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## Chapter

# *1 What's New*

## What's New

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3D Viewer Reference Help

Add-Ins Reference Help

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## What's New in Tecnomatix Plant Simulation 14

### **What's New in Tecnomatix Plant Simulation 14**

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

- [Important Changes in Plant Simulation 14](#)
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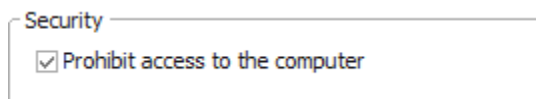
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## Important Changes in Plant Simulation 14

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

### Security

We added the setting **File > Model Settings > General > Access to the computer** is prohibited to ensure that simulation models, which you receive from others, do not damage your computer.



- To facilitate this via *SimTalk*, we added the method `isComputerAccessPermitted`.
- To facilitate this via *SimTalk*, we added the method `SetTrustModels` to the *COM* interface.
- If you activate this security setting, this also affects a number of methods that can access your computer.
- We added the start option `-TrustModels`. When you enter this start option, *Plant Simulation* treats models, which you receive from others as if they were your own models. When you open a model that your received from somebody else, for which the model setting permits access to the computer, *Plant Simulation* does not notify you about this.

Models, which were saved with a version older than 14, do not receive a trust ID and thus are always considered to be models from other people. Normally access to the computer is denied when loading an old model into version 14. If you entered the start option `-TrustModels`, the old model automatically has access to the computer.

- We added the setting Access to the computer is permitted to libraries.

We added another parameter to the method `getLibraryInfo` allowing you to query access to the computer.

### Save Models via Active Workspace to Teamcenter

You can now use *Active Workspace* to add your *Plant Simulation* models to the Teamcenter database and to later open them from the database.

With *Active Workspace* you can:

- Select the target folder of the model with the command **File > Teamcenter > Add to Teamcenter**.
- Select a model with the command **File > Teamcenter > Open from Teamcenter**.

### Active Workspace in the Teamcenter Interface

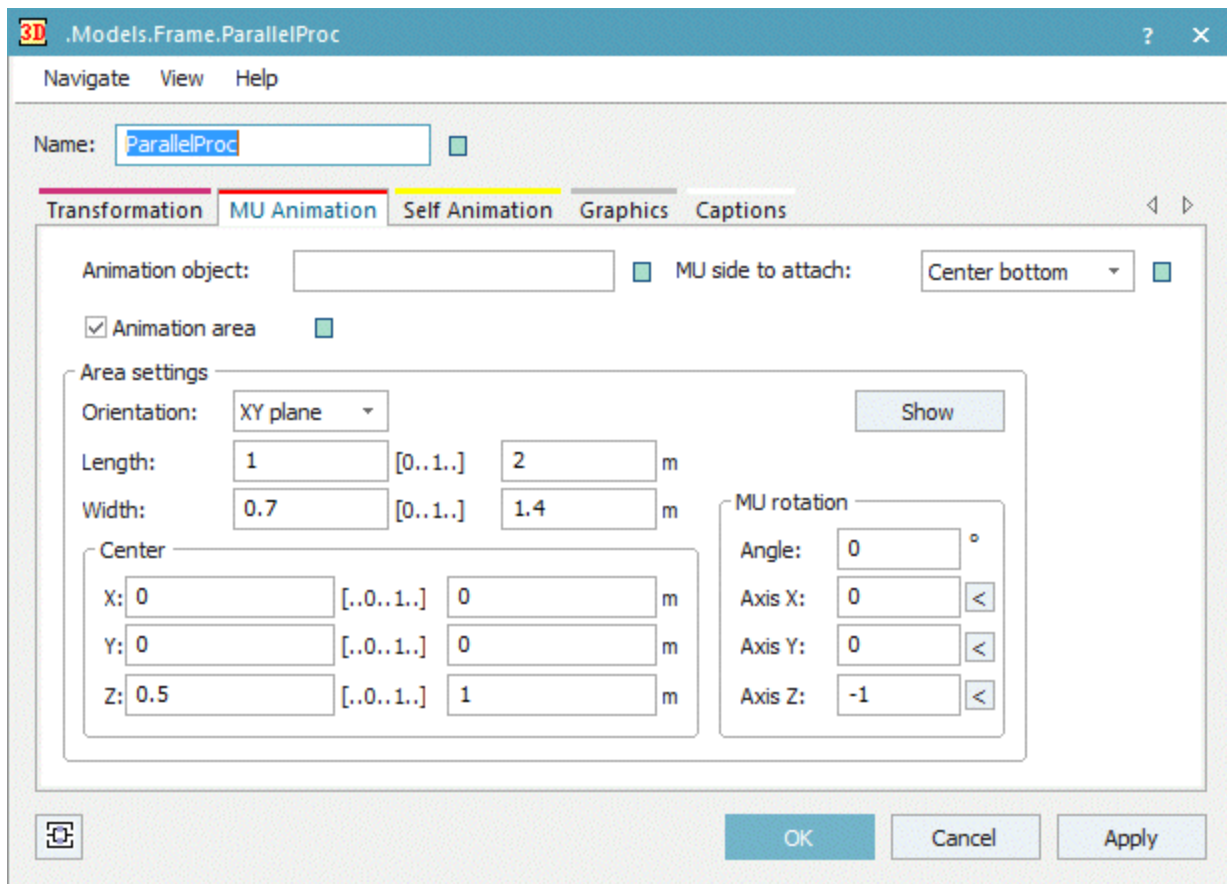
We added *Active Workspace* to the Teamcenter Interface. You can use it to select Teamcenter objects via *Active Workspace* and to further process these objects in *Plant Simulation*.

You can:

- Select an **application interface object** in the dialog of the *Teamcenter Interface* via *Active Workspace*.
- Select the **target folder** of the **Report** in the dialog of the *Teamcenter Interface* via *Active Workspace*.

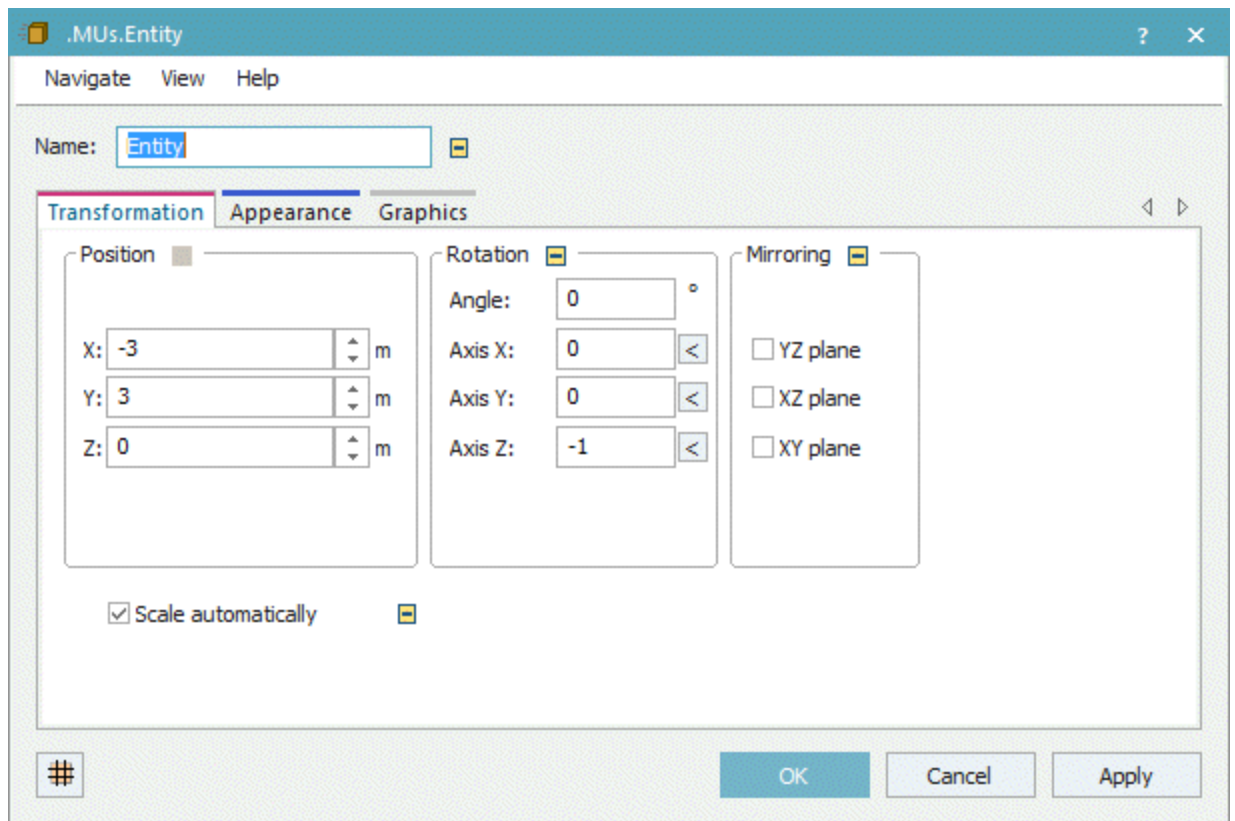
### Animation area

We added settings for the animation area to the tab **MU Animation** of the objects with matrix loading space. The animation area replaces the function **Create Paths > Create Locations** of previous versions of *Plant Simulation*.



### Scale automatically

We replaced the setting **Auto graphics active** for the MUs with the setting **Scale automatically**. It adjusts the size and the position of the graphic of the MUs to the dimension and the booking point of the MU in 2D.



## Simulation- and Animation-Relevant Changes

We made changes that are relevant for the simulation and the animation in *Tecnomatix Plant Simulation 14*. For this reason you have to adapt simulation models which you created in previous versions of *Tecnomatix Plant Simulation*, when you open them in *Tecnomatix Plant Simulation 14*.

### Simulation- and Animation-Relevant Changes in Plant Simulation 14.0

- We changed the behavior of the feature setup after n parts with the setting **After last part**. If you entered a formula for the setup time, the anonymous identifier @ was void in previous versions when the machine was set up after the n-th part. Now you can access the n-th part with @.
- We changed the behavior of the *Store* when it delivers mounting parts for an *AssemblyStation* and when several parts in the *Store* are simultaneously unblocked for a main part. From this version on the parts arrive in reversed order at the *AssemblyStation*.
- We changed the behavior of the read-only attribute *CurrentSpeed* of MUs on *Lines*. *CurrentSpeed* now always has the sign (+ or -) of the respective direction of movement of the *Line*. In previous versions the sign of the *CurrentSpeed* could differ from the direction of movement of the *Line* when the MU was conveyed by a *Converter* beforehand.
- We changed the behavior of method *initialize* of the *TableFile*. If you tried to initialize the column index, for example with `TableFile.initialize({0,*}, "AA")`, *Plant Simulation* did not execute this and retained the previous values. Now *Plant Simulation* assigns the passed initial value.

- We changed the behavior of the attribute `Coordinate3D`: It now returns an *array* of data type *length* instead of data type *real* as in previous versions.

### **Simulation- and Animation-Relevant Changes in Plant Simulation 13.2**

- We changed the behavior of the SQLite Interface: When you open a file-based *SQLite* database, *Plant Simulation* applies the following default settings, which deactivate transaction support:

```
PRAGMA locking_mode=EXCLUSIVE
```

```
PRAGMA journal_mode=NORMAL
```

```
PRAGMA synchronous=OFF
```

These settings considerably accelerate access to the database.

To get the *SQLite* default settings, which support transactions, you can use the following instructions:

```
SQLite.exec("PRAGMA locking_mode=NORMAL");  
SQLite.exec("PRAGMA journal_mode=DELETE");  
SQLite.exec("PRAGMA synchronous=FULL");
```

- We fixed non-expected behavior that occurred in the method `find` of lists and tables. When you searched a table and then started a second search, for which you entered a range, which did not contain the cell of the first search, the search was only started after the first cell of the new range, as the search was continued.

Now we reset the search and the search then starts in the first cell of the range as if a call of the method `setCursor` had been executed.

### **Simulation- and Animation-Relevant Changes in Plant Simulation 13.1**

- When **resetting** the simulation model, *Plant Simulation* now does not call the Request control, the Receive control, and the Release control of the *Importer* any more.

This is because the MUs are deleted when resetting the simulation model. This then triggered the **release control** for example. Normally you can access the active MU with the anonymous identifier `@`. As the active MU was deleted while resetting the model, the *Debugger* opened. For this reason you had to program source code in your model that handled a case that never occurred during the simulation.

- The new settings of the *3D-Viewer-function* MU side to attach caused the state of the setting to convert the animation path to the new setting. A model, that relies on a certain inheritance state of the **MU Animation** and then changes the state with *SimTalk* commands, might lead to a changed animation for the object *Pick-and-Place-Robot*.

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## **New Features of the Material Flow Objects**

*Tecnomatix Plant Simulation 14* provides a number of new features.


### **New Features in Plant Simulation 14.0**

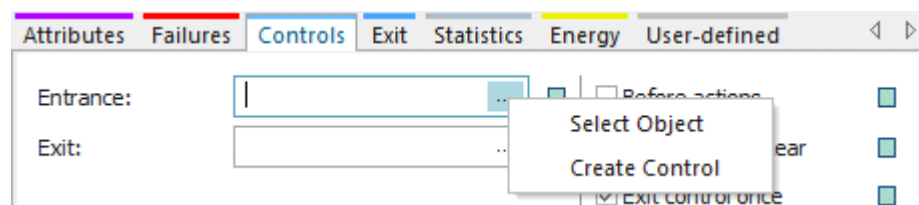
- We added the setting MU conveying direction to the tab **Attributes** of the *Pick-And-Place-Robot*.

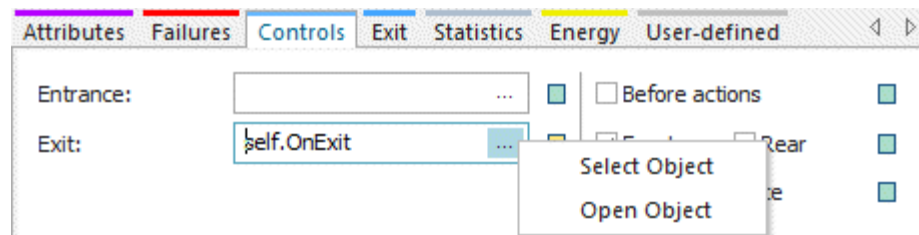


- We added the Tab Importer to the *Pick-And-Place-Robot*. This way you can order a *Worker* for repairing the services to remove the failure.
- We added the setting **Off** to the dropdown list Set-up depends on. It deactivates setting the object up after changing the type to another MU. This means that the station will only be set-up after the number of parts that you selected.
- We added the Z-dimension to the *Store*, the *Container*, and to the *Transporter*. This allows you to stack parts on these objects.
- We added the attribute MUHeightWithContent to the MUs. You can use it when stacking parts.
- We added the setting **Throughput per Minute** to the tab Tab Type-dependent Statistics of the *Drain*.
- We added a setting to the object Interface to show the number of the next aimed at exit on the tab **Exit** when you already determined that exit.

## New Features in Plant Simulation 13.2

- We added the setting Only for empty blocking list to the tab **Attributes** of the *Pick-And-Place-Robot*.
- We added the setting Target selection to the tab **Exit** of the *Pick-And-Place-Robot*.
- We added the Loading time and the Unloading time to the tab **Attributes** of the *Pick-And-Place-Robot*.
- We added the method findFreePlace to the *Store*.
- We added the read-only attribute LocationInFrame to the MUs.
- We added the attribute TargetDistance to the *Transporter*.
- We added the command Delete Sensor to the context menu of length-oriented objects in the *Frame*. To delete a sensor in 3D, press the **Del** key on the keyboard.
- We added the method getHTMLCode for all objects which can create a statistics table in the *HtmlReport*.
- The button  in the text box of the control on the tab Controls now provides these commands:





### New Features in Plant Simulation 13.1

- We enhanced the functionality of the *Source*. For the setting **Time of creation** > Interval Adjustable you can now also set the **Amount** of parts to be produced. When you do not set the **Stop time**, *Plant Simulation* produces the amount of parts you entered at most.
- We added the setting Assembly table > **Depends on Main MU** to the *Assembly* station.
- We added the menu command Calculate Dimensions from 3D to the **Tools** menu of the MUs.
- We added the method `getStoragePlace` to the MUs. You can use it to find out on which storage place within a *Store* the MU is located.
- We increased the number of Parameters which *observer methods* accept. You can declare *observer methods* with one, two, or three parameters.
- We added the optional parameters *Destination* and *Name* to the methods `derive` and `duplicate` to enable these methods to replace the method `createObject`. To create the object at a certain position in the *Frame* as with the method `createObject`, use the attribute `Coordinate3D`.
- We replaced the method `setUp` with the method `resSetUp`.

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### Changed Features of the Material Flow Objects

*Tecnomatix Plant Simulation 14* provides a number of changed and improved features.

#### Changed Features in Plant Simulation 14.0

- We changed how the function Fast Forward Simulation of the *Eventcontroller* works. It now automatically deactivates **Realtime mode**. When you terminate **Fast Forward Simulation**, **Realtime mode** will be activated again, provided it was activated before. You can now quick and easy switch between **Fast Forward Simulation** and normal simulation by clicking the respective button while the simulation is running.
- We changed the behavior when querying the **contents list** of a length-oriented object or of the **position list** of an MU on a length-oriented object with the methods `contentsList` and `positionList`. The values for the positions are not rounded any more.

#### Changed Features in Plant Simulation 13.2

- We extended the functionality of the method `outIn`. You can now also specify `outIn(-1, true)` for fully processed parts.

- We changed the behavior when an object, on which a blocked MU is located, is failed/paused/stopped: Now the MU is no longer removed from the blocking list when the MU you unsuccessfully attempted to move it with one of the methods *insert*, *move*, or *transfer* before an **Out** event was processed for this MU.
- We changed **product statistics** of the MUs: MUs, which are located in a blocking list, are now always counted as waiting, no matter which state the material flow resource is in. MUs, which are loaded or unloaded from a resource by a *Pick-and-Place Robot*, are always counted as working.

### Changed Features in Plant Simulation 13.1

- We now enter **root.Broker** into the text box **Broker** by default into the sub-tabs of the Tab Importer. For this reason *Plant Simulation* now does not show an error message any more when you click on **Apply**. When *Plant Simulation* detects an invalid *Broker* during the simulation, it opens the dialog of the object with the respective sub-tab.
- We changed the behavior of *Plant Simulation*. Now no events are calculated any more when resetting your model. This now happens when initializing the model.

You can now also initialize attributes, which affect event generation, for example the **availability**, in the Init Control. For this the **init controls** are now executed before the events are calculated. The normal *init methods*, on the other hand, are executed after calculating the initial events.

Based on this enhancement the Init Control of the *Transporter* will now also be executed before the events are calculated. In previous version the **init control** was executed after the events were calculated.

- We changed the behavior of the **Exit strategy** > Carry part away. It is not allowed any more for objects which are part of a balanced line. For models, which you created in previous versions, *Plant Simulation* deactivates the object *Cycle* when you had activated **Carry part away** for one of the objects it controls.
- We changed the behavior of the *Assembly* station. When it has objects of type *Store* as predecessors, it requests the required mounting parts from the *Store*. If the required parts are not available in the *Store* at the moment, the *Store* records the request and delivers the parts to the *Assembly* station when they are available again.

The parts can also be carried from the *Store* to the *Assembly* station by a *Worker*. The *Store* can only provide mounting parts, but no main parts and has to be connected with a *Connector*, even when the *Worker* carries the part away.

- We changed the behavior of the method *mu* of the *Container*, the *Transporter* with a loading space, and of the *Store*. You can now call it with the parameter -1. Then the method returns the last MU on the object or VOID when the object is empty. You can, for example, use the method to unload a *Container* in reverse order.
- We changed the behavior of *Plant Simulation*. The method *finishedTime* of the MUs is now observable.
- We changed the behavior *Plant Simulation*. The attribute *RemainingSetupTime* is now observable.

- We do not support the method *createObject* any more. Use the methods *derive* or *duplicate* instead. To create the object at a certain position in the *Frame*, use the attribute *Coordinate3D*.
- We do not support the method *ShowStandardMenus* any more.

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## **New and Changed Features of the Fluid Objects**

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

### **New Features in Plant Simulation 13.2**

We added the observable attribute *currentMaterial* to the *Portioner*.

### **New and Changed Features in Plant Simulation 13.1**

- We added the Tab Controls and the Ingredient complete **control** to the *Mixer*.
- We replaced the method *setUp* with the method *resSetUp*.

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## **New and Changed Features of the Resource Objects**

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

### **New and Changed Features in Plant Simulation 13.1**

We changed the behavior of the *Workplace* when you create a new model. Now *Worker* stays here after completing the job is activated by default.

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## **New Features of the Information Flow Objects**

*Tecnomatix Plant Simulation 14* provides a number of new features.

### **New Features in Plant Simulation 14.0**

- We added the method *deleteContent* to the *TableFile*.
- We added a message when you try to change the source code of a read-only *Method*.
- We added an optional parameter to the method *open* of the *FileInterface*.
- We added an optional parameter to the method *open* of the *SQLite Interface*.

### **New Features in Plant Simulation 13.2**

- We added the *PLCSIM Interface*.

