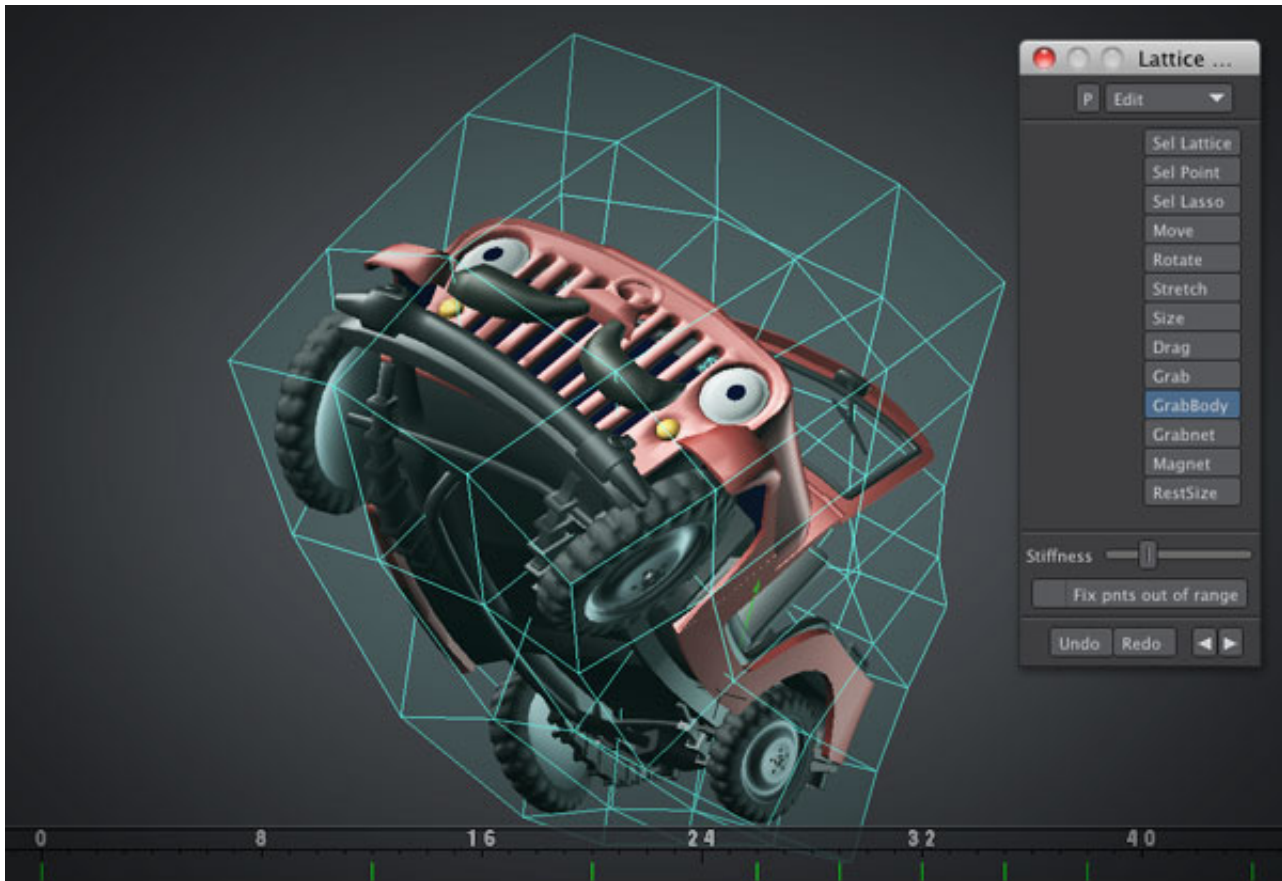## What is Lattice Deformer

Lattice Deformer is a very simple and powerful animation tool that allows you to distort and animate your object under the influence of the lattice. With lattice editing tool, as if by touching real thing, you can intuitively edit the lattice by grabbing, stretching, rotating, distorting. This deformer is suitable for animation of inanimate objects, such as cars and buildings, and also for perspective control.

Plug-ins

This tool consists of the following four plugins:

3PS_LatticeDeformer (Custom Object)

creates a lattice in a scene. Because it is automatically added into a scene by ”**Lattice Add**” command, you don't have to use the Add Custom Object pop-up menu on the Geometry Tab of the Object Properties Panel to apply this custom object plugin to an item.

3PS_LatticeDeformer (Displacement)

deforms the object under the influence of the lattices in the same group by referring to the lattices.

3PS_LatticeDeformer_Tool (Layout Tool)
opens the Lattice Tool panel, which allows you to edit the existing lattices in the current scene.

3PS_LatticeDeformer_Add (Layout Command)
adds a new lattice into the current scene.

Controls

3PS_LatticeDeformer_Tool (Layout Tool)

Properties button `P` - opens the Options panel for the currently selected lattice.

