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What's New

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What's New in Tecnomatix Plant Simulation 16

What's New in Tecnomatix Plant Simulation 16

Tecnomatix Plant Simulation 16 provides a number of new and improved features.

- **Important Changes in Plant Simulation**

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> Note:
>
> As opposed to the full versions, for example *Tecnomatix Plant Simulation* 16.0, we only support **English** and **German** as the user interface language for the intermediate versions, for example for *Tecnomatix Plant Simulation* 16.1.

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Important Changes in Plant Simulation

We made important changes in *Tecnomatix Plant Simulation* 16.0. 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* 16.

Important Changes in Plant Simulation 15.1

We restricted the support for *SimTalk* Version 1.0 in the *Method Editor*.

- We deactivated **syntax-controlled indentation** and **formatting of the source code** for *SimTalk* Version 1.0.

- We removed color **highlighting of keywords**, which only exist in *SimTalk 1.0*, and **outlining of structures** specific to *SimTalk* Version 1.0.

- We removed **inserting of structures** specific to *SimTalk* Version 1.0 via **templates**.

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Simulation and Animation Relevant Changes

We made changes that are relevant for the simulation and the animation in *Tecnomatix Plant Simulation* 16.0 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* 16.0.

Simulation- and Animation-Relevant Changes in Plant Simulation 16.0

- We changed what *Plant Simulation* does when an object changes to the **Unplanned** state.

  - In previous versions the **Unplanned control** as well as the **Pause control** were called.

  - From version 16 on only the **Unplanned control** is called. For compatibility reasons *Plant Simulation* still sets the attribute **Pause** to true when **Unplanned** is set to true.

- We changed how *Plant Simulation* enters **Pause** and **Shift** events into the **list** of simultaneous events.

- In previous versions the **Out** event of a completely processed MU was sometimes only scheduled after the end of the shift, even if it occurred simultaneously with the shift end, and the MU remained on the station until the new shift started.

- From version 16 on **Pause** and **Shift end** events are always entered into the list of simultaneous events as the last events.

- We enhanced the behavior of an empty workpiece carrier.

    - In previous versions an empty *workpiece carrier* was always moved on to the default successor.

    - For the following settings of the designated objects *Plant Simulation* uses the **attributes** or the **name** of the empty *workpiece carrier*.

        - For the setting **Exit > Strategy > MU Attribute** of the *material flow objects*.

        - For the settings **Exit behavior > Strategy > MU Attribute** and **MU Name** of the *FlowControl*.

        - For the settings **Attributes > Assembly table > MU Types** and **Depends on Main MU** of the *AssemblyStation*.

        - For the settings **Attributes > Strategy > MU Attribute** and **MU Name** of the *Turnplate*.

        - For the settings **Attributes > Strategy > MU Attribute** and **MU Name** of the *Converter*.

        - For the setting **Fluid depends on > MU Name** of the *DePortioner*.

- We changed how *Plant Simulation* handles the bounding box of parts that a *Worker* carries. From this version on the bounding box of the parts does not affect the computation of the bounding box of the *Worker* who carries parts. This is simulation-relevant if you used the bounding box in a model from previous versions to set simulation-relevant attributes, for example **MUHeightWithContent**.

- We changed the behavior of *Plant Simulation*. In previous versions you could read the attributes **ProcTime** and **SetupTime** for some objects that do not have a **processing time** or **setup time**. This caused the method **hasAttribute** to return true for these attributes. This is no longer the case.

- We replaced the tag **eMPlantTable** when exporting *DataTables* in XML format with the tag **PlantSimulationTable**, compare **Export XML File**. *Plant Simulation* can still read XML files that were written with the old tag by previous versions, but not the other way around. In addition the written XML file does not use a namespace any more.

Simulation- and Animation-Relevant Changes in Plant Simulation 15.2

- We changed the behavior of the **PickAndPlace Robot**. If the robot is to load parts onto a *Container* or a *Transporter* at the **sensor**, it now only picks the part up when a *Container* or a *Transporter* waits at the **sensor**.

- We changed the behavior when setting-up a material flow object. If the value 0 was determined in previous versions when setting the **set-up time**, for example resulting from a **distribution** or from a **formula**, *Plant Simulation* treated this as if a setup process had taken place, without requesting *Workers* though. When **setting up after n parts** this setup process was not counted though. From this version on the counter is reset for a setup process of time 0.

- We changed the conversion of the **speed units mph** (miles per hour) and **m/s** (meters per second) under **Preferences** > **Units** > **Speed** and **Model Settings** > **Units** > **Speed**:

Up to and including *Plant Simulation* 15.1	1 mph = 0.444444 m/s or 1m/s = 2.25 mph
From *Plant Simulation* 15.2 on	1 mph = 0.44704 m/s or 1m/s = 2.236936 mph

Simulation- and Animation-Relevant Changes in Plant Simulation 15.1

- We changed the behavior when deleting MUs. *Plant Simulation* now calls the **sensor control** of a sensor triggered by a light barrier (**Light barrier mode**). The **sensor control** will not be called when MUs are deleted when resetting the model with **Reset**.

- We enhanced the behavior of the methods **create** and **insert** of the moving objects: You can now also *create* or *insert* an MU at the beginning of a length-oriented object if a part of the MU hangs in thin air afterwards, i. e., is not located all the way on the length-oriented object.

- We changed the behavior of the method **getRouteLength** of the MUs. It returned the value -1 up to and including version 14.1. From version 14.2 on the method returned the value 1.79769313486232e+308. In this version the method returns -1 again.

- We implemented an optimization for accessing the index in *DataTables* in *Plant Simulation* 14.1. This optimization caused unexpected behavior if the index had the data type *string*:
  If the *DataTable* contained *strings* in the index which only used different upper and lower casing, *Plant Simulation* found the index, if it existed, whose casing of the *string* matched the notation of the *string* with which the index was accessed. If it did not exist, the index was returned, which matched the value without considering case sensitivity.
  This behavior only occurred when the setting **Fast index access** was activated.
  From this version on *Plant Simulation* finds the first index entry again which is identical while ignoring case sensitivity, no matter if **Fast index access** is activated or not.

- We removed the text box **Curve precision** from the **tab 3D** in the dialog **Preferences**. For this reason we do not support the attribute *_3D.CurvePrecision* any longer.
  To control curve sampling of polycurves and splines, we now use a common dynamic mechanism which is independent of the curve radius.
  This change can alter simulation results in models with length-oriented objects with curve segments, if a *Worker* is walking unrestricted within the model.

- We changed the behavior of **MU animations** of point-oriented objects:

  - If an **MU animation path** consists of more than one point and if you did not enter a time or speed respectively the **MU animation** now takes exactly as long as the **processing time**.

- Failure, pause, etc now interrupt **MU animations**, which consist of more than one point, on point-oriented objects.

Back to What's New in Tecnomatix Plant Simulation 16

New Features of the Material Flow Objects

Tecnomatix Plant Simulation 16.0 provides a number of new features.

New Features in Plant Simulation 16.0

- We added the **MU selection** > **Order Controlled** to the *Source* and the setting **Supermarket** to the *Store*. You can use them to model pulling material flow strategies.
  If the respective function is active, the command **View > Show Orders** of the *Source* or the *Store* is active as well.

- We added the setting **Fill whole layer** to the **Container**.

- We added the setting **Reset destination when at destination** to the tab **Routing** of the *Part* and the *Container*.

- We added the setting **Reset destination when at destination** to the tab **Routing** of the *Transporter*.

- We added the **Delete** button to the dialog **Reorder Successors**. You can click it to delete the *Connector* from the selected object to its successor. This is especially helpful when you cannot see the *Connector* because you moved the objects really close to each other.

- We added the setting **Sequentially indexing** to the *PlaceBuffer*.

- We added the setting **Show fill level** to the *PlaceBuffer*. It is only available in a **2D only** model.

New Features in Plant Simulation 15.2

- We enhanced the behavior of *Plant Simulation*. When you insert a *sub-Frame* into your model *Frame*, you now do not have to use objects of type **Interface** any more if the *sub-Frame* only contains a single object in 2D. In this case *Interfaces* are unnecessary as the incoming and outgoing connection is unique.

- We enhanced the behavior of the **DismantleStation**. It can now also remove a certain portion of the mounting parts from the main part instead of all mounting parts as in previous versions. You can select this under **Sequence**, **Dismantle Table**, and **Dismantle mode**.
  In previous versions all remaining parts were automatically moved to the same successor as the main part. You can now explicitly activate this behavior:

  - Leave the column **MU** in the **Dismantle Table** empty to designate any MU class.

- Type in the value −1 into the column **Number** to designate all remaining parts of this class.

- Type in the number of the desired successor into the column **Successor**.

When you load a model that was saved in a version older than version 15.2, and which contains a *DismantleStation* using a **Dismantle Table**, *Plant Simulation* automatically adds a respective row to the **Dismantle Table** to not change the behavior of the *DismantleStation* during the simulation.

- We enhanced the behavior of the **Transporter** when you **Create a Tugger Train**. Now the tractor and all trailers do not have to touch any more, as long as all *Transporters* are located all the way on the same *Track*. If necessary *Plant Simulation* moves the other *Transporters* up to the frontmost *Transporter* or the *tractor*.

- We added the read-only-attribute **FwBlockListEntry1** for those objects which have a **forward blocking list**. You can use it if you only need the first entry of the **forward blocking list**. Access is much faster than with the method **fwBlockList**.

- We added the method **setRouteSegments** for the *AGV* that is not bound to a fixed route network.

- We added the command **Split Up** to the context menu **Segments** of the length-oriented objects.

- We added the **F7** key to the context menu **Segments** > **Edit** of the length-oriented objects. It opens the **Segments** table. This applies to 2D and to 3D.

New Features in Plant Simulation 15.1

- We enhanced the behavior of the **PickAndPlace Robot**. The **sensor**, at which the robot loads parts onto a *Transporter* or a *Container*, can now also be triggered by the **rear** or the **booking point** of the part.
  If you **Configure the Pick-and-Place Robot with Drag and Drop** *Plant Simulation* now, by default, creates a sensor that is triggered by the **booking point**.

- We added the method **reset** to the failure profiles.

- We added the read-only attribute **IsTriggered** for sensors. You can use it to query if a part is located at the position of the sensor and triggered that sensor.

- We added the command **Inherit 'Entrance/Exit Locked' On Reset** to the **Tools** menu.

- We added the attribute **IsIdle** to the *Transporter*.

- We added the text box **Default curve radius** for the *AGV* to the *Transporter*. In previous versions you could only set the default curve radius with the attribute **DefaultCurveRadius**.

- We added the text box **Default curve radius** for the *AGV* to the *Transporter*.

- We added the text box **Rotation speed** and the attribute **RotationSpeed** for the *AGV* to the *Transporter*.

- We added the method **drive** for the *AGV* to the *Transporter*.

- We added the method **rotate** for the *AGV* to the *Transporter*.

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Changed Features of the Material Flow Objects

Tecnomatix Plant Simulation 16.0 provides a number of changed and improved features.

Changed Features in Plant Simulation 16.0

- We changed how you insert *length-oriented objects*: You now set each curved segments with a single mouse click, no matter for which check box you activated **Fixed**.

- We changed what *Plant Simulation* does when an object changes to the **Unplanned** state.

  - In previous versions the **Unplanned control** as well as the **Pause control** were called.

  - From version 16 only the **Unplanned control** is called. For compatibility reasons *Plant Simulation* still sets the attribute **Pause** to true when **Unplanned** is set to true.

- We changed the behavior of the **Pause control** and of the **Unplanned control**. In previous versions these only supported a single or no parameter. Now you can declare the new parameter *NewValue* of data type *boolean* for both controls:

  ```
  param Duration:real, NewValue:boolean
  ```

  If you specify the parameter *NewValue*, the controls will only be called when the *ShiftCalendar* changes the state of the object.
  In addition the object will not be put in the desired state. The **Pause control** or the **Unplanned control** have to do this from now on. The desired value is passed in the parameter *NewValue*. The part still can be processed all the way before the object changes to the state **Paused** or **Unplanned**.

- We changed the behavior of the **Pull control**. It is not called any more if an MU is moved onto the same location, for example in an **exit control**.

- We enhanced the behavior of the **Transporter** when you **Create a Tugger Train**. Now the tractor and all trailers do not have to touch any more, as long as all *Transporters* are located all the way on the same *Track*. If necessary *Plant Simulation* moves the other *Transporters* automatically up to the frontmost *Transporter* or to the *Tractor*.

- We enhanced the behavior of an empty **workpiece carrier**.

  - In previous versions an empty *workpiece carrier* was always moved on to the default successor.

  - For the following settings of the designated objects *Plant Simulation* uses the **attributes** or the **name** of the empty *workpiece carrier*.

    - For the setting **Exit > Strategy > MU Attribute** of the *material flow objects*.

    - For the settings **Exit behavior > Strategy > MU Attribute** and **MU Name** of the *FlowControl*.

    - For the settings **Attributes > Assembly table > MU Types** and **Depends on Main MU** of the *AssemblyStation*.

    - For the settings **Attributes > Strategy > MU Attribute** and **MU Name** of the *Turnplate*.

    - For the settings **Attributes > Strategy > MU Attribute** and **MU Name** of the *Converter*.

    - For the setting **Fluid depends on > MU Name** of the *DePortioner*.

- We changed the behavior of the **PlaceBuffer**: When parts are located in the *PlaceBuffer* you cannot change its **Capacity** any longer. You can only change it when it's empty.

Changed Features in Plant Simulation 15.2

- We changed the behavior when an **Interface** only has a single successor. From *Plant Simulation* 15.2 on the **exit strategy** is not only not going to be evaluated when moving the MU, but also not when the MU is blocked. An MU is now also moved on or blocked respectively when the *Interface* with a single successor only would not have determined a valid successor according to the **exit strategy**.

- We changed the behavior of the **PickAndPlace Robot**. If the robot is to load parts onto a *Container* or a *Transporter* at the **sensor**, it now only picks the part up when a *Container* or a *Transporter* waits at the **sensor**.

- We changed the behavior of the **Default Successor** of the exit strategy **MU attribute**: Type in 0 so that *Plant Simulation* shows an error message. We do not support the value -1 any more.

- We added the event **CheckMUPosition** for length-oriented objects to the **list of events** in the *EventController*.
  The event **CheckMUPosition** is scheduled when the **exit control** is called and checks, after processing the **exit control**, if the MU has to be stopped. This is the case when neither the position of the **front** of the part in the direction of movement nor its **direction** changed.

- We added the optional parameter *NextRandomSeedValue* to the method **derive**. It ensures reproducible simulation behavior when you create objects during the simulation.

- We enhanced the behavior of the method **setRoute** of the *Transporter* that is not bound to a fixed route. You can now also specify a *DataTable* containing the objects of the route in the first column. Or you can specify a one-dimensional list of data type *list*.

- We enhanced the behavior of the method **setRoute** of the *Transporter* that is not bound to a fixed route. If a standing *Transporter* cannot drive to the first *Marker* using the specified **Default curve radius**, the *Transporter* rotates on the spot, if possible, and then drives in a straight line towards the *Marker*.

- We changed the behavior of the attribute **Stopped** for a *tugger train*. When you change the state of the attribute for a trailer, this now stops the entire *tugger train* or makes it continue on its way.

- We changed the data type of the third parameter of the **Connect control**. This parameter now has the data type *object* instead of *boolean*. In previous version true/false was passed when the *Connector* was created/deleted. Now the *Connector* is going to be assigned to the parameter if it was created and VOID is going to be assigned when it was deleted.
  The new parameter profile looks like this:

  ```
  param predecessor, successor, connector: object
  ```

  The parameter profile of previous versions still works. If the **Connect control** expects the previous parameters, *Plant Simulation* calls it as before. If the **Connect control** expects the new parameters, the meaning of the first two parameters changes as well. If you externally connect an *Interface* of a *Frame*, the *Frame* was passed to the parameter *source/destination* of previous versions. If the **Connect control** expects the new parameters, now the *Interface* is passed.

Changed Features in Plant Simulation 15.1

- We enhanced access to sensors with the method **ID**: You can now also use this notation:
  `<Path>`.**Sensors.id**

- We enhanced the behavior of the methods **create** and **insert** of the moving objects: You can now also *create* or *insert* an MU at the beginning of a length-oriented object if a part of the MU hangs in thin air afterwards, i. e., is not located all the way on the length-oriented object.

- We changed the behavior of the method **setRoute** of an *AGV* that is not bound to a fixed route. The method *setRoute* can now also contain *Tracks* and, as the last object, its own *AGVPool*.

- We changed the parameters of the **Move-in-Frame-control**. These now only affect the 3D coordinates.

- We made the attributes **HasOrder** and **DrivingHome** of the *Transporter* observable.

- We renamed the read-only attribute of the *Transporter* to **DistanceObjectBelowLimit**.

- We changed the return value of the read-only attributes **Location** and **LocationInFrame**. It now is VOID for the *Transporter* and the *Worker* if they move freely within the model.

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New and Changed Features of the Fluid Objects

Tecnomatix Plant Simulation 16.0 provides a number of new and improved features.

New and Changed Features in Plant Simulation 16.0

- We added the read-only-attributes **CurrentMaterialColor** and **CurrentMaterialDensity** to the *fluid objects*.

- We enhanced the behavior of the *Pipe*. When you clear **Pipe opened**, it now shows the state **Pipe closed** in cyan.

New and Changed Features in Plant Simulation 15.2

- We added the drop-down list **Position** to the dialog **Sensors** of the *Tank*. Here you can select if the position of the sensor is **relative** or **absolute**.

- We added the attribute **PositionType** for the sensors of the *Tank*.

- We added the read-only-attribute **CurrentWeight** for the *DePortioner*, the *Mixer*, the *Portioner*, and the *Tank*.

- We added the optional parameter *PositionType* to the method **createSensor** the sensors of the *Tank*.

New and Changed Features in Plant Simulation 15.1

We added the command **Inherit 'Entrance/Exit Locked' On Reset** to the **Tools** menu.

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New and Changed Features of the Resource Objects

Tecnomatix Plant Simulation 16.0 provides a number of new and improved features.

New and Changed Features in Plant Simulation 16.0

- We added the setting **Capacity**, the attribute **Capacity**, and the menu command **Contents** to the *Workplace*.

