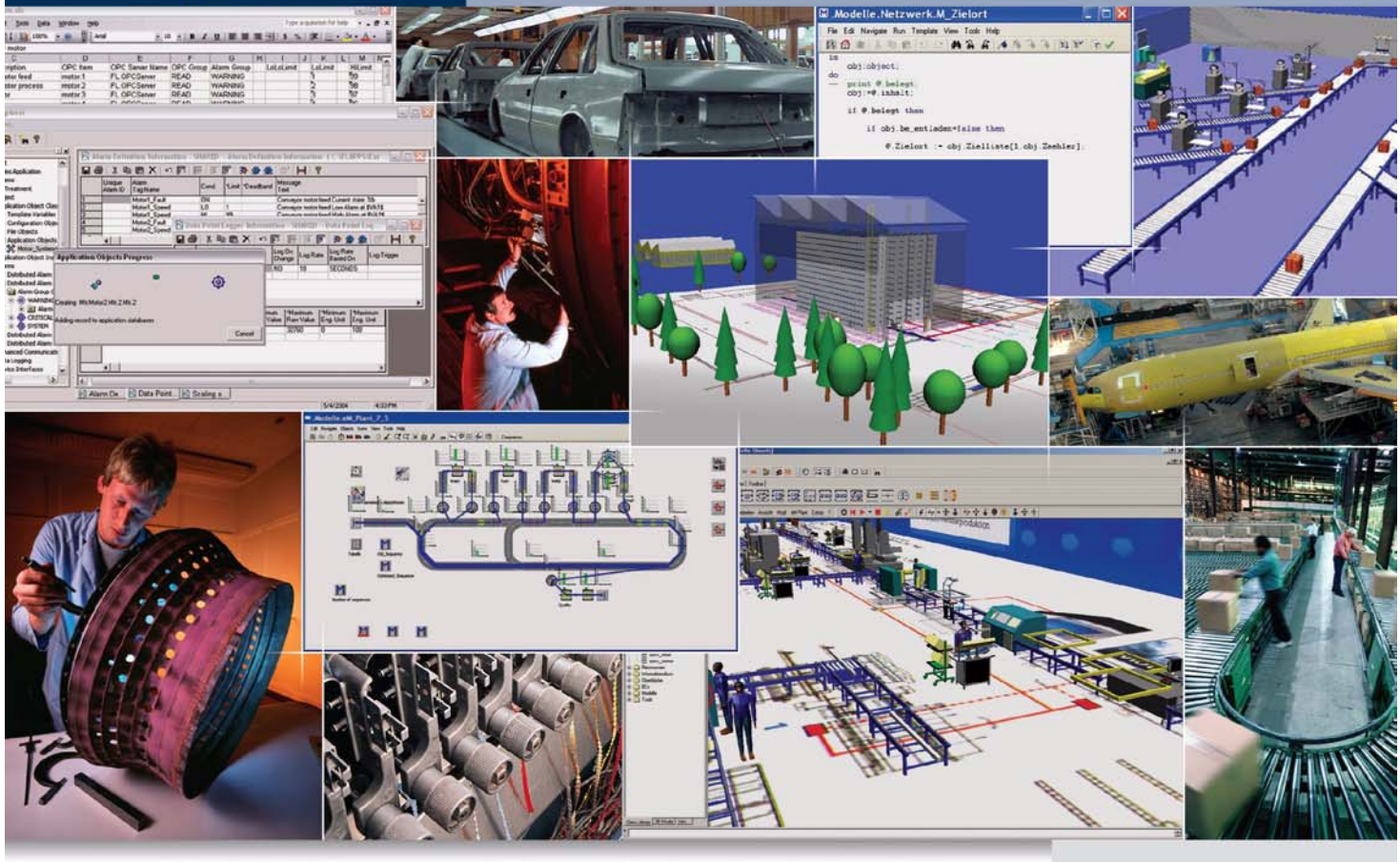
Plant Simulation Assembly library

Reference manual

Siemens PLM Software

www.siemens.com/plm



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Plant Simulation Assembly Line Library

Version 9.0

December 2008

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Introduction

Plant Simulation Assembly is an application object library for modeling, simulating and evaluating assembly areas.

As opposed to previous versions, we divided the application object library into several modules in the present version. This is justified by the fact, that as a rule, you will only use the material flow objects in your project. If any of your projects require the extended functionalities, such as *FiniteStateMachine* or *Kanban*, you can always add these libraries at a later point in time to your model. This results in lean Assembly models which, in addition, require less memory. All sub-libraries are still an integral part of the Assembly license.

Part of restructuring the Assembly library also consisted in grouping objects with similar functions in the respective sub-folders. This makes it easier to extend or to append parts or functionalities of the library. You can use the method *updateClassLibrary* which Plant Simulation 7 provides, to quickly and easily update the individual modules of a library. Restructuring also adds to the clarity of the library and thus allows to find objects faster.

Below we describe the individual modules of the library. We describe the objects themselves as well as the changed functionalities as compared to previous versions. You will notice that in general the library makes increased use of the new features which Plant Simulation provides. We especially tried to migrate the original *Frames* which contained the built-in objects and the methods of the object, to basic objects whose functionality we extended with user-defined methods.

Changes in Version 7.1

In addition to a number of bug fixes, Plant Simulation Assembly Version 7.1 provides these changed/extended features.

SingleprocRetouch: You can now define, which error symptoms you would like to feed into the model. This way you can create error-specific repair stations.

RetouchArea: In addition to define the percentage of scrap, you can now also define error combinations which lead to scrapping the parts.

We added the objects *AssyWork*, *AssyTrack* and *AssyLineChart*. These names are intentionally close to the names of the existing objects *Assy_Work* and *Assy_Track*. The new objects are based on the built-in object *Track* and not modeled in a *Frame*. This way you can use the built-in curve mode to draw curved segments of the *Track*.

We adapted the *Assembly-Explorer* and the *PartManager* according to the new objects.

Changes in Version 7.5

In Version 7.5 we added the object *AssemblyType* to the library. Use it to quickly define an assembly process.

In addition we changed how to enter times into a number of objects. We also added the method statistics to some objects which you can use to write the statistics data shown in the dialog to a table. We describe the format of the table in the respective objects.

Now all objects have the attributes *AOLType* and *objType*. For eM-Plant Assembly the attribute *AOLType* generally has the value assembly. The attribute objType will be defined for each object. Note that both attributes are case-sensitive.

Changes in Version 7.6

In version 7.6 the KANBAN library was removed. These objects are now part of the basic objects of Plant Simulation.

We added the object *SequenceAnalyzer*. You can use it to analyze production sequences before and after mixing the sequence. It shows the degree of mixing. At the same time you can draw conclusions from the values of the *SequenceAnalyzer* about the buffer capacity of a succeeding sorter-buffer.

Changes in Version 8.1

In version 8.1 some minor bugs are fixed.. For some objects which are implemented in frames the new functionality of the inteface object was used and exit controls could be removed.

For the object SourceN there is a new setting which allowes you to reset the statistic data of MUs at the time the MU leaves the sourceN object. This can be used to remove the blocking time on the sourceN object from the lifetime of the MU.

Changes in Version 8.2

In version 8.2 only some minor bugs are fixed. For all objects the Localization folder was added. Please refer to the localization document to get more inforation how to localize the library.