Tool Menu - Editing modes are as follows:

Sel Lattice - selects or deselects the lattices that you want to edit. You can select or deselect the lattices by left-clicking and also add more lattices to the existing selection by right-clicking. In this mode, you can also cancel your lattice selection by clicking in the blank space on this tool panel.

Sel Point - selects or deselects the points of the selected lattices. You can select or deselect the points by left-clicking and also add more points to the existing selection by right-clicking.

Sel Lasso - lasso-selects or lasso-deselects the points of the selected lattices.

When no points are selected, every point of the selected lattices is considered selected and is affected by editing. If points are selected, only the selected points will be affected by editing. You can also cancel your point selection by clicking in the blank space on this tool panel.

Move - moves the whole or selected control points of the selected lattices.

Rotate - rotates the whole or selected parts of the selected lattices. The center of the effect is the initial point of dragging.

Stretch - stretches the whole or selected parts of the selected lattices. The center of the effect is the initial point of dragging.

Size - scales the whole or selected parts of the selected lattices.

Drag - moves a control point of the selected lattice.
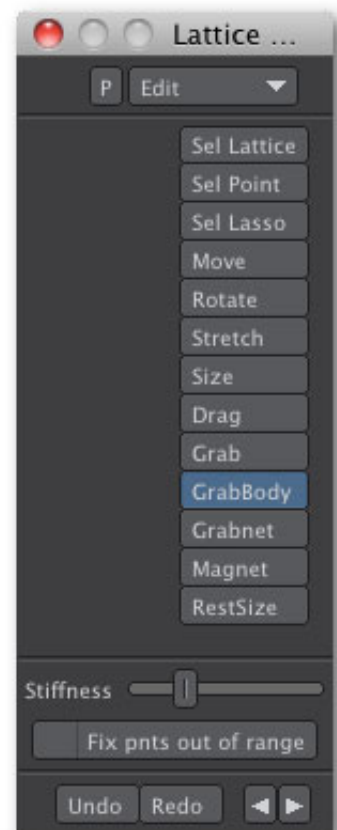
Grab - grabs and moves the surface of the selected lattice you clicked on. The center of the effect is the initial point of dragging on the surface. Control points within the brush's influence area will be affected.

GrabBody - grabs and moves the surface of the selected lattice you clicked on, in a similar way to **Grab**. The only difference is that this mode will try to maintain the volume of the lattice, and its retention rate is determined by the **Stiffness** value.

Grabnet - grabs and moves the surface of the selected lattices. **Grabnet** is similar to **Grab**, except that all of the selected lattices will be affected.

Magnet - smoothly moves control points within the brush's influence area in screen space. The center of the effect is the initial point of dragging.

RestSize - resizes the rest size (the initial size of a lattice at the time it is rested) of the currently selected lattice. You can adjust the XY rest size by left-clicking and adjust the Z rest size by right-clicking.

In **Grab**, **GrabBody**, **Grabnet**, and **Magnet** modes, you can graphically adjust the brush size by right-clicking and dragging out a circle.

Stiffness - causes the lattice to roughly maintain its own volume in **GrabBody** mode. The more the slider is moved to the right, the stiffer the lattice is. In other words, it will try to maintain the volume of the lattice much more strongly. However, too stiff lattices may be broken when you bend them. In contrast, the more the slider is moved to the left, it allows much more stretch of the lattice.

Fix pnts out of range - If checked, the control points out of the brush's influence area will be considered not selected, and they are not affected at all, that is, they are fixed at the current positions while you are clicking and dragging the mouse.

Undo/Redo - can undo and redo almost all of the changes you made to your lattices. This tool has its own undo/redo mechanism in Layout. The undo/redo stack will be retained during having the tool panel open as long as there is enough free space in RAM, and it will be cleared when the tool closes.

Left/Right Arrow Buttons ◄ ► - Clicking on the left arrow button will jump to the previous keyframe in the timeline for the currently selected lattices, and clicking on the right arrow button will jump to the next keyframe.


Edit Drop Down Menu `Edit ▼` - The commands in this menu are as follows:

Set Zero-Key - creates a keyframe that has no displacement value at the current time.

Create Key - creates an interpolated keyframe at the current time.

Delete Key - removes existing keyframes. This will remove a keyframe if one exists at the current time. If the selected (highlighted) time range exists in the timeline, all of the keyframes within the time range will be removed. In other cases, all the keyframes of the selected lattices will be removed.
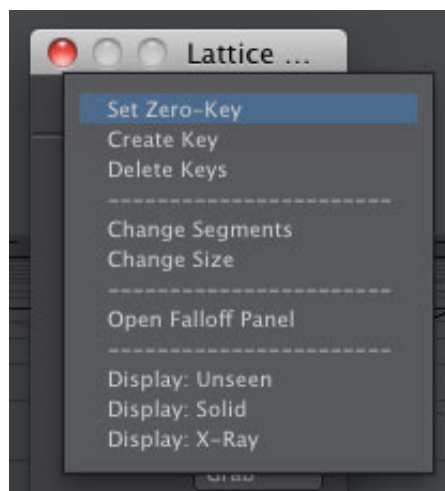
Change Segments - changes the number of segments in the currently selected lattice. Immediately after changing, the displacement values of all the keyframes are interpolated.