- We added the feature Statements to the SQLite Interface.
- We added the method executeStatement to the SQLite Interface.
- We added a feature allowing you to set a *class breakpoint* and/or an *instance breakpoint* for an encrypted method. The *Method* then stops at, respectively during, method execution in the *Debugger*.

When you did set a breakpoint, this *Method* shows the breakpoint with the respective icon within the *Method editor* or the *Method debugger* before the message **Source code is encrypted**.

### New Features in Plant Simulation 13.1

- We added the OPCUA Interface.
- We added the PLCSIM Interface.
- We added a function which shows the elapsed time in the status bar of the *Method Debugger* when you execute one or several instructions in a *Method* with the commands Step Over (**F10**), Step Into (**F11**), Step Out (**Shift+F11**) or Run to Cursor (**Shift+F10**) and when executing the instructions takes 10 milliseconds or longer.
- We added the tab Anonymous Identifiers to the **watch window** of the *Method*. *Plant Simulation* now shows the anonymous identifiers @ and ? on this tab instead of the **Tab Variables** as in previous versions of the program.
- We now mark temporary breakpoints and bookmarks in the source code of a *Method* in a brighter color than saved breakpoints and bookmarks. This might, for example, be the case when you changed the source code of a *Method* and set a breakpoint or a bookmark after the original end of the source code. These breakpoints or bookmarks are lost when you do not apply the source code.
- We added the method getHTMLCode to *lists* and *tables*.
- We added the method copyContentTo to the *lists* and *tables*.

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### Changed Features of the Information Flow Objects

*Tecnomatix Plant Simulation 14* provides a number of changed features.

#### Changed Features in Plant Simulation 14.0

- We changed the behavior of the column width of *lists* and *tables*. It is now limited to 180.
- We removed support for the method *selectSyncFromDialog* of the *Teamcenter Interface*.

#### Changed Features in Plant Simulation 13.2

- We fixed non-expected behavior that occurred in the method find of lists and tables. When you searched a table and then started a second search, for which you entered a range, which did not contain the cell of the first search, the search was only started after the first cell of the new range, as the search was continued.

Now we reset the search and the search then starts in the first cell of the range as if a call of the method `setCursor` had been executed.

- We added the columns **Description** and **Creation Date** to the tables in the dialog **Select Teamcenter Sync** (Import). In addition, you can now sort the columns in the tables.
- We changed the names of the following interface objects:

Old Name	New Name
OPCUAInterface	OPCUA
OPCClassicInterface	OPCClassic
SIMITInterface	SIMIT

### Changed Features in Plant Simulation 13.1

- We renamed the *OPCInterface* to *OPCClassicInterface* and we added the *OPCUAInterface*.
- We activated the setting *Decimal places* for the *Variable* for variables of data type *time*.
- We replaced the methods *indexXDim* and *indexYDim* of the *TableFile* with the read-only attributes *XDimIndex* and *YDimIndex*.
- We changed how *Plant Simulation* exports data from tables with the command *Export Excel File* to the Excel format: Until now *Plant Simulation* always used the proprietary SI units and not the unit that you had selected. Now *Plant Simulation* exports the data with the settings that you selected for the units. Suppose that you selected **Foot** as the length unit for a column of data type *Length*. Then *Plant Simulation* exports the values in **Feet** to Excel and interprets the values as **Feet** when you import them back to *Plant Simulation*.
- We added an optional parameter to the method `openDialogBox`. You can use it to set that the column widths will be calculated automatically.
- We do not support the attributes *ShowToolBar* and *ShowStandardMenus* any more.

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### New and Changed Features of the User Interface Objects

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

#### New and Changed Features in Plant Simulation 14.0

- We added the object *WorkerSankeyDiagram* to the **User Interface** objects.
- We added a message that asks if you want to cancel your changes when you click **Cancel** or press the **Esc** key in the dialog of the object *HtmlReport*.

#### New and Changed Features in Plant Simulation 13.2

- We added access to cells of lists and tables in the object *HtmlReport*.
- We changed the syntax of the method `getHtmlCode` of the *Chart*.

## New and Changed Features in Plant Simulation 13.1

- We added the method `setEditType` to the object *Dialog*.
- We enhanced the functionality of the object *HtmlReport*. You can set the table columns for objects which show statistics tables in the report, compare Display Statistics Values of an Object as a Table in the Report.
- We changed the unit with which *Plant Simulation* shows the **width** and the **height** of the objects *DropDownList* and *Button*. In previous versions these were displayed in pixels, now they are shown in meters.

To facilitate this, we introduced the attributes `ObjectWidth` and `ObjectHeight` and we removed support for the attributes *Width* and *Height*.

- We moved the setting `Data` in the dialog of the object *Chart* from the tab *Display* to the Tab `Data`.

The setting `Display in Frame` on the tab *Display* now also affects 3D.

When **Display in Frame** is activated, you can now enter the **Width** and the **Height** of the chart in length units, for example in meters. You can also set the dimensions with the attribute `SizeInFrame`.

- We replaced the methods `getValue` and `setValue` of the object *Display* with the attribute `Value`.

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## New and Changed SimTalk Features

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

### New and Changed Features in Plant Simulation 14.0

- We added the keyword `waitExpired`. This way you can specify a time limit for **waituntil- and stopuntil-statements**.
- We made these changes in connection with the internal web server of *Plant Simulation*:
  - The internal web server will now only be started when you entered the start option `-WebServer` or `-WebServer:Portnumber`.
  - The function `portNumber` now returns 0 when the web server has not been started.
  - For the function `openHTMLBrowser` URLs that begin with `L/` only work when the web server has been started.

### New and Changed Features in Plant Simulation 13.2

- We added the method `appendArray` to the arrays.
- We changed the behavior of the `wait` instruction: When it is executed with a negative time, *Plant Simulation* opens the *Method Debugger* and shows an error message. In previous versions a negative wait time was implicitly changed to 0.
- We added the method `_3D.activateMaterialWithColor` for the MUs.

## **New and Changed Features in Plant Simulation 13.1**

- We enhanced the functionality of the *modulo operator*, compare Arithmetic Operators. They now also work for floating point values.
- We enhanced the functionality of the *arrays*. You can now add and subtract arrays of numerical data types.
- We added the function `getErrorStop`.
- We enhanced the functionality of SimTalk 2.0. You can now enter *time literals*:

```
wait 1:30 -- wait 1 Minute and 30 seconds
&Method.methCall(1:0:0:0.5) -- call the Method in 1 and half a second
```
- We changed the behavior of *Plant Simulation*. When the *SimTalk* functions for arrays `min` and `max` are called with two values, which have the same physical unit, the return value now also has this value. Compare these examples

```
min(time, time)      -> time
min(length, length) -> length
min(length, speed)  -> real
min(length, real)   -> real
min(integer, integer) -> integer
min(integer, real)  -> integer
min(real, integer)  -> integer
min(integer, weight) -> real
```
- We changed which objects the method `numOfLimitedObjects` does not count as well, namely objects of type *Interface* and *EventController*.

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## **Miscellany**

*Tecnomatix Plant Simulation 14* provides a number of new and improved features.

## **New and Changed Features in Plant Simulation 14.0**

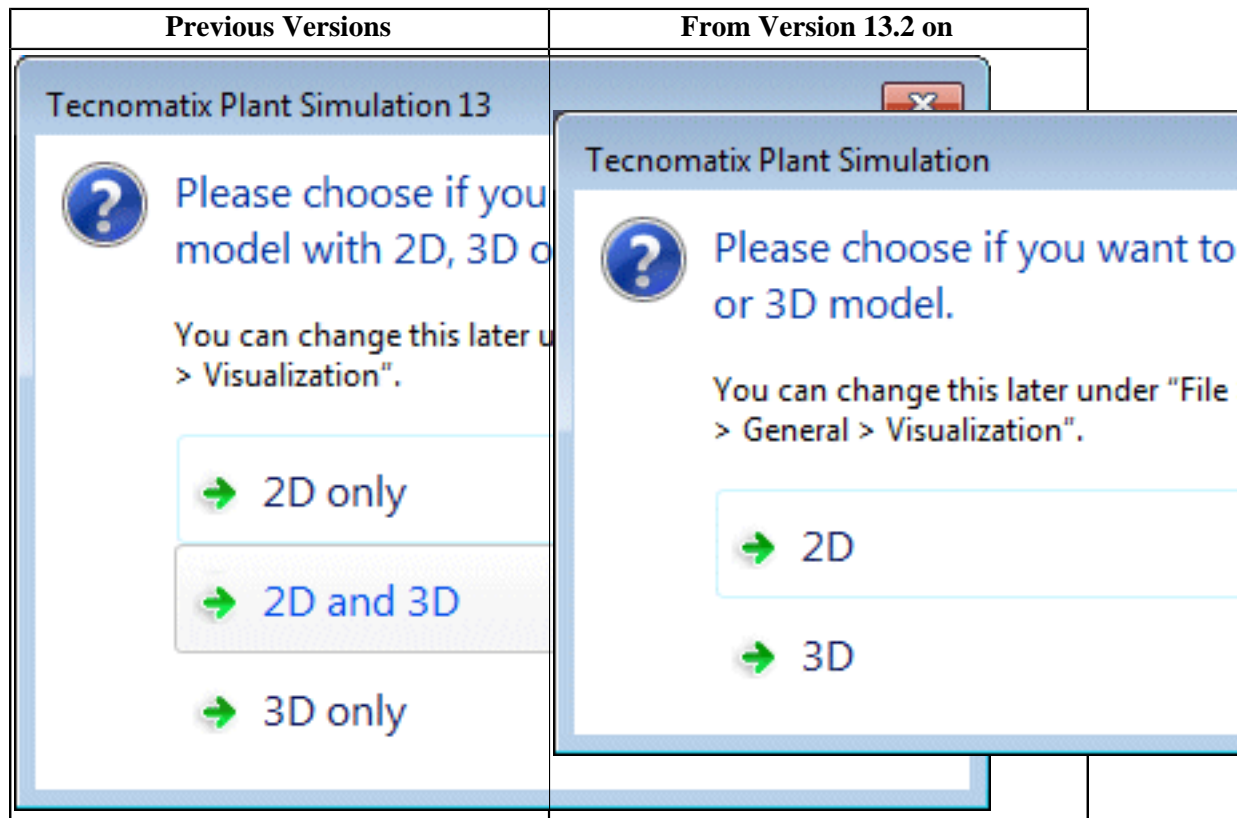
- We moved the settings for *Connectors*, namely Connect objects automatically and Connector positioning from the tab **User Interface** to the tab General in the dialog **Preferences**.
- We added the settings for *Connectors* to the tab General in the dialog **Model Settings**.
- We matched the categorization of the attributes and methods in the *Online Help* in the *Online Help* with the categories in the dialog **Show Attributes and Methods** in *Plant Simulation* itself. We now list the Methods of the Material Flow Objects, the Read-Only Attributes of the Material Flow Objects, and the Attributes of the Material Flow Objects.

## **New and Changed Features in Plant Simulation 13.2**

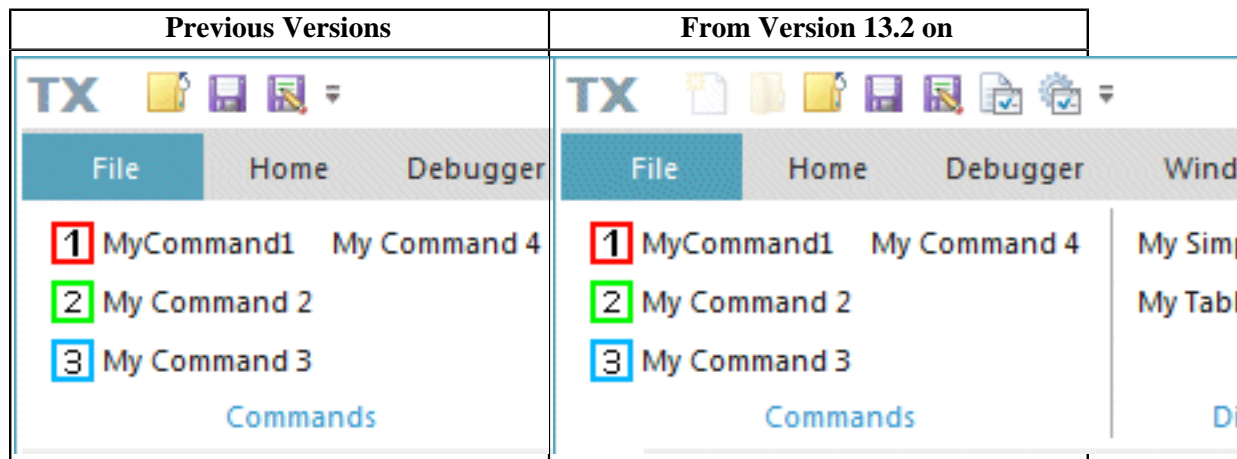
- We matched the description of the syntax of *Methods* and *Attributes* in the *Online Help* with the signature in the dialog **Show Attributes and Methods** in *Plant Simulation*.
- We matched the categorization of the attributes and methods in the *Online Help* in the *Online Help* with the categories in the dialog **Show Attributes and Methods** in *Plant Simulation* itself. We now list the Methods of the Material Flow Objects, the Read-Only Attributes of the Material Flow Objects, and the Attributes of the Material Flow Objects.



- We changed the selection that *Plant Simulation* offers when creating a new simulation model. *Plant Simulation* now only asks if you want to create 2D model or a 3D model. The setting 2D and 3D is not required any more as you can activate 3D any time for an existing 2D model by clicking **Activate 3D** on the tab **Windows** of the ribbon bar.



- We changed how *Plant Simulation* shows a user-defined ribbon tab. In previous versions *Plant Simulation* showed it under the ribbon tab/category **Frame** or **3D**. Now *Plant Simulation* shows it as a ribbon tab/category of its own named **User**.



- We renamed the tab **Modeling** to 2D. This allows us to hide the tab **2D** when you are only working with a 3D model.

- We moved the **Connector settings** Connect objects automatically and Connector positioning from the tab **2D** to the tab **User Interface** in the **Preferences** dialog.
- We changed the behavior of the **View Options**, such as Show Object Names, in the *Frame*. When you change one of these settings *Plant Simulation* changes it in the class from which this setting is inherited. If you only want to change the setting in the local instance, you have to **deactivate inheritance** first. We changed this because, as a rule, you will want to change the setting for all instances of the *Frame*.
- We added the check box Requires 3D to the dialog **Edit Library Information**. When you load a library for which this setting is selected, and when the *3D Viewer* is not activated, you will be asked if you would like to activate the *3D Viewer*. When you click **No**, the library will not be loaded.
- We moved the command **Edit 3D Properties** in the context menu of the selected object in the *Class Library* up to the commands for opening the object.
- We added an error message that *Plant Simulation* shows when you created a new object with the command *Derive* and when the new name, that you entered, could not be assigned.
- We enhanced the visualization of the *BottleneckAnalyzer* in 3D. We replaced the transparent box with transparent sides with lid and we adjusted the width to the number of columns.

### **New and Changed Features in Plant Simulation 13.1**

- We renamed the settings under Model Settings > General > Visualization. We added the setting **Ask Each Time** to Preferences > General > Visualization.
- We added the folder **User Objects** to the Class Library and to the *Toolbox*. Create and store the objects, which you yourself develop, in this folder.
- We added the folder **Objects** to the folder into which *Plant Simulation* is installed. By default it contains sub-folders with object files for *Containers* and *Transporters*. You can also save object files for re-usable objects which you and your colleagues created.
- We added the button **Update All Libraries** to the dialog *Manage Class Library*. You can use it to update all libraries to the newest version.
- We changed the behavior of when selecting objects in the *Toolbox*: When you select an object in the *Toolbox* while holding down the **Ctrl** key, the object remains selected in the *Toolbox* after inserting it. Thus you can insert several instances of the selected object one after the other. You can terminate this mode with the right mouse button or with the **Esc** key.

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### **New 3D Viewer Features**

*Tecnomatix Plant Simulation 14* provides a number of new features.

## New Features in Plant Simulation 14.0

- We added settings for the animation area to the tab **MU Animation** of the objects with matrix loading space. The animation area replaces the function **Create Paths > Create Locations** of previous versions of *Plant Simulation*.
- We replaced the setting **Auto graphics active** for the MUs with the setting **Scale automatically**. It adjusts the size and the position of the graphic of the MUs to the dimension and the booking point of the MU in 2D.
- We added settings for mirroring to the tab **Transformation**.
- We added settings for the rotation to the tab **point cloud**. This allows you to set a rotation with a rotation angle and a rotation axis. In previous versions you could only set the rotation angle and the point cloud used the pre-defined axis (0,0,-1).
- We added the command **Insert Factory Walls**.
- We added the setting **Obstacle for the worker > Sides** to the command **Insert Stairs**.
- We added the button **Obstacles** to the tab **View** of the *3D-Viewer*.
- We added the button **Adjust Graphics to MU Size** to the tab **Graphics** of the MUs in the dialog **Edit 3D Properties**.
- We replaced the command **Create Cone** with the command **Create Cone Frustum**.
- We added buttons for moving camera marks up or down in the list of camera marks.

## New Features in Plant Simulation 13.2

- We added the attributes `_3D.ShowConnections`, `_3D.ShowExternalGraphics`, `_3D.ShowGrid`, `_3D.ShowPointClouds`, and `_3D.ShowShadows`.
- We added the attribute `_3D.getPositionOfObject`.
- We added the methods `_3D.SelfAnimations.<Animation>.play`, `_3D.SelfAnimations.playRotation`, and `_3D.SelfAnimations.playTranslation`.
- We added the tab **Captions** to the dialog **Edit 3D Properties** of the objects.
- We added the command **Show Statistics Report** to the context menu of the animatable objects in 3D.
- We added the command **Help on Dialog** to the dialog **Edit 3D Properties**. It opens the help topic for the dialog. You can then navigate to the help for the different tabs that the dialog provides.
- We added alternative graphics for Euro pallets of type EUR 2/ISO2, EUR 3, and EUR 6/ISO0 to the **Plant Simulation installation folder > s3d-graphics > Containers**. We use the Euro pallet of type EUR 1/ISO1 as the standard graphic.
- We added a message that *Plant Simulation* shows when you exchange the 3D graphic of an object with matrix loading space, such as the *ParallelProc*, the *Container*, the *Workerpool*, etc. *Plant Simulation* now asks if you want to use the number of places from the 3D **MU**

**Animations** of the new graphic as the new capacity. This applies when the number of loading spaces differs between the original graphic and the new graphic.

### **New Features in Plant Simulation 13.1**

- We added the tab Robot Arm Animation to the dialog **Edit 3D Properties** of the *PickAndPlace Robot*. On it you can set if it will be animated with one, three, or with four axes.
- We added the objects *Dropdownlist*, *CheckBox*, and *Button* to the objects which the *3D Viewer* shows in 3D windows. When you set scaling on the tab **Transformation** in the dialog **Edit 3D Properties**, this does not affect the **width** and the **height** in the dialog of the object in 2D. The *3D Viewer* only distorts the graphic of the object and does not change its dimensions.
- We added the eddison interface.
- We added the sub-command Export Bitmap to the command Export Scene.
- We added the setting **Optimize for** to the command Insert Rack.
- We added the setting Show sensors to the dialog **Edit 3D Properties > Tab Graphics**.
- We added the command Show Corner Points to the context menu of the *Connector*. You can use it to attach the *Connector* to another object.
- We added **SolidEdge files** (\*.asm, \*.par, \*.psm) to the data types that *Plant Simulation* can import as graphics.
- We added the method `_3D.exportAsBitmap`. It exports the designated 3D scene as a .PNG file.
- We added the methods `_3D.addObject` and `_3D.delete`.
- We added the method `_3D.SelfAnimations.scheduleTranslation`.

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### **Changed 3D Viewer Features**

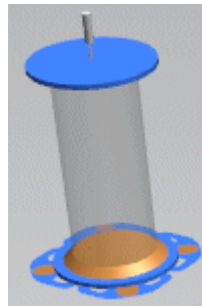
*Tecnomatix Plant Simulation 14* provides a number of changed features.

#### **Changed Features in Plant Simulation 14.0**

- We changed how to **create rotation paths**. You can now select the setting Rotation path (Lines) instead of clicking the button **Create Paths > Create Rotation Path**.
- We changed the functions of the command Insert Cylinder. You can now select the individual parts of the cylinder that you want to create.
- We changed how the *3D Viewer* searches for applicable MU animation paths for showing *Workers*. This no longer works based on animation path names, for example **Default** for the *FootPath* or **#0#1**, etc. for the *WorkerPool*, but based on the consecutive number in the MU animation attribute as already implemented for MUs on the *PickAndPlace robot* or on a *Worker*. When the *3D Viewer* does not find the path with the required number, for

example the second path to show the second *Worker* on the *WorkerPool*, it uses the path named **Default** if that path exists.

- We removed the commands **Show/Hide Camera Icons** and **Toggle Camera** from the tab **View** of the *3D-Viewer*.
- We separated inheritance of the state graphics from inheritance of the object graphics on the tab Graphics. You can now activate or deactivate them separately with the toggle buttons next to Object graphics and State group.
- We changed the behavior when modifying the orientation of a State group. The last transformation of the vertical or horizontal state group now does not get lost any more.
- We changed how the *3D Viewer* scales. In previous versions you could also enter a negative scaling factor. From version 14 on we split this into settings for unsigned scaling (settings for scaling) and settings for mirroring.
- We changed how the *WorkerPool* in 3D looks. It now looks like this:



As opposed to 2D it only shows a single *Worker* in 3D. If you would like to see how many *Workers* are staying in the *WorkerPool*, open it in a new 3D window.