The settings of the object *SourceN* was extended. It is possible to use the object *VaraintGenerator* to define the MUs and the attributes of the MUs. Please refer to the online manual to read more about the usage of the object *VariantGenerator*

The Library Modules

AssemblyLine

This folder contains the objects required for simulating assembly lines with a fixed or with a moving assembly.

Updating Existing Models

You can upgrade models, which you created in previous versions of Plant Simulation Assembly, at any time. First use the Update-Patches to update the model to eM-Plant Version 6. Then, load this model into eM-Plant 7 and use the command Save/Load > Update Class Library to update it.

Starting with versionn 7 of Plant Simulation you can update the model with the library modules by using Update Class Library.

Where to Get Help

We do not describe the built -in objects, such as the *AttributeExplorer* and the *ExperimentManager*, in this manual. You find information about them in the Plant Simulation Reference Manual or in the Plant Simulation Step-by-Step Help. The libraries *Personnel* and *FSM* have their own documentation.

Features Planned for Future Versions

For future versions we plan to implement these features:

- The Method statistics for all material flow objects
- We plan to add an additional setting to the object *SourceN*, which allows you to create MU types according to any list/table. This way you might, for example, use existing production programs for creating the MUs.
- We plan to revise the *Kanban* module.
- We plan to revise the *Transport* module.
- We plan to add a *Logistics* module for transporting parts within the production.

How to Get in Touch with Us

You will always find the current version of the assembly library on our customer page on the Plant Simulation Homepage:

www.emplant.de/support/plant/

Select Customer Support and enter your password. Select AOLs and then select assembly. You always find the most current version at this location. If you have a maintenance contract, you can download it from here.

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AssemblyLine

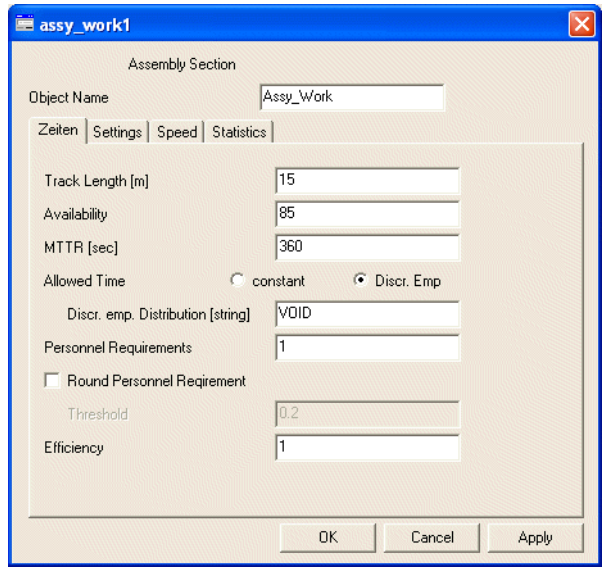
With the objects described in this chapter you can create simulation models containing assembly lines with stationary or moving processing steps. When you model moving processing steps an evaluation of the actual processing area is possible.

Assy_Work 

The object *Assy_Work* represents a length-oriented assembly section in which certain assembly steps are executed on an vehicle. The assembly is attached to the vehicle and depends on its type. This means that each vehicle carries along a production plan as an attribute. This production plan tells which and how many parts are to be assembled in which assembly section. The object *Part_Manager* manages the production plans of all parts.

The body in white or the *Skid* move independently on the assembly section. When assembly sections are connected, the body in white moves smoothly from predecessor to successor.

For each assembly section you can define if preparatory work (pre work) can be done in the previous section or if subsequent work (post work) can be done in the next section. In addition you can define for each assembly section if the can begin, when the body in white enters the station or if the previous assembly step has to be finished. You can also change the speed of the body in while.



Object Name

This text box shows the name of the object.

Tab Times

Track Length

Enter the length of the assembly section into this text box. Note that you enter meters here.

Availability

Enter the Availability of the object into this text box. Enter a value between 0 and 100.

MTTR

Enter the mean time to repair in seconds into this text box.

Default Time

Select the radio button Constant to use a constant allowed time. The object *Assy_Work* copies the allowed time from the production plan of the part. Select the radio button Discrete empirical if you want to use a discrete empirical distribution for the allowed time.

The processing time for the assembly will be calculated at runtime. The calculation uses the assembly times from the production plans of the parts and these parameters, which you can enter into the dialog.

The processing time is calculated as follows:

Processing time = allowed time / (required personnel * efficiency)

The value for the required personnel can be an exact value, such as 1.7 or a rounded value. Be aware that the processing time can, in addition, be overlaid by a discrete empirical distribution.

Discrete Empirical Distribution

Enter the name of a distribution object into this text box. This object is located on the top-level *Frame* of the model. It contains a discrete empirical distribution. Note that the text box is active only, when you select Discrete empirical as the Allowed time.

Required Personnel

Enter the number of people working in this assembly section. Depending on the required personnel, the program calculates the processing time at runtime.

Note: In order to be able to better evaluate the behavior of the assembly line with its linked assembly sections, and their mutual interactions, you can also enter values of type real, such as 1.7.

Round Required Personnel

Clear this check box to use the exact number of required personnel for calculating the processing time. Select it to round the value. Then, enter the threshold value for rounding.

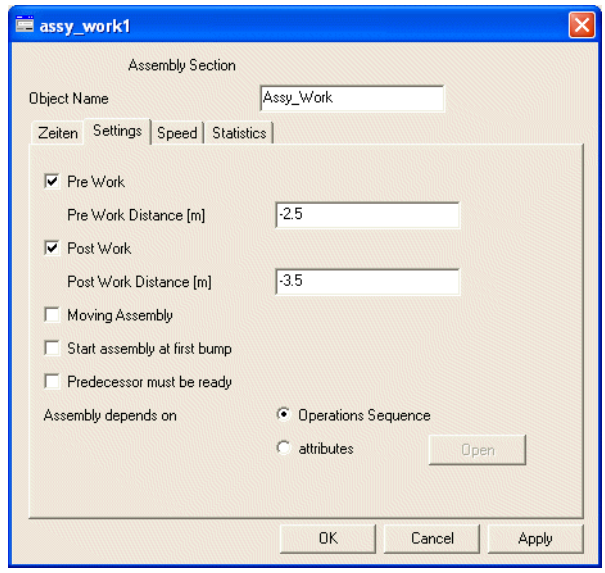
Threshold

Enter the threshold value for rounding the required number of staff. Values will be rounded up to the next integer from this value on. Values will be rounded down to the next integer for values below this value. Required personnel between 0 and 1 will always be rounded up.

Efficiency

Enter the efficiency of the assembly section into this text box. Depending on the required personnel, the program calculates the processing time at runtime.

Tab Settings



Pre(paratory) Work

Select this check box to allow staff to work into the previous section. Clear it to restrict staff to working in the section to which he is assigned.

Pre Work Distance

Enter the distance which staff can perform jobs in the previous section of the line. Note that you enter meters here.

Post Work

Select this check box to allow staff to work into the next section. Clear it to restrict staff to working in the section to which he is assigned.

Post Work Distance

Enter the distance which staff can perform jobs in the next section of the line. Note that you enter meters here.

Moving Assembly

Select this check box to allow working on the vehicle while it is moving. Clear it to allow working on the vehicle only at the end of the current section.

Start Assembly at First Bump

Select this check box to allow working on the vehicle as soon as it is located in the allowed area and collides with the preceding vehicle. This only applies, when the assembly is permitted on a standing vehicle. Clear the check box to allow working on the vehicle only after it came to a stop at the end of the current assembly section.