Change Size - changes the rest size of the currently selected lattice. Immediately after changing, the displacement values of all the keyframes are interpolated.

Open Falloff Panel - opens LightWave-style falloff setting panel. Here you can change the falloff setting for the influence area of the brush.

Display: Unseen - The Display mode of every lattice in the current scene is changed to **Unseen**.

Display: Solid - The Display mode of every lattice in the current scene is changed to **Solid**.

Display: X-Ray - The Display mode of every lattice in the current scene is changed to **X-Ray**.

Independent Timeline

This tool has its own independent timeline. When you open this tool by clicking on the **Lattice Tool** button, the timeline appears at the bottom of the viewport window, which allows you to edit keyframes for the current lattices in various ways, such as shifting keyframes by left-clicking, copying keyframes by right-clicking, removing keyframes, switching between linear and smooth interpolation settings, and quickly jumping to the previous or next key.

You can scroll the timeline by left-clicking and dragging at the top of the timeline.

A key can be moved by clicking and dragging the key itself directly in the timeline.

You can select (highlight) a desired time range by right-clicking and dragging at the top of the timeline. If keys are highlighted, all of the keys within the highlighted time range can be shifted, removed, and copied together by clicking and dragging any one of them.

Dragging and dropping the keys out of the timeline will remove the keys themselves. There is no problem even if you remove necessary keyframes by mistake. You don't need to worry about making mistakes because you can also undo the changes made in the timeline by clicking on the **Undo** button.
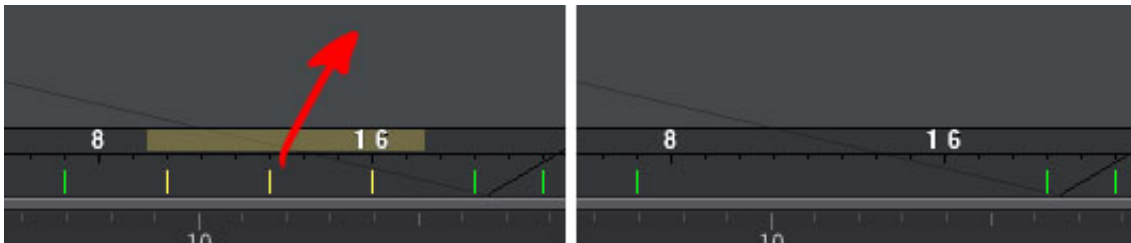
There is the **L** button at the right of the timeline. This button allows you to switch between the types of interpolation of the keyframe at the current time. If On, the shape motion of the lattice will be interpolated linearly between the keyframes. If Off, smoothly. Off by default. The left and right arrow buttons have the same functions as the tool panel's.

3PS_LatticeDeformer (Custom Object)

Display - has the following three visibility options:

> **Unseen** - makes the lattice invisible.
> **Solid** - The lattice is drawn the same way as the solid object. If the lattice is placed behind or inside an object, it will be hidden behind the polygons of the object. If it becomes a problem for you, try switching this to **X-Ray**.
> **X-Ray** - The lattice is drawn in front of all the objects existing in the scene. The whole lattice can always be seen through objects.

Selected Color - The lattice is colored with this color when selected in lattice editing mode or when the **Lattice Tool** is not open.

Unselected Color - The lattice is colored with this color when unselected in lattice editing mode.

Opacity - specifies the lattice's surface opacity.

Group Name - The lattice is grouped by this name. To deform your object with the lattice, the lattice deformer applied to the object must be given the same group name as the lattice.

Weight Map - You can also specify a weight map, which determines how much each point of objects will be affected by the lattice. If points are assigned a weight of zero, those points will not be affected at all by the lattice. If a weight of 100 percent, they will be affected, completely 100 percent.

