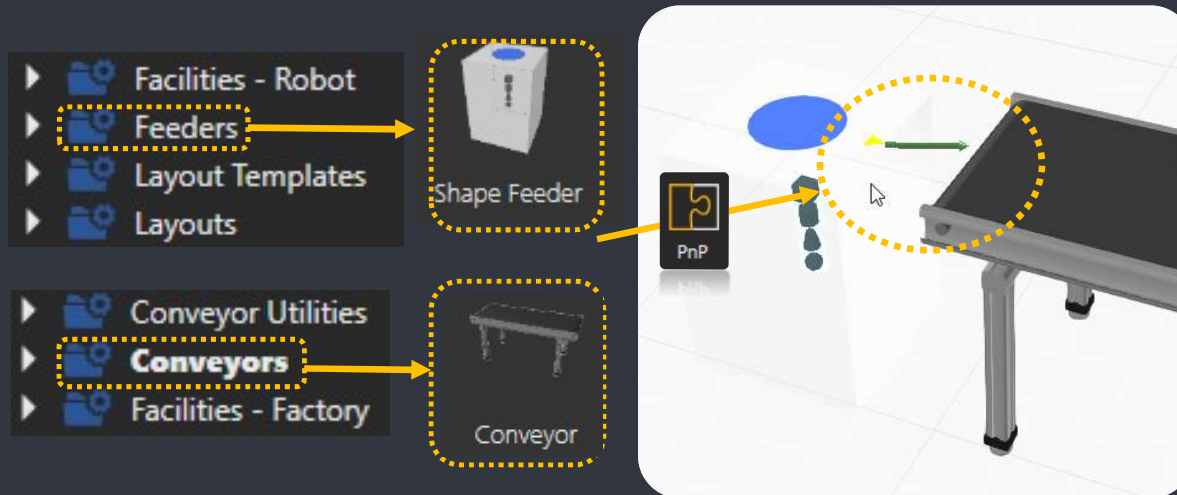
- 1) INTERFACES
- 2) PROPERTY AND ACTION PANELS
- 3) STATIC VS. DYNAMIC COMPONENTS
- 4) STATISTICS
- 5) DRAWING
- 6) SAVING A LAYOUT
- 7) FILE REVISIONS
- 8) EXPORTING TO MEDIA





# INTERFACES

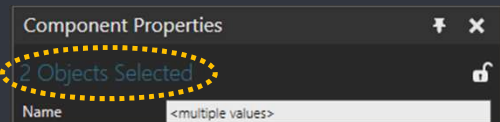
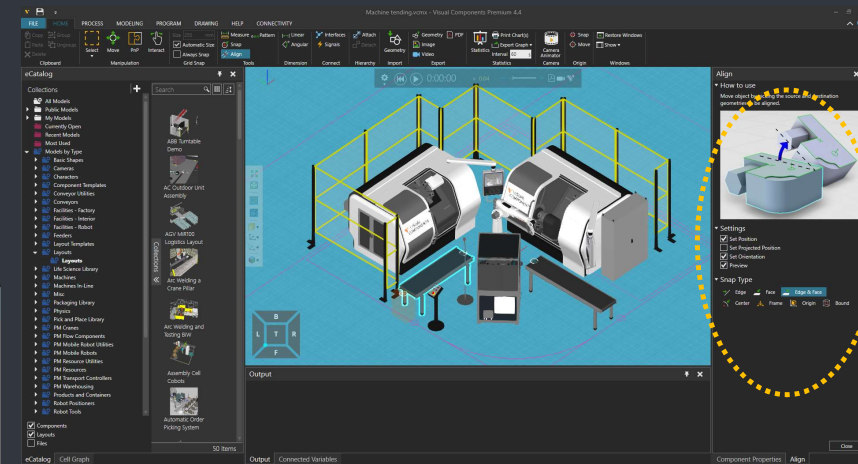
- Can be **physical** or **abstract** (non-physical)
  - ✓ **Physical** interfaces are connected with the **PnP tool** (green arrow in below image)



- 1) Interfaces
- 2) Property and Action Panels
- 3) Static vs. Dynamic components
- 4) Statistics
- 5) Drawing
- 6) Saving a Layout
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- 8) Exporting to Media

