GraphWorX64
3D Objects Quick Start

APPLICATION NOTE

October 2015

Description: Guide to working with 3D objects in GraphWorX64 displays.
General Requirement: Basic understanding of 3D space and graphics.

Introduction

A 3D object in GraphWorX64 enables an all-around visualization of an asset. This Application Note aims to guide you through adding and using 3D objects in GraphWorX64.

Adding a 3D Space

By default, a GraphWorX64 display is two dimensional only. When you want to add 3D objects, you must first create a 3D space that can contain these objects. The 3D viewport is such a space container.

1. Click on the

button in the Shapes section of the Home tab of the ribbon.
2. The mouse cursor should become a crosshair.
3. Click anywhere in the GraphWorX64 display and drag to a desired size for the 3D space.
4. You can expand the size of the 3D space anytime by double clicking outside the 3D space (so that 8 selection squares are around it) and dragging its corners.

Adding a primitive 3D object

1. Double click on the 3D space.
2. The ribbon should update to look like Figure 1.

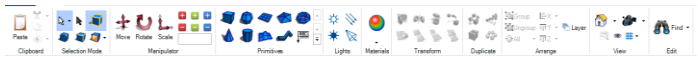

Figure 1 - GraphWorX64 3D Ribbon

3. Click on any of the primitive 3D objects in the Primitives section of the ribbon as shown in Figure 2.

Figure 2 - Primitive 3D objects

4. The selected primitive will be added to the middle of the 3D space.

Moving a 3D Object

1. Select the 3D object that you wish to move.
2. Hit 'W' or click on the **Move** button in the Manipulator section of the ribbon.
3. Arrows indicating the axes will appear on the object as in Figure 3.

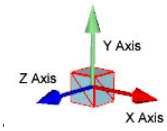

Figure 3 - Movement axis indicators

4. Left click, hold, and drag on any of the axis arrows to move the object along that axis.
5. For more precise movements, the following keys can be used:
   - Left/Right arrow keys to move along the X axis
   - Up/Down arrow keys to move along the Y axis
   - Pg-Up/Pg-Down to move along the Z axis (make sure Num Lock is off)
   - For free movement, hold the middle mouse button and drag to move the object anywhere in the 3D space

Rotating a 3D Object

1. Click on the 3D object you wish to rotate
2. Hit 'E' or click on the **Rotate** button in the Manipulator section of the ribbon.
3. Lines around the object indicating the axes will appear on the object as in Figure 4.

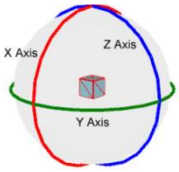

Figure 4 - Rotation axis indicators

4. Left click, hold, and drag on any of the axis lines to move the object around that axis.
5. For more precise movements, the following keys can be used:
   - Up/Down arrow keys to rotate around the X axis
   - Pg-Up/Pg-Down to rotate around the Y axis (make sure Num Lock is off)
   - Left/Right arrow keys to rotate around the Z axis

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- For free movement, hold the middle mouse button and drag to rotate the object along any of the axes

Scaling a 3D Object

1. Click on the 3D object that you wish to scale.
2. Hit 'R' or click on the **Scale** button in the Manipulator section of the ribbon.
3. Lines indicating the axes will appear on the object as in Figure 5.

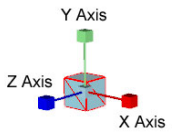

Figure 5 - Scaling axis indicators

4. Left click, hold, and drag on any of the axes to scale the object along that axis.
5. Left click, hold, and drag the middle square to scale the object proportionally.
6. For more precise scaling, the following keys can be used:
   - Left/Right arrow keys to scale along the X axis
   - Up/Down arrow keys to scale along the Y axis
   - Pg-Up/Pg-Down to scale along the Z axis
   - For free scaling, hold the middle mouse button and drag to scale along any of the axes

Materials of a 3D Object

Materials are the colors or images that are wrapped around a 3D object. You can apply a solid color as the material or a picture that resembles a brick wall to make your object look like it's made of bricks. Applying a material allows you to create more realistic objects.

1. Click on the 3D object whose material you wish to change.
2. Click on the Materials tab on the ribbon. The ribbon should look like Figure 6.

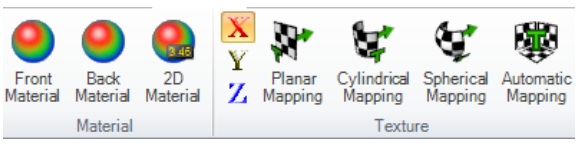

Figure 6 - Materials ribbon

3. Click on the **Front Material** button in the Material section of the ribbon to change the outer color or image of the object. Click OK.
4. Click on the **Back Material** button in the Material section of the ribbon to change the inner color or image of the object. Click OK.
5. Click on the **2D Material** button to add ActiveX components and other 2D elements to faces of the object.
6. After clicking on **Front Material** and **Back Material**, you can click on any of the color boxes to change its property:
7. Diffuse color changes the main color or image for the object.
8. Ambient color changes the color of the ambient light on the object.
9. Emissive color changes the color of the light emitted by the object.
10. Specular brush changes the color reflected on the object at certain angles.

