



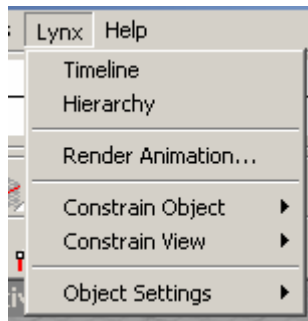
Bongo Tutorial

There are three main tools you have to access and manage animations:

- The **Bongo Menu**
- The **Timeline**
- The **Animation Manager**

Bongo menu

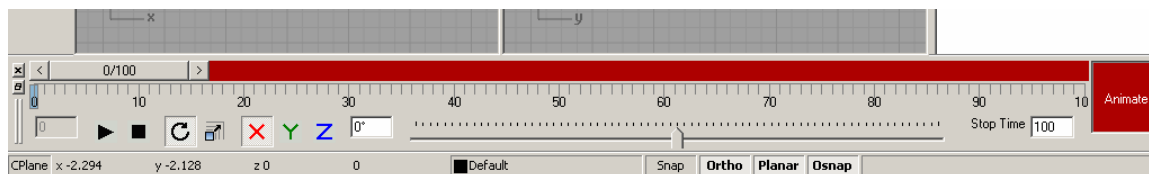
The first tool is the Bongo *menu*. When Bongo is loaded you will see a Bongo menu added to the Rhino menu bar.



This menu you can use to activate other parts of Bongo and access animation specific command.

Timeline

The second tool that you will want to become familiar with is the *timeline*. The timeline controls the timing of the animation and lets you coordinate movement during an animation. The *Transformation Slider*, located in the lower half of the timeline is the tool you use to rotate and scale objects during animations. This short tutorial will focus mainly on the Timeline and Transformation Sliders.



Timeline.

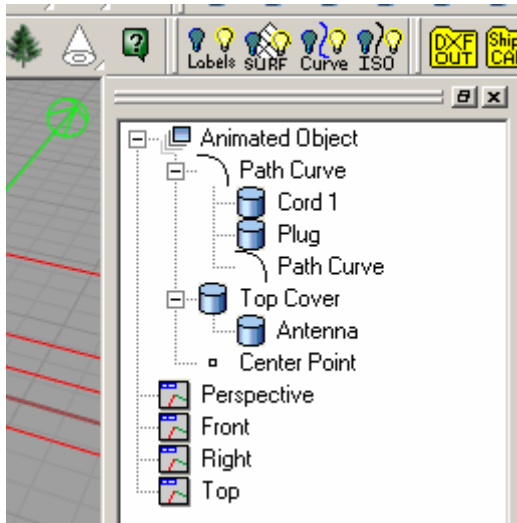
To activate the Timeline

- ▶ From the **Bongo** menu, select **Timeline**.



Animation Manager

The third tool is the *Animation Manager*. The Animation Manager is a view of the relationship between the objects you are animating. As your animations get more sophisticated, you will use this control to add relationships between object that will make controlling animations much more efficient.



Hierarchy window.

To activate the Animation Manager

- ▶ From the **Bongo** menu, select **Animation Manager**.

Moving and Rotating Objects

The first animation we will make is the assembly of a flashlight. To see the animation we are trying to create, open the file **Flashlight.avi**. The flashlight starts in the closed position. Exploding the lens assembly and moving the batteries out of the light are animated.

To create the animation

- 1 Open the model **Flashlight start.3dm**.
- 2 From the **Bongo** menu, select **Timeline**.

The timeline measures time in the number of frames. The gauge and the numbers along the timeline represent the number of frames in the animation. By default Bongo will use 100 frames. The Timeline Slider above the timeline controls the current time in the animation that you are working on.

The first part of the flashlight we will animate is the lens cap.

- 3 Click the **Animate** button.
The timeline will turn red.
- 4 Set the **Timeline Slider** to frame **50**.



- 5 Drag the lens and the lens cap to the right.

This tells the animation that at frame 50 you will want the lens to be at that point. Bongo will fill in from frame 0 to 50 how much the lens needs to move to get to that point.

- 6 Click the **Timeline Slider** and drag it back and forth along the timeline.

This is called *scrubbing*. The lens cap will slide back and forth with the timeline.

Now, that the lens cap is moving, let's also move the batteries out. Since in the animation the lens moves first, then the batteries, the batteries will move later in time than the lens cap movement.

- 7 Put the **Timeline Slider** at **100**.

- 8 Drag the batteries to the right to their final location.