3PS_LatticeDeformer (Displacement)
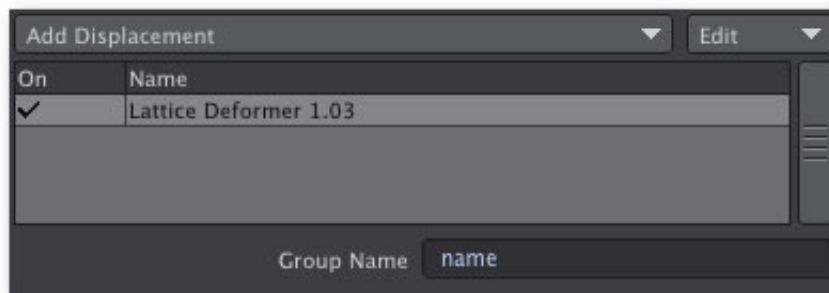
Group Name - The lattice deformer (3PS_LatticeDeformer Displacement plugin) refers to the lattice items (3PS_LatticeDeformer Custom Object plugins) given the same **Group Name** as this to deform the object.
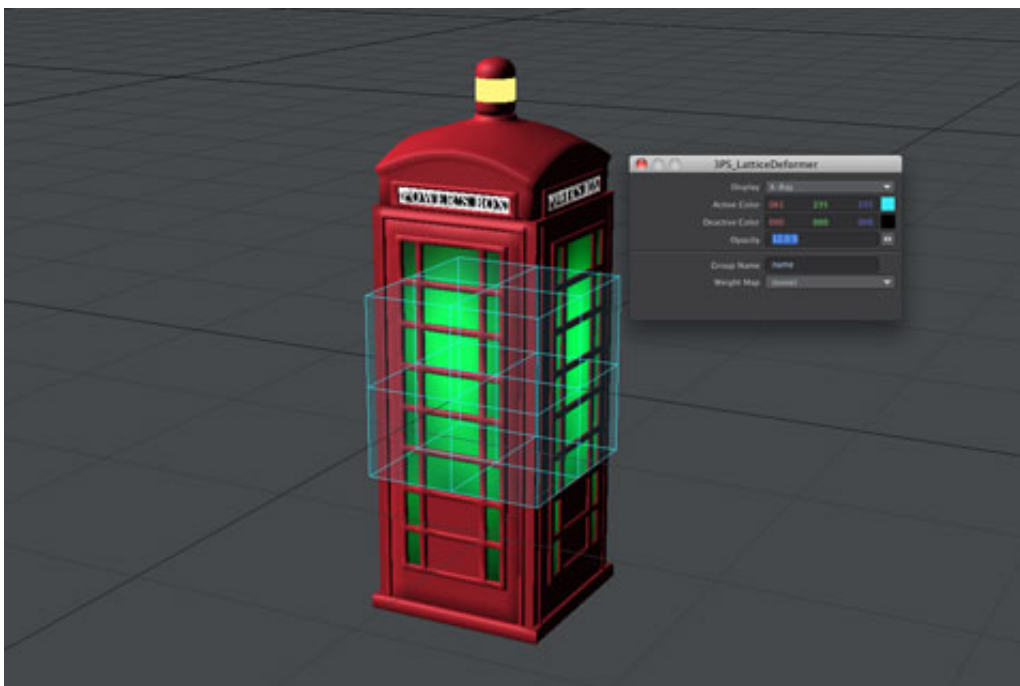
Example:

In Layout, we've loaded the "Spacecraft.lwo" file found in the content. The spacecraft object has appeared in front of us, which is very cool and looks strong. Let's distort this with a lattice.


We've used **Lattice Add** command to add a new lattice into our scene. Immediately after that, the options panel for the lattice has been automatically opened. We've made sure the **Group Name** field shows the default group name of "**name**", and then we'll accept the defaults and close the panel.

To parent the lattice to the spacecraft object just in this example, we've switched to the **Schematic View**, and then we've selected the lattice item and clicked on the spacecraft object while holding the Ctrl key down. If we want to animate the object within the lattice, we should parent the object to the lattice.
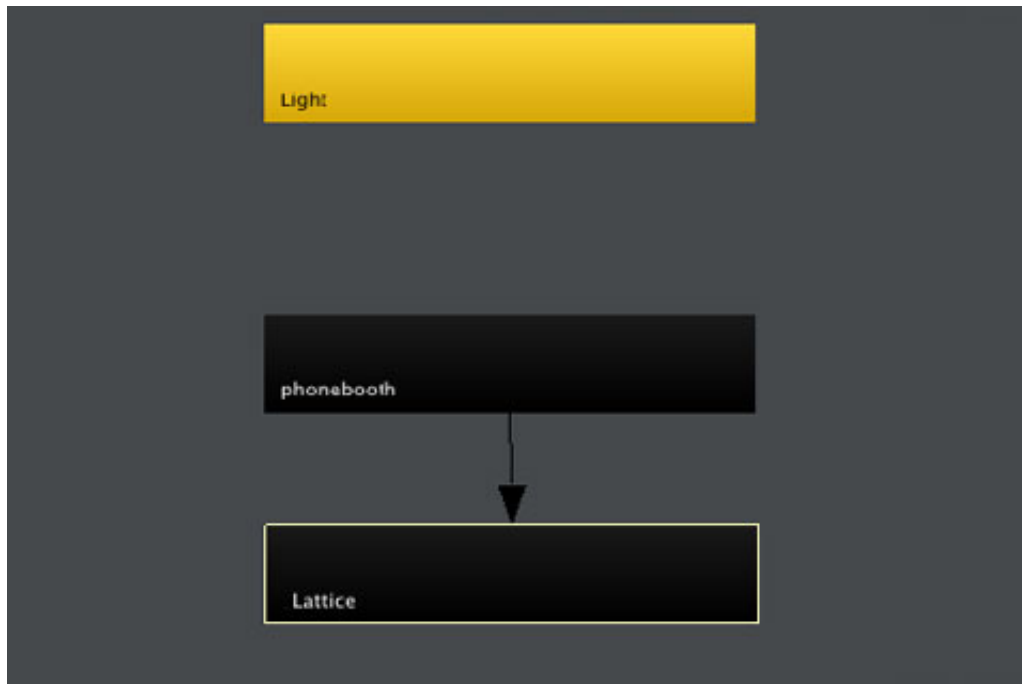