- We added the setting **Stopped** and the attribute **Stopped** to the *Worker*.

- We added the read-only attribute **CurrentSpeed** to the *Worker*.

New and Changed Features in Plant Simulation 15.2

We changed the behavior when creating *Workers*. If no *Broker* exists during that process, *Plant Simulation* sets the attribute **AutomaticMediation** for the *Workers* to false.

New and Changed Features in Plant Simulation 15.1

- We added the method **getIdleAGV** and the read-only attribute **NumIdleAGVs** to the *AGVPool*.

- We changed the behavior of the *Pick-and-Place-Robot*. If you send a *pick-and-place robot* to a station with the method *setDestination*, the MUs on this station are unblocked as follows:

  - First an already waiting MUs is unblocked for which the *pick-and-place robot* was requested.

  - If this is not the case, the **Pull control** is called, of it exists.

  - If both is not the case, the MU in the **blocking list** is unblocked that was scheduled first.

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New and Changed Functions of the Information Flow Objects

Tecnomatix Plant Simulation 16.0 provides a number of new features.

New Features in Plant Simulation 16.0

- We added *Oracle19c* to the supported Oracle versions.

- We enhanced the behavior of the *Method* and of *user-defined attributes of data type* **Method**. They now have their own random number stream. To enable this, we added the attribute **RandomSeed**. As you are used to from the material flow objects, *Plant Simulation* automatically assigns the random number stream when you insert an object, so that each object has its own random number stream. If you call one of the distribution functions in a *Method*, the first parameter, which specifies the random number stream, now is optional. If you do not specify the stream, *Plant Simulation* uses the random number stream of the *Method* or of the *user-defined attribute method*.
This affects the following **distribution functions**
z_beta, z_binomial, z_cEmp, dEmp, z_emp, z_erlang, z_frechet, z_gamma, z_geom, z_gumbel, z_hypgeom, z_laplace, z_logistic, z_logLogistic z_lognorm, z_negexp, z_normal, z_paraLogistic, z_pareto, z_poisson, z_triangle, z_uniform, and z_weibull.
You can still call the distribution functions with the parameter for the random number stream. For formulas it is required, as formulas never use the random number stream of the surrounding object. The random number sequences, which are generated by the random number streams of the *Methods*, differ from the random number sequences of the global random number streams, whose seed values you can set under **File** > **Options** > **Random Number Seed Values** even if they have the same random number seed value.

- We added the function **str_to_table**. It checks if the designated path references a user-defined attribute of data type *table*, *list*, *stack*, or *queue*.

- We changed the behavior of the function **str_to_method**. If the passed path does not reference a **DataTable**, it now returns VOID. In *Plant Simulation* 15.2 and earlier the *Method Debugger* opened with a runtime error.

- We added the method **cutEmptyRows** to the *DataTable*.

- We added the method **countMatches** to lists and tables.

- We enhanced the behavior of the command **Reformat Selection** of the *Method Editor*. You can now click anywhere within the source code and select the command to **reformat the entire source code** instead of only the selection.

- We added key combinations for **searching for the next occurrence** of the selected text in the *Method-Editor* without having to use the **Find** dialog:
  Ctrl+F3 searches for the next occurrence downwards
  Shift+Ctrl+F3 searches for the next occurrence upwards

- We changed how you can edit **observers**. In previous versions double-clicking a cell in the column **Method** opened the dialog of the *observer*. Now *Plant Simulation* opens the dialog of the **Method to be executed**.

- We enhanced the behavior of a **Variable** of data type **object**. Instead of typing in the path of the object or of selecting the object, you can now also drag the object onto the *Variable* and drop it there. *Plant Simulation* then inserts a reference to the object.
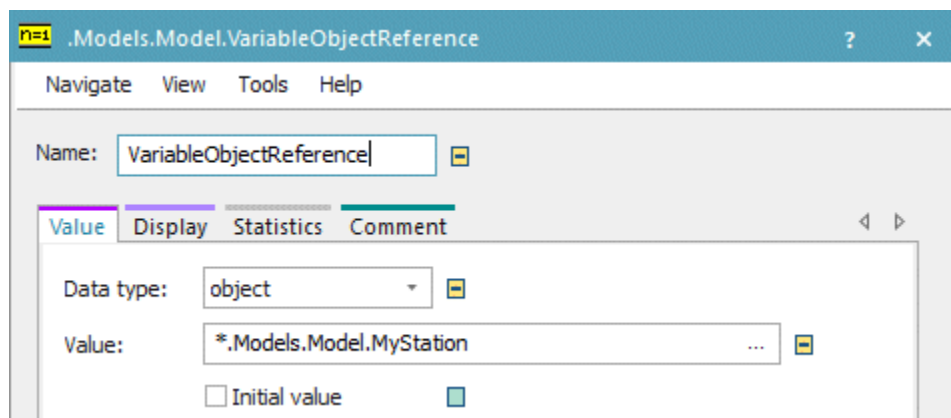
- We removed the tab **Communication** from the **Variable** as we do not support DDE any longer.

- We replaced the tag **eMPlantTable** when exporting *DataTables* in XML format with the tag **PlantSimulationTable**, compare **Export XML File**. *Plant Simulation* can still read XML files that were written by previous versions with the old tag but not vice versa. In addition the written file does not use a namespace any longer.

- We added the comma as **column separator** to the dialog **Text File Format** and to the method **ColumnSeparator**.

- We added two optional parameters to the function **ExecuteSimTalk** of the *COM Interface*. It allows you to add additional arguments to the *SimTalk* method to be executed.

- We added an optional parameter to the function **StartSimulation** of the *COM Interface*. You can use it to set that the simulation runs without animation.

New Features in Plant Simulation 15.2

- We changed the look and the functionality of the object **OPCUA**. It does not display the tab **Communication Statistics** any longer. The *Profiler* now contains the entire **OPC UA Communication Statistics**.

- We added the attribute **Timeout** to **OPCUA**. This might be necessary to establish the connection with a slow server.

- We changed the behavior of the **Teamcenter** Interface. From this version on you do not have to enter the URL of the Active Workspace Servers any more. Instead, you can now use the setting **Use Active Workspace** or the attribute **UseActiveWorkspace** to activate or deactivate Active Workspace. For this reason we do not support the attribute *AWServerURL* any more.
  This only works if the Active Workspace URL is set correctly in the Teamcenter data base in the **Preference > ActiveWorkspaceHosting.URL**.

- We added the commands **Remove Row**, **Remove Column**, and **Insert** to the context menu of lists and tables.

- We changed the behavior of lists and tables whose size you limited by entering the **number of columns** and the **number of rows** on the tab **Dimension**.
  In previous version *Plant Simulation* deleted the existing right-most column or the lowest existing row respectively when you added a new column or a new row. Thus the number of columns and the number or rows that you defined did not change.
  From this version on *Plant Simulation* increments the number of columns and the number of rows respectively when you add columns or rows. It does not delete the existing last column/row any longer preventing data loss.

- We enhanced the behavior of the method **sort** of *lists* and *tables*. When sorting according to several columns you can now specify the sort order for each column individually. To do so, enter an *array* of data type *string*, in which you defined the sort order for each column, as the last parameter.

- We changed the behavior of the methods **max**, **meanValue**, **min**, **standardDeviation**, and **sum**. These now treat the boolean value true like 1.0 and the boolean value false like 0.0.

- We do not support the method *inheritValue* of the *Variable* any more. You can use the instruction `Variable.`**inheritAttribute**`("Value")` instead.

New Features in Plant Simulation 15.1

- We added the command **MU and Icon Animation** to the **View** menu and to the **toolbar of the Method-Debugger**. You can use it to activate or deactivate **MU Animation** and **Icon Animation** together.

- We enhanced copying source code in the *Method Editor*. *Plant Simulation* pastes the copied source code in a suitable program, for example MS Word, with its color highlighting.
  Plant Simulation places the text, in addition to simple text, as RTF Text, on the clipboard.
  Suitable programs paste the formatted RTF text or provide options for the format to be pasted, compare **Working in the Method Window**.

- We enhanced the functionality of the command **Export to File** of the *Method Editor*. You can now select the format of the text file to be exported. To save color highlighting of keywords and comments in the source code, you can select **HTML Files** or **RichText Files**.

- We enhanced the behavior of the *DataTable*. You can also use the method **setXYWH** when a *DataTable* is open as a dialog in the foreground.

- We added the setting **Use RFC 1006** to the object *Socket*.
  As this functionality makes the method *writeString* superfluous, we do not support it any more.

- We added the optional parameter *HostAndPort* to the methods **write**, **writeByte**, and **writeNullByte** of the object *Socket*.

- We added the methods **getItemValue** and **setItemValue** to the *PLCSIM_Advanced Interface*.

- We added the attributes **OfflineCycleCtrl** and **OfflineMode** to the *PLCSIM_Advanced Interface*.

Back to What's New in Tecnomatix Plant Simulation 16

New and Changed Features of the User Interface Objects

Tecnomatix Plant Simulation 16.0 provides a number of new and improved features.

New Features in Plant Simulation 16.0

We changed the behavior of the object **GanttChart**. For *parts* being transported by a *Transporter* or carried by a *Worker*, it now shows the *Transporter* or the *Worker* as the resource instead of the *Track* or the *Footpath*.

New Features in Plant Simulation 15.2

- We extended the behavior of the object **HtmlReport**. It can now also **display a Sankey Diagram**. You can use the keyword `%planningview` to show the **planning view** of a **3D-Only-Model**, compare **Display a Frame**.

- We added the method **setActiveTabPage** to the *Dialog*.

- We improved adding **Annotations** to the *Chart*. You can now select the type of the annotation from a list instead of entering a number.

- We no longer support the attribute *Markers* of the *Chart*. If you have models that still use it, we recommend to remove the instruction from the source code.

New Features in Plant Simulation 15.1

- We added the tab **Attributes** to the *GanttChart*. Until now you could only specify these settings with attributes and methods.

- We added the methods **getInvestmentCostsTable** and **getPieceCostsTable** to the *CostAnalyzer*.

- We changed the behavior of the method **update** of the object *Display*. The method does not have a return value any more and the parameter is optional and will be ignored.

- We enhanced the method **setLineStyle** of the *Chart*.
  The parameter *LineStyle* now is more flexible. You can pass a shortened *string* to the method, which has to have a length of least three characters. You can, for example, now pass ". ." or ". . ." instead of ". . . . ." to create a dotted line. You can also pass "_ _" instead of "_ _ _ _ _" to create a dashed line.
  You can also pass minus signs instead of underscores, for example "- -" instead of "_ _".
  The parameter *LineWeight* is optional. If you do not pass it, *Plant Simulation* keeps the previous *LineWeight*.

- We changed the behavior of the *Chart*. When you selected **Reapply at Init** in the *Statistics Wizard*, the *Chart* will not be opened automatically when you initialize the model with **Init**. This had a negative effect on the performance of the ExperimentManager.

Back to What's New in Tecnomatix Plant Simulation 16.0

New 3D Features

Tecnomatix Plant Simulation 16.0 provides a number of new features.

New Features in Plant Simulation 16.0

- We significantly enhanced and simplified recording videos, compare **Start Simple Recording** and **Start Simulation Recording**.

- We added the command **Create Tugger Train** to the **Context Menu for Several Selected Objects**. We enhanced the behavior of the **Transporter** when you **Create a Tugger Train**. Now the tractor and all trailers do not have to touch any more, as long as all *Transporters* are located all the way on the

same *Track*. If necessary *Plant Simulation* moves the other *Transporters* up to the frontmost *Transporter* or the *tractor*.

- We enhanced the display of the **WorkerPool**. You can show the *Workers* either on an animation path or on an animation area.

- We enhanced the display of the **Workplace** with a **Capacity** of more than one *Worker*. You can show the *Workers* either on an animation path or on an animation area.

- We enhanced the behavior of the **Drop-Down List** in 3D. It can now also display **Captions**.

- We added the method **moveTo** for joints of animatable objects.

New Features in Plant Simulation 15.2

- We added the command **Split Up** to the context menu **Segments** of the length-oriented objects.

- We extended the behavior of the commands **Make Simulation Object** and **Make Animatable Object**. You can now also call these commands when you selected several graphics at the same time.

- We added the *six-axis robot* to the robot types which the **PickAndPlace robot** recognizes, compare **Configure the Robot in 3D**.

- We added the setting **Origin** to the appearance of the *Store*. You can select the **origin** for the graphic in the **X direction** and the **Y direction**. The **origin** sets if the insertion point of the object is the center or the left/lower or the right/upper border of the graphic.

- We extended the functionality of the command **Import Graphics**. It can now also import **NX Files** (**.prt).

- We added the setting **Preserve references** to the dialog **Optimize Selected Graphic**. If you optimize your model, *Plant Simulation* applies this setting as well. This also applies to the method **_3D.optimizeObject**. For the method *_3D.optimizeObject* this is a non-simulation-relevant change.

- We added the command **Add Animatable Object** to the **Context Menu of a Simulation Object** in the dialog **Show 3D Graphic Structure**.

- We changed the function of the command **Show 3D Graphic Structure**. It now always displays additional information for the graphics.

- We added the method **_3D.Poses.moveToCoordinate**. The method allows an object, for which you can define pose, to move to a coordinate with a certain destination orientation without having to define a pose. It thus simulates a pose movement that resembles robot kinematics.

- We added the key combination **Shift+double-click** to context menu command **Open in New 3D Window**.

- We introduced functions for the **Page Up key** and the **Page Down key**.
  Depending on your selection the **Page Up key** executes the following:

  - If you select the **first manipulator of a length-oriented object**, *Plant Simulation* elongates the neighboring segment towards this manipulator. The object thus becomes longer.
    A linear segment is elongated in a linear way. For a horizontal curved segment the curve angle is increased. For a vertical curved segment the **Page Up key** has no effect.
    If you select the **last manipulator of a length-oriented object**, *Plant Simulation* shortens the neighboring segment towards this manipulator. The object thus becomes shorter.
    A linear segment is shortened in a linear way. For a horizontal curved segment the curve angle is decreased. For a horizontal curved segment the **Page Up key** has no effect. Compare **Edit Manipulators with Keyboard Keys**.

  - If you select a **sensor**, the **Page Up key** moves the sensor to the left. The **left arrow key** does the same. Compare **Edit Sensors with Keyboard Keys**.

  - If you select an **animatable object**, which shows a pose state while editing a pose, the **Page Up key** moves the joint according to its degree of freedom towards its lower limit. The **left arrow key** does the same. Compare **Move Poses and Joints with Mouse and Keyboard Keys** and **Moving the Robot in 3D with Mouse or Keyboard**.
    If the object is not an animatable object, the offset is 10 % of the grid line distance that is used for snapping. By default this is 10 % of 1 m, i.e., 10 cm.
    If the object is an animatable object, the offset is described under **Move and Rotate Poses** on the **3D Quick Reference Card**. If you hold down the **Shift** key, it is ten times the value, i.e., the grid distance itself, etc. If you hold down the **Ctrl** key, it is a tenth of the value, i.e., 1 % etc.

  Depending on your selection the **Page Down key** executes the following:

  - If you select the **first manipulator of a length-oriented object**, *Plant Simulation* shortens the neighboring segment towards this manipulator. The object thus becomes shorter.
    A linear segment is shortened in a linear way. For a horizontal curved segment the curve angle is decreased. For a vertical curved segment the **Page Down key** has no effect.
    If you select the **last manipulator of a length-oriented object**t, *Plant Simulation* elongates the neighboring segment towards this manipulator. The object thus becomes longer.
    A linear segment is elongated in a linear way. For a horizontal curved segment the curve angle is increased. For a vertical curved segment the **Page Down key** has no effect.

  - If you select a **sensor**, the **Page Down key** moves the sensor to the right. The **right arrow key** does the same.

  - If you select an **animatable object**, which shows a pose state while editing a pose, the **Page Down key** moves the joint according to its degree of freedom towards its upper limit. The **right arrow key** does the same.
    For an animatable object, the offset is described under **Move and Rotate Poses** on the **3D Quick Reference Card**. If you hold down the **Shift** key it is ten times the value, i.e., the grid distance itself, etc. If you hold down the **Ctrl** key, it is a tenth of the value, i.e., 1 % etc.
    If the object is not an animatable object, the offset is 10 % of the grid line distance that is used for snapping. By default this is 10 % of 1 m, i.e., 10 cm.

- We extended scene manipulation with the 3D mouse in **Planning View**. The axes now correspond to those that are also used in modeling view.

New Features in Plant Simulation 15.1

- We added the **Shape > Dimensioning**. You can use it to measure the distance between objects and the dimensions in the 3D window. To do so, we also added the *SimTalk* functions **createDimensioning**, **DimensioningSpace**, **MeasuredLength**, **MeasuringPoint1**, **MeasuringPoint2**, and **TextPosition**.

- We added the setting **Edging** to the **Cuboid**. You can use it to add colored lines to the edges of the *Cuboid*.

- We enhanced the functionality of the method **createCuboid**. You can now also create a flat wall by entering 0 for one of the dimensions.

- We redesigned the dialog for creating a **rack**.
  We added the settings **board thickness**, **ground clearance**, **post diameter**, and **post form** to the rack.
  We added the optional parameters *SquarePosts*, *PostDiameter*, *BoardThickness*, and *GroundClearance* to the method **createRack**.

- We enhanced the functionality of the method **createRack** with an additional parameter. The **board thickness** now is no longer part of the height of a storage compartment and the height of the individual compartments is reduced by the board thickness of 3 cm.
  The overall height of the rack is increased by 3 cm each for each shelf.

- We added new **types** and additional settings for these types to the *Store* in 3D.

- We enabled multiple paste of shapes and graphics: Select the shape/graphic, hold down the **Ctrl** key and click on the positions in the *Frame* in the 3D window at which you would like to place the instances.

- We added the **base plate material** to the **Grid and Base Plate Settings**. It replaces the base plate color that previous versions of the program provided.

- We added settings for **acceleration**, **deceleration**, and **preview translation/rotation** of the joints to the **Tab Joint**.

- We added the radio buttons **Relative/Absolute** for objects with **animation area** to the tab **MU Animation**. They activate the text boxes for the respective settings and deactivate the text boxes for the other settings. This makes entering values easier.