- 9 **Scrub** the Timeline Slider back and forth. You will notice that the batteries start to move immediately on frame 0 – we want them to start moving on frame 50.

- 10 Select the batteries.

- 11 Drag the red **Keyframe Marker** at frame 0 to frame 50 (a small '+' will appear to indicate you are copying the keyframe)

Now you should see the lens cap move, then the batteries.

The final part of this animation is to get the lens cap to rotate onto the flashlight body.

To rotate the lens cap

- 1 Slide the **Timeline Slider** until the lens is almost touching the flashlight body.

You can adjust the view to help you see better.

- 2 Once at that frame, click the **Rotate** button to the left of the **Transformation Slider**.

- 3 Make sure the X-rotation axis is selected and slide the **Transformation Slider** all the way to the right.

When you scrub the **Timeline Slider** back and forth now, you should see the complete animation.

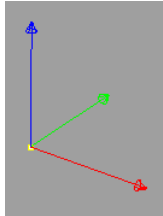
Tools to create and control animation

Transformations



Pivot points

Pivot points are the point around which objects will move, rotate, or scale. It is also the point at which objects are linked together when hierarchies between objects are made. Pivot points can be grouped with an object, or can be animated independently. Most of the time you will want to locate pivot point at the joints or connections between objects.



Create

Pivot points are automatically created once an object is animated. You can also insert Pivot points using the **BongoPlaceProxyPoint** command. Pivot points created automatically will be placed in a default position. The default position for most objects is the center of the bounding box of the object. For blocks the default position is the insertion point of the object.

Move

After a pivot point is created it may be moved using the **BongoMovePivot** command.

Orient

You may re-orient the rotation of a pivot point by using **BongoChangePivotPlane** command. Here you pick the direction of the x-axis and y-axis of the pivot point. The y-axis currently is the main axis of rotation.

Size

To set the size that the pivot point displays, from the **Tools** menu, select **Options**. Click **Bongo** in the Document Properties and change the Pivot Size..

Transformations

Once you have established a pivot point, you can apply transformations to animate. With Bongo you can transform both objects and views. Objects can be moved, rotated, scaled and driven along a path.

Move

To move an object, just drag the object to the new location.

Rotate

Scale



Path

Standard

Look At

Look Along

Animating Views

Hierarchies

You can add relationships between object using bongo. These relationships take the form of forward kinematics.

Parent Child Relationships

Using Pivots and Parent Child

Creating simple Geometry for control

Animation Glossary

Animate button

Anytime you would like to start an animation, you need to click the **Animate** button. When this button is depressed, the timeline will turn red. This means that any transformations will now be used in the animation you are create.

Animation formats

Keyframe

Animated objects have a few key positions which define how you want object to act during an animation. These key positions are called *keyframes*. Bongo will fill in the movements in between those keyframes to create a smooth animation.

Object keyframes for are displayed as small red boxes in the timeline.

View keyframes are shown as yellow rectangles under the timeline. To edit a keyframe, right-click it. To delete a keyframe, drag it off the timeline. To reposition a keyframe drag it to a different location on the timeline.



Frame

An animation is a series of still images that when played one after another create the illusion of movement. Each still image is a *frame*.

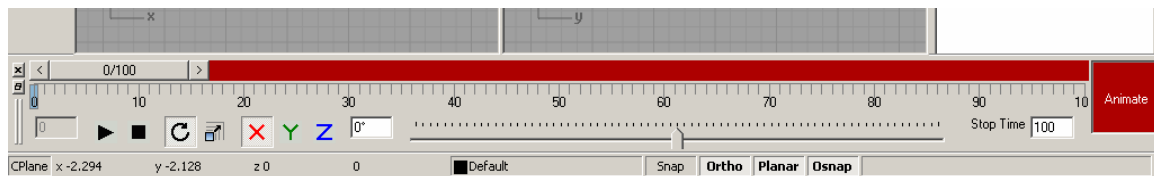
Frame rate

The speed at which you replay the still frames in an animation is called the *frame rate*. It is measured in frames replayed per second. For a smooth animation, 20 frames per second is a good rule of thumb. Motion pictures use 24 frames per second. Visio can use up to 30 frames per second. Depending on what you are showing and how it is being shown, you may find that lower frame rate of 10-15 frames per second may be acceptable.

Scrubbing

Moving the Timeline Slider along the timeline to see the animation.

Timeline



Timeline slider

The Timeline Slider shows the position of the current animation. The Timeline Slider denotes the current frame and the total number in the animation. The gray box under the Timeline Slider graphically shows the position of the slider