Predecessor Must Be Ready

Select this check box to allow working on the vehicle only when the processing steps of the preceding station have been finished. Clear the check box to allow working on the vehicle in the preceding and in the current assembly section at the same time.

Assembly Depends On

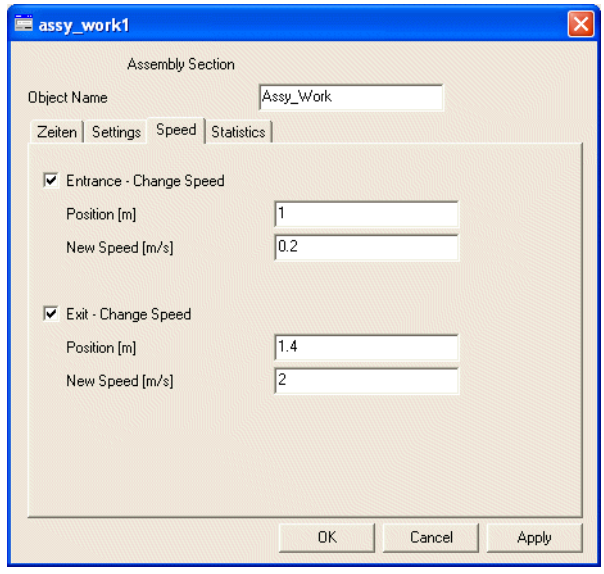
Select the radio button Operations Sequence to make the processing times within this assembly section depend on the production plan of the part.

When you select Operations Sequence the parts have to have a production plan, which is attached to them in the *Source* by the *PartManager*.

Select the radio button Attributes to make processing and the assembly of the parts depend on attributes of the main part. Click Open and enter the assembly plans into the table.

Tab Speed

On this tab you can set if the entrance speed and/or the exit speed changes. Frequently the *Skid* moves with a lower speed within an assembly section than outside of them.



Change Speed at the Entrance

Select this check box to change the speed of the body in white at the first position of the assembly section. Then, enter the position at which the speed changes and the new speed in the text boxes below the check box.

Position

Enter the position at which the speed of the body in white changes into this text box. This value denotes the distance from the entrance of the assembly section in meters.

New Speed

Enter the new speed of the body in white into this text box. Note that you enter meters per second here.

Change Speed at the Exit

Select this check box to change the speed of the body in white at the second position of the assembly section. Then, enter the position at which the speed changes and the new speed in the text boxes below the check box.

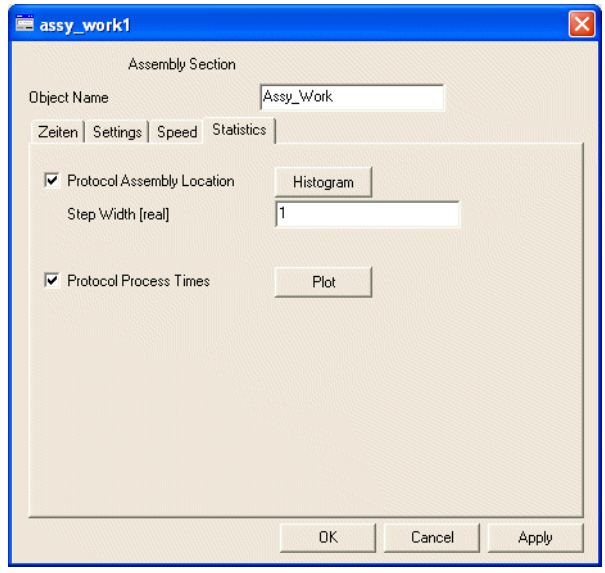
Position

Enter the position at which the speed of the body in white changes into this text box. This value denotes the distance from the entrance of the assembly section in meters.

New Speed

Enter the new speed of the body in white into this text box. Note that you enter meters per second here.

Tab Statistics



Record Assembly Location

Select this check box to record the exact assembly location of each part at runtime. Plant Simulation Assembly creates a Histogram with this data which shows how many parts were processed in which areas within the assembly section.

Histogram

Click Histogram to open the *Histogram* which shows the distribution of the assembly locations.

Step Size

Enter the step size for the histogram.

Record Processing Times

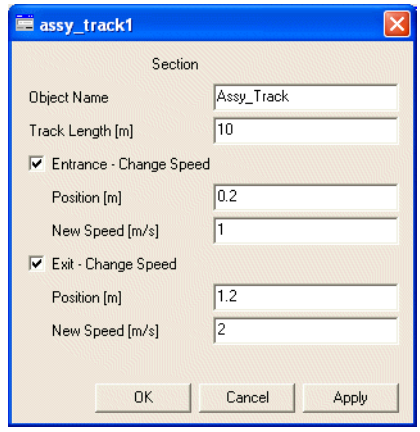
Select this check box to record the processing times at runtime.

Plot

Click Plot to open the *Plotter* which shows the processing times distributes over time. The program also calculates and shows the mean value and the standard deviation as well as the minimum value and the maximum value.

Assy_Track

You will use the object *Assy_Track* together with the object *Assy_Work*. It also is length-oriented but no assembly work can be done here. You can use the *Assy_Track* to bridge the distance between two assembly sections or to change the speed of the body in white.



Object Name

This text box shows the name of the object.

Track Length

Enter the length of the section into this text box. Note that you enter meters here.

Change Speed at the Entrance

Select this check box to change the speed of the body in white at the first position of the section. Then, enter the position at which the speed changes and the new speed in the text boxes below the check box.

Position

Enter the Position at which the speed of the body in white changes into this text box. This value denotes the distance from the entrance of the assembly section in meters.

New Speed

Enter the new speed of the body in white into this text box. Note that you enter meters per second here.

Change Speed at the Exit

Select this check box to change the speed of the body in white at the second position of the section. Then, enter the position at which the speed changes and the new speed in the text boxes below the check box.

Position

Enter the position at which the speed of the body in white changes into this text box. This value denotes the distance from the entrance of the assembly section in meters.

New Speed

Enter the new speed of the body in white into this text box. Note that you enter meters per second here.