# PROPERTY AND ACTION PANELS

- Every selected object (component, program statement, behavior, feature...) has properties that are shown in the **Properties Panel**
- Tools and other commands (once active) have typically own **Action Panel** that are grouped by default on to the same window as the Properties



Tabs (groups)

Defaults

Component Properties

Conveyor

Coordinates  World  Parent  Object

X: -3342.015 Y: 347.262 Z: 5

Rx: 0 Ry: 0 Rz: 0

Default Advanced Materials

Name: Conveyor

Material: black

Visible:

BOM:

BOM Description: Visual Components Conveyor

BOM Name: Conveyor

Category: Conveyors

PDF ExportLevel: Complete

Simulation Level: Detailed

Backface Mode: Feature

ConveyorLength: 2000 mm

ConveyorWidth: 500 mm

ConveyorHeight: 700 mm

ConveyorSpeed: 200 mm/s

ShowRollers:

ShowBelts:

ShowGuideRails:

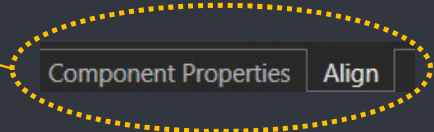
ShowSupport:

ShowStartIdler:

ShowEndIdler:

AutoProperties:

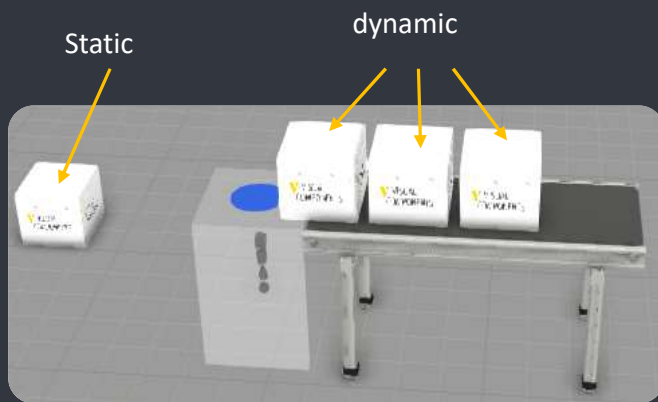
Presets: Belt Conveyor



- Custom properties can be grouped into separate **tabs**
- Shows the **number of selected components** and their common properties

- 1) Interfaces
- 2) **Property and Action Panels**
- 3) Static vs. Dynamic components
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# STATIC VS DYNAMIC COMPONENTS



**Best Practice:** create only simple components  
(without excess behaviors/functionalities)  
during simulation

## ➤ Static components

- Those that are added to the 3D world "manually", before running simulation
- Revert to **initial state\*** after simulation is reset
- Have always **unique name**

## ➤ Dynamic components

- Created while running the simulation
- Have to be contained in/belong **to a container** all the time, otherwise will vanish from the 3D world
- All dynamic components are **deleted after resetting** simulation

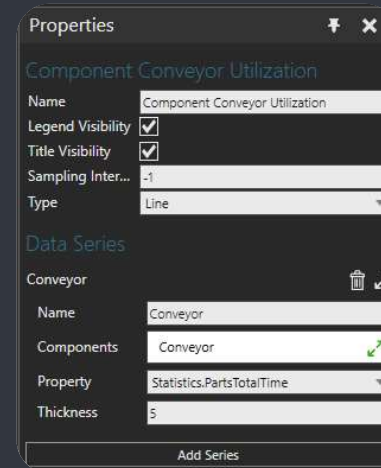
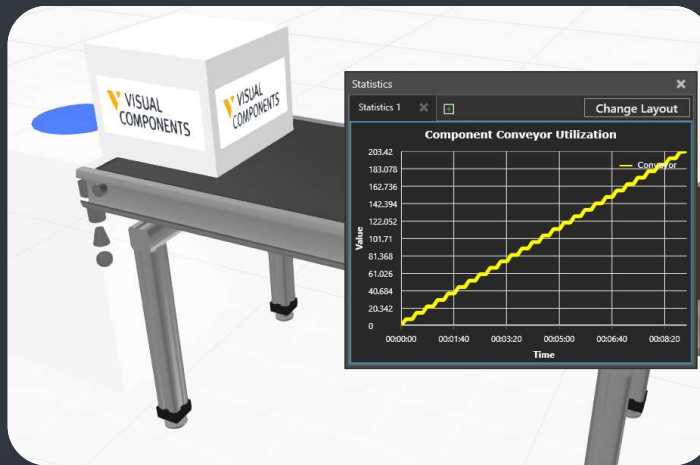
**\*Note:** State means location and orientation, including any joint values. State can be saved manually