- We enhanced the functionality of the *robot* in 3D. You can now move it with the mouse, compare **Move the robot in 3D with the mouse**.

- We added buttons to the dialogs **Make Animatable Object** and **Make Simulation Object**. You can click them to set the object position to values, which result from the bounding box of the graphic to be converted.

- We enhanced the functionality of the command **Make Animatable Object**. After you created it, *Plant Simulation* now opens the dialog **Edit 3D Properties** with the **tab Joint**.

- We enhanced the functionality of the command **Copy**. You can now also copy and cut graphics which are contained in other graphics.

- We added the command **Reorder Successors** to the **Context Menu of the Selected Simulation Object.**

- We added the method **_3D.getMUAnimationPosition**.

- We added the method **_3D.getRotationOfObject**.

- We added the method **_3D.getWorldRotation**.

- We added the method **_3D.MUAnimations.<AnimationPathName>.getMUAnimationPosition**.

Back to What's New in Tecnomatix Plant Simulation 16

Changed 3D Features

Tecnomatix Plant Simulation 16.0 provides a number of changed and improved features.

Changed Features in Plant Simulation 16.0

- We changed how *Plant Simulation* shows a newly created *simulation frame*. A *simulation frame* is a *Frame* that contains an *EventController* and in which you run simulations. The *EventController* is now located zoomed in the left top corner in whose vicinity the origin of the grid now also is located.

- We changed how *Plant Simulation* opens new 3D windows: As to the visibility of **grid** and **base plate** these are now always opened independent of what was set in a 3D window. Until now this was only the case for *Frames*. Other 3D windows always used the last selected setting, no matter if you opened it from a 3D Frame window or from another 3D window.

- We changed the **transparency** of the **base plate material**, to better see if objects are located below the base plate.

- We removed the spin buttons from the 3D dialogs as they reduced the performance of the program. Instead you can:

  - Roll the mouse wheel forward to increase the value, compare **Move and Rotate Objects** in the **3D Quick Reference**.

- Roll the mouse wheel back to decrease the value.

- Press the **Left**, **Right**, **Up**, or **Down arrow keys**, compare **Move and Rotate Objects** in the **3D Quick Reference**.

- We changed the behavior of extrusion configurations that are repeated in **equidistant** sequences, for example the **legs** of a *conveyor*.

  - In previous versions these were equidistant according to the length projected onto the XY plane.

  - Now they are equidistant according to the **length** in space. This looks better if they occur in vertical curves or with a height offset.

- We changed the behavior of the command **Show External Graphic Groups** External Graphics on the **View** ribbon tab:

  - For the *Frame* you can show or hide external graphics by clicking the button.

  - For 3D windows of all other objects the button is permanently activated External Graphics .

  - For the 3D window of a **folder** the button is permanently deactivated External Graphics .

- We changed the behavior of the option **Optimize 3D attribute inheritance** in the dialog **Optimize Model**. **Optimize 3D attribute inheritance** no longer suppresses the optimization of graphics inheritance.

- We changed license checking for the subcommands of the command **Export Scene**:

  - If you run *Plant Simulation* with a **Viewer license** the subcommands are no longer grayed out. Once you select one of these commands. *Plant Simulation* shows this message.
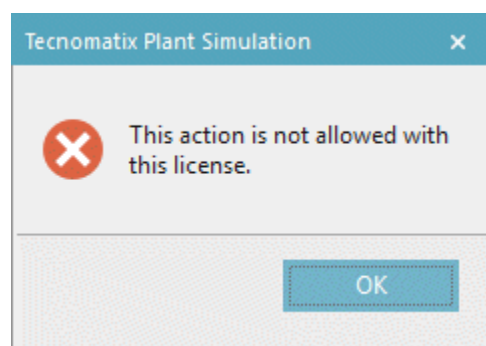
  - When you export the scene with the methods **_3D.exportAsBitmap**, **_3D.exportAsJt**, or **_3D.exportAsS3D** a *Debugger message* alerts you that this is not allowed with the **Viewer license**.

- We added an optional parameter to the method **_3D.exportAsJt**. It sets if the graphic of the object is exported with all of its components or if the components that are not visible if you opened the object in a 3D window are not exported.

- We added an optional parameter to the method **F3DPauseVideo**.

- We made the parameters *YUpToZUp* and *MoveContentToZero* of the method **importGraphics** optional.

- We made the parameter *Pose* of the **_3D.Poses.getAnimationTime** optional.

- We removed support of the method *_3D.deletePlainGraphics*. You can use the method **_3D.deleteGraphicGroupContent** instead.

- We removed support of the method *_3D.getAnimationPoint*. You can use the method **_3D.getMUAnimationPosition** instead.

Changed Features in Plant Simulation 15.2

- We changed the behavior when importing a 3D graphic with the command **Import Graphics** or with drag and drop from the Windows Explorer. *Plant Simulation* now automatically zooms the view to this graphic.
  To prevent zooming, hold down the **Shift** key before clicking **OK** in the dialog **Insert Graphic**. Zooming can, for example, be annoying if you want to import several JT graphics to certain positions and when *Plant Simulation* continuously changes the scene when doing so.

- We changed the behavior of an animatable object with a **joint velocity** of 0 on a **Turntable**. The animatable object now does not rotate with the *Turntable* if the *Turntable* rotates. You can use this to model a fixed base for the *Turntable* around which the turntable proper rotates.

- We enhanced the behavior when automatically connecting *Sources* and *Drains*. These are now connected on all four corners with the *Connector*.

- We changed the behavior when moving several objects at the same time with the mouse. If **Connect objects automatically** is active, *Plant Simulation* only connects the selected objects with other, non-selected objects, but not with each other.

- We extended the behavior when you duplicate objects with **Ctrl+drag-and-drop**. *Plant Simulation* now selects the duplicated objects in the scene window, just as when you copy and paste object.

- We changed the behavior of the dialog **Optimize Model**. When you hold down the **Shift** key while clicking **Optimize** and when **Optimize 3D attribute inheritance** is active, *Plant Simulation* does not optimize inheritance of the graphic and of the states.
  This is useful to suppress this optimization if it would take too long.

- We changed the behavior when you opened the dialog **Edit 3D Properties** of a simulation object and when you changed a value on the tab **Transformation**. In previous versions the preview of the

changed value triggered a **Move in Frame control** which caused *Worker paths* to be computed anew. From this version on *Worker paths* are not computed anew any longer.

- We renamed the function *basis._~._3D.concatenateRotations* to **F3DconcatenateRotations**.

- We changed the behavior of the method **makeAnimatableObject** and of the commands **Make Simulation Object** and **Make Animatable Object**. If the graphic, from which animatable object is created, is not part of the **default** graphics group, the commands create a graphics group with the name of the graphics group where the graphic to be extracted is located. In previous versions *Plant Simulation* created the graphics group within the **default** graphics group.

- We renamed the functions *basis._~._3D.generate...* to **F3DgenerateEllipse**, **F3DgenerateHollowEllipse**, **F3DgenerateHollowRectangle**, and **F3DgenerateRectangle**.

- We removed the slider from the settings **Transparency** and **Shininess** from the dialog **Material** and the tab **Appearance**. You can now only enter values into the text boxes.

Changed Features in Plant Simulation 15.1

- We changed how *Plant Simulation* recognizes the number of axes of a robot to be imported. Compare **Configuring the Pick-and-Place Robot in 3D**.

- We changed for which objects you can create **internal graphic groups**. You can now only do that for *Frames*.
  For all objects, except for the *Frame*, we removed the column **Internal** on the **tab Graphics** in the dialog **Edit 3D Properties**. The context menu command is grayed out in the dialog **Show Graphic Structure**. In existing models all graphic groups are treated as external, independent of the setting you chose.
  For this reason these *SimTalk* functions are only available for the *Frame*: **_3D.InternalGraphics**, **_3D.isGraphicGroupInternal**, **_3D.setGraphicGroupExternal**, and **_3D.setGraphicGroupInternal**. The parameter **Internal** of the method **_3D.addGraphicGroup** now is optional and is only available for the *Frame* as well.

- We enhanced the message dialogs that *Plant Simulation* shows when, for example, calling the command **Exchange Graphics** when the dimensions an MU graphic do not match the physical dimensions. These messages now also contain information about the booking point and highlight the value pairs that actually changed.

- We removed the setting **Show Grid** from the **tab 3D** in the dialog **Preferences**. For this reason we do not support the attribute *basis.~._3D.GridVisibleInNewWindows* any longer.
  Instead, you can show or hide grid and base plate with the buttons **Show Grid** and **Show Base Plate** on the **View tab** individually and separately.

- We removed the text box **Curve precision** from the **tab 3D** in the dialog **Preferences**. For this reason we do not support the attribute *_3D.CurvePrecision* any longer.
  To control curve sampling of polycurves and splines, we now use a common dynamic mechanism which is independent of the curve radius.

This change can alter simulation results in models with length-oriented objects with curve segments, if a *Worker* is walking unrestricted within the model.

- We changed how the **planning view** shows state graphics. 3D now hides the placeholders for state graphics. The state of an object with perpendicular state marker is now shown as a small colored dot.

- We changed how **line** and **point graphics**, for example **Dimensions**, are shown. These do not throw any shadows any more.

- We changed the behavior of the *Worker* on point-oriented objects. You cannot run the animation for it depending on the simulation time. For this reason the *Worker* does not support the method **_3D.resetAnimationTime** any more.

- We changed the behavior of **MU animations** of point-oriented objects:

  - If an **MU animation path** consists of more than one point and if you did not enter a time or speed respectively the **MU animation** now takes exactly as long as the **processing time**.

  - Failure, pause, etc now interrupt **MU animations**, which consist of more than one point, on point-oriented objects.

- We changed the behavior when adding new animation paths on the **tab MU Animation** if no MU animation paths are created yet for the default cases of the object. Now the text box **Path name** shows the ellipsis button … . When you click it, *Plant Simulation* opens a dialog with suggestions for path names which are not yet mapped to existing MU animation paths. The list is limited to 100 entries.
  The individual paths for individual MUs on the *PickAndPlace-robot*, the *PlaceBuffer*, the *AGVPool*, or the *WorkerPool* are not considered here as they do not have a fixed path name.

- We changed the behavior when optimizing a graphic with the command **Optimize Graphic** > **Step 2: Flatten structure** without the option **Keep grouping** being active. When you optimize a graphic with this command or when you export a graphic or when you optimize the model with the command **Optimize Model** > **Optimize 3D graphic structure**, *Plant Simulation* now deletes ungrouped graphics, which do not contain any other graphics. When exporting a graphic this only takes place in the exported .jt file.

Back to What's New in Tecnomatix Plant Simulation 16

New and Changed SimTalk Features

Tecnomatix Plant Simulation 16.0 provides a number of new and improved features.

New and Changed Features in Plant Simulation 16.0

- We added **JSON** to the *SimTalk* **data types**.
  We added the keyword **json**.
  We added the **data type** **json** to the *Variable*.

- We added the function **BitClear**.

- We added the optional parameter *MakeAbsolute* to the function **obj_to_str**.

- We added the optional parameter *forceUpdateNow* to the function **updateGUI**. You can use it to force *Plant Simulation* to immediately update the user interface.

- We removed support of the function *HTMLHelp*.

New and Changed Features in Plant Simulation 15.2

- We extended the behavior of the operators **+=** and **-=**. For objects of type *Variable* and for user-defined attributes of data types *time*, *length*, *weight*, *speed*, and *acceleration* these now check the type more stringent than before, compare **Arithmetic Operators**. The following source code will now, for example, cause an error:

```
var len : length
VariableObjectOfTypeSpeed += len   -- no longer allowed
len += VariableObjectOfTypeSpeed   -- was never allowed
```

- We changed the behavior of the functions *pow* and *sqrt*, compare **Basic Mathematical Functions**. They now also support the use of physical units.

- We extended the behavior of *SimTalk* 2.0. You can now also enter units for **speed** and **acceleration**. Enter the unit directly after the number, without a separating blank space, for example `42mph` or `42.0mph`.
  For the **speed** you can type in these units: `mps` (meters per second), `fps` (foot per second), `kmh` (kilometers per hour), and `mph` (miles per hour).
  For the **acceleration** you can type in these units: `mps²` (meters per second squared) and `fps²` (foot per second squared).

- We extended the behavior of *SimTalk* 2.0. You can now also enter the unit `s` for **seconds**. Enter the unit `s` directly after the number, without a separating blank space. Entering the unit sometimes is necessary to make sure that the computed expression has the correct data type.

```
var x : length := 10m
var s : speed := x / 2s   -- Beware: x/2 would have the
                          -- wrong unit, m instead of m/s
```

- We added an optional parameter to the method **sort** of *arrays*. It enables you to sort the array in ascending or descending order.

- We added the method **normalize** for *arrays* of data type *real*.

- We replaced the function *SHGetFolderPath* with the function **SHGetKnownFolderPath**.

- We enhanced the behavior of the methods **messageBox**, **prompt**, **promptList1**, and **promptListN**. You can now also set the text with them that is shown in the title bar of message dialogs.

- We renamed these functions for editing variables of data type *string* to better recognize them as string functions:

Outdated	Replaced by
ascii	**strAscii**
chr	**strChr**
copy	**strCopy**
incl	**strIncl**
omit	**strOmit**
pos	**strLPos**
toLower	**strToLower**
toUpper	**strToUpper**
trim	**strTrim**

> Note:
>
> Models you created in previous versions might not work any longer if you use the new names as names of variables.

Outdated SimTalk Names

Outdated	Replaced by
basis.~._3D.closeAllWindows	**closeAllWindows**
basis.~._3D.generateEllipse	**F3DgenerateEllipse**
basis.~._3D.generateHollowEllipse	**F3DgenerateHollowEllipse**
basis.~._3D.generateHollowRectangle	**F3DgenerateHollowRectangle**
basis.~._3D.generateRectangle	**F3DgenerateRectangle**
_3D.MUAnimations.<AnimationPathName>.getPositionAt	**_3D.MUAnimations.<AnimationPathName>.getMUAnimationPosition**
ActReceiver	no longer supported, EventController
ascii	**strAscii**
AWServerURL	no longer supported, **UseActiveWorkspace**
chr	**strChr**
copy	**strCopy**
deleteBreakpoint	no longer supported, EventController
getBreakpointCondition	no longer supported, EventController
getBreakpointReceiver	no longer supported, EventController

Outdated	Replaced by
getBreakpointSender	no longer supported, EventController
getBreakpointStartTime	no longer supported, EventController
getBreakpointStopTime	no longer supported, EventController
getBreakpointTraceFile	no longer supported, EventController
getBreakpointType	no longer supported, EventController
incl	**strIncl**
ModifyStructure	**LockStructure**
omit	**strOmit**
pos	**strPos**
setBreakpointCondition	no longer supported, EventController
setBreakpointReceiver	no longer supported, EventController
setBreakpointSender	no longer supported, EventController
setBreakpointStartTime	no longer supported, EventController
setBreakpointStopTime	no longer supported, EventController
setBreakpointTraceFile	no longer supported, EventController
setBreakpointType	no longer supported, EventController
SHGetFolderPath	**SHGetKnownFolderPath**
toLower	**strToLower**
toUpper	**strToUpper**
trim	**strTrim**

New and Changed Features in Plant Simulation 15.1

- We added lists of the **Outdated SimTalk Names in 2D** and of the **Outdated SimTalk Names in 3D**.

- We restricted the support for *SimTalk* Version 1.0 in the *Method Editor*.

  - We deactivated **syntax-controlled indentation** and **formatting of the source code** for *SimTalk* Version 1.0.

  - We removed color **highlighting of keywords**, which only exist in *SimTalk*, and **outlining of structures** specific to *SimTalk* Version 1.0.

  - We removed **inserting of structures** specific to *SimTalk* Version 1.0 via **templates**.

- We added the method **inheritAttribute**. It replaces these obsolete methods.

Obsolete Method	Replaced by Method
inheritPosition	*inheritAttribute("Coordinate3D")*
inheritSizeAndOrientation	*inheritAttribute("ZoomX")*
	inheritAttribute("ZoomY")
	inheritAttribute("ObjectAngle")
InheritGraphicVisibilities	*_3D.inheritAttribute("VisibleGraphicGroups")*

- We extended the behavior of the **waituntil and the stopuntil statement**. It now can now also observe expressions for which only the last part of the path is observable. Up until this version you could not observe `Station.Origin.Name` for example, as *Origin* is not observable.
  Up until this version you had to write:

```
var o : object := Station.Origin
waituntil o.Name = "a"
```

  This is not required any more.
  Note that it can be more efficient though to assign the object to be observed to a local variable as before and use it in the *waituntil/stopuntil statement*. If you are observing the condition `Station.Origin.Name = "a"` for example and if the name of the observed object changes very often before "a" is finally assigned, the entire observed condition is evaluated anew each time the name changes.

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Miscellany

Tecnomatix Plant Simulation 16.0 provides a number of new and improved features.