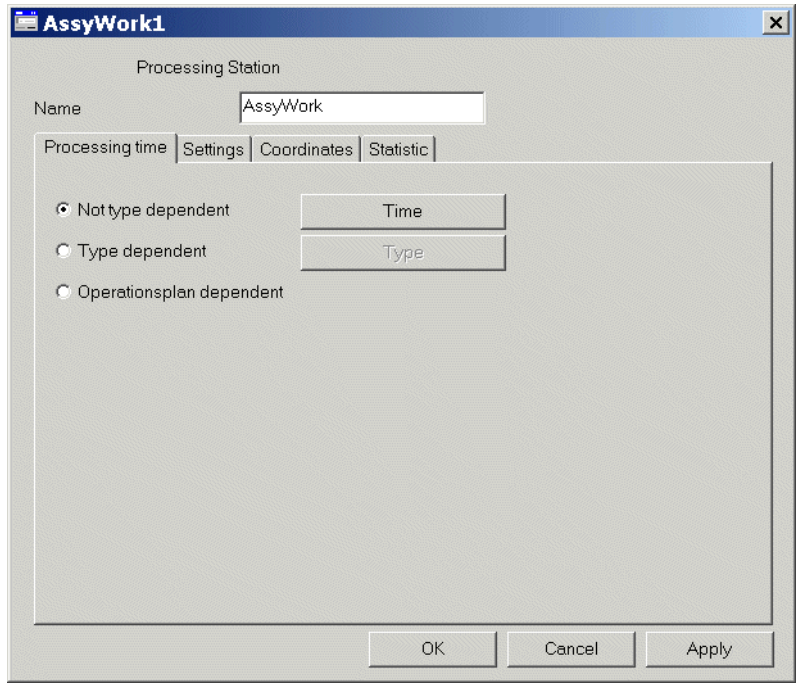
AssyWork 

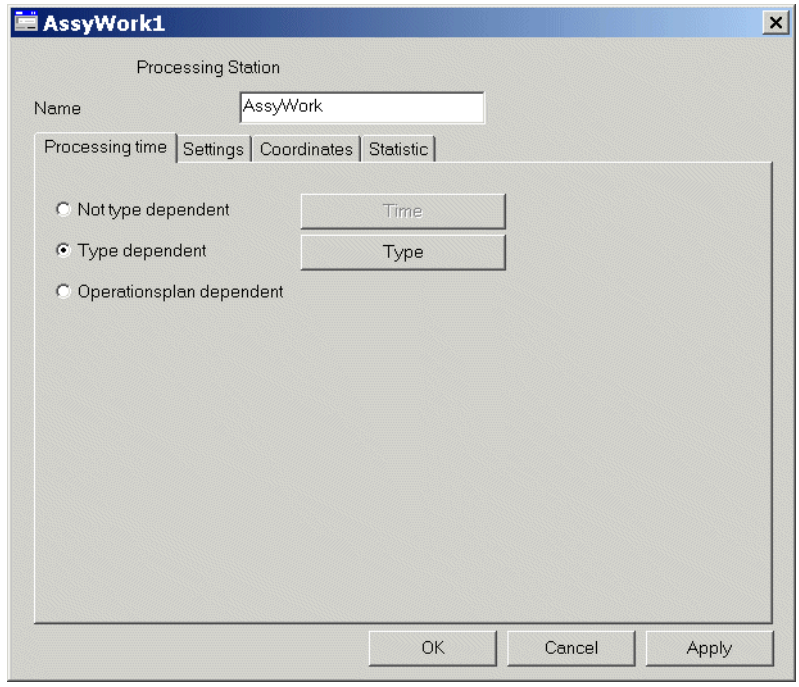
We developed the objects *AssyWork* and *AssyTrack* to add the curve feature to the original Plant Simulation Assembly objects *Assy_Work* and *Assy_Track*. At the same time we improved the dialogs and tightened the functionalities. This resulted in two easy-to-use objects which you can use to model assembly processes with moving and stationary objects on *Skids*. We also added the chart *AssyChar* to the object *AssyWork* which shows the assembly section for moving assemblies.

You can utilize this object in a number of ways:

- Line with stationary processing. Here you can define any type of processing time, such as type-dependent, type-independent, work-plan related. You can also define the position at which the part is being processed.
- Line with moving assembly. Here the skid moves on while the part is being processed. You can select any of the processing times mentioned above. You can also define the area within which the parts have to be processed. If processing within the defined area cannot be finished, the skid can either be stopped or the part can be marked to be reworked.

Either the skid itself can be processed or the part located on the skid. This only depends on the fact if parts are loaded onto the transporter or not. If several parts, which have to be processed, are located on the skid, the processing time is the sum of the processing times of the individual parts.





Tab Processing Time

You can select different settings for the processing time.

Not type-dependent

Select this radio button to define the processing time of the object without the processing time depending on the product to be processed. Click Time and enter the processing time into the *Variable* that opens. Note that you can use all distribution functions which eM-Plant provides.

Type-dependent

Select this radio button to make the processing time depend on the type of the product. Click the button Type and enter the product (entity) types, the processing time and the distribution function. Note that you can use any of the distribution functions which eM-Plant supports.

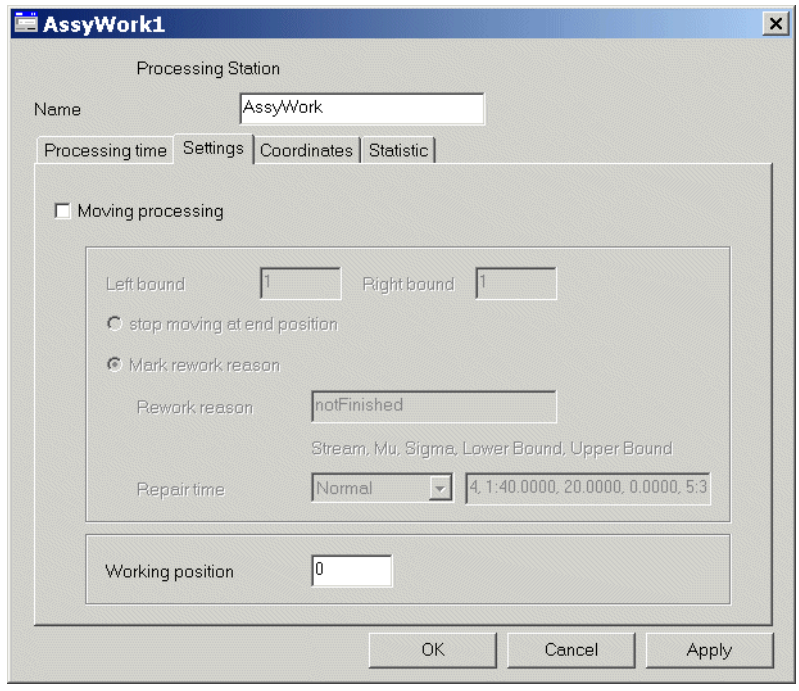
	string 1	string 2	string 3
string	Distribution	Parameter	entityType
1		60	AA
2		50	BB
3			

Depending on the Operations Plan

Select this radio button to make the processing time depend on the production plan of the product. This production plan is attached to the product (entity) when it is created by the *SourceN* by the *PartManager*.

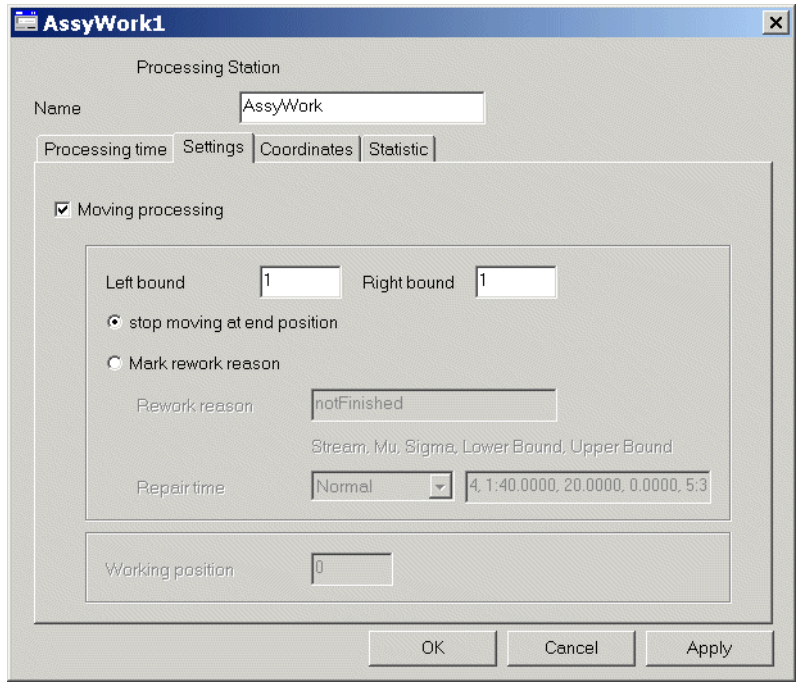
Tab Settings

On this tab you can select to attach parts while the product is moving or while it is stopped and stands still. For the moving assembly you can also define what happens, when the end of the assembly area is reached.



