Chapter 9- Animation Basics

Timing, Moving, Rotating and Scaling

Now that we know how to make stuff and make it look good, it’s time to figure out how to move it around in your scene. Another name for an animation is Interpolation (Ipo). Remember this term because Blender uses the Ipo name in many different window areas to relate to animation features. This is a big area with lots of things we can do and talk about. Many of the features available will become understandable with practice and by getting beyond the basics. This is a highly developed area in Blender therefore new features will more than likely be available before this document can ever be printed. For this reason, we will deal with the basics. The first thing we need to do is go back and re-read the section on Rendering and Animation Basics (pages 2-3).

Current Frame- You can change the current frame by holding down the “Shift” key and LMB clicking in the box. You can then type in a new number and will go to that frame. You can also use the “Arrow Keys” to move along the timeline. Up/Down arrows move 10 frames at a time, Left/Right arrows move 1 frame at a time.

Frames Per Second (fps)- set this to an adequate number. NTSC is 30 fps.

After you set up your scene and set the Frames/Second in the render button area, consider what you want your “actors” to do and how long they should take to do it. One of the problems that beginner animators experience is making the motions occur in an appropriate time. Remember to look at your frames/second when animating and relate it to time. For example, if you want something to take 3 seconds to make a complete “walk around circle” on the screen and you are running at 25 fps, you need to complete the animation in a total of 75 frames.

Moving, Rotating and Scaling:

These are the 3 basic modifiers to use on an object in animation. When you create keyframes in Blender with these modifiers, Blender will figure out all the inbetween locations on the other frames. To insert a key on an object, go to the frame where you wish to place the key, move, rotate or scale the object, then press the “I” key to “Insert Key”. Make sure your cursor is in the 3D window when you push the “I” key. The menu to the right pops up. You have 3 main options for now- Loc (location), Rot (rotation) and Size (size or scale) and combinations of these. We’ll talk about the Mesh option in a later chapter. Select the key option of what you’ve done to the object. Now, advance to the next frame where you want to put a key (i.e. frame 25 if you want a movement to occur after 1 second), move, rotate or size the object, then press “I” to insert another key.
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Continue placing keys along your timeline to create your animation. For the most part, location and size keys work flawlessly, but care needs to be given to rotation keys. If you try to rotate an object too far in one set of keys, the object may not rotate in the exact direction you want it to. It may rotate oddly. Try small angular steps while animating rotation keys. There are ways to control this better and tools to simplify this process that will be discussed later.

Viewing Your Animation:

There is a simple way to view your animation without having to render out a movie. Take the current frame number to the place where you want to start viewing the animation. Place your cursor in the 3D window you wish to view your animation and press the “Alt” and “A” keys together. The animation will play in the 3D window where your cursor is located. Blender will attempt to display the movie at the correct frames-per-second, but may be unable to do so due to scene complexity or image settings (solid or wireframe -Z key).

Movement may not be exactly how you planned it. Blender automatically defaults to trying to create a smooth flow through the keys you’ve place. This can be changed and will be discussed later.

Working With The IPO Window:

Animation is difficult to do without some basic knowledge of the IPO Window. If you are working in a split 3D window screen (as previously discussed), change the right hand viewport to the IPO Curve Editor Window Type. In this window you will see your animation represented in a graphical form. Location, Rotation and Size X,Y, Z tracks are displayed. You can zoom in/out and pan in this window with the center mouse wheel. You can also select a track and press the “Tab” key to edit individual keys on the timeline.

Right now, you are looking at the Object’s animation keys, but you can animate a lot of different things in Blender, including materials and world settings. To view the different types of animation tracks, select the “Ipo type” window.

To animate material and world settings, place your cursor down in the buttons window while in the world or material settings. Press “I” to insert keys. You will see a variety of options available to you.
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As mentioned before, when you create an animation for an object, Blender automatically tries to “smooth” the path of animation through your key points. You have ways of controlling the results of the path. One way is to click on the path(s) you want to modify in the IPO window and, with the cursor in the IPO window, type “T” for type. You have 3 options:

- **Constant**: Gives a square waveform, like turning it on and off. No smooth flow.
- **Linear**: Takes a straight path from point “A” to point “B”. Solves problems of animations swinging way out of where you want it to go, but jerky motion at key points.
- **Bezier**: The default type which tries to make the motion through the points smooth.