- We changed how the command Lock Structure works. It now also prevents you from inserting graphics.
- We changed the data type of the 3D attributes and the parameters of 3D methods, which refer to a position or to dimensions. In previous versions the data type was *real*. From this version on the data type is *length* or an array of data type *length*.

- We changed the behavior for the first anchor point of an extrusion polycurve. For the first anchor point you cannot open the dialog **Edit 3D Properties**.
- We changed the behavior when selecting something in a 3D window. From this version on this selection is only visible in this 3D window except the selection is an MU instance.

In previous versions this selection was visible in all open 3D windows. If, for example, you selected a graphic in an open *SingleProc*, this graphic was marked as selected in all 3D windows for all *SingleProcs* which inherit their graphics from this *SingleProc* or from the *SingleProc* from which this graphic inherits. When you selected an object this object was shown as selected in all windows, for example in an inserted *Frame* instance as well as in the *Frame* class and in all windows which were opened for that object. Now this is only the case when you select an MU instance, namely the object and not its graphic.

- We activated the buttons for controlling the simulation on the mini toolbar in the 3D window of an animatable object.
- In Full Screen mode you can now also show the frame rate by pressing the **F** key and use the multimedia buttons on multimedia keyboards.
- We changed the behavior when rolling the mouse wheel in the window of a 3D scene. *Plant Simulation* now zooms the 3D scene in when rolling the mouse wheel forward. In previous versions it zoomed the scene out. To facilitate this, we changed the standard setting under **Preferences > 3D > Mouse wheel behavior** to **Move camera**. In previous versions it was **Move scene**. The new standard setting is the same as in *NX* and on *Web sites*.
- We added a second optional parameter to the method `_3D.exchangeGraphic`.

### Changed Features in Plant Simulation 13.2

- We enhanced the behavior of the *3D Viewer*. You can now combine the functions Align to Grid and Snap to Grid.
- We enhanced the behavior of the function Align to Grid. It now also applies to graphics.
- We changed the behavior of the feature Show Shadows. You can now only activate it for objects of type *Frame*.
- We changed the behavior of the extrusion configuration of the length-oriented objects on the tab Appearance in the dialog **Edit 3D Properties**. We renamed the conveyor type setting **Not defined** to **User-defined**.

We moved the settings for defining a user-defined conveyor from a series of sub-dialogs to the tab Appearance itself.

We limited the values for **graphic group IDs** in the extrusion configuration to values between 0 and 10.

- We renamed the following methods: `_3D.pauseAnimation` to `_3D.pause`, `_3D.playAnimation` to `_3D.play`, and `_3D.resetAnimation` to `_3D.reset`.
- We removed the button **Show Preview** from the dialog **Edit 3D Properties**. The program now shows changed values immediately after changing them.

## Changed Features in Plant Simulation 13.1

- We renamed the tab **Extrusion** for length-oriented objects in 3D to Tab Appearance.
- We enhanced the behavior of the *3D Viewer* for displaying objects of type *Display*, *Comment*, and *Variable* in 3D windows. The *3D Viewer* now shows them with the font size that you selected in the dialog of the object in 2D.
- We enhanced the behavior of the *3D Viewer* for displaying angle-dependent *Connectors*. They are now displayed as in 2D, namely depending on the angle between the objects.
- We changed the coordinates with which we define the **bounding box** of an obstacle for the Worker:
  - From this version on we use the object coordinates. Previous versions used the coordinates of the graphic nodes.
  - The bounding box of the methods *\_3D.BoundingBoxSize*, *\_3D.BoundingBoxMax*, *\_3D.BoundingBoxMin*, and *\_3D.BoundingBoxCenter* as well as some interactive functions now excludes **all** hidden graphics.
- We changed the behavior when calculating the bounding box of the objects in 3D: Displayed path nodes and objects, which are located on the object, are now excluded from the calculation.
- We changed what the command Export Graphics exports:
  - If you selected an object or a graphic in the active 3D window, the *3D Viewer* exports the selected object or the selected graphic.
  - If you did not select anything, the *3D Viewer* exports all graphics that are visible in the 3D window.
- We changed the behavior when *Plant Simulation* automatically inserts *Connectors*. The *3D Viewer* now uses the *Interface*, when you insert an *Interface* into *3D Frames* with visible contents and move it with the mouse or with keyboard keys.
- We renamed the command **Insert Facet** to Insert Plate.
- We added four additional settings to the function MU side to attach and we changed the functioning of the existing settings.

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## What's New in Tecnomatix Plant Simulation 13

### What's New in Tecnomatix Plant Simulation 13

*Tecnomatix Plant Simulation 13* provides a number of new and improved features.

- [Important Changes in Plant Simulation 13](#)
- [New Features of the Material Flow Objects](#)
- [Changed Features of the Material Flow Objects](#)

- [New Features of the Fluid Objects](#)
- [New Features of the Information Flow Objects](#)
- [Changed Features of the Information Flow Objects](#)
- [New and Changed User Interface Features](#)
- [New and Changed SimTalk Features](#)
- [Miscellany](#)
- [New 3D Viewer Features](#)
- [Changed 3D Viewer Features](#)

As the program changed at a number of places, you might have to adapt simulation models you created in previous versions of *Tecnomatix Plant Simulation*, when you open them in *Tecnomatix Plant Simulation 13*.

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## Important Changes in Plant Simulation 13

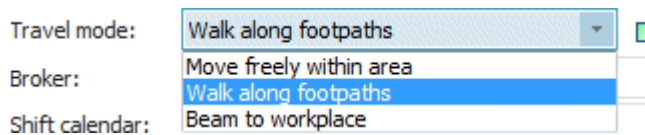
*Tecnomatix Plant Simulation 13* provides a number of new and improved features.

### Important Changes in Plant Simulation 13.0

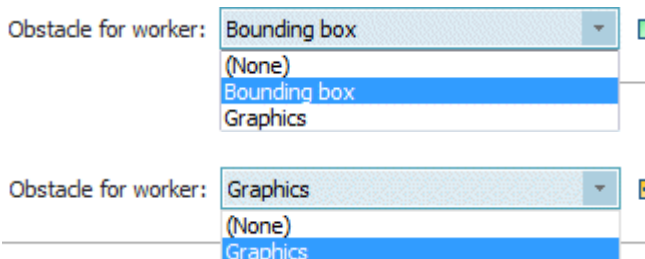
The most important new function in *Tecnomatix Plant Simulation 13* is the Worker **who moves freely within the area of the model**. This way he is not bound to *Footpaths* anymore which you insert into your model.

To enable free movement within the area, we added the following functions:

- We replaced the text box **Workers can beam to the Workplace** with the dropdown list travel mode in the *WorkerPool*.

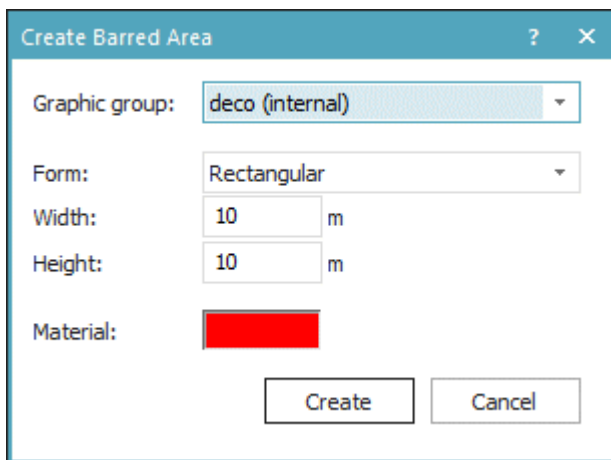


- We enhanced the functionality of most of the 3D objects to allow you to set if these are an obstacle for the *Worker* moving freely within the area. You find the setting **Obstacle** for the Worker on the Tab Graphics or on the Tab Graphic Settings. For most of the material flow objects the **bounding box** is an **obstacle for the worker** by default.





- We added the function Insert Barred Area to the *3D Viewer* to create areas which the *Worker* can enter but should not be, for example the pivoting range of a crane.

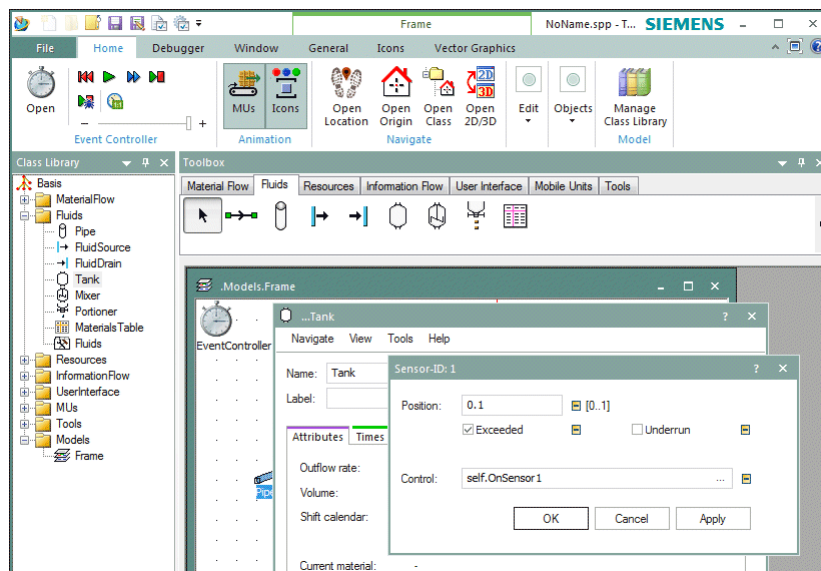


### Important Changes in Plant Simulation 12.1

*Tecnomatix Plant Simulation 12.1* provides a number of new and improved features.

- We changed the *user interface theme* of *Plant Simulation 12.1* to match the standard Siemens PLM theme. This affects the look-and-feel of the entire application, i.e., of the main program window, of the docking windows, of the object windows, and of the dialog windows.

Note that we have not replaced all screenshots of dialogs and windows in the *Online Help* yet.



- We introduced SimTalk 2.0. It's features make programming methods in *Plant Simulation*



faster, easier, and less error-prone. You can activate it by clicking New Syntax

on the **Tools** ribbon tab of the *Method*. If you want to use *SimTalk 2.0* syntax for all new *Methods* which you are going to program, activate **New Syntax** in the *Method class* in the *Class Library*. Changes caused by *SimTalk 2.0* also affect how the dialog Show Attributes and Methods displays the signature of attributes and methods. There turn value of a method is now displayed to the right of the keyword -> instead of to the right of the colon (:).

You can select if you want to use the **SimTalk 2.0** or **SimTalk 1.0 notation** for each and every of your *Methods*. You can also freely mix **SimTalk 2.0** or **SimTalk 1.0 notation** in your simulation models. There is no need to reprogram your existing source code.



Clicking **New Syntax** for an existing *Method*, which you created in **SimTalk 1.0 notation**, automatically converts the source code to the correct **SimTalk 2.0 notation**.

To convert the source code of all existing *Methods* in a simulation model to the new syntax, hold down the **Shift** key, click the object **Basis** in the *Class Library* with the right mouse button, and click Convert All Methods to New Syntax

- We only deliver the 64-bit version of *Plant Simulation*. We do not provide a 32-bit version any longer.
- We added support for the following 3D graphics formats to the command Import Graphics: **Parasolid Text**, **Parasolid Binary**, **PLMXML**, **STEP**, **IGES**, and **Catia V4**.

These formats require a **Professional**, an **Educational**, a **Research**, an **Application**, or a **Standard License**.

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## **New Features of the Material Flow Objects**

*Tecnomatix Plant Simulation 13* provides a number of new features.

### **New Features in Plant Simulation 13.0**

- We extended the functionality of most of the 3D objects to enable you to set if these objects are an obstacle for the *Worker* who moves freely within the area. You find the setting Obstacle for the Worker on the Tab Graphics or on the Tab Graphic Settings.
- We added the method isUp to the *AngularConverter*.
- We added the methods statTspUnplannedCount, statTspUnplannedDelta, statTspUnplannedMu, and statTspUnplannedTime to the *Transporter*.

### **New Features in Plant Simulation 12.2**

- We added the setting Base height to the Tab Curve of the length-oriented objects. As opposed to previous versions of the program, the **Base height** can now be inherited, meaning that you can define it once in the class instead of having to define it for each instance individually. It is mainly used in the *3D Viewer*. Here the **Z-coordinate** defines the floor of the installation and the **Base height** defines the distance of the legs of the

conveyor from the floor. By changing the setting  $\Delta Z$  in the **Segments table**, you can add an additional offset. The setting  $\Delta Z$  also affects the simulation time in *Plant Simulation 2D*.

To facilitate these changes, we also changed the Segments table, the Context Menu of Curved Objects, and we added the methods `getCurveSegments` and `setCurveSegments`. The methods replace the attribute *SegmentsTable*.

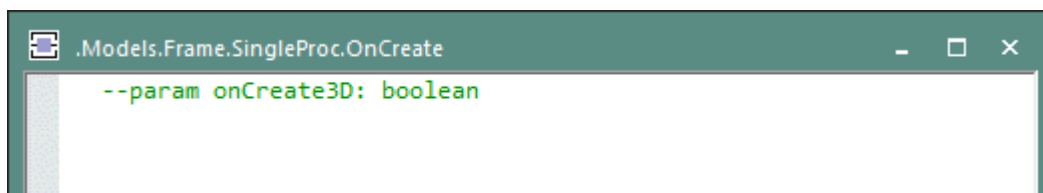
The changes above also affect the *3D Viewer*. We replaced the settings **Visualize**, **Edit**, and **Extend** in the group box **Curve** with the button Segments. It opens the segments table of the object in 3D, which now is the same as in 2D.



We removed support for the 3D attribute `_3D.ExtPolycurve`. We added the methods `3D.getExtSegments` and `3D.setExtSegments` instead.

## New Features in Plant Simulation 12.1

- We added the text box **Exit control** to the Tab Controls of the *Store*.
- We added the text box Capacity to the *Converter*.
- We added the **Exit strategy > Carry part away** to the *Store*. This enables a *Worker* to pick a part up at the *Store* and carry it to another station.
- We added the setting Width to the *length-oriented objects*.
- We added the attributes ObjectAngle and ObjectMirrored to the *curved objects*.
- We added the method `getObservers` to objects which can have observers.
- We added an optional parameter to the method `setUpFor`.
- We added an optional parameter to the Constructor control.



- We added the methods `getCurrentAngle`, `getLastDestination`, and `isRotating` to the *PickAndPlaceRobot*.
- We added the method `findPart` to the *ParallelProc*, the *Store*, and the *Container*.
- We added optional parameters to the method `createFailure`.
- We added a number of statistics methods to the MUs, for example `statProdFailTime`, etc., `statStoreFailTime`, etc., and `statTranspFailPortion`, etc.

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## Changed Features of the Material Flow Objects

*Tecnomatix Plant Simulation 13* provides a number of changed and improved features.

### Changed Features in Plant Simulation 13.0

- We changed and extended the following functions for setting curved objects:
  - After clicking on an existing object, *Plant Simulation* now also uses the angle from the previous object as start tangential angle of the new object when the predecessor object was displayed with its icon.
  - When setting a straight segment by clicking on an existing object, *Plant Simulation* uses, depending on the mouse position, either the angle of the object or +/- 90 degrees to this angle as the start tangential angle of the new object.
  - When setting a curve segment without clicking an existing object, *Plant Simulation* now proceeds as follows: When you enter an angle for straight segments, *Plant Simulation* uses this angle as start tangential angle of the new object. When you hold down the **Ctrl** key, *Plant Simulation* uses, depending on the mouse position, 0, +/-90 degrees or 180 degrees as start tangential angle.
- We changed when the **processing time** is evaluated. From now on no *Workers* are requested when you entered a **processing time** of 0. For this reason the **processing time** will now be calculated when the MU enters the object or when setting-up is finished, not when the *Worker* is requested or when he arrives as in previous versions.

If you would like to request a *Worker* in spite of a **processing time** of 0 enter a processing time that is slightly greater than 0, for example 0.001.
- We changed the user interface color of *Plant Simulation* from a dark teal to a dark cyan.
- We changed the behavior of the **user-defined ribbon**. The *3D Viewer* now also shows and activates it when you click on a *Frame* for which a **user-defined ribbon tab** is defined in *Plant Simulation 2D*.
- We changed the layout of the Tab Attributes of the MUs. In addition it now also shows the absolute position of the booking point.
- We changed the behavior when manually inserting MUs on *Line*, *Track*, and *TwoLaneTrack*. In previous versions *Plant Simulation* always inserted the MU at the end of the object. Now it inserts the MU at the position of the mouse pointer on the object.
- We changed the behavior when moving an MU with the method transfer. The MU is now moved with the command *transfer* after unblocking it, not with the command *move*.
- We renamed the method *movingAcceleration* of the MUs to *currentAcceleration*.
- We added the attribute *CurrentSpeed* to the *Line*. For the *Line*, the attribute is not observable.
- We renamed the method *movingSpeed* of the MUs to *currentSpeed*. The method now also applies to the *Transporter* as opposed to previous versions which provided the attribute *CurrentSpeed*. For the *Transporter* you can also set the **current speed**.

- We changed the behavior of the object *Cycle*. From now on you cannot drag two objects at the same time onto the object *Cycle* with the mouse anymore and drop it there.

## Changed Features in Plant Simulation 12.2

- We changed the Segments table so that it does not contain rotation or mirroring after a rotation or mirroring any more. The rotation is stored in the attribute *ObjectAngle* and mirroring is stored in the attribute *ObjectMirrored*. This allows to keep inheritance of the definition of the segments even when one or more segments are rotated or mirrored.
- We changed the behavior of the method *setRoute* of the *Transporter*. It now also accepts material flow objects other than objects of type *Track*. In previous versions these objects were allowed as destination of the route, but not as objects along the way. When assigning a route, which contains such objects with *setRoute*, then the *Transporter* passes these objects on its way to the destination. While automatically computing a route, *Plant Simulation* only takes *Tracks* and *TwoLaneTracks* into consideration.
- We changed the behavior of the methods *insert*, *move*, and *transfer* of an MU that is located on a *Converter*. These cannot be called with an index for the successor any longer. In previous versions the index was ignored when you passed one and *Plant Simulation* showed a warning in the *Console*. From this version on the *Method Debugger* will be opened with an error message instead.

## Changed Features in Plant Simulation 12.1

- We changed the behavior of *Transporters* that were stopped by *Plant Simulation*, for example in an **Exit control**. When you change the direction of movement by changing the setting **Backwards** of a *Transporter*, now the *Transporter* immediately starts moving. In previous versions you had to make the *Transporter* start moving again by entering `Stopped := false`. As a result of this change you may have to adjust your model by **Stopping** the *Transporter* before changing the state of **Backwards**. Otherwise the *Transporter* starts moving in the previous direction in order to reduce its **Speed** to 0 before being able to turn around.
- We changed the behavior when opening the **Blocked exit** of a material flow object. In previous versions the *Line* or the *Transporter* started accelerating again with the **Speed** that these objects had before. Now they accelerate starting a speed of 0.
- We limited the **Capacity** of *MUs* to 1 million storage places per MU and we limited the **Capacity** of *Stores* and *ParallelStations* to 10 million places per object to prevent slowing down the computer by using up too much RAM.
- We enhanced the behavior of the *Assembly* station. For the setting **Attributes** > Assembly table > **MU Types** the *Worker* can now deliver mounting parts to the *Assembly* station without you necessarily having to connect the *Assembly* station with the station which provides the mounting parts.
- We changed the behavior of the method *getDestination* of the *PickAndPlaceRobot*. It now also returns a destination object when it rotates to the destination without transporting a part.
- We removed the view option **Enlarge Objects** from the **General** ribbon tab of the *Frame*.

- We enhanced the behavior of the method `removeObserver`. You can now also enter `void` as second parameter. This deletes all *observers* which point to nonexisting methods.
- We changed the behavior of the **Exit strategy** > Carry part away. The **Exit strategy** will be executed once only when the part is moved onto the *Worker* and when **Exit control once** is activated.

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## New Features of the Fluid Objects

*Tecnomatix Plant Simulation 13* provides a number of new features.

### New Features in Plant Simulation 13.0

- We added a function allowing you to add the *MaterialsTable* to the objects *DePortioner* and *Mixer* with drag and drop.
- We added the method `contentsList` to the fluid objects.

### New Features in Plant Simulation 12.2

- We added the object *DePortioner*.
- We added the fluid objects to the objects which the *LockoutZone* can control.

### New Features in Plant Simulation 12.1

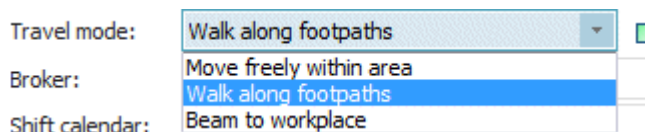
- We added *Sensors* to the *Tank*. You can select if the amount of material in the *Tank* has Exceeded or Underrun the sensor level.
- We added the setting *Outflow rate* to the *Pipe*.
- We added the methods `entranceOpen` and `timeUntilEntranceOpen` to the *Mixer*.