New and Changed Features in Plant Simulation 16.0

- We adapted the look of the dialogs and windows of *Plant Simulation 16.0* and to the look of the **Siemens Digital Industry Software** applications. The background of the dialogs is now white for example.
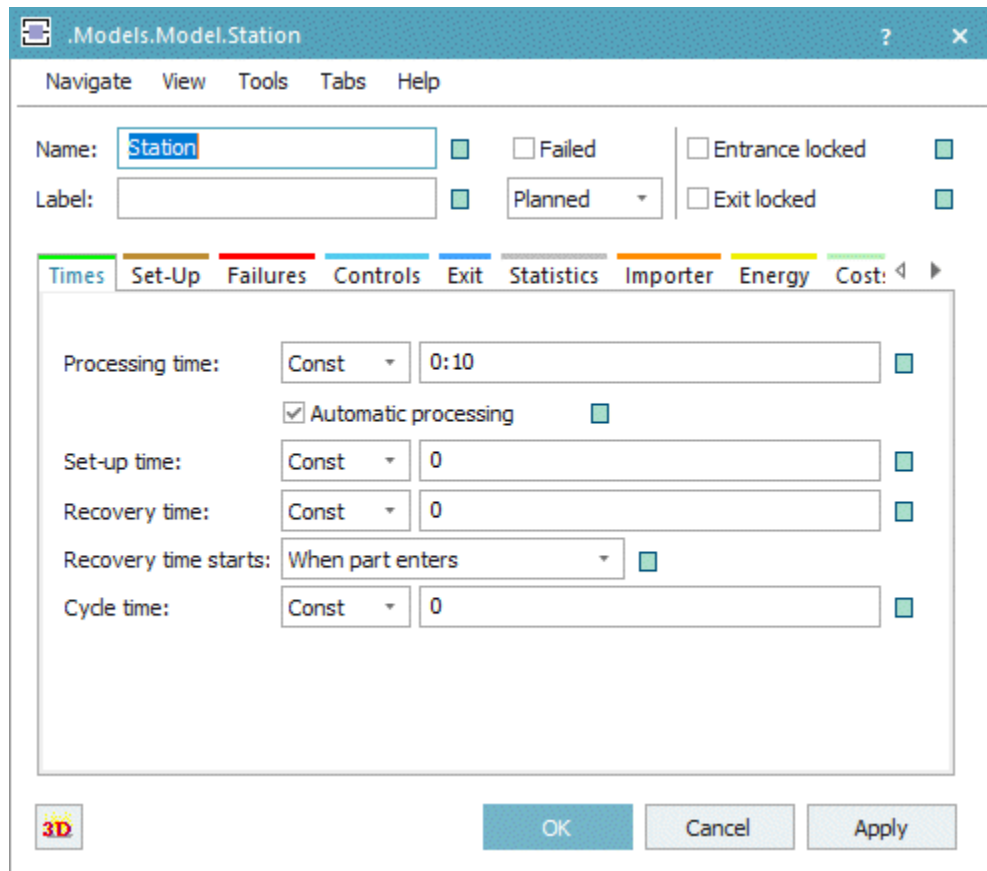
- We added the **Plant Simulation Foundation License**.

- We adapted the **Help** menu to accommodate the new **Siemens Industry Software Support Center**.

- In addition to the chm file, we now provide the **English**, the **Japanese**, and the **Russian** online help for *Plant Simulation 16.0* on the Web in the **Siemens Industry Software Support Center**. Web help runs on the most recent versions of Google Chrome, Firefox, and Microsoft Edge. We expect the **Japanese** and the **Russian** online help to be available in November 2020.
  To use the chm help file from the *Plant Simulation Installation*, create the registry key `UseInternalOnlineDocu` in the **Registry Editor** and type in `0` as the value. The value `1` shows the Web help.
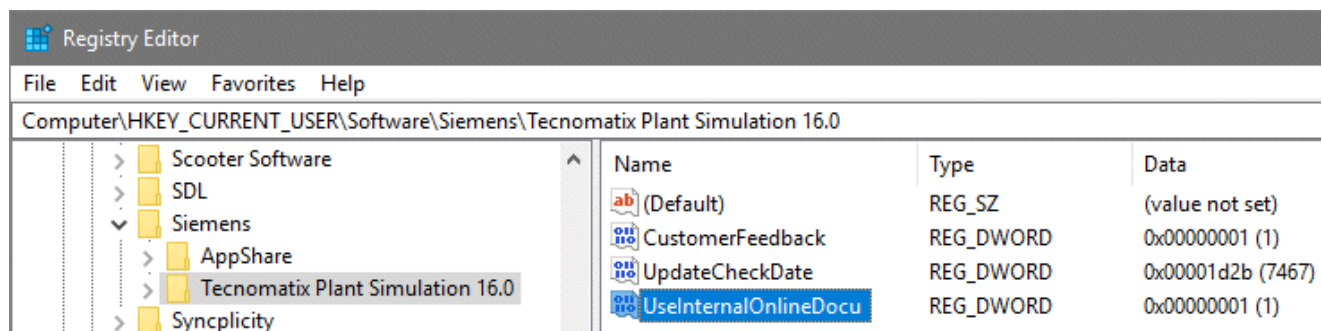
For technical reasons we cannot provide the **German** online help on the Web yet.

- We added the topic **Updating an Old Model to the Current Version** to the online help. It demonstrates how you can use the new functions of the current version of *Plant Simulation* in a model that you created in a previous version of the program.

- We improved the arrangement of the **Topics** and of the **Examples** in the **Example Models Collection**.

- We changed the behavior of the command **Compare Models**. From this version on *Plant Simulation* does not consider *attributes* any more which inherit their value. If the attribute value of a *class* changes, only the *class* is shown as changed, but not all *instances* of this *class*.

- We changed the behavior when pressing **Ctrl+Tab**, compare **Changing between Docking Windows and Object Windows**.
  In previous versions **Ctrl+Tab** only changed from object window to object window. Now **Ctrl+Tab** opens the **Windows Navigator** and shows a preview of the docking windows and of the opened object windows. The window navigator stays open until you release the **Ctrl** key again.
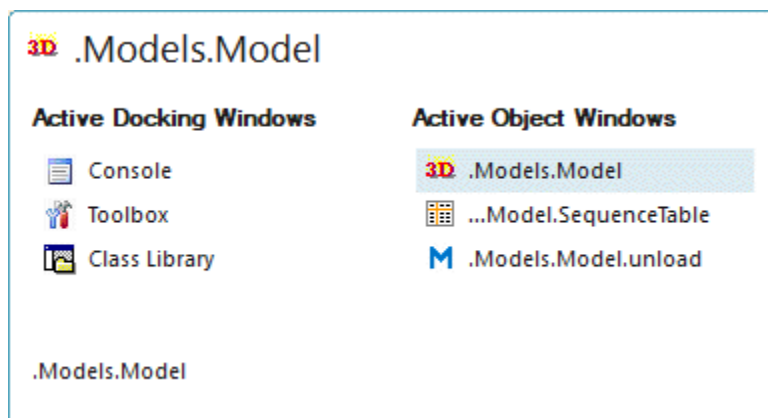
The **Active Docking Windows** are listed on the left and the **Active Object Windows** on the right.
The **left arrow key** and the **right arrow key** change between the columns **Active Docking Windows** and **Active Object Windows**.
The **tab key** or the **up/down arrow keys** change between the windows within a column. Releasing the **Ctrl key** activates the selected window.
If the focus is located on a docking window, **Ctrl+Tab** changes between the docking windows.
If the focus is located on an object window, **Ctrl+Tab** changes between the object windows.

- We removed the **visualization** setting **2D and 3D** from the **Preferences**. From now on you can only create new simulation models either in **2D only** or in **3D only**.

- We added the button **Show Movable Units** to the dialog **Show Structure**.

- We added the method **showObject** for all objects. It shows the object in the *Frame* or in the *folder*.

- We changed the behavior of the licensing mechanism. For security reasons new license files do not contain a WebKey. For this reason it will no longer be shown in the dialog **File > Help > About Tecnomatix Plant Simulation**. It is no longer available for user-defined licenses as **Host ID**.

- We changed licensing with a dongle from WIBU to Sentinel, compare **Installing the Sentinel Driver**.

- We enhanced the behavior of **Pack and Go**. When creating a Pack-and-Go-model you can now decide if you want to restrict the model permissions to the permissions of a Viewer license. Then you have to pass the license to be used to *Pack and Go* with the start parameter **/L**.

- We changed the behavior of the **high contrast mode**. *Plant Simulation* now creates pictures and *HTMLReports* as if **high contrast mode** is turned off.

New and Changed Features in Plant Simulation 15.2

- We added the topic **Plant Simulation for Beginners** to the *Online Help*. It provides a short overview over *Plant Simulation* and introduces the underlying simulation concepts. We also moved the **Tutorial** here and built the simulation models in 3D.

- We added key combinations for zooming the contents of the *Frame*:

  - To **zoom** the contents of the *Frame* **in**, you can:
    Hold down **Ctrl** and press **+**
    Hold down **Ctrl** and roll the mouse wheel up

  - To **zoom** the contents of the *Frame* **out**, you can:
    Hold down **Ctrl** and press **-**
    Hold down **Ctrl** and roll the mouse wheel down

  - To **restore** the **original size** of the contents of the *Frame*, you can:
    Hold down **Ctrl** and press 0 (zero)

- We changed the sequence in which the **Rename control** and the **Relabel control** are being called. From this version on the control is first called for the renamed or relabeled object and then for the inheriting objects.

- We added the setting **Initial value** to the *user-defined attributes*.
  These now also provide the attributes **HasInitValue**, **InheritHasInitValue**, **InheritInitValue**, and **InitValue**.

- We enhanced the behavior of the *user-defined attributes*. When you created a user-defined attribute that references an object, you can double-click it in the column **Name** on the tab **User-defined** to open it. Hold down **Ctrl** and double-click it to show the referenced object at its location and to select it.

- We changed our licensing mechanism to the Common Licensing Toolkit 11.0. For this reason you now need a license server of Version 11 or higher.

- We reduced the **units for the acceleration** under **Preferences** > **Units** > **Acceleration** and **Model Settings** > **Units** > **Acceleration** to these four units: **m/s²**, **cm/s²**, **ft/s²**, and **LU/s²**.

- We changed the conversion of the **speed units mph** (miles per hour) and **m/s** (meters per second) under **Preferences** > **Units** > **Speed** and **Model Settings** > **Units** > **Speed**:

Up to and including *Plant Simulation* 15.1	1 mph = 0.444444 m/s or 1m/s = 2.25 mph
From *Plant Simulation* 15.2 on	1 mph = 0.44704 m/s or 1m/s = 2.236936 mph

- We added the read-only attribute **IsLocked** to the *folder* in the *Class Library*. It returns if the designated folder is a locked library.

- We added an optional parameter to the **Open control** of all objects except the *DataList* and *DataTable*. It applies when the object is located within a locked library or a locked folder.

- We added an optional parameter to the method **sort** of *arrays*. It enables you to sort the array in ascending or descending order.

- We replaced the attribute *ModifyStructure* with the attribute **LockStructure**.

- We removed support for DDE.

New and Changed Features in Plant Simulation 15.1

- We changed the behavior of *Plant Simulation*. You cannot activate or deactivate **MU Animation** and **Icon Animation** separately any more. Activating/deactivating **MUs and Icons** activates/deactivates **MU Animation** and **Icon Animation** together.
  For this reason we do not support the methods *animMU* and *animIcon* any longer.

- We added the setting **Create backup files with time stamp** to the **Preferences**.

- We extended the behavior of drag and drop, compare **Drag an Object Onto Another Object and Drop It There**.
  When you drag an object into a window that expects text or into a text box which expects an object path and drop it there, you can now hold down the **Shift** and **Ctrl** keys to insert the absolute path of the object. If you do not hold down these keys, *Plant Simulation* inserts the relative path to the object instead of the object.

- We added the command **Edit User-Defined Attributes** to the dialogs **Show Structure** and **Show Inheritance**.

- We changed the behavior for user-defined attributes of data types *method*, *table*, *list*, stack, and *queue*. You can now double-click the column **Value** to open the respective object instead of the user-defined attribute.

- We replaced the file extension of object files, which you save or export, from .obj to .psobj. As the file extension .obj is also used by other programs, *Plant Simulation* could not show a **preview** of object files with the file extension .obj.

- We improved readability and look of the *What's This help*. It now contains formatted text and has a better window size.

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What's New in Tecnomatix Plant Simulation 15

What's New in Tecnomatix Plant Simulation 15

Tecnomatix Plant Simulation 15 provides a number of new and improved features.

- Important Changes in Plant Simulation

- Simulation- and Animation-Relevant Changes

- New Features of the Material Flow Objects

- Changed Features of the Material Flow Objects

- New and Changed Features of the Fluid Objects

- New and Changed Features of the Resource Objects

- New Features of the Information Flow Objects

- Changed Features of the Information Flow Objects

- New and Changed Features of the User Interface Objects

- New and Changed SimTalk Features

- Miscellany

- New 3D Features

- Changed 3D Features

- New and Changed Features in the Object Libraries

> Note:
>
> As opposed to the full versions, for example *Tecnomatix Plant Simulation* 15.0, we only support **English** and **German** as the user interface language for the intermediate versions, for example for *Tecnomatix Plant Simulation* 14.1.

Back to What's New

Important Changes in Plant Simulation

We made important changes in *Tecnomatix Plant Simulation* 15. 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* 15.

Important Changes in Plant Simulation 15.0

- We added the object **AGVPool** to the *Resource Objects*. You can use it to create *automated guided vehicles* for your installation that are not bound to a fixed route network.
  We also added the object **Marker**. You can use it to set waypoints along which the *AGVs* drive from the *AGVPool* to its destination.

  > Note:
  >
  > In the current version the **SankeyDiagram** does not record the **AGV**, that is not bound to a fixed route network.

- We added the object **CostAnalyzer** .

  To facilitate cost analysis, we also added the tab **Costs** to the *material flow objects* and the tab **Costs** to the *Part* and to the *Container*.

  > Note:
  >
  > The *CostAnalyzer* and the tab **Costs** are only available in the **Professional License**.

Important Changes in Plant Simulation 14.2

- We added the tabs **Poses** and **Joint** to the **3D Properties**. Together with the joints you can define joint kinematics.

- We added the sub-tab **Transport** to the tab **Importer**. In this context we moved the settings for the **Exit strategy > Carry part away** from the tab **Exit** to this sub-tab. These settings replace the **Exit strategy > Carry part away**.
  If you query the **exit strategy** with the attribute **ExitStrategy**, the return value is not **carry part away** any more. For this reason you have to change models that query this return value by using the attribute **TransportImp.Active**.

> Note:
>
> If you neither entered an **MU target** into the *transport importer* nor a **Destination** into the *part*, the object uses the **strategy** for determining the destination, which you entered on the tab **Exit**.

- We changed where *Plant Simulation* places duplicated or derived classes when you duplicate or derive one of the built-in classes in the *Class Library*. You now find the new class in the folder **User Objects**.
  When you create a new model this model is now called **Model**.
  The sample *Frame* in the folder **UserObjects** is now called **MyFrame**. It contains, by default, an *Entrance Interface*, a *Conveyor*, a *Station*, and an *Exit Interface*.

- We changed the names of the information flow objects below. Now the names of the list objects match the names of the data types.

Up to Version 14.1	From Version 14.2 on	Data Type
TableFile	**DataTable**	*table*
CardFile	**DataList**	*list*
StackFile	**DataStack**	*stack*
QueueFile	**DataQueue**	*queue*

The topic **The Conveyor** shows how to use the new name instead of the old name when **updating a model to the current version**.

Important Changes in Plant Simulation 14.1

- We changed the names of the following material flow objects in *Plant Simulation* 14.1:

Up to Version 14.0	From Version 14.1 on
Assembly	*AssemblyStation*
Line	*Conveyor*
ParallelProc	*ParallelStation*
SingleProc	*Station*
Entity	*Part*

- We added the object **GanttChart**. It replaces the *GanttChart* and the *GanttWizard* that previous versions of *Plant Simulation* provided. The *GanttChart* visualizes parts on resources.
  This affects the *GanttWizard* and the object *GanttChart* as follows:

  - If you are using the *GanttWizard*, you just have to update it under **Manage Class Library**.

  - If you are using the *GanttChart* of previous versions, you have to:

■ Replace the *GanttChart* with the *GanttChart* of the current version.

■ Adjust the source code, which you programmed in *SimTalk* of previous versions, to the current version, compare **Methods of the GanttChart** and **Attributes of the GanttChart**.

Back to What's New in Tecnomatix Plant Simulation 15

Simulation and Animation Relevant Changes

We made changes that are relevant for the simulation and the animation in *Tecnomatix Plant Simulation* 15. 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* 15.

Simulation- and Animation-Relevant Changes in Plant Simulation 15.0

• We changed the behavior of the outdated function *methcall* of the *Method*. The method now behaves again in exactly the same manner as in *Plant Simulation* 14.2 and in previous versions. The active element (@) now is void again as in version 14.2.

• We changed the behavior of the method **getRouteLength** of the MUs. It returned the value -1 up to and including version 14.1. From version 14.2 on the method returned the value 1.79769313486232e+308. In this version the method returns -1 again.

• We changed the behavior of the method **delete** of the *DataTable*. If you activated the setting **Column index belongs to contents** in previous versions, the following instructions also deleted the column index:

```
DataTable.delete({"ColumnB", *})
```

As this is unexpected behavior and is desired in rare cases only, *Plant Simulation* does not delete the column index any more from version 15 on.
If you would like to delete the column index as well, to have to explicitly include the column index with the instruction:

```
DataTable.delete({"ColumnB",0}..{"ColumnB",*})
```

The range definition `{"ColumnB", *}` now only sets the contents of the *DataTable*. The index is not contained any longer if it belongs to the format. Compare **Entering a Range of Cells**.

• We changed the behavior of the method **appendRow** of the *DataTable*. In previous versions the method overwrote a row if the *DataTable* with activated row index if the *DataTable* only contained a single entry in the row index. This is not the case any more.

• We changed the call sequence of controls of the *Exporter* and of the *Worker*. In previous versions it could happen that the **Order control** was executed before the **Release control** of the *Exporter* or that the **Order control** was executed before the **Release control** of the *Worker* when moving an MU. In

this context the call sequence of the **Entrance control** and of the **Order control** changed as well. From this version on the **Entrance control** is executed before the **Order control**.

- We changed how the legs of graphics of **type** > **Floorspace** for a *Store* look. These now also have a square foot print. This may cause different simulation results in models in which *Workers* walk underneath the *Store* and for which you selected **Worker obstacle > Graphics**.

Important Changes in Plant Simulation 14.2

- We changed the behavior of *Plant Simulation* when using the **Pull** control. The active MU (**@**) now designates the part (MU). When **unblocking** the value is void.

- We significantly improved the performance of *Plant Simulation* when **importing** MS Excel files. Importing is now several hundred times faster than before. To do so, we import the raw values from Excel and convert the data in *Plant Simulation* itself. When importing date into columns of data type *string* we convert numerical values in *Plant Simulation* itself. The *Plant Simulation* format might not match the format that was set in Excel.

Important Changes in Plant Simulation 14.1

- We minimally improved the accuracy when calculating the **CheckMUDistance** event. This can affect the simulation results, for example throughput and relative occupancy and when other events exist which occur at the same time but when it counts which of these events is processed first.