*Every application may require a different type and can be frustrating to work with until you get some practice.*

There is another way to keep the bezier type, but control the flow. It requires you to go into the track in **edit** mode and adjust vertices on the graph individually. First, select the track you wish to modify (Loc, Rot, Size- X, Y, or Z) and press the “Tab” key to go into track edit mode. **When you do that, each key will be displayed as 3 points.** By grabbing (“G” key) an end of the “3-point spline”, you can move and size it to get a different flow through that point. This technique requires some skill and practice. Key points can also be moved to different locations using this method (change a key from one frame to another.)

RoboDude Says: If you ever need to start over with an animation, you can erase all the animation tracks in the IPO window and start over. To select all tracks, hit the “A” key once or twice.
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Extended Modes:

When you need to animate something with repetitive motion (wheel spinning, person walking, etc.), you do not need to keep adding keys along the path. All you need to do is create one cycle of the motion you want to duplicate, find the animation path in the Ipo window you wish to duplicate, then select “Curve” from the menu. In the flyout menu, find “Extend Mode” and select the type you want. It will then duplicate the motion along the path. Again, experiment with the various types. Use “Extrapolation” to show circular motion like a wheel turning. “Cyclic” would be good for a walking or swinging motion.

Automatic Object Keyframing:

I have noticed problems in the last two releases with the Auto Keyframing option in the top “User Preferences“ menu. The alternate method for activating Auto Keyframing is to create an additional viewport somewhere on your screen and change the Window Type to Timeline. In this viewport, you will see standard play, rewind, fast-forward buttons along with a Red, Record button. By pressing the red button and selecting “Add/Replace Keys”, every movement will be recorded to an IPO. You will not need to press the “I” key. Start by moving, rotating or sizing in frame 1 (or wherever you want the animation to start), change to your next keyframe location and move, rotate or size again. Continue down the timeline as needed. Go back to the beginning and hit “Alt-A” to see the animation.

RoboDude Says: Remember to turn off Auto Keyframing when you don’t need it on. It’s too easy to mess up your animation! Also, remember that Blender can UNDO (Ctrl-Z), but Blender will not remind you to save your work. Save your file and save often!

This section dealt with basic object animation. Deforming meshes, following paths, creating bone structures (armatures) and creating child-parent relationships will be discussed later. Animation can be a frustrating thing to perfect. Practice is the best way to learn it and by asking questions.
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Animating Materials, Lamps and World Settings

Now that you know the basics of animating objects, we can now look at some of the things we can animate in materials, lamps and worlds. First, we select the object or lamp we want to create an animation effect on, then go to the appropriate lamp or material buttons, with the cursor in the buttons window, press “I” to insert key, and select our option.

Material Animation Options:

- **RGB**: Color can be animated to change.
- **Alpha**: Transparency of an object can be animated.
- **Halo Size**: A halo can grow or shrink in an animation. Setting a Halo to zero will make it fade out or in completely.
- **Offset**: If a texture has been applied, it can appear to move on the object in an X, Y and/or Z direction.
- **Size**: The X,Y,Z size of a texture on the object can be animated.
- **All Mapping**: Use this to set all possible adjustments in one step.

Lamp Animation Options:

- **RGB**: Color can be animated to change.
- **Energy**: The intensity of the lamp can be changed and even set to zero to go on or off.
- **Spotlight Size**: The angle of the spotlight beam can be sized during animation. Go from wide to narrow beam or vice-versa.
- **Offset**: If a texture has been applied to the lamp (yes, an image or movie can be projected), it can appear to move on the beam in an X, Y and/or Z direction.
- **Size**: The X,Y,Z size of a texture on the lamp can be animated.