- 1) Interfaces
- 2) Property and Action Panels
- 3) **Static vs. Dynamic components**
- 4) Statistics
- 5) Drawing
- 6) Saving a Layout
- 7) File Revisions
- 8) Exporting to Media

# STATISTICS

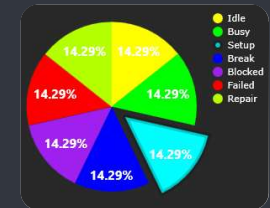
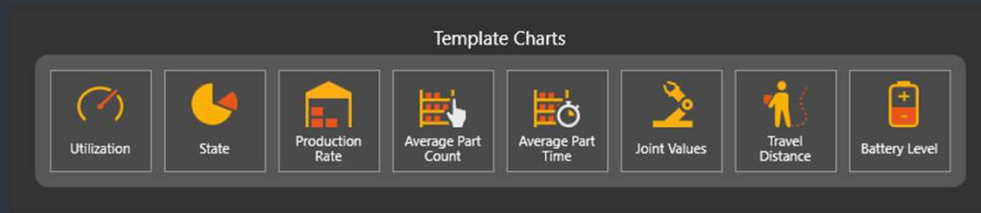


- a. Collect data of
  - material flow within components (requires)
  - components states / utilization
  - robot joint values
- b. Export to Excel sheet or CSV file
- c. Material flow info requires:
  - that the component has **Statistics behaviour** with
  - at least one **material flow behavior** (*Container, Path...*) associated to it
- d. Component state / utilization info requires
  - that the component has **Statistics behaviour** with
  - a **PythonScript behavior** in a component to define the states



- 1) Interfaces
- 2) Property and Action Panels
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- 4) Statistics**
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# STATISTICS: TEMPLATE CHARTS



**Utilization** – Indicates the percentage for being in "Busy" state

**State** – Indicates the percentage for each state

**Production Rate** – Indicates the amount of components produced or transported by the selected component(s)

**Average Part Count** – Indicates how many child components have been by average in the monitored component during the last interval period.

**Average Part Time** – Indicates the average duration that parts visited the selected component(s) within the last interval, for example to indicate transporting or processing times.

**Joint Values** – Indicates the values of each joint of the selected component(s).

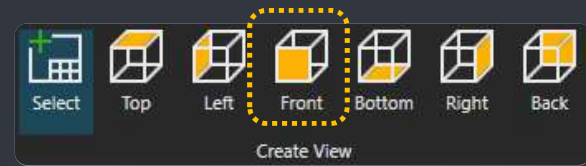
**Travel Distance** – Indicates the distance that the selected component(s) has travelled during the simulation run.

**Battery Level** – Indicates the current power capacity of the selected component(s)

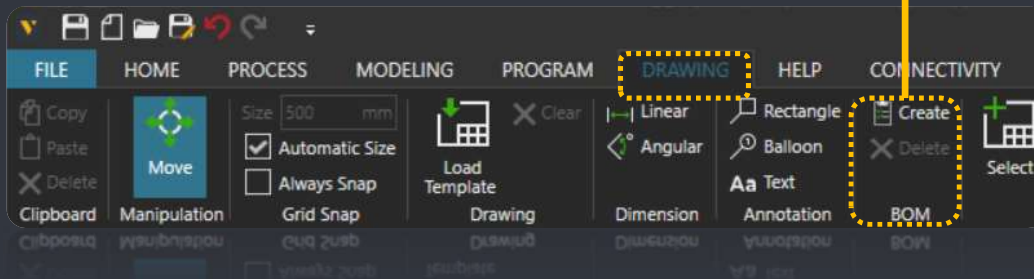
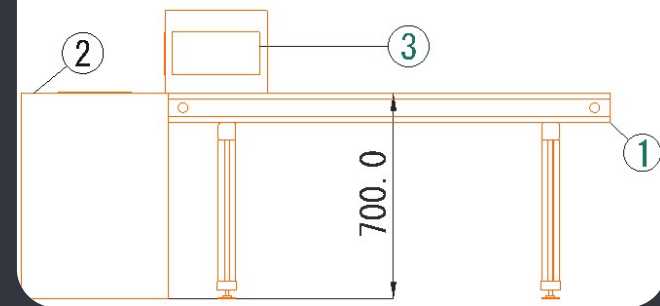
- 1) Interfaces
- 2) Property and Action Panels
- 3) Static vs. Dynamic components
- 4) **Statistics**
- 5) Drawing
- 6) Saving a Layout
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# DRAWING