Mapping of Images

1. Images or textures are applied to a 3D object by way of mapping. Different mappings would result in different ways of putting the texture on the object.
2. You can apply an image as a material of a 3D object.
3. With the object selected, click on any of the mappings in the Texture section on the Materials tab as shown in Figure 7.

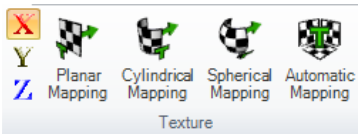

Figure 7 - Texture mapping

4. Here are the definition for each of the objects:
   - Planar Mapping: maps a texture on one plane
   - Cylindrical Mapping: maps a texture around a cylinder
   - Spherical Mapping: maps a texture around a sphere
   - Automatic Mapping: maps a texture automatically based on the object
   - X, Y, Z indicate along what axis you want to apply a particular mapping. If you choose Automatic Mapping, the axis selection will not make any difference.

Size Dynamics

1. Click on the 3D object you wish to add a size dynamic.
2. Click on Dynamics on the ribbon. The ribbon should look like Figure 8.

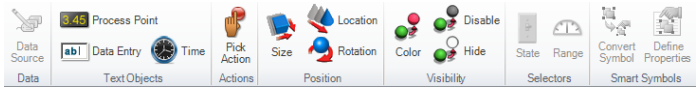

Figure 8 - Dynamics ribbon

3. Click on the **Size** button in the Position section of the ribbon to add a size dynamic.
4. The properties of the size dynamic show up in the dynamics list for the object which is at the right by default.
5. Click on **Data Source** and click on the button to launch the Data Browser.
6. Select a data source and click OK.
7. The low and high limits dictate the range of values that this dynamic will be active.
8. Select the animation mode that you would like in the **AnimationMode** field:
   - Analog – Size of object depends on the data source values.
   - Discrete – Size of object does not depend on the data source values. Data source merely starts or stops the animation.
9. Specify the start and end percentages of the actual size of the object.
10. Click on the **SizeMode** drop-down and click on any of the axis arrows to indicate the direction of the animation. You can select more than one arrow. When you are done, click away from the dropdown box.
11. For discrete animations, the following fields apply:
    - Duration – duration of animation from start percent to finish percent
    - ReverseAnimateWhenFalse – reverse the animation when dynamic becomes inactive
    - AutoReverse – reverse the animation automatically after its forward iteration is finished
    - RepeatCount – number of times to repeat this dynamic while its active

NOTE: If you do not see some of these objects, check that you are in the advanced application mode.

Location Dynamics

1. Click on the 3D object that will have the location dynamic.
2. Click on the **Location** button in the Position section of the ribbon.
3. The properties of the location dynamic show up in the dynamics list for the object, which is at the right by default.
4. Click on **Data Source** and click on the button to launch the data browser.
5. Select a data source and click on OK.
6. The low and high limits dictate the range of values that this dynamic will be active.
7. Click on **Path3D** and click on the dropdown button to choose a way to specify the 3D path for the object. The choices are "Edit Path On-Screen" and "Edit Path Vertex Values". Click on "Edit Path On-Screen".
8. In the 3D space, you should see something like Figure 9.

Figure 9 - 3D Path of Object

9. The transparent mirror of the selected object is the target location of the dynamic. Move it just as you would a primitive 3D object.
10. Click anywhere on the red line to add a location point. A sphere will appear with movement arrows.
11. Move the sphere to the desired location just as you would a primitive 3D object.

Rotation Dynamics

1. Click on the 3D object that will have the rotation dynamic.
2. Click on the **Rotation** button in the Position section of the ribbon.
3. The properties of the rotation dynamic show up in the dynamics list for the object, which is at the right by default.
4. Click on **Data Source** and click on the button to launch the data browser.
5. Select a data source and click **OK**.
6. The low and high limits dictate the range of values that this dynamic will be active.
7. Specify the rotation direction in the 'Clockwise' field.
8. Specify the start and end angles, in degrees, of the rotation range.
9. Specify the axis to rotate on in the 'Axis3D' field.
10. The pivot offset X, Y, and Z fields dictate the pivot points of rotation for this object. The object will rotate around these pivot points.
11. The pivot point is shown initially as a sphere in the middle of the object, as in Figure 10. Move it just as you would any primitive 3D object.

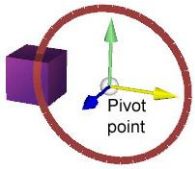

Figure 10 - Pivot point

Color Dynamics

1. Click on the 3D object that will have the color dynamic.
2. Click on the **Color** button from the Visibility section of the ribbon.
3. Specify the data source.
4. Specify the values for the necessary color dynamic fields, like StartColor and EndColor.
5. A description for each item shows up at the bottom of the Properties window after you select the item.

Disable/Hide Dynamics

1. Click on the 3D object that will have the disable or hide dynamic.
2. Click on the **Disable** or **Hide** button from the Visibility section of the ribbon.
3. Specify the data source and when the object should be disabled or hidden based on the value of the data source.