World Animation Options:

- **Zenith RGB**: Color of the zenith (top) can be animated. Great for simulating sunsets.
- **Horizon RGB**: Color of the horizon (bottom) can be animated. Again, great for simulating sunsets night scenes.
- **Mist**: Fog effects can be animated for interesting effects.
- **Stars**: Star effects can be animated.
- **Offset**: If a texture has been applied to the world, it can appear to move on an X, Y and/or Z direction. Great to show cloud movement.
- **Size**: The X,Y,Z size of a texture on the world can be animated.

RoboDude Says: Remember that animations can be seen in the Ipo window by changing what types of Ipos are seen in the window!
Open your “Landscape Scene” file and go to your scene buttons. It’s time to animate our “dark and stormy night”. We will start by making the correct setting to do a movie. First, review the “7 Easy Steps to Creating a Movie” found on page 63. Follow those steps and name the output movie file as “Stormy Night.mpg”. Also set the End frame to 200. Our movie will be 200 frames long, or 6.6 seconds at 30 fps.

The first thing we plan to animate is the camera. We will do a short, simple movement of the camera coming closer to the shore. In the top view, select the Camera. Make sure the camera is at a good location and does not render any edges of your planes. At frame 1, hit “I” to insert a Loc (location) key. Now use your arrow keys to move to frame 200. Move the camera closer to shore, hit “I” to insert another location key.

The motion doesn’t need to be much. We don’t want the boat moving too fast! Go back to frame 1 and hit Alt-A while your cursor is in the camera viewport. You should see the camera animated. Press Esc to stop playing the animation. Save your file.

Now we’re going to animate the spotlight rotating in the lighthouse. In the top view, select the spotlight. At frame 1, press “I” to insert a Rot (rotation) key. It doesn’t matter at what angle the spotlight is starting at in the animation.
Go to frame 30 (one second) and rotate the spotlight 45 degrees. To do this, type “R” to rotate, then type 45 on the keyboard. Press “Enter” or LMB click. The lamp will have rotated exactly 45 degrees. If you want the lamp to spin the opposite direction, type - after the 45. Use your left arrow key to go back to frame 1. You should see the lamp spin back to it’s original position.

In order to keep the lamp spinning consistently the entire animation, we could attempt to continue along the time line, inserting keys every 45 degrees and 30 frames, but that would get boring very fast. Instead, we will use an Extend mode in the IPO Curve window.

Change the right side window to the IPO Curve window and find the animation track that shows change over time (should be the Rot Z curve). RMB click on the curve to select it. In the Curve menu, select Extend Mode and Extrapolation.

This will cause the curve to extend infinitely in both direction, rotating constantly at that speed. Change this window back to the 3D View window type and press Alt-A to see the animation. The lamp should spin the entire time.
Now it's time to animate the water. We want to create some rolling waves, not too fast or slow. This is a little trial-and-error. I've tried to take some guess work out of the process. To begin, select the Water Plane and go to your Materials buttons. Go to the Map Input tab and find the Ofs (offset) keys for the texture. We will animate the Ofs Z number. Because we used a 3D texture and not an image to create the water effect, it can be animated to give the illusion of motion.

At frame 1, and with your cursor in the materials button area, press “I” and insert an Ofs (Offset) key. This will set the animated offset to zero at frame 1.

Now advance to frame 50 and change the Z Ofs number to 0.1. This will cause the water to “roll” up slightly. Again, with your cursor in the buttons window area, press “I” and insert an Ofs (Offset) key. This will cause the texture offset to roll from frame 1 to 50. Since we can’t really hit Alt-A to see the animated texture in the window, we have to wait until we animate a movie to see the speed and effect. If you place your cursor in the buttons window area and hit “Alt-A” you will see the number changing in the “Ofs Z” block.

Now we need to go to the IPO Curve window to Extrapolate the curve over time. In order to see the material animation curves, we need to change the view of the IPO type from Object to Material. Find the animated curve and select it (should be the Ofs Z curve). Go to the Curve menu, Extend Mode and select Extrapolation. This should extent the curve, just like we did for the lamp.

That’s it for animation for now. We have animated the camera moving, the lamp spinning and the waves rolling. Later, we will add some rain using particles. You can always change to a preview size to animate faster and check your wave effects. Check your movie setting and press Animate in the Scene buttons. Sit back and wait for your movie to animate.

** Call the instructor when finished **