Processing While the Product is Not Moving

When you clear the check box Moving processing, the product will be processed while the product is stopped and stands still. In this case you have to enter the position at which the product is to be processed. This may be any position within the length of the line.



Processing While the Product is Moving

Select the check box Moving processing to assemble the product while it is moving. You can limit the processing area by entering a value for the Left bound and for the Right bound. With the settings in our example above the assembly can start at 1 meter after the starting point of the section. It has to be finished 1 meter before the finishing point of the section.

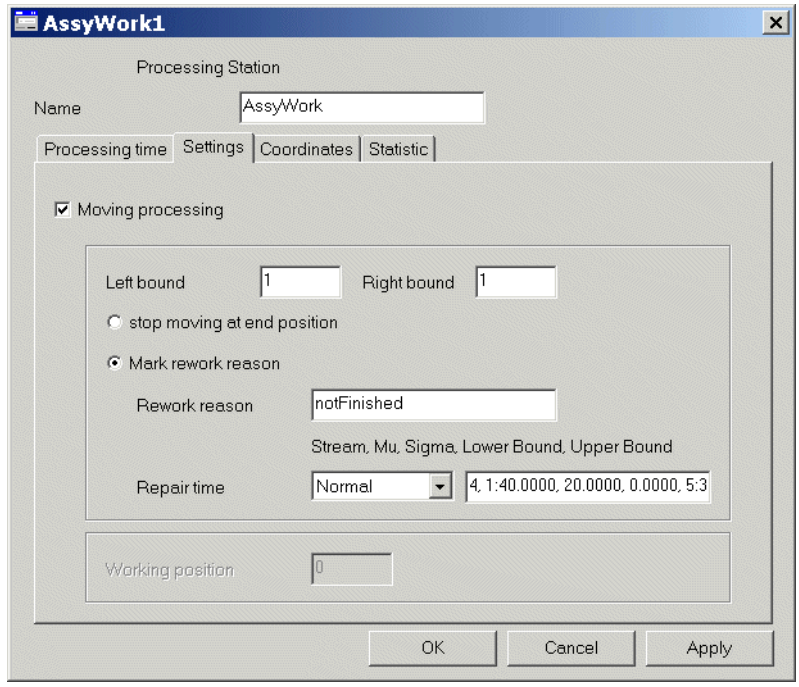
The values for the left bound and for the right bound can also be negative. A negative value for the left bound means that processing may start on the preceding track segment.

A negative value for the right bound means that processing may continue on the succeeding track segment.

Naturally this implies that the predecessor and the successor are tracks also. Otherwise the bounds for the beginning or for the end of the track respectively are set.

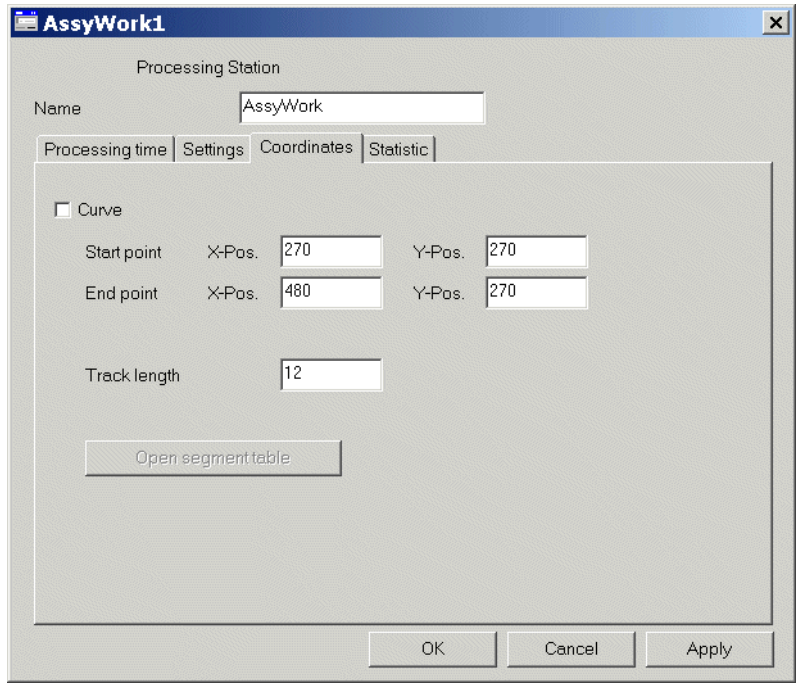
If processing has not been finished at the point in time which you defined, you can select how to proceed:

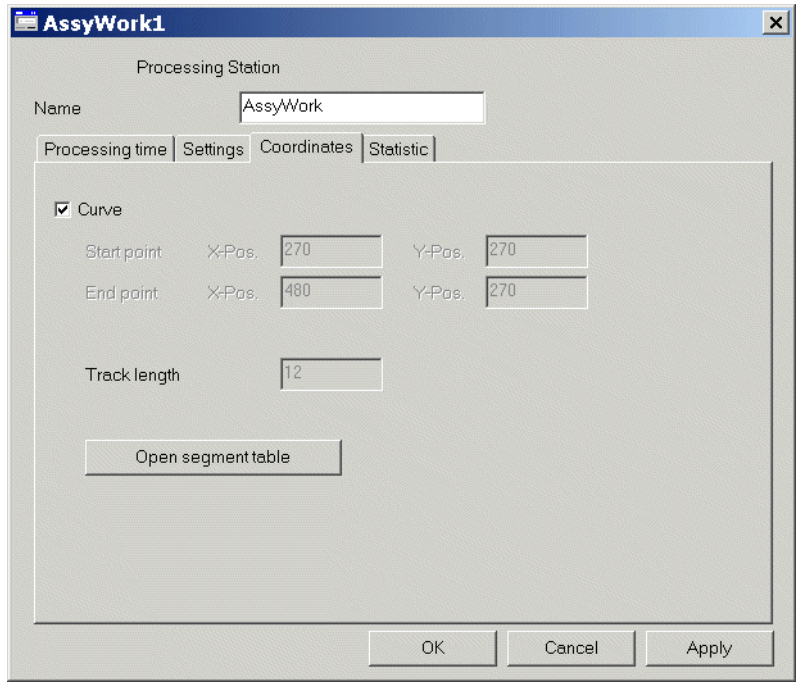
- Stop at end point: The *Skid* stops until the assembly process has been finished. The number of stops is recorded on the tab Statistics.



- Mark MU to be reworked: The MU on the skid is marked to be reworked. This way you can model a quality control station (SingleprocRetouch) and finish the assembly process with it. Enter the repair time or the rework time into the respective text boxes.

Tab Coordinates





On this tab you can define the coordinates of the line. Plant Simulation automatically enters coordinates when you insert the object. You can fine tune these values by entering values into the dialog. This way you can exactly define the position the way you need it to be.

Curve

Clear this check box to insert the track as a straight line without any curves. You can enter the coordinates of the starting point and of the end of the straight line. The program shows the length of the track segment in the text box. Note that it is determined by starting point and end point and that you cannot edit it.