- We minimally improved the accuracy when calculating the **Bump** event. This can affect the simulation results, when other events exist which occur at the same time and when it counts which of these events is processed first.

Back to What's New in Tecnomatix Plant Simulation 15

New Features of the Material Flow Objects

Tecnomatix Plant Simulation 15 provides a number of new features.

New Features in Plant Simulation 15.0

- To facilitate cost analysis with the **CostAnalyzer** 📟 💲, we added the tab **Costs** to the *material flow objects* and the tab **Costs** to the *Part* and to the *Container*.

- We added the setting **Workpiece carrier** to the *Container*. You can use it to model the carrier on which the part is transported from processing station to processing station in your facility. Statistics then does not collect the values for the carrier, but for the transported part. In previous versions this was cumbersome to achieve. This setting also affects routing the parts.

- We added the **Tabs** menu to the material flow objects. If you hide tabs that you do not need, *Plant Simulation* opens the dialog faster and you can change to those tabs faster that you need in your daily work

- We added the check box **Booking point** to the settings of the **Sensors**. It sets that the **booking point** of the part triggers the sensor.
  We also changed the dialog of the **Sensors** in this context, and we added the attribute **BookPosition**, the event **SensorBookPos** to the **event list** and the optional parameter **BookPos** to the **sensor control**.

- We added the menu command **Random Seed Value** to the **Tools** menu of the *material flow objects* and the *fluid objects*, which can create random numbers. To change the random seed value, select the command and type in another value into the dialog.

- We added the read-only attribute **CurrentDestinationAngle** to the *Turntable*.

- We made the read-only attributes **FrontLocation** and **RearLocation** of the MUs observable.

New Features in Plant Simulation 14.2

- We added the tab **Routing** to the *Part* and the *Container*. These automatically find their destination moving on *Conveyors*.
  We added the menu command **Route to Destination** to the *Part* and the *Container*.

- We added the attribute **DestinationWasReached** to the moving objects.

- We added the check box **Automatic processing** to the objects *Station*, *ParallelStation*, *AssemblyStation*, *DismantleStation*, and *Drain*. It sets if these objects start processing an entering MU immediately or not.

- We added the optional parameter *PredecessorNumber* to the method **create** of the MUs. It sets the number of the predecessor when the MU does not entirely fit onto the length-oriented object.

- We added the optional parameter *ConveyingDirection* to the method **insert** of the MUs. It sets the direction in which the MU will be inserted on the object.
  You can also enter −1 as the position. Then the MU is inserted so that its booking point is located on the position 0, or at the end of the object when the MU moves in reverse.

- We extended the method **setDestination** of the *PickAndPlace Robot*. You can now also specify a sensor as the **destination object**, for example `setDestination(Conveyor.sensorID(1))`. The **Angles Table** of the robot can now also contain a sensor on the *Conveyor* in the column **Name**, for example `Conveyor.sensorID(1)`. This is useful if you want to set several angles on the *Conveyor*.

- We added the attribute **Location** to the **sensors**. You can use it to query the object on which the sensor is located.

- We changed the behavior of the method **outIn**. The instruction `MyPart.outIn(-1)` no longer causes an error. The object determines the time until MU exits by means of its processing time. Normally statistics does not count this time as processing time unless you specify `true` for the optional parameter *WorkOnFinishedPartAgain*.

New Features in Plant Simulation 14.1

- We added the **Strategy > Method at Converting Point** to the **Converter**. We also replaced the attribute *ExitForNextEnteringMU* with the attribute **ExitForMU**.

- We added the method **getStackHeight** to the *Store*, to the *Container*, and to the *Transporter* with matrix loading space.

- We added the function **Start processing when full** to the *ParallelStation*. If you clear the check box, the *ParallelStation* behaves like it did in previous versions.

- We added the settings **Relative from end** and **Length from end** to the settings for creating a **new** sensor.

- We added the read-only attribute **ResCurrentState** to the material flow objects.

- We added the check box **Stopped** to the MUs. In previous version you could only stop MUs with the attribute **Stopped**.

- We added the statistics value **Exit blocked** to the tab **Statistics** of the *Conveyor*.

- We added the column ΔL to the **Segments** table. It shows the length of the length-oriented object up to this segment.

Back to What's New in Tecnomatix Plant Simulation 15

Changed Features of the Material Flow Objects

Tecnomatix Plant Simulation 15 provides a number of changed and improved features.

Changed Features in Plant Simulation 15.0

- We changed the default icon of the object *Track*. It now looks like this .

- We changed the behavior of the setting **Start processing when full** of the *ParallelStation*. If the *ParallelStation* does not have to be set up, the *ParallelStation* can now also accept parts of different types without starting processing them prematurely. For type-dependent and place-dependent **processing time** or when you entered a formula as the **processing time**, the parts can then have different **processing times**.

- We made the attribute **EntranceFree** observable. For a *ParallelStation* with activated setting **Start processing when full** the attribute *EntranceFree* now returns false if not all of the processed parts have exited the station.

- We changed the behavior of the *Transporter*: In previous versions *Plant Simulation* reset an existing **TargetPosition** or **TargetDistance** respectively when *Transporters* collided and showed an error message.
  From this version on *TargetPosition/TargetDistance* are retained and the *Transporter* drives to them with the **Speed/ Acceleration** which the *Transporter* has with which the second *Transporter* collided. If is impossible to reach the *TargetPosition/TargetDistance* because the first *Transporter* with which the second *Transporter* collided, stops before that, *TargetPosition/TargetDistance* is retained as well. As soon as the first *Transporter* starts driving again, the second *Transporter* tries to arrive at the *TargetPosition/TargetDistance*.

- We changed the behavior of the *Transporter*: When you set the **TargetPosition**, for which the direction would have to be changed, for a non-stopped *Transporter* with activated **acceleration** in an **exit control**, *Plant Simulation* now shows an error message as there is no room for breaking until it's time to turn around.

- We changed the behavior of the **Buffer** if MUs have several **Out** events because you set this with the method **outIn**. In previous versions *Plant Simulation* computed a new Out event for the next MU and overwrote the event that you created with the method when the first MU exited the *Buffer*. From this version on *Plant Simulation* only computes an **Out** event for the next event if the MU does not have an **Out** event yet.

- We added the optional parameters *DropPosition* and *DropLane* to the **Drag-and-drop control** of the length-oriented objects. They designate the position at which the object is dropped and the lane on a *TwoLaneTrack*.

- We added the optional parameter *IgnoreRouteWeightingAttr* to the method **getRouteLength** of the *Part/Container* and the method **getRouteLength** of the *Transporter*. The parameter sets if the **route weighting attribute** will be ignored (`true`) or if it will be used (`false`).

- We changed the data type of the attribute **AxesOrigin** of the *Frame*. In previous versions it was a *two-dimensional array* of data type *real* with two values (real[2]). From this version on it is a *two-dimensional array* of data type *integer* with two values (integer[2]).

Changed Features in Plant Simulation 14.2

- We moved the settings for the **Exit strategy > Carry part away** from the tab **Exit** to the sub-tab **Transport** of the **Importer**. The settings on this tab replace the **Exit strategy > Carry part away**.

- We extended the function **Start processing when full** to the *ParallelStation*. Here you can now also select the setting **Recovery time starts** > **When processing is done** for the start of the **Recovery time**. For the setting **When part exits** the **recovery time** starts when the last part exits the station.

- We reduced the default **processing time** of the objects *Station*, *ParallelStation*, *AssemblyStation*, and *DismantleStation* from 1 (**1:00**) minute to 10 seconds (**0:10**). The latter value is better suited for demonstrating the flow of materials.

- We changed the behavior of *Plant Simulation* when you define failures using the **availability** and in doing so enter bounds for the MTTR. *Plant Simulation* now normally also finds a distribution of the duration of the failure if one of the bounds is located closer to the MTTR as supported in previous versions.
  If one of the bounds is located very close to the MTTR, the program cannot determine a meaningful distribution. If this is the case, please increase the distance of the bound to the MTTR.
  The new algorithm also more accurately computes the distribution of the mean time between failures (MTBF). For this reason the simulation results might slight deviate from the simulation results of previous versions.

- We corrected the behavior of the *TurnPlate*, the *TurnTable*, and the *AngularConverter*. You now cannot accidentally set the internal attribute *Backwards* via *SimTalk* any more.

- We extended the behavior of the method **setRoute** of the *Part/Container* and the method **setRoute** of the *Transporter*. You can now also specify the objects along the route in an *array* of data type *object*.

- We extended the behavior of the method **getRouteLength** of the *Part/Container* and the method **getRouteLength** of the *Transporter*. The MUs can now also write the objects along the route to an *array* of data type *object*.

- We no longer support the method *getRouteToDestination*. Instead, you can use the method **getRoute** of the *Part/Container* and **getRoute** of the *Transporter*.

- We changed the data type of the **Width** of the *Connector* from *integer* to *real*. For **3D models** you can now reduce the default width, which corresponds to 0 or 1, with values between 0 and 1, to a fraction of that.

- We changed the name of the attribute *Ctrl* of the sensor control to **Control**.

- We added the return value of data type *boolean* to the read-only attribute **StatWaitingTimeTable** of the *AssemblyStation*. As it only collects statistics values for the settings **MU Types** and **Depends on Main MU**, the return value for the remaining settings is false.

Changed Features in Plant Simulation 14.1

- We replaced the attribute *ExitForNextEnteringMU* with the attribute **ExitForMU**.

- We do not support the method *init* of the *EventController* any more.

- We changed the behavior of *Plant Simulation* when an MU enters or leaves the loading space of **type Track** or **Line**. As it is no longer rotated by 90 degrees, the orientation of the MUs now depends on the orientation of the animation line in 2D and in 3D.

- We changed the behavior of *Plant Simulation*. The first parameter of the method **setDestination** of the pick-and-place-robot can now also be an MU or a storage place on an MU.

Back to What's New in Tecnomatix Plant Simulation 15

New and Changed Features of the Fluid Objects

Tecnomatix Plant Simulation 15 provides a number of new and improved features.

New and Changed Features in Plant Simulation 15.0

- We added the methods **addContent** and **setCurrentContent** to the *Mixer*.

- We changed the behavior of the method **setCurrentContent** of the *Tank*. You can now also set a new material when the *Tank* is not empty.

New and Changed Features in Plant Simulation 14.2

We added the read-only attribute **ResCurrentState** to the fluid objects.

Back to What's New in Tecnomatix Plant Simulation 15

New and Changed Features of the Resource Objects

Tecnomatix Plant Simulation 15 provides a number of new and improved features.

New and Changed Features in Plant Simulation 15.0

- We added the object **AGVPool** to the *Resource Objects*. You can use it to create *automated guided vehicles* for your installation that are not bound to a fixed route network.

- We added the object **Marker** to the *Resource Objects*. You can use it to set waypoints along which the *AGVs* drive from the *AGVPool* to its destination.

> Note:
>
> In the current version the **SankeyDiagram** does not record the **AGV**, that is not bound to a fixed route network.

- We change the call sequence of controls of the *Exporter* and of the *Worker*. In previous versions it could happen that the **Order control** was executed before the **Release control** of the *Exporter* or that the **Order control** was executed before the **Release control** of the *Worker* when moving an MU. In this context the call sequence of the **Entrance control** and of the **Order control** changed as well. From this version on the **Entrance control** is executed before the **Order control**.

New and Changed Features in Plant Simulation 14.2

- We changed the behavior of the *Worker*. All *Workers* now stop during a failure.

- We added the attributes **AdditionalServices**, **Amount**, **Efficiency**, **Shift**, **Speed** and **Worker** to the *WorkerPool*.

Back to What's New in Tecnomatix Plant Simulation 15

New and Changed Features in Plant Simulation 14.1

- We replaced the text box **Capacity** of the *Worker* with the text boxes **X-dimension**, **Y-dimension**, and **Z-dimension**. This now allows you to use an **animation area** for the *Worker* in 3D.

- We changed the behavior of the *Exporter/Worker*. When you turn on automatic mediation of the *Worker* with the attribute **AutomaticMediation**, *Plant Simulation* now immediately tries to broker the *Exporter/Worker* when the *Broker* has open requests.

Back to What's New in Tecnomatix Plant Simulation 15

New Features of the Information Flow Objects

Tecnomatix Plant Simulation 15 provides a number of new features.

New Features in Plant Simulation 15.0

- We added the command **Manage Breakpoints** to the *Method Editor*. We also added the commands **Breakpoint Active** and **Breakpoint Settings** to the *Method Debugger*.

- We added a key combination to delete all breakpoints, including those in the *EventDebugger*: To do so, hold down the **Shift** key while you click **Delete all Breakpoints**.

- We added the command **Open Debugger** to the context menu of the *Method* in the *Frame*.

- We extended the behavior of the **AttributExplorer**. It can now also read the attributes **Coordinate3D**.X, **Coordinate3D**.Y, and **Coordinate3D**.Z.

- We added the setting **Simulation mode** to the object *PLCSIM_Advanced*. You can use it to execute data exchange with the PLC in **real-time** or **stepwise**.

- We added the method **getColumn** to the object *SQLite*.

New Features in Plant Simulation 14.2

- We added the tab **Filter** to the **PLCSIM_Advanced Interface**.

- We added the attribute **HasInitValue** to the *Variable*.

- We added the optional parameter *WithIndexes* to the method **copyFormatTo** of *lists* and *tables*.

- We show the exact value with 17 floating point digits on the context menu of the tab **Variables** of the *Method Debugger* for local variables of data type *real*, *length*, *weight*, *speed*, and *acceleration*.

New Features in Plant Simulation 14.1

- We extended the functionality of the *Method Editor*. When you select text with keyboard keys (**Shift** key+arrow keys) or with the mouse pointer, *Plant Simulation* highlights all occurrences of the text fragments in the *Method* in color, compare **Find**. You can then jump to these occurrences via the ribbon like you would to any other bookmark or by pressing the **F2** key.

- We added the button for inserting **instance breakpoints** to the **Method Debugger**. We also removed the buttons for **Searching** and for **showing the line numbers**.

- We added the command **Step into Encrypted Methods** to the *Method Debugger*.

- We added the method **writeExcelXMLFile** to the lists and tables.

Back to What's New in Tecnomatix Plant Simulation 15

Changed Features of the Information Flow Objects

Tecnomatix Plant Simulation 15 provides a number of changed and improved features.

Changed Features in Plant Simulation 15.0

- We changed how *pre-formatted methods* are created. Previously these were created with *SimTalk-1.0-syntax* if **New Syntax** was deactivated in the class of the *Method* in the folder *InformationFlow*. From now on *pre-formatted methods* are always going to be created with *SimTalk-2.0-syntax*.

- We changed the behavior of the methods **executeIn** and **executeNewCallChain** of the object *Method* and of user-defined attributes of data type *method*. In the called *Method* the anonymous identifier ? now references the caller, i.e., the *Method* which contained the methods *executeIn* or *executeNewCallChain*, or if the caller is a user-defined attribute of data type *method* it references the location of this user-defined attribute.
In previous versions the anonymous identifier ? referenced the *EventController* for *executeIn*. For *executeNewCallChain* the anonymous identifier ? was VOID in previous versions.

- We changed the behavior of the **AttributeExplorer**. The results table is now sorted according to **path**, **name**, or **label**. As in previous versions, the *AttributeExplorer* first shows the data of the objects you specified and then the data that is defined by the query.

In previous versions the order in which the results were shown was determined by the sequence in which you inserted the objects into you model. This was not reproducible afterwards any more.

- We changed the behavior of the **DataTable**. When you create a new model the setting **Column index belongs to contents** is deactivated by default. For new models the column index belongs to the format and will thus be inherited when you deactivate inheritance of the contents.

- We enhanced the functionality of the methods **writeFile** and **writeObjectFile** of the *DataLists* and *DataTables*. For these you can now also enter `System` as equivalent to `ANSI` for the optional parameter *CodePage*.

- We added optional parameters to the method **step** of the object *SQLite*.

- We added a return value to the method **executeStatement** of the object *SQLite*.

- We deleted the setting for the **Allocated memory** from the dialog **Text File Format**.

- We removed the command **Tools > View > Tooltip Includes Type Info** from the *Method-Editor*. The command **Show Tooltip with Completion** now always shows the type information.

- We do not support the read-only attribute *InheritsProgram* of the *Method* any more. Instead you can use generic access with the attribute **getAttribute**.

```
var bInherit:boolean
getAttribute("Program", bInherit)
print bInherit
```

Changed Features in Plant Simulation 14.2

- We changed the names of the information flow objects below. Now the names of the list objects match the names of the data types.

Up to Version 14.1	From Version 14.2 on	Data Type
TableFile	**DataTable**	*table*
CardFile	**DataList**	*list*
StackFile	**DataStack**	*stack*
QueueFile	**DataQueue**	*queue*

- We changed the behavior of the **Method Debugger**. When the *Method Debugger* was opened because of a runtime error and when you then close it, *Plant Simulation* now terminates all call chains without asking and stops the simulation.
  If you only want to terminate the incorrect call chain and continue the simulation, press the **F5** key instead of closing the *Method Debugger*.
  If you do not want to terminate the incorrect call chain, you can continue the incorrect *Method* in a certain line of code by calling the context menu command **Set Next Statement**, or by placing the

input cursor into this line and by pressing **Ctrl+F10**, or by holding down the **Ctrl** key and double-clicking this line. Then press the **F5** key to continue executing the *Method* in this line.

- We renamed the method *methCall* of the *Method* to *executeIn*.
  We renamed the method *newCallChain* of the *Method* to *executeNewCallChain*.

- We extended the behavior when **checking in** a model in *Teamcenter*. You can now select if you want to create a new revision.

- We improved the behavior of the *Teamcenter interface*. You can now specify the **environment** instead of the **server** in the dialog of the object *Teamcenter* and in the **Teamcenter Login Dialog**. You can select the **Environment** from the list of the environments configured in the TCCS, provided environments are configured there. We also added the command **Change Environment or Server** to **File > Teamcenter** in which you can change the settings later on.
  The *Teamcenter interface* now also supports logging in to Teamcenter via *Single-Sign-On* (SSO). To do so, you have to select the TCCS environment in which the settings of the SSO-Server are configured. When logging in via SSO, you do not have to enter the **user name** and the **password**.
  We support logging in via SSO in the login dialog to Teamcenter as well as in the dialog of the *Plant Simulation object Teamcenter*.