We've made sure we are currently in Object Edit mode because this tool can only open in Object Edit mode. Then we've entered lattice editing mode by clicking on the **Lattice Tool** button in the Toolbar menu. We'll choose **Sel Lattice** on the lattice tool panel and click the lattice to make it editable in the viewport.
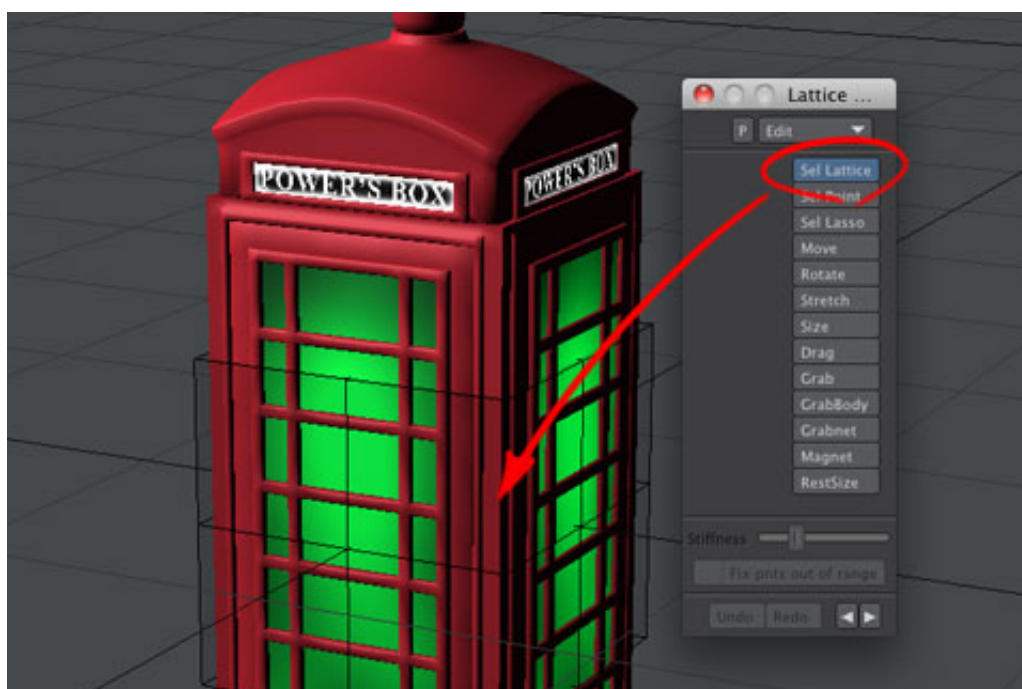
We've switched to the **RestSize** mode to fit the lattice to the spacecraft object. Now we can adjust the XY rest size by left-clicking and adjust the Z rest size by right-clicking.
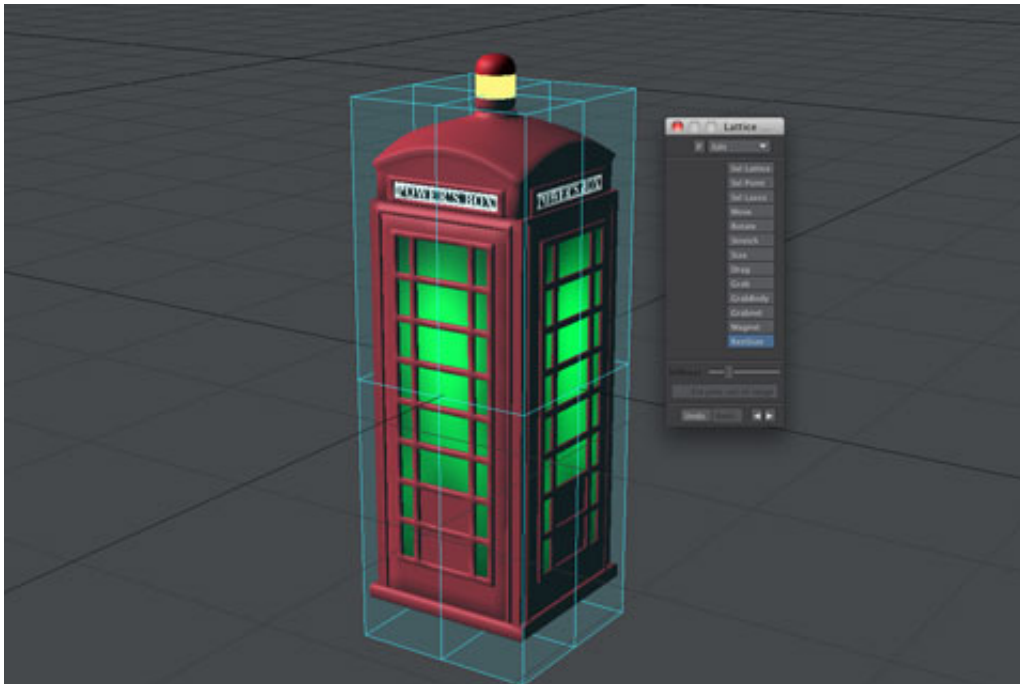