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## New and Changed Features of the Resource Objects

In *Tecnomatix Plant Simulation 13* we provide these new and changed features:

- We added the text box *Average traveled distance* and the method `statAverageTraveledDistance` to the *WorkerPool*.
- We replaced the text box **Workers can beam to the Workplace** with the dropdown list *travel mode* in the *WorkerPool*.



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## New Features of the Information Flow Objects

*Tecnomatix Plant Simulation 13* provides a number of new features.

### New Features in Plant Simulation 13.0

- We added a new function to open the *Method* from which the current *Method* inherits its source code. To do so, hold down the **Shift** key and click the button Open Origin in the current *Method* or in the *Method Debugger*.

### New Features in Plant Simulation 12.2

- We removed the Font selection from the settings of the *Method Editor*. The *Method Editor* and the *Method Debugger* now use the font **Consolas** in different fixed sizes between **6** and **72** points.

You can increase or decrease the font size by holding down the **Ctrl** key and by rolling the mouse wheel forward and backward in the *Method Editor* or the *Method Debugger* window. When you change the font size with the mouse wheel, *Plant Simulation* saves this as the new preference and uses it when you start the program the next time. *Plant Simulation* uses the changed font size in all open *Method* windows, not just in the one in which you rolled the mouse wheel.

Instead of rolling the mouse wheel, you can also use these key combinations:

**Ctrl** plus + increases the font size

**Ctrl** plus 0 resets the font size to the standard size of 10 points

**Ctrl** plus - decreases the font size

- We added horizontal scrolling in the *Method Editor* by holding down the **Shift** key and by rolling the mouse wheel.
- We added the command Show Object to the context menu of the selected object in the source code in the *Method Editor* and in the *Method Debugger*. The command opens the *Frame* in which the object is inserted and selects the object in the *Frame*.

If the selected object references another object, for example with a *Variable*, the command shows the referenced object, not the referencing object! The context menu of the *Variable* in the *Method Debugger* also provides the command **Show Object**.

- You can now add an *integer* value to a *string*. This applies to *SimTalk 1.0* as well as to *SimTalk 2.0*.

#### Example:

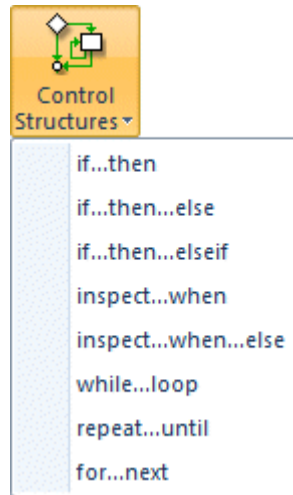
```
param obj : object -> string
return obj.Name + obj.XPos
```

- We added the method `appendRow` to the *TableFile*.
- We added an optional parameter to the method `createNestedList` of the *CardFile*, `createNestedList` of the *StackFile* and `createNestedList` of the *TableFile*. It allows you to enter the name of the list/table to be created in the designated row/cell.

### New Features in Plant Simulation 12.1

- We added the method `readXMLString` to the *TableFile*.

- We added renamed the control structures, compare Insert Control Structure. Note that they create SimTalk source code.



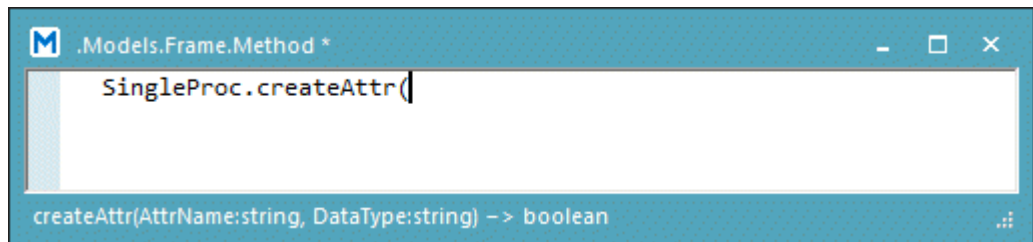
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## Changed Features of the Information Flow Objects

*Tecnomatix Plant Simulation 13* provides a number of changed and improved features.

## Changed Features in Plant Simulation 13.0

- We extended the function Auto Complete of the *Method*. When you insert a function or a *Method* with parameters into a *Method*, *Plant Simulation* now shows the status bar. The status bar shows the signature of the *function/Method* and thus makes entering the required parameters easier. *Plant Simulation* hides the status bar again when you type in the closing parenthesis or when you press the **Esc** key.



- We replaced the methods *getFormatData* and *setFormatData* of lists and tables with the method *copyFormatTo*.
- We changed the behavior of the **Options** (Syntax-controlled Indentation, Show Line Numbers, View) on the **Tools** ribbon tab in the *Method Editor*: When you change one of these settings, this change now applies to the entire *Plant Simulation* session for all newly opened *Methods*.

When you deactivate **Toggle Outline** in the *Method Editor* for example, it now remains deactivated when opening an additional *Method* or when reopening this *Method* in the current *Plant Simulation* session. These changes do not affect the preferences.



- We changed the behavior when changing the **font size** in the *Method Editor*. When changing the **font size** with the mouse wheel, this now does not affect the **Preferences** any more. The *Method* only uses the changed **font size** until you change it the next time or until the end of the current session for all *Methods* which you open afterwards. Changing the **font size** does not affect any opened *Methods* at all.

## Changed Features in Plant Simulation 12.2

- We changed the behavior when a *Method* accesses outdated, i.e., no longer officially supported *attributes*, *methods*, and *functions*. As opposed to previous versions *Plant Simulation* no longer shows a message in the *Console*. Instead, you can use the command Find Outdated Functions on the Debugger Ribbon Tab to find outdated *attributes*, *methods*, and *functions*.
- We changed the behavior of the *TableFile*. When you accessed a cell via a **column or row index** of data type *string*, *Plant Simulation* only matched the case when the **Fast index access** was activated. From now on *Plant Simulation* ignores case sensitivity.
- We changed/enhanced the behavior of the *SQLiteInterface*. If you do not enter a File Name for the database, *Plant Simulation* creates it in memory. This then is the same as if you had entered `:memory:`.

## Changed Features in Plant Simulation 12.1

- We removed the LED for *Methods* that are suspended by a *wait-instruction* or by a *sleep-instruction*. The *Methods* now shows the same LED as for suspended *Methods*.
- We changed the behavior of the method `createNestedList` of the *CardFile*. In methods, which use *SimTalk 2.0* syntax, the method `createNesteList` does not insert the new sublist between already existing sublists, but overwrites the sublist without moving existing sublists one row downwards.

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## New and Changed Features of the User Interface Objects

*Tecnomatix Plant Simulation 13* provides a number of new and improved features.


### New Features in Plant Simulation 13.0

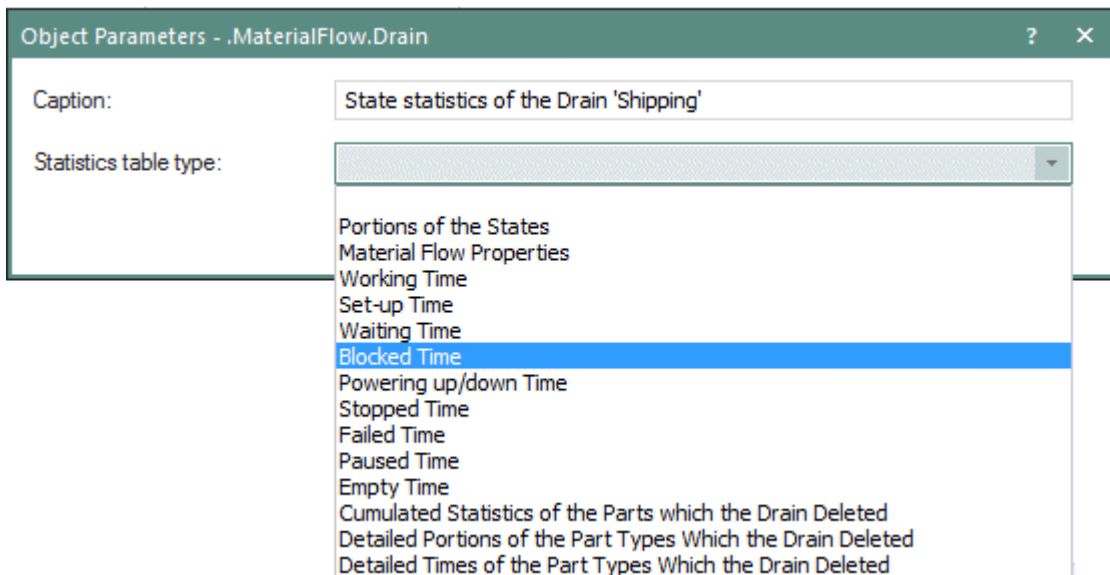
We added the attribute `TocLevels` to the `HtmlReport`. You can use it to set the number of levels for the table of contents.



### New Features in Plant Simulation 12.1

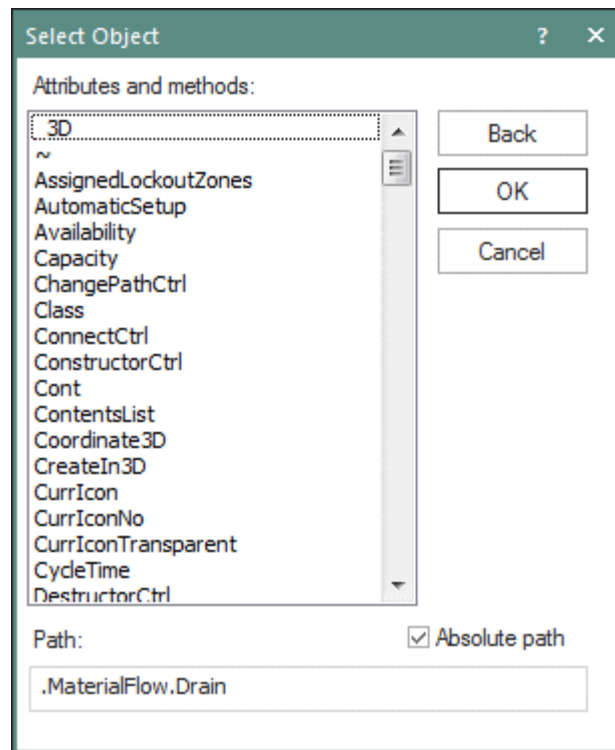
In *Tecnomatix Plant Simulation 12.1* we added or modified these features of the user interface objects.


- We added a function to Display a Picture of a 3D Scene to the `HtmlReport`.
- We changed a number of functions of the `HtmlReport` when you add objects on the Tab Content:

- When the text cursor is located within an object reference ([...]), *Plant Simulation* opens the dialog **Object Parameters** for entering the object parameters of the object within the square brackets, when you click **Add Object** .



- When the text cursor is located within an object reference ([...]), *Plant Simulation* opens the dialog **Select Object** preset to the path detected within square brackets, when you hold down the Shift key while clicking **Add Object** .
- When the text cursor is located within a picture reference ([ !... ]), *Plant Simulation* first opens the dialog **Open File** and then the dialog **Object Parameters** for the path within square brackets when you click **Add Image** .



- When the text cursor is located within a picture reference ( [ !... ] ), *Plant Simulation* first opens the dialog **Open File Object** and then the dialog **Object Parameters** preset to the path detected within square brackets when you hold down the **Shift** key while clicking **Add Image** 
- When you select a *Frame* to be inserted, which provides the user-defined attribute *StatisticsObject*, the dialog **Object Parameters** shows the available statistics functions.

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## New and Changed SimTalk Features

*Tecnomatix Plant Simulation 13* provides a number of new and improved features.

### New and Changed Features in Plant Simulation 13.0

- We added the function computeSHA3Hash.
- We added the function strHash.
- We added the function \_3D.ShowSensors.
- We changed what the function closeAllWindows does. As opposed to previous versions it now also closes 3D windows.

### New and Changed Features in Plant Simulation 12.2

- We added the function setRandomSeedCounter.

- We added the functions `regex_replace` and `regex_search` to search and replace regular expressions.
- We added a function to define Default Arguments in *SimTalk 2.0*.
- We added the attributes X, Y, and Z to the one-dimensional arrays which are of data type *integer*, *real*, or *length* and which have a fixed dimension of two or three elements.
- We changed the behavior of the method `str_to_method` and we added a second, optional parameter.

### **New and Changed Features in Plant Simulation 12.1**

- We introduced SimTalk 2.0. It's features make programming methods in *Plant Simulation* faster, easier, and less error-prone.
- We added the function `splitStringToNum` to the functions for manipulating strings.
- We added the function `atan2` to the trigonometric functions.
- We added the function `deleteValue` to the one-dimensional arrays.
- We enhanced the function `setMUTraceRouteMethod`. You can now set several *MU-Trace-Route-Callback-Methods*. Up until version 12 you could only set a single *Method*. To do so, you can enter an array of objects.

When you save a *Frame* or a *folder* as an `.obj` file *Plant Simulation* now also saves the list of the assigned *MU-Trace-Route-Callback-Methods* to the `.obj` file. This only applies to those **callback methods** whose *Method* objects are also written to the `.obj` file. If you load the `.obj` file into another simulation model, *Plant Simulation* adds the *MU-Trace-Route-Callback-Methods* in the `.obj` file to the **callback methods** contained in the model.

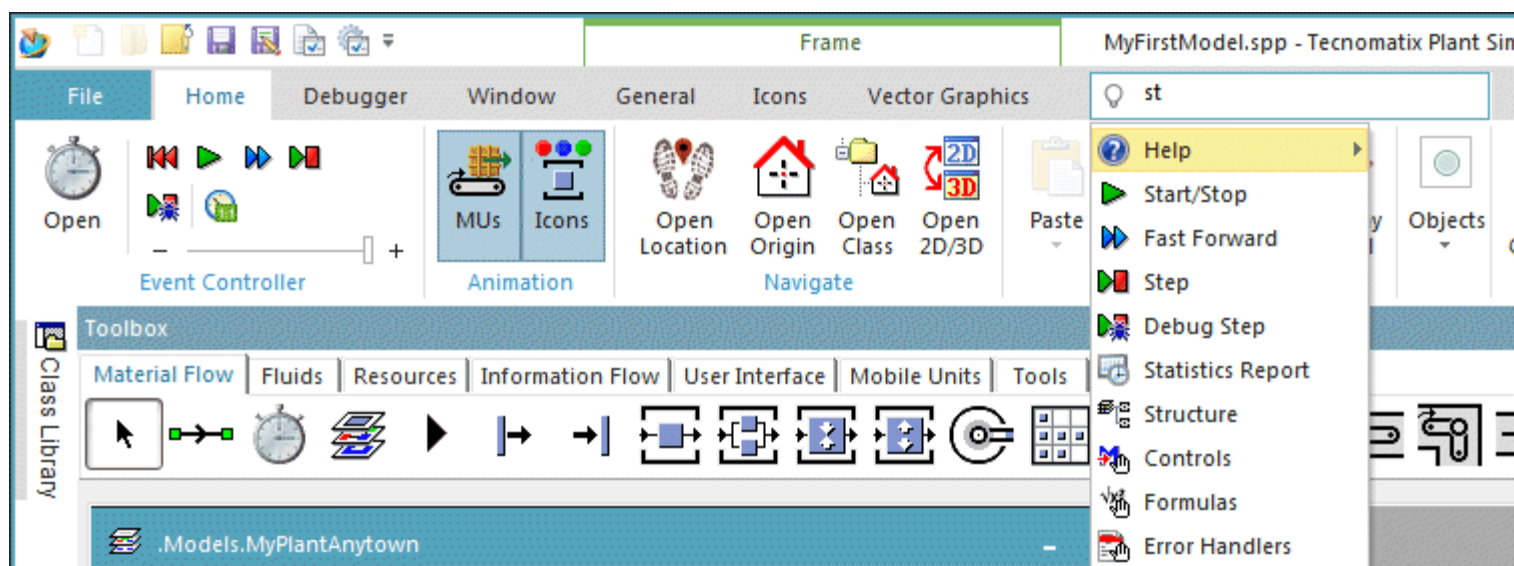
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## **Miscellany**

*Tecnomatix Plant Simulation 13* provides a number of new and improved features.

### **New and Changed Features in Plant Simulation 13.0**

- We added the function Find a Command. Enter words and phrases about what you want to do next and quickly get to features you want to use or actions you want to perform into the text box **Find a Command**.



- *Plant Simulation* now uses the SPLM license mechanism version 8.0.1. For this reason *Plant Simulation* now requires the license server version 8.0 or higher.
- We removed support for the start option **-StartPage**.
- We removed the **View Option > Show Animation Points** of the *Frame*.
- We removed the **Preference/Model Setting > Modeling > Show Animation Points**.

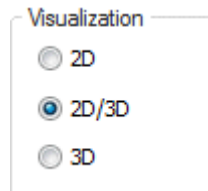
## New and Changed Features in Plant Simulation 12.2

- We added the function `setVisible` to the *COM Interface*. When *Plant Simulation* is created as a COM server it is invisible by default. You can use `setVisible` to make it visible.
- We enhanced the behavior of the feature Find Outdated Functions on the **Debugger** ribbon tab: In addition to finding outdated *attributes*, *methods*, and *functions* in the source code of *Methods*, it also finds *observers of outdated attributes*, for example observers of the attribute *ChannelID*. For such observers *Plant Simulation* opens a window containing a list of all outdated attributes for the observers. When you double-click an entry in the list, *Plant Simulation* opens the dialog Edit Observers for the observed object, as long as only a single observed object exists. If several observed objects exist, *Plant Simulation* opens a window with a list of all observed objects. To open the observer window for the respective object, double-click the respective entry in the list.
- We changed the behavior when you modify the Axes origin X and the Axes origin Y of the *Frame*. When you change the **axes origin**, *Plant Simulation* now keeps the 3D coordinates and changes the pixel coordinates. *Plant Simulation* checks if your changes create allowed pixel coordinates. It only changes them if that is the case.
- We changed the behavior when you modify the Scaling Factor of the *Frame*. When you change the **scaling factor**, *Plant Simulation* now keeps the 3D coordinates and changes the pixel coordinates. *Plant Simulation* moves the axes origin if your change would create negative pixel coordinates.

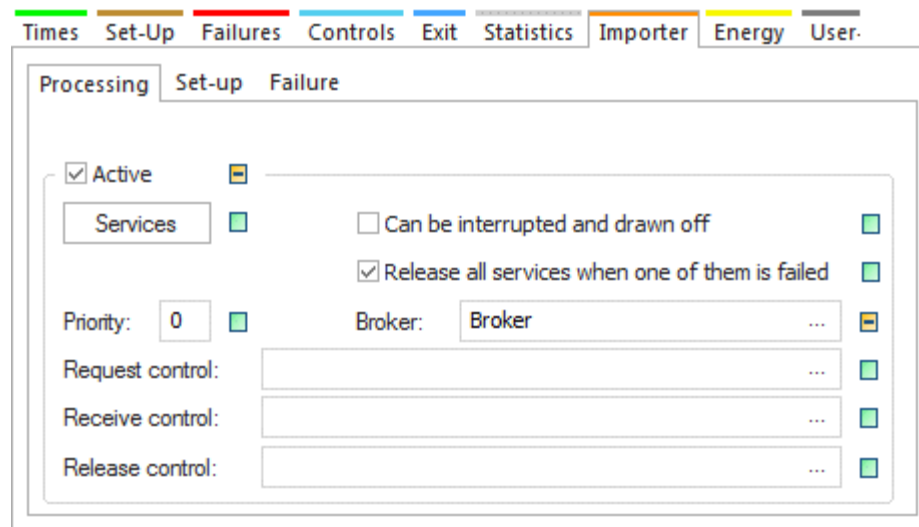
- We changed the behavior when **zooming the contents** of a *Frame*: In previous versions you could hold down the right mouse button and drag a marquee over the objects of interest. Now you have to hold down **Ctrl + Shift** and drag a marquee with the left mouse button.
- We changed the behavior of *user-defined attribute methods*, which are deleted while they are being executed. Method execution is now terminated immediately, it will not be continued. Compare the following examples:
  - Suppose that an MU has a *user-defined attribute method*, which was suspended via a *waituntil instruction*. Then, the MU is deleted in the *Drain*, which naturally also deletes its *user-defined attributes*. Thereupon the *Method* is deleted from the list of suspended methods and method execution is terminated, i.e., the instructions after the *waituntil instruction* will not be executed. If the *attribute method* was called from another *Method*, execution of this *Method* will be continued. When the *attribute method* had a return value, the value, which the implicitly existing local variable *result* had at this point in time, will be returned to the calling *Method*.
  - Suppose that an MU has a *user-defined attribute method*, which is called by the **entrance control** of a *SingleProc*. The *attribute method* in turn calls a *Method* that is inserted in the *Frame*. This *Method* deletes the MU with the statement *SingleProc.cont.delete*. Both the execution of the *attribute method* and of the *Method* called by it are terminated immediately. The return value of the *attribute method* (or VOID if no return value was declared) will be returned to the **entrance control**, whose execution is continued.

### **New and Changed Features in Plant Simulation 12.1**

- We added the setting Visualization to the tab General of the Model Settings. It sets how *Plant Simulation* creates the new simulation model.



- We added the setting OpenGL Version to the tab 3D of the Preferences.
- We added the method unshare to the *user-defined attributes* and to the object Variable.
- We changed the layout of the Tab Importer and integrated the *failure importer* into it. It now shows the Sub-tab Processing, the Sub-tab Set-up, and the Sub-tab Failure.