- Created view is a **snapshot** of the layout at the time of creation
  - Changes in the 3D World do not reflect in to the drawing
- BOM
  - Components with BOM property checked are included automatically
  - Can be overridden by a creating balloon for the component
  - Otherwise check BOM property and create BOM again

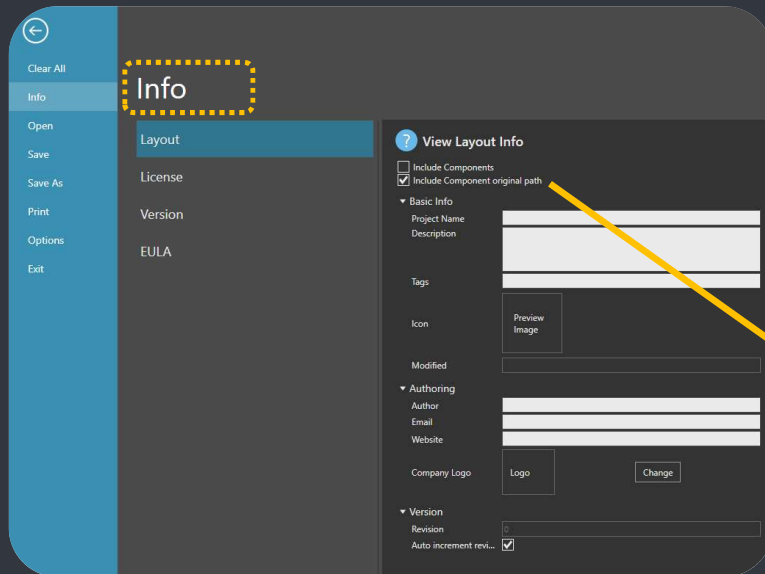


| ITEM | QTY | NAME                  |
|------|-----|-----------------------|
| 1    | 1   | Conveyor              |
| 2    | 1   | Shape Feeder          |
| 3    | 1   | Visual Components Box |



- 1) Interfaces
- 2) Property and Action Panels
- 3) Static vs. Dynamic components
- 4) Statistics
- 5) **Drawing**
- 6) Saving a Layout
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# SAVING A LAYOUT



Any other than non-primitive geometry modification in a component (within eCatalog) are NOT reflected to layouts!

- A layout references the **VCID of the included components** (unique identifier)
- Non-primitive **geometry is NOT saved**
  - Except when using *Include Components* –option
  - Except on imported CAD geometries (if not saved as a component)
- Component geometry is searched **within the eCatalog sources**
  - *Include component original path* –option is used only in error message output (information) if e.g. geometry loading fails

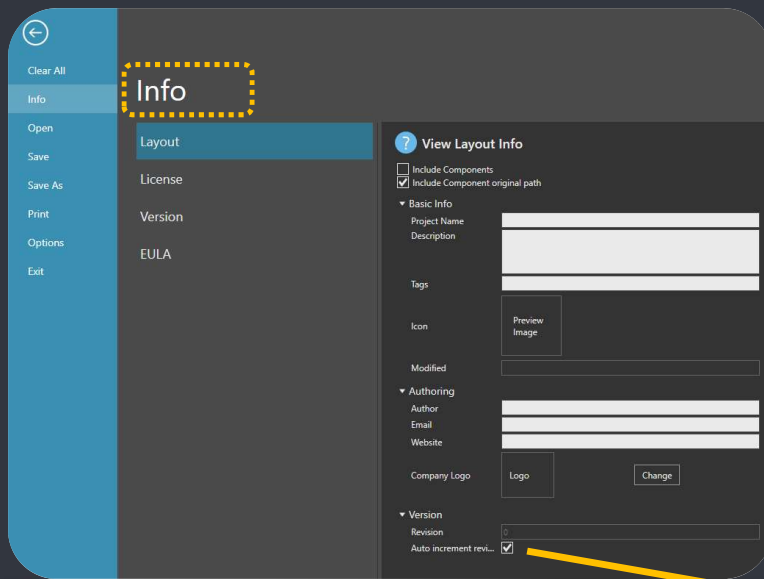
Include Components  
 Include Component original path