We'll tap the spacebar or close the tool panel to get out of lattice editing mode for a short time, and we'll adjust the Y position of the lattice item to fit the lattice to the object. It is not recommended to use other tools or commands with the Lattice Tool panel open.
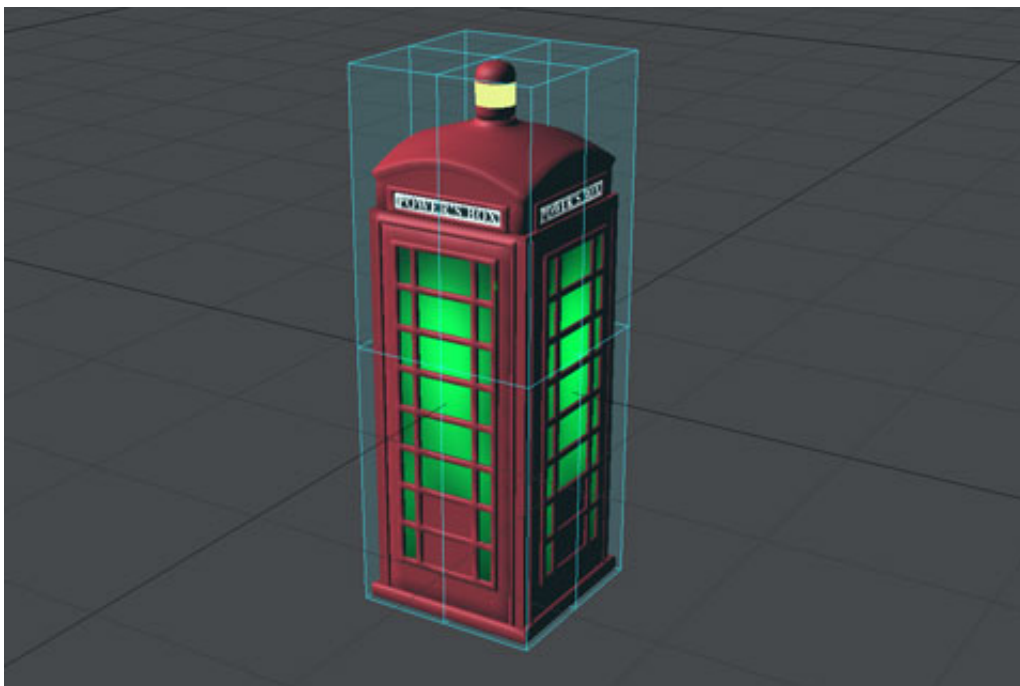
After adjusting the Y position of the lattice item, we've entered lattice editing mode again and selected the lattice. We can also change the XYZ rest size of the lattice by choosing the **Change Size** command from the **Edit** drop down menu. The dimensions shown in the following image, a width value of **1.05 m** in X, a height value of **3 m** in Y, and a depth value of **1.05 m** in Z, are best in this example.
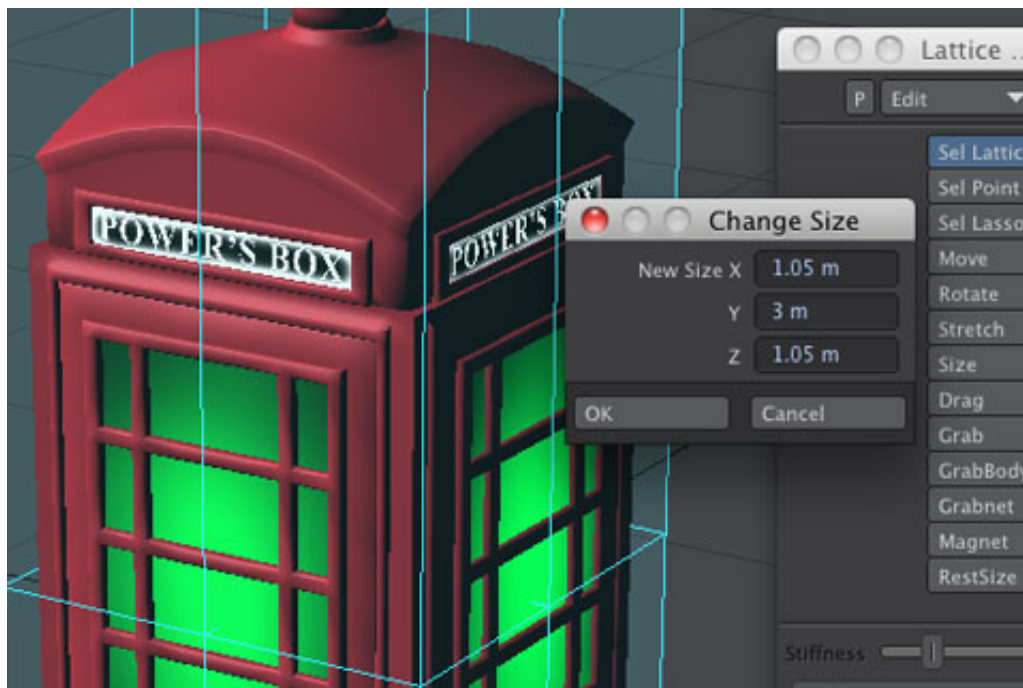