- We replaced the attributes *ImporterActive* and *FailImporterActive* with the attribute *imp.Active/ failImp.Active*. We added the attribute *setupImp.Active* for the *set-up importer*.
- We changed the notation for the Tolerance for about equal ( $\approx$ ) comparison. Instead of using  $==$  for the operator, we now use  $\approx$ .
- We enhanced the functions Open Origin and Open Class. When you hold down the **Shift** key while clicking the buttons, *Plant Simulation* shows the location of the origin of the object or the location of the class of the object respectively.
- We removed the setting **User interface concept**. We do not provide the setting **Menus and Toolbars** any more.
- We removed the button **Hide All Dialogs** from the **Window** ribbon tab.
- We removed the tab **Communication** from the dialog **User-defined Attributes** of the objects.
- We removed support of the graphics formats *.ppm* and *.ppm\_raw* for the command Import Bitmap File.
- We moved the *user-defined attributes* of the object *GaOptimization* from the **Tools** menu to the Tab User-defined Attributes.
- We replaced the attribute *IconAngle* with the attribute *ObjectAngle*.
- We replaced the attribute *IconRotation* with the attribute *ObjectMirrored*.
- We added the Tab 3D to the *MultiPortalCrane*.
- We added the methods *synchronize* and *unsync* to the *MultiPortalCrane*.
- We added the attribute *Load by capacity* to the *CrossSlidingCar*.
- We extended the functionality of the **Student License**. You now can also load models, which you created with a **Student License** in any of the commercial licenses.

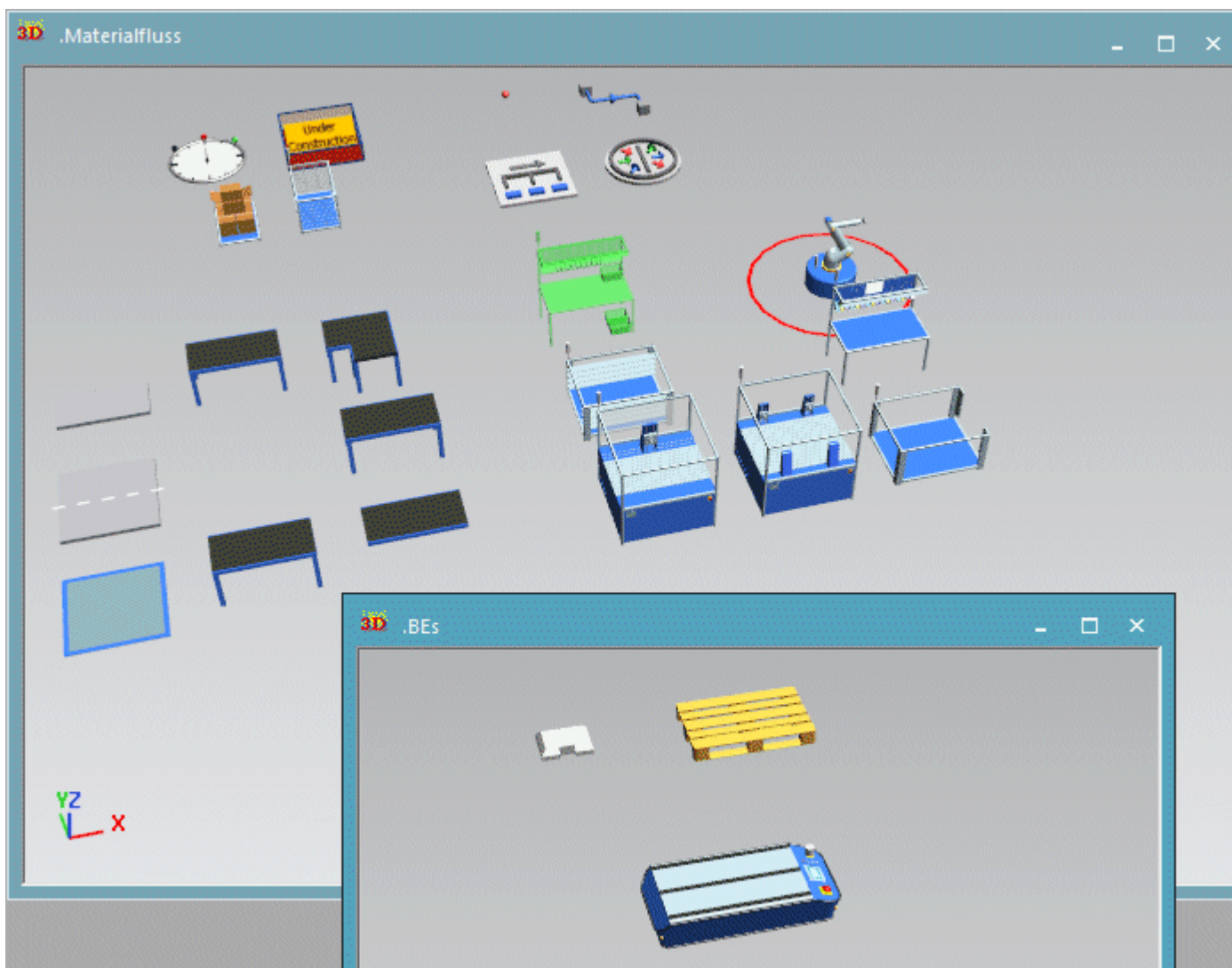
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## New 3D Viewer Features

*Tecnomatix Plant Simulation 13* provides a number of new features.

### New Features in Plant Simulation 13.0

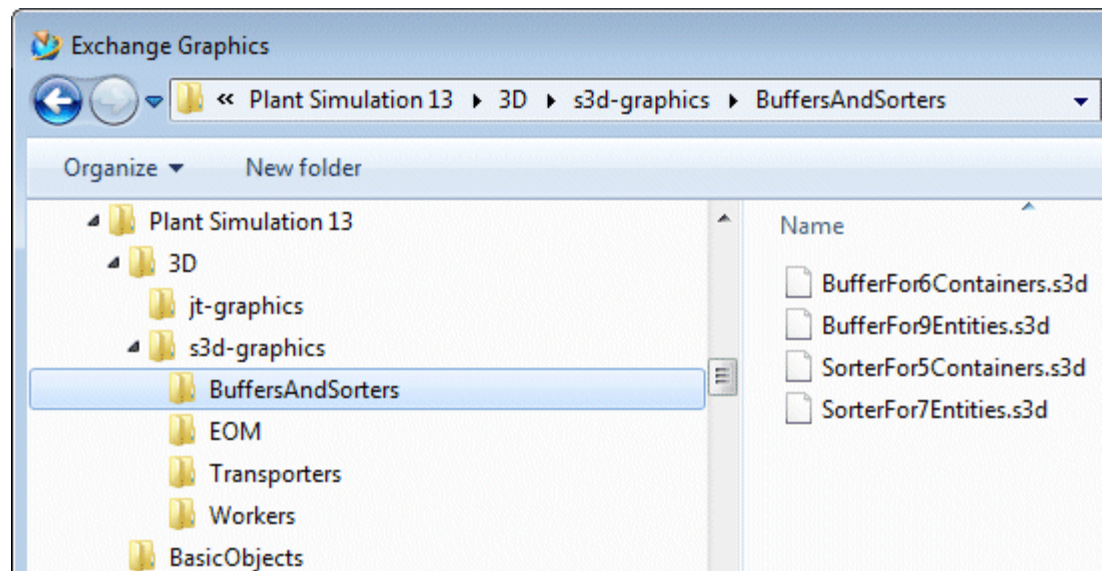
- We added new 3D graphics for a number of material flow objects, which represent these objects more realistically in your installation.



To replace existing graphics in a model, which you created in a previous version of the program, with the new graphics, select the respective graphic and select Exchange Graphics. Navigate to the folder **3D > BasicObjects** and select the new graphic of the object.

In addition we offer alternative graphics for special applications for the *Buffer*, the *Sorter*, and the *Transporter*. To use one of it, select one of these objects in the 3D window, click Exchange Graphics, and select an alternative graphic.





- We extended the functionality of most of the 3D objects to enable you to set if these objects are an obstacle for the *Worker* who moves freely within the area. You find the setting **Obstacle for Worker** on the Tab Graphics or on the Tab Graphic Settings.
- We added the Tab Graphic Settings for graphics. Here you can set if the graphic is an Obstacle for the Worker or not.
- We added the functions Insert Barred Area and Insert Stairs.
- We added the Tab Appearance of the Store. Here you can set its configuration for its appearance in 3D.
- We added the **Tab Material** to the *Worker*. You can now add a material to them, just as you can do for the MUs, which applies to all graphics for which no other material applies. As opposed to the MUs you cannot use a 2D material for the Worker, when no material is defined, as the 2D vector graphics material that is required for does exist.
- We added the Tools Menu to the dialog **Edit 3D Properties** of the *Frame*.
- We added the attribute `_3D.TransformationMatrix`.

## New Features in Plant Simulation 12.2

- We added the button Add Camera to the **View** ribbon tab. This button replaces the button **Capture Current View** in the dialog **Path Anchor Points**.
- We added new mouse button combinations to move or zoom the scene with the mouse:
- To zoom the scene in **Planning View**, hold down the **Shift** key and the right mouse button and drag the mouse.
- To move the camera backwards and forwards in normal 3D view, hold down the **Shift** key and the right mouse button and drag the mouse.
- We added key combinations for moving the camera in the scene:

To do this	Do this
Move the camera backwards and forwards in normal 3D view	Hold down the middle and the right mouse buttons and drag the mouse
Move the camera up by 10 cm	Press <b>Shift+Z</b> on the keyboard
Move the camera down by 10 cm	Press <b>Z</b> on the keyboard
Move the camera left by 10 cm	Press <b>Q</b> on the keyboard
Move the camera right by 10 cm	Press <b>E</b> on the keyboard


- We added a function for showing information about the open scene. To do so, press the **F** key on the keyboard.
- We added CAD Layout Files (\*.dgn, \*.dwg, \*.dxf) to the files types which the command Import Graphics can import.
- We added the commands Controls and Edit User-defined Attributes to the Context Menu of the Selected Animatable Object in the 3D Scene.

### New Features in Plant Simulation 12.1

- We added the command Insert Rack to the command **Edit > Insert Shape**.
  - We added the text box Width to the settings of the *conveyors*.
  - We added the function `_3D.createBox` to create a box via *SimTalk*.
  - We added the command Planning View to the **View** ribbon tab.
- We removed the command **Projection** from the **View** ribbon tab.
- We added the command Generate SimTalk Code and Copy to Clipboard to the command **View > Camera Marks**.
  - The command also copies the corresponding *SimTalk* code to the clipboard. You can then paste this code into a *Method* object to set the material of another graphic.

We added the buttons Copy the Current Material Settings  and Paste a Previously

Copied Material  to the tab **Material**.

The command  also copies the corresponding *SimTalk* code to the clipboard. You can then paste this code into a *Method* object to set the material of another graphic.

- We added the function Locked to graphic groups.

- We added the command **Calculate Angles** to the context menu of the objects *PickAndPlace Robot* and *Turntable* in the *3D Viewer*.
- We added the methods `F3DRecordVideo`, `F3DFinishVideo`, and `F3DPauseVideo` for recording videos in the *3D Viewer*.
- We added the function `_3D.setGraphicTransformationMatrix`.
- We added key shortcuts to Manipulate Objects in the 3D scene.
- We added the command **Find Object** to the Context Menu of the Opened 3D Object.

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## Changed 3D Viewer Features

*Tecnomatix Plant Simulation 13* provides a number of changed and improved features.

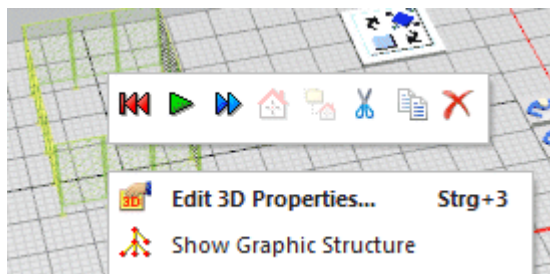
### Changed Features in Plant Simulation 13.0

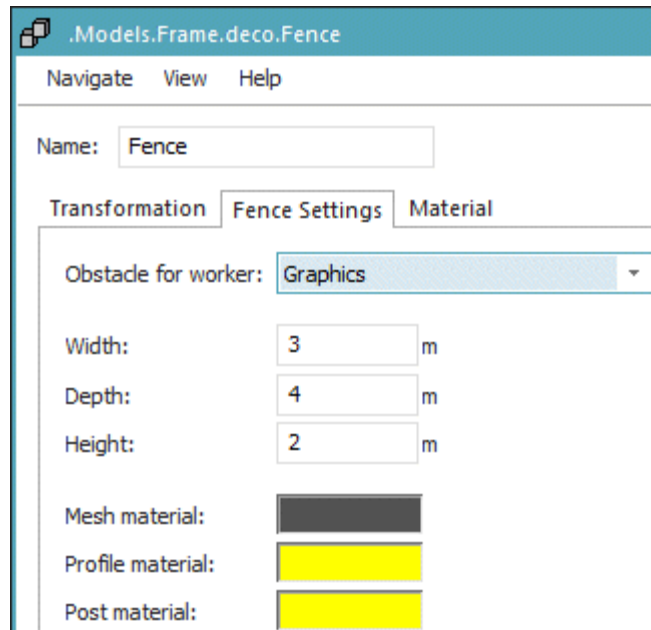
- We changed how the *3D Viewer* inserts materials. You can now also insert a material from the *Clipboard* into the Tab Material when the material is not active. Then the *3D Viewer* automatically activates a material that was deactivated before.
- We changed the behavior of the **MU Animation** of *Container* and *Transporter* with **matrix loading space** and with **automatically generated graphics**. The *3D Viewer* distributes the MUs on these objects now automatically and ignores existing MU animation paths.

For the *Store* the *3D Viewer* also distributes the MUs automatically and ignores existing **MU animation** paths.

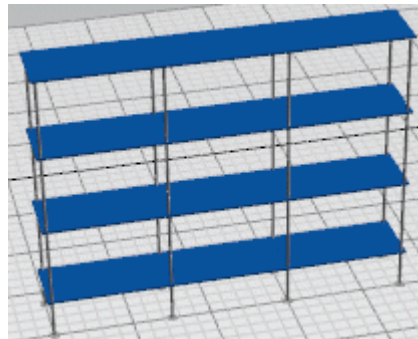
You can activate and deactivate the automatically generated animation graphics jointly with the automatically generated graphics with the checkbox Auto graphics active on the Tab Appearance of the MUs or Auto graphics active on the Tab Appearance of the Store.

- You can now subsequently change the settings of a *Box*, a *Shelf*, a *Barred Area* and a *Fence* which you insert into your simulation model in version 13. To do so, click the shape with the right mouse button and select **Edit 3D Properties**.





- We changed the behavior of the command Insert Rack. The topmost shelf is now included in the amount of shelves (**board count**). In the example below the rack has four shelves.



- We changed the behavior of the *3D Viewer* when it could not import a Jt file because that Jt file originated in a not supported Jt version. Now the error message points this out. If you imported the file with a *Method* it still returns -1.
- We changed the behavior of a model which you created in **3D Only** mode: Now *Plant Simulation* moves the axes origin, if this is possible, when inserting or moving an object would create invalid pixel coordinates. In previous versions *Plant Simulation* moved the object in such a way that the pixel coordinate was located within the valid area and thus changed the 3D coordinate if an invalid pixel coordinate would have resulted.
- We changed the behavior of a model which you created in **3D Only** mode. Then the dialog **Show Attributes and Methods** does not show these attributes and methods of the objects any more:

Method/Attribute
All objects
maximizeWindow

Method/Attribute
XPos
YPos
setPosition
setXYWH
getXYWH
Icons
setCurrIconFromClipboard
putIconToClipboard
setIconFromFile
saveIconToFile
createIcon
deleteIcon
CurrIcon
CurrIconNo
existsIcon
turnIcon
resetIcon
mirrorY
mirrorX
inheritSizeAndOrientation
setPixel
getPixel
CurrIconTransparent
redraw
openImg
openImg
getIconSize
setIconSize
ObjectAngle
ObjectMirrored
getRefPoint
setRefPoint
getBoundingBox
StatusWithIcons
RotateAroundRefPoint
RotateMUs
NumAnimationEvents
getAniPoints
setAniPoint
setAniLine
moveAniPoint
delAniPoint

Method/Attribute
delAniPoints
linkAniPoint
unlinkAniPoint
DisplayPanel
Frame
AxesOrigin
drawLine
drawRectangle
drawEllipse
drawText
eraseLayer
eraseAllLayers
redraw
setXYOrigin
rearrange
setBackgroundImage
copyBitmapToClipboard
selectContents
BackgroundColor
ScalingFactor
ZoomFactor
ShowObjectNames
ShowObjectLabels
ShowDisplayPanels
RepresentationMode
ShowObjectLabels
setRepresentationArea

- We changed the behavior when inserting a new graphic. When you select an invisible graphic group as the insertion target, *Plant Simulation* now makes this graphic group visible. When the visibility of the respective object was inherited, *Plant Simulation* asks if you want to cut inheritance of the graphics.
- We changed the label of the check box **Hide this object in the representation of the location** on the Tab Graphics to Exclude from Show content of the location.

We renamed the attribute *\_3D.HideInRepresentationOfLocation* to *\_3D.ExcludeFromShowContentOfLocation*.

### Changed Features in Plant Simulation 12.2

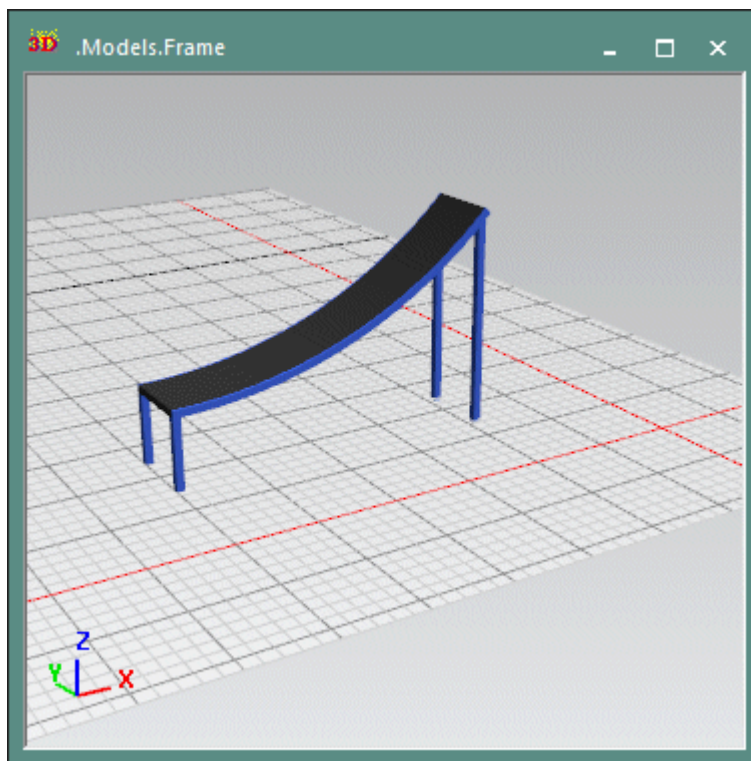
- We renamed the tab **Auto Graphics** of the dialog **Edit 3D Properties** to Tab Appearance and changed some of its functions:
  - You can now define materials for all MUs, not only for MUs with an automatically generated graphic.

- We changed the group labels **Override 2D vector graphic color** and **Assign a material** to **Material active**.
- We changed the names of the attributes starting with *\_3D.Autographic...* to `3D.MaterialActive`, `3D.MaterialAmbientColor`, `3D.MaterialDiffuseColor`, `_3D.MaterialEmissiveColor`, `3D.MaterialActive`, `3D.MaterialShininess`, `_3D.MaterialSpecularColor`, and `3D.MaterialTransparency`.
- We changed the behavior of the *3D Viewer*. The dialog **Edit 3D Properties** can only be open for an object or for a graphic once, not several times simultaneously.
- We changed the behavior of the *3D Viewer*. When you click **Edit** and **Apply** on the tabs **MU Animation**, **Self Animation**, or **Camera Animation**, paths now remain displayed.
- We changed the behavior of the *3D Viewer*. The tabs **MU Animation**, **Self Animation**, or **Camera Animation** now show the path type **Generated** in the column **Type** instead of the column **Generated** for animation paths which the *3D Viewer* created and which you cannot edit.
- We changed the behavior of the *3D Viewer*. To confirm the current changes to an animation path in the dialog **Edit Path Anchor Points**, you now click the new button **Apply** in the dialog. In case the path is displayed at the moment, this also updates the visualization of the path.
- We changed the definition of the Reduction level when you optimize a graphic.