- We changed the return value of the methods **max**, **min**, **sum**, **maxAttr**, **minAttr**, and **sumAttr** of lists and tables.

  - If the designated list range has a uniform data type, the return value now also has this data type.

  - If the data type is not uniform, the return values are converted to the data type *real* and the method returns the data type *real*.

- We extended the functionality of the **PLCSIM Advanced** interface. You can also allocate signals in the Input/Output/Marker range via their address. This is useful if you want to access memory in the virtual PLC for which no identifiers were assigned in the PLC program.
  Open an existing group by double-clicking it. Or create a new group, click **Apply**, and then double-click the new group. Enter a percentage sign followed by a character that sets the range, and the address as the identifier. Compare these examples:

  - %I100 for an Input signal at address 100

  - %Q40.7 or %O40.7 for an Output signal at bit 7 of address 40

  - %M5 for a Marker signal at address 5

Changed Features in Plant Simulation 14.1

- We changed the behavior of the **Step Into** mode of the *Method Debugger*: In previous versions this mode also jumped into encrypted methods. From this version on this is not the case any more. When the next instruction is the call of an encrypted *Method*, the command **Step Into** instead behaves like the command **Step Over**.

- We changed the behavior of the object **Variable**. When you clear **Show units**, *Plant Simulation* does not show the distribution parameters any more.

- We changed how *Plant Simulation* sorts table columns of data type *object*: In previous versions empty rows were sorted like the string VOID. From now on empty cells are sorted at the end of the column for ascending sorting; they are sorted at the start of the column for descending sorting (**sort**, **inOrder**).

- We do not support the method *increment* of the *TableFile* any more. You can use the **+=** operator instead, for example

```
TableFile[x,y] += 1
```

instead of

```
TableFile.increment(x,y)
```

Back to **What's New in Tecnomatix Plant Simulation 15**

New and Changed Features of the User Interface Objects

Tecnomatix Plant Simulation 15 provides a number of new and improved features.

New and Changed Features in Plant Simulation 15.0

- We added the object **CostAnalyzer** .

  To facilitate cost analysis, we also added the tab **Costs** to the *material flow objects* and the tab **Costs** to the *Part* and to the *Container*.

- We added the check box **Inheritance box** to the command **New Check Box** of the object **Dialog**.

- We enhanced the behavior of the setting **Display in Frame** of the *Chart*. It now provides the setting **3D image quality** provided 3D is activated.

- We changed the behavior of the **HtmlReport**.
  It now sorts according to the object names. Let's say that you show a table with statistics data of all objects in the current *Frame* with the instruction `[current, %States]`. The report then sorts the object order according to the object names.
  If you show all *Drains* with the instruction `[.MaterialFlow.Drain*]`, the report sorts the order of the *Drains* according to their names.

- We changed the behavior of the **HtmlReport** for collecting and displaying object instances, compare **Collect Object Instances and Show Them in the Report**.

- We added the **GanttChart** to the objects which the **HtmlReport**, compare **Display a GanttChart**.

- We added these methods to the **GanttChart**.

  - **exportChart**

  - **getLanes** and **setLanes**

- We added these attributes to the **GanttChart**.

  - **EnableVisualTracking**

  - **NumVisibleBars**

  - **ShowBarText**

  - **ShowPartView**

  - **ShowResourceStates**

  - The method **getData** now does not return any intermediate resource states any more, which do not use up any time.

- We added the method **getPartFlowData** to the *SankeyDiagram*.

New and Changed Features in Plant Simulation 14.2

- We renamed the object *WorkerSankeyDiagram* to **SankeyDiagram**. It replaces the object *SankeyDiagram*, which previous versions provided in the **Toolbox** under **Tools**. The *SankeyDiagram* can display *Sankey flows* of parts as well as *Sankey flows* of *Workers*, who walk freely within the area or walk on *FootPaths*.

- We changed the behavior of the **Dialog**. In previous versions the *Dialog* was closed when the focus/the mouse was located in a dialog item of type **New Edit Text Box** and when you pressed the **Enter** key. In this case the *Dialog* interpreted pressing the **Enter** key as being identical to clicking **OK**. When the standard buttons OK, Cancel, Apply are shown, the *Dialog* will not be closed any longer when the **Enter** key is pressed.
  If the edit text box has a **Callback argument**, now the *Callback Method* of the *Dialog* will be called and the *Callback Method* is assigned the **callback argument _Enter**.

New and Changed Features in Plant Simulation 14.1

- We added the object **GanttChart**. It replaces the *GanttChart* and the *GanttWizard* that previous versions of *Plant Simulation* provided. The *GanttChart* visualizes parts on resources.
  This affects the *GanttWizard* and the object *GanttChart* as follows:

  - If you are using the *GanttWizard*, you just have to update it under **Manage Class Library**.

- If you are using the *GanttChart* of previous versions, you have to:

  ▪ Replace the *GanttChart* with the *GanttChart* of the current version.

  ▪ Adjust the source code, which you programmed in *SimTalk* of previous versions, to the current version, compare **Methods of the GanttChart** and **Attributes of the GanttChart**.

- We added the methods **getAnnotations** and **setAnnotations** to the *Chart*. They replace the attribute *Annotations*.

- We added the read-only attributes **GetAverage** and **GetStandardDeviation** to the object *Display*.

- We enhanced the functions that *Plant Simulation* executes when you click **Select an Object or an Object Attribute to be Displayed on the HTML Page** in the *HtmlReport*.
  The dialog **Object Parameters** now recognizes statistics types and shows the respective column parameters. For objects, which record statistics values, the *HtmlReport* now also shows the columns and you can enter which columns you want to show.

Back to **What's New in Tecnomatix Plant Simulation 15**

New and Changed SimTalk Features

Tecnomatix Plant Simulation 15 provides a number of new and improved features.

New and Changed Features in Plant Simulation 15.0

- We added the method **asObject** to the *arrays*.

- We added the methods **appendValueOfType** and **getValueOfType** for *arrays* of data type *integer*.

- We added the method **join** to the *arrays*.

- We added the method **pop** to the *arrays*.

- We changed how *Plant Simulation* displays empty **arrays**. These are now displayed with an empty space between the brackets, like this " `[ ]` ". In previous versions they were displayed without the empty space like this " `[]` ".
  This also affects the global function **to_str**:

  ```
  var a : real[]
  var s : string := to_str(a)  -- s := "[ ]"
  ```

- We changed the behavior of the **equal operator** and of the **not equal operator** for *arrays*.
  In previous versions the equal operator always computed the value false if the data types of the *array* were different. Suppose that an *array* of data type *real* was compared to an *array* of data type *length*, *Plant Simulation* always computed false, even if the values were identical.

If an *array* of data type *any* was compared with an *array* that did not have the data type *any*, the result was always false as well.
From version 15 on this behavior applies:
When comparing *arrays* of different data types, *Plant Simulation* creates a runtime error and opens the *Method Debugger* in the following cases:

- Arrays of data type *real*, *length*, *time*, speed, and *weight* based on their content.

- Arrays of data type *any* are compared to other *arrays* based on their content as well.

  Arrays of data type *integer* cannot be compared with *arrays* of data type *real*, *length*, *time*, *speed*, or *weight*.

- We changed the behavior of the function **throwRuntimeError**: In case the method does not run as a subroutine, i.e., when no caller exists, *Plant Simulation* opens the *Method debugger* at the position which contains the function *throwRuntimeError*. If the method is encrypted, *Plant Simulation* opens a message box instead that shows the message.

- We extended the upper bound of the parameter *Lambda* of the **Poisson**-distribution from 700 to unlimited. The value of the parameter *Lambda* has to be greater than 0 though.

- We changed the names of the distribution parameters of the **Uniform** distribution: In previous versions they were called **Start** and **Stop**. From this version on they are called **Lower Bound** and **Upper Bound**.

New and Changed Features in Plant Simulation 14.2

- We added the method **contains** to the *arrays*.

- We added the read-only attribute **Magnitude** to the *arrays*.

- We added these functions to check if a string has a valid date/time format: **isValidDateString**, **isValidDateTimeString**, and **isValidTimeString**.

- We added the function **datetime_to_str**.

- We extended the global functions *min* and *max*, compare **Functions for Numerical Values**:

  - You can now also pass more than two parameters to both functions.

  - Both functions can now handle additional data types. In addition to numerical values (*integer*, *real*, *length*, *weight*, *speed*, *acceleration*) the functions now also process parameters of data type *date* and *dateTime* as well as parameters of data type *string*. You cannot mix data types arbitrarily though, i.e., all data types either have to numerical, or all data types have to be of data type *date* and *dateTime*, or all have to be of data type *string*.

- We changed the behavior of the method **connectAutomatically**. It now does not return false any more when you try to connect a class. Instead, the program opens the *debugger*.

- We changed the return values of the method **getSimTalkTypename**. It now returns for the data types *table/stack/queue* instead of *list* these strings:

Data Type	Up until version 14.1	From version 14.2 on
table	*list*	*table*
stack	*list*	*stack*
queue	*list*	*queue*

For local variables of data type *any*, which were assigned a special object, for example a sensor, the return value now is not of data type *object* more, as such a special object cannot be assigned to a local variable of data type *object*. Instead *getSimTalkTypename* now returns **sensor**, **lane,**, **storage place**, **3D object**, or **3D animation** depending on the type of the special object.

- We changed the behavior of **switch** instruction for values of data type *real*. These no longer check for exact equivalence.

- We changed the behavior of print instructions for values of data type *length*, *weight*, *speed*, and *acceleration*. These now show the unit after the value in the *Console*.

New and Changed Features in Plant Simulation 14.1

- We changed how to enter *arrays* in *SimTalk 2.0 Methods*. Up until now you had to use the function *makeArray*. Now you can enter *arrays* directly into the source code:

```
var a : real[3]
a := [1.4142, pi, sin(0.5)+1]
```

This makes it easier to enter an *array* and it also makes your source code considerably shorter.

- We changed how you enter lengths into *SimTalk 2.0 source code*. Now you can also specify the **Length** with a physical unit. You can enter one of these units: m, mm, km, cm, yd, ft, and in.

```
var len := 1.0ft
var len := 1.0ft
var s : speed := 10.5m / 1:30
```

- We added an optional parameter to the function **num_to_hex**, with which you can set if *Plant Simulation* creates a 64-bit hexadecimal number.

- We added the function **throwRuntimeError**.

- We added the function **enableFullScreenMode**.

Back to What's New in Tecnomatix Plant Simulation 15

New 3D Features

Tecnomatix Plant Simulation 15 provides a number of new features.

New Features in Plant Simulation 15.0

- We introduced navigating with a *3D mouse* in the **Planning View**. Moving on the plane corresponds to moving the view, just like dragging with the right mouse button with a *3-button-mouse*. Pulling the puck up zooms in, pushing it down zooms out.

- We added the command **Optimize Model** to the **Home Ribbon Tab**.

- We added the command **Show Sky** to the **View Ribbon Tab** in 3D.

- We added the subcommand **Mezzanine** to the command **Insert Shape**.

- We added the submenu **Transformation Inheritance** to the **Context Menu for Several Selected Objects**.

- We added **Optimization settings** to the dialog **Import Graphics**.

- We added the check box **Start at first tread** to the object **Stairs**. Select it to make the stairway start at the first tread without the stringer extending onto the floor on which the stairway rests.

- We added the settings **Bounding box of visible graphics** and **Visible graphics** to the **Obstacle for the Worker**.

- We added the number of **obstacles** and the number of the resulting **corner points** to the dialog **Show Obstacles**. The number of **obstacles** and **vertices** affects the computation of the shortest route.

- We added attributes, read-only attributes and methods of **3D Shapes**.

- We added attributes for the material of graphics, compare **Detailed Access To Graphics**.

- We matched the behavior of *Connectors* in 3D with their behavior in 2D, meaning you can now also insert anchor points.

  - The subcommand **Inherit Positions** of the command **Transformation Inheritance** now also activates inheritance of the anchor points of the *Connectors*.

  - You can now also edit the anchor points of the *Connectors* with the position manipulator. If you did not select anything in the scene, the command **Show Manipulators** also shows the position manipulator of the *Connectors* in the scene if *Connectors* are shown in the scene.

- We added the attribute **_3D.getAttribute**.

- We added the read-only attribute **_3D.getWorldCoordinate**.

- We added the optional parameter *Offset* to the method **_3D.getPositionOfObject**.

- We added two optional parameters to the method **createCuboid**. You can use them to add a colored line around the created cuboid.

Back to **What's New in Tecnomatix Plant Simulation 15**

New Features in Plant Simulation 14.2

- We added the tab **Poses**. Together with the joints you can define joint kinematics.
  We added **Methods for Poses** for objects which you can insert into a *Frame*, and for *MUs*.

- We added the tab **Joint**. Here you can define the settings for **rotating** and **translating** the animation joints of the animation objects. In this context we moved the settings for the **rotation axis** and the **rotation center** of the animatable objects from the tab **Self Animation** to this tab.

- We added the read-only attribute **_3D.ExistsWithAnimation**.

- We added the attribute **_3D.AniTranslationDirection**.

Back to **What's New in Tecnomatix Plant Simulation 15**

New Features in Plant Simulation 14.1

- We added the conveyor **type** > **Guide-railed belt conveyor**.

- We added a number of new extrusion profiles for the conveyor **type** > **User-defined**.

- We enhanced the **configuration options** of the conveyors considerably and we changed the **leg types**.

- We added the tab **States** to the **3D Properties** of the objects. In doing so, we moved the respective settings from the tab **Graphics** to the tab **States**.

- We added the **animation area** to the tab **MU Animation** of the **PlaceBuffer** in 3D.

- We added the setting **Wall thickness** to the dialog **Insert Box**.

- We added the buttons **Show Manipulators** and **Hide Manipulators** for most objects to the **Edit** ribbon tab. During this process we removed the context menu command **Segments > Show Segments** for the length-oriented objects and the command **Show Corner Points** from the context menu of the *Connector*.

- We added settings for positioning the imported graphic to the dialog **Import Graphics**.

- We added the **context menu for several selected objects**.

- We added the commands **Show**, **Paste**, and **Remove Texture** to the **context menu of a graphic node**.

- We added the methods *_3D.MUAnimations.AnimationPathName.getPositionAt* and **_3D.MUAnimations.AnimationPathName.Length** for saved MU animations.

Back to What's New in Tecnomatix Plant Simulation 15

Changed 3D Features

Tecnomatix Plant Simulation 15 provides a number of changed and improved features.

Changed Features in Plant Simulation 15.0

- We simplified the *SimTalk* access to **3D Shapes** and graphics, compare **Detailed Access To Graphics**. Among others, we replaced access via *methods* with access via a number of individual *attributes*. We also added a number of new attributes and methods.

- We changed the look of the **Planning View**:

  - We now show the background of the *Frame* without a color gradient and white by default. This is not the case if you set a color of its own for the opened *Frame* or the *folder*.

  - We now always show the grid, independent of the grid settings, without a base plate.

- We changed the behavior of **3D only** models:
  In **3D only** models the positions and rotations between 2D and 3D are now always synchronized. In the past you could not deactivate the connection between positions and rotations between 2D and 3D. It was still possible though via *SimTalk* and existing models retained their state concerning their existing connection between position and rotation connections when switching the model type to **3D only**.
  The new behavior has the following effects:

  - When loading models created in previous versions, positions, rotations, and anchor points of length-oriented objects are force-synchronized based on the data from 3D.

  - The same happens when switching the model type to **3D only**.

  - *SimTalk* access to the attributes **_3D.RotationsConnected** and **_3D.PositionsConnected** do not cause an error in the *Debugger*. The assignment is ignored though and *Plant Simulation* now always returns a constant value when querying it. For **positions** the return value always is true and

for **rotations** it is true in most cases, depending on the object type. In some special cases, for example for the *Variable*, the return value is false.

- We changed the behavior when you select *MU instances* and *Worker instances*. *Plant Simulation* now does not select these per window in 3D any more, but in general. In most cases this does not have any direct visible effects.
  You can see the difference though when more than one 3D window is open and these 3D windows show the same *Frame* or different parts of the same *Frame*. An instance then counts as being selected in a window when in it is selected in 3D and is also visible in this window. As opposed to previous versions you can now also select an MU in one window and deselect it in another window.

- We changed the behavior when **Lock Structure** is activated. When you hold down the **Alt** key, *Plant Simulation* selects the objects which you click. When you do not hold down the **Alt** key, *Plant Simulation* selects the *Frame instances* that are inserted in the model.

- We changed the behavior, when you create a new animatable object from a graphic for an object with **matrix loading space** *Transporter* and *Buffer*. Then *Plant Simulation* creates the **MU animation area** by means of the physical size of the created animatable object.

- We changed the number of 3D windows that you can open interactively. In previous versions you could open 32 3D windows, from version 15 on you can only open 30.

- We terminated support of the methods *_3D.MUAnimations.Animation.cancelRedirection*, *_3D.MUAnimations.Animation.isRedirected*, and *_3D.MUAnimations.Animation.redirectTo* any more. We recommend to use the attribute **_3D.AnimationObject** with additional animatable objects instead.

- We changed the display of 3D graphics: If 3D graphics are hidden because of the values you set for the **Screen coverage threshold**, the entire numeral display is now treated as an indivisible graphic, meaning that *Plant Simulation* either shows the entire number or nothing at all. In previous versions each number was treated individually, which, for example, lead to the decimal point being hidden. When you select OpenGL 4.3 or higher and have a graphics card that is suited for this, *Plant Simulation* now uses a different mode for processing stacked transparencies, for example half-transparent window in front of another half-transparent window.

- We changed the behavior of the commands **Make Animatable Object** and **Make Simulation Object**: If the command **Lock Structure** is active for one of the concerned *Frames*, these commands will not be executed when you called them in a view.

- We changed the behavior when importing graphics, which are to consist of several files. When *Plant Simulation* now does not find a reference to a file, it cancels the entire graphics import with an error message.

- We changed the looks of the legs of store graphics of **type** > **Floorspace**. These now always are square. This can lead to changed simulation results in models in which Workers walk below the *Store* and for which you selected **Obstacle for the Worker > Graphics**.