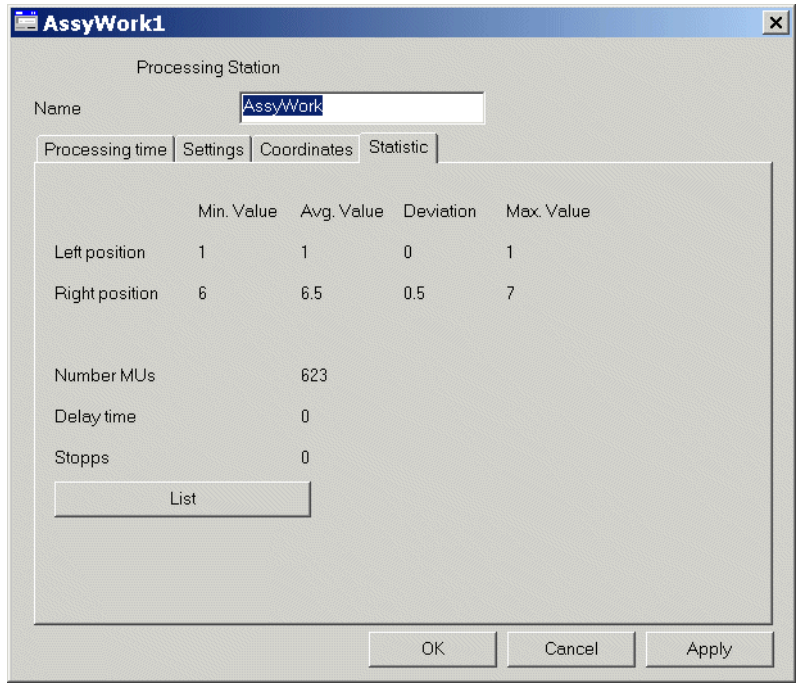
Select the check box to insert the track as a sequence of straight and curved segments. In this case Plant Simulation Assembly uses a coordinates table. To modify the shape of the track, click Open Segments Table and edit the values in the table.

	xpos	ypos	isCurve	angle
1	270	270	false	0.00
2	480	270	false	0.00

When you insert a curved track, the program enters the x-coordinate and the y-coordinate of the anchor points. The cells of the column isCurve tells that the next segment of the track is a curved segment. The cells of the column angle define the angle of the curve, compare the eM-Plant Help.

The box Track length shows the length of the track.

Tab Statistics



The tab **Statistics** shows the most important statistics values. The values mainly refer to the moving assembly. For the standing assembly they are less meaningful.

The row **Left position** shows at which position the assembly started. It shows the minimum value, the average value, the standard deviation and the maximum value.

The row **Right position** shows at which position the assembly was finished. It shows the minimum value, the average value, the standard deviation and the maximum value.

The value next to **Stops** shows how often *Skids* had to stop because the assembly was not finished within the specified area.

Click **List** to open a table showing the individual values the program recorded.

	Name	StartDelay	stopDela	Start Process	Start Positi	Stop Moveme	Stop Positio	Stop Procesir	End Processing Posit
1	BB			2:50.0000	1			3:40.0000	6
2	BB			3:50.0000	1			4:40.0000	6
3	BB			4:50.0000	1			5:40.0000	6
4	BB			5:50.0000	1			6:40.0000	6
5	BB			6:50.0000	1			7:40.0000	6

The cells in the column **Name** show the MU type. The values in the column **Start Processing** show the point in time at which processing started. The values in the column **Start Position** show the associated position at which processing started.

The columns **StartDelay** and **StopDelay** show the times which lead to a delay in processing. These times are then recorded, when the preceding work place has not finished processing yet and work could begin on this station.

The values in the columns **Stop Processing** and **End Processing Position** show when and where processing was finished.

When the *MU* or the *Skid* had to stop because processing was not finished within the specified area, the column Stop Movement shows the point in time at which the MU was stopped and the column Stop Position shows the position. When these two columns are empty, the MU was not stopped.

Note: The statistics table will only be filled, when you selected "moving processing."

Attributes of the Object

objType: AssyWork

leftbound [length]: Defines the left bound of the processing area. This is the position from which on the MU can be processed. When the value is negative, processing can already start on the preceding object. This naturally implies that the preceding object also is of type AssyTrack or AssyWork.

rightbound [length]: This is the position until which the MU can be processed. After this position the skid stops or the MU is marked for being reworked. A negative value means that processing may continue on the succeeding object. This naturally implies that the succeeding object also is of type AssyTrack or AssyWork.

numStops [integer]: This attribute counts the number of skids which were stopped.

workPosition [length]: For stationary processing the parts are process at the position which you define here.

Methods of the Object

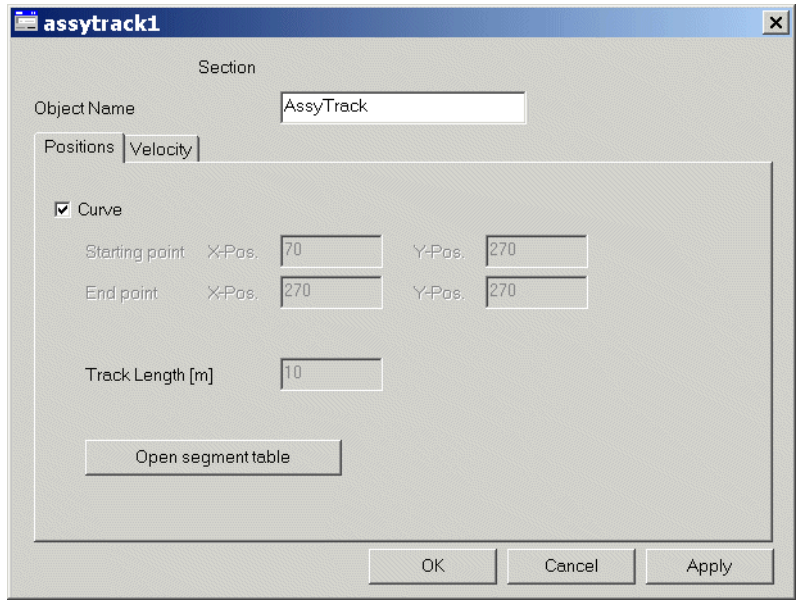
Usage:
```
<path>.statistic(<table>);
<path>.statistic(<table_path>);
```

This method returns the values from the tab Statistics and writes them into a table. You can pass the name of a table or an object of type table. Plant Simulation automatically formats the table.

We described the contents of the individual columns above.

AssyTrack

The *AssyTrack* does not have any special functionality. It serves for connecting two *AssyWork* objects. It thus represents a track You can change the speed of the track at its beginning and at its end.



Tab Positions

On this tab you can exactly define the position of the track.

