3D in Plant Simulation

1. Facilitate Modeling in 3D
2. Improve Your Visualization
3D in Plant Simulation

1. Facilitate Modeling in 3D
   - Use the Keyboard
   - Lock Graphic Groups
   - Visualize States with LEDs
   - Configure the Inside and Outside Representation

2. Improve Your Visualization
Use the Keyboard

- Edit objects and graphics:
  - Move on the plane with ←→↑↓
  - Move vertically with Ctrl+↑↓
  - Rotate with Ctrl←→
  - Open the 3D Properties dialog with Ctrl+3
- Accelerate with ⌘ (Shift):
  - Move 1m instead of 0.1m
  - Rotate 15° instead of 1°
  - Step into a structured graphic with + and back with –
  - Show or hide the grid with Insert

Lock Graphic Groups

- Use cases:
  - You have assembled the graphics for an object and want to make sure that they aren't accidentally modified.
  - Large layout graphics are in the way when you want to navigate through your scene.
- Solution:
  - In version 12.1, you can lock graphic groups:
    - A locked graphic group blends into the background regarding its selection behavior, meaning that it is treated by all interactions as if it doesn't exist.
    - You can now easily navigate through your scene, select objects by drawing a frame, and so on – the plant layout won't be touched or even selected.
Visualize States with LEDs

In 3D, states are now visualized with automatically generated LEDs. They
- may either be
  - horizontally arranged (like in 2D)
  - vertically arranged with a pillar
  - or removed
- can be positioned and scaled according to your individual default graphics.

It is preferable to adjust states in the class, not in the instances!

Configure the Inside and the Outside Representation (1)

The inside representation consists of …
- Graphic groups that are marked as internal
- The state group if generated
- The outside representation of contained 3D objects (simulation objects and animatable objects)

The outside representation consists of …
- Graphic groups that are not marked as internal
- The state group if generated
- If Show Content is set, in addition:
  - Graphic groups that are marked as internal
  - The outside representation of contained 3D objects, except those that are explicitly hidden
Configure the Inside and the Outside Representation (2)

**Seen from the inside**

- Visible graphic groups
  - External graphics*
  - Internal graphics

**Seen from the outside**

- State group
- Contained objects
  - not hidden from the outside representation
  - hidden from the outside representation

* For modeling purposes, external graphic groups can be temporarily shown. You can modify this setting for each window separately and it is not stored in the model.
3D in Plant Simulation

1. Facilitate Modeling in 3D

2. Improve Your Visualization
   - Import Realistic Graphics
   - Optimize Graphics
   - Create a Fence
   - Create a Storage Rack
   - Animate Walking Humans

Import Realistic Graphics

Use the Ribbon Command
- Click *Import Graphics* in the 3D category *Edit*.
  (Accelerator: Alt 3EI)
- Open the file you want to import.

Drag and Drop a File
- Open a Windows Explorer.
- Select the file you want to import.
- Press the *left mouse button*, move the mouse over to the 3D window and release the mouse button.
- In the 3D window move the graphics at the mouse pointer to the desired position and *click the left mouse button*.
- If you have several graphic groups into which you can import the graphics, a selection dialog opens that allows you to select one.

SimTalk:  _3D.importGraphic(_..._)

© Siemens AG 2015
### Supported File Types for Importing Graphics

<table>
<thead>
<tr>
<th>File Type</th>
<th>File Extensions</th>
<th>Exported by (amongst others)</th>
</tr>
</thead>
<tbody>
<tr>
<td>JT</td>
<td>.jt</td>
<td>Solid Edge, NX, Plant Simulation, Teamcenter Visualization</td>
</tr>
<tr>
<td>Parasolid</td>
<td>.x_t .xmt_txt .x_b .xmt_bin</td>
<td>Solid Edge, NX, MicroStation, SolidWorks</td>
</tr>
<tr>
<td>VRML</td>
<td>.wrl .vrml</td>
<td>Blender, Teamcenter Visualization</td>
</tr>
<tr>
<td>PLMXML</td>
<td>.plmxml</td>
<td>Teamcenter Visualization</td>
</tr>
<tr>
<td>STEP</td>
<td>.stp .step</td>
<td>AutoCAD, SolidWorks</td>
</tr>
<tr>
<td>IGES</td>
<td>.igs .iges</td>
<td>AutoCAD, 3D Studio Max, Creo</td>
</tr>
<tr>
<td>Catia V4</td>
<td>.exp .model</td>
<td>Catia</td>
</tr>
</tbody>
</table>

### Problem
You import a large graphics file and everything starts to slow down and performance becomes sluggish.

### Possible Solution
Optimize your graphic.

- If you want to split off **animatable objects**, subdivide the object first, then optimize the parts.

- Compare the graphic complexity before and after an optimization:
  - The number of **nodes** mainly affects your **CPU**
  - The number of **polygons** mainly affects your **GPU**
  - It is preferable to optimize class graphics, not object graphics!

**SimTalk**: `3D.optimizeGraphic(...)`  
**Accelerator**: Alt 3EO
Create a Fence

Create a fence … … and modify it.
Insert a closed rectangular fence and specify its dimensions and materials:
Remove parts of its graphic structure to make room for doors:

Create a Storage Rack

Create a storage rack … … and modify it.
Insert a storage rack and specify its dimensions, subdivisions and materials:
Remove parts of its graphic structure to adjust it to your needs:
In version 12.0, we added fully prepared walking humans for our workers. Simply exchange the graphic of your worker class:

- TransportContainer.s3d
- TurningMachine.s3d
- VerticalDrillingMachine.s3d
- VideoTest.s3d
- WashingMachine.s3d
- Worker_Jack_5.s3d
- Worker_Jack_15.s3d
- Worker_Jill_5.s3d
- Worker_Jill_15.s3d

Accelerator: Alt 3EX

Thank you for your attention!

Dipl.-Inf. Peter Komarek
Dipl.-Inf. Angela Rösch

Siemens PLM Software