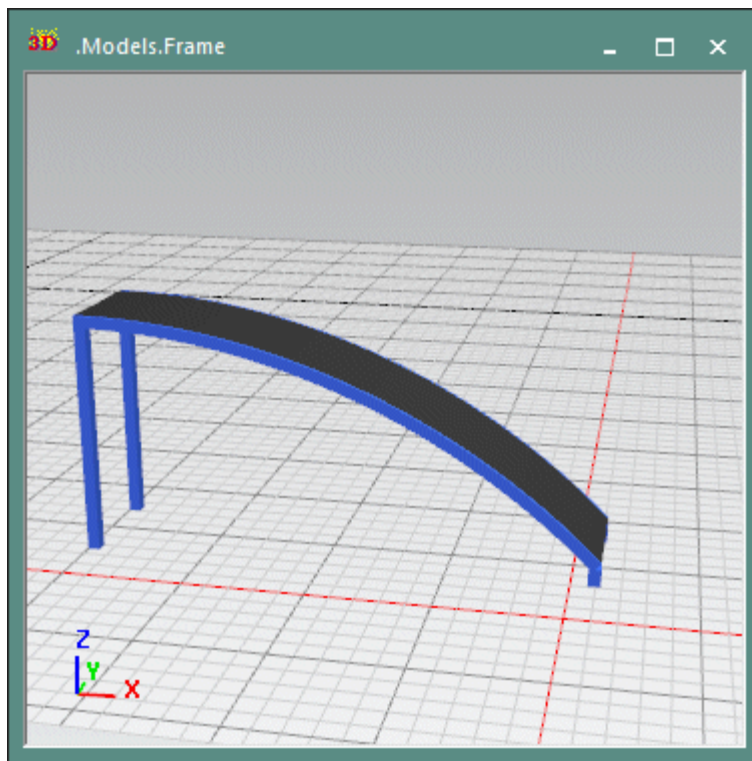
New name	Old name	Results in
<b>Low</b>	<b>Super</b>	a low reduction level, a high level of detail
<b>Super</b>	<b>Low</b>	a great reduction level, a low level of detail

- We changed the behavior of the *3D Viewer*. You now enter the setting Screen coverage threshold in pixels instead of one-hundred-thousandth of the window area.
- We simplified the layout and the settings in the dialog **Optimize Selected Graphic**. You can now use all of the provided optimization strategies at the same time instead of one setting only as in previous versions.
- We simplified the layout and the settings in the dialog **Create Rotation Path**. You can now define the path via the **r** instead of the **start position**. The *3D Viewer* now automatically computes the number of steps for the path.
- We simplified the layout and the settings in the dialog **Create Locations**.
- We changed the behavior of the *3D Viewer*. When playing a camera animation in the dialog **Fly on Path**, the tab **Camera Animation** of the dialog **Edit 3D Properties**, or via *SimTalk* commands, the *3D Viewer* automatically terminates the camera animation when reaching the end position. You can then edit the camera setting again with the mouse.
- We changed the behavior of the *3D Viewer*. You can now define vertical curve segments for a length-oriented object. This only works when the tangential angle is 0° for arriving and departing segments in all directions.

- We changed the behavior of the *3D Viewer*. You can now insert vertical curve segments into polycurves with the mouse. To do so, proceed as follows while inserting curved object, compare Edit a Curved Path with the Mouse:
  - Press and hold down the **Up arrow** on the keyboard to insert a curve pointing upwards in the **Z dimension**. Press and hold down the **Down arrow** to insert a curve pointing downwards in the **Z dimension**.
  - Enter the **radius** and the **angle** of the segment into the dialog **Edit Parameter of Curve**.
  - Click the mouse in the scene to insert the segment.







- We changed the behavior of the *3D Viewer*. Scaling of a 3D object now only applies to its own graphics, not to the simulation objects contained within. Contained animatable objects, on the other hand, are scaled as they are part of the graphic. This way neither the visible contents of a scaled *Frame* nor MUs located on scaled objects are scaled. The graphics of an object are now shown on each hierarchy level according to its scaling, ensuring that the proportions which you selected are visible everywhere.
- We changed the behavior of the *3D Viewer*. When you load graphics, except in the format s3d, into your simulation model, the *3D Viewer* now removes suffixes in the format `.<extension>;<no>;<no>` from the imported node names. This matches the naming conventions which *TcVis* shows when loading the same files. In addition the *3D Viewer* now automatically removes empty group nodes.
- We changed the behavior of the *3D Viewer*. You can now also activate the **Planning View** for objects other than *Frames* and *folders*.
- We changed the behavior of the *3D Viewer*. The setting if a 3D window shows **shadows** or not is now saved to the model file.



We replaced the button  on the tab **Graphics** of the dialog **Edit 3D Properties** with the button .

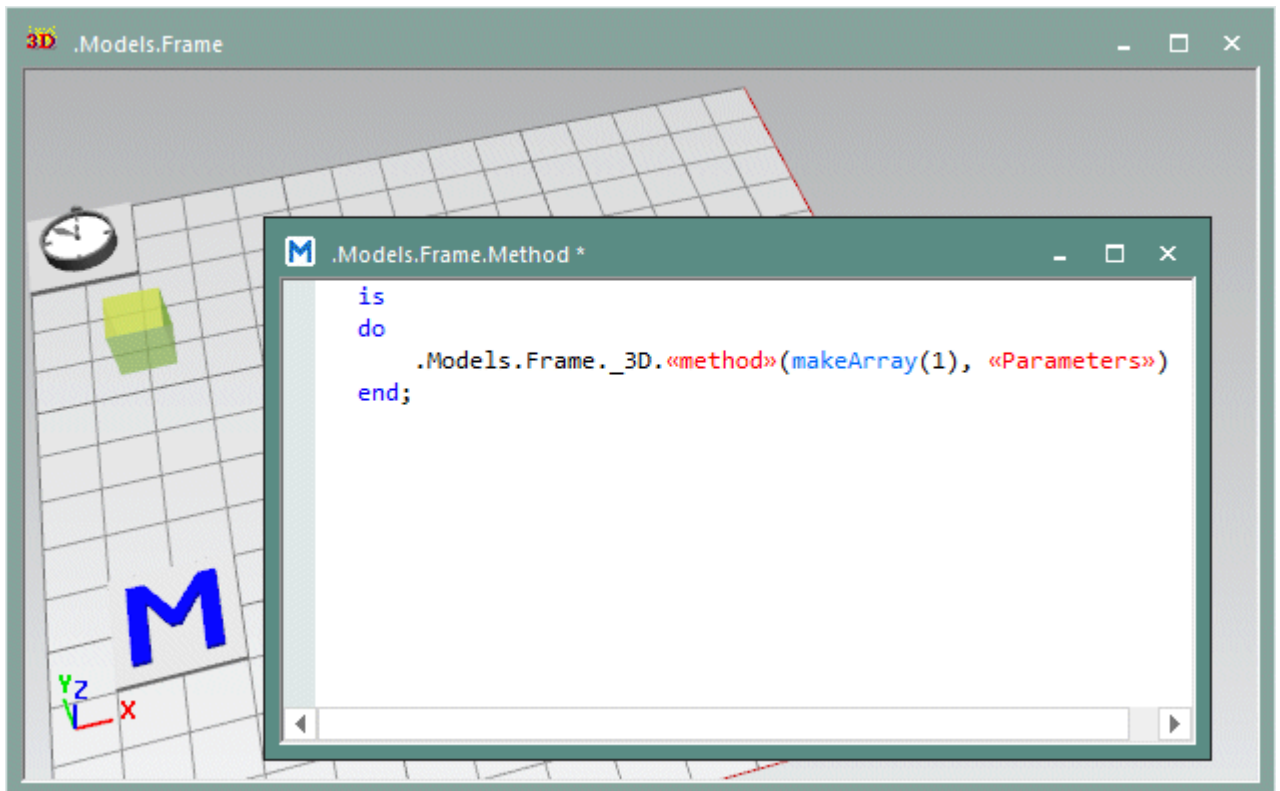
- We replaced the methods `_3D.connectPositions/_3D.disconnectPositions` and `_3D.connectRotations/_3D.disconnectRotations` with the attributes `_3D.PositionsConnected` and `_3D.RotationsConnected`.

- We removed the setting for activating **inheritance of the position** for the class of an object in the dialog **Edit 3D Properties**.
- We removed support for the method `_3D.disconnectPositionsAndRotations`.

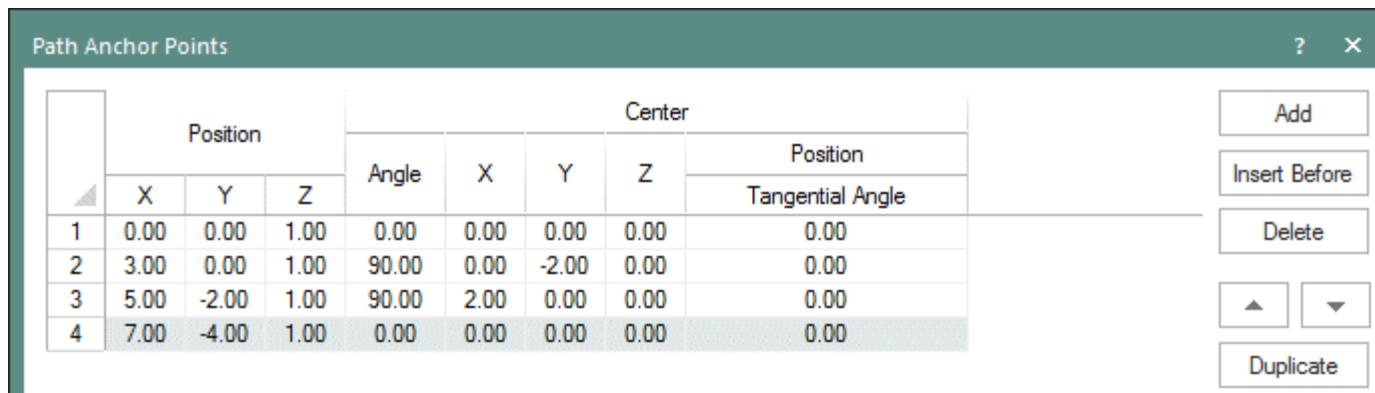
### Changed Features in Plant Simulation 12.1

In *Tecnomatix Plant Simulation 12.1* we changed or improved these features of the *3D Viewer*:

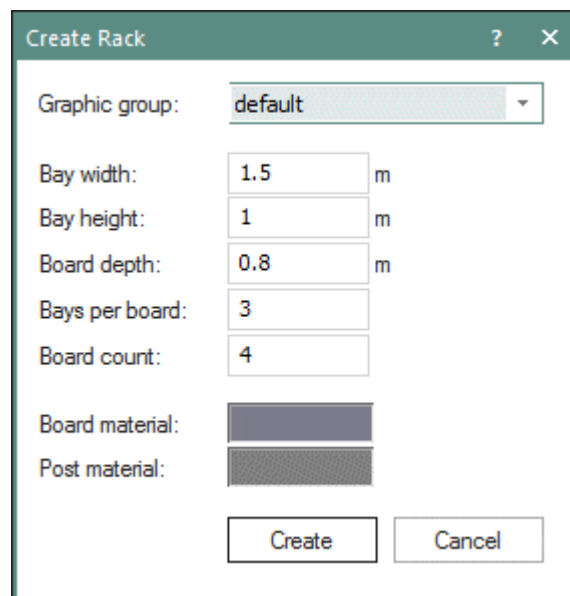
- We enhanced the functionality of the length-oriented objects in the *3D Viewer*: You can now activate or deactivate the connection of the rotations in 2D and 3D independent of the connection of the positions.
- We enhanced the *Drag-and-Drop* function in the *3D Viewer*: You can now duplicate 3D objects and graphics in 3D windows with *Drag-and-Drop*. When you drag a graphic from one 3D window to another or when you want to duplicate generated graphics, the *3D Viewer* allows you to select the graphics group to which it adds the new graphic. If you do not select a graphics group, the *3D Viewer* adds it to the graphics groups of its original object.
- We enhanced the *Drag-and-Drop* function in the *3D Viewer*: You can drag a 3D object or a 3D graphic into the *Method editor* and drop it there to insert the path to this 3D object or 3D graphic.



- We enhanced **Editing** path anchor points in the dialog **Path Anchor Points**. You can now also double-click the row of the anchor point, whose values you want to change in the list in the dialog.



- We integrated the setting for selecting the Graphic group into the dialogs for creating shapes.



- We changed what the attribute `_3D.Position` does. It now shows the local positions for MU instances which are calculated by the animation. It now also is available for MU classes.
- We changed how you define an **extrusion profile** with the attribute `_3D.ExtConfiguration`.
- We added the attributes `_3D.AniRotationAxis` and `_3D.AniRotationCenter`. They now define the rotation axis and the rotation center used in the method `_3D.<Type>Animations.scheduleRotation`. In previous versions you used the attribute `_3D.Rotation` to set the rotation axis and the rotation center. This resulted in the following changes:
  - The attribute `_3D.Rotation` now only returns an array of four values, excluding the rotation center.
  - The Tab Transformation in the dialog **Edit 3D Properties** does not contain settings for the rotation center any more.

- The Tab Self Animation now has settings for the rotation axis and for the rotation center of the object.
- The *Turntable* now uses the rotation center you set on the tab **Self Animation**. In previous versions it used the center you set in the attribute *\_3D.Rotation*.
- An anchor point of an animation path of type **Lines**, compare Edit **Path Anchor Points**, now only contains 8 instead of 11 values. You can still set paths with 11 anchor points in the methods *\_3D.<Type>Animations.setTable* and *\_3D.<Type>Animations.<AnimationPathName>.setTable*, they will ignore the three values for the rotation center though. The methods *\_3D.<Type>Animations.getTable* and *\_3D.<Type>Animations.<AnimationPathName>.getTable* now only return 8 instead of 11 values.
- An anchor point of an animation path of type **Polycurve**, compare Edit **Path Anchor Points**, now only contains 9 instead of 12 values. You can still set paths with 12 anchor points in the methods *\_3D.<Type>Animations.setTable* and *\_3D.<Type>Animations.<AnimationPathName>.setTable*, they will ignore the three values for the rotation center though. The methods *\_3D.<Type>Animations.getTable* and *\_3D.<Type>Animations.<AnimationPathName>.getTable* now only return 9 instead of 12 values.
- We changed how the *3D Viewer* handles the background color of *3D Frames*. As long as you do not set a model-wide background color, the *3D Viewer* does not save a background color in the model but uses the predefined color our programmers set. When loading models which were created in previous versions of the program, the *3D Viewer* interprets these background colors as the predefined background color.
- We replaced the icons of the state graphics in the dialog **Show 3D Graphic Structure**. They now are spheres with the color matching the color of the respective state in 2D.
- We replaced the attribute *\_3D.StatesVertical* with the attribute *\_3D.StatesOrientation*.
- We removed the tab **Visibility** from the dialog Edit 3D Properties.
  - We removed the setting **External graphic groups**. Now external graphics groups always represent their owning 3D object except those which are not marked visible.
  - We renamed the setting **Contained objects and internal graphic groups** to Show content and moved it to the Tab Graphics.
  - We removed the check box **Hide this object temporarily in all 3D windows**. You can still click Hide Object/Unhide Objects on the View ribbon tab.
  - We removed support for the attribute *\_3D.Representation*.
- We removed the function **Show Coarse Grid** and renamed the function **Show Fine Grid** to Show Grid.
- We removed support of the attribute *\_3D.ExtSpline*.

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## What's New in Tecnomatix Plant Simulation 12

### What's New in Tecnomatix Plant Simulation 12

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

- [Important Changes in Plant Simulation 12](#)
- [New Features of the Material Flow Objects](#)
- [Changed Features of the Material Flow Objects](#)
- [New Features of the Resource Objects](#)
- [New and Changed Information Flow Features](#)
- [New and Changed User Interface Features](#)
- [New and Changed SimTalk Features](#)
- [Miscellany](#)
- [New and Changed 3D Viewer Features](#)

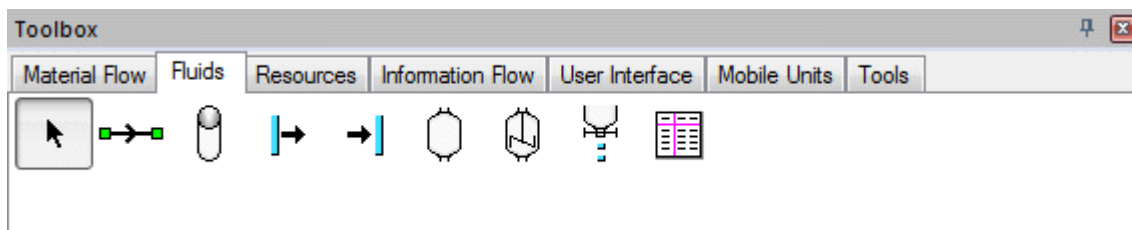
As the program changed at a number of places, you might have to adapt simulation models you created in previous versions of *Tecnomatix Plant Simulation*, when you open them in *Tecnomatix Plant Simulation 12*.

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### Important Changes in Plant Simulation 13

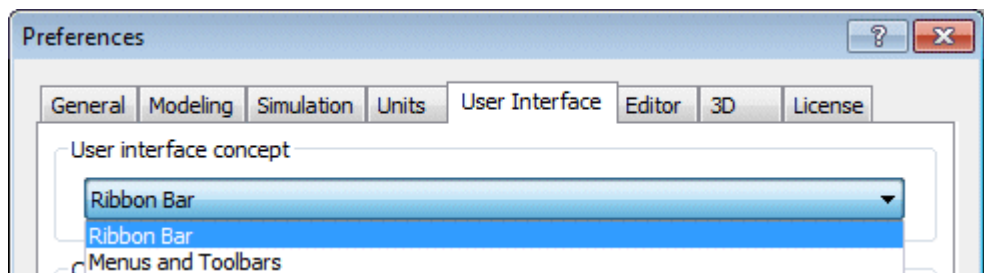
*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

- The most important and noticeable new feature in *Tecnomatix Plant Simulation 11 TR 3* are the Fluid Objects.

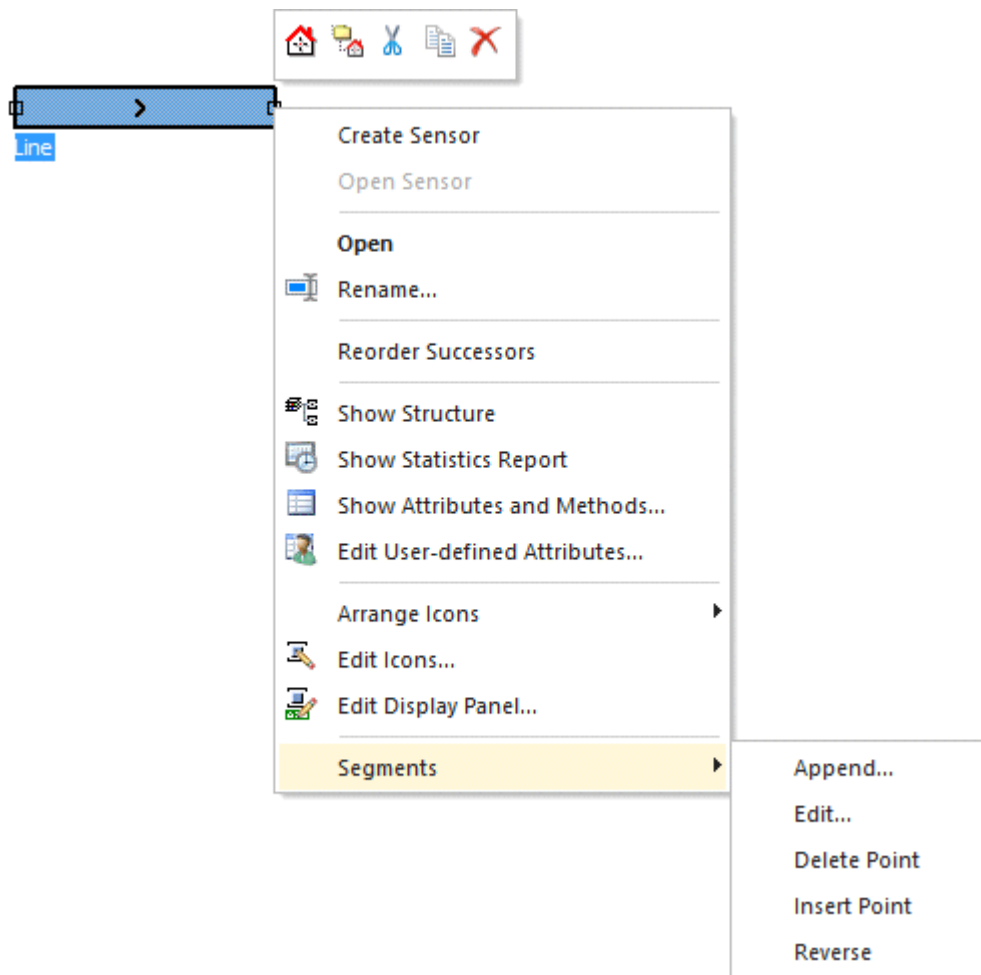


- We also rewrote the object  HtmlReport
- The most important and noticeable new feature in *Tecnomatix Plant Simulation 11 TR 2* is the Ribbon Bar.

It replaces the menus and toolbars which the main program window and the object windows in previous versions of the program offered. In this version you can still use **Menus and Toolbars** though.



Along with the ribbon bar, we also introduced **context menus** with the **mini toolbar** and with symbols for most of the commands on the context menu itself.



- We further integrated the *3D Viewer* into *Plant Simulation 2D*. In most cases the *3D Viewer* now behaves the same as *Plant Simulation 2D*.