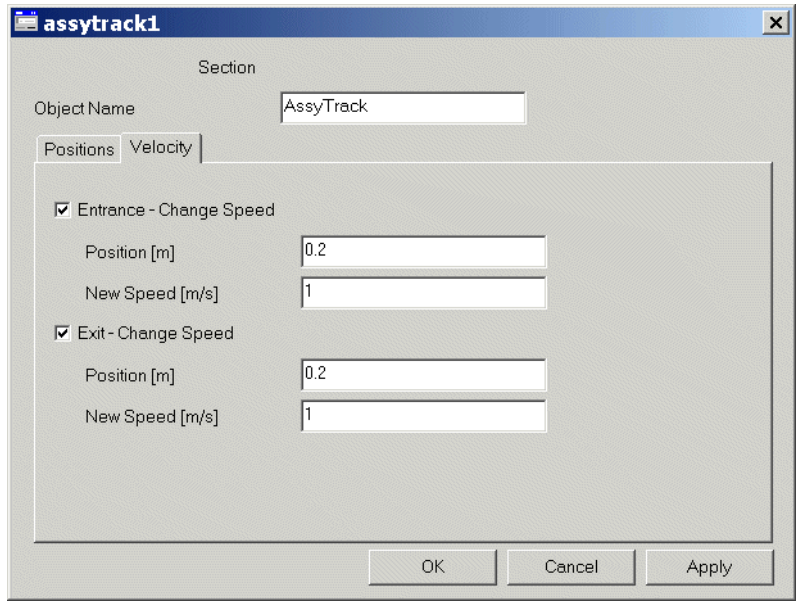
Clear the check box Curve to show the track as a sequence of straight segments. You can enter the exact position of the starting point and of the end point. The program calculates the length of the track from these positions, you cannot enter it into the text box.

Select the check box Curve to show the track as a sequence of straight and curved segments. You mainly define the curved segments while inserting the track. If you want to modify the segments, you can click Open Segments Table and edit the coordinates in the cells of this table. The meaning of the individual values is described in the eM-Plant.

	integer 1	integer 2	boolean 3	real 4
string	xpos	ypos	isCurve	angle
1	70	270	false	0.00
2	270	270	false	0.00
3				

Tab Velocity

On this tab you can change the entrance speed as well as the exit speed. The program uses the speed you select until you explicitly change it again. This way you can also use the *AssyTrack* to set the speed to a certain value at a defined position.



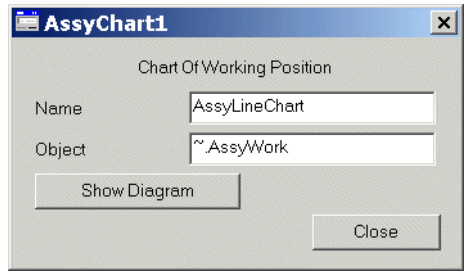
Select the check box Entrance Change Speed. Enter the position at which the speed changes into the text box Position. Enter the speed which applies from that position on into the text box New speed.

Select the check box Exit Change Speed. Enter the position at which the speed changes into the text box Position. Enter the speed which applies from that position on into the text box New speed.

AssyChart 

The object *AssyChart* is intended for use with the object *AssyWork*. It graphically represents the actual work area.

Note: It only shows it, when you selected moving processing for the associated object AssyWork.



Name

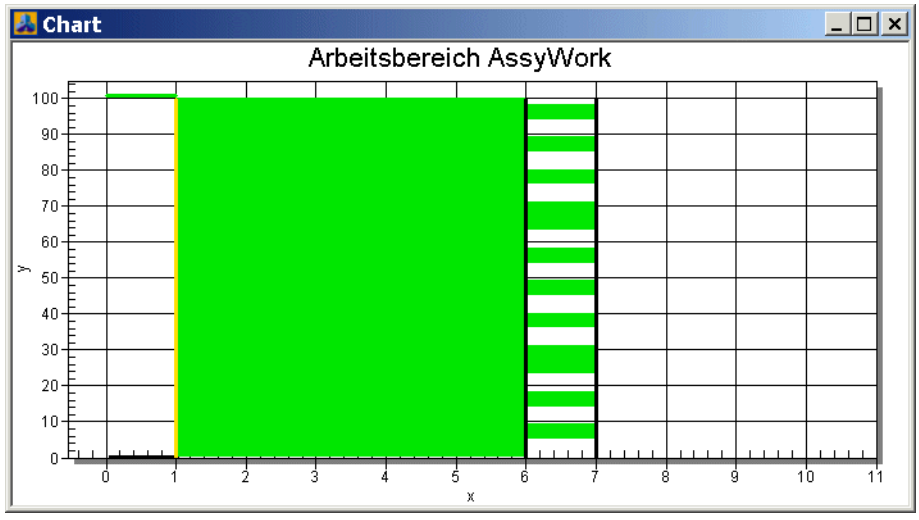
Enter the name of the object into this text box.

Object

Enter the name of the *AssyWork* object you want to show into this text box. Instead of entering the name of the *AssyWork* object you can also use drag and drop to add it onto the *AssyChart* object.

Show Diagram

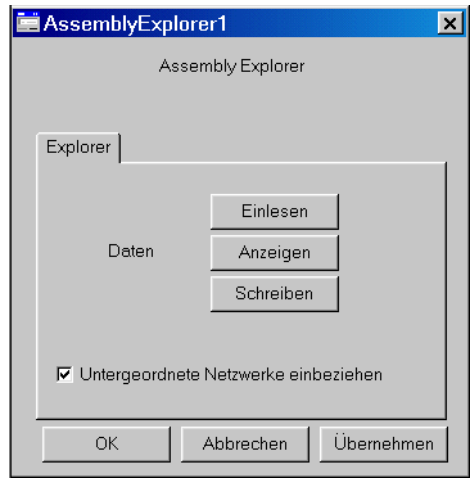
Click this button to open the chart. The horizontal lines show the position of the assembly. The vertical axis shows the positions. The yellow vertical lines show the minimum and the maximum of the start position of the assembly. The blue lines show the minimum and the maximum of the final position of the assembly.



AssemblyExplorer

You can use the *AssemblyExplorer* to manage and parameterize all parameters of the objects *Assy_Work, Assy_Track, AssyWork and AssyTrack*. The user has to start the actions of the object. Otherwise it will be totally passive.

Tab Explorer



Read Button

Click this button to read the data of the assembly line objects. Note that the *AssemblyExplorer* only reads parameters of the objects mentioned above.

Display Button

Click this button to show the data, which the object read in before, in a table.

	string 1	string 2	integer 3	real 4	real 5	real 6	string 7	real 8	boolean 9	real 10	integer 11
string	station	type	capacit	length	assembly_start	assembly_loc	discr. distributi	pers_req	round_req	threshol	pers_roun
1	.ApplicationObjects.Assembly.Mod	Assy_Track	-1	10.00	-1.00	-1.00	-1	-1.00	false	-1.00	-1
2	.ApplicationObjects.Assembly.Mod	Assy_Work	-1	15.00	-2.50	-3.50		1.00	false	0.20	1
3	.ApplicationObjects.Assembly.Mod	AssyTrack	-1	2.00	-1.00	-1.00	-1	-1.00	false	-1.00	-1
4	.ApplicationObjects.Assembly.Mod	AssyWork	-1	2.00	0.00	0.00	-1	-1.00	false	-1.00	-1
5											

	real 12	boolean 13	boolean 14	boolean 15	real 16
string	level_of_eff	moved_assy	start_at_bump	pred_ready	MTTR[sec]
1	-1.00	false	false	false	0.000
2	1.00	false	false	false	360.000
3	-1.00	false	false	false	0.000
4	-1.00	true	false	false	0.000
5					

	real 17	boolean 18	real 19	real 20	boolean 21	real 22	real 23	boolean 24	real 25	boolean 26
string	availability	change_entr_spee	entr_loc	entr_new_speed	change_exit_speed	exit_loc	exit_new_speed	write_position	step_width	write_proctimes
1	100.00	true	2.00	3.00	true	4.00	1.00	false	-1.00	false
2	85.00	false	1.00	0.20	false	1.40	2.00	false	1.00	false
3	100.00	true	0.20	1.00	true	0.20	1.00	false	-1.00	false
4	100.00	false	-1.00	-1.00	false	-1.00	-1.00	false	-1.00	false
5										

Write Button

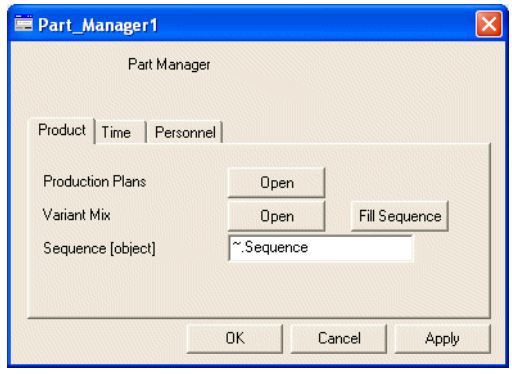
Click this button to write the values from the table, which you may have changed, back to the object.