Layout includes:

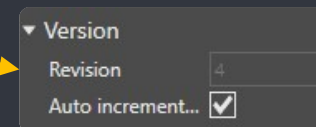
- ✓ Components
  - Properties
  - Behaviors
  - Features (excluding non-primitive geometries)
  - Robot programs
  - Materials
- ✓ Imported CAD geometries
- ✓ Drawing
- ✓ Statistics
- ✓ Camera animations
- ✓ Connectivity configurations

- 1) Interfaces
- 2) Property and Action Panels
- 3) Static vs. Dynamic components
- 4) Statistics
- 5) Drawing
- 6) Saving a Layout**
- 7) File Revisions
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# FILE REVISIONS



- Layouts and components carry auto incremented revision number
- **Every save increments the revision number**
- Each time a layout is saved the previous version of the file is stored with **.bk** extension to the same folder
- **Reverting** to previous version
  - It is possible to open .bk files directly and then use Save As
  - or .bk file can be renamed to .vcmx



- 1) Interfaces
- 2) Property and Action Panels
- 3) Static vs. Dynamic components
- 4) Statistics
- 5) Drawing
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- 7) File Revisions**
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# EXPORTING TO MEDIA

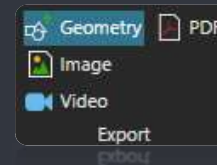
**Hint:** Use Camera Animator for more impressive Video output

| Reflects to the output | Animated 3D PDF | Video (avi, mp4, mov) | Animation (VC Experience) |
|------------------------|-----------------|-----------------------|---------------------------|
| Simulation speed       | X               | X                     | -                         |
| Camera movements       | -               | X                     | -                         |

**Hint:** Creating an animation is the fastest!

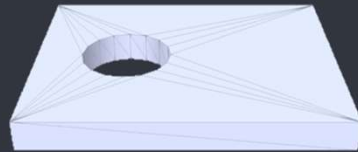
Export to **non-animated geometry** (selected component or the whole layout) to

- a static 3D pdf
- a 3D Studio (.3ds) or Stereo Lithography (.stl)
- and more

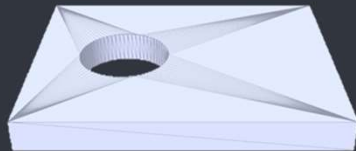


- 1) Interfaces
- 2) Property and Action Panels
- 3) Static vs. Dynamic components
- 4) Statistics
- 5) Drawing
- 6) Saving a Layout
- 7) File Revisions
- 8) **Exporting to Media**

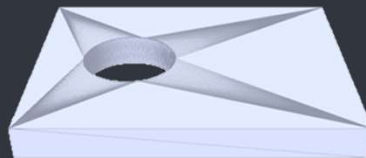
# CAD IMPORT PARAMETERS



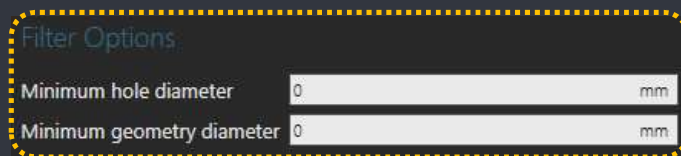
➤ Extra Low: 80 triangles



➤ Medium: 272 triangles



➤ Extra High: 528 triangles



- Recommended polygon (triangle) count limit
  - < 150 000 is good for a robot
  - Pay special attention to dynamic and/or moving components
- Adjust tessellation quality, start from higher setting and check results, [see round shapes](#) for evaluating the level of detail
- Filtering features
  - Use to fill holes
  - Exclude nuts, bolts etc.