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## New Features of the Material Flow Objects

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

## New Features in Plant Simulation 12

- We added the command Open Without Control to the context menu of an object in the Frame.
- We activated the command State Icons/LEDs for the *Frame*. In previous versions you could only activate it with the attribute StatusWithIcons.
- We added the method importExporter. You can use it in the Request control of the *importer*.

## New Features in Plant Simulation 11 TR 3

- We added the check box **Exit control once** / ExitCtrlOnce to the Exit control.
- We added the attribute TargetPosition to the *Transporter*.

## New Features in Plant Simulation 11 TR 2

- We added the optional parameter *EndSim* to the method stop of the *EventController*.
- We added check box Part can only enter on cycle to the *Cycle*.

## New Features in Plant Simulation 11 TR 1

- We added the settings Relative converting point for the length and Relative converting point for the width to the Converter. We also added the corresponding attributes RelConvertingPointL and RelConvertingPointW.

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## Changed Features of the Material Flow Objects

*Tecnomatix Plant Simulation 12* provides a number of changed and improved features.

### Changed Features in Plant Simulation 12

- We changed the behavior of the point-oriented material flow objects which can accept several parts. When several MUs were moved to a *ParallelProc*, a *Store*, a *Container*, a *Transporter* with a **matrix loading space**, or a *Worker*, the arrangement of the MUs on the object sometimes was chaotic, i. e., the MUs were oftentimes not placed from top left to bottom right onto the free storage places on the object. From now on the MUs are placed onto the free storage places from top left to bottom right on the object.

This change also prevents the following problem: When all MUs on the object were to exit at the same simulation time and when the object was failed before the MUs exited, the exit order of the MUs sometimes changed once the failure was repaired.

- We changed the behavior of the *Converter*. When an MU is moved from a *Converter* to another object with the methods insert, move, or transfer specifying an index is not allowed any more. *Plant Simulation* ignores the specified index and moves the MU onto the target object designated in the **target control**.
- We changed how to enter the Booking point length, the Booking point width, and the Booking point height of the mobile objects. In previous versions you entered these as an

absolute value for the **length, width, and height**. Now you enter the values as a **relative value between 0 and 1**.

When you change the dimension of the MU, *Plant Simulation* automatically changes the absolute position of the booking point because the existing relative position is preserved. When you then access the attributes *BookPnt*, *BookPntH*, *BookPntL*, and *BookPntW*, *Plant Simulation* now returns different values than in previous versions.

When you set the absolute **booking point** with the attributes *BookPnt*, *BookPntH*, *BookPntL*, and *BookPntW*, the relative position of the **booking point** will be calculated with the currently existing **length/width/height** of the MU. When you subsequently change the **length/width/height** of the MU, this results in a different position of the **booking point**, as the one which you previously set with the attributes.

We recommend to use the attributes *BookPntHRelative*, *BookPntLRelative*, and *BookPntWRelative* from now on.

- We changed the behavior of the *Store*. When you drag a *Method* onto a *Store* and drop it there, *Plant Simulation* now enters this *Method* as the **Entrance control** not as the **Exit control** as before.
- We changed the order in which the Exit control and the Release control of the *Importer* are called when you defined both: In previous versions the **exit control** was called first and then the **importer release control** was called twice. Now the **importer release control** is called first and then the **exit control** is called once.
- We changed the behavior when you selected **Times > Set-up time > Matrix(Type) or Formula**. When a set-up time of 0 results, *Plant Simulation* does not start setting up, in particular it does not request *Workers*. The type of part for which the station is set up will be set to the new type of part immediately.
- We changed how you define a polycurve (Tab Curve) in *Plant Simulation* and in the *3D Viewer*:
- When you insert a straight segment after a curved segment, *Plant Simulation* now always enforces a tangential angle of 0°.
- When you create a new polycurve by clicking on an existing polycurve, *Plant Simulation* now uses the end angle of this polycurve as the start angle of the new polycurve. You can prevent this by holding down the **Alt** key.

### Changed Features in Plant Simulation 11 TR 3




- We changed the behavior of the setting **setup** After n parts and **setup after last part**. In previous versions a new *Worker / Exporter* was requested each and every time. Now *Plant Simulation* uses the *Worker / Exporter*, who just finished working.
- We added an optional *boolean* parameter to the Open control.
- We renamed these methods of the curved objects: *mirrorHorizontally* to *mirrorX* and *mirrorVertically* to *mirrorY*.
- We made the argument of data type *table* of the methods *brokerStat*, *getOfferedServices*, *getOpenImporters*, *getSatisfiedImporters*, and *serviceStat* of the *Broker* optional.



- We made the argument of data type *table* of the methods `typeStatistics` and `typeStatisticsCumulated` of the *Drain* optional.
- We changed the behavior of the *Source* when you select **Time of creation > Interval adjustable**: When you change the **interval** before the next time of creation, an existing **CreateMU** event will be deleted and will be scheduled anew with the **interval** starting from the time of change.
- We extended the functionality of the method `move` of the moving objects. You can now also enter an *array* of objects to which the MU tries to move. When none of the objects you entered as members of the *array* can accept the MU, it will be entered into the **blocking list** of each of the objects that are members of the *array*.
- We changed the behavior when you Merge *Method classes*. When the *Method* to be replaced was being executed while merging, for example because of the *Method* was suspended or when it was stopped at a breakpoint in the *Debugger*, the old program code was executed again when method execution was continued. The *Method* then behaved like a deleted attribute method, i.e., relative paths could no longer be evaluated correctly. The *Method debugger* then opened with an error message.

When the replaced *Method* was continued after merging, the new program code will now be executed and relative paths will be evaluated correctly.

## Changed Features in Plant Simulation 11 TR 2

- We made **vector graphics mode**, compare the Tab Graphics, the default setting for the *mobile objects*. The default vector graphic of the *Entity* looks like this , the *Container* looks like this , and the *Transporter* looks like this .
- We changed the name of the command *Frame > Modify Structure* to Lock Structure.
- We changed the return value of the attribute **Speed** of the conveying objects, such as the Line and the Transporter. When you enter `-1` for an infinite speed, the *SimTalk* functions and the dialog **Show Attributes and Methods** now return or show `-1`. Previous version returned/showed `1.#INF`.

The **current speed** still returns/shows `1.#INF` as the function returns negative values when the object moves in reverse.

## Changed Features in Plant Simulation 11 TR 1

- We changed how the Source creates parts. When you select the Operating mode **> Blocking**, the *Source* now stops creating parts when the simulation time has reached the **Stop** time. In previous versions it stopped creating parts when the planned points in time for creating parts were reached.  
  
You can now also clear **Blocking**, i.e., activate non-blocking mode, and enter an **Interval** of `0`.
- We changed how *Plant Simulation* calls the Pull control of the Converter. It now also calls it for parts that move onto it moving in reverse.
- We changed how the Container shows its state. Now a **pause** always has precedence over a **failure**. This also applies for statistics.

- We changed how *Plant Simulation* computes the next event for MUs. From now on it computes the event before calculating the event of the following MUs. In previous versions this was not always the case for collided MUs. This then could lead to a changed order of simultaneous events of two MUs after they collided.
- We changed how *Plant Simulation* moves parts on from an *Interface* or a *ParallelProc* with a Pull control if this *Interface* or *ParallelProc* only has a **single successor**. The setting **Exit Strategy** > **Strategy** > Blocking has no effect from now on. *Plant Simulation* enters all MUs into the **blocking list** of the simulation successor again as it did in version 10.1.
- We enhanced drag-and-drop for a *Frame* class on a Connector in a *Frame*. When that *Frame* contains a suitable *Entrance Interface* and a suitable *Exit Interface*, *Plant Simulation* inserts an instance of the *Frame* between the end objects of the *Connector* and adjusts the *Connectors*.

**Back to** [What's New in Tecnomatix Plant Simulation 12](#)

## **New Features of the Resource Objects**

In *Tecnomatix Plant Simulation 12* we added these features to the resource objects:

- We added the methods `doStandardExport`, `doStandardImport`, and `getExportersForService` to the *Broker*.
- We added the attribute `AutomaticMediation` to the *Exporter* and to the *Worker*.
- We added the read-only attribute `AvailableForMediation` to the *Exporter* and to the *Worker*.
- We added the methods `getRouteLength` to the *Workplace*.
- We changed the behavior of a failed *Worker*. They now stop instead of walking towards their destinations as they did before.
- We changed the behavior of the *Worker*. In previous versions a *Worker*, who picked up parts to carry them to the target station, forgot the **dwelling time** after a **failure** of the station and delivered the parts immediately after picking them up. Now it also considers the **dwelling time** after a **failure**.
- We changed the behavior of the method `engage` of the *Broker*. Up until now it did not interrupt *Importers* with a lower priority although the method `testImportFor` also returned *Exporters* whose current job had a lower priority.

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## **New and Changed Information Flow Features**

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

### **New and Changed Features in Plant Simulation 12**

- We added the columns **Insertion Time** and **Parameters** to the table which the method `getEventList` of the *EventController* returns.
- We added the method `getColumnYDim` to the *TableFile*.

- We made the argument of data type *table* of the method `getStatisticsTable` of the *Variable* optional.
- We changed how *Plant Simulation* executes *observer methods*: When an **observer** and another **control** were triggered at the same time, until now the **control** was executed first and when then the **observer** was executed. We changed this that now **observer** is called first and only then the **control** is called.

The previous execution sequence had the disadvantage that calls of an *observer method* could pass each other. If the **control** changed the observed attribute anew, the **observer** was triggered again anew, i.e., the **control** was interrupted and the **observer** was executed with the second value change. Then the execution of the **control** was continued and only then the **observer** was executed with the first value change.

With the new, changed execution sequence this problem cannot occur any more, as the **observer** with the first value change is executed before the **control**. In addition, the new execution sequence has the advantage that **observers** now behave more similar to *suspended methods*, which always had precedence over **controls** and **observers**.

### New and Changed Features in Plant Simulation 11 TR 3

- We added the return value of data type *list* to the method `createNestedList` of the *TableFile*.
- We added the return value of data type *boolean* to the method `setCursor` of the *TableFile*.
- We renamed the command **Highlight Void Cells** on the **List** ribbon tab to **Highlight Empty Cells**.
- We changed the behavior of built-in methods which expect a *list* or a *table*, for example `putAttributeNamesIntoTable`. In previous versions these could only be called with an instantiated *list* or *table*, i.e., you had to tell *Plant Simulation* to create it first:

**Example:**

```
local tab: table;
tab.create; -- was required in the past

SingleProc.putAttributeNamesIntoTable
```

From now on you can also pass a non-instantiated *list* or *table*. *Plant Simulation* then creates it automatically:

**Example:**

```
local tab: table;
SingleProc.putAttributeNamesIntoTable
```

- We changed the behavior of the *Trigger*: For a **TriggerStart** event *Plant Simulation* does no longer assign the value to the attribute, which corresponds to the **start time** (in most cases the first value in the Values table), but the previous value on the table. If this value does not exist, because the first row in the values table applies to the **start time**, *Plant Simulation* assigns the Default value.
- We removed the button **Attributes** from the tab **Actions** of the *Trigger*.

### New and Changed Features in Plant Simulation 11 TR 1

- We changed the behavior of the feature Column index belongs to contents of the *list objects* under **Format > Format** .

For new models the check box is activated by default again as it was in previous versions.

- We changed the behavior of the AttributeExplorer. It no longer adds *Connectors* when you drag connected objects onto it and drop them there. It also removes empty rows from the tables on its tabs when you click **OK** or **Apply** .
- We added the method increment to the *TableFile*.
- We added the menu command **Outlining** to the **Edit** menu of the Method.
- We added the text box Decimal places and the attribute DecimalPlaces to the Variable.
- We added the methods loadFromFile, saveToFile, storeStatement and useStatement to the SQLite interface.
- We added the statistics values Time to set single item, Time to get single item, Time to set multiple items, and Time to get multiple items to the object OPC.
- We added the return value -1 to the method *selectSyncFromDialog* of the Teamcenter interface. It tells that the user closes the dialog by clicking **Cancel**.
- We changed the behavior of *Lists* and *Tables*, which you opened in the foreground as a dialog with the method openDialogBox.
  - Changes you make to the contents of a cell are now displayed immediately in that cell.
  - The list object now also accepts the decimal point, in addition to the comma, for floating-point numbers and times.
- We removed support of the methods *closeFile*, *openFile*, *readFileRow*, and of the attribute *FileCursor* of lists and tables. You can use the method readFile instead.

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## **New and Changed User Interface Features**

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

### **New and Changed Features in Plant Simulation 12**

- We extended the functionality of the HtmlReport. It can now display objects to type *Checkbox*, *DropDownList*, *FileLink*, and tables which the object *SQLite* contains.  
We also added the dialog **Object Parameters** into which you can enter the settings which some objects require.
- We removed the *HtmlWizard*. The *HtmlReport* now provides most of its functionalities.

### **New and Changed Features in Plant Simulation 11 TR 3**

- We added the object HtmlReport. It replaces the *Report*, which previous versions of the program provided.
- We changed the behavior of the objects Button, Checkbox, and Drop-Down List. When you enter a **Height** of more than 30 pixels or drag the border of the icon of the object, *Plant Simulation* uses a larger font to display their **label**.

- We changed the behavior of the object Comment. You no longer have to click **Apply** after activating Save the contents in rich-text format to actually activate the feature.

### **New and Changed Features in Plant Simulation 11 TR 1**

- We added the text box Interval and the attribute YGridLineInterval to the object Chart.
- We added the menu command Use Metric Prefix and the attribute UseMetricPrefix to the object Chart.
- We added the setting **Right, stacked** to the drop-down list Legend of the object Chart.
- We added the attribute getHTMLCode to the object Chart.
- We added the attribute appendToContent to the object Comment.
- We added the attribute Items to the object Drop-Down List. It replaces the methods *getItems* and *setItems*.

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### **New and Changed SimTalk Features**

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

### **New and Changed Features in Plant Simulation 12**

- We replaced the function *version* with the function *applicationVersion*.
- We added the method *max* for one-dimensional arrays with a numerical data type and with the data type *string*.
- We added the method *min* for one-dimensional arrays with a numerical data type and with the data type *string*.
- We added the method *sum* for one-dimensional arrays with a numerical data type.

### **New and Changed Features in Plant Simulation 11 TR 3**

- We added the function *getLibraryFiles*.
- We added the function *\_3D.isGraphicGroupGenerated*.
- We added the methods *copyFromTableColumn* and *copyToTableColumn* to the *one-dimensional arrays*.

### **New and Changed Features in Plant Simulation 11 TR 2**

- We removed support for the function *resetClipboard*.
- We removed support for the method *copyToClipboard*.
- We added the function *copyObjectsToClipboard*.
- We added the function *getLibraryFiles*.

## New and Changed Features in Plant Simulation 11 TR 1

- We added the function `setInfiniteLoopDetectionTimeout`.
- We added the function `splitString`.
- We extended the function `startExtProc` with two optional parameters.

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## Miscellany

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.

## New and Changed Features in Plant Simulation 12

- We added the button **Open Event Controller** to the **Home** ribbon tab and removed the launch dialog button below the *EventController* buttons.
- We added the attribute `HiddenWhenInLockedFolder` to the *folder* in the *Class Library*.
- We added the description of the Tutorial to the *Online Help*.
- We added the topic Available Features of the Individual Licenses to the *Online Help*.
- We removed the buttons **Previous Icon** and **Next Icon** from the **Edit** ribbon tab of the *Icon Editor*. You can click the respective buttons

Number: 1/3

Name:




RGB: 0, 128, 128

in the dialog window of the *Icon Editor*

instead.


- We removed the options to show or hide **Print messages**, **Info messages**, and other **messages** under **File > Preferences > User Interface > Console filter**. These messages are now always active.
- We removed the setting for entering the size of the **toolbox icons** from **File > Preferences > User Interface**.
- We added the function `Damping time` to the *Cross Sliding Car*.
- We added the function `Take preferred position` to the *Cross Sliding Car*.

## New and Changed Features in Plant Simulation 11 TR 3

- We added functions to the command `Configure User-defined Ribbon Tab`.
- We changed which icon of an object *Plant Simulation* displays in the Toolbox by default. In previous versions it always displayed the first icon, i.e., the icon with the number 1. It now checks if an icon named **ToolboxIcon** exists. If this is the case, it displays this icon, if this is not the case, it displays the first icon.
- We replaced the button **Open EventDebugger** on the **Home** ribbon tab with the button **Real-Time** .

- We changed the order in which the Importer request control and the Exporter request control, which you defined on the Tab Controls of the Broker, are called.
  - When you defined **Exporter** and **Importer request controls**, the **Exporter request controls** will now be executed first. This way you can make the *Worker* follow the part when the part moves to the next station. This causes changed behavior as compared to modeling without controls. Without controls, the *Worker* is brokered for the new station in the *Workerpool*.
  - When several **Importer request controls** are executed at the same time, for example because an *Exporter* is released and when several open *Importers* exist, the sequence of the controls now matches the sequence of the *Importers* in the list **Open Importers**. This way brokering of *Exporters* now behaves identical when you model with our without controls.

## New and Changed Features in Plant Simulation 11 TR 2

- We added the method lockFolder to the folder.
- We added the feature Lock library  Lock library to lock a library.
- We added the **VSM** (Value Stream Mapping), **Shop**, and **Assembly** libraries to the libraries which you can borrow in the dialog Borrow Licenses.

## New and Changed Features in Plant Simulation 11 TR 1


- We now enable administrators to set default values for simulation models, compare Setting Default Values in the Windows Registry.
- We changed the order of the menu commands of the **Tools Menu**.
- We added the functions Encrypt Model File and Restrict Permission to the **Tools Menu**.
- We changed what the function Encrypt Methods does:

The command now encrypts all *Methods* except for the prototype *Method* in the folder *InformationFlow*.

In addition it now also encrypts all user-defined attributes of data type *method*, which are located within the built-in objects in a new model, such as the **Callback method** of the built-in prototype of the object *Dialog*.

In previous versions the command generally did not encrypt *Method* classes and no user-defined attributes of data type *method* of classes. This then prevented all instances of *Methods* and all user-defined attributes of data type *method*, which inherited their source code from a not encrypted *Method* class or user-defined attributes of data type *method*, from being encrypted when you called the command.

- We added the tab 3D to **Tools > Preferences** and the tab 3D to **Tools > Model Settings**. It replaces the 3D preferences which you could select under **Tools > 3D Preferences** in previous versions of the program.
- We added the setting User interface concept to **Tools > Preferences > User Interface**. You can select if you want to show **menus and toolbars** in the *Plant Simulation* user interface or if you want to use the **ribbon bar**.

- We integrated the **3D Library** into the Class Library in the main program window. You find information about the 3D structure of the selected object in the window Show 3D Graphic Structure.
- We added a toolbar to the window Show Structure.
- We added the method setRequiredLicense to the *folder*.
- We changed the sort order of the interaction **controls**, which you defined for an object, on its context menu in the *Frame*. The **controls** are sorted now alphabetically.
- We changed how you can select the currency you want to use in your model. In addition to selecting it, you can now also enter it directly into the drop-down combo box **Currency** under **Tools > Preferences > Units**.
- We modified the function Print for printing the contents of a *Frame* or for printing the source code of a *Method*. It now shows the last selected printer when you print one of the above.
-  We removed the button **Switch Console Messages On/Off** from the Console window. When you display the *Console*, *Plant Simulation* now records messages, when you hide it, it does not record messages.
- We removed the boolean parameter from the function closeConsole.
- We changed how *Plant Simulation* shows on the labels of the tabs of minimized windows on the *tab bar*. The length of the displayed label now depends on the number of displayed tabs and the width of the program window as well as the median width of a character of the font used. If the tab is too narrow, *Plant Simulation* abbreviates the displayed object path, just like it does in the title bar of the object window, by showing an ellipsis ... The tooltip always shows the entire path though even if a window is minimized.
- We changed the behavior of the method getLibraryInfo. The fourth optional parameter now designates the file path of the library file (.lib).
- We added the function checkForLicense.
- We added the function createLicenseFile.
- We added the method getLibraryVersionFromFile.
- We added the optional parameter *Password* to the method loadModel.
- We added the optional parameter *Password* to the method loadModel of the COM *Interface*.
- We added the optional parameter *Password* to the method writeObject.

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## **New and Changed 3D Viewer Features**

*Tecnomatix Plant Simulation 12* provides a number of new and improved features.



## New and Changed Features in Plant Simulation 12

- We added a number of topics to the chapter Modeling in the 3D Viewer of the *Step-by-Step Help*.
- We added the command Show Point Clouds to the **View** ribbon tab of the *3D Viewer*.
- We added the Tab Point Cloud to the dialog **3D Properties** of the *Frame*. We also added the corresponding Built-in Attributes for Point Clouds of the Frame.
- We added the Tab Graphic Sequences to the dialog **3D Properties** of the *Worker*.
- We added settings for arranging States orientation.
- We added the command Edit 3D Properties to the Context Menu of a State Graphic.
- We added the command Insert Fence to the Edit Ribbon Tab.
- We raised the number Camera Marks, which you can define, from 20 to 40.
- We enhanced the **Paste** command. It now pastes the object with an offset to the original position.
- We improved handling of the *3D Viewer* to also support two-button mice:
- **Shift** + right mouse button now also zooms the scene
- **Ctrl** + right mouse button now also rotates the scene

## New and Changed Features in Plant Simulation 11 TR 3

- We added the command State Graphics to the Context Menu of a 3D Object. This way you can create state graphics that match the LEDs in 2D. These replace the **state objects** of previous versions.
- We added the button Add Rotation to the Tab Transformation of the dialog **Edit 3D Properties**.
- The *3D Viewer* now uses anti-aliasing for displaying objects in the 3D scene.
- We switched to version 8.1 of the Direct Model engine for displaying 3D. We strongly recommend to update your graphics card driver to make sure that your 3D model will be displayed correctly.