To give the lattice a minimum desired resolution by changing the number of segments, we've chosen the **Change Segments** command from the Edit drop down menu, and we've set X to 2, Y to 6, and Z to 2.
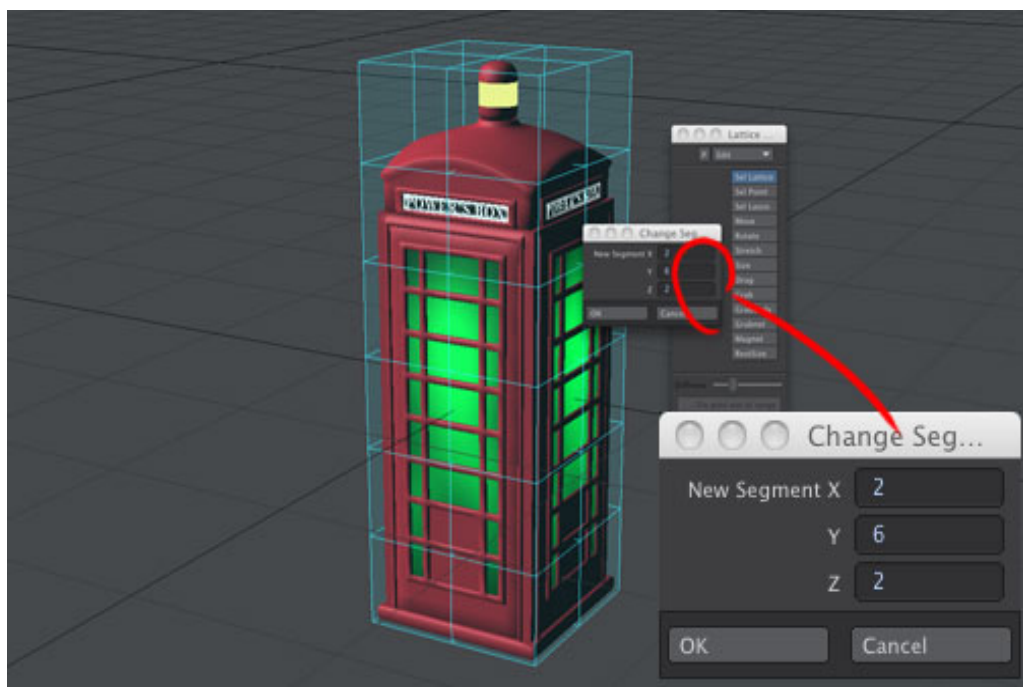
To apply a lattice deformer plugin to the spacecraft object, we've opened the Object Properties panel and chosen "**3PS_LatticeDeformer**" from the Add Displacement pop-up menu on the Deform Tab. Basically, its **Group Name** text field needs to be typed the same group name as the lattice to tie the deformer to the lattice, but we've accepted the default group name of "**name**" without changing it because they both have already become the same.