- We changed the behavior of the **Rack**. Its frame does not create a **worker obstacle** any more.

- We changed and enhanced the settings of the command **Optimize Selected Graphic**.

- We enhanced the behavior of the command **Move to Zero**. It now also apples to **JtTriStripSets**. These are graphics nodes, which do not have any child nodes and oftentimes consist of imported graphics.

- We enhanced the behavior of the command **Show Manipulators**. You can now also display them for *Frames*. We also combined the commands **Show Manipulators** and **Hide Manipulators** to a single command.

- We changed the behavior of the attribute **_3D.Dimensions**. You cannot assign negative dimensions to a *Store* any more.

- We enhanced the behavior of the mouse wheel in the **Pose Editor**. You can now also use the mouse wheel when entering the **upper limit** or the **lower limit** for the joint on the tab **Poses**.

- We changed the behavior when editing **poses**. These are not shown orange any more.

- We enhanced the behavior of the **edddison** *interface*. When you define a bounding box, you can now also set its **Name** and its **Height**.

Changed Features in Plant Simulation 14.2

- We improved the behavior of the setting **Transparent** of the objects *Display*, *Comment*, and *Variable* in 3D. These now allow the background of the *Frame* to shine through, just as the objects do in 2D, when you activate the check box.

- We changed the behavior for automatically connecting length-oriented objects which transport parts. *Plant Simulation* now also considers this exception in 3D for the objects *Turnplate*, *Turntable*, *AngularConverter*, *Conveyor*, *Track*, *Converter*, and *TwoLaneTrack*: When **Transfer length** is deactivated for one of these objects in 3D, but when a suitable MU animation path exists, then *Plant Simulation* uses the start and the end point of this animation path for automatically connecting objects and for depicting the *Connectors*. Suitable MU animation paths are **Default** or **Cross** for the *Converter*, **A** or **B** for the *TwoLaneTrack*, and **Default** for all other objects. This applies to the setting **Connect objects automatically** and for the method **connectAutomatically**.

- We changed the looks of the manipulators of the length-oriented objects to improve usability, compare **Show Manipulators**.

- We changed the behavior of manipulators for **factory walls** and for the **fence**. You can now also set one of the dimensions to **0** by dragging the respective manipulator.

- We changed the looks of the cross hairs when you use the command **Make Animatable Object**. The cross hairs is now drawn in the maximum contrast color to the background color and is twice as thick starting from a certain distance from the object itself.

- We changed the identifiers **Extrusion path** and **Extrusion profile** to **Extrusion configuration**.

- We changed how 3D shows the individual lines in the **WorkerSankeyDiagram**. These are now terminated with semi-circles to make the transition between lines look better.

- We changed how to play translations and rotations. In previous versions you had to specify <Path>_3D.**SelfAnimations.playTranslation** and <Path>_3D.**SelfAnimations.playRotation**. Now you can also type *<Path>_3D.playTranslation* and *<Path>_3D.playRotation*.

- We changed the behavior of the attribute **_3D.ShowContent** or *_3D.getObject(...).ShowContent* respectively. It now only applies to objects, which can transport MUs, and for the *Frame*.

- We changed the behavior of the dialog **Grid Position and Orientation**. When you close it, grid position and grid orientation will now be reset.

- We changed the behavior when exporting 3D scenes, for example with the command **Export Bitmap**, for adding the picture to a *HTMLReport* or for **printing**. The picture of the 3D scene is now created with the best possible quality, i.e., the **screen coverage threshold** is ignored here.

- We renamed the attributes *_3D.SelfAnimations.EstimatedBlockAnimationTime* and *_3D.SelfAnimations.EstimatedTotalAnimationTime* to **_3D.SelfAnimations.AnimationTimeBlock** and **_3D.SelfAnimations.AnimationTimeTotal**.

- We renamed the attributes *_3D.CameraAnimations.EstimatedBlockAnimationTime* and *_3D.CameraAnimations.EstimatedTotalAnimationTime* to **_3D.CameraAnimations.AnimationTimeBlock** and **_3D.CameraAnimations.AnimationTimeTotal**.

- We removed the command **Insert Shape > Box**. To create a flat plate, type in a very small value, for example `0.01`, for the respective **dimension** of the box.

- We terminated support of the attribute *_3D.Location*.

- We terminated support of the methods *_3D.CameraAnimations.scheduleRotation*, *_3D.CameraAnimations.scheduleTranslation*, *_3D.CameraAnimations.playRotation*, and *_3D.CameraAnimations.playTranslation*.

Changed Features in Plant Simulation 14.1

- We changed where *Plant Simulation* places an object:

  - When you click an object with the mouse and then insert it on another object or a graphic.

  - When you place objects with Drag and Drop, for example a *part* onto a *Pick-and-Place-robot*.

  - When you create and insert a sensor with the mouse.

  In previous versions *Plant Simulation* projected the mouse position onto the grid and used this coordinate as the insertion or target position. From now on *Plant Simulation* uses the surface of the object or the graphics over which the mouse is located as the insertion or target position.

- We changed how to create a non-textured plate. Just type in 0 into one of the text boxes in the dialog **Create Cube**.

- We set the height of text, which you insert with **Insert Shape > Create Text** into your model to 1 cm.

- We changed how parts are animated on length-oriented objects. The length-oriented objects now longer provide automatically generated animation paths on the tab MU Animation. Instead they now animate the parts without using animation paths. This makes the enforced deactivation of the MU animation for length-oriented objects redundant.

- We changed the behavior of **Buffer** and **Sorter**. *Plant Simulation* now shows the parts stacked in 3D when these object only have a single animation point.

- We changed the behavior of the command **Select All** (**Ctrl+A**). It does not select path nodes and manipulators any more.

- We changed the behavior in a **3D Only model**. It does not show the check boxes **Connect 2D and 3D Positions** and **Connect 2D and 3D Rotations**.

- We changed the behavior when inserting *Connectors* with the mouse. When you click on an *Interface* of a *sub-Frame* while doing so, this *Interface* is now directly evaluated as the starting point or as the target. When the *Interface* is allowed, it will be connected, when the *Interface* is not allowed, *Plant Simulation* does not execute any action. When you click on any other part of the *Frame*, *Plant Simulation* behaves as in previous versions, and opens the dialog **Select Interface**.

- We changed the return value of the method **_3D.CameraAnimations.getAnimation**.

- We do not support the graphic format PLMXML any more. From this version on, you cannot import graphics in PLMXML format.

Back to What's New in Tecnomatix Plant Simulation 15

Miscellany

Tecnomatix Plant Simulation 15 provides a number of new and improved features.

New and Changed Features in Plant Simulation 15.0

- We changed the behavior of the method **move** of the MUs. The **destination** of the MU is now only deleted when the MU moves from the *Worker* to the **destination**.

- We changed looks of the **Toolbox**.

- We changed the looks of the **Statistics Report**. The data it shows is the same.

- We added the read-only attribute **NumberOfLimitedObjects** to the *Frame*. It counts the number of objects which you can use in a **Student License** per used *Frame*.
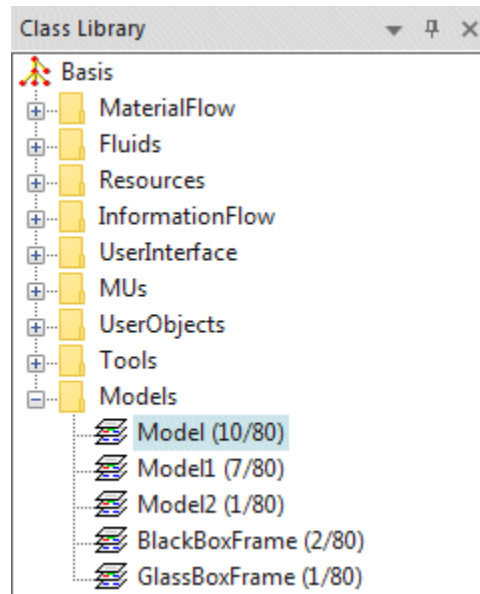
- We changed the data that the **Profiler** shows:

  - Instead of the total time for method execution it now shows the **percentage**.

  - In addition we now also show the **Total CPU time for 3D rendering** and the **Percentage for worker path network computation**.

- We changed the looks of the window **Show Attributes and Methods**. The column **Inherited** now shows a ✔ for inherited *attributes*, *methods*, and *read-only attributes* and a **-** for not inherited *attributes*, *methods*, and *read-only attributes*. In previous versions the column showed **i** for inherited and **ni** for not inherited.
  In addition you can now change inheritance of the value of an attribute by clicking the inheritance toggle button of the value that you are editing.
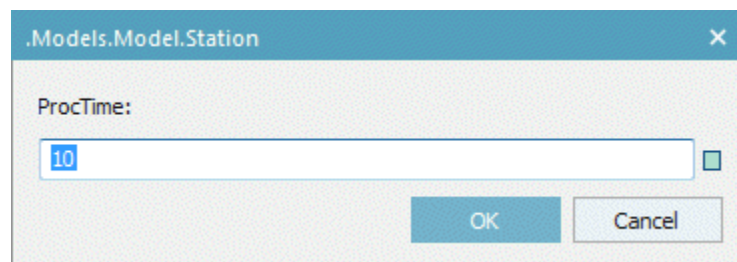
> Note:
>
> This does not apply to the objects for the **Genetic Algorithms**.

- We changed the behavior of the window **Show Attributes and Methods**. It now only shows the column with the **German** names of the *SimTalk functions* when:
  You are working on a computer that runs the **German** version of *Windows*.
  You selected **German** as the **model language** of your simulation model.

- We removed the check box **Tooltip includes type info** from the tab **Editor** of the dialog **File > Preferences**. The command **Show Tooltip with Completion** now always shows the type information.

- We added the optional parameter *CanInherit* to the attribute **getAttribute**. It returns if the value of the attribute can be inherited or not.

- We added the **Data Type of the Value You Can Assign** to the **Syntax** description of the *attributes*.
  We added the **Data Type of the Return Value** to the **Syntax** description of the *read-only attributes*.

New and Changed Features in Plant Simulation 14.2

- We changed the behavior when dragging and dropping an object to a **text box**, into *Method* or into a *DataTable*: In previous versions *Plant Simulation* then entered the **absolute path**. From version 14.2 on it enters the **relative path**.

- *Plant Simulation* 14.2 and higher requires version 9 of the *SPLM License Server*.

- We extended the functionality of the command **Import Bitmap File**. The format DWG now also supports **AutoCAD 2018** files.

- We improved the behavior of *Plant Simulation* when you changed the size of text and other items under **Control Panel > All Control Panel Items > Display**. This settin not only applies to the common Windows user interface, but also for *Frames* in 2D. In doing so, *Plant Simulation* increases the size of the *Frame*. If you select a values less than 150 %, *Plant Simulation* does not increase the size of the contents of the *Frame*.
  If you select different sizes of text and other items for different monitors, this does not affect *Plant Simulation*. In this case *Plant Simulation* always uses the size set for the primary monitor. Your changes will only take effect after you logged off and on again.

- We removed support of the method *step* of the *EventController*.

New and Changed Features in Plant Simulation 14.1

- We changed the initialization of random number streams. With the previous way of initializing them it was possible that the first rolled number of a random number stream took similar values for different random number variants of the *EventController*. Due to the changed random numbers the results of short simulation runs can change.

- We added the buttons for controlling the simulation to the **TX** 🗋 📒 📝 💾 📊 📈 ⚙ ▾ **Quick Access Toolbar**.

- We added the command **Stop on Controls in Object** to the ribbon tab **Debugger**.

- We added the tab **User-defined Attributes** to these objects: **FileInterface**, **FileLink**, **Comment**, **SQLite Interface**, and **PLCSIM_Advanced Interface**.

- We added the context menu command **Revert all Objects to Standard Graphics** to the *Class Library*.

- We enhanced the function **Manage Class Library**. The dialog now also shows **deprecated libraries**.

- We added the method **hasAttribute** for all objects.

- We added the function **OpenConsoleLogFile** to the *COM Interface*.

- We changed the behavior of the attribute **Coordinate3D** for MU instances in a **3D Only** model. Now you cannot query that value any more.

- We enhanced the behavior of the *EventController*. You can now activate and deactivate breakpoints in the dialog window of the **Event Debugger**.

- We enhanced the functionality of the method **setRequiredLicense**.

- We changed the structure of the **SimTalk Reference Help** in the online help. It now consists of two separate topics: **General SimTalk Functions** and **3D-related SimTalk Functions**.

Back to What's New in Tecnomatix Plant Simulation 15

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**

- **Simulation- and Animation-Relevant Changes**

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

- **Changed Features of the Material Flow Objects**

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

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

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

- **Changed Features of the Information Flow Objects**

- **New and Changed Features of the User Interface Objects**

- **New and Changed SimTalk Features**

- **Miscellany**

- **New 3D Features**

- **Changed 3D Features**

Back to **What's New**

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.
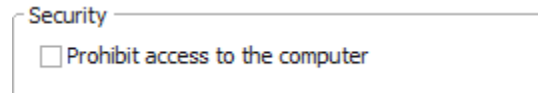
- To facilitate this via *SimTalk*, we added the method **isComputerAccessPermitted**.

- 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.

Active Workspace in Teamcenter

We added *Active Workspace* for easier and more convenient access of *Plant Simulation* to the *Teamcenter database*.

- You can 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**.

- With *Active Workspace* in the Teamcenter *Interface* you can 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 for Parts

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*.
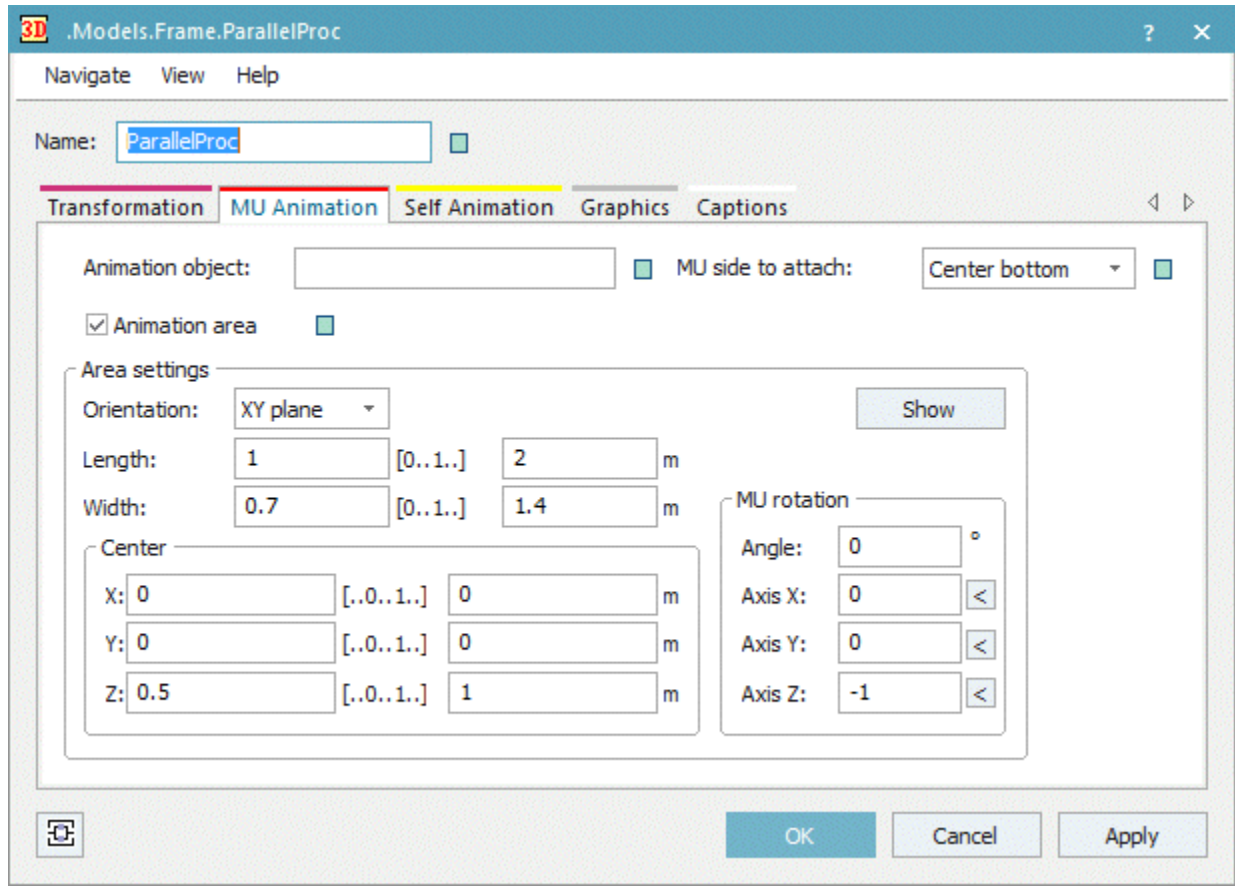
Scale Parts Automatically

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.
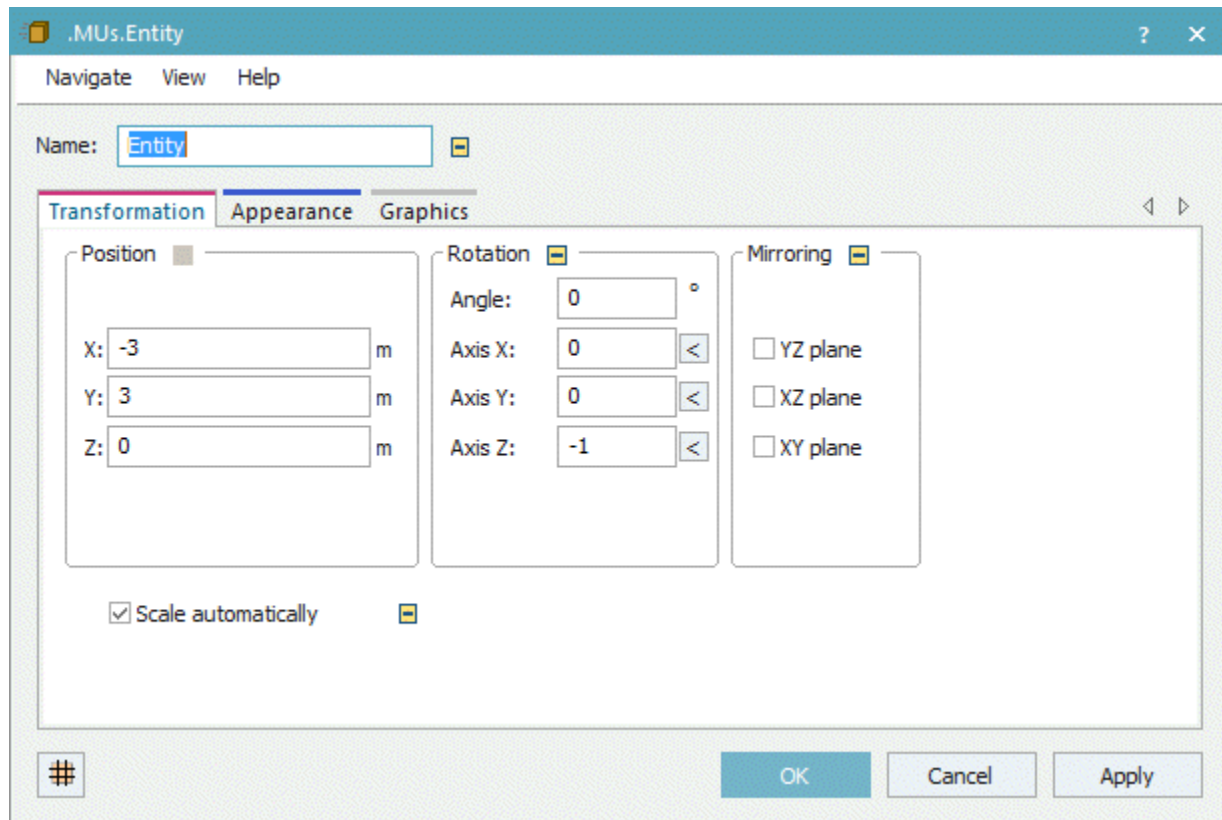
Simulation- and Animation-Relevant Changes

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 *Conveyors*. *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 *Conveyor* 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 `TableFileFile.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-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*.