Update the graphics card driver from the website of the manufacturer of your graphics card to make sure that you receive the most up-to-date drivers.

- We removed the tab **Connect data** from the dialog Edit 3D Properties. We moved the functions Connect 2D and 3D positions and Connect 2D and 3D rotations to the Tab Transformation.
- We removed the buttons **Accept Rotation** and **Accept Scale** (and the corresponding attributes *\_3D.acceptRotation* and *\_3D.acceptScale* ) from the Tab Transformation.
- We removed the button **Reset Camera** from the **View** ribbon tab.

- We changed the behavior of the *3D Viewer* when an object camera is active, which you attached to an object with the command **Attach Camera**:
- You cannot change the view as long as the view of the object camera is active. To return to interactive navigation mode, you have to remove the camera by clicking **Detach Camera** or switch camera mode by clicking **Toggle Camera**.
- The *3D Viewer* removes the camera, when you delete the object to which it was attached. Removing an object camera automatically resets the view.

## **New and Changed Features in Plant Simulation 11 TR 2**

- We added the function **Internal** to the context menu of the dialog **Show 3D Graphic Structure**. It determines if the selected graphics group will be used for visually representing the object to which the graphic belongs.
- We added settings for entering the object coordinates for objects you create with the commands **Make Animatable Object** and **Make Simulation Object**.
- We added the settings **Animation object** and **MU side** to attach to the tab **MU Animation** of the dialog **Edit 3D Properties**.
- We added a number of **Built-in Methods for Accessing Graphic Groups**.
- We added a number of **Built-in Attributes for Accessing Graphic Groups**.
- We added the read-only attribute `_3D.NumObjects`.
- We added the method `_3D.<Type>Animations.playAnimation`.
- We changed the function **Insert Textured Plate**.
- We adjusted the drag-and-drop function of the *3D Viewer*. When you drag something onto a *3D Viewer* window this now has the same effect as when you drag something onto a *Frame* window in 2D.
- We removed the function **Connect 3D Viewer** and the corresponding *SimTalk* functions. You cannot run the *3D Viewer* without a connection to *Plant Simulation* any more.
- We removed the menu command **View > Hide > Unhide Scene Graphics** as you cannot hide individual graphic groups any longer with the command **Hide**.

If you want to change the visibility of individual graphic groups of the selected object, for example temporarily while modeling, you can select the check box **Visible** on the context menu of the dialog **Show 3D Graphic Structure** or on the Tab **Graphics > Visible** of the dialog **3D Properties** of the object.

This setting is, in contrast to the command **Hide Object**, permanent and applies to all 3D windows which contain the object.

- We removed the check box **Show Graphics** under **File > Preferences > 3D > View Settings** as you can now define graphics to be internal or external graphics.

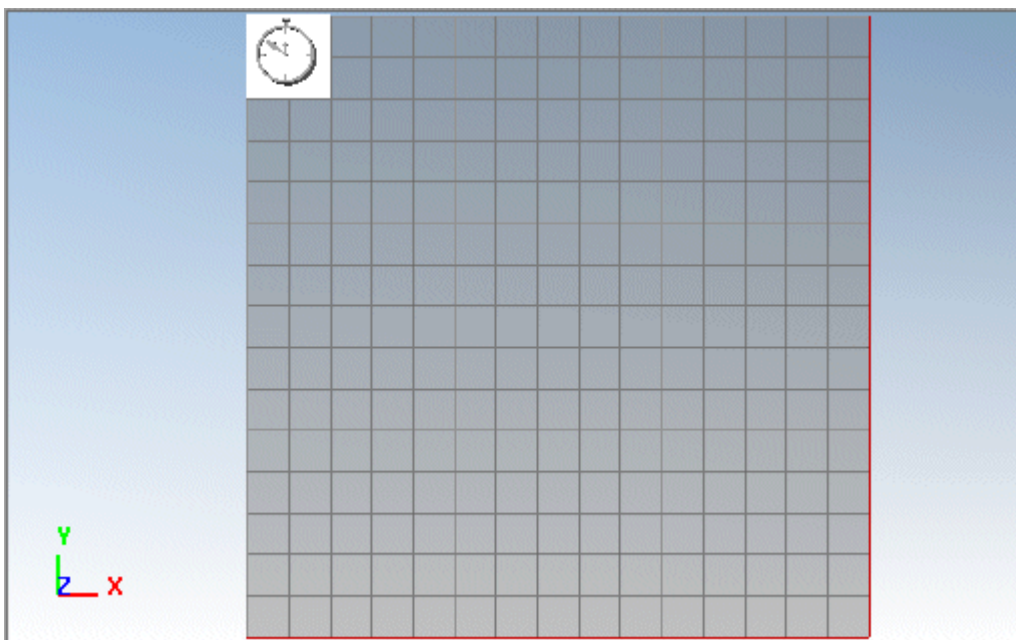
Note that graphics of models, which you created in previous versions of the program, initially are treated as external graphics. As **Show External Graphics** now always is deactivated by default when you open a model, you might have to define some graphics as being internal in your old models so that these look the same as before.

- We removed the check box **Select Children** under **File > Preferences > 3D > View Settings**.

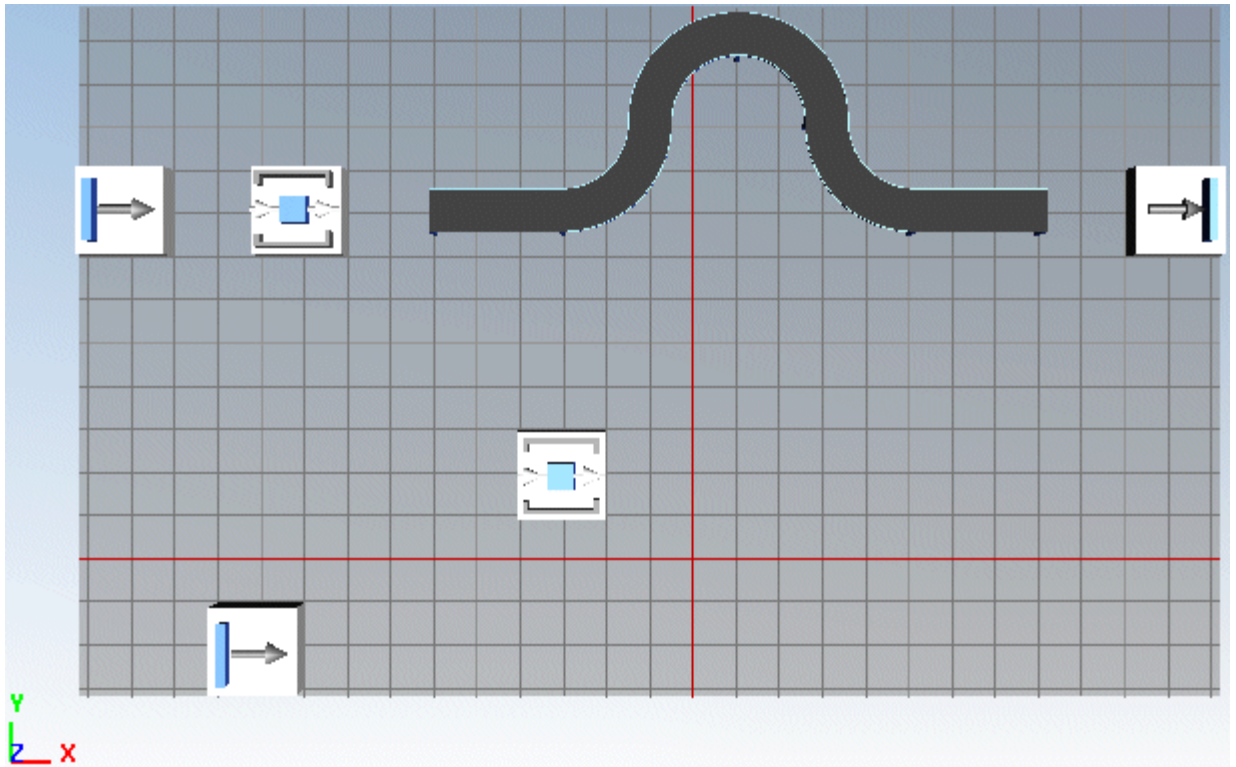
### New and Changed Features in Plant Simulation 11 TR 1

- We removed the tab *3D Library* from the program. We integrated the *3D Library* into the *Class Library* and replaced parts of its functionality with the dialog that the command **Show 3D Graphic Structure** of the selected object in the *Class Library* opens. The context menu command **Show Graphic Structure** in the 3D scene window shows the same information. So does the button **Show Graphic Structure** in the dialog **3D Properties** of the object.
- We moved the settings for the **Grid** from the **Tools** menu to the **View** menu. We also simplified the settings.



When you open the *3D Viewer*, the grid in the scene window looks like this:



When you insert and move an object towards the borders of the grid, it automatically extends in that direction. The grid always expands or shrinks to show all objects in the scene.



- We changed the functionality of the command **Edit > Attributes**. You can now only view them, you cannot edit them any more. We removed the command **Tools > Attributes > Viewer**.
- We changed when the program offers **MU animations** in the *3D Viewer* via *SimTalk*. They are now only offered for those 2D objects which actually can accommodate *MUs* or *Workers*.
- We changed how you can paste graphics. You cannot paste graphics into the selected graphic in the 3D scene window any more. Instead, you can only paste the graphic into the graphic group of the selected object in the 3D scene window. You can now paste graphics in the dialog Show 3D Graphic Structure.
- We added a new feature: The *3D Viewer* can now also show the icons of most of the objects, which are not relevant for 3D, such as the *information flow objects*, in the 3D scene. To do so, double-click the icon of the object, for example of the *TableFile*, in the *Toolbox* and select **Tools > 3D**. Select the check box **Create in 3D**. When you then insert an instance of this object into the **3D Scene**, it shows the icon of the object. You can then click the icon with the right mouse button and select **Open 2D Counterpart** to open the dialog of the object in 2D.
- We added the **Tab Auto Graphics** for MUs to the dialog **3D Properties**.
- We added the check box **Visibilities** to the **Tab Graphics**.
- We added the menu command Optimize Selected Graphic to the **Edit Menu**.
- We added the menu command Make Simulation Object to the **Edit Menu**.

- We added the functions **Show Fine Grid**  and **Show Coarse Grid**  to the toolbar **3D Modeling**.
- We added the submenu commands Cancel Recording, Pause Recording, and Finish Recording to the **Tools Menu**.
- We added the menu command Edit 3D Properties to the context menu of the *Frame* in the *Class Library*.
- We added the menu command **Edit 3D Properties** to the context menu of the dialog Show Structure in the *Class Library*.
- We added the method `_3D.concatenateRotations` to execute several rotations in one step as a single rotation.
- We replaced the methods `_3D.flattenGraph` and `_3D.pruneTinyGraphics` with the method `_3D.optimizeGraphic`.
- We enhanced the way you can select objects in the *3D Viewer*. Just like in *Plant Simulation 2D* you can now drag a selection rectangle around the objects you want to select. When you do not hold down a modifier key, dragging a marquee cancels an existing selection. When you hold down the **Shift** or the **Ctrl** key, the objects within the marquee are added to the existing selection.
- We changed the version of Direct Model on which the *3D Viewer* is based on to Direct Model 8. For it to work correctly driver version 8.911.3.3 or higher has to be installed for AMD FireGL and FirePro graphics cards.
- We changed the JT format version when saving models containing a 3D part and when saving `.s3d` files. We now use version 10.0. When exporting JT files we use version 9.5.
- We changed when you can model in the *3D Viewer*. It now only works when a connection between *Plant Simulation* and the *3D Viewer* has been established and is active.
- We changed how you can cancel moving an object in 3D while holding the left mouse button down and dragging the mouse. To do so, press the **Esc** key, just like you do in 2D. Each action with the mouse or keyboard keys, which transforms an object or a graphic, is applied as soon as you release the mouse button or the keyboard key.
- We removed the menu command **Background Color** from the **Tools Menu**. You can now change the background color of each *Frame* on the **Tab Background Color** in the dialog **3D Properties**. As opposed to previous versions, you can now also assign white as the background color.  
  
We also added the corresponding attributes `_3D.BackgroundBrightness` and `_3D.BackgroundColor`.
- We removed the menu command **Update 2D Model** from the **2D Menu**.
- We renamed the menu commands **Tools > Import Geometry** and **Tools > Export Geometry** to **Tools > Import Graphics** and to **Tools > Export Graphics**.
- We renamed the method `_3D.importGeometry` to `_3D.importGraphics`.

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## What's New in the Object Libraries

### What's New in the Object Libraries

The object libraries in Tecnomatix Plant Simulation 13.x provide a number of new and enhanced functions.

- We added the GantryLoader to the Cranes Library.
- We adjusted the position and the dimension of the racks and the conveyors in the library High Bay Warehouse (HBW) so that no gaps appear when you insert them into your model.
- We enhanced the functions of the object Warehouse Management System (WMS) in the library High Bay Warehouse (HBW).

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## Value Stream Mapping Library

### Value Stream Mapping Library

We fixed the following bugs and added the following features to the Value Stream Mapping library.

- [Value Stream Mapping Library Version 12.0.10](#)
- [Value Stream Mapping Library Version 11.0.14.2](#)
- [Value Stream Mapping Library Version 11.0.14.1](#)
- [Value Stream Mapping Library Version 11.0.13.7](#)
- [Value Stream Mapping Library Version 11.0.13](#)
- [Value Stream Mapping Library Version 11.0.12.3](#)
- [Value Stream Mapping Library Version 11.0.12.2](#)
- [Value Stream Mapping Library Version 11.0.12.1](#)
- [Value Stream Mapping Library Version 11.0.12.3](#)
- [Value Stream Mapping Library Version 11.0.11.2](#)
- [Value Stream Mapping Library Version 11.0.11.1](#)
- [Value Stream Mapping Library Version 11.0.11](#)

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### Value Stream Mapping Library Version 12.0.10

We added the following features in Version 12.0.10 of the library:

- We add the button **Edit** to the Tab Product of most objects.
- We add the check box Use product groups to the Tab Statistics of most objects.
- We added **product groups** to the Tab Product of the object PPS.
- We redesigned the object Supplier.
- We redesigned the object TransportExternal.

Caused by the changes we made to the objects *Supplier* and *TransportExternal*, existing simulation models can behave differently. The products on the *Supplier* can accumulate because the object *TransportExternal* does not provide sufficient transport capacity. As a consequence memory consumption can increase dramatically.

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### Value Stream Mapping Library Version 11.0.14.2

We changed the behavior of the object Work in Process (WIP) [on Version 11.0.14.2 of the library. Now it not only shows a snapshot of the current work in process. You can also activate the collection of the work in process during the simulation run and you can evaluate the collected data afterwards. You can define the interval for collecting the data.

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### Value Stream Mapping Library Version 11.0.14.1

We added the object ForeignOrders to Version 11.0.14.1 of the library. You can use it to define additional production orders for processing objects which are shared with other production lines.

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### Value Stream Mapping Library Version 11.0.14.0

We fixed the following bugs and added the following features to the Value Stream Mapping library in Version 11.0.14 of the library.

- We changed the handling of *Interfaces* of the Value Stream Mapping objects.
- We added the object Rework. This was necessary to allow *Plant Simulation* to identify the correct *Interface* then connecting the object using for example the *material flow connector* or for example the *information flow connector*.

You can use the object *Rework* object to model a reworking process within your value stream processes.

- We added the object LeadProcess. You can use this processing object to simulate a **lead time** and a **cycle time**. First the product has to spend the **lead time** for processing. The products then leaves the object using the **cycle time**. If the **lead time** is the same as the **cycle time**, the *LeadProcess* behaves like the object *Process*.

- We added the object *ScheduleBox*. You can use it to define a list of production orders which will be transferred to the processing object connected with the *ScheduleBox*.

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### **Value Stream Mapping Library Version 11.0.13.7**

We fixed a bug of the object *Customer* then using a **fixed date** for production orders. You can now define a **start date** on the *EventController* which is long before the first customer order starts.

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### **Value Stream Mapping Library Version 11.0.13**

We fixed the following bugs and added the following features to the Value Stream Mapping library in Version 11.0.13 of the library.

- We added the object *FlowGrade* which was part of the object *Analyzer* on previous versions.
- We removed the object *Analyzer* from the library. You can use object *FlowGrade* instead.
- We modified the **product table** on the dialog of the *Supermarket*.
- We modified the behavior of the object *ProcessIndexed*. The processing time is now defined again during the initialization phase. This fixed a problem which sometime prevented the processing time from being set to a fixed time.

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### **Value Stream Mapping Library Version 11.0.12.3**

We fixed the following bugs and added the following features to the Value Stream Mapping library in Version 11.0.12.3 of the library.

- We added the object *FIFO\_Analyzer*.
- We modified the behavior of the object *UtilizationAndStock*. Its display can now be closed with one click.
- We fixed a bug in the object *ProcessAssembly*, which occurred when you double-clicked into the table of the sub-products.
- We modified the behavior of the object *Check*. It now checks if there are more than one object of type *FIFO/Transport* is located in front of a *ProcessAssembly* station. Only one object of type *FIFO/Transport* is allowed.

### **Value Stream Mapping Library Version 11.0.12.2**

We added the following feature to the Value Stream Mapping library in Version 11.0.12.2 of the library.



- We added the object *ScheduleBox*.

### Value Stream Mapping Library Version 11.0.12.1

We fixed the following bug in Version 11.0.12.1 of the Value Stream Mapping library.

- We fixed a bug which caused an error when products with the **transfer quantity** if 1 were produced in a sequence of stations and when the same product was produced repeatedly.

### Value Stream Mapping Library Version 11.0.11.2

#### *Value Stream Mapping Library Version 11.0.11.2*

We fixed the following bugs and added the following features to the Value Stream Mapping library in Version 11.0.11.2 of the library.

- Customer  
We changed the title of the *Chart* for the **delivery time**.
- Process\_indexed  
We changed the statistics evaluation.
- Inventory  
We fixed a bug that occurred when closing the edit table.

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#### *Value Stream Mapping Library Version 11.0.11.1*

We fixed the following bugs and added the following features to the Value Stream Mapping library in Version 11.0.11.1 of the library.

- Check
  - We changed the behavior of the object. It now checks if all connections are *VSM Connections*.
  - We changed the text of some error messages to make them easier to understand.
- *MRP*  
We fixed a bug that occurred when you modeled rework processes without using a *Rework Connector*.

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### Value Stream Mapping Library Version 11.0.11

We fixed the following bugs and added the following features to the Value Stream Mapping library in Version 11.0.11 of the library.

- Inventory

We changed the dialog of the object to match the same look and feel of the dialogs of the other processing objects.

When closing the dialog while the **product table** is open, the program now also closes the window of the table. This deletes all of your changes to the table. We recommend closing the **product table** before closing the object dialog.

- Kanban

- We revised the **Heijunka** functions. You cannot enter any values into the time slot after the last time entry any more.

- We extended the **Heijunka** function. You can now define any value for the interval of the **Heijunka board**.

- Customer

We extended the functions of the object. You can now directly connect the *Customer* with an *Information Connector* with a *Supermarket*. In this case, the *Customer* orders the products from the *Supermarket* and the *Supermarket* handles the production of the products.

- Supermarket

We changed the behavior of the object. When products arrive at the *Supermarket*, and the order is finished, it now checks if the reorder level has been exceeded. If this is the case, it creates a new order.

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### Value Stream Mapping Library Version 11.0

We fixed these bugs, we extended the functionality of Value Stream Mapping objects, and we added new objects to the library:

- We fixed some bugs for the strategy **Kanban-Box** of the object Kanban.

We extended the functionality of the object. You can now also define **Parts per Kanban Card** as 1 part. If you defined scrap or rework in the line where the *Kanban* parts are processed, this will also be treated correctly. In a *Kanban* production line you can now define  $XBP > 1$  and  $XBP < 1$ . Both cases will be treated correctly.

- We extended the functionality of the object Supplier.

- In addition to the *Disposition* of the object *PPS* you can now also define the delivery of products interval-driven. By defining an interval of n minutes, the defined number of products will be delivered every n minutes.

- You can now use a *Supermarket* for ordering parts from the *Supplier*.

- A *Kanban* object can also order parts from the supplier (*Supplier-Kanban*).

- You can now also export the delivery days and the data for cyclical delivery.

- We added a chapter to the help of the *Supplier* object in which we demonstrate how to use the different functionalities.

- We added the object EPEI. It computes the EPEI value of all processing objects in your *value stream mapping* model.
- We redesigned the object Check. Now the consistency check of the objects *PPS* and *Check* use the same functionality.
- We added help for the Value Stream Mapping library to the *Tecnomatix Plant Simulation Online Help*.
- We extended the functionality of the object DataExchange. It now also stores the **Heijunka board** of the object Kanban as well as the contents of the table of the **Kanban box**.
- Note that because of these changes is no longer possible to read in Excel files created with older versions of the value stream mapping library.

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