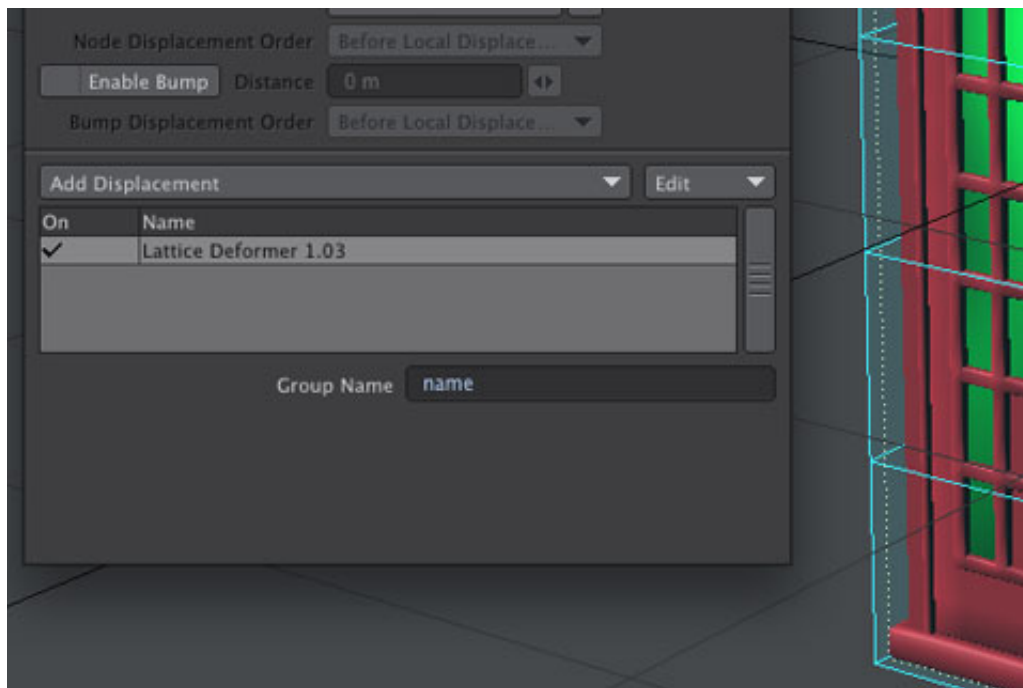
We've moved the **Stiffness** slider to the middle and chosen **GrabBody** to deform the spacecraft object with the lattice. Then, after making the diameter of the brush slightly smaller than the height of the lattice by right-clicking and dragging, we've left-clicked on the upper part of the lattice and dragged the mouse left. As you see in our viewport, the spacecraft was distorted just like a clay model as if it had been drawn into a hyper space!
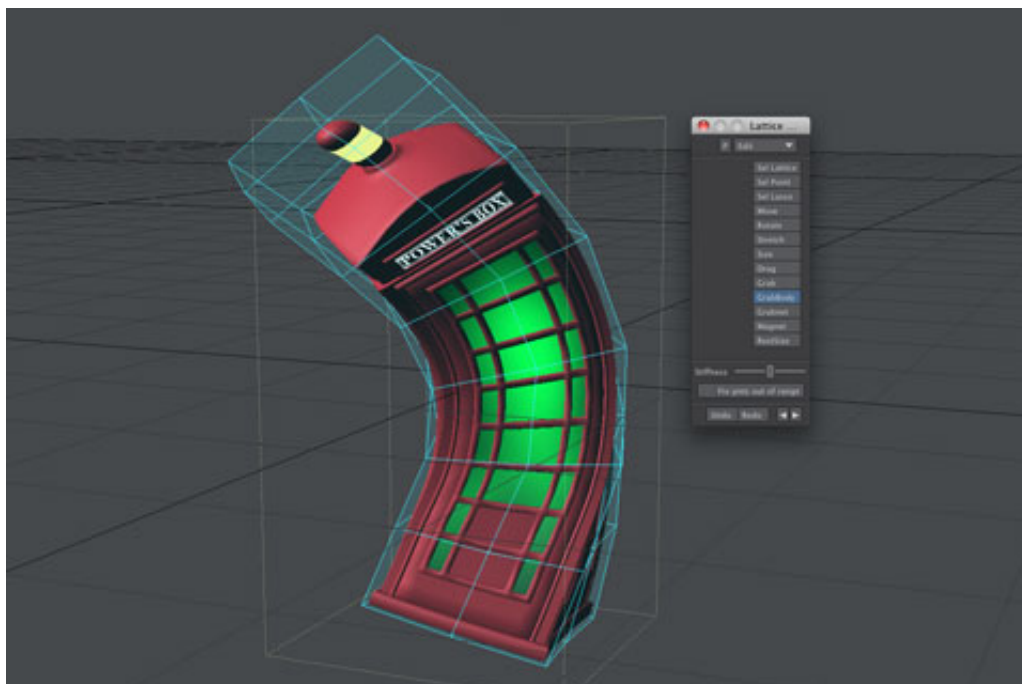
Now, let's enjoy animating this spacecraft freely, just follow your heart and senses.