Back to What's New in Tecnomatix Plant Simulation 14

New Features of the Material Flow Objects

Tecnomatix Plant Simulation 14 provides a number of new features.
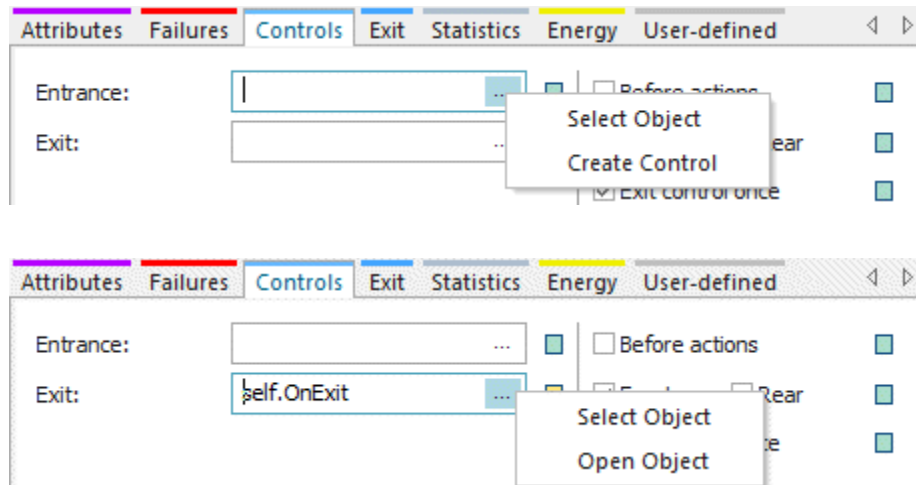
New Features in Plant Simulation 14.0

- 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 *AssemblyStation*.

- 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**.

Back to What's New in Tecnomatix Plant Simulation 14

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 *AssemblyStation*. 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 *AssemblyStation* when they are available again.
The parts can also be carried from the *Store* to the *AssemblyStation* 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.

Back to What's New in Tecnomatix Plant Simulation 14

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**.

Back to What's New in Tecnomatix Plant Simulation 14

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 14.0

We added an optional parameter to the method **getRouteLength** which sets if the *Worker* gets to the *Workplace* by walking freely within the area or not

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.

Back to **What's New in Tecnomatix Plant Simulation 14**

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*.

Back to **What's New in Tecnomatix Plant Simulation 14**

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.

Back to **What's New in Tecnomatix Plant Simulation 14**

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**.

Back to **What's New in Tecnomatix Plant Simulation 14**

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 fuctionality 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*.

Back to What's New in Tecnomatix Plant Simulation 14

New 3D 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 window*.

- 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 *ParallelStation*, 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 *3D* shows. 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. *3D* only distorts the graphic of the object and does not change its dimensions.

- We added the **edddison** 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**.

Back to What's New in Tecnomatix Plant Simulation 14

Changed 3D 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 *3D* 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 *3D* 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 window*.

- 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 *3D* 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:
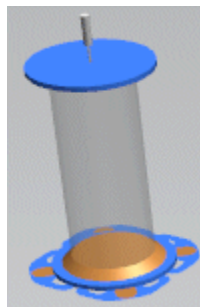
As opposed to 2D it only shows a single *Worker* in 3D. If you would like to see how many *Workers* are staying in the *WorkerPool*, open it in a new 3D window.
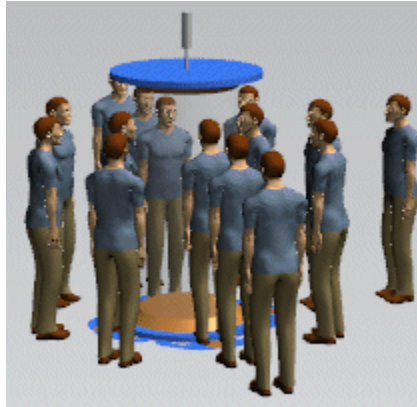
- We changed how the command **Lock Structure** works. It now also prevents you from inserting graphics.

- 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 *Station*, this graphic was marked as selected in all 3D windows for all *Stations* which inherit their graphics from this *Station* or from the *Station* 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 *3D*. 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 *3D* for displaying objects of type *Display*, *Comment*, and *Variable* in 3D windows. *3D* now shows them with the font size that you selected in the dialog of the object in 2D.

- We enhanced the behavior of *3D* 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, *3D* exports the selected object or the selected graphic.

- If you did not select anything, *3D* exports all graphics that are visible in the 3D window.

- We changed the behavior when *Plant Simulation* automatically inserts *Connectors*. *3D* 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.

Back to **What's New in Tecnomatix Plant Simulation 14**

Miscellany

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

### New and Changed Features in Plant Simulation 14.0

- We do not start the internal webserver automatically any more. If you want to use it, you have to start it explicitly with the start option `/WebServer`.

- We do not show the **TransferStation** by default on the tab *Tools* any more when creating a new model. You can always add it to your model via **Start > Manage Class Library**. The new functions of the **pick-and-place robot** can now also emulate most of the functions of the *TransferStation*.

- 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.

Previous Versions	From Version 13.2 on
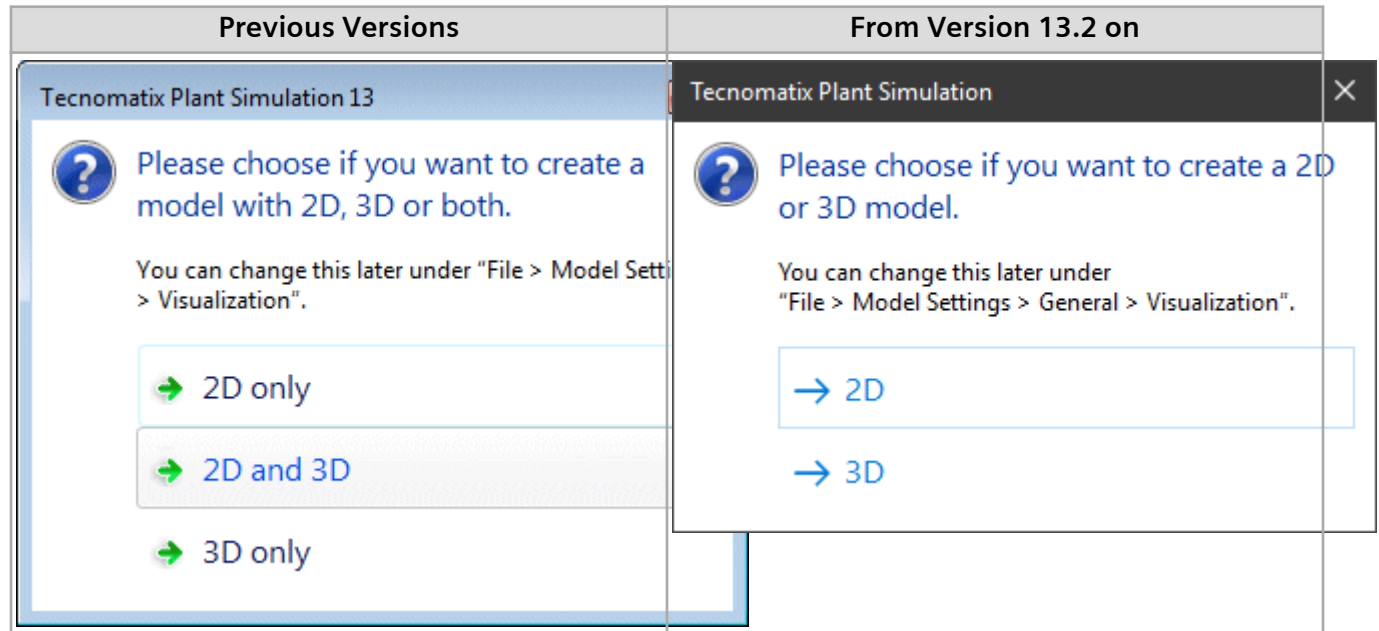
- We changed how *Plant Simulation* shows a user-defined ribbon tab. In previous versions *Plant Simulation* showed it under the ribbon tab/category **Frame** or **3D**. Now *Plant Simulation* shows it as a ribbon tab/category of its own named **User**.

Previous Versions	From Version 13.2 on
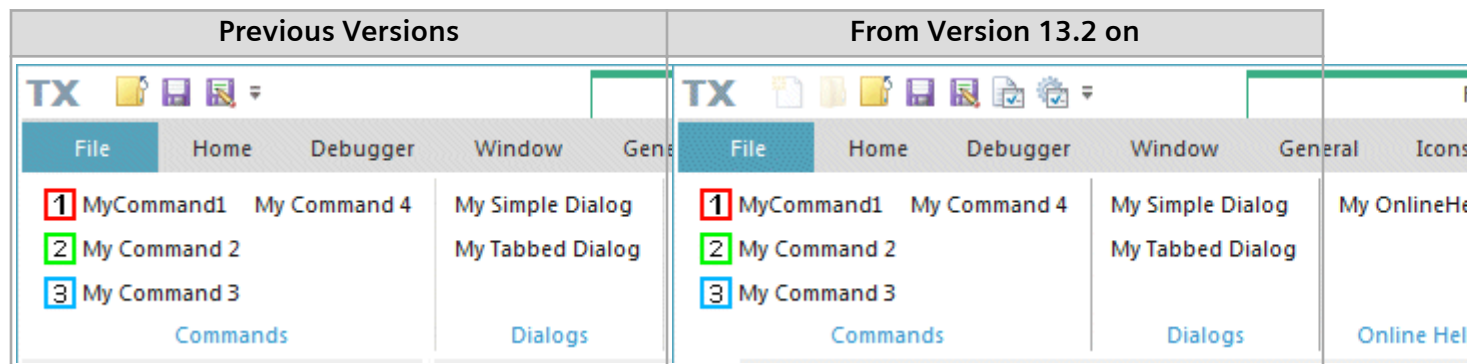
- We renamed the tab **Modeling** to **2D**. This allows us to hide the tab **2D** when you are only working with a 3D model.

- 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 *3D* is not activated, you will be asked if you would like to activate *3D*. 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.

Back to What's New in Tecnomatix Plant Simulation 14

What's New in the Object Libraries

New and Changed Features of the Object Libraries

The object libraries in *Tecnomatix Plant Simulation* 16 provide a number of new and enhanced functions.

- **New and Changed Features of the Object Libraries in Plant Simulation 16**

- **New and Changed Features of the Object Libraries in Plant Simulation 15**

- **New and Changed Features of the Object Libraries in Plant Simulation 14**

Back to What's New

New and Changed Features of the Object Libraries in Plant Simulation 16

The object libraries in *Plant Simulation* 16 provide a number of new and enhanced functions.

New Features and Changed Features in Plant Simulation 16.0

We made the following changes and enhancements to the *Value Stream Mapping library*.

- We undertook a number of extended restructuring measures in the background of the objects of the *Value Stream Mapping library*.

- We changed the definition of the setup matrixes. For better reproducibility these now refer to the station-final final products instead of to the base products as in previous versions.

- We changed the behavior of the *Supermarket*. It does not accept over-ordering any longer as the maximum stock now also is physically limiting.

- We changed the behavior of *Value Stream Mapping objects* with missing connections. The model Frame cannot contain such objects any more. The object *Check* shows a corresponding message.

- We changed how order queues are updated. These are now updated every five minutes and they reflect the time-weighted average.

- We extended the behavior of process to process linkages. These are now allowed. It is no longer required to insert the objects *FIFO* and *InternalTransport* between two Process objects.

- We improved the local order management in Processes and we unified, among others, the BOM definitions.

- We improved how materials are passed on. Each object now has an entrance store from which, starting with base parts, the station-final parts are created, analog to the assembly. In previous versions parts were sometimes buffered and then deleted.

- We fixed bugs in the disposition routine which sometimes occurred for certain constellations in several used base parts, including assemblies.

- We undertook capsuled combinations in sub-Frames at a number of places. We also renamed internal statistics and data structures. This is important if you explicitly accessed them to return values via *SimTalk*.

New Features and Changed Features in Plant Simulation 15.2

- We added the tool **Gozintograph** to the **Value Stream Mapping** library.

- We changed the behavior of the *GAWizard*. The predefined value of the user-defined Attribute *lastGeneration4DuplicatesCheck* now is -1. The *GAWizard* then runs a check for all generations on the already evaluated individuals. You can change the value of the attribute *lastGeneration4DuplicatesCheck*. You can enter -1 and positive integer numbers.

- We changed the behavior of the *SequentialSampler* with several simulation runs. You can now set the number of observations so that the confidence interval for a given target value has the desired width. You can still use the Batch method that previous versions provided.

New Features and Changed Features in Plant Simulation 15.1

We fixed a bug of the *ExperimentManager* which occurred when an input value or an output value was set by an absolute path and the *ExperimentManager* was not located in the *root Frame*.

Back to New and Changed Features of the Object Libraries

New and Changed Features of the Object Libraries in Plant Simulation 15

The object libraries in *Plant Simulation* 15 provide a number of new and enhanced functions.

New Features and Changed Features in Plant Simulation 15.0

- We enhanced the behavior of the *ExperimentManager*. For each output value, which is not an object of type *DataTable*, you can select in the table **Output Values** in the column **High values are better** if higher values are better or not. The *ExperimentManager* creates the parametrization (sets of input values) for the desired output values, which have the best output value (as mean value) and shows them under the heading **Best Parametrizations of the Model** of the *HtmlReport*.
  For each output value you can show all parametrizations of the model which result in a maximum or minimum mean value respectively with the method *getBestParameter*.
  The *ExperimentManager* can now show *Sankey diagrams* in a non-distributed simulation in the *HtmlReport*.

When some observations of output values are not available in a distributed simulation because of terminated simulation runs, the statistics values, for example the mean value, are now only computed for the correctly simulated observations.

- We added the tool **Timeline** to the **Value Stream Mapping** library.

- We added the attributes *simulateWithAnimation* and *DCOM_StartDelay* to the *ExperimentManager* and to the *GAWizard*, compare **Executing Distributed Simulations**.

- We added the check box **Apply settings to connected rack lanes** to the *RackLane* of the *High Bay Warehouse*.

Back to New and Changed Features of the Object Libraries

New Features and Changed Features in Plant Simulation 14.2

- We removed the localization of the libraries *CranesAndMore*, *CrossSlidingCar*, and *HBW*. These only provide these libraries with an English user interface from now on.

- We changed the functions that the tab **3D** of the *GantryLoader* provides.

- We moved the library *CrossSlidingCar* from the *Tools* to the library *CranesAndMore*.

- We added the object *Lift* to the library *CranesAndMore*

- We renamed the method *moveMUFromTo* of the *portal* of the *MultiPortalCrane* to *transferMU*.

Back to New and Changed Features of the Object Libraries

New Features and Changed Features in Plant Simulation 14.1

- You can delete the folder for the *distributed simulation* if the *ExperimentManager* and the *GAWizard* are of version 14.1 or higher.

- The user-defined methods of the *ExperimentManager* for configuring, for setting the input values of the random number streams, and for the evaluation now have to be realized as objects of type *Method*. The configuration method and the method for calculating the fitness of the *GAWizard* are also realized like this. This way the controls of the material flow objects and these configuration methods behave the same. As these user-defined methods of these two *Tools* were realized with *Methods* in previous versions, which were loaded in the *Frames* of these *Tools*, you have to save the source code of these methods in new *Method* objects.

- Note that the source codes of these user-defined methods have a different name space. The method for evaluating the *ExperimentManager* is only called at the end of an experiment study in version 14.1 and thus has only a single parameter for the calling *ExperimentManager*. In this method you can, for example, transmit statistical evaluations of the table *DetailedResults* of the *ExperimentManager* to another application.

- We removed the *StorageCrane* from the library *Cranes* as we do not support the *StorageCrane* any more. The objects *MultiPortalCrane* and *StorageArea* replace it.

Back to New and Changed Features of the Object Libraries

New and Changed Features of the Object Libraries in Plant Simulation 14

The object libraries in *Plant Simulation* 14.0 provide a number of new and enhanced functions.

- We added the *GantryLoader* to the *CranesAndMore* library.

- We adjusted the position and the dimension of the racks and the conveyors in the *High Bay Warehouse (HBW)* library 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 *High Bay Warehouse (HBW)* library.

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