Note: Note that not all columns are valid for all objects. Often the cells in columns which do not apply contain the value -1.

PartManager

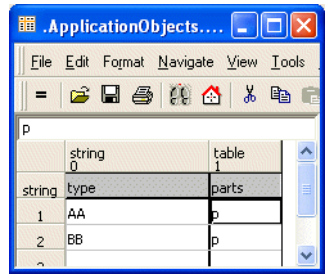
The *PartManager* manages the parts lists which the assembly sections *Assy_Work* use. The *Source SourceN* connects the *PartManager* with the MUs. The source attaches a type-dependent parts list to each part as an MU attribute.

Tab Product

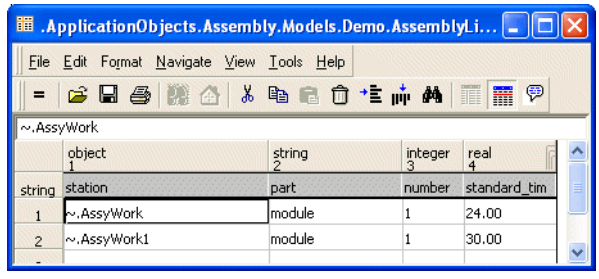


Production Plans

Enter the production plans for the individual part types into this table.



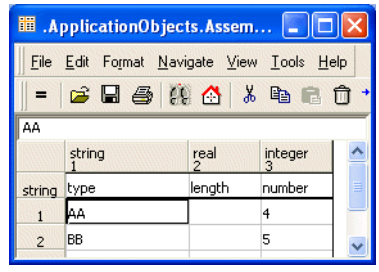
Enter the part types into the column **type**. Enter an identifier of your choice into the column **parts**. This creates a subtable into which you enter values relating to the production plan for the respective part type.



- **station**: Enter the paths to the assembly sections on which the mounting parts are attached.
- **part**: Enter the names of the mounting parts into the cells of this column.
- **number**: Enter the number of the attached parts of the mounting part here.
- **standard_time**: Enter the time it takes to attach a mounting part into the cells of this column.

Variant Mix

Click Open to open a table in which you define the variant mix. The objects load the production sequence from this table. It contains information about which and how many part types have to be created. In addition you can enter a length for each part type.



- type: This column contains the part type.
- length: Enter the length of the part here.
- number: Enter the associated number into the cells of this column.

Fill Sequence

Click Fill Sequence to transmit the values of the variant mix into the variants table of the object *Sequence´*.

Sequence

Enter the path to the *Sequence* object here.

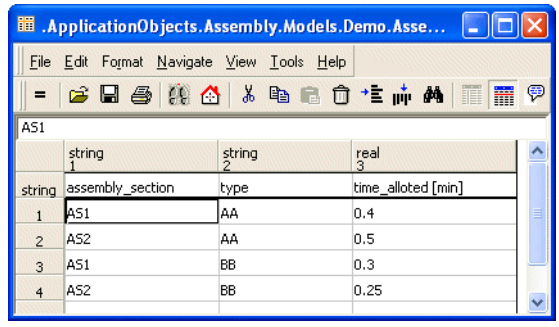
Tab Times

Section Times and Mapping

You can use these tables as an interface to external data sources, for example to MS Excel. After the data has been loaded into this table, the data can be transmitted into the table of the production plans. This is especially helpful when you are working with large amounts of data.

Section Times

Enter the time which each part type requires in each assembly section.



	string 1	string 2	real 3
string	assembly_section	type	time_alloted [min]
1	AS1	AA	0.4
2	AS2	AA	0.5
3	AS1	BB	0.3
4	AS2	BB	0.25

- assembly_section: Enter the name of the assembly section here. This name can be any identifier for the assembly section. You will map it to the simulation objects under mapping below.
- type: Enter the part type into this column.
- time_alloted: Enter the allotted time for the part type here.

Mapping

In this table you will map the external identifiers of the assembly sections and the object in the model. Click *Fill Mapping* to enter all *Assy_Work* objects of the model into *Mapping* table.

	string 0	object 1
string	external_name	object_path
1	AS1	*.ApplicationObjects.Test_Modelle.AssemblyLine.Demo3.AssyWork
2	AS2	*.ApplicationObjects.Test_Modelle.AssemblyLine.Demo3.AssyWork1
3		

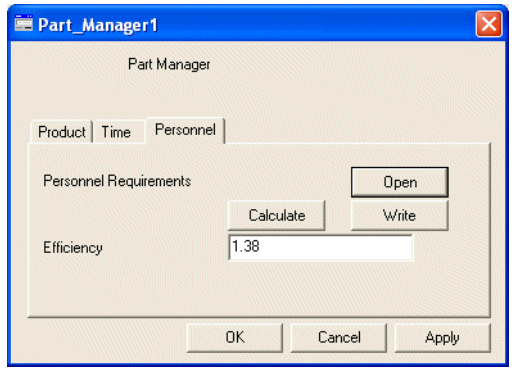
- external_name: Enter the external name of the assembly section here.
- object: Enter the object of the model here.

After you filled in the tables Section Times and Mapping, you can click Fill Prod Pl to fill the table with the production plans.

Global Cycle Time

Enter the global cycle time here. The program needs this value to determine the required number of staffers for each assembly section.

Tab Manpower Requirements



Calculate the Required Number of Personnel

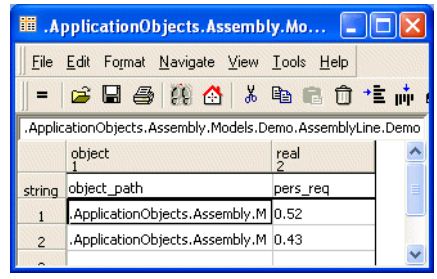
The program only calculates the required number of staffers when the above tables have been filled in. It is calculated as follows:

The mean allocated time will be calculated for each assembly section. The calculation takes into account how often the part types have been created as well as the lengths of the allocated times for the individual part types (section times).

Depending on the global cycle time the program calculates the required number of staffers.

Write Required Number of Staffers.

Click this button to write the calculated values back into the assembly section.



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Siemens PLM Software, a division of Siemens Automation and Drives (A&D), is a leading global provider of product lifecycle management (PLM) software and services with 4.6 million licensed seats and 51,000 customers worldwide. Headquartered in Plano, Texas, Siemens PLM Software's open enterprise solutions enable a world where organizations and their partners collaborate through Global Innovation Networks to deliver world-class products and services. For more information on Siemens PLM Software products and services, visit www.siemens.com/plm.

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